SINTERON 2000
Photonic Curing R&D System

The SINTERON 2000 provides a high energy, pulsed light for reliable, repeatable sintering of conductive nano particles on heat sensitive materials. The system features a high intensity pulsed xenon lamp that provides a broadband spectrum, from 240 nm to 1000 nm with adjustable pulse energy up to 1500 Joules/pulse.

The SINTERON 2000 offers the flexibility to adjust both the energy delivered to the flashlamp and the pulse width. The pulse width can be adjusted to four different preset values. The energy to the flashlamp can be controlled by setting the voltage on the system. This exceptional flexibility makes evaluating and deploying easy.

For more than 45 years, Xenon has provided high-energy pulsed-light lamps and systems for the production of medical devices, optical storage media, and displays. The SINTERON 2000 can generate pulsed light for photonic sintering of nanoparticle inks on low-temperature substrates and low-temperature curing of thin-film substrates (e.g. organic photovoltaic, OLED displays and multi-layer flexible circuits). Xenon has developed products with extraordinary ranges of power and system flexibility.

Features

- Selectable pulse duration: 572 to 2044 us
- Adjustable pulse energy: 200 – 1500 Joules
- Single pulse sintering
- Sintering area: 1.9 x 30.5 cm

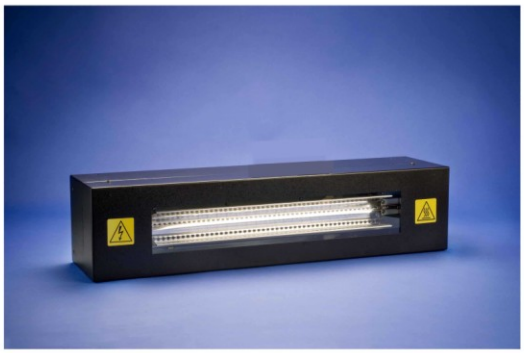
Applications

- Sintering conductive Cu & Ag metallic inks
- Curing thin-film substrates
- Solar
- Surface Modification

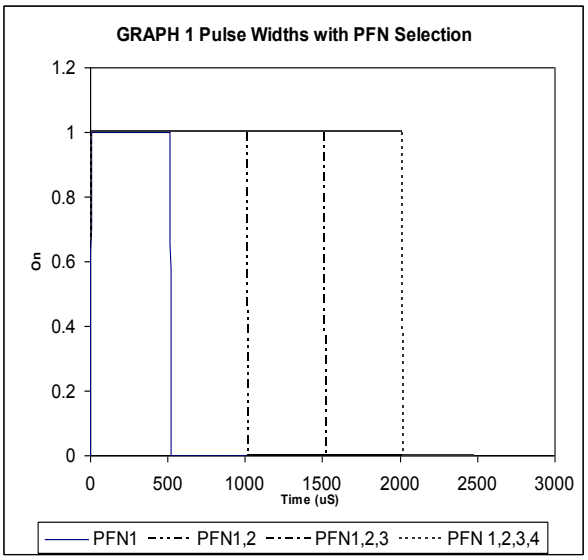
Detailed Description

The SINTERON 2000 is a 19-inch rack unit comprising four bays that house the power supply, the controller and two pulse forming network (PFN) bays containing two PFN each. By allowing easy connections for these PFN stages, different pulse periods can be configured. Graph 1 shows the four different pulse widths that can be selected.

