ENERGY AND POWER MEASUREMENTS FOR INTENSE PULSED LIGHT SYSTEMS

LASER S.O.S. AESTHETICS

GEMINI

USER MANUAL

GEMINI

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GENERAL

Gemini is a fully automatic, hand-held energy and power meter designed for IPL (Intense Pulsed Light) applications. Gemini works on a microprocessor based patent pending measurement technique of temperature dynamics through a thermopile sensor. Measurement and data acquisition are fully automatic, making this technique virtually free from operator induced errors.

Gemini can measure both flashlamp single shot energies up to 350 Joules and average powers, when in burst mode operation, up to 100 W

Gemini innovative measurement concept reduces the time of measurement and display to 10 sec. with excellent repeatability (±1%), accuracy (+3%) and high resolution (10 mW and 100mJ) associated with a wide dynamic range of measurement (down to 1% of Ls.).

Gemini is extremely friendly in use and features a large rectangular exposure area (50x18mm) to match with all handpieces.

The broadband detector works in the range from 400 to 1400 nm, which is the range of interest for the majority of applications (photoepilation, skin rejuvenation, treatments of acne. vascular and pigmented lesions, psoriasis).

The absorber coating of Gemini remains fully responsive also when filters are used to reduce the lamp spectral bandwidth. This absorber is very robust, as it has been designed to face the extreme fluences (up to 90,7cm2) of professional systems (medical and clinic) where the highest pulse energies are involved. But it is also very flexible since it can operate with semi-professional systems (beauty salons) and consumer-oriented systems (2 to 10J/cm2).

Gemini has a window for gel or water coupled handpieces but can also measure air coupled IPLs. The unit bears a multifunction LCD that simultaneously indicates the flashlamp energy (or power) delivered by the handpiece; it also shows the mode of operation [Sin for single shot (energy) or rEP for repetitive (power)j, probe model and warning for low-battery. A bargraph shows the sensor temperature to inform the operator whether he can still perform more measurements before the sensor reaches its maximum allowable temperature. Additionally, the probe status is displayed by a two colour LED indicating if the instrument is ready for measurement, if the reading is in progress or over and if cooling is needed.

Gemini is operated by a single button; it shuts automatically off after 5 minutes of non operation and always stores its last measurement in memory. Two common AA batteries allow a minimum of 4000 measurements.

Gemini has been ergonomically designed in all its details: the low profile sensor head, connected to the display body by 1m extensible cord, permits remote testing even in tiny spaces. Another important feature is the possibility given to users to match to a custom reference or re-calibrate in house.

CALIBRATION

MODEL: GEMINI_____	SERIAL NUMBER:_____
REFERENCE POWER:_____W	MEASURED POWER:_____W
REFERENCE ENERGY:_____J	MEASURED ENERGY:_____J
DATE OF CALIBRATION: ___/___/_____	

Laser S.O.S. Aesthetics certifies that, at the time of calibration, the above listed instrument meets or exceeds all technical specifications defined on page 11 of this Instruction Manual.

The above listed instrument has been calibrated using standard references traceable to the National Institute of Standards and Technology (NIST) or Physikalisch Technische Bundesanstalt (PTB).

THIS IS NOT A CALIBRATION CERTIFICATE FOR TRACEABILITY PURPOSE; SUCH A CALIBRATION CERTIFICATE CAN BE QUOTED ON DEMAND.

IMPORTANT - FOR CUSTOMER USE ONLY

The reference setting of this instrument can be matched by user to a custom own reference by means of the instructions reported at Section 11.0 of the Operation Section of this Manual.

OPERATION

1.0 SAFETY

Take all the required safety procedures needed when working with high power light sources and wear protection glasses all the time! The beam must hit ONLY the sensor head front side. Avoid to incidentally expose the protected stainless steel stem to the beam as dangerous back-reflections can be produced! Never touch the sensor head as this part can reach 70°C of temperature!

In the case the power density (W/cm2) or energy density (J/cm2) exceed the damage threshold of the head absorber coating, damages like coating discolouration or underlying metal melting might occur. In both cases consult Laser S.O.S. Aesthetics.

2.0 STARTING THE INSTRUMENT

To switch on the instrument, keep pushed the **ON/Zero** key until the LCD shows IPL rEP (if the instrument is in Power mode) or IPL Sin (if the instrument is in Energy mode) (lasts about 3 sec).

