

RadiPower®

Service & Operating Manual



RF power sensor

~ with USB interface ~

Models
RPR1006A/RPR1006P

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1 WARNINGS & PRECAUTIONS



Read the contents of this manual and become familiar with the safety markings, instructions, operation and handling of the system.



Only qualified service personnel are allowed to perform adjustment, maintenance or repair to the equipment.

Verify that the supply voltage is within the operating range of the equipment.



The RadiPower® contains materials which can be recycled and reused. At the end of its life, specialised companies can dismantle the discarded system to concentrate the reusable materials and to minimize the amount of materials to be disposed of. Please return the system to your local reseller if it is discarded at the end of its life.

2 Introduction

An accurate power meter is indispensable to perform reliable EMC measurements. The RadiPower® is a RF power meter dedicated for CW power measurements during EMC tests. The RadiPower® is an affordable, accurate and extremely fast power meter. It provides measurements within 0,2 dB over a frequency range from 9 kHz till 6 GHz, which enables effective measurements in accordance with the latest CISPR standards.

EMC immunity measurements are time consuming. The total elapsed time is mainly depending on the number of frequency points, the dwell time and the speed of the power meter. As standards in general prescribe the first two parameters, the speed of the power meter is the only one that can be optimized. The unprecedented diode technology of D.A.R.E!! makes extremely fast though accurate power measurements finally a reality, even at low power levels.

Next to speed, accuracy is the first concern when performing EMC measurements. The RadiPower® allows high precision EMC measurements with a high dynamic range of over 65 dB. With an accuracy of 0.2 dB over the complete band it is suitable for measurements in accordance to CISPR or EN61000-4-3 standards.

As impedance mismatch is often the main contribution to the measurement uncertainty the RadiPower® has a very low Standing Wave Ratio (SWR). Because of this, very good measurement uncertainties can be obtained.

Due to the USB interface, the RadiPower® can be easily used. Besides the RadiMation® integral EMC measurement software the RadiPower® can be controlled by all EMC measurement packages as all software codes to control the unit are available. For stand-alone use the RadiPower® measurement software is delivered with the system.

To enable the possibility of measuring RF pulse signals the RadiPower® can also be delivered as a dedicated RF pulse power head. This version measures pulses as short as 20µs.

There are two 6GHz models available;

- RPR1006A for Continuous Wave signals (CW)
- RPR1006P for CW and Pulse signals (RF burst)

3 The RadiPower®

The RadiPower® RF power sensor is optimised for EMC measurements, where high dynamic range, together with fast measurements is 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 measurement speed of 1MS/s, at power levels as low as -55 dBm without the need for zero adjustment!

The USB port makes the RadiPower® easy to install and easy use on almost each computer.



The RadiPower RF power sensor is mounted in a rugged metal housing in order to ensure long life and excellent RF shielding.

The power sensor is equipped with an N-type precision RF input connector and a standard USB-B connector for communication to a computer.

The RadiPower® sensor is supplied with the following items:

- *The RadiPower® RF power sensor*
- *Shielded USB cable*
- *Installation CD*
- *This manual*

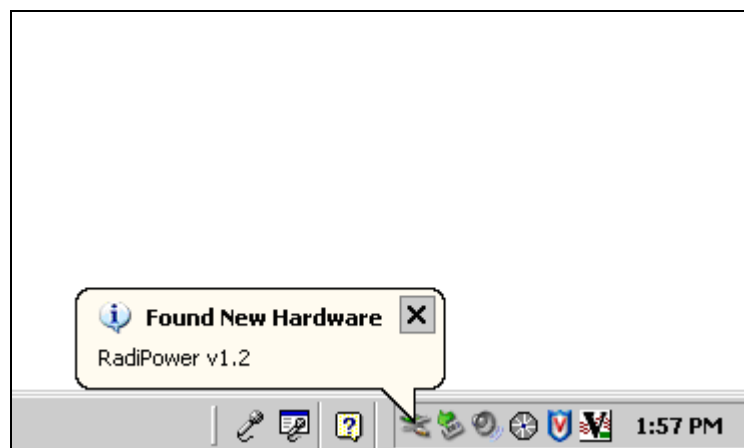
4 Installation of the RadiPower®

4.1 Hardware installation

Use the supplied USB cable to connect the RadiPower® sensor to a Windows computer with a USB 1.1 port.

