



LP10

LASER POWER METER



SANWA ELECTRIC INSTRUMENT CO., LTD.

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Thank you for purchasing SANWA laser power meter LP10. Read this manual carefully before use for safe use of the instrument. Retain this manual together with the instrument for future reference.

[1] Operating Precautions

- Do not stare directly at the laser light or allow its reflections enter your eyes during measurement. Laser light incident to your eyes may lead to degradation or loss of eyesight. Special care is required for the IV light which is invisible for naked eyes.
- An excessive optical input may damage the photodiode in the light sensor. Do not apply light that is stronger than the measurable range.
- Be careful not to damage the light sensor surface or stain it by douching with a bare hand. Scratches or stain may deteriorate the sensitivity of the instrument. If the light sensor surface gets dirty, wipe lightly with ethyl alcohol.
- The auto power save function of the instrument turns it off in 15 minutes after an operation. To resume the meter from auto power save status, press MAX/MIN button or turn the Range switch off position, then turn off the power.
- Be sure to set the Power/Range switch to OFF after use.

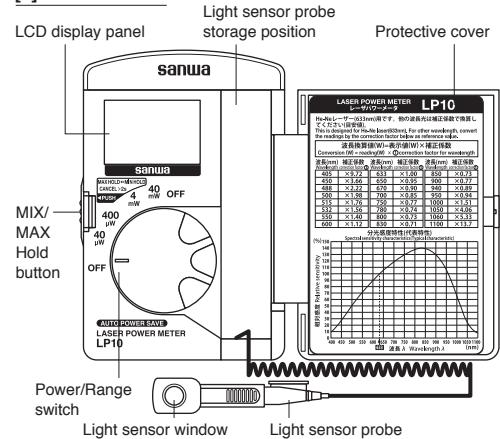
[2] Applications

This instrument is a pocket-sized laser power meter featuring excellent portability and operability. It can be applied easily in check and maintenance of the optical power levels of equipment using laser light. Using 633 nm of a He-Ne laser as the reference wavelength, this instrument enables direct reading of the optical power of visible-range laser light from a visible laser pointer, DVD player's optical pickup, etc. The power of other wavelength can also be measured by converting the reading according to the spectral sensitivity characteristic table (typical values). The measured object is CW laser. A modulated laser cannot be measured accurately.

[3] Features

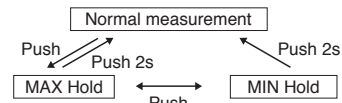
- Pocket size.
- Separate light sensor probe can be integrated with the main body for measurement.
- 4039 full-scale count with a bar graph display.
- Direct reading of the laser power of the reference wavelength of 633 nm, while the laser power of other wavelengths can be read by converting it according to the spectral sensitivity characteristic table.
- Wide measuring range from 0.01 μW to 40.39 mW.
- MIN/MAX hold functions.
- The diffusion sheets are used in the sensor, it can suppress the "return light" that is generated when a laser light enters the sensor.
- Auto power save function prevents wasting of battery power.

[4] Nomenclature



[5] Functions

- Power/Range switch**
This rotary switch is used to turn the illuminance meter on-off and switch the measurement range to the 40 μW, 400 μW, 4 mW or 40 mW range.
- Battery warning indicator**
When the internal batteries are nearly exhausted and the supply voltage drops, blinking "BT" appears in the display. If this happens, please replace both batteries with new ones.
- MIN/MAX Hold button** (Also used as the protection cover lock)
Push this button during measurement to set the digital value display to the MAX Hold or MIN Hold mode as shown below.



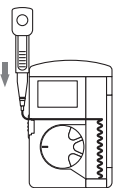
- MIN Hold mode:**
Holds the minimum value during measurement and displays it in the digital display. Indicated by "MIN" shown in the display.
- MAX Hold mode:**
Holds the maximum value during measurement and displays it in the digital display. Indicated by "MIN" shown in the display.

Using the MAX Hold function makes it possible display always the maximum value measured. This solves the problem in the meter reading, that varies depending on the position, distance and angle of the incidence of laser beam into the light sensor surface.

- Notes)
- The bar graph display is not held.
 - The MIN/MAX Hold mode is canceled when the measurement range is changed.
 - The auto power save function does not work in the MIN/MAX Hold mode.

