raditeq
Product Manual

RadiPower®
RF Power Meters

RadiPower® USB Power Meter
raditeq Vijzelmolenlaan 3 | NL-3447GX Woerden | +31 348 200 100 | www.raditeq.com

Models:
RPR3006W

www.raditeq.com

RadiPower® product manual

This product manual pertains to the RadiPower®.
Models: RPR3006W
Made by Raditeq.

It is strongly advised that this manual is carefully read before operating this product and adhere to any safety instructions it might contain.

For your convenience a Quick Start Guide has been added to this product. This Quick Start Guide contains the basic start-up steps and the safety warnings.

Please keep the Quick Start Guide (and this product manual) close at hand.

Please contact Raditeq or your local reseller if you have any questions.

Supplier Information

Raditeq B.V.
Vijzelmolenlaan 3
3447 GX, Woerden
The Netherlands

Tel.:   +31 (0)348 200 100
Internet: www.raditeq.com
Email: support@raditeq.com

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WARNINGS & PRECAUTIONS

Read the contents of this product manual carefully and become familiar with the safety markings, the product instructions and the handling of the system. Please refer to the applicable product manual(s) for further information regarding the operation and control of the product(s).

Only Raditeq qualified maintenance personnel is allowed to perform maintenance and/or repair service on the equipment.

This product® contains materials that can be recycled and reused to minimize material waste. At the 'end-of-life', specialized companies can dismantle the discarded system to collect the reusable and recyclable materials. If your product is at its 'end-of-life', please return it to your local reseller or to Raditeq for recycling.

For cleaning, use a clean, dry cloth (or a damp cloth where needed) and wipe the surface of equipment.

This product contains no hazardous substances as described in the RoHS Directive (2011/65/EU).

This product contains embedded software, which is field upgradeable.
For more information contact your local reseller or go to www.raditeq.com

Introduction

This manual contains information about the RadiPower® RPR3006W RF power meters.

An accurate power meter is indispensable to perform reliable EMC measurements. The RadiPower® is a RF power meter especially designed for power measurements during EMC tests. The RadiPower® is an affordable, accurate and fast power meter. It provides accurate measurements over a wide frequency range, which enables effective measurements in accordance with the latest EMC standards.

Please read this manual carefully and make sure to pay special attention to the chapters regarding your new product(s).

RadiCentre® System

The RadiCentre® is a modular EMC/RF test system that serves as the interface between user and computer for all the RadiCentre® plug-in cards and modules.

RadiMation® Software

RadiMation ® is the EMC software package from Raditeq used for remote control and automated testing of the RadiCentre® plug-in cards and modules and is sold separately.

RadiField® Electric Field Generator

The patented RadiField® Triple A is no less than a revolution in EMC immunity testing. A complete paradigm shift involves a combination of high-level integration and a field combining technique, making several discrete components like combiner, coupler, power meters and cabling superfluous. This product is sold separately.

The RadiPower® 3000 Series

RadiPower® RF power sensor
Model: RPR3006W.

Shielded USB cable
Model: USB A male to USB mini B5 male.
To connect the RF power sensor to a USB connector.

MMCX Trigger cable
For measurements on multiple ports.

Supporting documentation is supplied on a USB stick containing:

- The (digital) User Manual and Quick Start Guide.

- The installation of RadiMation® Free software and drivers.

- **Optional** - The calibration certificate for the power meter.

The RadiPower® 3000 Series
Product characteristics

The RadiPower® RF power sensor is optimized for EMC measurements, where a high dynamic range, together with fast measurements, are required even at low power levels. Where most power sensors require long measurement times at low RF levels, the RadiPower® RF power sensor is able to perform accurate power measurements, with a high measurement speed, at power levels close to the noise floor, without the need for zero adjustment!

Fast - EMC immunity measurements are time consuming. This is mainly dependent on the number of frequency points, the dwell time and the speed of the power meter. As the first two parameters are generally prescribed by standards, the only one that can be optimized is the speed of the power meter. The unprecedented detector technology of Raditeq's power meters makes extremely fast and accurate power measurements a reality, even at low power levels.

Accurate - Accuracy is another concern in addition to speed, when performing EMC measurements. The RadiPower® allows for high precision EMC measurements with a large dynamic range. Because the RadiPower® has a high accuracy over the complete band, it is suitable for measurements in accordance to automotive, military, telecom and EMC basic standards such as the IEC61000-4-3/6 standards.

