

# POWER METER INSTRUCTION MANUAL

FOR

KPM-1000 KPD-1000

Version 1.0

*Please read this instruction manual carefully and thoroughly  
Before installing or operating your power meter.*

 **KIMMON KOHA CO., LTD.**

## TABLE OF CONTENTS

1.	Introduction.....	1
2.	General Cautions.....	1
	2-1 Transporting instruments.....	1
	2-2 Setting up.....	1
	2-3 Operation.....	1
3.	Unpacking.....	2
4.	Parts Name and Functions.....	3
	4-1 Front panel description (KPM-1000).....	3
	4-2 Connector description (KPM-1000).....	4
	4-3 Getting started.....	5
	4-4 Detector (KPD-1000).....	6
5.	Display Description.....	7
6.	Batteries.....	8
	6-1 Battery selection.....	8
	6-2 Battery installation.....	8
	6-3 Battery removal.....	8
7.	Specifications.....	9
	7-1 Meter unit KPM-1000.....	9
	7-2 Detector KPD-1000.....	9
8.	Calibration.....	10
9.	Drawings.....	10
	9-1 Meter unit KPM-1000.....	10
	9-2 Detector KPD-1000.....	10
10.	Limited Warranty.....	11
11.	Repair of Products.....	11
12.	Contact.....	11

## **1. Introduction**

Thank you very much for your purchase of KPM-1000 power meter. The power meter has a large display that features outstanding efficiency, ease of use, and good battery life. To obtain full performance from the power meter, we recommend that you read this manual carefully.

## **2. General Cautions**

### **2-1 Transporting instruments**

This power meter is a very delicate instrument, so please handle gently when you operate. When transporting the instruments, pay special attention to shock and vibration.

### **2-2 Setting up**

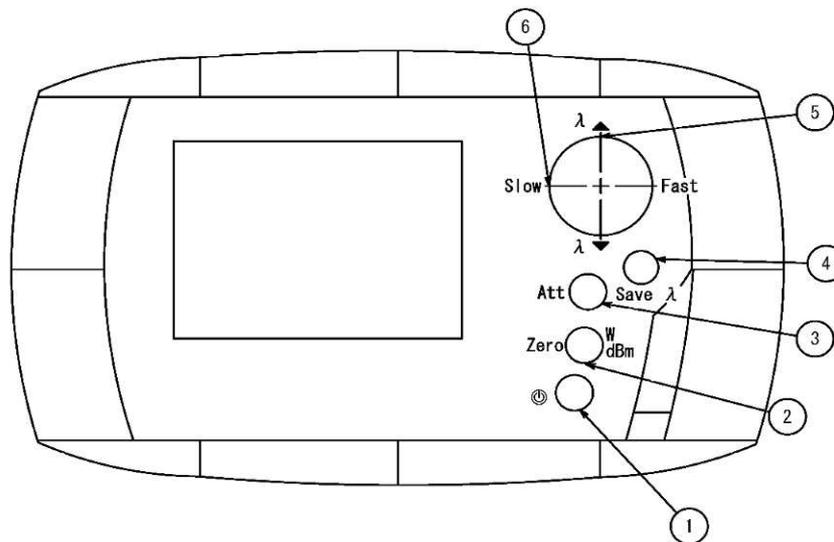
This power meter uses thermal sensors and is very sensitive to ambient temperature change. For precise measurement, we recommend the followings.

- 1) Around the detector, please avoid forced air flow or air draft.
- 2) When you measure very low power, please use thermal isolation.

### **2-3 Operation**

- 1) Stabilize the detector to the ambient temperature before you adjust zero reading.
- 2) Do not touch the detector (aperture) while you are operating.
- 3) Put on the cap to detector when you are not using in order to keep the detector surface clean.
- 4) Do not expose detector to power higher than the power specified in the specification chart to prevent the surface damage. (Refer to page 9)
- 5) Avoid heat and high humidity for storage.





**Front panel (KPM-1000)**

#### 4. Parts Name and Functions

##### 4-1 Front panel description (KPM-1000)

###### ① Control key (I/O key)

This key can be on and off the KPM-1000.

###### ② Zero / dBm control key (Unit change of mW and dBm)

This key can be canceled the electronic offset, detector offset and ambient light on the detector. This key should be pressed before taking measurements. Refer to page 5 for adjusting the zero (steps 8 and 9).

