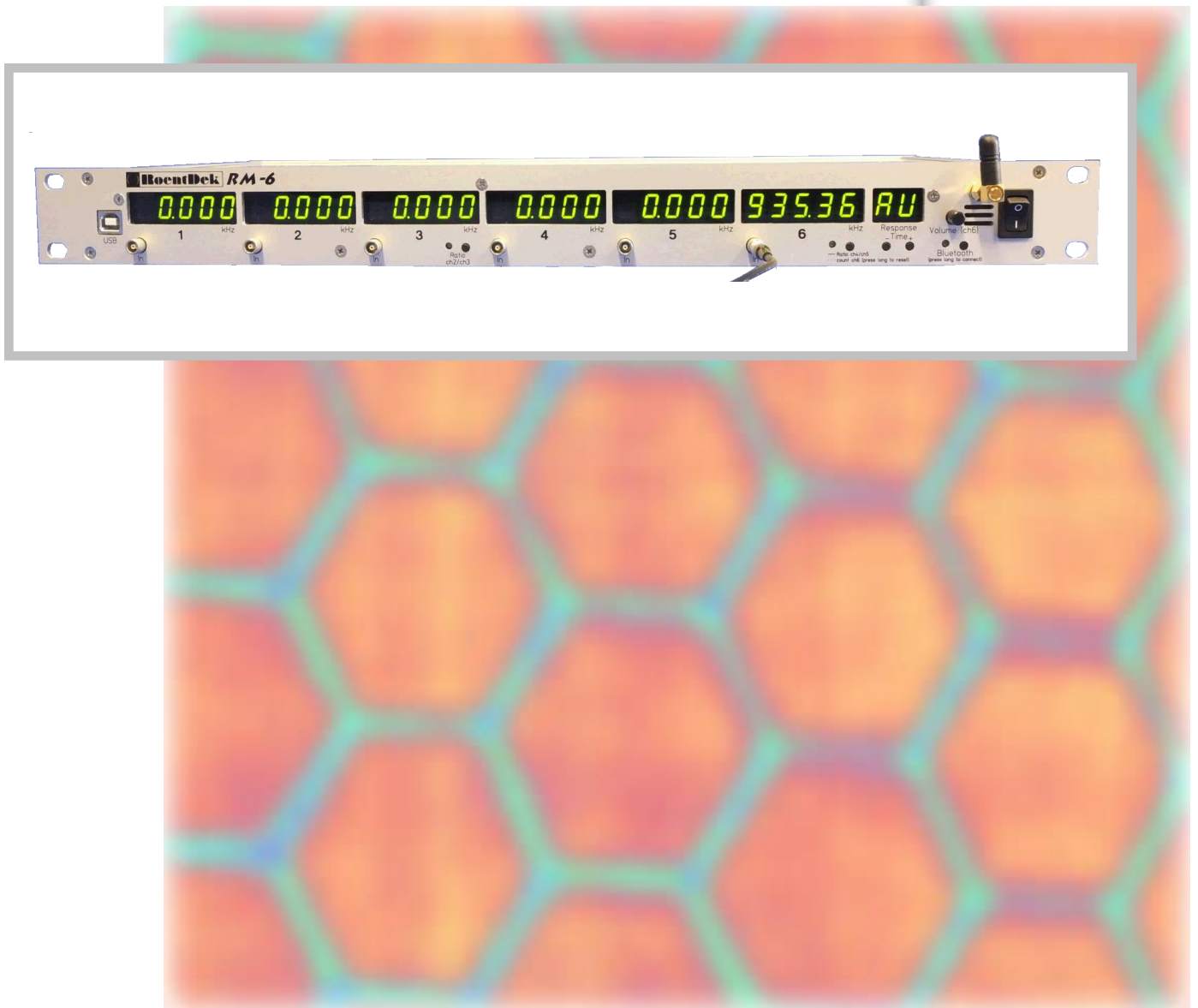


## RM-6 Ratemeter and Counter

(Version 11.0.1802.2)



