KIGRE, INC.
Laser Transmitters & Components

MK-830-PS Laboratory Diode Driver
(For use with MK-11, 81, 82, 85, 88 & 830 lasers)

Kigre manufactures a laboratory laser diode driver for use with the MK-830, 88, 85, 82, 81 and MK-11 laser heads. The driver features precision pulsed current operation and supports the HESP family eye-safe laser diode requirements. A USB cable and software are provided so that the customer may use their computer as a laser controller. The driver operates over an extremely wide AC input voltage range and includes ultra-high performance hold-up capacitors for stable pulsed current control up to 140 Amps. Soft-start control, active current limiting, transient filtering, and a mechanical shorting relay provide robust protection for the laser diode even when power is removed.

Power Input	**100 – 240 VAC**
Pump Pulsewidth	**3.6 ms**
Output Current Range	**5 - 140A +/-0.5A**
Pulse Repetition Rate	**0 – 60Hz**
External Fire Input Signal	**+5 V TTL**
Photodiode (To) Output Signal	**+5 V Pulse**
Size (W x D x H)	**12"x 10" x 5"**

MK-830-PS computer laser control software provides a ready-made repetition rate generator with burst and shot count features.

- Use the cursor or keyboard to set the proper repetition rate for your laser.
- Use the cursor or keyboard to set the proper number of shots (burst count) for your application.
- Select START to begin firing the laser and STOP to stop firing the laser. You may stop firing the laser during a burst count-down at any time by pressing the stop button. The software provides a count-down of the remaining number of shots in the burst.

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The MK-830-PS computer control software may be operated at any pulse repetition rate setting from 1 Hz to 30 Hz. The software allows for both pulse rep-rate and current adjustment. With the pull down menu, the current scale is adjusted to a maximum of 140 amps.

✓ The MK-830-PS laser driver requires a computer for laser operation.

✓ Kigre **does not** supply a computer with the MK-830-PS laser driver.

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Kigre HESP Laser Power Supply Information

AC input voltage:	90-250 Volts AC (Auto-switching)
AC input frequency:	50-60 Hz (Auto-switching)
AC input current:	6A (Slo-Blo 5 x 20mm fuse located on rear panel)
Pump diode current range:	1A – 140A +/- 0.5A
Frequency range:	0.1 – 30 Hz
Laser diode forward voltage range:	0.7 – 16 Volts
External trigger input:	4.5 – 5.5 V, 1.0 – 10mS
Power Supply Weight	4.2Kg (9.3 pounds)
Power Supply Size (H x W x L)	300x261x135 mm (11.8 x 10.3 x 5.3 inches)
Power Inlet with Fuseholder:	Qualtek Electronics # 723W-X2/04 (IEC 320 - C14)
Laser connector:	Amphenol # 77TWA7W2S, Female Combo D-sub
Mate to Laser connector:	Amphenol # 717TWA7W2P, Male Combo D-sub
Control connector:	USB 2.0 (backwards compatible to 1.0)

OUTPUT PULSE TIMING JITTER
PHOTODIODE FEEDBACK DEVICE

Due to the passive Q-switch design, the laser output pulse will have up to 300uS of jitter with respect to the fire input Command. A high speed InGaAs photodiode is installed in the HESP lasers. The power supply uses this feedback to control the pulse width of the pump diodes to insure stable, single-pulse laser output. Kigre recommends using a laser output pickoff detector if timing of the output pulse is critical to your application.

Kigre HESP Laser Power Supply Information

Display Screen Shown For Laser Driver Software Version 1.1.b

HESP LASER
Amperage Setting Conversion Table
Kigre 120 Amp. Power Supply

DISPLAY ONLY Ver. 1.1.b	DISPLAY ONLY Ver. 1.3.1					Actual Pump Amps
15 A	23%					60
21 A	31%					70
28 A	39%					80
34 A	47%	MK-81	MK-85	MK-88	MK-830	90
40 A	55%	MK-11				100
48 A	63%					110
55 A	71%					120

MK-830-PS Laboratory Diode Driver

Kigre's MK-830-PS laboratory laser diode driver is for use with the MK-830, MK-88, MK-85, MK-82, MK-81 and MK-11 laser heads. The driver features precision pulsed current operation and supports the HESP family eye-safe laser diode requirements. A USB cable and software are provided so that the customer may use their computer as a laser controller. The driver operates over an extremely wide AC input voltage range and includes ultra-high performance hold-up capacitors for stable pulsed current control up to 140 Amps. Soft-start control, active current limiting, transient filtering, and a mechanical shorting relay provide robust protection for the laser diode even when power is removed. HESP laser customers are provided electrical engineering support to facilitate HESP laser integration. This includes access to Kigre's laboratory diode driver schematics, surface mount board vendors, parts list, and power supply design support.