The hidden dBm function is available by pressing more than 2 seconds on the Zero control key. The KPM-1000 will convert the displayed number in dBm (dB referenced to 1mW) and will display “dBm” unit. To get back to the previous display in Watt, press again more than 2 seconds on the Zero control key.

###### ③ Att control key

This key allows the user to select the proper configuration and wavelength. Photodetectors can be calibrated with or without attenuator. The display of ATT on a display shows whether attenuator is contained or not.

###### ④ Save λ control key (Wavelength saves)

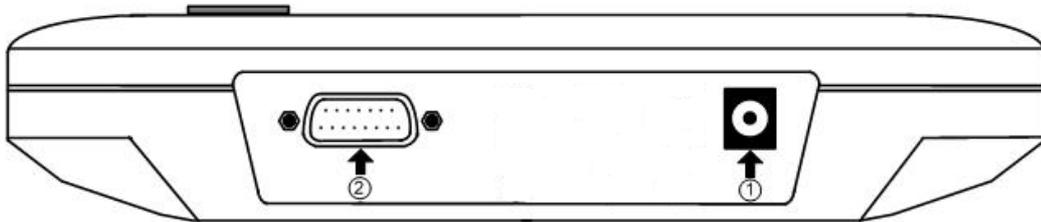
This key can be store the wavelength. After selecting the proper wavelength using the λ ▲ and λ ▼ control keys, pressing the Save λ control key stores the wavelength in non-volatile memory and returns to the measurements with the corresponding sensitivity.

###### ⑤ λ up (λ ▲) and λ down (λ ▼) control keys

This key allows the user to select the appropriate wavelength.

###### ⑥ Fast and Slow control keys

These keys are only useful with thermal detector heads. The Fast mode enables anticipation, which shortens the natural response time of the detector. The Slow mode disables anticipation. By default, the power meter is in Fast mode. This setting is not stored in non-volatile memory and therefore returns to Fast mode on every power-up.



Connectors (KPM-1000)

#### 4-2 Connector description (KPM-1000)

① **External power supply input jack.**

Input voltage required: 9 VDC/100 mA. The external power supply does not charge the batteries; it allows the use of the power meter without batteries, with dead batteries or simply to avoid discharging the batteries inside the power meter.

	<p style="text-align: center;"><b>CAUTION</b></p> <p><b>When the external energizer supply of those other than KPM-1000 is used, the eternal damage to the meter of optics may arise. Please contact us, when an excessive power supply is required.</b></p>
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② **Probe input jack.**

The KPM-1000 uses a DB-15 connector to mate with the detector heads.

### 4-3 Getting started

This section contains important information concerning the installation and operation of the KPM-1000. The KPM-1000 is delivered ready to use. Just install the 4 Alkaline R6 batteries (DC1.5V), insert a detector head in the probe input jack and press the I/O key.