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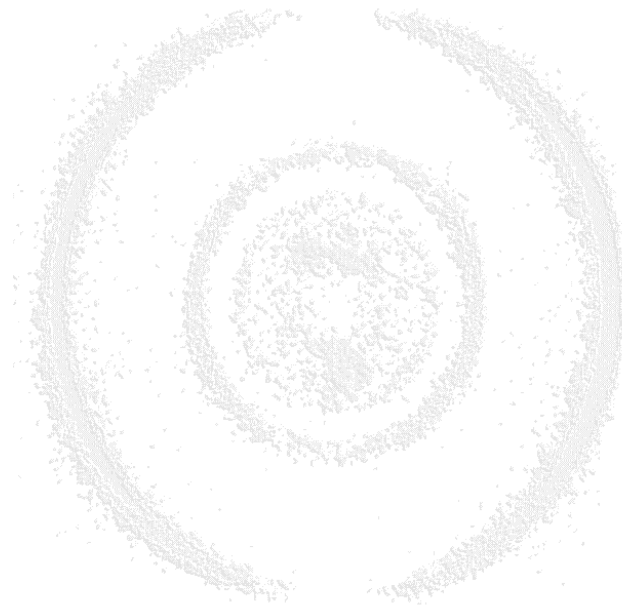
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DE48573152



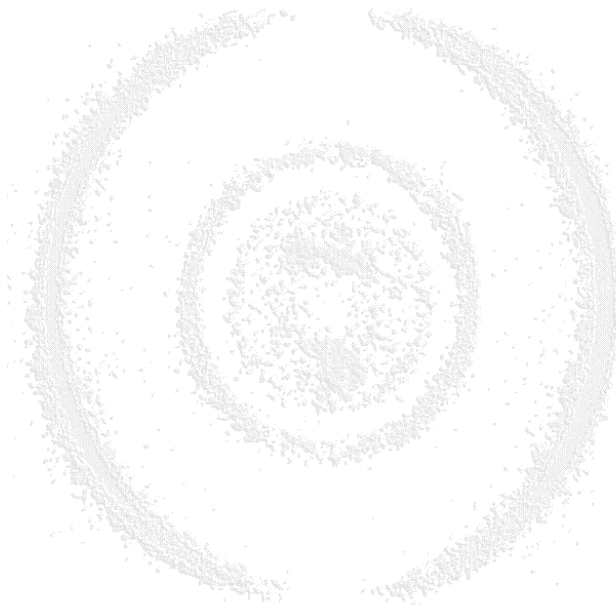
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## 1 General Description

The **RoentDek RM-6** is a six-channel 100 MHz counter/rate-meter for logic signals (default: NIM, on 50 Ohm impedance lemo00 input socket) with a variety of display and computing options. The counter memories can be read-out via USB and blue-tooth allowing full control for analysing the data stream on the inputs by software (a small GUI-interface or via our software **CoboldPC** or **LabView**).



Figure 1: RM-6 counter module. Several displays allow simultaneous observation of up to six count rates.

The display range adopts automatically for each channel. The Response Time (i.e. display refresh rate) can adopt automatically for each channel or be manually set for all channels.

Parallel read-out through a USB socket or via Bluetooth allows full control in recording the data stream. An audio output allows sensing count-rate changes if the **RM-6** display is out of sight.

The displays of channels 3 and 6 can optionally show the ratio between the rates on channels 1(4) and 2(5). The rate or the counts. The actual rates on inputs 3 and 6 can still be accessed via USB or Bluetooth. The **RM-6** comes in a 1 HU 19" case (WxHxD: 483 x 43.6 x 230 mm<sup>3</sup> incl. Bluetooth antenna. Insertion depth: < 270 mm with power cable connected. Weight: 1.6 kg without mains adapter). It has a power consumption of about 12 W (1 A on 12 V, supplied via mains adapter (included) for 100-250 VAC).

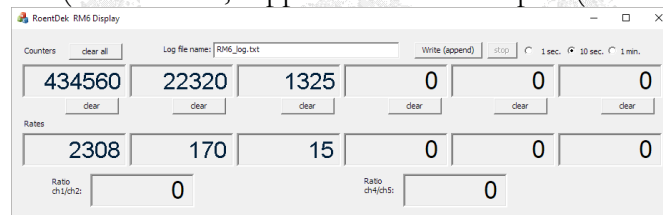


Figure 2: Read-out software.

