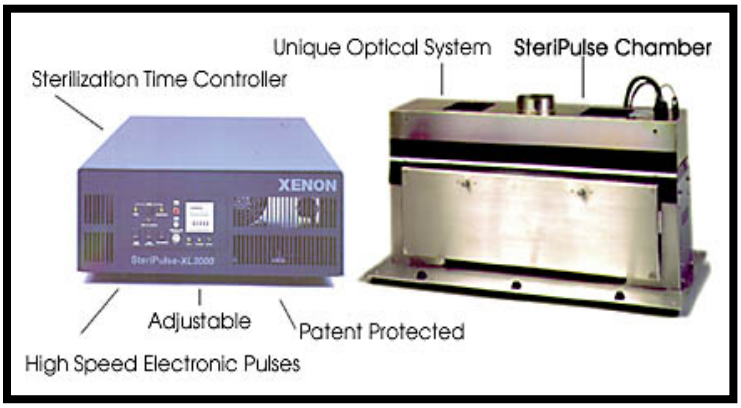
SteriPulse-XL® RS-3000 Sterilization Systems



PULSED UV LAMP
Rapid, high intensity, broad spectrum UV light emitted by the clear fused quartz lamp causes formation of Pyrimidone dimers in DNA, resulting in genetic damage to cells and their ultimate destruction. Types of damage induced by pulsed light are: (a) photolysis; (b) loss of colony-forming ability (death); (c) inability to support phage growth (enzyme inactivation) and (d) destruction of nucleic acid.

APPLICATIONS

- Sterilizing or decontaminating food, medical devices, packaging materials, blood or pharmaceutical products
- Validate operating parameters for inline processing

FEATURES

- R&D Benchtop (Model RS-3000C) and inline processing systems available (Models RS-3000B and RS-3000M)
- Pulsed UV lamp delivers 505 joules/pulse (1.27 joules/cm²)
- Short pulses (360µs width) prevent excessive heat buildup and accomplish sterilization without overheating the product
- Front-panel operator control (Models RS-3000B and RS-3000C) or PLC control (Model RS-3000M)
- No toxic materials, such as mercury or microwaves are involved

GENERAL DESCRIPTION

The SteriPulse-XL Systems are high energy, pulsed UV light sterilization systems that have been shown to completely eradicate microorganisms (1) and provide a higher rate of sterilization than continuous mercury UV exposure. A revolutionary xenon lamp at the heart of the system delivers high energy pulses of UV light that penetrate deeply to achieve unprecedented degrees of decontamination. The pulsed UV light process is environmentally benign since it does not create or use volatile organic compounds (VOCs) or create suspended airborne particulates.

SteriPulse-XL is a registered trademark of Xenon Corporation.
(1) Sterilization and Decontamination Brochure; Xenon Corporation

STERILIZATION CHAMBER

The SteriPulse-XL Sterilization Chamber, with removable Lamp Housing, is detached from the Controller. Ozone is evacuated to ensure EPA ozone level compliance in the workplace. Forced air evacuation is in the range of 1-4 volumes per minute to ensure no heat buildup within the chamber during sterilization. The Chamber does not evacuate air borne pathogens nor introduce air borne pathogens into the Chamber while the system is in the ON cycle. Microbe filters, ozone resistant, are used at both the inlet and outlets of the ventilation path to ensure containment of air borne pathogens. The Chamber has an interlocking door for lockout during the sterilization ON cycle. The door interlock switch is connected with the safety interlock switches in the Controller. The Chamber and insert are made of stainless steel construction for ease of sterilization and disinfection. This construction also insures the Chamber is able to withstand UV light and heat conditions, experienced under normal operating conditions.

Model RS-3000C Sterilization Chamber

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SPECIFICATIONS

All specifications are typical unless otherwise noted ($T_{AMBIENT}$ @ +25C, V_{INPUT} = 208 V_{RMS}, blower operating)

System Components

Controller	Sterilization lamp power and front panel operator controls
Lamp Housing[1]	Lamp Housing with 16" Linear UV lamp
Sterilization Chamber	Lamp Housing mounted on top; access door on front
LiteMark-XL 1000	Lamp intensity monitor; mounted on Lamp Housing
Blower Kit[2]	Provides filtered air to the Lamp Housing to cool lamp
Interconnecting Cables	10-ft Lamp Control cable attached to Lamp Housing
	10-ft High Voltage cable attached to Lamp Housing