4.2 Drivers installation

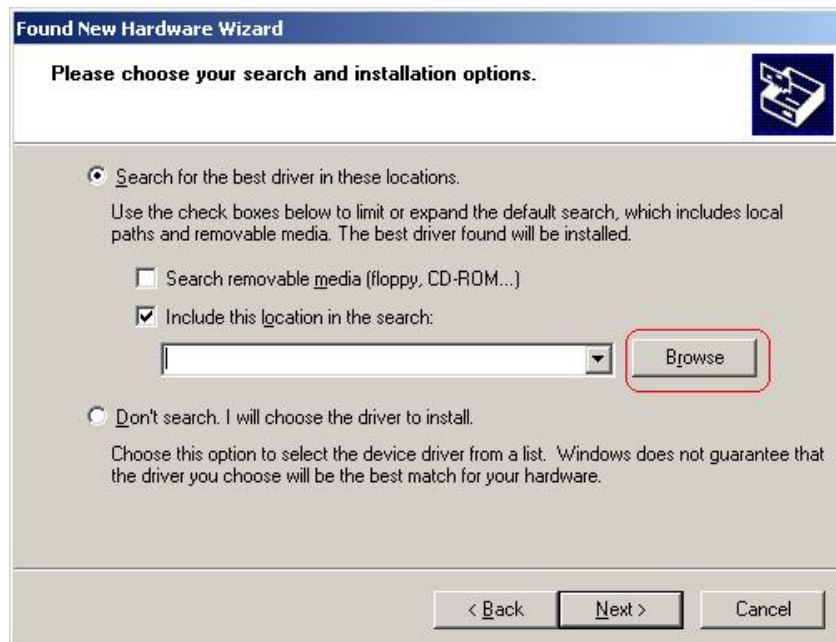
Plug in the RadiPower® into a USB port of your PC. Windows will prompt that new hardware was found. Two drivers must be installed for normal usage on the computer. Windows will automatically start the installation of both drivers as soon as the RadiPower® has been detected.



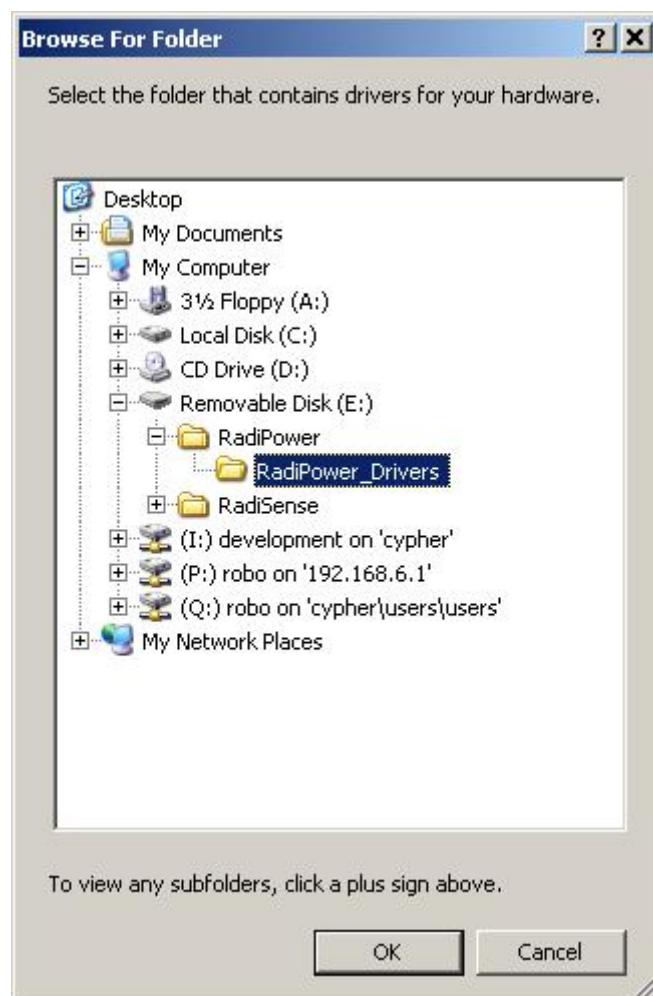
Windows will ask you to install device drivers



