

METASONIX

RKP Power System user's manual

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Please read all of this before using it!



RETAIN INSTRUCTIONS: The safety and operating instructions should be retained for future reference.
HEED WARNINGS: All warnings on the RKP and in the operating instructions should be adhered to.
FOLLOW INSTRUCTIONS: All operating instructions should be followed.

WATER AND MOISTURE: The RKP must not be used near water (e.g. near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, near a swimming pool etc.). Care should be taken so that liquids are not spilled onto or near the equipment.

VENTILATION AND COOLING: The RKP module normally operates cool to the touch. The AC adapters that feed it can become very hot. They **MUST** be situated so that their location or position does not interfere with convective cooling. The RKP **MUST NOT** be used on a bed, sofa rug or similar surface which may prevent proper cooling. It is **NOT** a toy. If the RKP is mounted in a synthesizer rack or other built-in installation, space **must** be left around it to allow convection cooling. Use great caution if handling the RKP when it is powered up.

HEAT: The RKP **MUST** be situated away from heat sources such as radiators, heat registers, stoves, or other devices (including power amps) that produce heat. The external AC adapters operate quite warm when fully loaded, so **DO NOT** leave them on a flammable surface.

POWER SOURCE: The RKP should be connected to DC-output power supplies of the type specified. It requires two **ISOLATED** +12v power sources, maximum 5 amps each.

CLEANING: The RKP should only be cleaned with a soft cloth moistened with water. Disconnect all possible power supplies before attempting to clean or handle.

NON-USE PERIODS: The RKP should be shut off when left unused for a long period of time.

MECHANICAL: protect the RKP from damage. Unplug or disconnect all power adapters from AC mains when not in use.

DAMAGE REQUIRING SERVICE:

The RKP should be serviced by qualified service personnel when:

- Any of the AC adapters has been damaged;
- The RKP has been dropped, physically damaged, or subjected to force;
- Liquid has been spilled onto the RKP or it has been exposed to rain;
- The RKP does not appear to operate normally or exhibits a marked change in performance.

SERVICING: The user should not attempt to service the RKP. All servicing should be referred to qualified service personnel.

METASONIX LIMITED WARRANTY and standard legal disclaimer

Thank you for purchasing this Metasonix product. The following terms and conditions apply:

1. Warranty period is for **ONE YEAR** from date of purchase with proof of purchase submitted. Warranty covers electrical failure of vacuum tubes and gas-filled tubes, except in cases explained in 3 below.

2. Operating instructions must be followed. This device was intended **ONLY** for use by **AUDIO AND MUSIC PROFESSIONALS**.

IT IS NOT INTENDED FOR USE BY ORDINARY CONSUMERS!!

Product must not have been damaged as a result of defacement, misuse, abuse, neglect, accident, destruction or alteration of the serial number, improper electrical voltages or currents, repair, alteration or maintenance by any person or party other than our own service facility or an authorized service center, use or installation of non-Metasonix replacement parts in the product, or the use of this product outside of the U.S.A. or Canada (except as a product distributed by an authorized Metasonix dealer), or modification of the product in any way, or incorporation of the product into any other products, or damage to the product caused by accident, fire, floods, lightning, or acts of God, or any use violative of instructions furnished by Metasonix.

3. Obligations of Metasonix shall be limited to repair or replacement with same or similar unit, at our option. To obtain repairs under this warranty, present the product and proof of purchase (e.g. bill or invoice) to the authorized Metasonix service center, **transportation charges prepaid**. When returning the product for repair, please pack it very carefully, preferably using the original packaging materials. Please also include an explanatory note.

IMPORTANT:

To save yourself unnecessary cost and inconvenience, please check carefully that you have fully read and followed the instructions in this instruction manual.

