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EPM-P Series Peak and Average Power Meters

Installation Guide

Agilent Technologies

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Agilent Technologies, Inc.
5301 Stevens Creek Blvd.
Santa Clara. CA 95052 USA

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Legal Information

Certification

Agilent Technologies certifies that this product met its published specifications at the time of shipment from the factory. Agilent Technologies further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.

Warranty

This Agilent Technologies instrument product is warranted against defects in material and workmanship for a period of three years from date of shipment. During the warranty period, Agilent Technologies will at its option, either repair or replace products which prove to be defective. For warranty service or repair, this product must be returned to a service facility designated by Agilent Technologies. Buyer shall prepay shipping charges to Agilent Technologies and Agilent Technologies shall pay shipping charges, duties, and taxes for products returned to Agilent Technologies from another country. Agilent Technologies warrants that its software and firmware designated by Agilent Technologies for use with an instrument will execute its programming instructions when properly installed on that instrument. Agilent Technologies does not warrant that the operation of the instrument, or firmware will be uninterrupted or error free.

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Safety Symbols

The following symbols on the instrument and in the documentation indicate precautions which must be taken to maintain safe operation of the instrument.

	The Instruction Documentation Symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the supplied documentation.
	Alternating current (AC)
	This symbol indicates the operating switch for 'On' mode.
	This symbol indicates the operating switch for 'Stand-by' mode. Note, the instrument is NOT isolated from the mains when the switch is pressed. To isolate the instrument, the mains coupler (mains input cord) should be removed from the power supply.
	External Protective Earth Terminal. While this is a Class I product, provided with a protective earthing conductor in a power cord, an external protective earthing terminal has also been provided. This terminal is for use where the earthing cannot be assured. At least an 18AWG earthing conductor should be used in such an instance, to ground the instrument to an assured earth terminal.

Safety Notices

This guide uses warnings and cautions to denote hazards

WARNING

A warning calls attention to a procedure, practice or the like, which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning until the indicated conditions are fully understood and met.

CAUTION

A caution calls attention to a procedure, practice or the like which, if not correctly performed or adhered to, could result in damage to or the destruction of part or all of the equipment. Do not proceed beyond a caution until the indicated conditions are fully understood and met.

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General Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

WARNING **This is a Safety Class I instrument (provided with a protective earthing ground, incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the instrument is likely to make the instrument dangerous. Intentional interruption is prohibited.**

DO NOT operate the product in an explosive atmosphere or in the presence of flammable gasses or fumes.

DO NOT use repaired fuses or short-circuited fuseholders: For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type.

DO NOT perform procedures involving cover or shield removal unless you are qualified to do so: Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers and shields are for use by service-trained personnel only.

DO NOT service or adjust alone: Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, service personnel must not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a Agilent Sales and Service Office for service and repair to ensure the safety features are maintained.

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DO NOT substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Sales and Service Office for service and repair to ensure the safety features are maintained.

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Getting Started

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Welcome

Welcome to the Agilent Technologies E4416A and E4417A *EPM-P Series Peak and Average Power Meters Installation Guide*. This guide shows you how to:

- physically check the power meter
- adjust the carrying handle
- switch it on
- confirm the meter passes the power on self test
- connect it to a power sensor
- carry out a zero and calibration routine
- make connections to the rear panel
- configure the remote programming interfaces
- attach the rack mounting kits (supplied with Option 908 or Option 909)

NOTE Both single and dual channel power meters with variety of rear panel configurations have been used for the illustrations in this guide. Your power meter may differ in detail to those shown.

Initial Inspection

Please inspect the shipping container for damage. If the shipping container or packaging material is damaged, it should be kept until the contents have been checked mechanically and electrically. If there is mechanical damage, notify the nearest Agilent Technologies office. Keep the damaged shipping materials (if any) for inspection by the carrier and an Agilent representative. If required, you can find a list of Agilent Sales and Service Offices on page 44.

Before continuing, please ensure you have read and understood the preceding safety information.