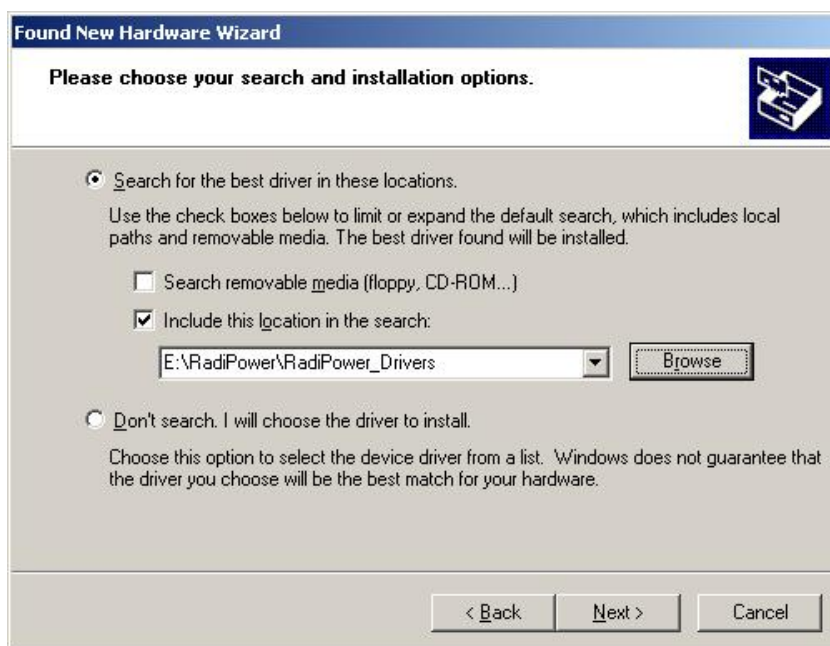
Select “Install from a list or specific location (Advanced)”. Press the “NEXT>” Button



Press the “Browse” Button



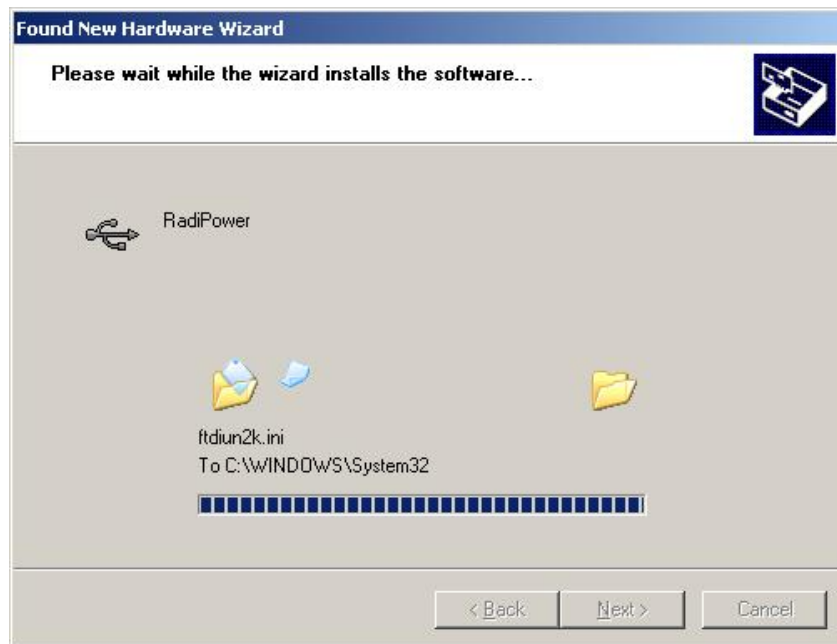
Select the Folder of the RadiPower _Drivers.
Press the “OK” Button