The HESP lasers contain a built-in photodiode that is used to turn off the pump pulse as soon as the laser pulse is emitted. The laser's photodiode signal may also be used as a "To" (time zero) for a range counter or other event timing. The pump pulse-width is typically between 1.5 and 2.5ms depending upon the laser head's temperature and operating conditions. We time out the pulse at a maximum of 3.4ms for safety to prevent the pump diodes from runaway CW operation. Laser pump pulses greater than 3ms are near the point of diminishing returns with regard to laser output energy and system efficiency.

A useful method for monitoring the laser's internal temperature is to look at the pump current pulse width. Specifically, this pulse width should not exceed 3 milliseconds. You'll notice that the pump pulse width will increase as the laser heats up. This is due to the loss of efficiency. Once the pump pulse width gets beyond 3mS, the efficiency of the laser drops dramatically and the pump pulse width will rise quickly - indicating an overheated condition. Please do not operate the laser if the pump current pulse width exceeds 3mS.

We suggest the use of a Tektronix model # A622 probe. The probe should be located between the driver and the laser. You can clip on a section of the red wire anywhere in the laser cable.

Datasheet for current probe:
http://www2.tek.com/cmswpt/psdetails.lotr?ct=PS&ci=13510&cs=psu&lc=EN

To purchase the probe:
http://www.alliedelec.com/search/productdetail.aspx?SKU=7000622

Pump Pulsewidth: Approximately 1.5mS (photodiode feedback controlled)
Internal Photodiode: Hamamatsu # G8376-05 (InGaAs, 0.5mm Ø active area)

Link to Photodiode Datasheet:
http://sales.hamamatsu.com/assets/pdf/parts_G/g8376_series_kird1051e05.pdf

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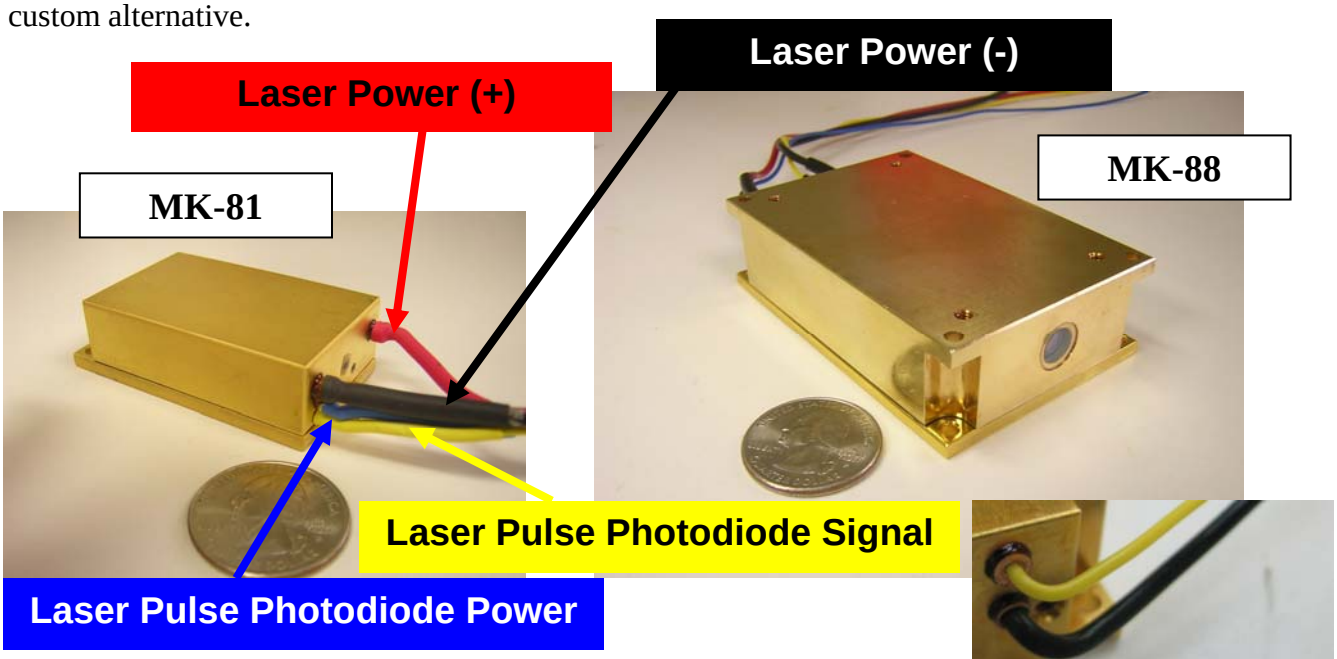
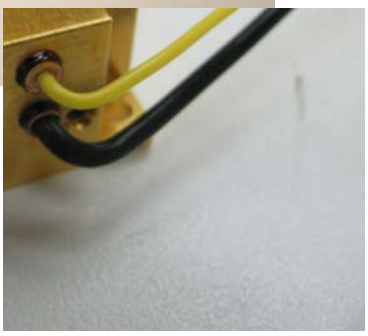
HESP Laser Flying Lead Electrical Interface