### List of features:

- Input: 6 channels via 50 Ohm Lemo00 sockets, NIM level ("High" < - 0.3 V), DC coupled
- other input levels and polarities (e.g. TTL) can optionally be factory-set.
- Additional output channel programmable for signalling events (e.g. signal after n input signals or when the rate exceeds or falls below a certain limit. Adjustable via software.)
- Maximum rate per channel: about 160 MHz (burst: 250 MHz for up to 4 signals), but display is limited to 99.999 MHz. Higher rates will only be visible via USB or Bluetooth!
- Minimum count rate 1 Hz
- Minimum input signal width: 2 ns (for NIM)
- Maximum voltage tolerance of inputs +/- 2V (for NIM input version)
- Outputs:
  - o 6x digital displays with automatic ranging and variable integration times
  - o 1x audio output (3.5mm Line Out jack for connecting active speakers)
  - o 1x analog output (Lemo 00 socket) for channel 6 (0.55-2.75 V correspond to a rate of 0-100 MHz)
  - o data logging via USB and Bluetooth.
- Available Response Times: 'AU' (each channel adjusts automatically), '--' (current rate will be displayed without smoothing), '1.0', '2.0', '5.0', '10.0' (smoothing with 1/2/5/10 s time constant)
- Windows read-out and control software. Rate and counter values can be directly read from **CoboldPC** and written into the LMF-data file. **LabView** is also supported.

## 2 Installation

The ratemeter **RM-6** can be installed in any standard 19"-rack. It can be connected with a PC using the front USB-port of the **RM-6**. However, this connection is not necessary for standard operation as stand-alone device.

## 3 Operation

Up to 6 signal cables can be connected with the **RM-6** using the 6 front LEMO00-connectors. The signal rate will be automatically displayed. The digits left of the period denote the rate in kHz.

### 3.1 Averaging Time constant



Figure 3.1: Averaging Time constant

The default setting is “automatic”. In the mode the averaging time period will be automatically set. With the buttons + and - the time can be set to zero (“--”), 1, 2, 5 and 10 s.

### 3.2 Rate, ratio and counter mode



Figure 3.2: Rate, ratio and counter mode

These two buttons control the behaviour of the display fields for channel 3 and 6. Pressing the buttons for a short time will cycle between 3 different modes:

- rate (LED is off)
- ratio between ch 1/2 (or 4/5) (LED is blinking)
- counter in channels 3 or 6 (LED is continuously on).

Pressing the button for a longer time will reset the counter values to zero.

### 3.3 Bluetooth



Figure 3.3: Bluetooth

The **RM-6** can send the current rate- and counter values via Bluetooth to other devices (e.g. a smart phone). This function is activated with the Bluetooth-button. Pressing the button for a longer time will activate the discovery function for about 60 s.

- enable Bluetooth on your device
- start the search for new Bluetooth devices on your device
- press the Bluetooth button on the **RM-6** for about 5 s.
- now a new Bluetooth device “*RoentDek\_RM6*” should appear in the list of Bluetooth devices.
- couple the new device and accept the security code.

For the read out of the Bluetooth data any “Bluetooth terminal”-app can be used. Please contact **RoentDek** for a list of recommended apps.

### 3.4 Audio out / Volume control of channel 6



Figure 3.4: Audio out / Volume control of channel 6.

The current rate in channel 6 is encoded as audio signal and sent to a 3.5 mm phone jack on the back of the **RM-6**. The volume of the audio signal can be controlled with the black knob.

### 3.5 Voltage output of channel 6

The current rate is encoded into an analogue voltage ranging from 0.54 V to 2.75 V. The connector is on the back side of the **RM-6**.

## 4 Readout via USB-cable



Figure 4.1: Readout via USB-cable

The current values of the 6 rates and the 6 counters can be displayed in a program on a PC. For this, please connect the **RM-6** with a USB-port of the PC using the USB-connector on the front of the **RM-6**.

If you connect it to the PC for the first time, please make sure that the PC is connected to the internet so that it can automatically download the drivers for the **RM-6**. In the Windows Device Manager, it will show up in the section “Ports (COM & LPT)” as “USB Serial Port (COM)”. If the automatic installation of the drivers is not possible then they can be downloaded from the FTDI-website: <http://www.ftdichip.com/Drivers/D2XX.htm> Please download and install the D2xx-drivers.