This warranty is in lieu of all other expressed warranties, obligations or liabilities. **ANY IMPLIED WARRANTIES, OBLIGATIONS, OR LIABILITIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL BE LIMITED IN DURATION TO THE DURATION OF THIS WRITTEN LIMITED WARRANTY.** Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you. **IN NO EVENT SHALL WE BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF THIS OR ANY OTHER**

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METASONIX shall not be held liable for any incidental, consequential, or direct damages or expenses associated with the use or misuse of its products. The audio output of this product is capable of damaging some types of solid-state audio equipment; such use is entirely at the risk of the user. METASONIX does not guarantee that any of its products are designed for any particular use or purpose. The entire risk of suitability and performance of this product lies with the user. Products manufactured and/or sold by METASONIX are not authorized for use as critical components in devices used in life support and other systems whose failure or performance could result in compromised safety or danger to life or property.

NOTE: All sales are FINAL, especially custom designs. Only a Metasonix authorized dealer is permitted to return products to Metasonix for a refund or exchange.

What it does:

The RKP is a limited-issue power supply intended to provide the high current demands of Metasonix R and RK series Eurorack modules. It is an 8HP module that accepts DC power from two +12v switchmode power adapters of the "universal" type, provides protection against reverse voltage and overcurrent (5 amps maximum), and has six (6) standard 16-pin Euro power output headers. The RKP, used with the 5-amp adapters provided, will run any combination of six Metasonix R or RK modules.

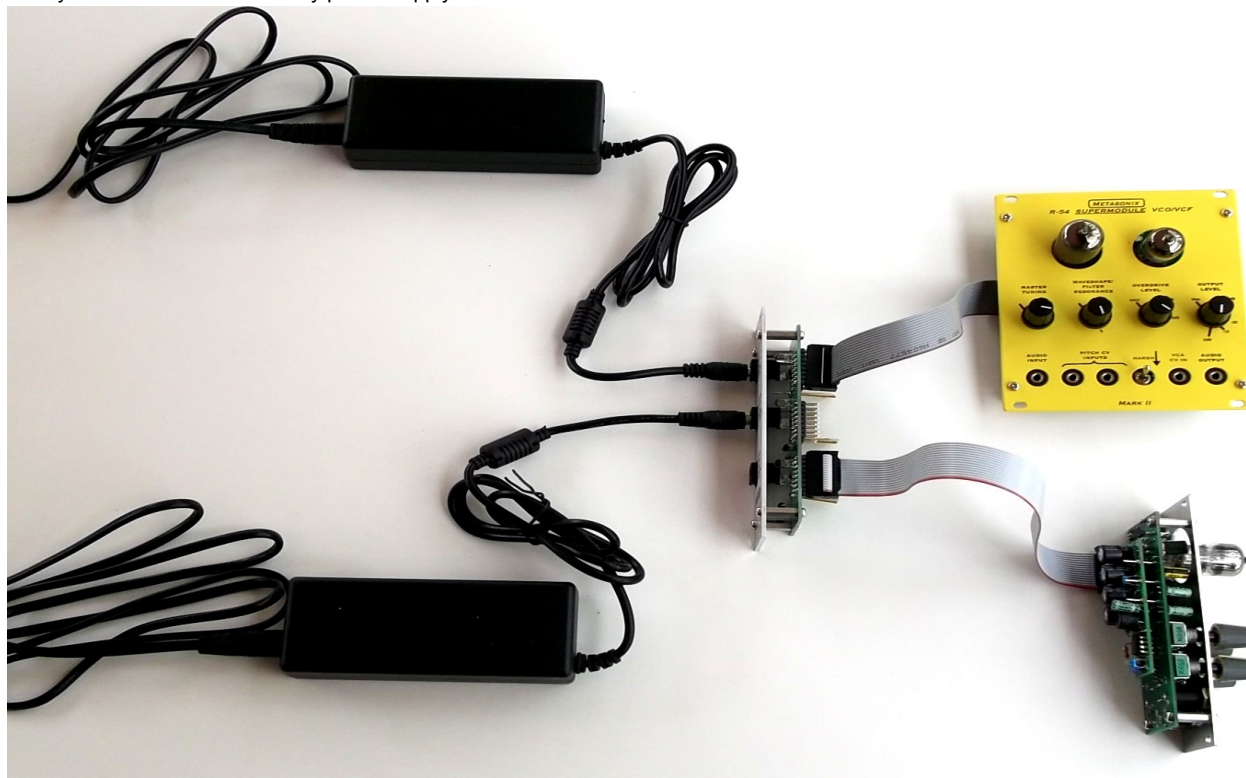
The RKP uses high-current adapters because the vacuum tubes in Metasonix modules have filamentary heaters to heat their cathodes to operating temperature (about 650 degrees Celsius). Similar to tungsten-filament lamps, the heaters in tubes have a lower electrical resistance when cold than they do at operating temperature. The power supply must be able to supply this larger "cold inrush" current in order to bring the heater to operating temperature. Usually it requires about 2.5 times the normal operating current, for only a few seconds, to heat the tube properly.

