

MU2

*Micro-details are masked by conventional conversion.
Our discrete DAC design reveals the hidden beauty.
MU2: true integration yields true fidelity.*



MU2 - manual

Please read this manual before operating the unit.

Grimm | *AUDIO*

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1. Introduction

Thank you for purchasing the Grimm Audio MU2 streaming DAC and media player. It is designed to be the best sounding music player on the market while at the same time blending seamlessly into your daily music playing routine. Its main source is a Roon Core server and Roon End Point, that offer playback from local files, network files and online streams from Tidal and Qobuz. It is followed by our revolutionary '*Major*' Digital to Analog Converter and dedicated FPGA processor board, with the highest possible quality in analog and digital signal processing and de-jittering. Apart from Roon, three digital inputs can be selected as source for the *Major* DAC. After the DAC an analog pre amp with relay based analog volume control is found, that also offers source selection of two analog sources. The output can be switched between line and headphone.

The amount of innovation, work and knowledge that went into this project can hardly be overestimated. All this effort resulted in the elegant MU2 'box' of minimalistic design that humbly steps out of the way for

the music. We are grateful that we were allowed to develop this gem and wish you many joyful hours of listening pleasure.

The Grimm Audio Team
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Scope

In this manual you find information specifically related to the hardware of your MU2. Since the software of the MU2 may be updated somewhere in the future, we decided to offer the MU2 software manual as download only. You can find the latest version of the MU2 software manual on the MU2 page on our web site: www.grimmaudio.com.

2. Important Safety Instructions

Grimm Audio gaat er van uit dat u deze Engelstalige tekst volledig begrijpt. Als u hier moeite mee heeft dient u contact op te nemen met Grimm Audio. Op verzoek sturen wij u een vertaling toe.

Grimm Audio geht davon aus, dass Sie diesen Englischen Text völlig verstehen. Wenn notwendig, nehmen Sie bitte Kontakt auf mit Grimm Audio. Auf Wunsch wird Ihnen eine Übersetzung zugeschickt.

Grimm Audio suppose que le lecteur comprend parfaitement le texte en Anglais ci-dessous. En cas de doute s.v.p. contacter Grimm Audio. Si nécessaire, on pourra vous envoyer une traduction.

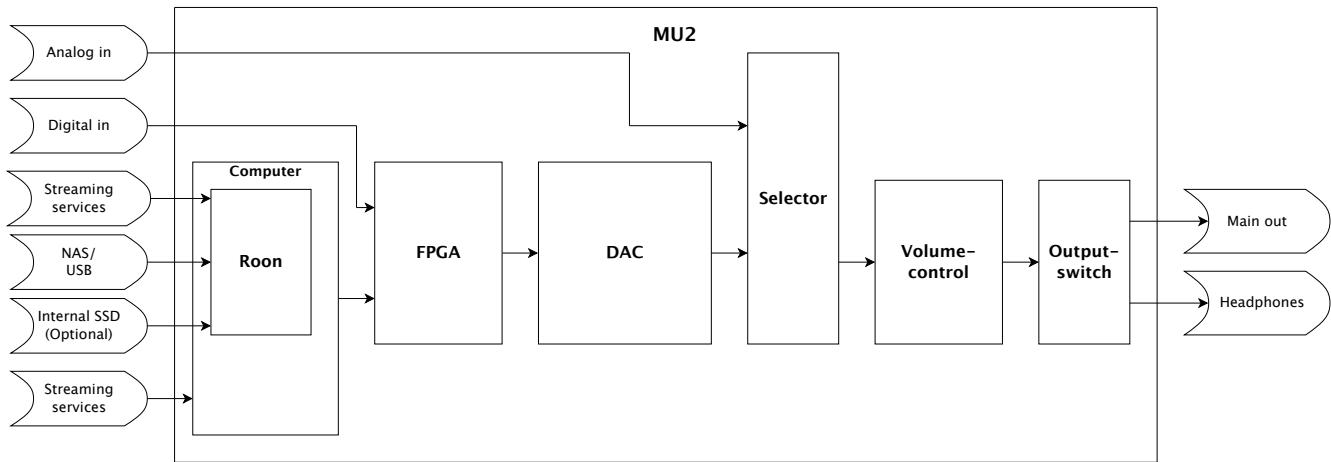
Grimm Audio da por supuesto que el texto en versión Inglesa no ofrece ninguna duda de interpretación y se entiende íntegramente. Si este no fuese su caso rogamos contacte con Grimm Audio quien, a petición, se encargaría de enviarle la correspondiente traducción.

