

raditeq Product Manual

RF Power Meters



Models: RPR2006C | RPR2006P | RPR20018C | RPR2018P

www.raditeq.com



Radixxx Product Manual

This product manual pertains to the RadiPower®.

Models: RPR2006C | RPR2006P | RPR20018C | RPR2018P - **By Raditeq** Plug-in card: USB1004A - **By Raditeq**

Read this manual carefully before operating the product and make sure all the safety instructions are strictly followed. Please keep this manual close at hand when you operate your new Raditeq product(s).

Note that all product specifications are noted in the data sheet for this product. All product data sheets can be found on https://www.raditeq.com/downloads/

Supplier Information

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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).



This product requires a protective earth connection. The mains power source for the equipment must supply an uninterrupted safety ground to the IEC input connector(s).



This equipment is designed to be used as a plug-in card for the RadiCentre® series. Do not use this card on its own or in combination with any other mainframe. Using this product with any other mainframe can cause harm and will void warranty.



To make Raditeq's product as safe as possible, all devices fitted inside a RadiCentre® must comply to the safety interlock system of the RadiCentre®. all Raditeq Plug-in cards are designed to work with the interlock fitted on all RadiCentre® systems.



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.



Position the product in such a fashion that power cables are easily accessible or connect the equipment to a mains network that can be easily disconnected from the mains.



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 from the RadiCentre® using the USB-A connection port on the backside panel of the RadiCentre®. For more information about updating your Raditeq plug-in card, please read the RadiCentre® manual.

Raditeq Introduction

At the core of Raditeq's products and software lies the paradigm of effectiveness, efficiency, and accuracy. We firmly believe in empowering our customers with solutions that deliver unparalleled performance and reliability, without limitations on system extensiveness or compatibility.

In line with this philosophy, the RadiMation software is designed with an open architecture, welcoming compatibility with other brands and ensuring seamless integration with various EMC test software. This approach allows our customers the flexibility to leverage RadiMation alongside other tools and systems, maximizing their capabilities and streamlining their testing processes.

Similarly, Raditeq hardware is engineered with versatility in mind, making it compatible with a wide range of EMC test software available on the market. Our hardware solutions are meticulously designed to ensure interoperability and ease of integration with third-party software, enabling customers to harness the full potential of their testing setups. In essence, our commitment to openness and compatibility underscores our dedication to empowering our customers with flexible and comprehensive solutions that meet their diverse needs and preferences. With Raditeq, you have the freedom to choose the best combination of hardware and software to achieve your EMC testing objectives with utmost effectiveness, efficiency, and accuracy.

The Brain of the system

RadiMation® serves as the central intelligence (The Brain) of Raditeq systems, seamlessly integrating Raditeq's products with a vast array of other brands. With over 6000 individual drivers available, there's a high probability that your device is already supported by RadiMation®. However, if your device is not yet supported, Raditeq is dedicated to adding support for it at no additional cost. At the heart of RadiMation® is a focus on automating EMC tests and ensuring the quality of the output. Through rigorous driver testing and meticulous command verification, RadiMation® prioritizes accuracy and reliability in delivering results. As a result, it stands as the software with the

utmost emphasis on producing correct outputs and achieving precise results, empowering users to conduct EMC testing with confidence and efficiency.

The Heart of the system

All of Raditeq's products are compatible with the RadiCentre® system, serving as its modular heart in EMC testing setups. The RadiCentre® is a versatile unit capable of accommodating up to eight individual devices, offering unparalleled flexibility in system configuration. With the RadiCentre® at its core, users have the freedom to construct comprehensive EMC testing systems tailored to their specific requirements. Whether it's combining multiple Raditeq devices or integrating third-party components, the RadiCentre® provides a seamless platform for building extensive and adaptable systems. This modular approach not only maximizes flexibility but also streamlines



system management and maintenance. By consolidating multiple devices into a single unit, the RadiCentre® simplifies setup, operation, and troubleshooting, ensuring efficient and reliable performance in EMC testing endeavors.

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The RadiPower[®] 2000 Essential Series

This manual contains information about the RadiPower® range of 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.

Each RadiPower® RF power meter has an USB port that allows direct connection and control from any Microsoft® Windows PC. The RadiPower® models RPR2000 Series can also be connected and controlled through the four (4) channel USB plug-in card (model USB1004A) in combination with the RadiCentre® modular test system.

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

The RadiPower® advantages

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.