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Documentation Information

This guide is only part of the information supplied. The documentation consists of:

- The installation guide (this book) - Shows you how to check your power meter, switch it on and connect it to an Agilent power sensor. This information is presented in English, French, German, Italian, Japanese, and Spanish languages.
- The user's guide - Shows you how to operate your power meter from the front panel interface to make measurements using the Agilent E-Series E9320, E-Series E9300, E-Series E4400, 8480 Series and N8480 Series power sensors. You can find the user's guide as Adobe Acrobat PDF (Portable Document Format) files on the supplied CD-ROM in English, French, German, Italian, Japanese, and Spanish languages.
- The programming guide - Shows you how to operate your power meter using the remote interfaces. You can find the programming guide as an Adobe Acrobat PDF file on the supplied CD-ROM in English language only.

Printed Guides available by ordering the following options:

- English language user's guide - Option OBK
- French language user's guide - Option ABF
- German language user's guide - Option ABD
- Italian language user's guide - Option ABZ
- Japanese language user's guide - Option ABJ
- Spanish language user's guide - Option ABE

NOTE A printed programming guide is also supplied with the above options but in English language only.

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What You'll Find in this Guide

This guide is divided into the following sections:

- Adjusting the Carrying Handle on page 15
- Turning the Power Meter On on page 16
- Front Panel Keys and Connections on page 19
- Connecting a Power Sensor on page 23
- Rear Panel Connections on page 26
- Remote Interface Configurations on page 28
- Rack Mounting the Power Meter on page 30
- General Specifications on page 36
- Compliance and Markings on page 38
- Regulatory Information on page 40
- According to ISO 7779 (Type Test). on page 40
- Responsibilities of the Customer on page 43
- Agilent Sales and Service Offices on page 44

For more detailed operating information, refer to the EPM-P Series power meters user's guide and programming guide.

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Conventions Used in this Guide

The following conventions are used to show the difference between a front panel key and a softkey.

	This is used to represent a labeled key on the power meter front panel.
Softkey	This is used to represent a labeled softkey and, when used as part of a procedure, indicates you should press the unmarked key beside the displayed text.
Message	This is used to represent a displayed message.
Parameter	This is used to represent a parameter, value, or title.

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Power Meter and Sensor Capability

Your E4416A or E4417A power meter is compatible with Agilent E-Series E9320, E-Series E9300, E-Series E4400, 8480 Series and N8480 Series power sensors. However, not all sensor and meter combinations have the same features or capabilities. The main differences are:

Features	E-Series E9320	E-Series E9300	E-Series E4400	8480 Series	N8480 Series
Average Power of CW Signal	•	•	•	•	•
Cal Factors on EEPROM	•	•	•		•[1]
>200 Readings/sec.	•	•	•		
Average Power of modulated signal	•	•			•
Peak Power	•				
Rising Edge Trigger	•				
Falling Edge Trigger	•				

[1] Not applicable for N8480 Series power sensors with Option CFT

Specifications

The specifications for the power meter are listed in the E4416A and E4417A user's guide.

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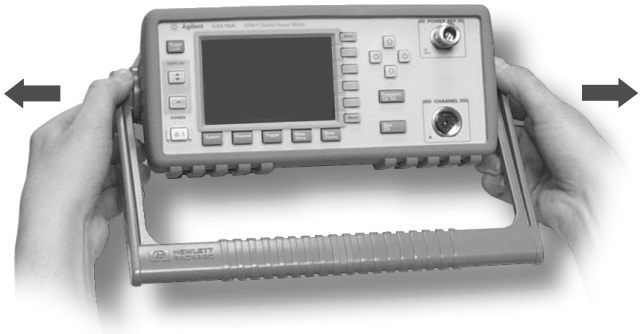
Adjusting the Carrying Handle

Adjust the carrying handle to carry the meter or view the display.

The carrying handle can be locked into three different positions.



Pull the handle outwards, rotate it to the required position and release it into one of the three locks.