#### 4-3-1 Power measurement procedure

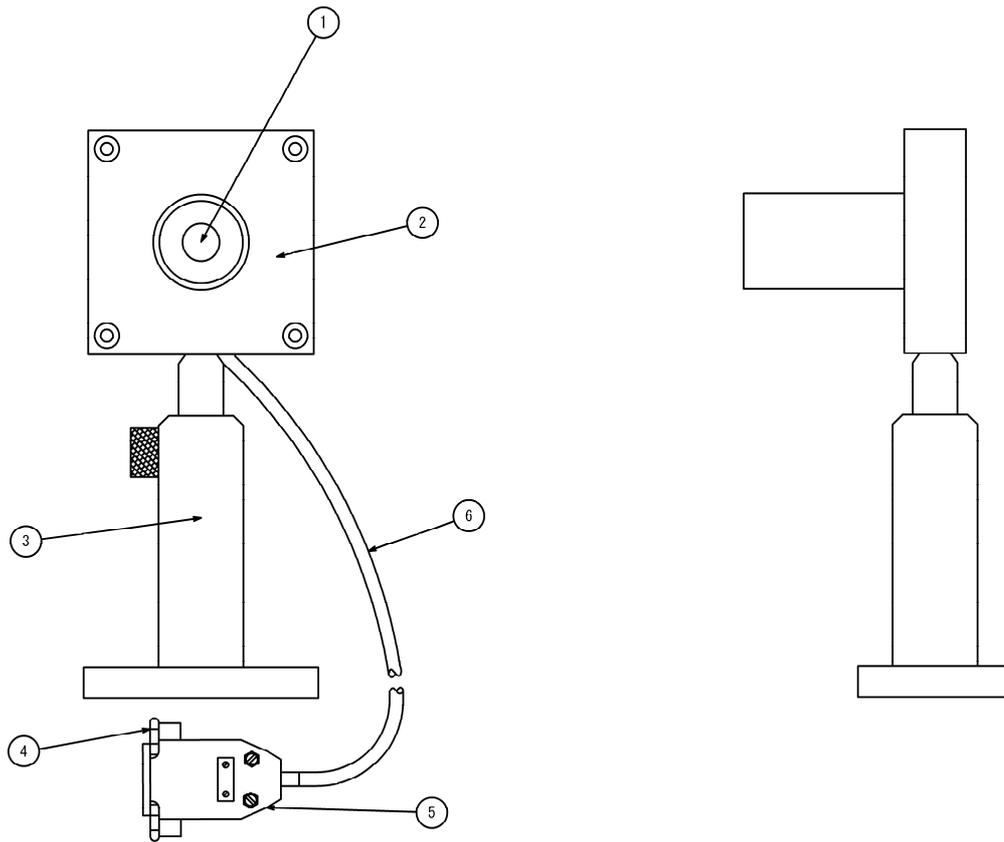
- 1) Install the power detector on its detector attachment stand.
- 2) Slide the connector latch to the right to unlock the connector.
- 3) Turn the KPM-1000 off and connect a power detector head to the KPM-1000 using the probe input jack. It is recommended to turn the KPM-1000 off before connecting a new head in order to prevent any loss of information from the detector head's EEPROM.
- 4) Slide the latch to the left to lock the connector into place.
- 5) Switch the KPM-1000 on using the I/O key. The KPM-1000 displays the current wavelength for a moment before displaying measurements. If this wavelength is not the wavelength of the laser, go to step 6, otherwise proceed to step 7.
- 6) Select the proper wavelength using the  $\lambda \blacktriangle$  and  $\lambda \blacktriangledown$  control keys. Then press the Save  $\lambda$  control key to store the wavelength in non-volatile memory and return to the measurement mode. Adjusting the zero (steps 7 ~ 11)
- 7) Remove the detector's protective cover. Put the detector into the laser beam path. The entire laser beam must be within the sensor aperture. Do not exceed maximum specified densities, energies or powers. For the most accurate measurement, spread the beam across 60%~80% of the sensor area. Leave it there until the detector has reached its equilibrium temperature.
- 8) Block off laser radiation to the detector.  
The power read by the KPM-1000 when no laser beam is incident on the detector may not be exactly zero. This is because the detector is not thermally stabilized or there was a heat source in the detector's field of view when you turned on the KPM-1000, or from the internal electronic offset of the KPM-1000.
- 9) Reset the zero; wait until the reading has stabilized and press the Zero key on the front panel. The KPM-1000 will display the characters of "ZEro" for a moment and then return to the normal measurement. You are now ready to make an accurate measurement. Pressing the Zero key again will not undo the zero; it will re-do it.
- 10) Enter a wavelength and then press Save  $\lambda$  control key to exit, when you will select Att.
- 11) Apply the laser beam to the detector. The laser must be CW for photo detectors.

#### Notes:

The power detectors are thermal sensors sensitive to temperature variations.

For high-precision measurements, it is recommended to

- ① allow the power detector's temperature to stabilize before zeroing the KPM-1000.
- ② avoid touching the detector itself when handling the power detector and touch only the stand.
- ③ avoid forced airflow or drafts around the detector.



### Detector (KPD-1000)

#### 4-4 Detector (KPD-1000)

① **Detector (Aperture)**

This is detector that converts to the thermal from the laser emission. Expose the laser emission to the center of the detector.

② **Head**

This thermal detector is set inside, and the jack for calibration is also mounted.

③ **Stand (Detector attachment)**

This is the stand for setting the detector.

④ **Slide latch**

This is the lock for connector.

⑤ **Connector (DB-15)**

This is the connector between meter unit and detector unit.

⑥ **Flexible cable**

This cable is 1800mm long flexible cable.



LCD display (KPM-1000)

### 5. Display Description

The LCD provides measurement information, wavelength information, attenuator selection, and other useful messages. When the batteries are discharged enough to compromise the measurement, the KPM-1000 displays “LO” instead of the measurement. Refer to the battery maintenance section to replace the batteries. The ATT field indicates if the detector sensitivity used takes into account the presence of the attenuator that the detector was calibrated with.

