

Laser Diode Current and Direct Current Control

Under normal conditions, a typical laser diode is designed to run for 9000 hours or more. As the laser progresses through this lifetime, it will require additional current to maintain the same optical output power. The diode manufacturer definition for end of life is represented by a 30% increase in current, relative to the current required when the diode was new. Vortran Laser Technology provides a number of manufacturing and operational safeguards to ensure the diode lifetime is maximized. Each new diode is supplied with data from the manufacturer listing all optical and electrical parameters unique to each individual laser. With this information available, Vortran Laser Technology is able to ensure the laser is running at or below the current measured by the diode manufacturer. This information also ensures the system does not suffer from excessive optical loss. All of the diode manufacturer data is available from Vortran Laser Technology upon request.

The Vortran Stradus™ Laser system provides the capability to automatically increase the diode current and maintain constant output power throughout the life of the laser. The external power control circuit also protects the diode from receiving excessive current that could potentially cause damage.

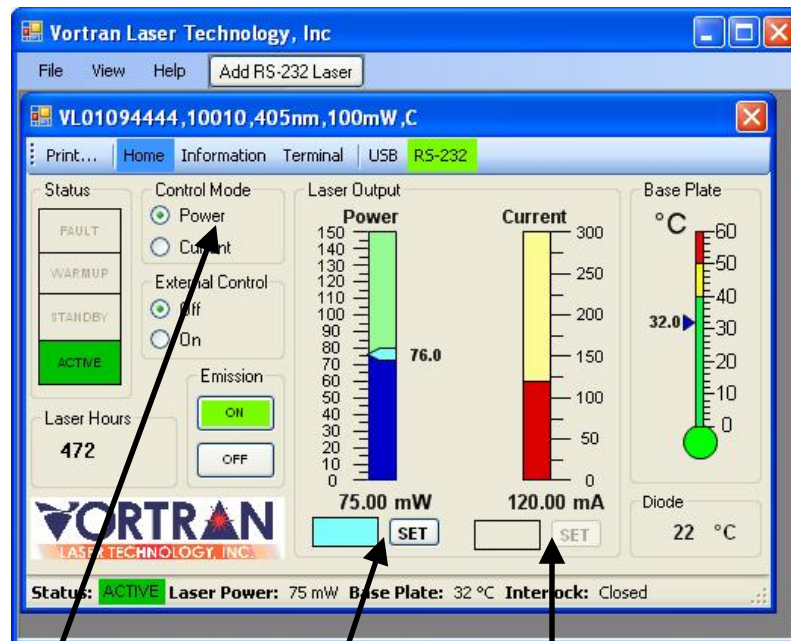
Direct current control is available from the Vortran Stradus™ laser system. The firmware supports direct current setting with a computer command. The analog power control input supports direct control of the laser current. Please review the Analog Power Control section for information on establishing USB or RS-232 communication with the Vortran Stradus™ laser system. Once communication is established, the C=1 command will set the laser in direct current control mode. The LC= command will allow the user to set the laser current directly. The values associated with the LC= command are entered in mA with the resolution of ####.#.

Direct current control is non-linear relative to laser output power

Laser power control is linear. The Vortran Stradus™ laser includes a high performance photocell with supporting power control circuitry. The progression from no output power to full output power is linear in nature. In the case of current control, each laser diode has a unique threshold current and slope efficiency. Threshold current is the amount of current required to initiate laser emission. Slope efficiency is the rate associated with the increase in optical output power relative to the increase in current. Slope efficiency is unique to each laser diode and is linear in nature. Vortran Stradus™ laser current settings begin at zero mA to full laser output. Values between zero and threshold current do not produce optical output power. Once the threshold level has been reached, increasing current will increase the optical output power at the rate of the slope

efficiency. Slope efficiency is measured at mA per mW. For these reasons, zero mA to full current is not linear.

Calibrating the laser current to full laser power is simple with the Vortran Stradus™ laser system. At any point during the diode lifetime, set the laser to the rated output power in power control mode. This can be accomplished by clicking the “Power” button on the “Control Mode” section of the Vortran Stradus™ software Home Screen or enter C=0 with RS-232 communication. The rated power is listed on the laser datasheet, Vortran Stradus™ software information screen or you can use the ?RP query with RS-232 communication. Enter the rated power value in the Vortran Stradus™ software Home Screen or Enter P=<value> with RS-232 communication. With the laser running at the rated output power, record the corresponding operating current. This value is shown on the Vortran Stradus™ software Home Screen or use the ?C query with RS-232 communication. Now you are able to set the current to produce the rated output power. First set the laser for current control, by clicking the “Current” button on the “Control Mode” section of the Vortran Stradus™ software Home Screen or enter C=1 with RS-232 communication. With the laser running in current control mode, set the current to the value recorded with the laser running at the rated output power. Enter the value in the Vortran Stradus™ software Home Screen and click “Set” or enter C=<value> with RS-232 communication.



**Control
Mode**

**Enter
Rated
Laser
Power Here**

**Enter
Laser
Current
Here**