If you want to remove the handle, refer to Rack Mounting the Power Meter on page 30.

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Turning the Power Meter On

You can turn the power meter on without connecting a power sensor or power-sensor cable.

CAUTION The instrument has an autoranging power supply. Ensure the supply voltage is within the range 85 to 264 V_{ac} and 47 - 440Hz.

1. Connect the Power Cord.



2. Check the orange LED is lit.

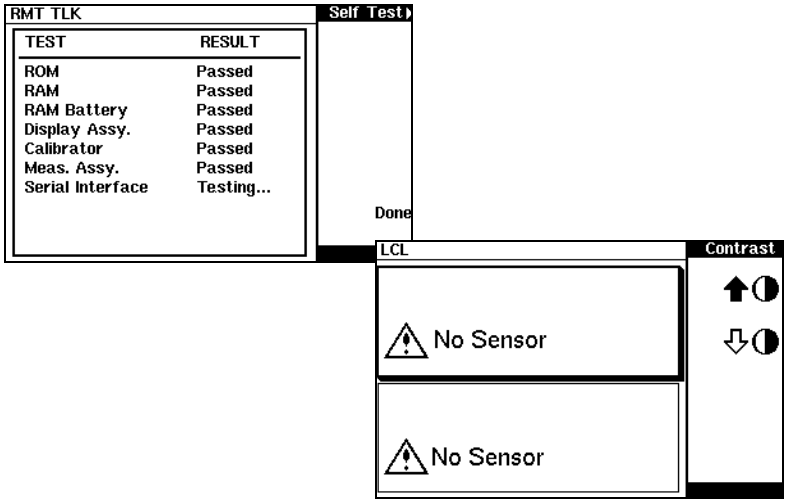


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3. Turn the meter on and confirm the green LED is lit.



4. The meter automatically steps through a self test routine...



...and is now ready for use.

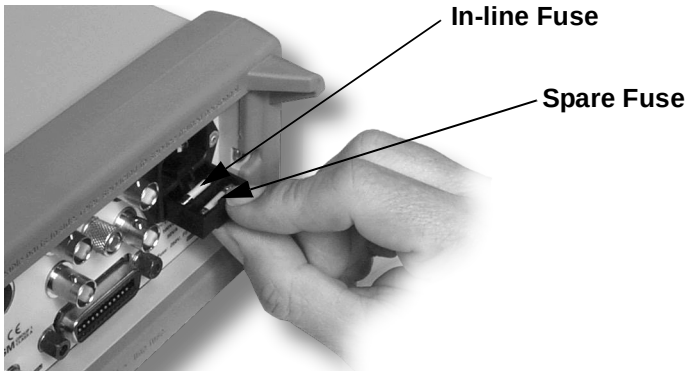
NOTE If the meter has been stored in extremely cold conditions, beyond its normal operating range, the display may require a few minutes to warm up and operate normally.

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What Can Go Wrong?

See this	Do this
Orange LED not lit	Check that power is supplied to the meter. Check the power meter fuse. (see Step 5)
Fails self test(s)	If there are any self-test failures the meter is defective. Contact your nearest Agilent Service Center (Refer to Agilent Sales and Service Offices on page 44).

5. Line input fuse and spare.



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Front Panel Keys and Connections

This section briefly describes the functions of the front panel keys and connectors. The user's guide shows you how to use them in more detail.



These keys are located to the left of the display.

Key	Function
	Press this key to switch the meter between on and standby. When power is supplied, the orange LED above the key is lit. Press the key to switch the meter on. The green LED lights.
	Press this key to select the measurement window or the individual measurement display lines. Any measurement setup you create is implemented in the selected measurement.
	Press this key to choose windowed, expanded, or full-screen display.
	Press this key to preset the power-meter when it is operating in local mode (front panel operation). A pop-up-window is displayed asking you to confirm the command. It also enables you to take control of the meter from the front panel when operating via the remote interfaces (when Local Lock Out is not enabled).