Controller - Supplied with Models RS-3000B and RS-3000C

Front Panel Controls	
Timer Power	ON/OFF
High Voltage	ON/OFF
Continuous mode	ON/OFF
Pulse Mode Select	Timed or Continuous
Programmable Timer	1 to 999 seconds in 1 sec intervals
Timed Start	Pushbutton
Output	
Pulse Width	360 µs
Pulse Rate[3]	3 pulses/sec
Electrical Energy	505 Joules/pulse; 1,516 Joules/sec
Mains Line Voltage	200-240 Vrms (±10%), (50/60 Hz), single phase
Line Current	20 ampere @ 50 Hz, 18 ampere @ 60 Hz, maximum
Mains Line Power	2500 W, maximum
Mains Power Cord	8-ft (2.4 meters)
Warm-up time	1 minute
Outline Dimensions	8.0" x 18.5"x 27.0" (203 x 470 x 686 mm) (H x W x D)
Weight	90 pounds (40.8 kg)

Lamp Housing

Pulsed UV lamp	16-inch linear clear fused quartz; non-toxic; mercury free
Radiant Energy	1.27 Joules/cm^2 @ 0.76" (19.3 mm) from window face
Flashlamp Footprint	16" x 1" (406.4 x 25.4 mm)
Reflector Type	Ellipsoid
Mounting Position	May be mounted in any position; cooling must be provided
Air Cooling	Minimum 300 cfm of filtered air at 2.0" water gauge (free flow)
Outline Dimensions	7.5" x 30.0" x 7.0" (190.5 x 762 x 178.8 mm) (H x W x D)
Weight	36 pounds (16.35 kg)

Sterilization Chamber - Supplied with Model RS-3000C

Access Door	Hinged; 18" x 6" (457.2 x 152.4 mm)
Material	Metal grade stainless steel with clear passivate overcoat
Disinfecting Methods	Note 4
Door Interlock	High Voltage disabled at controller when chamber door open
Chamber interlock cable	2-ft (0.6 meters)
Mains Power Cord	7-ftt (2.1 meters)
Outline Dimensions	11.61" x 30.5" x 16.0" (294.9 x 774.7 x 406.4 mm) (H x W x D)
Voltage (includes internal fan)	200-240 Vrms (±10%), (50/60 Hz), single phase, 3 amperes
Weight	57 pounds (25.9 kg)

SPECIFICATIONS

System Environmental

Temperature, ambient	
Rated Performance	0 to +40°C (+32 to +104° F)
Storage	-40 to +85°C
Relative Humidity	10 to 80% @ +40°C noncondensing

Notes

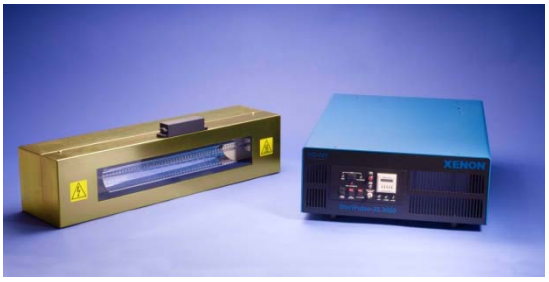
1. Supplied as a stand alone unit (models RS-3000B/M) or mounted on Sterilization Chamber (model RS-3000C)
2. Blower kit includes blower, blower filter, metallic ducting, duct clamps and mains power cord
3. Pulse rate is factory set and cannot be changed by user
4. The sterilization chamber and tray can withstand sterilizing or disinfecting methods such as autoclaving (276°F steam at 30 psi for 30 minutes), glutaraldehyde (Cydex) and/or 7% chlorine bleach disinfectant wash

Specifications subject to change without notification.

MODEL CONFIGURATIONS

The SteriPulse-XL is available in three application specific configurations.

Model RS-3000B is a basic sterilization system offering a Controller unit and a standalone 16" Lamp Housing with Clear Fused Quartz (CFQ) lamp. The Controller provides all power to the Lamp Housing as well as complete operator control of the sterilization process using front-panel controls.



Model RS-3000B Controller, 16" Linear Lamp Housing and LiteMark-XL mounted on housing

Model RS-3000C is a complete benchtop sterilization system with Controller unit and separate Sterilization Chamber containing a 16" Lamp Housing and Clear Fused Quartz (CFQ) lamp. The Controller provides all power to the Lamp Housing as well as complete operator control of the sterilization process using front-panel controls. Safety interlocks are provided to protect the user from exposure from the lamp when the chamber door is open.

Model RS-3000C Controller

Model RS-3000M is a modular system designed for ease of integration into large scale sterilization systems. Units include a Controller, High Voltage Power Supply Module, and a standalone 16" Lamp Housing with CFQ lamp. System control is via a remote PLC.

Model RS-3000M Controller, Power Supply, 16" Linear Lamp Housing and LiteMark-XL mounted on lamp housing

LAMP HOUSING COOLING

The 16" Linear Lamp Housing has been designed for continuous forced air cooling to insure the lamp temperature is maintained during operation. Air volume of 300 cubic feet per minute is required. Light blocking air exhaust filters are provided on the housing. To provide adequate cooling for the Lamp Housing and lamp, a blower kit is available.