Press the “NEXT>” Button



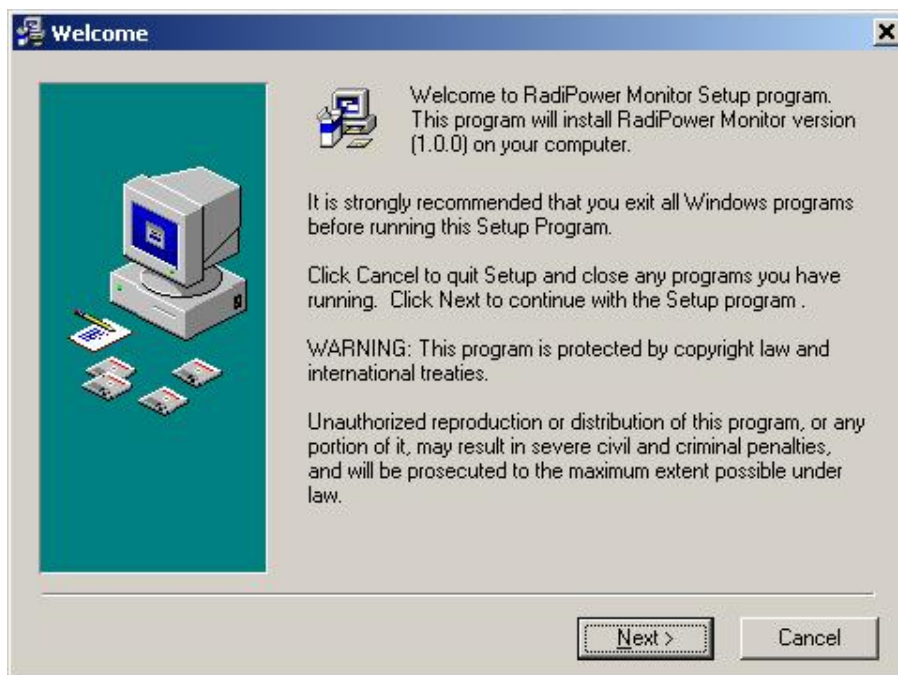
Press the “Continue Anyway” Button



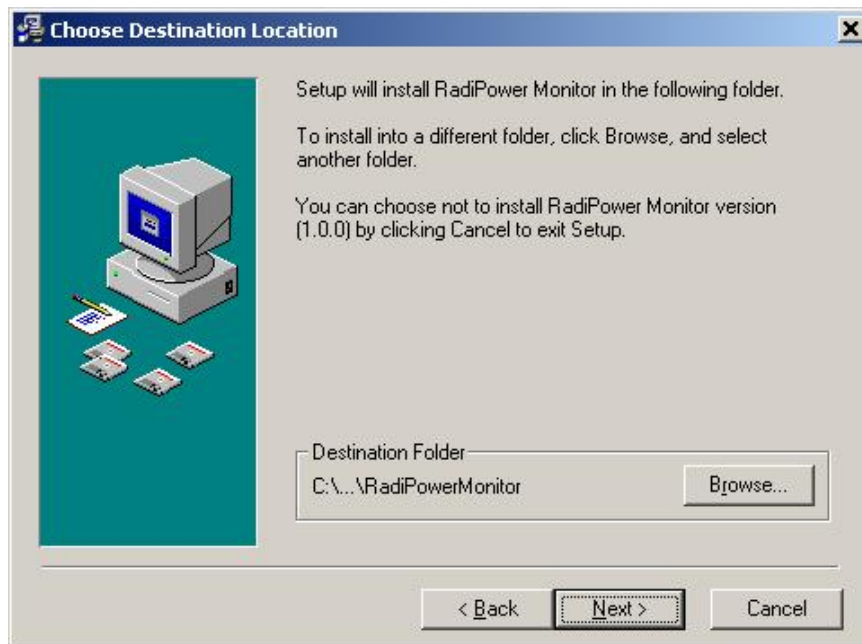
Press the “Finish” Button
This process will repeat for the second driver.

4.3 “RadiPower® Monitor” installation

The “RadiPower® Monitor” is a PC program that read the power level of the RadiPower®. Start Setup RadiPower Monitor.exe and install the software. See the screen shots.