Simultaneous power measurements on multiple ports - The RadiPower® RPR3006W has two trigger ports (MMCX) which can be used to synchronize multiple power meters. These power meters connected through a daisy chain trigger each other to make time synchronized measurements. Due to this function measurements of WLAN and/or MIMO devices according to the EN 300 328 and EN 301 893 standards.

All necessary parameters can be set and calculated by RadiMation® Free (or a higher version) making the setup and measurements effortless.

Low measurement uncertainties - Impedance mismatches contribute to the measurement uncertainty. The RadiPower® has a very low Standing Wave Ratio (SWR) and as a result, measurement uncertainties are low compared to other contributions in the EMC measurement setups.

Robust housing
The RadiPower® RF power sensor is mounted in a rugged metal housing to ensure a long life and excellent RF shielding. The power sensor is equipped with an N-type precision RF input connector and a mini USB-B connector for communication with a computer.

Easy to use - With the USB interface the RadiPower® is easy to use. In addition, the RadiPower® can be controlled by both the RadiMation® integral EMC measurement software and any other EMC measurement packages, because all the software commands needed to control the unit are available. For 'stand-alone use' of the RadiPower®, RadiMation® Free measurement software is delivered with the power meters.
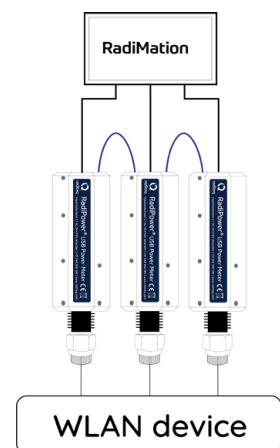
Functional description

The RadiPower® uses a high speed power detector to measure the RF signal, independent of the crest factor of the input signal waveform. The detected signal is sampled, at high speed, by a high speed ADC and the samples are processed by a powerful DSP. The sophisticated software enables unique functions, such as envelope tracing and burst logging. The table below shows which models support the different measurement modes.

Mode	RPR20XXC	RPR20xxP	RPR3006W
0 : CW	√	√	√
1 : Peak		√	√
2 : Envelope tracing		√	
3 : Burst			√

CW mode

The RadiPower® performs RMS power measurements of CW-signals. In RMS mode the RadiPower® samples the signal at high speed. The RMS value of the power is calculated over the number of samples defined by the filter setting and can be read by a simple command. Due to the high sampling speed the number of readings is high, even at large filter settings. This mode is supported for all the RadiPower® models.

Peak mode

Peak mode keeps track of the maximum power that is measured during a specific time interval. In PEAK mode, the "power?"-command will return the highest value that was measured since the last "power?"-command. After each cycle of the command the previous peak value is cleared,

Burst mode

In burst mode, the RadiPower can measure a burst of RF power. It is even possible to measure a burst on multiple powermeters at the sime time (using the MMCX trigger ports). The power readings of each powermeter can be combined to a total power by RadiMation according to the EN 300 328 and EN 301 893 standards..

In this mode the sample speed can be set to either 1 MS/s or 5 MS/s. The RadiPower can store a total of 100.000 bursts and is independent of the observation time. The stored data of a single burst consists of the RMS power and the start/stop-time of the burst. The start and stop time are defined by how long the power was higher than the threshold value. The threshold value can be set in RadiMation.

The RMS power of a burst is calculated according to the following formula:

$$P_{Burst} = \frac{1}{M} \sum_{n=1}^{m} P_{sample}^{(n)} \ [W]$$

Where m is the number of RMS power samples within the start and stop time. When measuring on a MIMO device with more than one port. It is possible to use multiple power meters. The burst values of each power meter can be combined to a single RF power using RadiMaiton. This can also be done manual by using the following formula:

$$P_{Burst\ total} = \sum_{i=1}^{i} P_{burst}^{(i)} \ [W]$$

i is the number of power meters

It is also possible to add corrections for the coupler, beamforming gain (Y) and the assembly gain (G) of the DUT. RadiMation can compensate for these values.
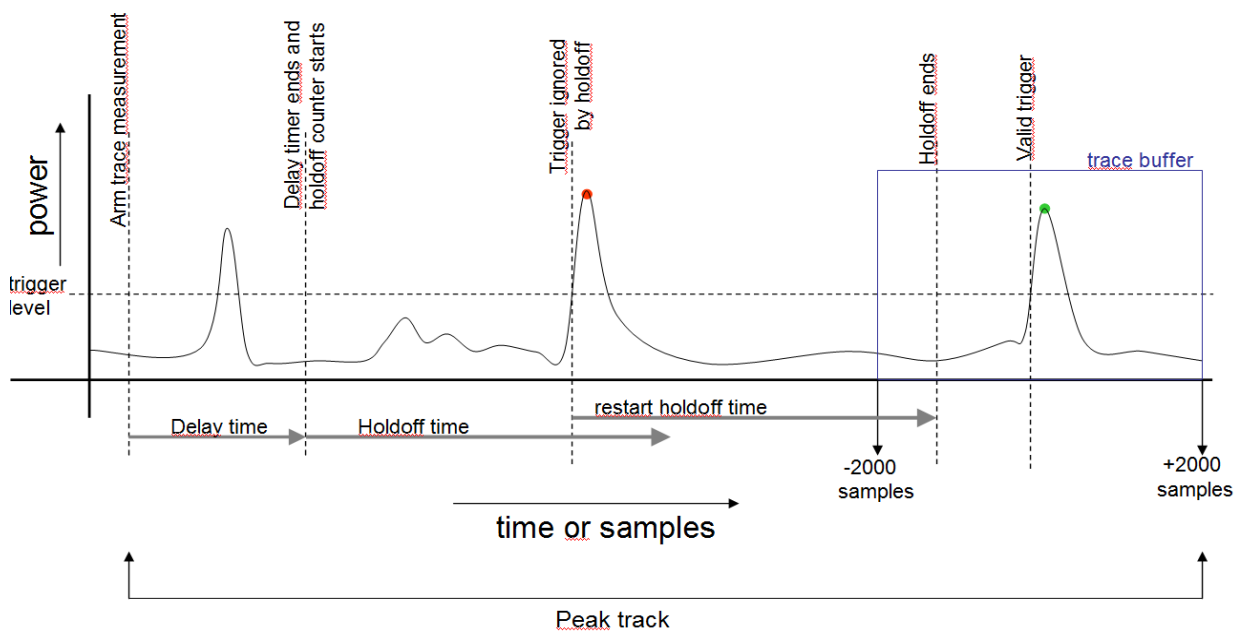
RadiPower® Installation

Stand-alone Configuration
Connect the RadiPower® sensor to a Windows computer with a USB 2.0 compatible port. Use the supplied USB cable to connect the RadiPower® sensor. The hardware installation for the RadiPower® sensor is now complete.

Connect the RadiPower® sensor to a Windows computer with a USB port for 'stand-alone' use. Use the supplied USB cable to connect the sensor to your computer. Windows will prompt that new hardware has been found. The USB-driver for the RadiPower® is Windows certified and will be loaded automatically from the Windows update. If the drivers are not loaded automatically, these can be installed manually from the supplied USB-key. Follow the normal instructions from Windows to install the drivers manually.