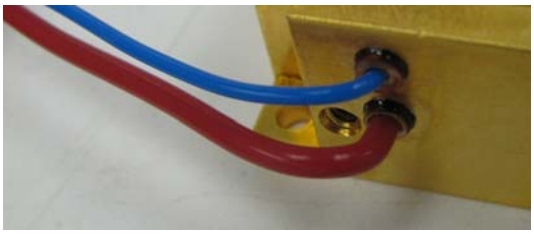
Kigre has developed a highly flexible flying lead electronics interface using Teflon coated wire and a unique high strength strain relief support through the enclosure bulkhead. The standard configuration for Kigre's HESP laser products is rear exit flying leads. Side exit flying leads are a custom alternative.





MK-11, 81, 82 & 85

- 1pc **Blue** 24AWG Teflon Coated Alpha Wire # 2844/19-6.
- 1pc **Yellow** 24AWG Teflon Coated Alpha Wire # 2844/19-5.
- 1pc **Red** 20AWG Teflon Coated Alpha Wire #5856-3.
- 1pc **Black** 20AWG Teflon Coated Alpha wire #5856-2.



MK-84, 88 & 830

- 1pc **Blue** 24AWG Teflon Coated Alpha Wire # 2844/19-6.
- 1pc **Yellow** 24AWG Teflon Coated Alpha Wire # 2844/19-5.
- 1pc **Red** 16AWG Teflon Coated Alpha Wire #5858-3.
- 1pc **Black** 16AWG Teflon Coated Alpha wire #5858-2.

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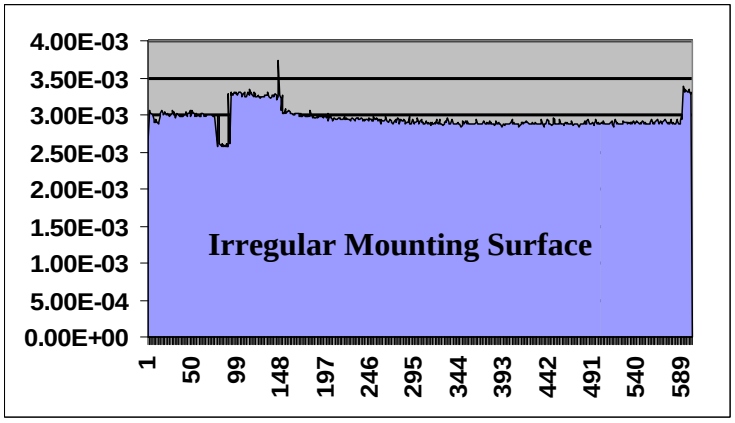
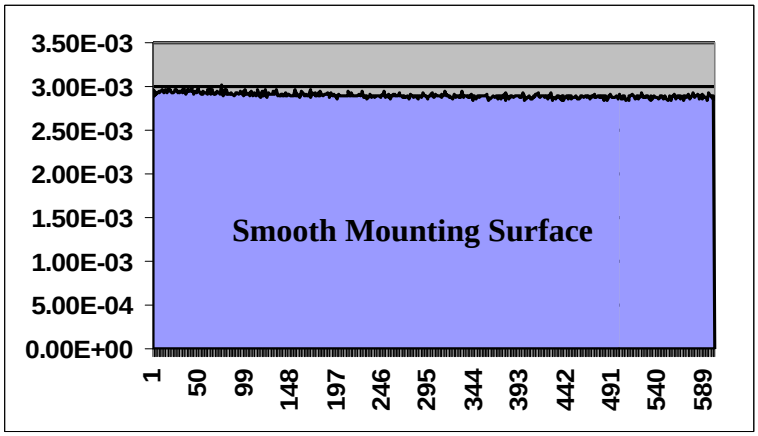
HESP Laser Mounting Notes

