

Model 1916-C/-R

Hand-held Optical Power Meter



User's Manual



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Experience | Solutions

Warranty

Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of one year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made and the instrument returned freight prepaid. Repaired products are warranted for the remainder of the original warranty period or 90 days, whichever is longer.

Limitation of Warranty

The above warranties do not apply to products which have been repaired or modified without Newport's written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. NEWPORT CORPORATION SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE PURCHASE OR USE OF ITS PRODUCTS.

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1791 Deere Avenue
Irvine, CA, 92606
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P/N: 90001050 Rev. G

D/N: 45502

Declaration of Conformity

We declare that the accompanying product, the models 1916-C Power Meter and 1916-R Power Meter, identified with the  mark, meets the intent of the Electromagnetic Compatibility Directive, 2004/108/EC.

Manufacturer's Name: Newport Corporation
 Manufacturer's Address: 1791 Deere Avenue
 Irvine, CA 92606 USA
 Type of Equipment: Laser Power/Energy Meter
 Model No.: 1916-C/1916-R Power Meter
 Year of test & manufacture: 2011
 Standard(s) to which Conformity is declared:
 BS EN 61326-1:2006 Electrical equipment for measurement, control and laboratory use-Basic Immunity Requirements
 CISPR11: 2009+A1: 2010 Class A Group 1 radiated and conducted emission limits

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
EN 61000-4-3 2006+ A2:2010	Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques- Radiated, Radio Frequency, electromagnetic field immunity test	Class A
EN 61000-4-4 2004+A1:2010	Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques- Electrical fast transient/burst immunity test.	Class B
EN 61000-4-5 2006	Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques- Surge immunity test.	Class B
EN 61000-4-6 2009	Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurements techniques- Immunity to conducted Radio Frequency.	Class A
EN 61000-4-11 2004	Electromagnetic compatibility (EMC) – Part 4-11: Testing and measurement techniques- Voltage dips, short interruptions and voltage variations immunity tests	Class B Class B Class C Class C

Mark Carroll

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Newport Corporation Calling Procedure

If there are any defects in material or workmanship or a failure to meet specifications, promptly notify Newport's Returns Department by calling 1-800-222-6440 or by visiting our website at www.newport.com/returns within the warranty period to obtain a **Return Material Authorization Number (RMA#)**.

Return the product to Newport Corporation, freight prepaid, clearly marked with the RMA# and we will either repair or replace it at our discretion. Newport is not responsible for damage occurring in transit and is not obligated to accept products returned without an RMA#.

E-mail: rma.service@newport.com

When calling Newport Corporation, please provide the customer care representative with the following information:

- Your Contact Information
- Serial number or original order number
- Description of problem (i.e., hardware or software)

To help our Technical Support Representatives diagnose your problem, please note the following conditions:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Have you seen this problem before? If so, how often?
- Can the system continue to operate with this problem? Or is the system non-operational?
- Can you identify anything that was different before this problem occurred?

Safety Information

Do not use the 1916-C/-R if the device or the detector looks damaged, or if you suspect that the 1916-C/-R 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 B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, it is suggested to try to correct the interference by taking one or more of the following steps:

- Reorient or relocate the receiving antenna.
- Increase the distance between the equipment and receiver.
- Connect the equipment to an outlet that is on a different circuit than the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE

The 1916-C Power Meter and the 1916-R Power Meter are intended for use in an industrial laboratory environment. Use of these products in other environments, such as residential, may result in electromagnetic compatibility difficulties due to conducted as well as radiated disturbances.

Waste Electrical and Electronic Equipment (WEEE)



Figure 1-1 WEEE Directive Symbol

This symbol on the product or on its packaging indicates that this product must not be disposed of with regular waste. Instead, it is the user responsibility to dispose of waste equipment according to the local laws. The separate collection and recycling of the waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For information about where the user can drop off the waste equipment for recycling, please contact your local Newport Corporation representative.

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1 General Information

1.1 Introduction

To obtain full performance from the 1916-C/-R, we recommend that you read this manual carefully.