Please follow these precautions when using this product:

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Dangerous voltage is inside this apparatus. Opening is only allowed by qualified service personnel.
6. Use the supplied power cable as intended. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

7. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
8. Unplug this apparatus during lightning storms or when unused for long periods of time.
9. Do not use this apparatus near water.
10. Do not use this apparatus outside.
11. Do not expose the apparatus to dripping or splashing. Do not place objects filled with liquids (flower vases, drink cans, coffee cups, etc) on the apparatus.
12. Clean only with a dry, soft, non-fluffy cloth. Do not spray any liquid cleaner onto the cabinet, as this may lead to dangerous shocks.
13. Install in accordance with the manufacturer's instructions.
14. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. Avoid exposure to direct sunlight.
15. Use only attachments or accessories specified by the manufacturer.
16. This unit runs slightly warm when operated normally. Operate in a normal ventilated area.
17. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
18. **WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

3. Block Diagram



In this block diagram the connections and signal flow in the MU2 are shown. A MU2 combines a Digital to Analog Converter, a digital source selection, a streamer, an audio file server and an audio file player, with an analog source selector, volume controller and headphone amp. Therefore this 'playback device' can also replace a standard pre-amp in most audio systems. When the

highest audio quality is of prime importance, the MU2 outputs are best fed directly to the input of your power amplifier. The audio file and streaming functions are offered by Roon Labs software. The computer operating system is Tiny Core Linux. Most other software is developed by Grimm Audio.

4. Installing

Unpacking and Installation

Your MU2 was carefully packed at the factory and the packaging it came in was designed to protect it from the trials and tribulations of shipping. Keep the box and all packing materials, so that in the unlikely event that you need to return the MU2 for servicing, you can do so safely.

Placement

The MU2 does not produce strong RF fields nor is susceptible to them. It can be positioned near other audio equipment without worry. Preferably the MU2 is not placed inside an unventilated cabinet, to prevent it from running too hot and for easy access to the main control knob.

The supplied infrared extension cord should be placed such that it has clear view on your IR handheld remote.

AC Power Hookup

The MU2 has a switch mode power supply that works with AC mains voltages from 90 V to 240 V. Make sure this complies with your local mains voltage. The MU2 is shipped with a proper mains cable. Grimm Audio cannot be held responsible for problems caused by using the MU2 with improper AC wiring or voltage. The MU2 has a small power switch on the rear panel. A short press will initiate start-up of the system. Another press will initiate the power-down cycle. Please wait till the power led turns off before unplugging the AC power cable.

The MU2 relies on safety earth in the mains cable to guarantee your safety. It also needs this connection as low impedance path for mains leakage current to prevent hum or sound quality degradation in your system. For this reason, please connect all audio equipment in your system to a common mains outlet with safety earth connection. If you do not have safety earth available on the outlets in your listening room, please consult an electrician for installation.

5. Operation and System Setup

Front:



On the front you find the MU2 activity LED in the 'i' of the Grimm logo. The display shows all user information. It is a TFT screen that does not suffer from burn-in.

Top:

The top of the MU2 carries the main control knob. It is used for all user input of the MU2 via turning and pressing. Depending on the actually active menu or system state, the knob may change function.

The system will boot to the Music View. The use of the main control in this state is:

- Volume up (turn clockwise)
- Volume down (turn counter clockwise)
- Pause/mute (short press)
- Line / Headphones out toggling (double short press)
- Press and turn simultaneously for input selection
- Enter menu (long press)

A short press is shorter than 2 seconds, a long press is longer than 2 seconds.

