EO Edmund
optics | worldwide

USER MANUAL

USB Power Meter | With Direct PC Interface and Software

WARRANTY

The Edmund Optics USB POWER METER Single Channel Laser Power/Energy Meter carries a one-year warranty (from date of shipment) against material and/or workmanship defects when used under normal operating conditions. The warranty does not cover recalibration, or damages related to misuse.

Edmund Optics will repair or replace at our option any USB POWER METER which proves to be defective during the warranty period; except in the case of product misuse.

Any unauthorized alteration or repair of the product is also not covered by the warranty.

The manufacturer is not liable for consequential damages of any kind.

In the case of a malfunction, contact your local Edmund Optics distributor or the nearest Edmund Optics office to obtain a return authorization number. Return the material to the appropriate address below.

Contacting Edmund Optics

To help us answer your calls more efficiently please have the model number of the detector you are using ready before calling Customer Support.

<div align="center">

Edmund Optics, Inc
101 E. Gloucester Pike
Barrington, NJ 08007

P: 1-800-363-1992
F: 1-856-573-6295
E: techsup@edmundoptics.com
Web: www.edmundoptics.com

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CLAIMS

To obtain warranty service, contact your nearest Edmund Optics agent or send the product, with a description of the problem, transportation and insurance prepaid, to the nearest Edmund Optics agent. Edmund Optics assumes no risk for the damage in transit. Edmund Optics will, at its option, repair or replace the defective product free of charge or refund your purchase price. However, if Edmund Optics determines that the failure is caused by misuse, alterations, accident or abnormal condition of operation or handling, you will be billed for the repair and the repaired product will be returned to you, transportation prepaid.

SAFETY INFORMATION

Do not use the USB POWER METER if the device or the detector looks damaged, or if you suspect that the USB POWER METER is not operating properly.

Appropriate installation must be done for water-cooled and fan-cooled detectors.   Refer to the specific instructions for more information. The user must wait for a while before handling these detectors after power is applied. Surfaces of the detectors get very hot and there is a risk of injury if they are not allowed to cool down.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution: Changes or modifications not expressly approved in writing by Edmund Optics may void the user's authority to operate this equipment.

SYMBOLS

The following international symbols are used in this manual:

Refer to the manual for specific Warning or Caution information to avoid any damage to the product.

DC, Direct Current

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1. USB POWER METER SINGLE CHANNEL LASER POWER METER

1.1. INTRODUCTION

To obtain the full performance from the USB POWER METER, we recommend that you read this manual carefully.

The USB POWER METER is a microprocessor-based power and energy meter that uses the latest technology to provide a multitude of options in a user-friendly environment. It is a complete power meter, which can provide a statistical analysis of your measurements. Moreover, it can be updated over the internet by connecting the USB or the RS-232 port to a personal computer.

The USB POWER METER USB version and the RS-232 version have enhanced network capabilities that take further advantage of the USB or RS-232 ports for data acquisition and remote control depending on the USB POWER METER version. It can transfer data files to a PC for more sophisticated data analysis and respond to commands through the PC interface. Although the default measurement unit is Watt, you may also choose to measure in dBm.

Easy software upgrade

Keep in touch with the latest improvements to our user-friendly software. You can download the latest software version anytime from our website and install it on your PC.

1.2. SPECIFICATIONS

The following specifications are based on a one-year calibration cycle, an operating temperature of 18 to 28ºC (64 to 82ºF) and a relative humidity not exceeding 80%.