The 1916-C/-R is a microprocessor based hand-held optical power meter featuring a large display, outstanding efficiency, ease of use and battery life. 1916-R is a RoHS compliant version that replaces 1916-C. When a detector is connected to the instrument, its specific model type and calibration information is downloaded into the meter, enabling the appropriate measurement ranges and units of measure. The instrument is compatible with Newport's 918D Series low-power, photodiode detectors and 818P Series high-power, thermopile detectors.

1.2 Unpacking

Each 1916-C/-R is thoroughly tested and calibrated prior to shipment.

Visually inspect your 1916-C/-R after removing it from the shipping container. If you see any damage, retain all packaging materials and shipping receipts. Any damage claim should be made promptly to the shipping company. Notify the nearest Newport representative concerning the claim, so that any repair or replacement can be arranged as soon as possible.

1.3 Parts List

The following is a list of parts included with the 1916-C/-R Hand-held Power Meter. Please make sure everything is present before discarding packing materials.

- 1916-C/-R hand-held power meter
- 4 alkaline AA batteries (already installed)
- User manual

1.4 Specifications

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

General Specifications 1916-C/-R

Digital Display	76 x 57 mm LCD
Display Rate	2 Hz
Dimensions (without stand)	210mm (W) x 122 (H) x 44 mm (D)
Weight (with batteries)	0.47 kg
Batteries (included)	4 alkaline AA batteries
Battery Life	670 hours (estimated)
Universal Power Supply	Input: 100/240 VAC 50-60 Hz, Output 9 VDC 1.66 A (not included)



CAUTION

Permanent damage to the optical meter may occur if an external power supply other than the Newport PM-PS9 (200960A) is used. Please call Newport Corporation if extra power supplies are needed for a particular setup.

Power Meter Specifications

Power Range	1 nW to 10 kW
Low Power Scales (with 818-series detectors)	Autoscale
High Power Scales (with 818P-series detectors)	single wide range scale
Resolution (with 818-series detectors)	1pW
Resolution (with 818P-001-12 detector)	1 μ W
Resolution (with other 818P-series detectors)	1mW
Meter Accuracy	$\pm 1\%$ $\pm 5\ \mu\text{V}$
Response Time (accelerated)¹	1 sec
Sampling Frequency	16.7 Hz

¹ Varies with individual detector (see 818P Series Detector Manual).

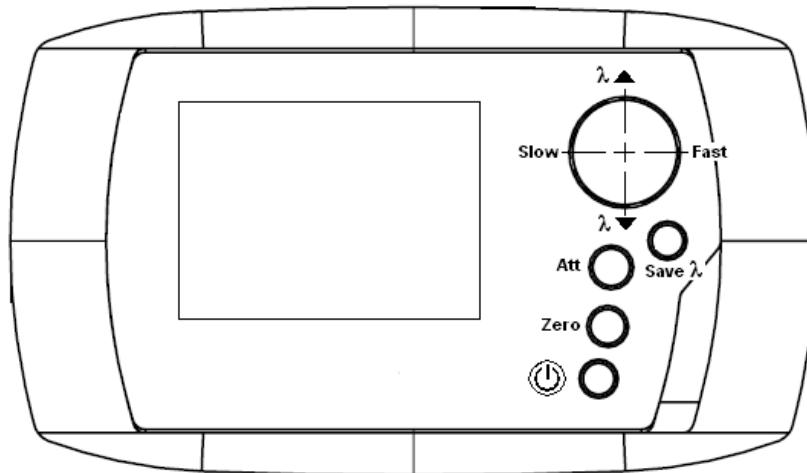


Fig. 1-1 1916-C/-R Front Panel

1.5 Front Panel Description

- **I/O Control Key**
Turns 1916-C/-R on and off.
- **Zero /dBm Control Key**
Cancels electronic offset, detector offset and ambient light on the detector. This key should be pressed before taking a measurement. Refer to p.7 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 1916-C/-R 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.
- **Att Control Key**
Newport’s photodetectors are calibrated with and without attenuator, with both responsivity data captured in the detector EEPROM and downloaded into the instrument upon start-up. This key allows the user to select the proper configuration. The ATT LCD annunciator indicates whether the attenuator setting is activated.
- **Save λ Control Key**
After selecting the proper wavelength using the λ **up** and λ **down** control keys, pressing the Save λ control key stores the wavelength in non-volatile memory and returns to measurements with the corresponding sensitivity.
- **λ Up and λ Down Control Keys**
Allows the user to select the appropriate wavelength by scrolling up or down within the wavelength range of the detector in use.