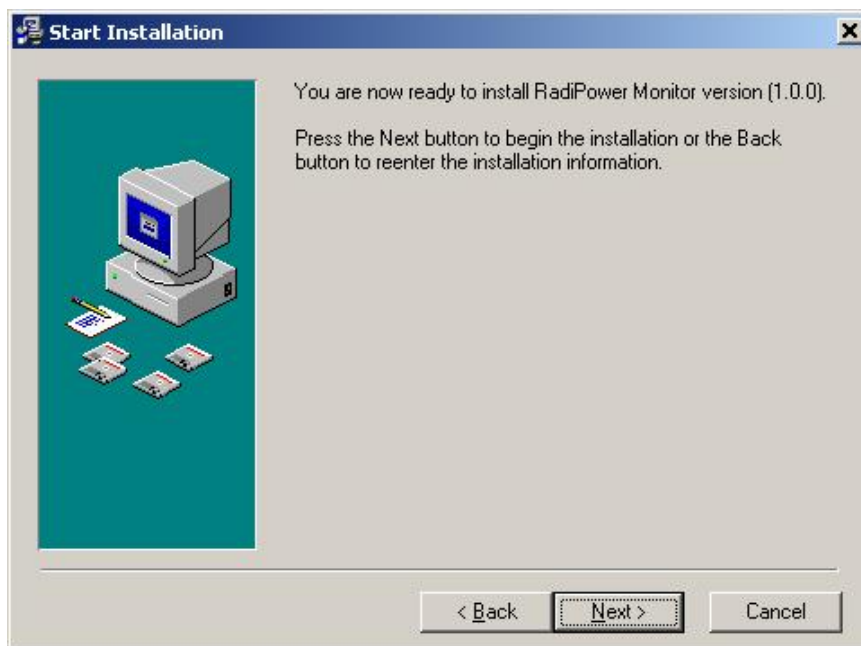
Press the “NEXT>” Button



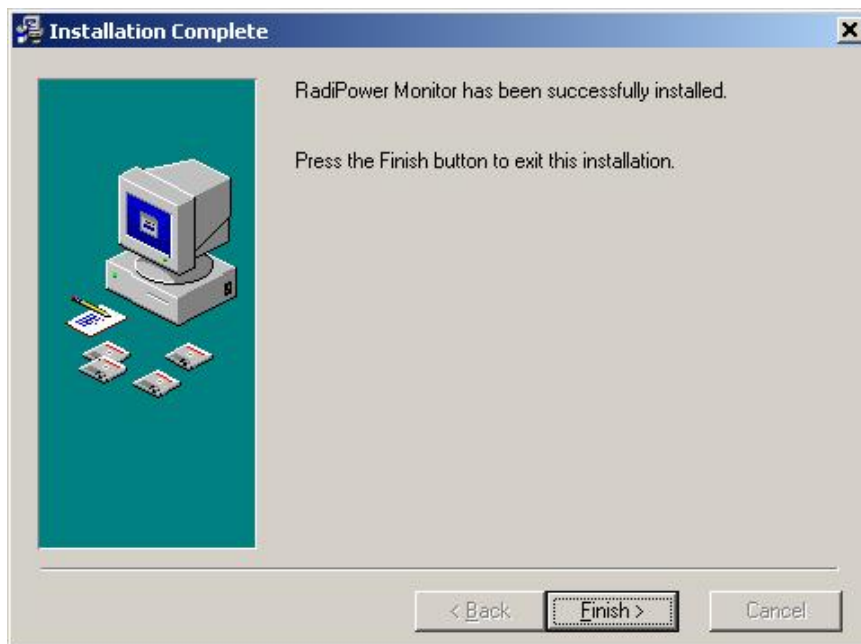
Press the “NEXT>” Button



Press the “NEXT>” Button



Press the “NEXT>” Button



Press the “Finish” Button
The “RadiPower® Monitor” software is now installed.

To improve the communication speed to the RadiPower the Buffer Transfer size can be reduced and Latency Timer set to 1msec. These settings must be applied for the COM-port which is being used for the RadiPower.

Advanced Settings for COM2

COM Port Number: **COM2**

USB Transfer Sizes

Select lower settings to correct performance problems at low baud rates.
Select higher settings for faster performance.

Receive (Bytes): **64**

Transmit (Bytes): **64**

BM Options

Select lower settings to correct response problems.

Latency Timer (msec): **1**

Timeouts

Minimum Read Timeout (msec): **0**

Minimum Write Timeout (msec): **0**

Miscellaneous Options

- Serial Enumerator ☒
- Serial Printer ☐
- Cancel If Power Off ☐
- Event On Surprise Removal ☐
- Set RTS On Close ☐
- Disable Modem Ctrl At Startup ☐