	USB POWER METER
Power Meter Specifications	
Power Range	1 nW to 10 kW
Physical Scale	2 V, 15 mV
Virtual Power Scales (Photo Detector)	3 nW, 10 nW, 30nW, 100 nW, 300 nW, 1 µW, 3 µW, 10 µW, 30 µW, 100 µW, 300 µW, 1 mW, 3 mW, 10 mW, 30 mW, 100 mW, 300 mW, 1 W, 3 W
Virtual Power Scales (Thermopile Detector)	300 µW, 1 mW, 3 mW, 10 mW, 30 mW, 100 mW, 300 mW, 1 W, 3 W, 10 W, 30 W, 100 W, 300 W, 1 kW, 3 kW, 10 kW
Resolution (Digital)	Physical scale/8 388 608
Monitor Accuracy	± 0.5%, ± 5µV
Response Time (Accelerated)[1]	1 sec
Sampling Frequency	10 Hz
Statistics	Current value, Max, Min, Average, Std Dev., RMS stability, PTP stability, Time
Energy Meter Specifications (Energy Mode)	
Energy Range	3 mJ to 20 kJ
Virtual Energy Scales	3 mJ, 10 mJ, 30 mJ, 100 mJ, 300 mJ, 1 J, 3 J, 10 J, 30 J, 100 J, 300 J, 1 kJ, 3 kJ, 10 kJ, 30 kJ
Resolution (Digital)	2 nV
Accuracy[2]	1.0%
Default Trigger Level	250 mJ
Software Trigger Level	User Defined in Joules
Repetition Frequency	Supports all energy mode power heads
Statistics	Current value, Max, Min, Average, Std Dev., RMS stability, PTP stability, Repetition Rate, Avg Power
General Specifications	
Display Rate	3Hz numeric display 10 Hz graphic displays
Data Displays	Real-time, Histogram, Tuning Needle, Statistics,
User Input Correction Factors	1 multiplier and 1 offset (7 digit floating point)
Analog Output	0 – 2.05 Volt user defined, full scale, ± 1%
Internet Upgrades	USB or RS-232
PC Serial Commands	USB or RS-232
Dimensions (without stand)	91 (L) x 57 (W) x 26 max (H) mm
Weight	0.12 kg
External Power Supply (for RS-232 version	Input: 100/240 VAC 50-60 Hz, Output 9-12 VDC 100mA

Specifications are subject to change without notice

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[1] Varies with the detector
[2] Including linearity
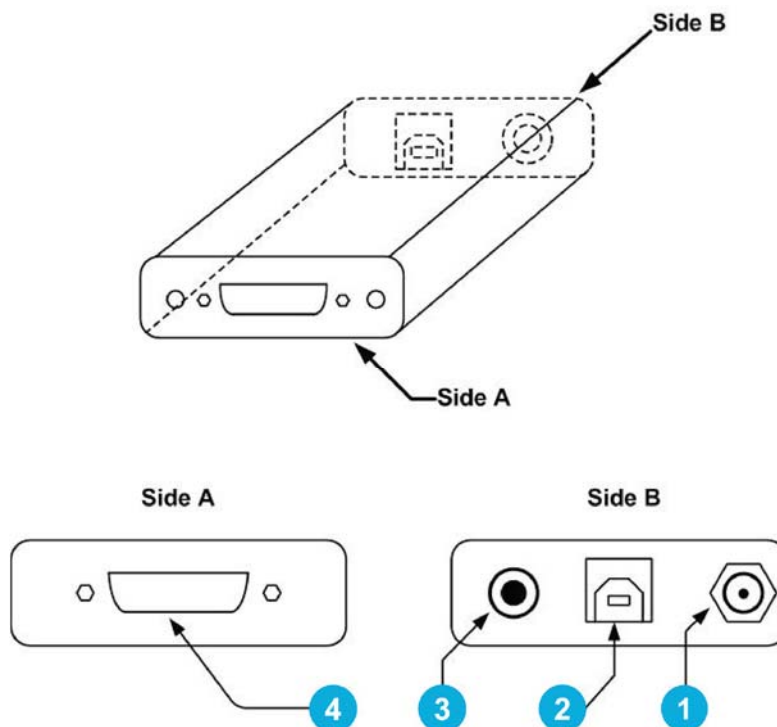
1.3. FRONT PANEL DESCRIPTION

Figure 1 USB POWER METER Top Panel

① EXTERNAL POWER SUPPLY INPUT JACK

Input voltage required: 9-12 VDC/100 mA.
Note: The external power supply input is provided only for the USB POWER METER with the RS-232 Serial Connection Option.

