

OCTAVE

PHONO MODULE

## INTRODUCTION

Congratulations and thank you for choosing the OCTAVE

## PHONO MODULE

You are about to enjoy the benefits of one of the world's most innovative and reliable phono preamplifiers. Take care of it, and your preamplifier will provide you with many years of listening pleasure.

You often hear people claim that there has been no real progress in tube amplifier design for years. The operating principles of tubes have been documented extensively and are well known to amplifier designers. Of course, the same can be said for transistor amplifiers.

Nevertheless, there is still room for further development with both of these technologies. This is both necessary and desirable. With tube amplifiers in particular, a general reluctance to depart from the classic circuit designs has not done the technology any favours. Today's loudspeakers and source equipment provide better performance than ever before, but also present greater demands on amplifiers. Modern sound reproduction equipment delivers a level of performance at a price that simply would not have been possible 20 or even 10 years ago.

These advances have been achieved through the application of cutting edge technology as it becomes available and more affordable.

Integrating these technologies into amplifier design demands a detailed knowledge of the inner workings of amplifiers and an appreciation of the sonic benefits of each modification.

We have specialized in tube amplification for the past 25 years, during which time we have developed a number of innovative technologies that have earned us a reputation as one of the leaders in the field.

We hope you will enjoy many hours of wonderful music with your OCTAVE preamplifier.



Andreas Hofmann



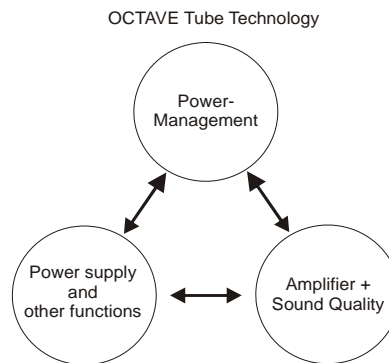
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# 1. OCTAVE TECHNOLOGY

## 1.1. Characteristics of the OCTAVE tube technology

- Sound**
  - 1. The design goal of OCTAVE amplifiers is honest, natural sound reproduction. The sound characteristics of an amplifier are derived from the sum of all its parts. Tubes themselves do not guarantee high quality sound.
- Amplifier Design**
  - 2. The limitations of classic tube designs are evident as soon as you connect the amplifiers. These designs often only perform to their full potential when they are used with special cables and amps. OCTAVE amplification and power supply technology has largely overcome these common problems. Thanks to the innovative OCTAVE output stage design, they will maintain their optimum sound quality with virtually any amplifier, irrespective of the cables.
- Control Monitoring**
  - + 3. OCTAVE employs the latest electronic circuit designs to create the best possible operating conditions for the tubes, and thus for the amplifier itself.



OCTAVE amplifiers are equipped with a proprietary control and monitoring system we call Power Management. This is an "electronic brain" within the amp that regulates and controls all of the amplifier's functions. It includes the **Soft Start Electronics** that gently ramp up the heating and supply voltages to reduce wear and tear on the components. In the event of a problem, the Power Management's **protection system** will disconnect the unit from the power supply. Power Management helps us achieve a completely consistent sound while at the same time ensuring the total reliability of our products.

- Hand built**
  - 4. OCTAVE amplifiers, designed and developed by Andreas Hofmann, are hand built and individually tested. The company has its own in-house winding department, in which all custom transformers are specially wound for each amplifier.
- Made in Germany**
  - 5. OCTAVE amplifiers are 100% built in Germany. Our employees are highly qualified and committed. We collaborate closely with local specialist subcontracting companies. The hardware components are all manufactured on modern CNC machines.

## 1. OCTAVE- TECHNOLOGY

### 1.2. Description Phono Module

The concept behind the new Octave Phono Module was to develop a high-end phono preamplifier that would perform without restrictions in respect to the pickup technology or the output connectivity while offering an unmatched level of versatility. To allow for optimized use with both MM and MC cartridges while offering the utmost system matching flexibility, the Phono Module was developed on a universal platform, with both the output section as well as the input section configurable in a modular technology.