OK Cancel Defaults

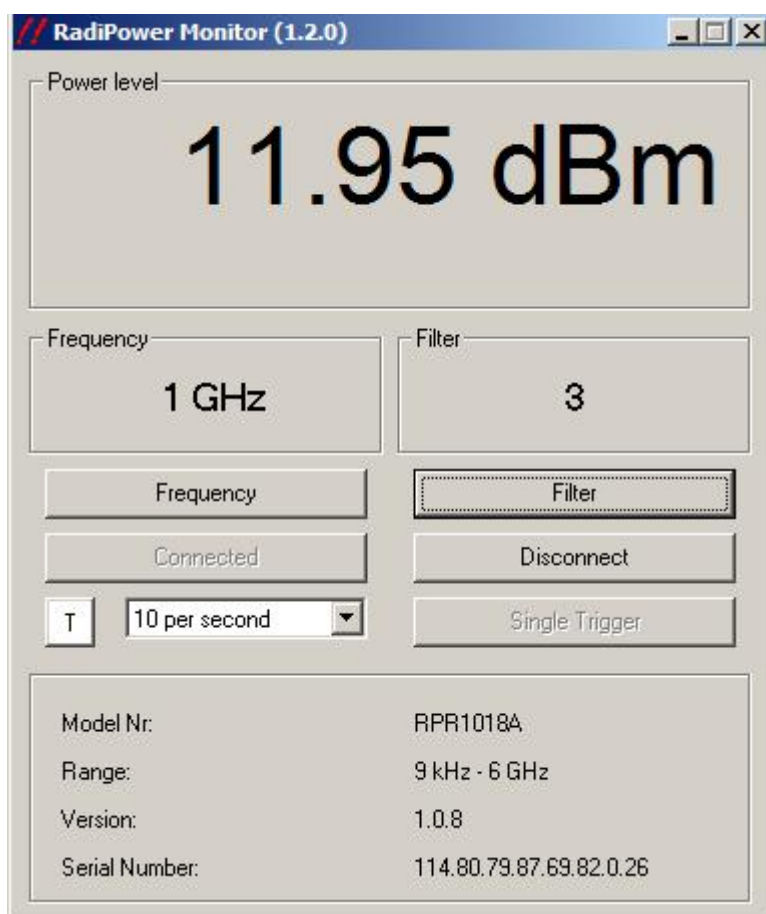
5 Using the RadiPower®

5.1 Running “RadiPower® Monitor”

In Windows, go to the Start button and press:

[Start] -> [Programs] -> [RadiPower] -> [RadiPower Monitor]

The RadiPower® Monitor is now started.

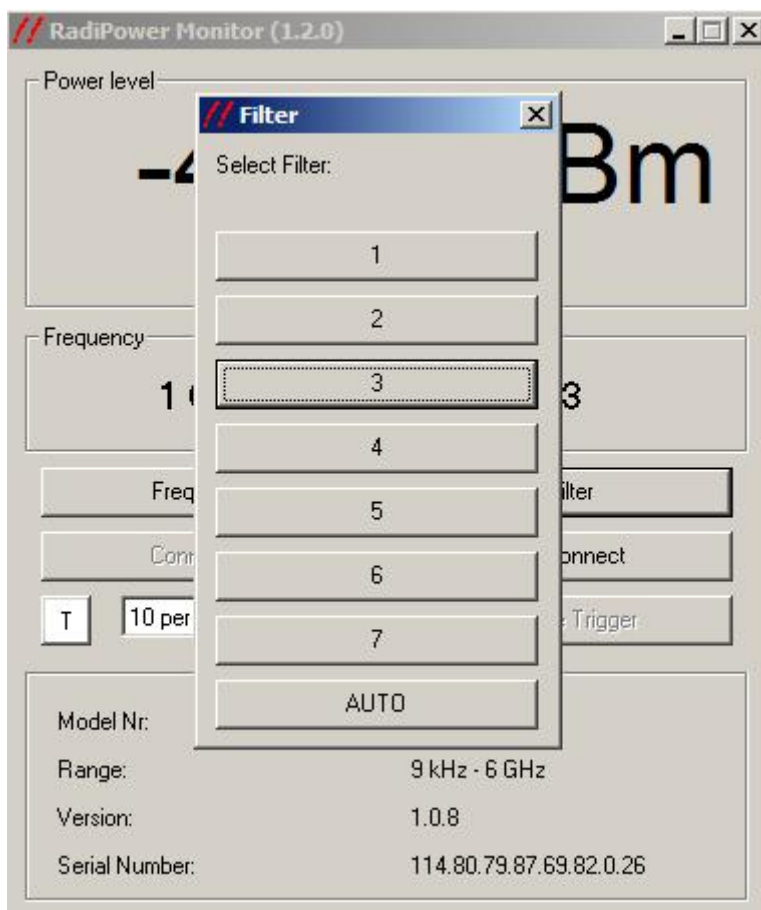


At first the program tries to connect to the RadiPower® sensor. As soon as this has been successful, the reading of the power level will automatically start.

Use the “Frequency” button to set the the RadiPower® sensor to the correct frequency at which the power is being measured. The internal correction for entered frequency will be automatically applied.