> ⚠ **CAUTION**
> **Permanent damage may occur to the optical meter if an external power supply other than the Edmund Optics 200130, 200960, SPU15A-105 or SPU15A-104 is used. Please call Edmund Optics or your local distributor if extra power supplies are needed for a particular setup.**

② USB INTERFACE CONNECTOR

This interface allows remote control and data transfers between the USB POWER METER and a computer that has a USB communication port. With the RS-232 USB POWER METER, this connector is use as a RS-232 com port.

3 **ANALOG OUTPUT**

For monitoring laser average power or energy by using external equipment such as a chart recorder, a computer with an analog interface, a voltmeter, etc.

The output signal represents a DC analog voltage proportional to the amplified and anticipated power detector response in the case of a power measurement. In the case of an energy measurement (energy mode), the output signal is a DC voltage representing the pulse energy value.

The user must enter the maximum value in the Settings → **SET Max Analog Out Range**. This value is the value at which the analog output equals 2.05 V. That provides the best signal-to-noise ratio. The measured power or energy is then related to the output voltage and to the selected range according to the following equations:

V_{out} = Measurement * 2.05 / Max Analog Out Range

For example, with a 10 W max analog range:

2.05 V corresponds to 10 W
1.025 V corresponds to 5 W

Another useful example: To set the analog output so that 1V corresponds to a measurement of 56W, the Max Analog Out Range must be set to 20.5 according to the following equation:

Max Analog Out Range = 56 * 2.05

Specifications on the analog output:

Maximum output voltage:	2.05 V
Output impedance:	274 Ω
Connector type:	Female 1/8" jack

4 **PROBE INPUT JACK**

The USB POWER METER uses a DB-15 female connector to mate with the detector heads (probes).
The USB POWER METER works with all Edmund Optics power detectors. It automatically recognizes every power detector head, which ensures accurate auto-calibration. More importantly, it can take advantage of our Personal wavelength correction™. It reads the memory in the Smart Interface connector (version 5 and higher) to provide a wavelength correction that is based on spectral data measured from that specific detector.

The USB POWER METER may not recognize some of the earlier heads.

> ⚠ **WARNING**
> **This DB-15 connector, though similar to that of the former TPM-310 and TPM-330 monitors, is incompatible with the power detector heads of PS-310 Series Version 1 and PS-330 Series Version 1. These heads used a different technology and do not have the same pin-out configuration.**

The Edmund Optics C-300 adaptor can be used in order to connect the power detector heads of PS-310 Series and PS-330 Series Version 1 and 2. Please contact your local Edmund Optics distributor or the nearest Edmund Optics office for further information.

Any attempt to modify connectors of the early version heads to mate with the USB POWER METER can result in damage to the monitor.

2. OPERATING INSTRUCTIONS

First, you have to install the PC-PREMIER software on your computer, along with the USB drivers. Please find the latest version on our website. The software will automatically connect to the first COM port available. As soon as you are connected, you are ready to adjust the settings (please refer to the PC-PREMIER manual).

2.1. INSTALLING THE USB DRIVERS

Plug the USB POWER METER into a USB port on the PC. If the PC supports USB 1.1, Windows detects the new device and prompts you for the software drivers. A window will open that says "Found New Hardware – USB Device" and after a few moments, the "Found New Hardware Wizard" will appear.

The USB drivers are available on our website.

Please note that old monitors without the (R2) at the end of the product name need different USB drivers which are available on our website also. They do not support Windows VISTA, unless noted on the website.

At the end of this process, a new serial COM port will be added to the list of communication ports. It may be used as any other serial port. You will need to know the COM port number to set up the serial connection to the USB POWER METER.

Verify COM Port

To verify the USB installation and find the COM port number, open the device manager and scroll down to **Ports (COM & LPT)** and double click that line. One of the options should be:

USB-to-Serial Port (COM#)

Note the COM port number, you will need it for the next step.

2.2. QUICK MEASUREMENT PROCEDURE

This section shows you the fastest way of making a laser power measurement with the USB POWER METER.

The monitor automatically recognizes all the Edmund power heads of version 4 or higher. All custom technical data required for optimum operation of the detector will be automatically downloaded from the EEPROM in the DB-15 connector. This data includes sensitivity, model, serial number, version, wavelength correction factors, and time response. In case of a conflict, use the sensitivity on the most recent calibration certificate. The USB POWER METER must be disconnected from the PC before connecting a new head in order to prevent any lost of data from the detector's head EEPROM.