Low measurement uncertainties - Impedance mismatches contribute to the measurement uncertainty. The RadiPower® has a very low Standing Wave Ratio (SWR) 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 command codes needed to control the unit are available. For 'stand-alone use' of the RadiPower®, RadiMation® Free measurement software is delivered with the system. By using the USB1004A plug-in card, up to four RadiPower® heads can be connected to a single plug-in card in a RadiCentre®.

CW sgnals & RF bursts - To enable the measurement of RF bursts, the RadiPower® can also be delivered as a RF pulse power head. This P-version of the RadiPower® is able to measure RF bursts as short as a few microseconds. The C-version of the RadiPower® only supports RMS-measurements for CW signals.

The RadiPower® Accessories





Model: RPR2006C, RPR2006P, RPR2018C or RPR2018P A RF power sensor to be used together with a RadiPower® plug-in card or directly to a PC.

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Shielded USB cable (standard included)

Model: USB A male to USB mini B5 male. To connect the RF power sensor with the plug-in card.



RadiPower® plug-in card (purchased seperatly)

Model: USB1004A.

The RadiPower Plug-in card USB1004A provides the ability to combine and incorporate four RadiPower® power meters in a single slot of the RadiCentre®. Doing so provides the means to control the (four) RadiPower® through the touch-screen of the RadiCentre®.

Additionally to controling the RadiPower® the USB1004A gives the option to link and combine the power meter output. Furthermore it can calculate the gain, net power and VSWR.



RadiPower® System

The RadiPower Models: RPR2006C | RPR2006P | RPR20018C | RPR2018P can all be operated stand alone in combination with a PC. These RF Power meters can all be controlled using their respective USB (A) Connector located on the back of the RadiPower[®].



RadiCentre® Modular test system

Alternative to the stand alone option is it possible to use RadiCentre® and a USB1004A plug-in card to function .This plug-in card is powered by a RadiCentre® modular test system. For the RadiPower® 2000 series and a USB1004A plug-in card a minimum of a RadiCentre® 1 Slot RadiCentre® is necessary to operate. This can be an advantage when more than one RadiPower® need to be operated and controlled from one PC.



RadiPower[®] 2000 Series User Functions & Handeling

Different Models

The RadiPower® RF power sensor is available in 4 models; the RPR2006C, RPR2006P, RPR2018C and RPR2018P. The differences between these models is the frequency range that they cover and the types of measurements that they can perform.

- <u>C- vs P-models</u> The C-models support measurements for CW signals. The P-models can measure RF bursts as short as a few microseconds.
- 2006 vs 2018 models
 RPR2006: 9 kHz to 6 GHz -55dBm to + 10 dBm
 RPR2018: 80 MHz to 18GHz -45 dBm to + 10 dBm
- Options for 2006 models
 #010 4 kHz extension (-40 dBm to +10 dBm from 4 to 9 kHz)

Theory of operation - RadiPower® 2000 series

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
0 : CW	\checkmark	\checkmark
1 : Peak		\checkmark
2 : Envelope tracing		\checkmark

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.

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,



Envelope tracing

It In this mode, the power meter captures data before and after a trigger event occurred. In conjunction with the extremely fast measurement speed of the power meter. This function excels in analysing switching errors that can occur for example in signal generators or transmitters.

To setup an envelope tracing measurement, the user must set a trigger level (threshold value). This trigger can be rising (power exceeds the threshold value) or falling edge (power drops below the threshold value). When the trigger occurs, the power-meter will store 4000 measurement point, 2000 before the trigger occurs and 2000 after.

Besides the trigger, the user can also set a hold off and a delay time. The hold off timer sets a time window, in this window no trigger may occur. If a trigger is detected during this window the timer will reset. If this function is not used the timer must be set to 0. The delay time is a delay before the hold off timer starts. This delay can be used to get the all the (test) equipment in a steady state, before the power meter will capture any trigger.



The following figure shows an example.

The X axis represents power and the Y axis is the time and samples. The trigger is set to a rising edge, this is the horizontal dashed line. The measurement starts with a delay time. In this delay time a theoretically trigger occurred but is ignored by the power meter. After the delay time the hold off timer start, in this example there is also a trigger. The power meter will detect the peak and resets the hold off timer. When the (second) hold off timer has ended the power meter will be able to detect a peak. When this peak is detected the power meter will store the 2000 samples before and after the trigger occurred.