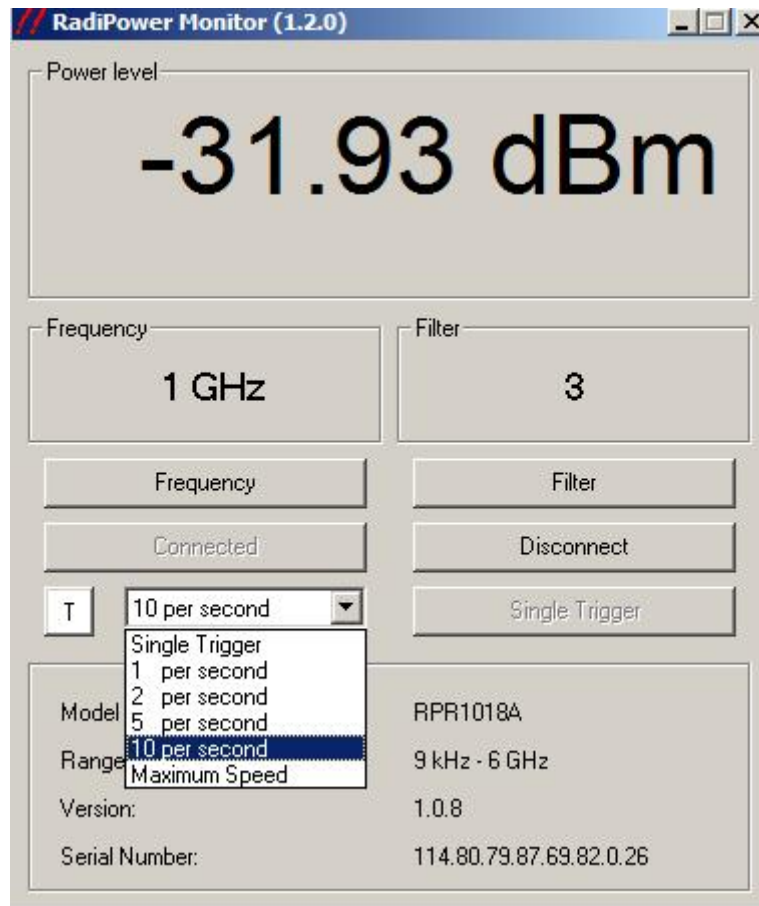


Use the “Filter” button to set the number of averaging.



See section 6 for the effect of a different filter setting.

The measuring speed or readout speed can be set using the drop-down box. The maximum speed depends on the filter setting and can be up to 100 measurements per second.



When using the RPR1006P pulse mode power meter, the sampling rate is much higher to enable peak measurements of short RF pulses down to 20 μ s. The pulse power meter performs a max hold on these samples. As soon as a reading from the sensor has been performed, the max hold value in the sensor is being reset.

In single trigger mode, the triggering will start by pressing the “Single Trigger” button.

An under range will be displayed as “-- -- -- dBm”,

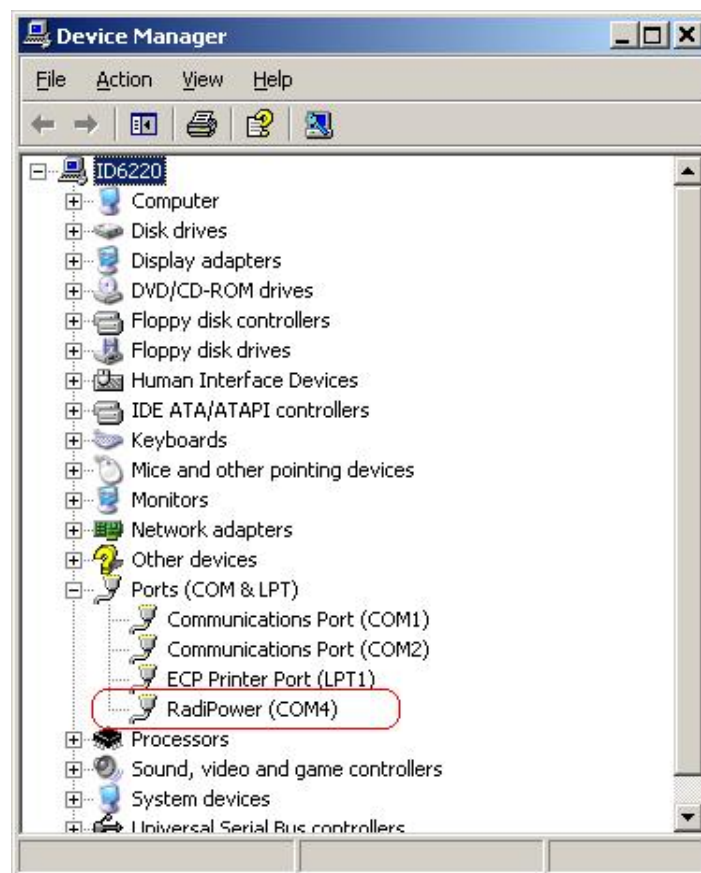
An over range will be displayed as “+ + + dBm”

Do not apply more than +20 dBm RF power to the input of the power sensor. This may result in permanent damage.