3.0 SELECT POWER OR ENERGY

To switch from Power (shown as rEP) to Energy (shown as Sin) measurement modes, or viceversa, keep pushed the **ON/Zero** key until the unit switches off (approx 3sec); release the key and press it again until Sin o rEP appears on the screen (about 4 sec). Release then the key and the instrument is ready for a new measurement.
The displayed value is the last measured.

4.0 AUTO-CHECK CYCLE

When the **ON/Zero** button is released, the instrument starts an auto-check cycle during which both circuit and display are controlled and reset. During this cycle, the LCD shows all available segments of alphanumeric characters and the bar graph at full scale. Upon completion of this cycle, the LCD displays the last recorded value of measured power.

5.0 RESETTING

Before starting the first measurement or a new one, the instrument has to be reset; to do so, just push and soon release the **ON/Zero** button. After the LCD has displayed **"CAL"**, the lateral LED turns steady green and **"FIT"** blinks. Any previously recorded value is zeroed and the instrument is ready to measure.

An automatic Zero is performed by Gemini after every measurement.

6.0 MEASUREMENT CYCLE

Check that the light beam is not available; align the probe to the beam axis and start the measurement cycle by removing the beam stop. Avoid taking measurements during the machine warm up or in case of beam instabilities.

Always position and keep the beam in the centre of detector.

The measurement starts automatically. During the acquisition time, **"RUN"** and the LED both blink for approximately 5 seconds. The bar graph indicates the head temperature on an arbitrary scale.

7.0 MEASUREMENT DISPLAY

As soon as the measurement is over, the LED turns into steady red. Remove the probe from the light beam: the display shows the actual power, and the remaining thermal capacity. If the bar graph is below full scale, one or more measurements can be carried out before the sensor head needs to be cooled.

A new measurement can be done after the LED automatic shuts off (approximately after 20 seconds). To perform a different measurement return to Section 3.0.

ENERGY MEASUREMENTS:

8.0 RESETTING

Before starting the first energy measurement (see Section 3.0) or a new one, the instrument has to be reset; to do so, just push and soon release the **ON/Zero** button. The LCD displays **"rdY"** and the LED on the right side of the screen, turns steady green.

At this point, any previously recorded value is zeroed and the instrument is ready to measure. No light must strike on the sensor during the resetting period.

An automatic Zero is performed by Gemini after every measurement.

9.0 MEASUREMENT CYCLE

Check that the light beam is not available; align the probe to the beam axis and start the measurement cycle by removing the beam stop. Avoid taking measurements during the machine warm up or in case of beam instabilities.

Always position and keep the beam in the centre of detector.

The measurement starts automatically (during the measurement the display shows **tr'd**) During the acquisition time the LED blinks green. The bar graph indicates the head temperature on an arbitrary scale.

10.0 MEASUREMENT DISPLAY

As soon as the measurement is over the LED turns into steady red. Remove the probe from the light beam: the display shows the actual power, and the remaining thermal capacity. If the bar graph is below full scale, one or more measurements can be carried out before the sensor head needs to be cooled.

A new measurement can be done after the LED automatic shuts off (approximately after 20 seconds). To perform a new measurement go back to Section 3.0

11.0 CUSTOMER'S CALIBRATION

This instrument can be re-calibrated by the user to match a custom reference. Remove the plastic cover of the adjustment switch located at the right side of the instrument body. Zero the instrument as indicated in Section 2.0 of this Operation Section and afterwards carry out a measurement of a known light source.

Shift the switch on + or – if you need to increase or decrease the reading displayed on the LCD in order to match your reference. This is done by limited pushes on the **ON/Zero** key, until the desired value is achieved on the display. Reset the switch to its middle position CAL and re-cap. The instrument is ready for new measurements

12.0 COOLING THE HEAD

Should the probe reach its limit temperature, the LCD shows " **COOL**" and the LED blinks red. Use spontaneous or air forced cooling. **Never use liquids.**

As soon as the temperature returns below its maximum allowable limit, the LCD displays the last measured power value.

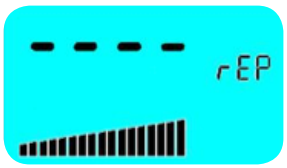
13- AUTO OFF /BATTERY WARNING

As the battery pack is about getting exhausted, a battery symbol pops up on the LCD: it warns you have approx. 10 hours of residual power.

Note: to increase the battery life, the instrument automatically switches off after 5 minutes of stand by operation. However the last recorded value is not lost; to retrieve it, go back to Paragraph 2 and follow the instructions. After the internal auto check cycle, the display will show the last measured value.

To intentionally shut the instrument off, keep the **ON/Zero** button pushed until the LCD shuts off (this takes approximately 4 seconds).

