QUANTUM DEVICES, INC.

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The Snap-Lite™ Solid State Lighting System For Plant Growth

The Snap-Lite™ technology is a patented solid state lighting system offering a high degree of reliability and repeatability for plant research. The unique modular design is scaleable to up to 9 or 18 modules per power supply (depending on APS model number), making large area LED arrays available to plant researchers.

The Snap-Lite™ is constructed with the latest State-of-the-art high efficiency Light Emitting Diodes (LEDs). Each 15 x 15cm (6 x 6in.) module has a irradiance power output that is continuously variable from 0 to 400µmol/m2/sec. The Snap-Lite™ bichromatic or monochromatic spectral quality is determined by the selection of wavelength specific narrow band pass LED die. The half power spectral bandwidth is typically +/- 15 nanometers of the peak wavelength.

Each Snap-Lite™ module has been designed to accommodate two separate channels of wavelength specific LED die in order to provide the means to produce a bichromatic spectral output. Typical combinations for plant research include, but are not limited to, 670nm and 470nm, and 670nm and 735nm.

Snap-Lite™ System Features

* Two channel variable intensity control
* Bichromatic or Monochromatic spectral output
* Computer Interface
* Factory Selected Power Requirements:
  90-132 VAC, 50-60 Hz
  180-264 VAC, 50-60 Hz

Unpacking and Inspection

Open the carton and check each item in the box. Make sure that you have everything listed on the packing list. There should be one or more of the following items.

1. Power Supply

Consisting of all the controls necessary to power the Snap-Lite™ source into operation. Mounted on the front panel are the Channel A and B intensity controllers, Front panel Control/External Reference switches, and the Power Switch. Mounted on the rear panel are four (4) Analog power bus connectors, two (2) BNC connectors (for External Reference control), and the AC Power outlet and fuse module.

2. Snap-Lite™ Module
The Snap-Lite™ module houses patented thermal management system, on which the LED's are mounted. A fan is mounted on the opposite side of the Snap-Lite™ to keep the monolithic system running cool. Air flow ducts, cut into the sides of the Snap-Lite™ supply the cooling air flow within the system (care should be taken not to block these vents). The Snap-Lite™ interface cable connector which connects the Power Supply to the Snap-Lite™ module is mounted on the side of the source unit. An additional cable connector on the opposite side provides a means to connect additional Snap-Lite™ modules (up to 9 modules for APS-2509 power supply and up to 18 modules for APS-5018 power supply).

3. Interface Cable Model #SL08
The 2.4m (8 ft.) Interface Cable has gender defined connectors and is used to connect both the Power Supply and the Snap-Lite™ module together.

4. Power Cable
The 1.2m (4ft.) power cable supplies power from a standard three prong wall outlet to the Power Supply.

System Assembly

The following is a step-by-step guide to the assembly of your Snap-Lite lighting system.

1. Connect one end of the Interface Cable with one of the four connectors, on the rear panel of the Power Supply, marked Analog Power Bus. Once you have made sure the connection is complete, screw the Interface cable firmly to the Power Supply.

2. Next connect the other end of the Interface Cable to the Snap-Lite™ Module by inserting the twelve pin plug into the receiving receptacle attached to the module.

3. Plug the power cord into the three prong receptacle on the rear panel of the power supply.

4. Now you are ready to plug in the Power Supply. Taking caution in making sure the power switch is in the off position before plugging the system in, then turn it on.

Switches and Indicators for the Snap-Lite™ unit

1. Two Channel Variable Intensity Control
These are Marked Channel A and Channel B Intensity Control, and are located in the center of the front panel. These controls allow the controller to independently regulate the intensity of both channels of the light source from minimum to full scale with precise repeatability.

2. Front Panel/External Reference Control

These two (2) switches, marked Front Panel Control and External Reference, are located on the front panel of the power supply. When both switches are set to Front Panel Control, intensity and spectral mixing of both Channel A and B can be independently controlled via the ten turn potentiometers on the front panel. When both switches are set to External Reference, The Channel A and B intensity control is supplied through convenient BNC connectors provided on the rear panel of the Power supply. Supplied reference voltages of 0 to 5 volts will control the intensity levels from zero to full scale, and can be supplied by an appropriate voltage source including standard analog to digital computer boards. (Computer, Software, A/D board, and cables not included).