EQUIPMENT RACK

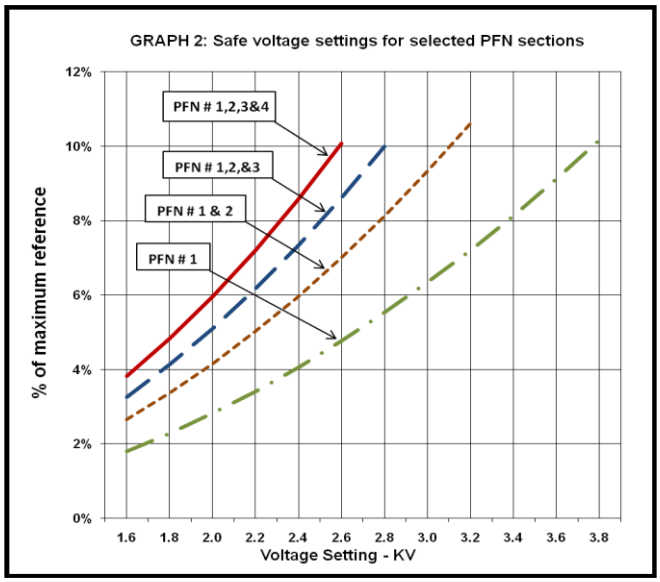


LAMP HOUSING WITH FLASHLAMP

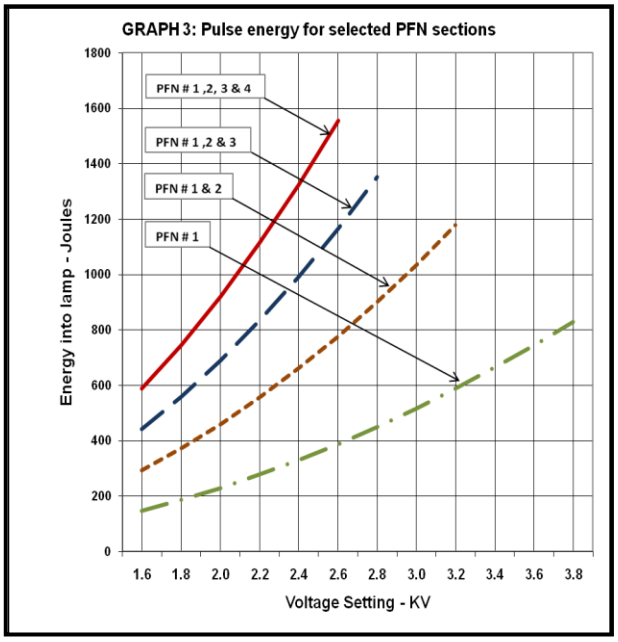


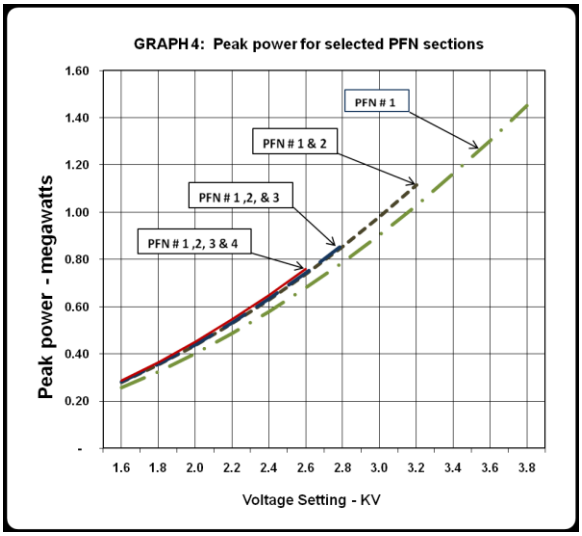
Once the pulse duration has been selected, the voltage can be adjusted by a dial on the controller bay. An LED display shows the voltage set. Care must be taken to ensure that the voltage set is within the safe operating range for the lamp.

Graph 2 illustrates the range of voltages that are recommended for each PFN setting.

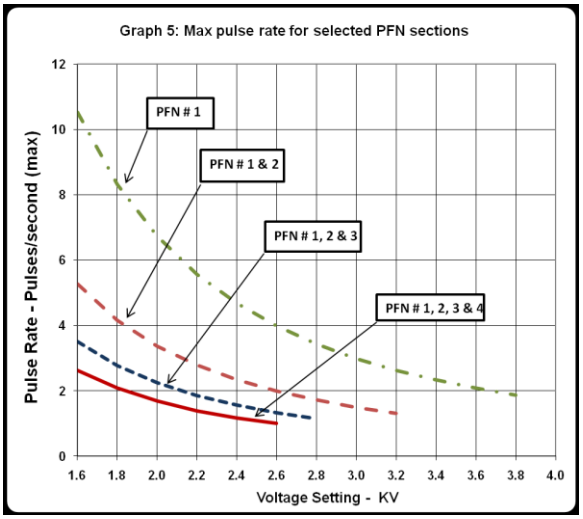


The energy into the flashlamp can be controlled by adjusting the voltage and pulse duration. Graph 3 illustrates the electrical energy into the flashlamp for the four PFN settings based on voltage setting. Graph 4 shows the variation in peak power for these settings in megawatts.