Kigre's High Efficiency Side Pumped (HESP) Diode Pumped Solid State (DPSS) laser transmitters should be mounted on a smooth, clean, flat metal surface. The following mounting specifications are suggested:

- **32 Ra micro-inch mounting surface finish specification**
- **Surface to be free of defects larger than 50um.**
- **First "finger" tighten all four screws evenly.**
- **Continue tightening screws to ~ 0.5 in-lb.**



Laser Output Energy with Irregular Mounting Surface



Laser Output Energy with Smooth Mounting Surface

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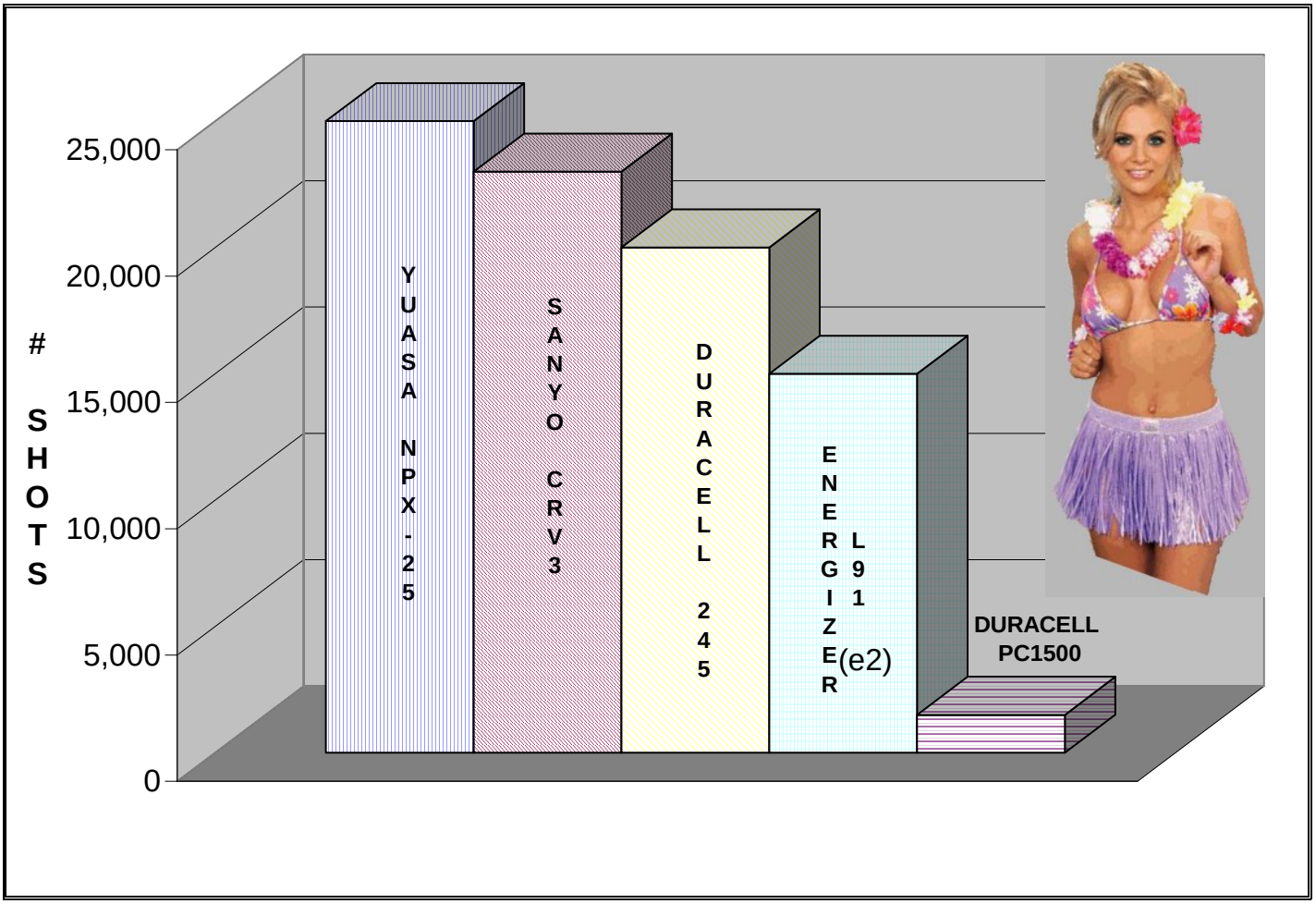
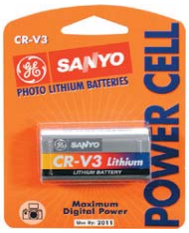
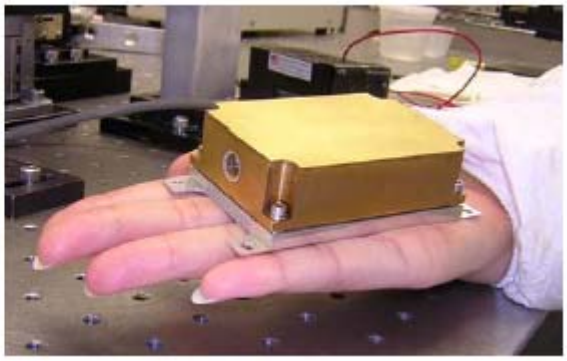
MK81 BATTERY LIFETIME @ 1.0Hz