When you start RM6\_ReadOut\_x64.exe (or RM6\_ReadOut\_x86.exe on 32 bit systems) you will see the following interface:

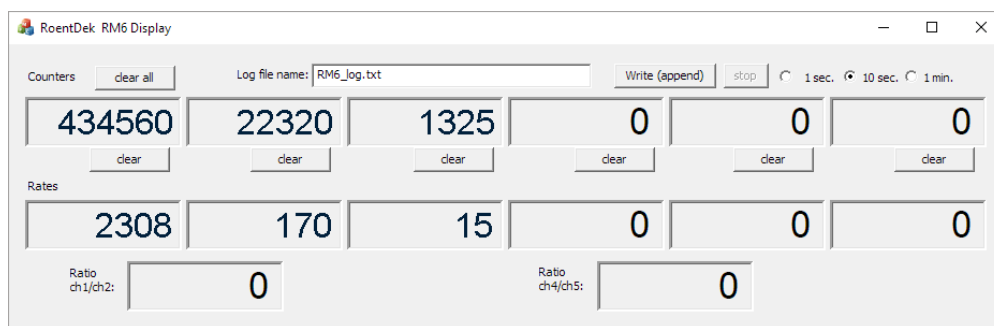


Figure 4.2: RM-6 interface display

In addition to the simple GUI-interface it is also possible to read out the RM6 via CoboldPC and LabView. Please contact **RoentDek** for details.

## 5 Upgrading the firmware

The firmware version of the **RM-6** is displayed during the first seconds after powering on the unit (e.g. "F 2-06"). It can be upgraded using a flash program on a PC. Please contact **RoentDek**. The latest version will be sent to you.

Please follow these instructions:

- I. Power on the **RM-6** and connect it with the PC using an USB-cable. It is important to use the USB-port on the back side of the **RM-6**. Do not use the front USB-port. If there is another USB-cable connected to the front port of the **RM-6** then please disconnect it.
- II. Go into the Device Manager of Windows. The **RM-6** will appear as "Arduino Due Programming Port". You will find it either in the section "Ports (COM & LPT)" or in "other devices".

Please make sure that no other Arduino-Device is connected to the PC as it might be damaged during the flash procedure!

If it is visible in "Ports (COM & LPT)" then the necessary driver is already installed and you can continue with step VI.

- III. Right click on "Arduino Due Programming Port" and select "Update Driver Software"

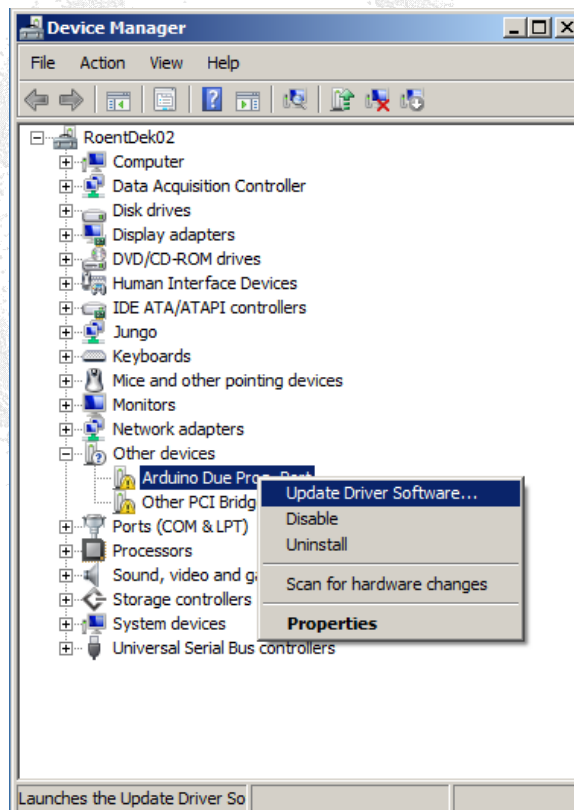


Figure 5.1: Windows Device Manager for "Arduino Due Programming Port"

- IV. In the next window select "Browse my computer for driver software".