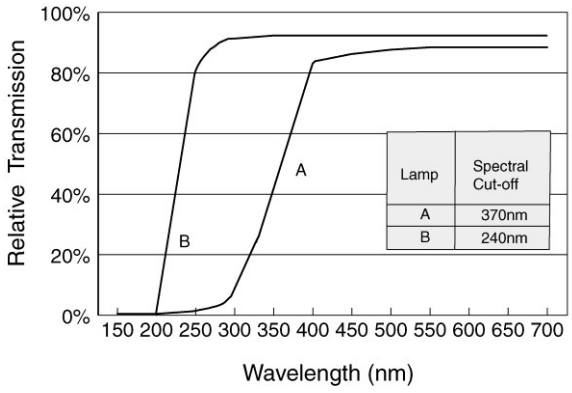
The controller bay includes the timer module to turn on and trigger the lamp. External triggering and control is also possible at the rear of the unit. Two BNC connectors are available for monitoring voltage and current during operation. Graph 5 illustrates the range of pulse rate for each PFN setting



The SINTERON 2000 includes circuit breaker emergency-stop and interlocks for safety. It also has LED indicators on the PFN modules to indicate presence of power. For user safety, ensure that the PFN LEDs are OFF and the power is switched OFF before opening the rear of the rack unit to configure the circuit. There is 8U spare rack space in the SINTERON 2000 for expansion and other equipment.

Lamp Spectra

The Xenon flash lamp produces a broadband spectrum suitable for materials that absorb UV light from 240nm to 1000nm. Lamps are available with two different spectral cut-offs, as illustrated in graph 6, producing unique wavelength properties suitable for specific types of substrate materials. Both lamps are ozone-free.



Graph 6 – Spectral cut-off wavelengths

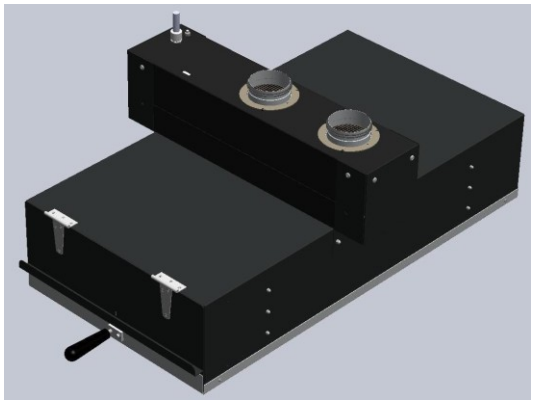
Selecting a Lamp

Selection of lamp is based on the relative size of the nano material and the characteristics of the substrate. Table 1 provides a guide to assist in selecting the flash lamp type. The pulse energy shown is representative and must be determined by actual testing.

INK MATERIAL	SUBSTRATE	LAMP TYPE		PULSE ENERGY (Joules)
		A	B	
Ag - small size	Low Temp.	√		500
Ag - large size	High Temp.		√	800
Cu - small size	All	√		800
Cu - large size	All	√	√	1500

Curing Area – Linear Stage

The LH-840 linear lamp housing provides a curing area of 1.9 x 30.5 cm (0.75" x 12"). Model LS-845 linear stage integrates with the LH-840 optical source to provide a single axis linear motion for area sintering applications. The Sample tray is 14" x 18" with a treatment area up to 10" x 14". The Linear stage offers precise adjustment for the speed of the sample up to 1"/second or 5 feet/minute. A fixed light mask inside the unit allows for a fixed region where light is incident on the substrate. The aperture size is 0.5" x10". The height of the sample from the lamp can be adjusted up to 2.25" starting at a distance of 0.5" from the lamp window. The focal plane for the lamp housing is approximately 1" from the lamp window. A stepper drive allows for precision staging of the sample with digital control of the speed and pulses. The linear stage has internal interlocks for door and light shielding for safe and easy usage.