With this modular concept, the Phono Module enables a wide range of system configurations. There are three independent input sections, and in the input section three different output boards can be utilized. The input boards range from MM RCA (single-ended) to MC XLR (balanced), plus one input board for line level units, including one RCA and one XLR input.

The output boards range from line-level (the standard module for driving a preamp or preamp section of an integrated amp) to regulated high-level Direct Drive modules with RCA or XLR output (for driving a power amplifier directly).

To provide the output modules with the greatest possible flexibility, there is always a pair of fixed RCA outputs. These RCA outputs can be used in the traditional manner for monitoring the signal or as a source for recording equipment.

The Octave Phono Module is a four stage system comprising the Input Module, the RIAA Equalization, the Subsonic Filter and the Output Module. The Subsonic Filter can be bypassed. The power supply is external, and mounted in a magnetically-shielded housing.

Developing a phono stage presents a great challenge to achieve low distortion, low noise and a low input sensitivity in the circuit topology. The overall gain of a phono stage is very high, thus the demands on the circuit are complex in every aspect of the analogue technology.

The Octave Phono Module combines both tube and solid state devices. Incorporating solid state circuitry is the best choice for the MC input section. Using tubes alone would result in unacceptably high levels of noise. The output of a low-output MC cartridge is definitely too low for an all tube input stage. Utilizing modern technology Octave developed a tube RIAA equalization stage operating in the optimum signal range of the tubes by using professional Integrated Circuits in the MC Input Stage.

Optimizing the three-tube stage in respect to the feedback, the dynamic behaviour of this stage is exceptional. The distortion is very low, while the spectral purity is close to the finest professional units. To realize these characteristics, a power supply with battery-power quality is necessary. In addition to its stability, the most positive attribute of battery power is an absence of hum and noise. A drawback, of course, is that there must be a loading system, and that the voltage decreases during discharge. Therefore additional electronic systems are required to achieve these benefits without any drawbacks.

A particularly unique option of the Octave Phono Module is the Line Input module. Adding this module provides the unit with line level functionality allowing the connection of a high level source via either single-ended (RCA) or balanced (XLR) inputs. In combination with the Regulated Output module and the Remote Control Option the Octave Phono Module comprises all that is necessary for a minimalist high-end audio system combining analogue and digital sources.

## 2. SAFETY INSTRUCTIONS

### 2.1. Before you begin

#### **In case of emergency: disconnect the plug from the mains supply**

Never use an amplifier that is damaged or faulty. Make sure that it cannot be used until it has been repaired by a qualified service technician.

Make sure that there is easy access to the IEC socket and power cord.

#### **Do not open the case**

There are dangerously high voltages and hot tubes inside this equipment. To avoid a burn or the risk of electric shock, never allow anyone except qualified personnel to open the case or remove the grille.

#### **Servicing and maintenance**

For reasons of safety, please ensure that servicing, repairs and other modifications to OCTAVE equipment are carried out only by a qualified technician. Fuses should also only be changed by a qualified technician. Always replace fuses with ones of the same type and rating. If your amplifier requires servicing, please ship or take your equipment directly to OCTAVE or to one of our authorized service centers.

#### **Explanation of the warning symbols:**



The exclamation point within an equilateral triangle is intended to alert the user to important operating and maintenance instructions.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of 'uninsulated dangerous voltages' within the product's enclosure that may be sufficient to constitute a risk of electric shock to persons.

#### **Before connecting**

Make sure that the voltage of your amplifier matches your household mains voltage.

#### **Grounding**

The Phono Module is a protection class 2 device (without a ground connection).  
The Power Supply is a protection class 1 device (with a ground connection).

## 2. SAFETY INSTRUCTIONS

### 2.2. Placement

#### 1. Location

OCTAVE equipment is designed strictly for use in a dry domestic environment. Do not use it in the open air or in damp environments!