3. Power Switch/ Power Switch LED

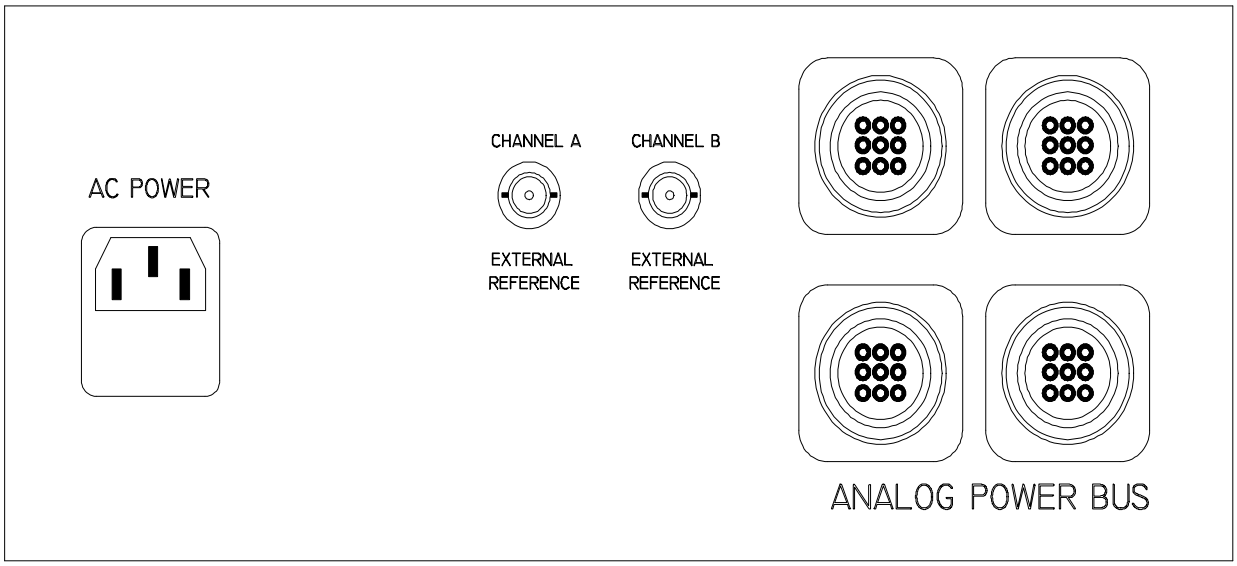
The Power Switch is a simple on/off switch. When set to the on position, the Power Switch LED is lit indicating that the power supply is receiving sufficient power

4. Fuse Holder and Location

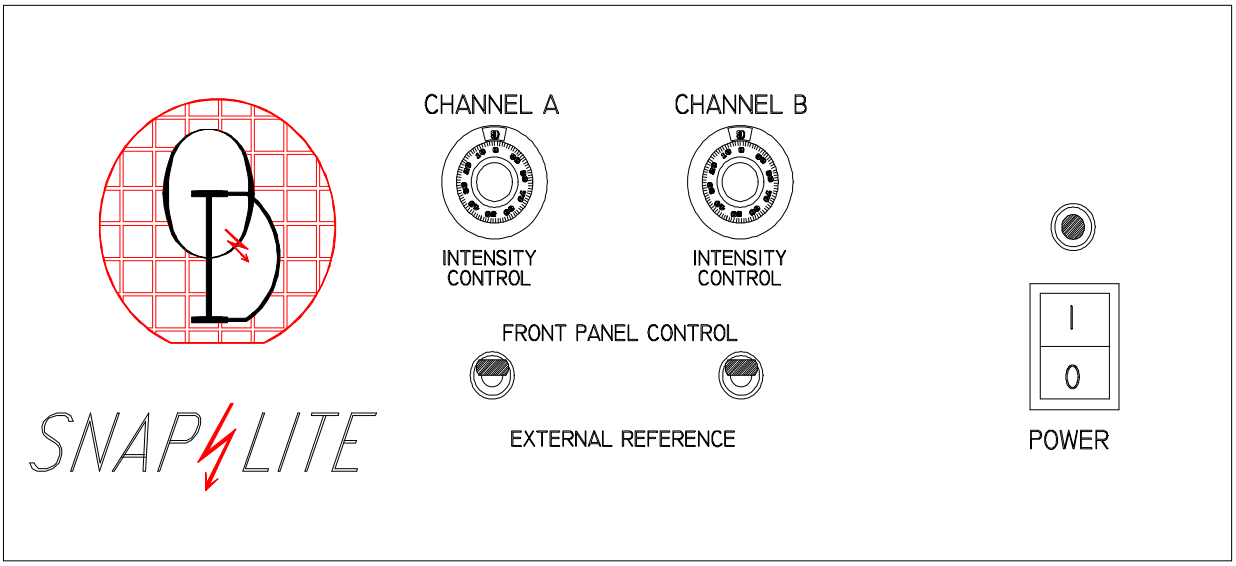
The fuse holder is located on the rear panel. Unplug the power cord prior to inspection and removal of the fuse.

Proper fuse types (Slo-Blo) for the Snap-Lite™ system are as follows:

Line Voltage	Model APS-5018	Model APS-2509
90-132	15A, 250 VAC	10A, 250 VAC
180-264	10A, 250 VAC	5A, 250 VAC



BACK PANEL



FRONT PANEL