This kit includes a blower, mains power cord, air filter, flexible aluminum ducting and hose clamps.

INLINE STERILIZATION SYSTEMS
The SteriPulse-XL RS-3000B and RS-3000M systems can be applied in inline production applications, offering rapid sterilization. Model RS-3000M systems can be configured with multiple Lamp Housings to effectively increase the linear radiation length. The small bore lamp and elliptical reflector provide high peak UV irradiance for deep penetration and high speed sterilization, as well as maximum energy for dose-dependent sterilization. The ability to implement remote Programmable Logic Control (PLC) for timed sterilization (stop and sterilize), permits ease of integrating RS-3000M systems into small and large scale manufacturing systems

LITEMARK-XL LIGHT MONITOR
A useful accessory item that can be supplied with the SteriPulse-XL systems is the LiteMark-XL Light Monitor. The LiteMark-XL Monitoring System is a photo-electric detector module which is factory supplied mounted on a Lamp Housing or Sterilization Chamber to enable the operator to monitor, on a real-time basis, the performance of a flashlamp system during its operating life. Such a capability allows the flashlamp to be changed before the output falls below a predetermined safe minimum. It does this by sensing the light intensity from each flash which is scattered sideways in the Lamp Housing window and relating it to the side-scattered intensity produced by the same flashlamp when new. The side-scattered intensity produced by the new flashlamp is designated as the “100% level”, and the intensity at any later time is compared to that 100% level to produce a percentage value slowly declining from 100% as the lamp continues in use, indicative of the status of the flashlamp at any given time. A correlation chart must be used in conjunction with the LiteMark-XL data to obtain the reduced exposure percentage.

LiteMark-XL Mounted on Lamp Housing

MEASUREMENT OF TARGET INTENSITY
Since the LiteMark-XL detector does not look directly at the flashlamp and is not located at the actual target surface, it does not provide an absolute calibration in joules/cm² of the energy striking that target surface. It does, however, provide an indirect and real-time means of tracking the target surface exposure at any time if the new-lamp exposure value (the “100% level”) has been measured at the target. The correspondence between the actual target surface exposure at any time and the reduced value derived from the LiteMark-XL relative value and the correlation chart will remain in close agreement during the entire effective operating life of the flashlamp.

The starting exposure (the 100% level) at the target surface must be measured with an exposure (joules/cm^2) measuring instrument having a current calibration certification. The instrument calibration certification should cover the spectral range from 200 nm to 3 microns, the nominal transmittance range of the quartz components in the light path, except in cases where narrow-band exposure data is needed. It should be noted that this real time monitoring procedure has taken place without having to interrupt operation to take an irradiance measurement with a radiometer.

DATA LOGGER SYSTEM
The incorporation of the Data Logger System into the LiteMark-XL Light Monitoring System enables the evaluation process to be carried on continuously without the need for operator calculations The Data Logger is a computerized data collection and analysis system which captures, records, processes, stores and prints radiant energy information from any Xenon Corporation Lamp Housing or Sterilization Chamber fitted with a LiteMark-XL Light Monitoring system. The Data Logger interfaces to a personal computer through an Analog-to-Digital Converter (ADC) which is built into the output connector of the Data Logger cable, plugging directly into the computer printer port. The system operator can observe the flashlamp intensity display on his computer monitor as either tabulated data or as a graph. Additionally the operator can input the data into an Excel-style spreadsheet for further processing off-line.

LITEMARK-XL LIGHT MONITOR SPECIFICATIONS

All specifications are typical unless otherwise noted ($T_{AMBIENT}$ @ +25C, V_{INPUT} = +5 VDC)

Accuracy [1]	±10%	
Linearity	±2%	
Linear Output Range	0 - 2 VDC	
Over Range	1% (+2.2 VDC)	
Output Load [2]	10K Ω, max	
Relative Light Intensity Signal [3]	+2 VDC nominal output @ 10KΩ Load	
Decay Time	600 milliseconds	
I/O Interface Connector	DB9F, 9-Pin Sub D socket	
Warm-up Time [4]	1 minute	
Power Input [5]	+5 VDC ± 5%	
	50 milliamps, quiescent	
Operating Environment		
Temperature	0 - 40º C (32 -104ºF)	
Relative Humidity	10 - 80% (non-condensing)	
Outline Dimensions [6]	Height:	1.50" (3.58 cm)
	Width:	6.12" (15.5 cm)
	Depth:	1.41" (3.8 cm)
Weight [6]	7 oz (198 g)	

Notes

1 Tolerance of output voltage relative to light input
2 Protected for shorts to signal ground
3 Factory calibrated setting
4 Initial flashlamp operating time to achieve peak flash output level
5 Not protected for reverse polarity
6 LiteMark-XL only; does not include Lamp Housing or Sterilization Chamber

Specifications subject to change without notification

ORDERING GUIDE

All systems are supplied with UV glasses and User Manuals.