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These keys are located along the lower edge of the display.

Key	Function
System	Press this key to access general configuration menus, such as GPIB address. You can also access some measurement configuration menus. The measurement screen remains visible.
Channel	Press this key to access the channel configuration tables and menus. Channel parameters such as averaging and offsets are configured from this menu.
Trigger	Press this key to access the triggering menu. Unless an E-Series E9320A sensor is connected, all the menu keys are disabled (greyed out).
Meas Setup	Use this key to configure the selected measurement.
Meas Display	Use this key together with Meas Setup to configure measurement displays.

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These keys are all associated with the menu labels and data entry. They are located to the right of the display.

Key	Function
More	Press this key to access the next pages of a menu. For example, **1 of 2** displayed beside the More key indicates page one of a two page menu is displayed. Press More to access the second page. (**2 of 2** is displayed.)
Prev	Press this key to access the previous pages of a menu. For example, **2 of 2** displayed beside the More key indicates page two of a two page menu is displayed. Press Prev to access the previous page. (**1 of 2** is displayed.)
	These unmarked keys are called 'softkeys' and are referred to by the text on the display beside them. For example, during a Preset, a pop-up window asks you to confirm the command. Press **Confirm** to continue, that is, press the softkey beside the displayed word 'confirm'. Similarly, pressing **Cancel** (the softkey beside the word 'cancel') stops the Preset.
	The arrow keys are used to select measurement displays and to select and change parameters such as instrument state names and offset values. The user's guide shows how these keys are used in more detail.

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These keys and connectors are associated with the measurement channels and are located on the right-hand side of the front panel.

Key	Function
Frequency Cal Fac	Press this key to access the input frequency, and sensor calibration factor menus. Use these functions to improve the accuracy of your measurement. Refer to the user's guide for more information.
Zero Cal	Press this key to access the zero and calibration menus. Use these functions to improve the accuracy of your measurement. Refer to the user's guide for more information.

Connector	Function
POWER REF 50 MHz	The power-reference is a 1 mW (0 dBm) 50 MHz signal available from a 50 ohm Type-N connector. It is used for calibrating the sensor and meter system. If the meter is configured with Option 003, the connector is fitted to the rear panel. The green LED beside the connector is lit when the calibrator is turned on.
CHANNEL A B	The sensor input connectors (Agilent E4417A shown, the E4416A has one input). If the meter is configured with Option 002 or Option 003, the connectors are fitted to the rear panel.

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Connecting a Power Sensor

Using the correct cable, any Agilent diode based power sensor can be connected to the E4416A or E4417A power meters. (The E9288 Series cables are color coded to help distinguish them from the 11730 Series.)

Power Sensor	E-Series E9288	11730 Series
8480 Series	•	•
E-Series E4410	•	•
E-Series E9300	•	•
E-Series E9320	•	
N8480 Series	•	•

NOTE The following shows the procedure for single channel meters configured with front panel mounted POWER REF and CHANNEL connectors. The procedure is similar for meters configured with rear panel connectors. Also, for dual channel meters (E4417A), you should repeat the procedure for the channel B sensor.

1. Connect the sensor to an Agilent E9288 Series cable.

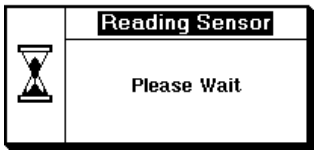


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2. Connect the other end of the E9288 Series cable to the CHANNEL A (or CHANNEL B) input connector.



3. Confirm the message pop-up **Reading Sensor** appears briefly.



Message does not appear when connecting an 8480 Series power sensor.