YUASA NPX-25	SANYO CR-V3	DURACELL 245	ENERGIZER L91	DURACELL PC1500
				

Manufacturer	YUASA	SANYO	DURACELL	ENERGIZER	DURACELL
Part #	NPX-25	CR-V3	245	L91 (e^2)	PC1500
Type	Lead-Acid	Lithium	Lithium	Lithium	Alkaline
Quantity x Size	1 x 3.5"x2.8"x4"	4 x Double AA	2 x Double AA	8 x AA	8 x AA
Total Volume/Wt.	32 in^3 / 4.4#	4 in^3/ 5.2oz	2 in^3/ 2.6oz	4 in^3 / 4.0oz	4 in^3/ 4.8oz
Number of Shots	>25,000	>23,000	>20,000	>15,000	>1,500

MK-88 & MK-830
Engineering Notes



Using a fan and heat sink the MK88 laser is typically operated up to its maximum duty cycle: 10Hz, 30 second burst (300 shots) followed by a cool down period of at least 1 minute.

Using a fan and heat sink the MK830 laser is typically operated up to its maximum duty cycle: 30Hz, 30 second burst (900 shots) followed by a cool down period of at least 2 minutes.

Water cooled baseplates are also acceptable. Active cooling must be used to operate at the maximum duty cycle. A good method for monitoring the laser's internal temperature is to look at the pump current pulse width. Specifically, this pulse width should not exceed 3 milliseconds. You'll notice that the pump pulse width will increase as the laser heats up. This is due to the loss of efficiency. Once the pump pulse width gets beyond 3mS, the efficiency of the laser drops dramatically and the pump pulse width will rise quickly - indicating an overheated condition. Please do not operate the laser if the pump current pulse width exceeds 3mS.

We suggest the use of a Tektronix model # A622 probe. The probe should be located between the driver and the laser. You can clip on a section of the red wire anywhere in the laser cable.

Datasheet for current probe:
http://www2.tek.com/cmswpt/psdetails.lotr?ct=PS&ci=13510&cs=psu&lc=EN

To purchase the probe:
http://www.alliedelec.com/search/productdetail.aspx?SKU=7000622

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