Refer to next section for listing of all items supplied with each system.

Model	Description
RS-3000B-1	SteriPulse-XL Basic System
RS-3000B-2	SteriPulse-XL Basic System with Blower Kit
RS-3000B-3	SteriPulse-XL Basic System with LiteMark-XL Light Monitor
RS-3000B-4	SteriPulse-XL Basic System with LiteMark-XL and Blower Kit

RS-3000C-3	SteriPulse-XL Chamber System with LiteMark-XL Light Monitor
RS-3000C-4	SteriPulse-XL Chamber System with LiteMark-XL and Blower Kit

RS-3000M-1	SteriPulse-XL Modular System
RS-3000M-2	SteriPulse-XL Modular System with Blower Kit
RS-3000M-3	SteriPulse-XL Modular System with LiteMark-XL Light Monitor
RS-3000M-4	SteriPulse-XL Modular System with LiteMark-XL and Blower Kit

Note: RS-3000C Systems are only available with LiteMark-XL, mounted on Sterilization Chamber.

Data Logger System Model	Part Number	Used with SteriPulse-XL System
LM-1411	400-0005	RS-3000B-3, -4 and RS-3000M-3, -4
LM-1611	400-0005	RS-3000C-3, -4

User Manual	Part Number	Supplied With
SteriPulse-XL Controller	810-0076	All RS-3000B, RS-3000C and RS-3000M
16" Linear Lamp Housing and Blower Kit	810-0077	All RS-3000B, RS-3000C and RS-3000M
Sterilization Chamber	810-0058	RS-3000C
LiteMark-XL Light Monitor	810-0075	All RS-3000**X**-3 and -4 Systems
LiteMark-XL Data Logger System	810-0078	All Data Logger Systems

LiteMark-XL Cable (order part number 580-0105)

An optional 16-foot (4.8 meters) I/O cable assembly is available to facilitate quick installation and shielding from external noise. This assembly provides three, 2-pair cables, each having an individual shield. Connection to a monitoring device, such as a PLC, requires the use of two of the three cable pairs provided with cable (+5 VDC power in; 0 to +2 VDC signal out). Cable is provided with Data Logger System.

System Items

The following tables list the items that are provided with each SteriPulse-XL System.

Model RS-3000B-1

Item	Quantity
Controller – provides operator control and power to Lamp Housing	1
16" Linear Lamp Housing	1
16" Linear CFQ, Type C, Flashlamp	1
UV Glasses	1 Pair
User Manual, Controller	1
User Manual, 16" Lamp Housings and Blower Kit	1

Model RS-3000C-3

Item	Quantity
Controller – provides operator control and power to Lamp Housing	1
16" Linear Lamp Housing	1
16" Linear CFQ, Type C, Flashlamp	1
Sterilization Chamber with tray and mains power cord	1
LiteMark-XL Light Monitor (cable must be ordered separately)	1
UV Glasses	1 Pair
User Manual, Controller	1
User Manual, 16" Lamp Housings and Blower Kit	1
User Manual, Sterilization Chamber	1
LiteMark-XL User Manual	1

Model RS-3000M-1

Item	Quantity
PFN/Control Unit	1
High Voltage Power Supply Module	1
2 Meter Control Cable (PFN/Control Module to HVPS)	1
16" Linear Lamp Housing	1
16" Linear CFQ, Type C, Flashlamp	1
UV Glasses	1 Pair
User Manual, Controller	1
User Manual, 16" Lamp Housings and Blower Kit User Manual	1

The following table lists items that are included with RS-3000X-2, -3 or -4 systems as well as optional accessories. (RS-3000**X** designates RS-3000**B** or RS-3000**C** or RS-3000**M** System)

Item	System	Note
LiteMark-XL; Model LM-1410	RS-3000B/M-3 & -4	1
LiteMark-XL: Model LM-1610	RS-3000C-3 & -4	2
LiteMark-XL User Manual	RS-3000X-3 & -4	3
LiteMark-XL Light Monitor 16-foot cable	Option: All Systems	
LiteMark-XL Data Logger System	Option: All Systems	4
LiteMark-XL Data Logger User Manual	All Systems	5
Blower Kit	RS-3000X-2 & -4	

Notes
1 – Supplied mounted on Lamp Housing (RS-3000B and RS-3000M)
2 – Supplied mounted on Sterilization Chamber (RS-3000C)
3 – Supplied with LiteMark-XL
4 – Includes 16-foot cable, analog-to-converter module and software programs
5 – Supplied with LiteMark Data Logger System

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