*For more information about the control of your MU2,
please consult the MU2 software manual that can be
downloaded from our web site.*

Rear:

From left to right:

- 1) Mains power switch
- 2) Mains power socket
- 3) 3.5mm socket for an IR remote sensor
- 4) RCA type analog outputs
- 5) 6.3mm headphone socket
- 6) RCA type analog inputs
- 7) XLR type analog outputs
- 8) XLR type analog inputs
- 9) Three types of digital audio inputs
- 10) USB connector for external storage
- 11) Ethernet network input

Mains power socket

The mains power socket is a standard IEC C13 model. In case your country has an EU, US or UK type wall outlet, your MU2 was shipped with the corresponding power cord. Otherwise, please consult your dealer.

Mains power switch

This is a small recessed switch that triggers the software that turns off and on the system. If the system is off and the power cord is connected, press the switch once to boot the system. If the system is on, press the switch once to shutdown the system.

Note: The power switch does not respond when the MU2 is updating, never unplug the AC power during the update process.

The MU2 is switched off when both the power led and the display are dark. Only then you may unplug the AC power hookup without causing any harm.

In general, please put the MU2 in 'stand-by' when not in use. For more information, please consult the MU2 software manual.

Mini jack for IR sensor extension cord

This 3.5mm jack input is intended for use with an IR extension cord with the following pinout:

Tip = Signal

Ring = 5 V power

Sleeve = Ground

This is the most common pinout for IR extension cables. The supplied extension cord is of the correct type.

Please refer to the software manual to learn how your MU2 can be set-up to work with a certain infrared remote.

Ethernet connector

Connect your wired local network to the MU2 using this RJ45 connector. The cable type should be at least Cat5e to ensure that loss of network data packets does not occur. Please use high quality cables intended for use with computer systems and avoid cables with claimed special qualities for audio. The MU2 makes use of DHCP. To use a static IP address in the MU2 please consult the manual of the network device that acts as DHCP server within your network (usually the main router).

USB connector

This general purpose USB type A connector can be used to connect an external USB drive (flash drive, SSD or HDD) to the MU2 system. You may then play music files from this drive. For information about supported disk formats and about how to access the drive in your system, please refer to the MU2 software manual.

Digital audio inputs

The MU2 has three digital inputs on the back. They can receive PCM rates up to 192 kHz and also DoP ("DSD64 over PCM"). These sources can be selected with the main control dial. The selected source is routed via the FPGA de-jittering and fully benefits from the MU2 high performance rendering. These are the three inputs:

- AES3 digital input: XLR connector, digital input for AES3 sources.
- S/PDIF digital input: RCA connector, digital input for S/PDIF sources.
- Optical digital input: Toslink connector, digital input for S/PDIF sources.

Analog audio inputs

The MU2 has two sets of analog inputs. Their signal stays in the analog domain. Volume is controlled with a reference quality relay based volume control and buffer stage.

- a) RCA type analog inputs for connection of analog sources using unbalanced RCA cables.
- b) XLR type analog inputs for connection of analog sources using symmetrical XLR cables.

Analog audio outputs

There are three sets of analog outputs, two at line level for amplifiers, and one for headphones.

- a) RCA type analog outputs for connection to an amplifier equipped with unbalanced RCA inputs. In case the connected amplifier is also equipped with XLR connectors, we recommend using the XLR type outputs of the MU2.
- b) XLR type analog outputs for connection to an amplifier equipped with symmetrical inputs.
- c) A 6.3mm headphone plug allows connection of headphones. Any reasonably sensitive headphones can be driven from the MU2. Note that the output is not automatically switched when plugging in the headphones. Instead it has to be selected with the main

knob via a double short press. When 'headphones' is selected as output, the RCA and XLR outputs are muted.

Note: The RCA and XLR outputs are electrically derived from the same output buffer stage. Using both at the same time may result in sub-optimal performance in certain system setups. If your use case requires to connect both outputs simultaneously we recommend to perform a listening test to determine the extent of the influence..

6. Specifications

General:

- Max. ambient temperature for operation: 35 °C.
- Fuse (worldwide): 1 A fast blow (F).
- Weight: 4.5 kg.
- Dimensions: width x depth x height:
355 x 295 x 100 mm or 14" x 11.6" x 3.9".
- Package dimensions: 536 x 392 x 219 mm.