- **Fast and Slow Control Keys**

These keys are used with 818P Series High-Power thermal detectors. 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.

1.6 Connector Description

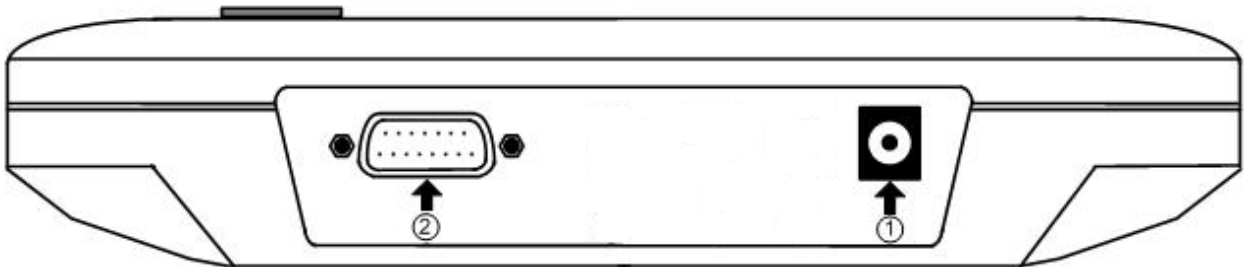


Fig. 1-2 1916-C/-R Top Panel

1- **EXTERNAL POWER SUPPLY INPUT JACK:**

The optional external power supply (not included with the 1916-C/-R) does not charge the batteries; it allows the use of the power meter without batteries, with depleted batteries or simply to avoid discharging the batteries inside the power meter. Input voltage required: 9 VDC/100 mA.

2- **PROBE INPUT JACK:**

The 1916-C/-R uses a DB-15 female connector to mate with the detectors. See section 2.1 for compatible detector list.

2 System Operation

This section contains important information concerning the installation and operation of the 1916-C/-R hand-held power meter. The 1916-C/-R is delivered ready to use. Just insert a detector in the Probe Input Jack (#2 in Figure 1-2)) and press the I/O key.

2.1 Making a Power Measurement

- 1- Install the power detector on its optical stand.
- 2- **With the 1916-C/-R turned off**, connect the power detector head to the 1916-C/-R using the **PROBE INPUT JACK** (see Fig. 1-2). It is recommended to turn the 1916-C/-R off before connecting a new detector head in order to prevent any loss of information from the detector head's EEPROM.
- 3- Fasten the DB-15 thumbscrews.
- 4- Switch the 1916-C/-R ON using the **I/O** key. The 1916-C/-R displays the current wavelength for a moment before displaying measurements. If this wavelength is not the wavelength of the laser, go to step 5, otherwise proceed to step 6.
- 5- Select the proper wavelength using the **λ up and λ down control keys**. Then press the **Save λ control key** to store the wavelength in non-volatile memory and return to the measurement mode.

Zero Offset Adjustment (steps 6 to 8)

- 6- 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% to 80% of the sensor area. Leave it there until the detector has reached its equilibrium temperature.
- 7- Block off laser radiation to the detector.

The power read by the 1916-C/-R 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 1916-C/-R, OR it is caused by the internal electronic offset of the 1916-C/-R.

- 8- To reset the zero, wait until the reading has stabilized and press the **Zero button** on the front panel. The 1916-C/-R will display "ZEro" for a moment and then return to

the normal measurement mode. You are now ready to make an accurate measurement. Pressing the **Zero key** again will not undo the zero; it will re-do it.

- 9- When you select **ATT** you must enter a wavelength and then press **Save λ** to exit.
- 10- Apply the laser beam to the detector. The laser must operate in CW mode for measurements with low power detectors.

Notes:

- Refer to the 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's temperature to stabilize before zeroing the 1916-C/-R.
- Do not touch the detector body itself when handling. Touch only the stand.
- Avoid forced airflow or air drafts around the detector.

Detectors compatible with 1916-C/-R Power and Energy Meter
818P Series High Power Detectors
918D Series Low Power Detectors
818 Series Low Power Detectors (with connector adapter)

Table 1-1. Detectors compatible with the 1916-C/-R

NOTE:

High Power detectors can be used with both CW and pulsed lasers.
 Low Power detectors can only be used with CW lasers.