1	Install the power detector head on its optical stand.
2	First, slide the connector latch to the right to unlock the connector.
3	Connect a version 5 (or higher) power or energy detector head to the USB POWER METER using the **PROBE INPUT JACK** while the USB POWER METER is disconnected from the PC.
4	Slide the latch to the left to lock the connector into place.
5	Connect the USB cable to your computer for the USB model or, for model RS-232, plug the RS-232 cable to your computer and then the power supply.
6	Open PC-PREMIER and click on the Connect button in the Ribbon menu.
7	If you have a photodiode, to obtain measurements in dBm, select Measure Mode / dBm.

Adjust the Zero (Steps 8 to 10)

8	Remove the head's protective cover.
	Put the detector head into the laser beam path. The entire laser beam must be within the sensor aperture. Do not exceed maximum specified densities or powers. For the most accurate measurement, spread the beam across 60% to 80% of the sensor area.
	Note: Power heads can be used with both CW and pulsed lasers.
9	Block off the laser radiation to the detector.
10	The power read by the USB POWER METER 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 USB POWER METER.

11	To reset the zero, wait until the reading has stabilized and select Zero Offset button in the Ribbon menu. Note that the Zero Offset process can take about 20s for a photodiode. It is much quicker for other detectors. You are now ready to make an accurate measurement.

Notes:

- Refer to specific power detector documentation for complete installation and operating instructions.
- The power detectors are thermal sensors sensitive to temperature variations.
- For high-precision measurements, it is recommended to:
- Allow the power detector temperature to stabilize before zeroing the USB POWER METER.
- Do not touch the detector head when handling the power detector. Touch only the stand.
- Avoid forced airflow or drafts around the detector.

12	Apply the laser beam to the detector head.
13	The laser beam average power will be displayed in three ways for your convenience:

- Digitally for real time measure.
- On a histogram to allow the laser beam's long-term stability to be evaluated.
- On a digital needle for laser tuning.

2.3. USING THE USB POWER METER WITH PC-PREMIER

The PC-PREMIER is a user-friendly communication software specially made for Edmund Optics monitors, including the USB POWER METER (USB and RS-232). It is available for free through our website. The PC-PREMIER lets you control, visualize and save the monitor's and detector's information, while saving data.

You can download the PC-PREMIER program. Access our website and go to the Downloads section. Click on the file name and download it to your PC. The specific actions necessary vary by browser and browser settings. After it is transferred, open the file on your PC and follow the instructions to decompress and install it.

Please refer to the PC-PREMIER manual also available on our website.

If you try to install the same PC-PREMIER version twice on your computer, you will have the following warning:

      Installation Summary:
      No software will be installed or removed.

In such a case, please press Enter and continue using the installed version of PC-PREMIER.