Clock specifications:

- Internal intrinsic clock jitter < 0.6 ps RMS (> 10 Hz).
- Can slave to 44.1 kHz and 48 kHz based digital sources of 1FS, 2FS and 4FS within a +/- 50ppm range. De-jittering with FLL topology.

Major DAC

- 128FS oversampling with proprietary "Pure Nyquist" filter.
- Bit perfect 11th order 1.5 bit Noise Shaper at 512FS.
- Max 12 dBu output for 0 dBFS digital input signal.
- Harmonic Distortion: < -120 dB, < 0.0001%.
- SNR: 107 dB.

Analog outputs:

- XLR output 12 dBu nominal max *, 100 Ohm (impedance balanced).
- RCA output 12 dBu nominal max *, 50 Ohm.
- Max. output voltage: 18 dBu.
- Headphone max output 40 mW in 30 Ohm, 55 mW in 600 Ohm.
- Relay based volume control from -79 dB to +8 dB in 1 dB steps (0 dB is the recommended maximum position, positive gain is for soft sources and may cause internal clipping on loud sources).

*) nominal values listed are with 0dB volume setting.

Analog inputs:

- XLR input, 100 kOhm input impedance, 18 dBu max in (balanced).
- RCA input, 50 kOhm input impedance, 13 dBu max in.

Power supply:

- Mains voltage range: 100 – 240 V AC (50 and 60 Hz).
- Active power factor correction.
- Power consumption: Normal use 35 W, peak 70 W.

Internal computer properties:

- Industrial grade quality main board.
- Intel i3 CPU, > 2.4 GHz.
- 4 cores, 4 threads, with Hyper-threading.
- 8 GB DDR4-2133 RAM 2666 MHz.
- 1 Gb/s Ethernet.
- 1 x USB 2.0 port.
- Internal SSD for OS.
- Optional 2nd internal SSD for music data storage.

Display specifications:

- Full color TFT LCD.
- 3.5 inch diagonal.
- 480 x 320 pixels.

Included accessories:

- MU2 hardware manual.
- Power cord.
- IR remote extension cable.
- Warranty extension card.

7. Grimm Audio Limited Warranty

Grimm Audio BV ("Grimm Audio") warrants this product to be free of defects in material and workmanship for a period of two (2) years for parts and for a period of two (2) years for labor from the date of original purchase.

This warranty is linked to the serial number of the device and can be transferred to second hand owners if they can show their purchase bill. The original owner can extend his limited warranty to a period of five (5) years for labor and parts if he sends the original warranty card that came with the unit to the Grimm Audio factory. The extended warranty is enforceable only by the original retail purchaser and cannot be transferred or assigned. The extended warranty does not apply to the built in computer and SSD drive parts of the MU2.

During the warranty period Grimm Audio shall, at its sole and absolute option, either repair or replace free of charge any product that proves to be defective on inspection by Grimm Audio or its authorized service representative. In all cases disputes concerning this

warranty shall be resolved as prescribed by law. To obtain warranty service, the purchaser must first call or write Grimm Audio at the address and telephone number printed below to obtain instructions where to send the unit for service. All enquiries must be accompanied by a description of the problem. All authorized returns must be sent to Grimm Audio or an authorized Grimm Audio repair facility postage prepaid, insured and properly packaged. Proof of purchase must be presented in the form of a bill of sale or some other positive proof that the product is within the warranty period. Grimm Audio reserves the right to update any unit returned for repair. Grimm Audio reserves the right to change or improve design of the product at any time without prior notice.

This warranty does not cover claims for damage due to abuse, neglect, alteration or attempted repair by unauthorized personnel, and is limited to failures arising during normal use that are due to defects in material or workmanship in the product.

In no event will Grimm Audio be liable for incidental, consequential, indirect or other damages resulting from the breach of any express or implied warranty, including, among other things, damage to property, damage based on inconvenience or on loss of use of the product, and, to the extent permitted by law, damages for personal injury.

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