Once the drivers are loaded successfully, the RadiPower® will be shown in the device list.
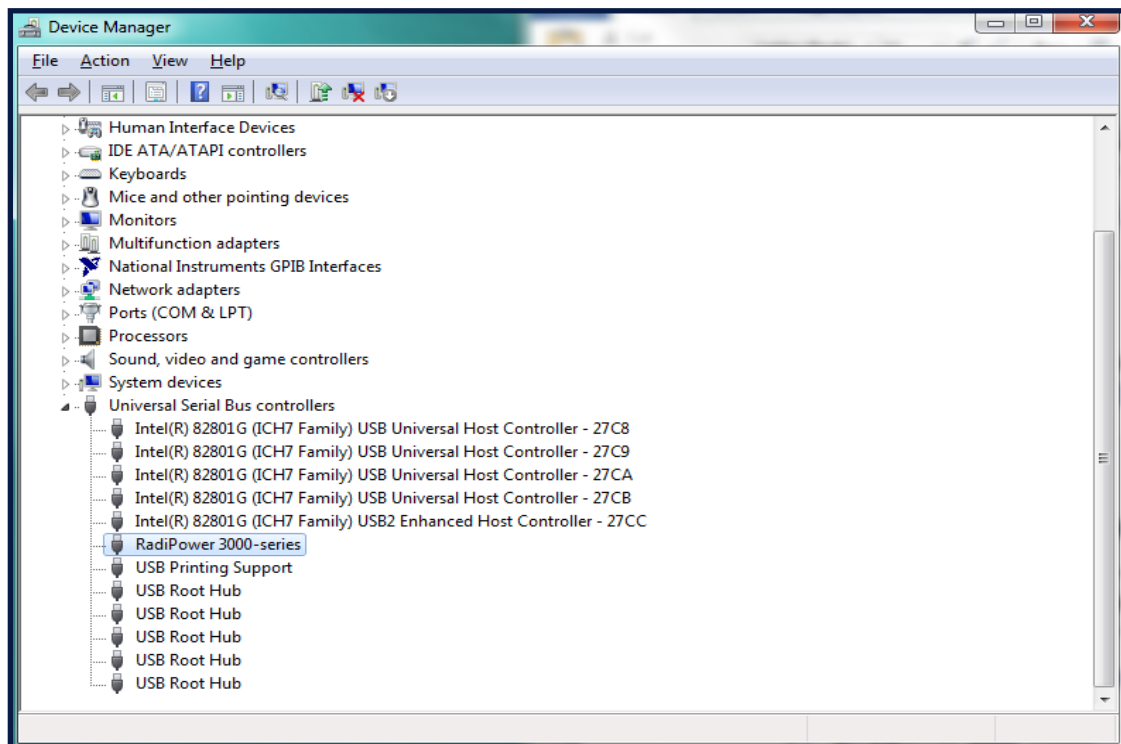
Software Configuration

In order to control the RadiPower® from a computer, the RadiMation® EMC software package can be used. RadiMation® from Raditeq is sold separately. **A free version of RadiMation® is available on:** https://www.raditeq.com/automated-emc-software/radimation-free/. If the RadiPower® is operated manually, this chapter can be skipped.