This was not a problem in the "old days", when tubes in electronics ran their heaters from power transformers or directly from the AC "mains". Inrush currents weren't a problem, because there was extra capacity available. Conventional iron-core power transformers can handle brief inrush current easily. But the modern switchmode power supply has a problem with this. Because it is designed to supply a maximum rated output current at all times, and has NO inrush capacity above that. So running tube heaters from a switchmode supply demands that the supply be "over-rated" by at least twice the normal operating current, just to handle a few seconds of the cold current at power-up. Yes, it's wasteful, but if the user wants the "magic" of vacuum-tube audio, this is the only way. For this reason, switchmode power supplies are almost never seen in modern tube guitar amps – they continue to use heavy, costly power transformers, that are ironically even more wasteful.

If modules needing 5-volt power are to be connected to the RKP, it has an additional input jack to accept a n optional 5-volt AC adapter output. As with the 12-volt inputs, it will accept up to 5 amps.

USAGE

Powering a modular synthesizer is difficult in the 21st century. Off-the-shelf power supplies are designed to power laptop computers or other digital gadgets that need a lot of low-voltage current at a single voltage, and don't require inrush surge currents when cold. Digital electronics also aren't bothered so much by noisy switchmode supplies. Modulators, on the other hand, need at least two supply rails, positive and negative (+12v and -12v for Euro modules). The power supplies must be stable, clean, and quiet, because most modules are full of analog circuitry which is intolerant of noisy power supply sources.