4. Confirm the display has changed to a measurement reading.

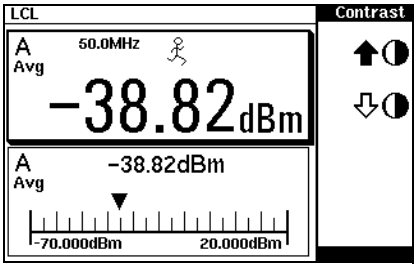


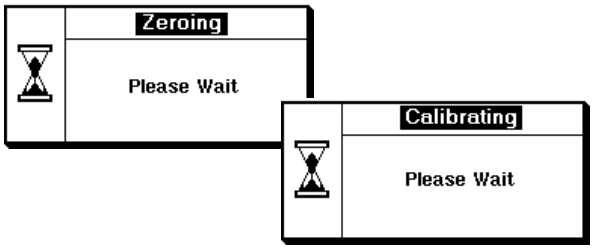
Diagram shows display with an E-Series E9320 power sensor connected.

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5. Connect the sensor to the POWER REF connector.



6. When the sensor is connected to the POWER REF, you can zero and calibrate the measurement path quickly by pressing Zero Cal, **Zero and Cal**. On dual channel meters, press **Zero + Cal A** or **Zero + Cal B**.



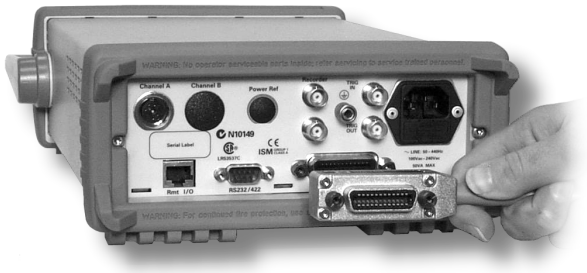
The **Zeroing** pop-up is displayed during the zeroing process, the **Calibrating** pop-up during calibration. The meter-sensor measurement path is calibrated when the **Calibrating** pop-up disappears.

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Rear Panel Connections

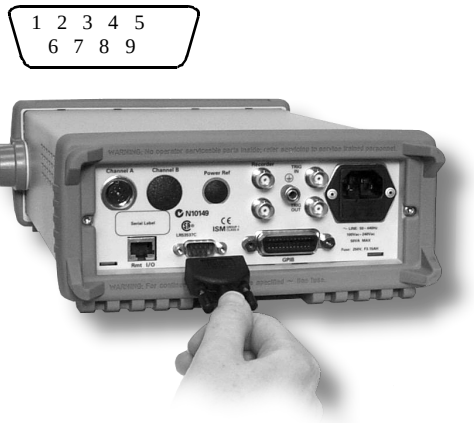
The following connections are available on the rear panel. To setup the remote interfaces, refer to Remote Interface Configurations on page 28.

1. GPIB



2. RS232 and RS422

Pin	RS232	RS422
1	DCD	CTS-
2	Rx	Rx-
3	Tx	Tx+
4	DTR	Tx-
5	GND	GND
6	DSR	Rx+
7	RTS	RTS+
8	CTS	CTS+
9	RI	RTS-



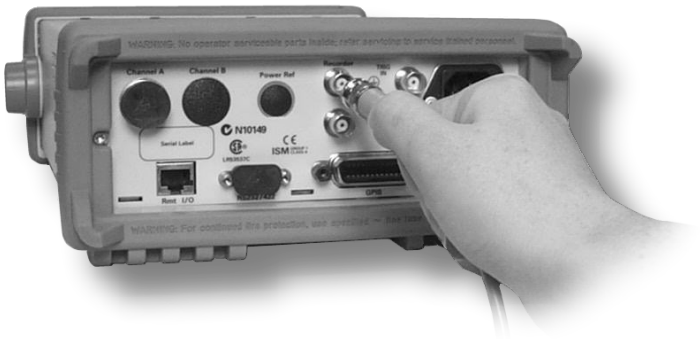
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3. RJ11

Pin	Connection
1	none
2	Ground
3	TTL Output 1
4	TTL Output 2
5	TTL Input 1
6	TTL Input 2
7	Ground
8	Ground



4. Recorder output (two outputs are fitted to dual channel meters) and Trigger Input and Output connections are made via BNC connectors.