14.0 OUT OF RANGE



Accuracy remains within the specified value (±3%) when the detector is exposed to powers up to 40W. At powers higher then 40W the measurements are not correct; at much higher values the LCD will show four blinking segments instead of a numeric value.

15.0 NOTE: REPEATABLE MEASUREMENTS

To make repeatable measurements and avoid errors it is important that the hand piece is always positioned to be well centred with respect to the active surface and that it is never in direct thermal contact with the sensor. The hand piece has to be placed a few millimetres from the surface taking care that no radiation is lost.

NOTICE TO EUROPEAN UNION CUSTOMERS

EUROPEAN UNION WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE) DIRECTIVE 2002/96/EC

The European Parliament will enforce new Directives in 2006 concerning the disposal of electrical and electronic equipment such as the Monitoring and Control Instruments.

The regulations place responsibilities on the instruments supplier and the purchaser/user.

One of the actions required by suppliers is to inform users of their obligations.

The present instrument has been assessed in accordance with the European Parliament Directive 2002/96/EC on Waste Electrical and Electronic Equipment, usually referred to as the WEEE Directive.

The WEEE Directive requires that the instrument is disposed of at the end of its useful life in an environmentally responsible manner.

Parts and materials that can be re-used and/or re-cycled have been identified in order that the use of new resources and the amount of waste going for landfill can be minimised. The WEEE Directive requires that if you are replacing the instrument with a new equivalent product from the original supplier, then that supplier can collect the old item without cost to yourself. It is emphasised that this no-cost return option is only available when you purchase a new product of equivalent type that fulfils the same function. Please inform your supplier of your wish to have the old instrument collected when ordering the replacement.

If you wish to dispose of the instrument without replacing it then the appliance must not be mixed with unsorted municipal waste. The crossed-out wheeled bin symbol on the unit label or unit packaging, as shown in the table below, indicates this requirement.

You must ensure that the instrument is disposed of at an authorised treatment facility; details can be obtained from your local council.

Your role is critical and will help to ensure that the Earth's resources are maintained and that as much re-usable and re-cyclable material as possible is processed. It will also ensure that landfill volume requirements are kept at a minimum and that hazardous materials are not buried thereby providing potential future problems for the environment and human health.

	WHEELED BIN SYMBOL AND DESCRIPTION The symbol applies to all Laser S.O.S. Aesthetics electronic products placed on the European Market after August 13, 2005.Laser S.O.S. Aesthetics will affix the wheeled bin symbol with a bar to appropriate products. The bar indicates that the product was placed on the market after August 13, 2005.

The WEEE Directive comes into force in January 2006.

TECHNICAL SPECIFICATIONS

PARAMETER	POWER (rEP)	ENERGY (Sin)
Maximum Measurable Power (W)/Energy (J)	100	350
Minimum Measurable Power (W/J)	2	2
Spectral Range (nm)	400-1100	
Maximum Spot Size (mm) (W x H)	20 x 60	
Power density damage threshold @ full scale at 1064 nm (YAG laser wavelength) (W/cm2)	10000	
Repeatability (W/J)	± 1%	± 3%
Display Resolution (W/J)	0.1	0.1
Measurement Accuracy (1)	± 3%	± 5%
Maximum allowable sensor head temperature (°C)	70 °C	
Time to measure and display data (s)	10	-
Waiting time between 2 energy measures (s)	20	20
Power consumption in On status (mW)	26 mW	
Power consumption in Off status (µW)	25 µW	
Power supply (2x AA Batteries) (V)	3 V	
Continuous operation without battery replacement (h)	200h	
Operating temperature range (°C)	da +10 a +40	
Storage temperature range (°C)	da +10 a +60	
Weight (body) (g)	336g	
Weight (sensor with cable) (g)	178g	
Size (head) LxWxH (mm)	60 x 100 x 26	
Size (body) LxWxH (mm)	95 x 71 46	

WARRANTY

All Laser S.O.S. Aesthetics instruments are warranted against defect in material and workmanship for one year after invoice date. During the warranty period Laser S.O.S. Aesthetics will repair, or at his sole option, replace at no charge components that prove to be defective, provided the parts are returned, shipping prepaid, to Laser S.O.S. Aesthetics Customer Service.

This warranty does not apply if the instrument or any accessory has been damaged by accident or misuse, or as a result of service or modification by other body than Laser S.O.S. Aesthetics. No warranty is given by Laser S.O.S. Aesthetics on coatings and battery pack.

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