INSTRUCTION MANUAL

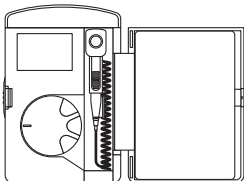
- How to integrate the light sensor probe with the main body for measurement
Insert the light sensor probe in the position on the top left of the main body as shown in the figure.



- How to open or close the protective cover
1. To open the protective cover, push and hold the button on the left side of main body into the direction shown in the figure, and open the protective cover.
2. To close the protective cover, first store the light sensor probe in the storage position of the main body as described below, and then close the protective cover until it is locked.



- How to store the light sensor probe
The light sensor probe can be stored in the main body as shown below.
1. Fit the light sensor probe into the storage position so that the light sensor surface faces up.
2. Bend the cord and store it in the space on the right of the light sensor probe.



[6] Measurement

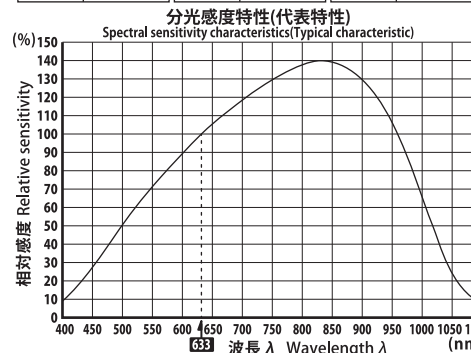
Measurement Procedure

- Set the measuring range to the maximum range (40 mW).
- Apply the laser beam to the light sensor surface.
- After measuring the current power, set the measuring range to the optimum range.
- After completing measurement, set the Power/Range switch to OFF.

- Notes)
- The auto power save function of the instrument turns it off in 15 minutes after an operation. To resume the meter from auto power save status, press MAX/MIN button or turn the Range switch off position, then turn off the power.
 - When over range, displays "OL".
 - Laser should be received on the center of the sensor at right angle.
 - Measurement of weak laser power (below 1 mW) tends to be affected by ambient light (disturbance). In this case, it is required to take a countermeasure against disturbance, by performing measurement in a dark room.

- How to correct the wavelength sensitivity of the light sensor
The reference wavelength that can be read directly with this instrument is 633 nm. To measure light with wavelengths other than 633 nm, convert the reading using the sensitivity correction coefficient obtained from the photodiode's spectral sensitivity characteristics (typical values).

波長換算値(W)=表示値(W)×補正係数 Conversion (W) = reading(W) × ① correction factor for wavelength					
波長(nm) Wavelength	補正係数 correction factor ①	波長(nm) Wavelength	補正係数 correction factor ①	波長(nm) Wavelength	補正係数 correction factor ①
405	× 9.72	633	× 1.00	850	× 0.73
450	× 3.66	650	× 0.95	900	× 0.77
488	× 2.22	670	× 0.90	940	× 0.89
500	× 1.98	700	× 0.85	950	× 0.94
515	× 1.76	750	× 0.77	1000	× 1.51
532	× 1.56	780	× 0.74	1050	× 4.06
550	× 1.40	800	× 0.73	1060	× 5.33
600	× 1.12	830	× 0.71	1100	× 13.7



Example)
When the measured laser light wavelength is 780 nm and the power meter reading is 2.44 mW:

Reading Correction coefficient Wavelength-converted value
2.44 (mW) × 0.74 = 1.81 (mW)

*This conversion value is a guide and is not guaranteed.

[7] Maintenance and Administration

To maintain accuracy, perform calibration and inspection at least once a year.

- Maintenance check**
1. External finish
 - Check if the external finish is damaged by dropping the instrument, etc.
- Light sensor**
 - Check if the light sensor surface is damaged or dirty.
 - Check if the light sensor cord is damaged.

If any of the above parts is damaged, do not use the instrument but have it repaired.
- Calibration**
For calibration and inspection of the instrument, please contact dealer, sole agent and maker.
- Battery replacement**
Replacement Procedure:
 - Set the Range switch to OFF, then remove the screw retaining the battery compartment cover using a screwdriver.
 - Remove the battery compartment cover and take out the exhausted batteries.
 - Insert new batteries without mistaking the + and - polarity.
 - Attach the battery compartment cover and clamp it with the screw.
- Storage**
 - The panel and case are little resistant to volatile solutions and heat. Do not wipe the thermometer using lacquer thinner or alcohol and do not place it heat a source of high temperatures (soldering iron, for example).
 - Do not store the instrument in a place subject to vibrations or in a place which it may drop.
 - Do not store the instrument under direct sunlight or in a place with low temperatures, high humidity or condensation.
 - Be sure to remove the batteries when the instrument is not to be used for an extended period.