Installation into the RadiCentre

Follow the instructions below for installing the Raditeq plug-in card into the RadiCentre® correctly:

Step 1:

- Before proceeding, ensure that the RadiCentre® is turned OFF.
- Choose an empty slot in the RadiCentre[®] suitable for installing the plug-in card.
- Unscrew the four screws on the blind panel covering the slot (two at the top and two at the bottom) to remove it.

Step 2:

- Insert the plug-in card into the rail of the empty slot, following the orientation shown in picture A.
- Position the plug-in card into the slot and gently push it in using the lower part of the card.
- Continue pushing until the card reaches the end of the rail, then securely push it into the backplane socket.

Step 3:

- Once the plug-in card is correctly inserted into the backplane socket, secure it by tightening the four screws at the top and bottom of the card (as indicated in picture B).
- Use a screwdriver type Poze, size PZ1 for this purpose.

Step 4:

- After installing the plug-in card, connect the AC mains power cord to the back of the RadiCentre[®].
- Switch the ON/OFF button to the ON position.
- The RadiCentre[®] can now be started by tapping the touch screen or by pressing the front ON button.

Once installed properly, the plug-in card should be automatically recognized and displayed on the front









RadiCentre[®] & USB1004A - Manual Control

Once the RadiCentre® is switched on, the RadiPower® can be activated from the 'main'- screen on the RadiCentre® touch-screen.

Sensor configuration

The large 'status' button in the 'main' screen of the RadiCentre® will display the detected RadiPower® USB1004A plug-in card and the inserted RadiPower® power meters. To monitor the measured power level(s), one can go to the 'control' screen by pressing the RadiPower® 'status' button.





Frequency settings

In order to obtain the correct absolute power level, the user can enter the measurement frequency in the frequency window (see figure below). This window will appear after pressing the frequency button next to the power sensor data.

Note: When the user does not enter the correct measurement frequency, the power sensor will not display the correct absolute power level.

Sol.ooo MiHz Valid range starts from 9.0 kHz to 6.0 GHz 7 8 9 GHz Exit RadiSone 0.00 V/m 7 8 9 GHz Exit Radifiend off 4 5 6 MHz Clear Radifiend 6.000 d/m 1 2 8 9/2 B/zg 0 3 Hz B/zg • Down 1/2 9/2

Offset settings

Another function that is available for the RadiPower[®] is the 'Offset' function. The Offset value can be used to 'compensate' for a fixed – known value, for example 20 dB attenuation. The offset value defined in dB will be subtracted from the measured value of the RadiPower[®] the user can enter the 'Offset' value by pressing the 'Offset' button on the RadiPower[®] screen, where a new window will open in which the value can be entered. Please refer to figure on the right where as an example an offset of 20 dB has been entered. The displayed value on Port B will now be the measured value minus the offset value (20 dB lower).

Port A: RPR3006W	-51.79 dBm	Frequency : 1.300 GHz	Offset : 20.0 dB	Filter : Auto	Home Home
Port B: RPR2006P	-22.14 dBm	Frequency : 1.300 GHz	Offset : 0.0 dB	Filter : Auto	RadiSense 0.00 V/m
Port C: RPR1006A	-66.70 dBm	Frequency : 50.000 MHz	Offset : 	Filter : 1	RadiField Off
Port D:		Frequency :	Offset : 	Filter :	RadiGen 6.000 GHz Off
Add calculation					
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Filter Settings

The user can also enter the filter setting, to select a 'filter time constant'. For more information on the available filter settings, please refer to the 'RadiPower® Specifications' section of this manual.



Filter calculations

The RadiPower can be set to a filter setting manually and using an auto filtering mode. "Mode 0" is what is referred to as the manual setting and "Auto mode" does filtering depending on the measured power. Note below the samples take per filter setting to calculate the average signal.

Filter settings for (Mode 0)	Number of samples for calculation
Filter 1	10
Filter 2	30
Filter 3	100
Filter4	300
Filter 5	1000
Filter 6	3000
Filter 7	5000

Auto Filter mode	Number of samples for 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 3)
-300 to -40 dBm	1000 (filter 3)
-40 to -50 dBm	3000 (filter 3)
Below -50 dBm	5000 (filter 7)

Calculation functions

In situations where multiple RadiPower® USB power heads are connected to the USB1004A plug-in card, the operator can use predefined calculations on the main screen to calculate between two different power meter measurements. This function is only applicable for mode 0 (CW).