**The RadiPower® device driver is part of the Power Meter Device Driver family**

How to configure the RadiPower® in RadiMation®

1. Start the latest version of RadiMation®; **https://www.raditeq.com/radimation-download/**
2. Select the button 'Device' at the top menu bar, followed by clicking 'Configure';
3. In the configuration screen select 'Device Drivers' and Select 'Power meter' or any of the other drivers as driver type;
4. Click the 'Add' button to open the selection of available drivers in RadiMation®;
5. Enter 'RadiPower' in the search bar which will show all available RadiPower® drivers;
6. Select the correct driver, double click it (Optional, rename it) and press 'OK'.
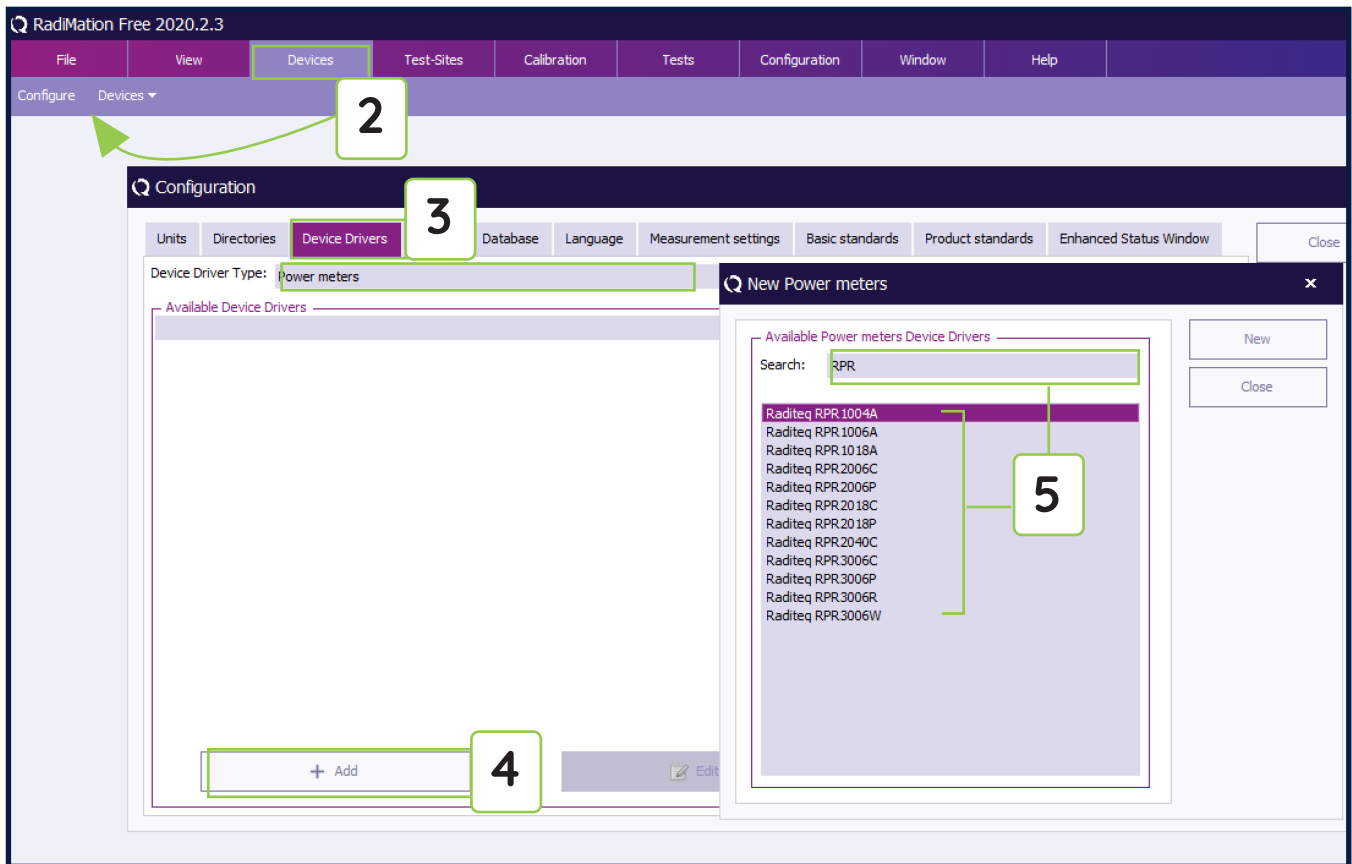
How to check whether the RadiPower® is properly connected to RadiMation®