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Remote Interface Configurations

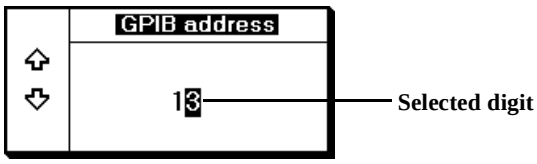
The power meter is equipped with GPIB (IEEE488), RS232, and RS422 remote programming interfaces. This section shows you how to change the interface settings.

GPIB

The power meter is shipped from the factory with GPIB as the selected interface and the address set to 13. Addresses between 0 and 30 are valid. The GPIB address is stored in non-volatile memory. To change the address proceed as follows:

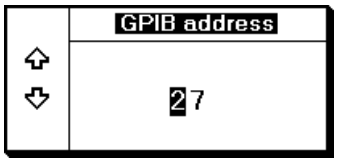
---

1. Press System, **Remote Interface**, **Configure Interface**, **GPIB**, **GPIB Addr**. The GPIB address pop-up appears.



---

2. Use the ◀ and ▶ keys to select (highlight) the digit you want to change; use the ▲ and ▼ keys to increase or decrease the value. Press **Enter** to confirm and save the new address. Pressing **Cancel** restores the previous value.

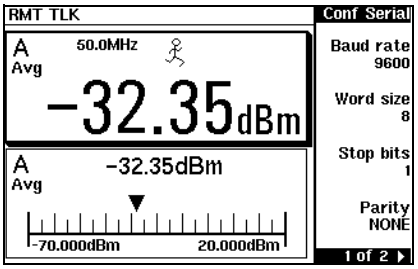


To ensure the GPIB interface is selected press System, **Remote Interface**, **Select Interface**, **GPIB**.

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RS232/RS422

To check the settings for the RS232 or RS422 interfaces press System, **Remote Interface**, **Configure Interface**, **Serial**. The settings are displayed below the respective softkey labels. Press **More** to access the next menu page.



To change any setting:

1. Press System, **Remote Interface**, **Configure Interface**, **Serial**.
2. Select the parameter you want to change by pressing the softkey.
3. Use the ◀ and ▶ keys to select (highlight) the digit you want to change; use the ▲ and ▼ keys to increase or decrease the value. Press **Enter** to confirm and save the new value. Pressing **Cancel** restores the previous value.
4. Press More to access the second page of the settings menu.

To configure the power meter to use the serial RS232 or RS422 interfaces press System, **Remote Interface**, **Select Interface**, **RS232**, or **RS422**.

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Rack Mounting the Power Meter

Rack Mounting One Meter
(Using the Option 908 rack mount kit)

1. Remove the carrying handle.



2. Remove the front and rear rubber bumpers.



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3. Fit the rack mount flanges.
(Parts available separately: 5063-9240).



Ready for installation.



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Rack Mounting Two Meters Together
(Using the Option 909 rack mount kit)

1. Remove the carrying handle.



2. Remove the front and rear rubber bumpers.



Hardware required to link meters together.



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4. Fit one small rack mounting flange to opposite sides of each power meter. (Parts available separately: 5061-9694 and 5063-9212).



5. Fit two front linking plates to each power meter.

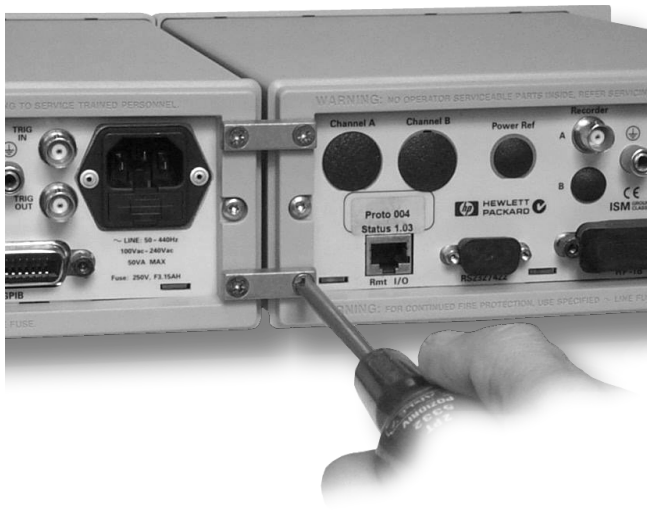


6. Engage the linking plates at the front of the power meters.



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7. Attach the rear linking brackets.