#### **Error messages can also be displayed**

E-05 Indicates that no detector is present on power-up.

E-07 Appears after pressing the Att control key with a detector that does not have attenuator calibration. The message disappears a few seconds after pressing the control key.

E-08 Indicates that the detector is not supported or that the detector calibration EEPROM is corrupted. It can also appear if the DB15 is poorly secured or is worn out.

E-09 Appears after pressing the Fast or Slow control key with a detector that does not have anticipation. The message disappears a few seconds after pressing the control key.

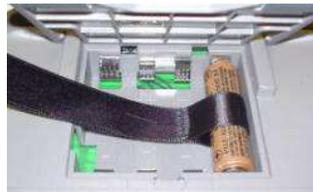
## 6. Batteries

### 6-1 Battery selection

To avoid leakage and poor autonomy, it is highly recommended that only good quality, new and identical alkaline batteries R6(DC1.5V) be put into the KPM-1000. Good quality rechargeable batteries can also be used with the KPM-1000 and recharged with an external charger. The batteries need to be replaced if the KPM-1000 displays “LO” on its digital display or if it does not power-up when the I/O control key is pressed.

### 6-2 Battery installation

- 1) Put the KPM-1000 face down on a flat surface.
- 2) Lift the kickstand.
- 3) Open and remove the battery door.
- 4) Insert one battery in the nylon strap (to ease removal) and insert it at one extremity of the KPM-1000 battery compartment with the right polarity. To avoid intermittent contact and involuntary disconnection, firmly insert the batteries. Insert the other batteries over the nylon strap with the right polarity so that pulling on the strap will pull every battery out of the KPM-1000.
- 5) Put the battery door back in place.



### 6-3 Battery removal

- 1) Put the KPM-1000 face down on a flat surface.
- 2) Lift the kickstand.
- 3) Open and remove the battery door.
- 4) Hold down the KPM-1000 and slowly pull on the nylon strap to remove the batteries. Do not use a pointed tool to remove the batteries, since that could puncture them. The batteries need a firm pull to be removed in order to have a reliable contact.

## 7. Specifications

The following specifications are based on a one-year calibration cycle, an operating temperature of 20~28°C (68~82°F) and a relative humidity not exceeding 80%.

### 7-1 Meter unit KPM-1000

Item	Specifications
Power range	1μW ~ 3W
Digital resolution	1 μW
Monitor accuracy	±1 % ±5 μV
Response time	1 second
Digital display	76 × 57 mm LCD
Display rate	2 Hz
Dimensions	210 mm(W) × 122 mm (H) × 44 mm (D)
Weight (including batteries)	0.47 kg
Batteries (included)	4 Alkaline R6 batteries(DC1.5V)
Battery life (with thermal detector)	670 hours (estimated)

### 7-2 Detector KPD-1000

Item	Specifications
Effective aperture diameter	12 mm
Spectral range	0.19 μm ~ 20 μm
Calibrated spectral range	0.248 ~ 2.5 μm and 10.6 μm <sup>a</sup>
Power noise level <sup>b,c</sup>	± 0.5 μW
Thermal drift	12 μW/°C
Typical rise time (0 ~ 95%)	27 s (2.5 s with anticipation)
Typical sensitivity	200 mV/W
Calibration uncertainty	± 2.5 %
Linearity with power	± 2 %
Repeatability (precision)	± 0.5 %
Power resolution	± 0.5 %
Max. Average power	3 W
Max. Average power (1 minute) (cooling : minimum 3 minute)	3 W
Max. Average power density 1.064 μm, 1 W CW	1 kW/cm <sup>2</sup>
Dimensions	73mm(W) × 73mm(H) × 72mm(D)
Weight	0.312 kg
Cooling	Heat sink
Recommended load impedance	100 kΩ
Linearity vs. beam dimension	± 0.7 %

<sup>a</sup> The calibrations at 2.1 to 2.5 μm and 10.6 μm are on special request only.

<sup>b</sup> Nominal value, actual value depends on electrical noise in the measurement system.