1. Select 'Devices' in the top menu bar
2. Open 'Device Drivers' and select device driver type: 'Power Meter'
3. Double click the recently configured RadiPower® or click 'Edit'.
4. Finally select the 'Check' button on the right side of the opened screen.
5. When correctly configured, RadiMation® will notify you that the device is correctly installed.
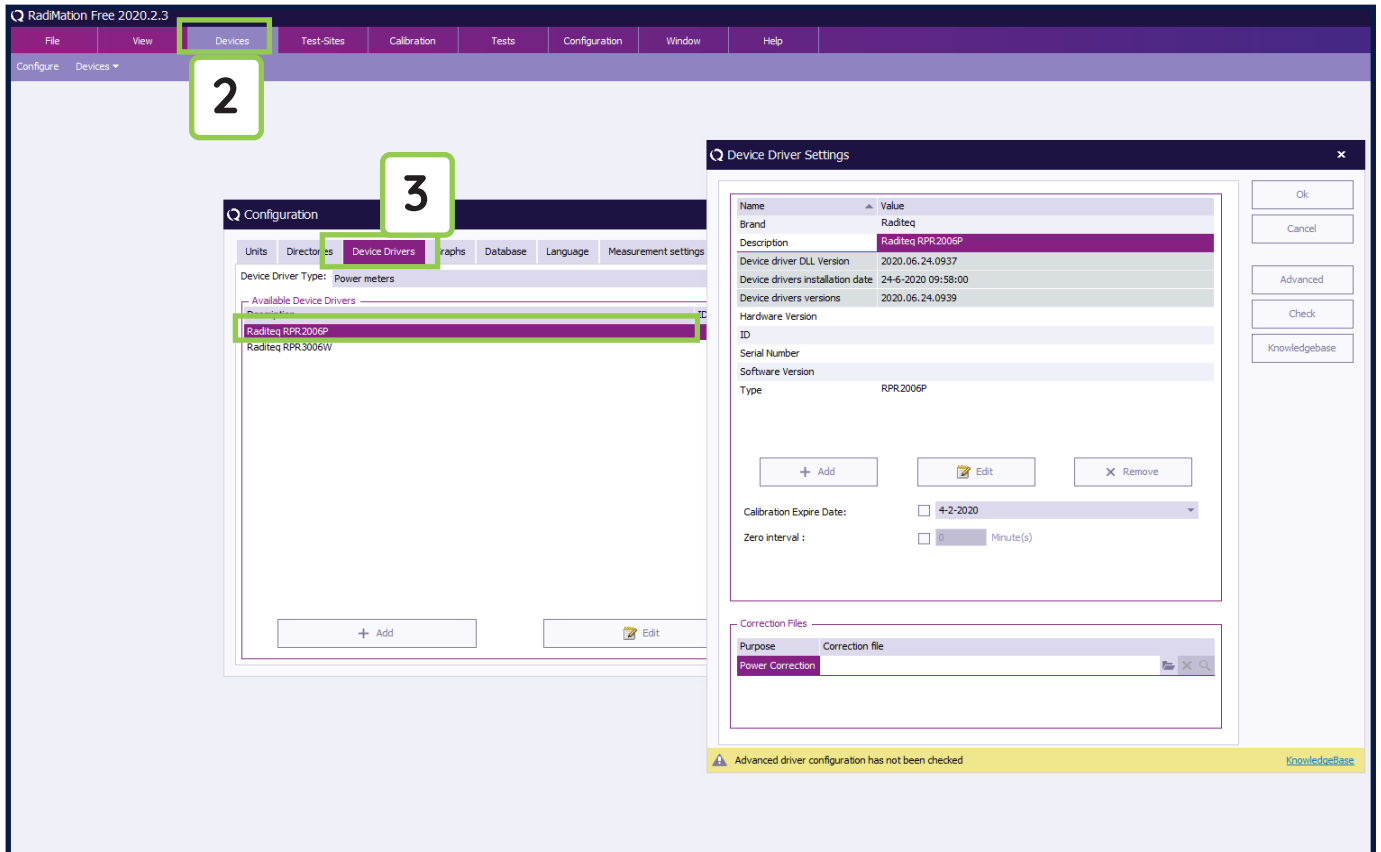
Adding coupler values in RadiMation®

In a MIMO test setup, power measurements are often performed using a coupler on the antenna port. Coupling factors can be compensated by RadiMation® using a correction file. If no couplers or additional attenuators are used in the setup, there is no need to create and apply these correction files.

To create a correction file, select "File" – "New" – "Correction" from the menu bar.
Press "Colums/units" to create to columns for Frequency and Attenuation.

To create a constant correction versus frequency:
• 	Press "Add Row" and enter the lowest frequency with the corresponding attenuation.
• 	Press "Add Row" again and enter the highest frequency with the corresponding attenuation.
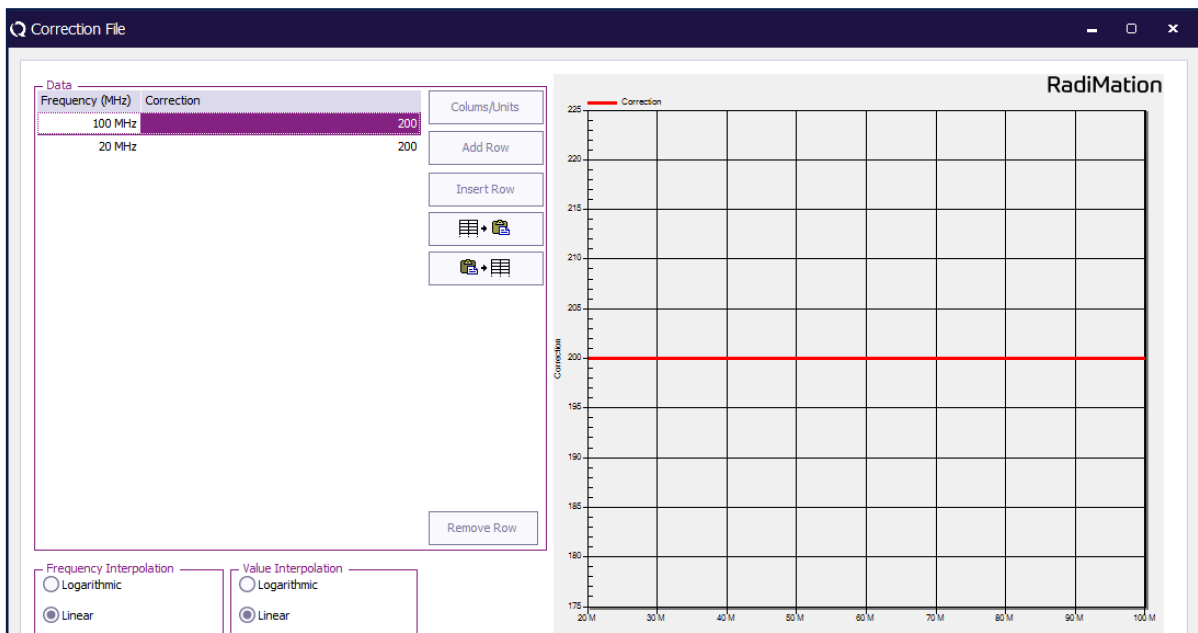
If calibration data of the coupler is available, this data can be used to create an accurate correction for the coupler.