2.2 Display Description



Fig. 1-3 1916-C/-R LCD Display

The 1916-C/-R LCD display provides measurement information, wavelength information, attenuator selection and other useful messages.

When the batteries are discharged enough to compromise the measurement, the 1916-C/-R 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 which the detector was calibrated with.

The following error messages can also be displayed:

E-05: 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: the detector is not supported or 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 key or the Slow key when this feature is unavailable on the detector.

Any other error message indicates a malfunction and should be reported.

3 Batteries

3.1 Battery Selection

To avoid leakage and poor autonomy, it is highly recommended that only good quality, new and identical alkaline batteries be inserted in the 1916-C/-R. Good quality rechargeable batteries can also be used with the 1916-C/-R and recharged with an external charger.

The batteries need to be replaced if the 1916-C/-R displays “LO” on its digital display or if it does not power-up when the I/O control key is pressed

3.2 Battery Installation

- Place the 1916-C/-R face down on a flat surface.
- Lift the kickstand.
- Open and remove the battery door.
- Insert one battery in the nylon strap (to ease removal) and insert it at one end of the 1916-C/-R battery compartment, making sure to observe the correct battery polarity. Insert the other batteries over the nylon strap observing the correct polarity so that pulling on the strap will pull every battery out of the 1916-C/-R. To avoid intermittent contact and involuntary disconnection, insert the batteries firmly.



- Replace the battery door.

3.3 Battery Removal

- Place the 1916-C/-R face down on a flat surface.
- Lift the kickstand.
- Open and remove the battery door.
- Hold down the 1916-C/-R and slowly but firmly pull on the nylon strap to remove the batteries. Do not use a pointed tool to remove the batteries as it may puncture them.

Service Information

The Model 1916-C/-R Hand-held Power Meter contains no user serviceable parts. To obtain information regarding factory service, contact Newport Corporation or your Newport representative. Please have the following information available:

1. Instrument model number (1916-C/-R)
2. Instrument serial number (on rear panel)
3. Description of the problem.

If the instrument is to be returned to Newport Corporation, you will be given a Return Number, which you should reference in your shipping documents. Please fill out a copy of the service form, located on the following page, and have the information ready when contacting Newport Corporation. Return the completed service form with the instrument.

To obtain warranty service, contact your nearest Newport agent or send the product, with a description of the problem, transportation and insurance prepaid, to the nearest Newport agent. Newport Corporation assumes no risk for the damage in transit. Newport Corporation will, at its option, repair or replace the defective product free of charge. However, if Newport Corporation 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.

Service Form



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Newport Corporation
U.S.A. Office: 800-222-6440
FAX: 949/253-1479

Name _____

Return Authorization # _____
(Please obtain RA# prior to return of item)

Company _____

Address _____ Date _____

Country _____ Phone Number _____

P.O. Number _____ FAX Number _____

Item(s) Being Returned:

Model # _____ Serial # _____

Description _____

Reason for return of goods (please list any specific problems):

Appendix A

Recycling and Separation Procedure

This section is used by the recycling center when the power meter reaches its end of life. Breaking the calibration seal or opening the power meter enclosure will void the 1916-C/-R warranty.

The complete 1916-C/-R power meter contains:

- 1 Hand-held power meter
- 4 AA Alkaline Batteries
- 1 User manual
- 1 Calibration certificate

Separation

Paper: user manual and calibration certificate.

Plastic: stand, connector plate, battery door, power meter enclosure, keypad.

Wires: inside power meter enclosure.

AA batteries: inside battery compartment.

Metal battery clips.

Printed circuit board: inside the power meter featuring a liquid crystal display less than 100 cm².

Dismantling procedure:

- Remove batteries.
- Remove the posts on each side of the DB15 connector using pliers.
- Open power meter enclosure by removing the Phillips head screws in the 4 corners.
- Cut the wires on the PCB side and battery clips side with wire cutters.
- Remove battery clips with pliers.

Internal #101250 Rev. G

Newport Corporation, Irvine, California; Evry and Beaune-La-Rolande, France have all been certified compliant with ISO 9001 by the British Standards Institution. Mountain View, California is DNV certified.