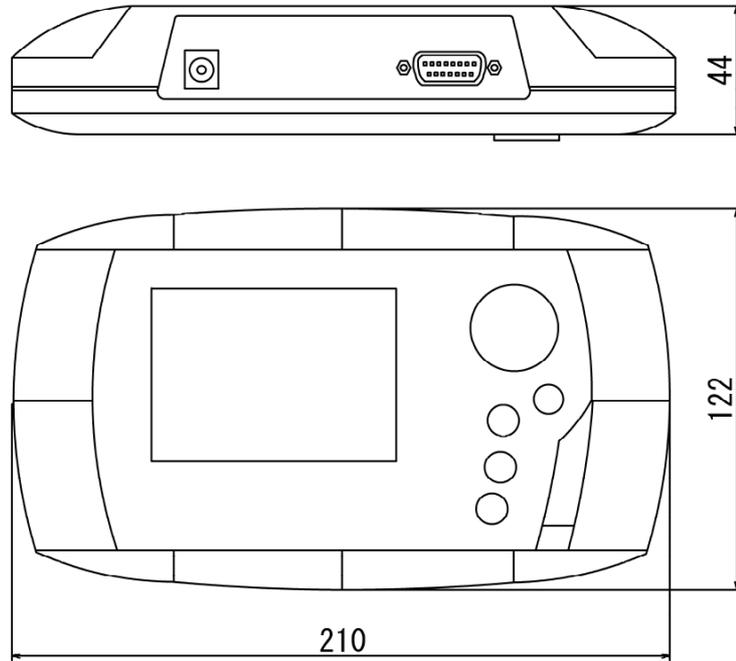
<sup>c</sup> Without anticipation. ± 5 μW with anticipation.

## 8. Calibration

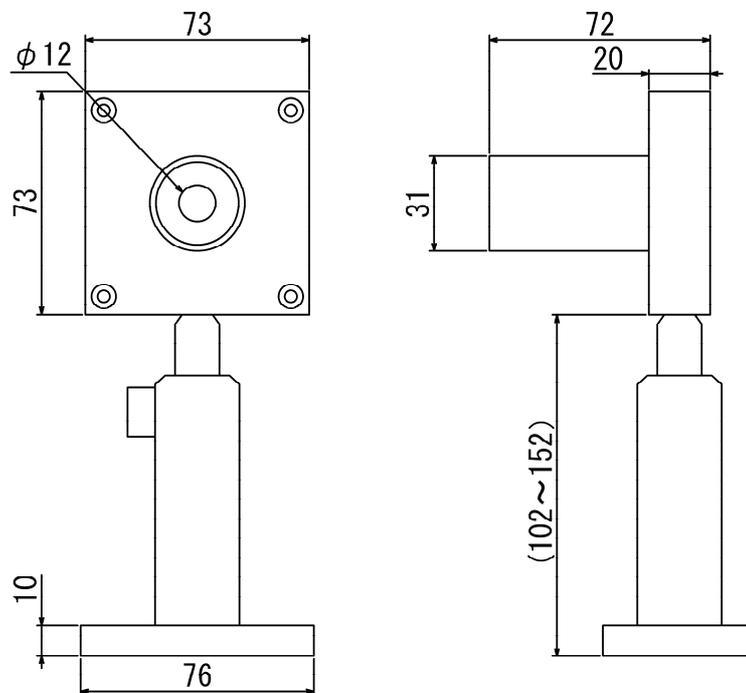
We recommend that your power meter be sent back to us for calibration once a year.

## 9. Drawings(mm)

### 9-1 Meter unit KPM-1000



### 9-2 Detector KPD-1000



## **10. Limited Warranty**

Warranty period of our products are as follows. In case of failures that fall within our responsibility, we will provide free repair or parts replacement for that period. Within one year from the date of shipment.

This limited warranty will not apply for the following failures:

- 1) The control or adjustment or environmental conditions other than those listed in this instruction manual or catalog.
- 2) The excessive shock or fall in the handling.
- 3) The wrong storage of other than those listed in this instruction manual.
- 4) The cause of other equipment.
- 5) The repair and remodeling by the customer or the third party.
- 6) The natural disasters such as floods and lightning and earthquake, and the accidents such as fire.
- 7) The damage to the customers by our product. We are not responsible for any damages.

## **11. Repair of Products**

- 1) Repair of power meter can only be accepted up to 7 year from the date of shipment. Even within the duration, it is the sole discretion of Kimmon as to if a repair work be carried out. In case of product discontinuation, repair will only be accepted up to 3 year from the date of product discontinuation, provided that all components are available.
- 2) In case of repair or replacement, please bring in or return the product to us or our agent. Transportation costs will be borne by the customer.

## **12. Contact**

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