After all data has been entered, select "File" – "Save Correction As" to save the data.

Next, the correction data of the coupler has to be added to the correct power meter. Select "Configuration" and "Configuration" again. In the Configuration window select the "Device drivers" tab and select the power meter for which the correction has to be added. Press "Edit".

Press the "file open"- button in de Correction Files area to select the correction file. Perform this procedure for each power meter for which a coupler correction has to be added. RadiMation® will now automatically calculate the power values, including the coupler values.

Stand-alone command set

Communication with the RadiPower® sensor is possible using a virtual COM-port (VCP)
For more information see chapter 'stand alone configuration'.

NOTE: All commands can be found in the RadiCentre® Manual under the programming manual.
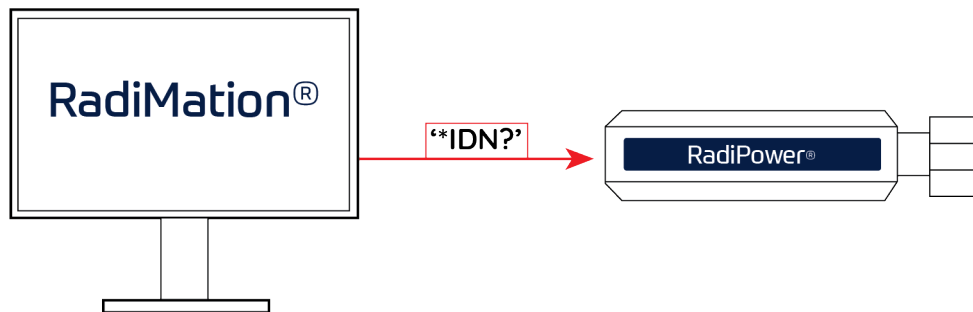
Specifications RPR3006W

Model	RPR3006W
Measuring function	RMS power, peak max hold and Burst mode
Measurement speed	10, 50, 100 kS/s, 1, 5, 10, 20, 33 MS/s[1]
Storage capacity	100.000 samples 100.000 bursts
Resolution	0,01 dB
Measuring units	dBm or Watt
Zero adjustment	Not required
Input damage level	> +20 dBm
Measurement range & accuracy	
Frequency range	10 MHz tot 6 GHz
Power measuring range	-50 dBm to +10 dBm @ 10 MHz to 6 GHz
Frequency response accuracy (at 23° C ± 2° C)	+/- 0,2 dB
Linearity error	0,05 dB + 0,005 dB/dB
Temperature effect	0,15 dB max over full temperature range
Deviation from CW for signals with high Crest factor	< 0,2 dB
VSWR	
Max SWR: < 100 MHz	1,10
100 MHz to 1 GHz	1,10
1 GHz to 6 GHz	1,15 typical (max 1,18)
Connections & Dimensions	
Dimensions of measuring device	124 * 32 * 32 mm
RF input connector	N type precision
Data connector (power head side)	USB mini type B
Power Consumption	
Supply voltage	+5Vdc from USB port (4,75 V to 5,25 V)
Current consumption (USB)	Max. 250 mA
Environmental conditions	
Temperature range (operating)	0° to 40° Celsius
Temperature range (storage)	-20 to 85° C
Relative humidity	10 – 90% (non-condensing)
Compliance	
EMC	EN 61326
Low Voltage	N/A
Warranty	**3 year (misuse excluded)***