Net Power function

The 'Net power' function is shown as an example in figure on the right. This function will calculate the difference (in dBm) between two power meters. The measured power on port A (in Watts) and the measured power on port C (in Watts) will be subtracted resulting in the net power.

Gain function

The 'Gain' function will calculate the difference (in dB) between the measured power of two ports.

VSWR function

The 'VSWR' function will calculate the VSWR based on the measured forward power and reflected power between two ports (in U).







RadiPower[®] Stand-alone Installation

Stand-alone Configuration

Connect the RadiPower® sensor to a Windows computer with a USB 1.1 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.





Stand-alone command set

The RadiPower® sensor can also be directly connected to a PC. When the RadiPower® is directly plugged into a PC the prefix is not required or necessary.

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





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'.

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How to connect the RadiPower® to the RadiCentre®

To connect the RadiPower® to the RadiCentre® simply connect the USB cable between the two devices.

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.

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From the configuration list, select the RadiPower® and press "Edit". A device driver settings window will now appear.

- Press the "Advanced" button.
- Select the "Option" tab and set the desired filter for CW measurements, for example: Filter 5.
- Select the "RadiCentre" tab and select "Directly to PC".
- Select the "Communication" tab and select "Detect". Press Configure.

A new window will appear to detect the USB identifier of the RadiPower®. and press "Detect".

If the device Identifier is detected, press "OK". Press "OK" again to return to the Configuration window.

Perform a final check to determine whether the RadiPower® is ready to be used. From the configuration windows press the "Check" button.

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In case you want to configure multiple RadiPower® power meters, make sure that only one RadiPower® is connected at the same time and repeat the procedure as described above for each RadiPower®. Please be noted that each RadiPower® will have an unique name.

If all necessary power meters are added in the configuration, the measurement can be setup and all RadiPower® can be connected to the USB ports of the PC.

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: 'Field Sensors'
- 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.

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Important information

When you need support with the configuration of your Radi-Product in RadiMation®, please consult the RadiMation® support team at: <u>Support@radimation.com</u>.

It is also advised to visit the RadiMation® Wiki page and the FAQ section, which can be found at: https://wiki.radimation.com

RadiMation® software can be downloaded at: https://www.raditeq.com/emc-test-software/radimation-download



Remote Control

The RadiPower® can be controlled remotely through the interfaces of the RadiCentre®. The exact communication protocol can be found in the RadiCentre® manual. The specific commands for the RadiPower® are shown in 'RadiPower® 2000 series Command Set'.

RadiPower[®] 2000 Series Command Set

RadiCentre[®] command set

The commands for the plug-in card of the RadiPower® sensor can be found in the RadiCentre® product manual under the **Programming manual**. Please note that if the RadiPower® is connected to the USB1004A all the commands must have a prefix consisting of the 'Device number' and the RadiCentre® slot. An example is shown in the picture below and the next page.



Refer to the Raditeq Programming manual, for more information on the command sets, error codes and device numbers.

Prefix & Communication example:

• "2A:POWER?"

Get the power level of the RadiPower® sensor which is connected to port A of the RadiPower® plug-in card in slot 2.

• "2B:FILTER?"

Get the filter setting of the RadiPower[®] sensor which is connected to port B of the RadiPower[®] plug-in card in slot 2.

• "3B:FILTER?"

Get the filter setting of the RadiPower[®] sensor which is connected to port B of the RadiPower[®] plug-in card in slot 3.

- "2" = 'board-number' of the RadiPower® plug-in card
- "A" & "B" = ports of the RadiPower® RF power sensor
- "FILTER?" = message to the RadiPower® RF power sensor

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 <u>www.raditeq.com</u>. 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 <u>www.raditeq.com/support</u>. Upon receipt of the request, an RMA number will be provided. <u>Please do not_send the product without this RMA number</u>! 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: <u>www.raditeq.com/support</u>. 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 3447GX Woerden The Netherlands

Declare under our sole responsibility that the

Product:RadiPower® SeriesModels:RPR3006W | RPR2006C | RPR2006P | RPR2018C | RPR2018P

Are in accordance with the European directives:

EMC Directive 2014/30/EU Low Voltage Directive 2014/35/EU RoHS Directive: 2015/863/EU

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
	EN60825-1:2014, Safety of laser products - Part 1: Equipment classification and requirements

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

Date of issue:

- Place of issue: Woerden, The Netherlands
- Authorized by: P.W.J. Dijkstra

Title of authority: Director



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