5.2 Comport settings

The RadiPower[®] sensor uses a virtual comport. The settings can be viewed and changed in the Windows Device Manager. In Windows press:

[Start] -> [Settings] -> [Control Panel] -> [System] -> Tab [Hardware] -> [Device Manager]



The correct settings for the serial port¹ are:

Baud rate: 115k2
Data bits: 8
Parity: None
Stop Bits: 1
Flow control: None

¹ Make sure that the serial port which is being used is COM8 or lower.

5.3 Commands

Please note that every command has to be terminated with a carriage return. Communication setting of the serial USB port is 115200,8,N,1.

RadiPower		
Requests	Reply	Description
"*IDN?"	"RPR1018A_REMOTE, Version x.y.z'n"	Identity string of the RadiPower
"ID_NUMBER?"	"x.x.x.x.x.x.x.x"	Unique number
"FREQUENCY f Hz"	"OK"	Set the frequency in Hz, where "f" is the frequency in Hz
"FREQUENCY 50000 Hz"		
"FREQUENCY?"	"f"	Get the frequency, where "f" is the frequency in Hz.
"FILTER 1"	"OK"	Set the filter to 1
"FILTER 2"	"OK"	Set the filter to 2
"FILTER 3"	"OK"	Set the filter to 3
"FILTER 4"	"OK"	Set the filter to 4
"FILTER 5"	"OK"	Set the filter to 5
"FILTER 6"	"OK"	Set the filter to 6
"FILTER 7"	"OK"	Set the filter to 7
"FILTER AUTO"	"OK"	Set the filter to auto
"FILTER?"	"n"	Get the filter setting , where "n" is the filter setting 1 to 7 or "auto"
"POWER?"	"P"	Get the measured power, where P is the power value in dBm. Resolution is 0,01dBm
"MODE m"	"OK"	Sets measurement mode m=0 for CW and m=1 for Pulse mode
"MODE?"	"m"	Returns current mode, where m=0 for CW and m=1 for Pulse mode
"ACQ_SPEED s"	OK	Sets ADC measurement speed, where s is the samples rate in kS/s: 10, 100, 1000
"ACQ_SPEED?"	"s"	Returns ADC measurement speed, where s is the samples rate in kS/s: 10, 100, 1000
"TEMPERATURE?"	"t"	Returns sensor temperature t in degrees Celsius. Resolution is 0,1 degrees.
"REBOOT SYSTEM"		Reboots the system

5.4 Error codes

Error codes	
Error code	Description
"ERROR 1"	Wrong command
"ERROR 50"	Argument error
"ERROR 51"	Argument too high error
"ERROR 52"	Argument too low error
"ERROR_601"	Error frequency not set
"ERROR_602"	Error over range
"ERROR_603"	Error under range
"ERROR_604"	No Cal data

6 **RadiPower**® specifications

Electrical specifications	RPR1006A
Detector type	Logarithmic detector
Measuring function	Average power
Frequency range	9 kHz to 6 GHz
Power measuring range	-55 dBm to + 10 dBm (usable from -60 dBm)
Input damage level	> +20 dBm
Resolution	0,01 dB
RF input connector	Precision N-type
RF input impedance	50 Ohm
SWR	< 1,05 (9 kHz to 100 MHz)
	< 1,15 (100 MHz to 2 GHz)
	< 1,35 (2 GHz tot 6 GHz)
Frequency response accuracy (at 23° C ± 2° C)	0,25 dB (at 23° C ± 2° C)
Linearity error	0,05 dB/10 dB (0 dBm reference point)
Temperature effect	0,15 dB max over full temperature range
Measuring units	dBm
Zero adjustment	Not required
Frequency response correction	Stored frequency response data is taken into account by numerical entry of the measurement frequency
Measurement speed	Up to 100 sps (depending on filter settings)

Filters	Number of Averages
Filter 1	1
Filter 2	3
Filter 3	10
Filter 4	30
Filter 5	100
Filter 6	300
Filter 7	1000
Auto	See next table

Auto filter mode	Number of Averages
+10 to 0 dBm	10 (filter 3)
0 to -10 dBm	10 (filter 3)
-10 to -20 dBm	10 (filter 3)
-20 to -30 dBm	30 (filter 4)
-30 to -40 dBm	100 (filter 5)
-40 to -50 dBm	300 (filter 6)
-50 to -60 dBm	1000 (filter 7)
-60 to -70 dBm	1000 (filter 7)

Mechanical	
Dimensions of measuring device	100 * 40 * 40 mm
RF input connector	N type precision
Data connector (power head side)	USB type B

Environmental	
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

Supply	
Supply voltage	+5Vdc through USB port
Current consumption (USB)	100 mA max.

Interfaces	
Communication	USB 1.1