Filter setting for RMS (Mode 0)	Number of samples used for RMS calculation
Filter 1	10
Filter 2	30
Filter 3	100
Filter 4	300
Filter 5	1000
Filter 6	3000
Filter 7	5000

Filter setting for RMS (Mode 0)	Number of samples used for RMS calculation
+10 to 0 dBm	100 (filter 3)
0 to -10 dBm	100 (filter 3)
-10 to -20 dBm	100 (filter 3)
-20 to -30 dBm	300 (filter 4)
-30 to -40 dBm	1000 (filter 5)
-40 to -50 dBm	3000 (filter 6)
Below -50 dBm	5000 (filter 7)

1. In burst mode only 1 and 5 MS/s can be set and used.

- All specifications are measured after 10 minutes warm-up time and 0dBm unless specified otherwise.
- Typical specifications indicate that the measured values are met on at least 80% of the points.
- Three years warranty will be granted only after you register the product at www.raditeq.com. Without registration, a 1 year warranty period applies.

For more information about the current and new Raditeq products at:
T: +31 348 200 100   M: Sales@raditeq.com
W: www.raditeq.com

Warranty Conditions

Raditeq B.V. offers a standard warranty term of three (3) years on their products, calculated from the shipping date, under the condition that the product is registered on www.raditeq.com. For registration of the product, the customer should provide the product model, serial number and the responsible reseller (if applicable). If the product is not registered, a limited warranty term of one (1) year will be applicable.

Return Material Authorization (RMA) & Warranty repair

If a defect occurs to our product within the warranty term, a Return Material Authorization (RMA) 'Warranty Repair' request can be issued using the RMA link at www.raditeq.com/support. Upon receipt of the request, an RMA number will be provided. Please do not send the product without this RMA number! The defective product should be shipped to our service department at the following address:

Raditeq B.V. – Service Department
Vijzelmolenlaan 3
3447GX WOERDEN
The Netherlands

There will be no charge for repair services (materials or labour) within the (extended) warranty term.
These warranty terms are not applicable to:

- Normal wear and tear
- Fibre optic cables
- Products that have been improperly used
- Products that have been used outside their specified range
- Products that have been improperly installed and/or maintained
- Products that have been modified without approval of Raditeq
- Calibration and/or re-calibration of the product

Repair services on products that are not covered by the Raditeq warranty will be charged to the customer.

Repairs outside warranty

If a defect is not covered under warranty, an RMA fixed-repair can be ordered on the RMA link: www.raditeq.com/support If a re-calibration is needed after repair, this calibration should be ordered separately. The calibration will be performed at the ISO17025 accredited calibration laboratories of DARE!! Calibrations, based on the applicable service code / prices.

Warranty after repair

For repairs outside the original warranty period, a limited warranty of six months is applicable on the performed repair. Shipping conditions are the same as with repairs that are covered within the original warranty period.

Shipping

The customer will need to arrange shipping and cover for the costs (like e.g. transportation costs, duties, taxes) for sending the defect product the service department of Raditeq in The Netherlands. Raditeq will arrange the courier and cover for the costs for the return shipment after repair.

EU Declaration of Conformity

We

Raditeq B.V.

of

Vijzelmolenlaan 3
NL-3447GX Woerden
The Netherlands

declare under our sole responsibility that the

Product:	**RadiPower® Series**
models:	RPR3006W

are in accordance with the European directives:

EMC Directive 2014/30/EU

Low Voltage Directive 2015/35/EU

RoHS Directive: 2011/65/EG

per the provisions of the applicable requirements of the following harmonized standards:

Emission: EN 61326-1:2013, Class A1
Electrical equipment for measurement, control and laboratory use.

Immunity: EN 61326-1:2013, Industrial level, performance criteria A
Electrical equipment for measurement, control and laboratory use.

Safety: EN 61010-1:2010, Safety requirements for electrical equipment
for measurement, control, and laboratory use

The technical construction files are maintained at the adress specified above.

Date of issue:	16/10/20
Place of issue:	Woerden, the Netherlands
Authorized by:	P.W.J. Dijkstra
Title of authority:	Director

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