Model LS-845 Linear Stage

SPECIFICATIONS

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

System Units
- SINTERON 2000 rack with four bays – each 4U height
  - Bay 1: Power Supply
  - Bay 2: Controller
  - Bay 3: PFN 1 and PFN 2
  - Bay 4: PFN 3 and PFN 4
- Lamp Housing Model LH-840 with Type A or Type B Linear Flashlamp
- Linear Stage Model LS-845
- Lamp Housing Blower Options: Model BL-1020 (60 Hz) or BL-1030 (50 Hz)
- Lamp Housing Blower Kit [1]

SINTERON 2000 User Controls

Main Power Switch	ON/OFF
Emergency-STOP	OFF
Timer	ON/OFF
High voltage	ON/OFF/STANDBY
Continuous mode	ON/OFF
Pulse-mode select	Timed or Continuous
Programmable timer	1 to 999 seconds in 1 sec interval
Flashlamp pulse rate	Timed start, thumb-wheel switches

Power Input

SINTERON 2000 Rack	1-phase 200-240 Vrms, 50/60 Hz, 30 amps, max
Lamp Housing Blower	Model BL-1020 1-phase 200-240 Vrms, 60 Hz, 6 amps
	Model BL-1030 1-phase 200-240 Vrms, 50 Hz, 6 amps

Pulsed Light

Max Pulse rate	Determined by lamp voltage setting - see graph 5
Pulse Energy Adjustment Range – Determined by lamp voltage setting – see graph 3	
	600-1500 Joules, max @ 2.0ms pulse width
	500-1350 Joules, max @ 1.5ms pulse width
	300-1100 Joules, max @ 1.0ms pulse width
	200-800 Joules, max @ 0.5ms pulse width
Pulse Duration[2]	PFN 1 = 0.572ms
	PFN 1 & 2 = 1.055ms
	PFN 1, 2 & 3 =1.570ms
	PFN 1, 2, 3 & 4 = 2.044ms
Power output to flashlamp	
	2300 Joules/second, max

Lamp Housing Model LH-840

Arc Length, Spectra	40.6 cm (16") linear flashlamp, with type A or Type B spectra options
Window Opening	53 x 8.9 cm (21" x 3.5") L x W
Sintering Curing Area	1.9 x 30.5 cm (0.75" x 12")
Optimum Distance from Window	2.5 cm (1.0")

Cooling

Electronics Rack units	Total of 5 internal fans, continuous ON
Lamp Housing	External blower 1.5" Water Static Pressure

Outline Dimensions — Height x Width x Length

Electronics Rack	147 x 56 x 79 cm (58" x 22" x 31")
Model LH-840 Lamp housing	19 x 76 x 18 cm (7.50" x 30.0" x 7.0")
Model LS-845 Linear Stage	25 x 59 x 151 cm (10" x 23.1" x 59.5")

Operating Environment

Temperature	0 - 40°C (32-104°F)
Relative Humidity	10 - 90% (non-condensing)

Weight

Electronics Rack	159 kg (350 pounds)
Model LH-840 Lamp Housing	14.5 kg (32 pounds)

Notes:
1 – Lamp Housing Blower Kit includes blower, blower filter, metallic ducting, duct clamps and mains power cord.
2 – User selectable with PFN jumper settings on rear of electronics rack

Specifications subject to change without notice

ORDERING GUIDE

The SINTERON 2000 ordering options are shown in the guide below, e.g. to order only the SINTERON 2000 electronics, order model ***SINTERON 2000-R***.

SINTERON 2000 - L / L / 3 / B

LAMP SPECTRA	
A	Type A - spectral cutoff 370 nm
B	Type B - spectral cutoff 240 nm

BLOWER FOR LAMP HOUSING	
3	BL-1030 - 1020 m³/h, 60 Hz mains power
2	BL-1020 - 1020 m³/h, 50 Hz mains power
N	None

SINTERING CHAMBER	
L	Model LS-845 - linear stage
N	None

SINTERING AREA	
L	1.9 x 30.5 cm (0.75" x 12") linear lamp
R	Electronics Rack Only

XENON Corporation
37 Upton Drive
Wilmington, MA 01887-1018

Telephone 1-978-661-9033
Fax 1-978-661-9055
E-mail info@xenoncorp.com
Web www.xenoncorp.com

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