3. SERIAL COMMUNICATION

3.1. SERIAL COMMANDS

The star(*) is part of each command

Commands	Description	Return Example
*ATT	Turns the attenuator correction ON when available for the detector	"ACK\r\r\n"
*ATF	Turns the attenuator correction OFF. OFF by default.	"ACK\r\r\n"
*CAU	Sends the data points through the serial port at a frequency of 10 Hz	"9.793354e-01\r\r\n 9.792939e-01\r\r\n"
*CSU	Ends the *CAU mode	"ACK\r\r\n"
*CVU	Returns a single measurement (the current measurement) through the serial port.	"ACK\r\r\n9.793354e-01\r\r\n"
*ANT	Turns the anticipation ON. ON by default & return characters « ACK »	"ACK\r\r\n"
*ANF	Turns the anticipation OFF	"ACK\r\r\n"
*CFT	Turns the power correction ON. ON by default.	"ACK\r\r\n"
*CFF	Turns the power correction OFF	"ACK\r\r\n"
*AOB	Modifies the analog output voltage value (*AOB + 8 characters) ***Example: *AOB1.00E+01*** The maximum value of the analog display (2.05 volts) is 10 watts	"ACK\r\r\n"
*AOD	Sets an analog output delay from 1s to 7s for a return to 0V after an energy measurement. Default 0 (no return to zero after an energy measurement). ***Example: *AOD2.00E+00*** The delay is 2 seconds.	"ACK\r\r\n"
*RST	Resets the device	""
*SOU	Sets the zero offset	"ACK\r\r\n"
*KPA	Returns the character string « **ACK** »	"ACK\r\r\n"
*PWC	Wavelength correction value (+ 5 characters) ***Example: *PWC01064*** selects the wavelength 1064 nm	"ACK\r\r\n"
*TLC	Modifies the trigger level in energy mode (+ 8 characters) ***Example: *TLC2.00E-02*** selects a Trig Level of 0.002 Joules	"ACK\r\r\n"
*NAM	Returns the model of the head to the serial port	"UP55N-400W-H9\r\r\n"
*VER	Returns the name of the software to the serial port	"Version 1.14\r\r\n"
*F01	Returns information about current status All field are separate by a TAB character "\t"	"Version\t3\tName\tUP55N-400W-H9\tWavelength\t1064\tTrig Level\t2.500000e-01\tMax Analog Output\t2.047500e+00\tMode\t0 Offset\t0\tMUL\t1.000000e+00\tOFF\t0.000000e+00\tPWCStatus 65536\tMinScale\t24\r\r\n"

*F02	Returns more information about current status All field are separate by a TAB character "\t"	"Version\t3\tName \tUP55N-400W-H9\tWavelength \t1064\tTrig Level\t2.500000e-01\tMax Analog Output \t2.047500e+00\tMode \t0\tOffset\t0\tMUL\t1.0 0000e+00\tOFF\t0.000 000e+00\tPWCStatus\ t65536\tMinScale\t24\t LinearCorr\t1\tAnticipa tion\t1\tAttenuator \t0\r\r\n"
*MUL	Modifies the multiplication factor (+ 8 characters) ***Example:* *MUL1.00E+01** selects a multiplication factor of 10	"ACK\r\r\n"
*OFF	Modifies the offset (8 characters) ***Example:* *OFF-2. 0E-00** selects a user offset of two watts	"ACK\r\r\n"
*CMW	Turns the Energy Mode ON	"ACK\r\r\n"
*CMX	Turns the Energy Mode OFF. OFF by default.	"ACK\r\r\n"
*SHI	Make a physical scale down.	"ACK\r\r\n"
*SLO	Make a physical scale up.	"ACK\r\r\n"
*FAS	Turns the autoscale mode on.	"ACK\r\r\n"

Please note that you must type the exact number of characters or numerical values required.

Example: *AOB1.00E+01 has 8 characters/numerical values. Don't put any space between characters or numerical values.

3.2. ERROR MESSAGES

"\r\r\nE01\r\r\n"	Bad Command
"\r\r\nE02\r\r\n"	Energy Mode is not available
"\r\r\nE03\r\r\n"	N/A
"\r\r\nE04\r\r\n"	The selected wavelength correction factor is not valid
"\r\r\nE05\r\r\n"	The connector is not connected
"\r\r\nE06\r\r\n"	Attenuator not available

3.3. COMMUNICATION SETTINGS

Bits per second	57600
Data bits	8
Parity	None
Stop bits	1
Flow control	None

4. DECLARATION OF CONFORMITY

Application of Council Directive(s):   2014/30/EU   The EMC Directive

Manufacturer's Name: Gentec Electro Optics, Inc.
Manufacturer's Address: 445 St-Jean Baptiste, suite 160
                                 (Québec), Canada   G2E 5N7

European Representative Name: Laser Components S.A.S.
Representative's Address: 45 bis Route des Gardes
                                  92190 Meudon (France)

Type of Equipment: Optical Power Monitor
Model No.:   P-Link
Year of test & manufacture: 2011

Standard(s) to which Conformity is declared:
EN 61326-1:2006: Emission generic standard

Standard	Description	Performance Criteria
CISPR 11 :2009 A1 :2010	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement	Class A
EN 61000-4-2 2009	Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques- Electrostatic discharge.	Class B
EN61000-4-3 2006+A2:2010	Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques- Radiated, Radio Frequency, electromagnetic field immunity test.	Class A
EN61000-4-4 2012	Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques- Electrical fast transient/burst immunity test.	Class B
EN 61000-4-6 2013	Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurements techniques- Immunity to conducted Radio Frequency.	Class A
EN 61000-3-2:2006+A1:2009	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)	Class A

I, the undersigned, hereby declare that the equipment specified above
conforms to the above Directive(s) and Standard(s).