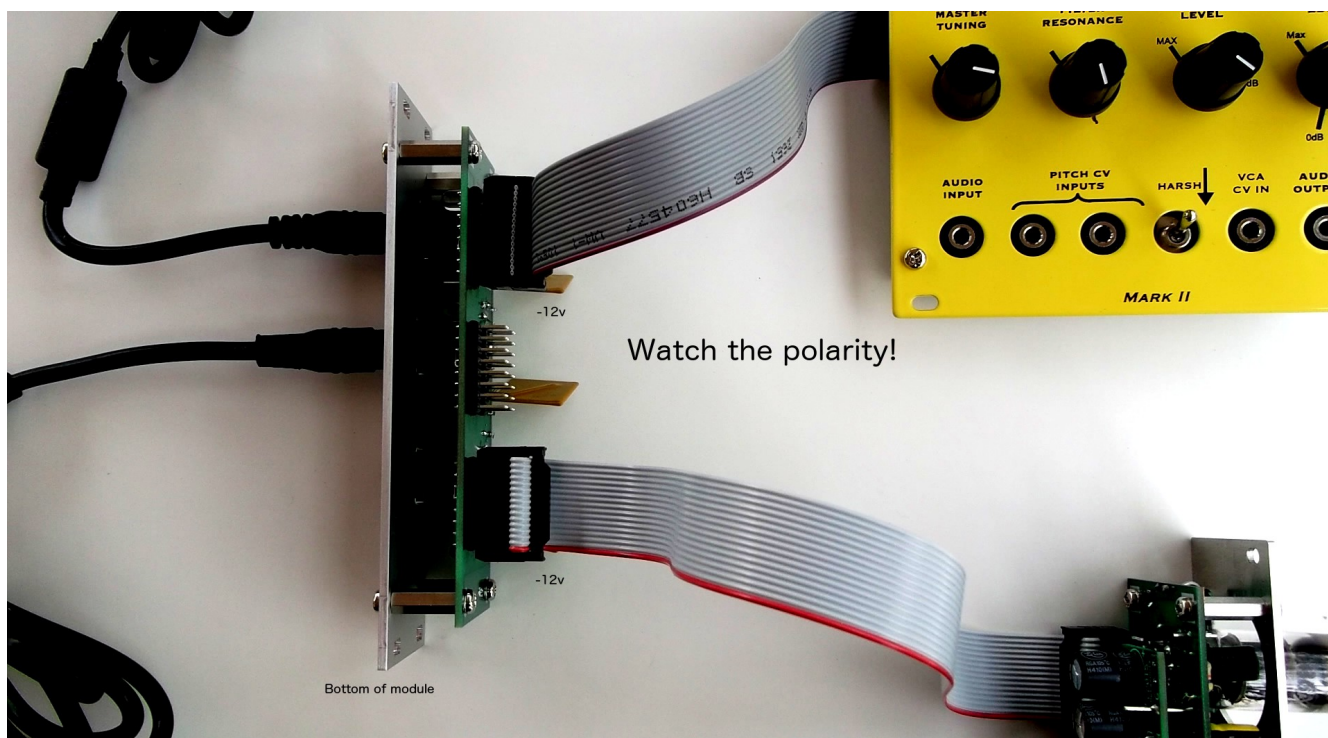
The RKP includes two “universal” AC-to-DC switchmode power adapters. They were chosen specifically to work well with the loads presented by Metasonix modules. One of them is connected to the AC mains, then to the upper 12v input connector on the RKP module. This connector is a 2.1mm or 2.5mm center-positive coaxial connector, the most common type on AC adapters. The other adapter is connected to the AC mains, then to the middle input connector.

You **MUST** use two separate, isolated AC adapters to power these two connectors, because the middle connector is “wired backwards” to feed the -12v power rail in the modular synth. **DO NOT** attempt to use a single AC adapter to feed the +12v and -12v inputs. This will not work and might damage the adapter, because the way these connectors are wired will “short out” the supply’s output.

Both adapters should be rated 5 amps maximum (smaller adapters can be used, as long as a reduction of power capacity is acceptable). **DO NOT** use random AC adapters! Use only adapters producing 12 volts DC, with a 2.1mm or 2.5mm “barrel” connector with the *center pin positive*. If you attempt to use an adapter with a center-negative connector, you will damage the AC adapter and might damage your synthesizer modules.

The AC adapters included with the RKP are of the “universal input” type, accepting any AC mains input between 90 volts and 250 volts at 50 or 60 Hz, so they can be used anywhere on earth with the proper adapter plug. Each supply rail has a yellow LED next to its input connector, so if the power is on that rail, you will see the connector light up.

The RKP will also run a large number of other Euro modules of conventional solid-state design (the number is impossible to estimate due to wildly varying power needs of various modules). In order to run more modules, Metasonix recommends obtaining one or more “passive” power busboards of the Doepfer or Monorocket type, and feeding each bus the power from the RKP via two 16-pin Euro power ribbon cables. (Warning: **DO NOT** connect the RKP to a powered busboard of the Tiptop or 4MS type. You will damage the busboard and the RKP. Do not try to “mix” power supplies on a busboard.) Note that each wire in a Euro power ribbon cable will carry ½ amp (500 mA), and Euro cables have two wires dedicated to each supply rail, so each cable will only carry a maximum of 1 amp. Plan your cabinet layout accordingly.