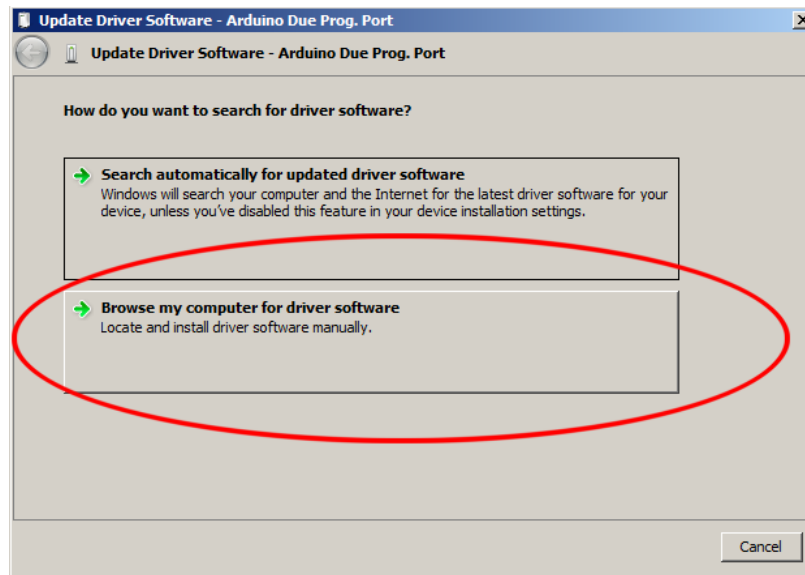


Figure 5.2: Update Arduino Due Prog. Port driver software

- V. Point it to the “driver”-folder which is in the same folder as this document.  
Now the driver will be installed. Please confirm all messages during the installation
- VI. Double click on the file “update\_firmware\_RM6.bat”. Now a black window will open.  
At the end of the flash procedure (it will take some seconds) the output should look as in the following image:

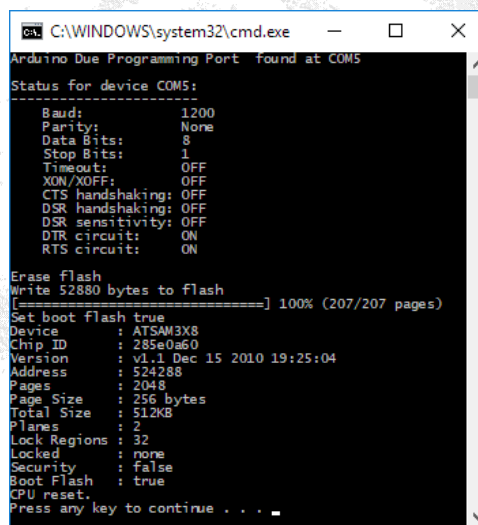


Figure 5.3: Batch file output window

- VII. Disconnect the USB-cable from the back USB-port of the **RM-6**.

## 6 Specifications and Recycling

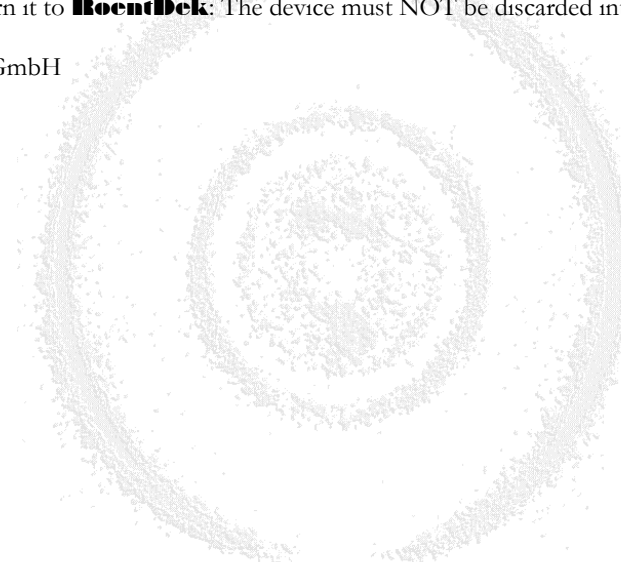
### 6.1 Specifications

Mains input voltage:	100 V – 240 V AC
Power consumption:	12 Watt, 1 A on 12 V
Operating temperature:	20 – 45 degrees Celsius
Minimum signal rate per channel:	1 Hz
Maximum signal rate per channel:	160 MHz (250 MHz during short bursts)
Maximum displayed rate per channel:	99.999 MHz
Maximum voltage tolerance of inputs:	±2 V (for NIM input version)
Input connectors:	50 $\Omega$ terminated Lemo00 sockets
Input signal levels (NIM-version):	LOW : > -0.3 V    HIGH: < -0.3 V (other input levels can be factory set, e.g. TTL)

### 6.2 Recycling

**RoentDek** is registered with the “Stiftung Elektro-Altgeräte Register” as a manufacturer of electronic systems with the registration ID DE48573152. The **RM-6** belongs to the category 9 “Überwachungs und Kontrollinstrumente für ausschließlich gewerbliche Nutzung”. The last owner of a **RM-6** must recycle or treat the module in compliance with §11 and §12 of the German ElektroG law or return it to **RoentDek**. The device must NOT be discarded into the standard trash.

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