Place: Québec (Québec)

Date: July 14, 2016

_____
(President)

APPENDIX A – WEEE DIRECTIVE

Recycling and separation procedure for WEEE directive 2002/96/EC

This section is used by the recycling center when the monitor reaches its end of life. Breaking the calibration seal or opening the monitor will void the USB POWER METER warranty.

The complete Monitor contains:
       1 Monitor
       1 power supply for RS-232 option (not made by Edmund Optics).
       1 USB cable for USB option.
       1 calibration certificate

Separation

Paper: Manual and certificate
Plastic: Monitor side enclosure.
Wires: USB cable and power supply plug.
Printed circuit board: inside the monitor.
Aluminum: Monitor enclosure
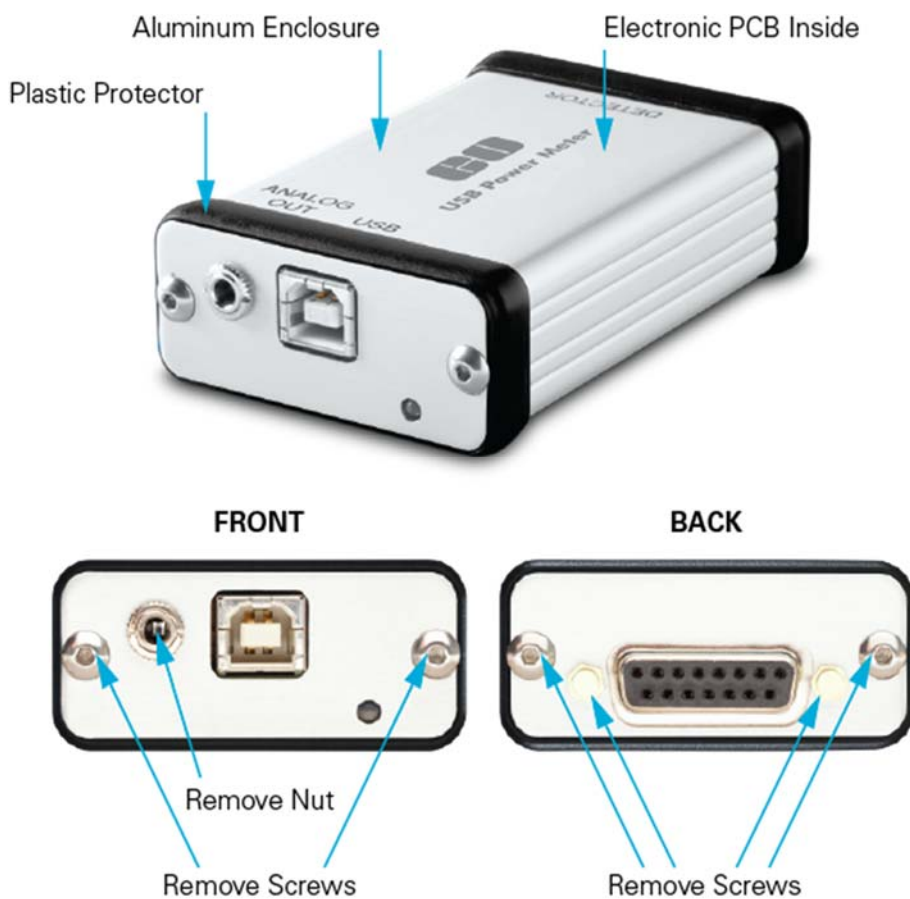
Opening the Monitor

Figure 2 Opening the USB POWER METER Monitor

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