[8] After-Sale Servicing

For information of repair, please contact the dealer, selling agent or maker.

[9] Specifications

Light sensor element	Si photodiode (Light sensor surface diameter Ø 9 mm) with diffusion sheet
Measurable wavelength range	400 nm to 1100 nm
Directly-readable wavelength	633 nm (He-Ne laser) Other wavelengths should be converted using typical correction factor
Display	Digital display: 4039 full scale Bar graph display: 41-segment display
Over load indication	displays "OL"
Low battery indication	Blinking "BT" appears in the display when the built-in batteries are nearly exhausted and battery supply voltage drops
Sampling rate	Digital display: Approx. 3 times/sec. Bar graph display: Approx. 30 times/sec.
Ranges	40 μW range: 0.01 μW to 40.39 μW 400 μW range: 0.1 μW to 403.9 μW 4 mW range: 0.001 mW to 4.039 mW 40 mW range: 0.01 mW to 40.39 mW
Measured object	CW laser, the modulated laser cannot be measured accurately
Accuracy	±5 % (in the 4 mW range, at the reference wavelength of 633 nm and 1 mW) Temperature: 23 °C ±2 °C
Functions	MIN Hold function, MAX Hold function Auto power save function (15 min. after operation)
EMC directive, RoHS directive	IEC61326(EMC). EN50581(RoHS).
Power supply	LR44 1.5 V x 2
Power consumption	Approx. 8 mW
Environmental condition	Altitude 2000 m or below, pollution degree II.
Operating temperature /humidity range	Temperature 0 to 40 °C, humidity 80 %RH or less (without condensation)
Storage temperature /humidity range	Temperature -10 to +50 °C, humidity 80 %RH or less (without condensation)
Dimensions	117(H) x 76(W) x 18(D) mm, approx. 120 grams
Light sensor probe	84(H) x 16(W) x 10(D) mm
Sensor cord length	Approx. 0.5 m when extended
Accessories	Instruction manual x 1

Design and specifications are subject to change for reasons of improvement, etc.

[9] Specifications

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Measurable wavelength range	400 nm to 1100 nm
Directly-readable wavelength	633 nm (He-Ne laser) Other wavelengths should be converted using typical correction coefficient
Display	Digital display: 3999 full scale Bar graph display: 42-segment display
"Over" display	"4000" with "4" in the highest digit blinking
Low battery indication	Blinking "BT" appears in the display when the built-in batteries are nearly exhausted and battery supply voltage drops
Sampling rate	Digital display: Approx. 2 times/sec. Bar graph display: Approx. 20 times/sec.
Measuring ranges	40 μ W range: 0.01 μ W to 39.99 μ W 400 μ W range: 0.1 μ W to 399.9 μ W 4 mW range: 0.001 mW to 3.999 mW 40 mW range: 0.01 mW to 39.99 mW
Measuring accuracy	\pm 5 % (in the 4 mW range, at the reference wavelength of 633 nm and 1 mW) Temperature: 23 $^{\circ}$ C \pm 2 $^{\circ}$ C
Functions	MIN Hold function, MAX Hold function Auto power save function (30 min. after operation)
EMC directive, RoHS directive	IEC61326(EMC). EN50581(RoHS).
Power supply	LR-44, x 2
Power consumption	Approx. 6 mW
Environmental condition	Altitude 2000 m or below, pollution degree II.
Operating temperature /humidity range	Temperature 0 to 40 $^{\circ}$ C, humidity 80 %RH or less (without condensation)
Storage temperature /humidity range	Temperature -10 to +50 $^{\circ}$ C, humidity 80 %RH or less (without condensation)
Main body dimensions & mass	117(H) x 76(W) x 18(D) mm, approx. 120 grams
Light sensor probe	84(H) x 16(W) x 10(D) mm
Sensor cord length	Approx. 0.5 m when extended
Provided accessories	Instruction manual x 1

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