Power cables included with Euro modules do not come in any “standardized” length. So, since the RKP is its own “busboard”, we would recommend mounting it in the center of a cabinet or pair of rails, so the modules can be distributed on either side. If you need a longer power cable to reach a module, contact your dealer. As usual with Doepfer “standards”, the -12v pins are on the **BOTTOM** of the power headers. So if your modules follow the Doepfer convention (Metasonix modules always do), the red or marked wire on the ribbon cable should be down when the connector is plugged in.

Grounding

As long as the RKP is used to power all the modules in a system, there will be no grounding or ground-loop problems. However, if two or more cabinets with separate power supplies are being used together, it might help to connect the earth grounds of the cabinets together. The RKP’s front panel is firmly connected to ground via the four metal standoffs, so any set of rails it is installed in should also be grounded. (Use plastic washers with care – if you get ground-loop hum problems, you might have to remove the washers.)

+5v Power

Do you need +5v? Most Euro owners really don’t. +5 was used only in two Doepfer products and a few others. However, the Metasonix R-55 VCO needs +5v power. So, the RKP can accept a +5v power supply, which is optionally available from your dealer. Or, if you prefer to purchase one separately, we recommend Phihong PSAC30U-050-R or Mean Well GS25U05-P1J, available from Mouser

www.mouser.com.

Maintenance and Technical

The RKP includes two switching AC-adapter power supplies producing +12v DC at 5 amps maximum. Because vacuum tube heaters need extra "inrush" current when cold, the switching supplies must be over-rated to handle this initial load. The RKP module contains self-resetting fuses of the "Polyswitch" type, that heat up when too much current is drawn, and then stop carrying current. These fuses are the large yellow square devices on the back of the RKP's module circuit board. (Warning: if an RKP is overloaded, the resettable fuse will become too hot to touch.) The RKP is protected against reverse voltage on the +-12v circuits and overvoltage on the +5v line. Plus, the AC adapters contain their own protection circuitry.

Even with all this protection, it is still possible to damage an AC adapter used with the RKP. So we designed the RKP to accept "industry standard" AC adapters, widely used in medical and commercial electronics. Most of the AC adapters made today are of the "universal input" type, accepting any AC mains input between 90 volts and 250 volts at 50 or 60 Hz, so they can be used anywhere on earth with the proper AC mains adapter plug.

Suitable and recommended replacement AC-to-12v-DC power adapters include:

- * Mean Well GSM60B12-P1J or Artesyn model DPS53 (available from Mouser, www.mouser.com)
- * Phihong model PSAA60W-120, CUI model ETSA120500UD-P5P-SZ, or Artesyn model DPS53 (available from Digi-Key, www.digikey.com)
- * Mean Well GS60A12-P1J (Jameco part 1952370) or Jameco 2099420 (available from Jameco, www.jameco.com)

Whichever power adapter is used, it MUST have a 2.1mm or 2.5mm DC output connector with **center positive**. DO NOT use an adapter with a center-negative connector. DO NOT attempt to use random AC adapters to power the RKP. DO NOT EXPERIMENT, unless you know exactly what you are doing and are able to check an AC adapter for the correct polarity and output voltage.

The RKP's external AC adapters produce a lot of waste heat, and they use some power even when not running a load, so we recommend removing AC mains power from them when not in use. A switched AC socket strip is recommended, so all the adapters can be shut off together.

The best possible performance from an RKP can be obtained by feeding it from a *linear* regulated power supply producing +12v and -12v, such as the BEL Power Systems HCC15-3-AG (available from Digi-Key). It must be correctly wired to AC mains, and to the RKP via two 2.1mm barrel connectors, and then installed in a protective cabinet or enclosure. This is an advanced modification, and can ONLY be performed by an experienced technician. DO NOT EXPERIMENT.

If you are confused or have ANY technical questions, feel free to contact us. Please DO NOT ASSUME! Please DO NOT try to use random AC adapters!

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