Ready for installation



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Regulatory Information

General Specifications

Environmental	**Operating Temperature:**	0 to +55°C
	Storage Temperature:	–20 to +70°C
	Humidity:	Up to 95% Relative Humidity to +40°C
	Altitude:	3000m (9,840 ft.)
	EMC:	MEETS EN55011: 1991 (GROUP 1, CLASS A), AND EN50082-1:1992
Physical	**Weight:**	4.2 kg nominal
	Dimensions: (height x width x depth)	130H x 250W x 462D mm nominal (including handle and rubber bumpers) 88H x 212W x 363D mm nominal (excluding handle and rubber bumpers)
Power Requirements	**Operating Voltage Range:**	85 - 264 Vac
	Operating Frequency Range:	47 - 440Hz
	Power Dissipation:	50 VA (maximum)



Cooling Requirements To provide adequate cooling, and air gap of approximately 75mm (3ins) should be maintained around the vented sections of the instrument.

Cleaning Use a soft, clean, damp cloth to clean the front-panel and side covers.

Use This instrument is designed for indoor use only.

WARNING Appliance coupler (mains input power cord) is the power disconnect device. Do not position the instrument such that access to the coupler is impaired.

WARNING For continued protection against fire hazard, replace the line fuse only with the same type and line rating (250V, F3.15A, 20mm fast blow fuse with high breaking capacity, Agilent part number 2110-0957).
The use of other fuses or materials is prohibited.

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WARNING No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers.

WARNING If this instrument is not used as specified, the protection provided by the equipment could be impaired. This instrument must be used in a normal condition only (in which all means for protection are intact).

CAUTION This instrument is designed for use in Installation Category II and Pollution Degree 2 per IEC61010 and 60664 respectively.

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Compliance and Markings

IEC 61010-1 Compliance

This instrument has been designed and tested in accordance with publication EN61010-1(1993) / IEC 61010-1(1990) +A1(1992) +A2(1995) / CSA C22.2 No. 1010.1(1993) Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

Electromagnetic Compatibility (EMC)

This product conforms with the protection requirements of European Council Directive 89/336/EEC for Electromagnetic Compatibility (EMC).

The conformity assessment requirements have been met using the technical Construction file route to compliance, using EMC test specifications EN 55011:1991 (Group 1, Class A) and EN 50082-1:1992.

In order to preserve the EMC performance of the product, any cable which becomes worn or damaged must be replaced with the same type and specification.

Refer to the Declaration of Conformity on page 41.

Safety

This instrument has been designed and tested in accordance with publication EN61010-1(1993) / IEC 1010-1(1990) +A1(1992) +A2(1995) / CSA C22.2 No. 1010.1(1993) Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, and has been supplied in a safe condition. The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

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Markings

The following markings can be found on the rear panel.

CE	The CE mark shows that the product complies with all the relevant European legal Directives.
SA®	The CSA mark is a registered trademark of the Canadian Standards Association and indicates compliance with the standards set out by them.
ISM GROUP 1 CLASS A	This is the symbol of an Industrial Scientific and Medical Group 1 Class A product.
	The C-Tick mark is a registered trademark of the Australian Communications Authority. This signifies compliance with the Australian EMC Framework Regulations under the terms of the Radio communications Act of 1992.

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Regulatory Information

Sound Emission

Herstellerbescheinigung

Diese Information steht im Zusammenhang mit den Anforderungen der Maschinenlarminformationsverordnung vom 18 Januar 1991.

- Sound Pressure LpA < 70 dB.
- Am Arbeitsplatz.
- Normaler Betrieb.
- Nach DIN 45635 T. 19 (Typprufung).

Manufacturers Declaration

This statement is provided to comply with the requirements of the German Sound DIN 45635 T. 19 (Typprufung).

- Sound Pressure LpA < 70 dB.
- At operator position.
- Normal operation.
- According to ISO 7779 (Type Test).

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Declaration of Conformity

according to ISO/IEC Guide 22 and CEN/CENLEC EN45014

Manufacturer's Name:	**Agilent Technologies UK Limited**
Manufacturer's Address:	Electronics Products & Solutions Group - Queensferry South Queensferry West Lothian, EH30 9TG Scotland, United Kingdom

Declares that the product

Product Name:	Single Channel EPM-P Series Power Meter
Model Numbers:	E4416A
Product Options:	This declaration covers all options of the above products as detailed in TCF A-5951-9852-02

EMC:

Conforms with the protection requirements of European Council Directive 89/336/EEC on the approximation of the laws of the member states relating to electromagnetic compatibility,
against EMC test specifications EN 55011:1991 (Group 1, Class A) and EN 50082-1:1992.

As Detailed in:	Electromagnetic Compatibility (EMC) Technical Construction File (TCF) No. A-5951-9852-02
Assessed by:	Dti Appointed Competent Body EMC Test Centre, GEC-Marconi Avionics Ltd., Maxwell Building, Donibristle Industrial Park, KY11 5LB Scotland, United Kingdom

Technical Report Number:6893/2201/CBR, dated 23 September 1997

Safety:

The product conforms to the following safety standards

IEC61010-1(1990) +A1(1992) +A2 (1995)/EN61010-1:1993
(1990) CSA-C22.2 No. 1010.1-92
EN60825-1 (1994) / IEC 825-1 (1993)

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC, and carries the CE-marking accordingly.

South Queensferry, Scotland **17 October 2000**

R.M. Evans / Quality Manager

For further information, please contact your local Agilent Technologies sales office, agent, or distributor.

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Declaration of Conformity

according to ISO/IEC Guide 22 and CEN/CENLEC EN45014

Manufacturer's Name:	**Agilent Technologies UK Limited**
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Model Numbers:	E4417A
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against EMC test specifications EN 55011:1991 (Group 1, Class A) and EN 50082-1:1992.

As Detailed in:	Electromagnetic Compatibility (EMC) Technical Construction File (TCF) No. A-5951-9852-02
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(1990) CSA-C22.2 No. 1010.1-92
EN60825-1 (1994) / IEC 825-1 (1993)

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Responsibilities of the Customer

The customer shall provide:

- Access to the products during the specified periods of coverage to perform maintenance
- Adequate working space around the products for servicing by Agilent personnel.
- Access to and use of all information and facilities determined necessary by Agilent to service and/or maintain the products. (Insofar as these items may contain proprietary or classified information, the customer shall assume full responsibility for safeguarding and protection from wrongful use.)
- Routine operator maintenance and cleaning as specified in the Agilent operating and service manuals.
- Consumables such as replacement fuses, etc.

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Agilent Sales and Service Offices

In any correspondence or telephone conversations, refer to the power meter by its model number and full serial number. With this information, the Agilent representative can quickly determine whether your unit is still within its warranty period.

UNITED STATES	(tel) 800 829 4444 (fax) 800 829 4433
CANADA	(tel) 877 894 4414 (fax) 800 746 4866
CHINA	(tel) 800 810 0189 (fax) 800 820 2816
EUROPE	(tel) 31 20 547 2111
JAPAN	(tel) (81) 426 56 7832 (fax) (81) 426 56 7840
KOREA	(tel) (080) 769 0800 (fax) (080) 769 0900
LATIN AMERICA	(tel) (305) 269 7500
TAIWAN	(tel) 0800 047 866 (fax) 0800 286 331
OTHER ASIA PACIFIC COUNTRIES	(tel) (65) 6375 8100 (fax) (65) 6755 0042

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