Never place plants or liquid filled containers on your OCTAVE equipment. Take care that objects do not fall or liquids are not spilled into the enclosure. Should this happen, remove the mains plug immediately and have your amplifier checked by a qualified service technician.

Condensation may form if the amplifier is taken from a cold environment into a warm one. If you do this, wait until the amplifier has reached room temperature and is dry before switching it on.

Avoid installing the unit close to sources of heat such as radiators or anywhere that it may be in direct sunlight.

Do not operate the unit near flammable materials, gases or vapours. Avoid areas where there may be heavy accumulations of dust or where the unit may be subject to mechanical vibration.

Place your OCTAVE amplifier on a stable, even surface.

#### 2. Cover

Never operate the amplifier without the cover.

#### 3. Ventilation

Make sure that your amplifier has a good flow of air around it. If you intend to install your equipment in a cupboard or a shelf unit, ensure that there is at least a ten centimeter (four inch) gap between the ventilation slots and the walls all around the amplifier. Do not rest the equipment on a soft surface such as carpet or foam sheeting.

### 2.3. Warranty

OCTAVE can only guarantee the safety, reliability and performance of this unit if modifications and repairs are carried out by specialized personnel and if the amplifier is operated in accordance with the instructions contained in this manual.



## 3. SETTING UP

### 3.1. Connecting the amplifier

1. In your own interest, please observe the safety precautions and positioning advice (Chapter 2).
2. Before connecting your OCTAVE amplifier up, switch off all the other equipment that you intend to connect to it. This will avoid a source of possible problems when you plug these components in.
3. Connect the inputs from the power amplifier resp. of the preamplifier / integrated amplifier to the appropriate outputs of the Phono Module.
4. Check that the amplifier is switched off before connecting the power cable to the wall socket.
5. Check that the volume control is *not* set at maximum before playing music.
6. Switch on the mains power with the on/off power switch of the power supply.  
(see chapter 4.5. External Power Supply)



***The preamplifier needs approx. 2 - 4 minutes warm up time. During the warm up period, the output is shorted to ground to avoid disturbances.***

7. Switch on the other components in any sequence.

### 3.2. Running in

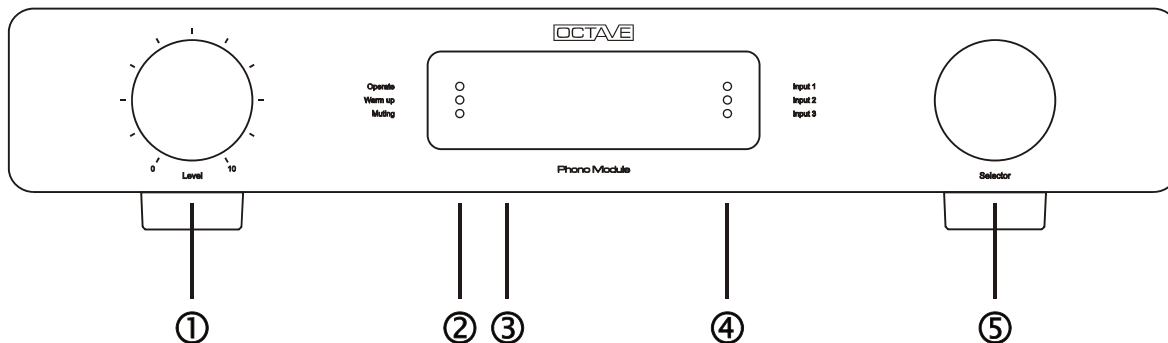
All OCTAVE equipment is subject to a 48-hour continuous run-in period at the factory to break in the unit. The tubes are individually selected for use in each particular model.

**The sound quality of tube equipment improves throughout the initial running-in period of up to three months.**

During this time, daily use is beneficial but not a requirement. Continuous operation does very little to help reduce the break-in period and is therefore *not* recommended.

## 4. MAIN UNIT

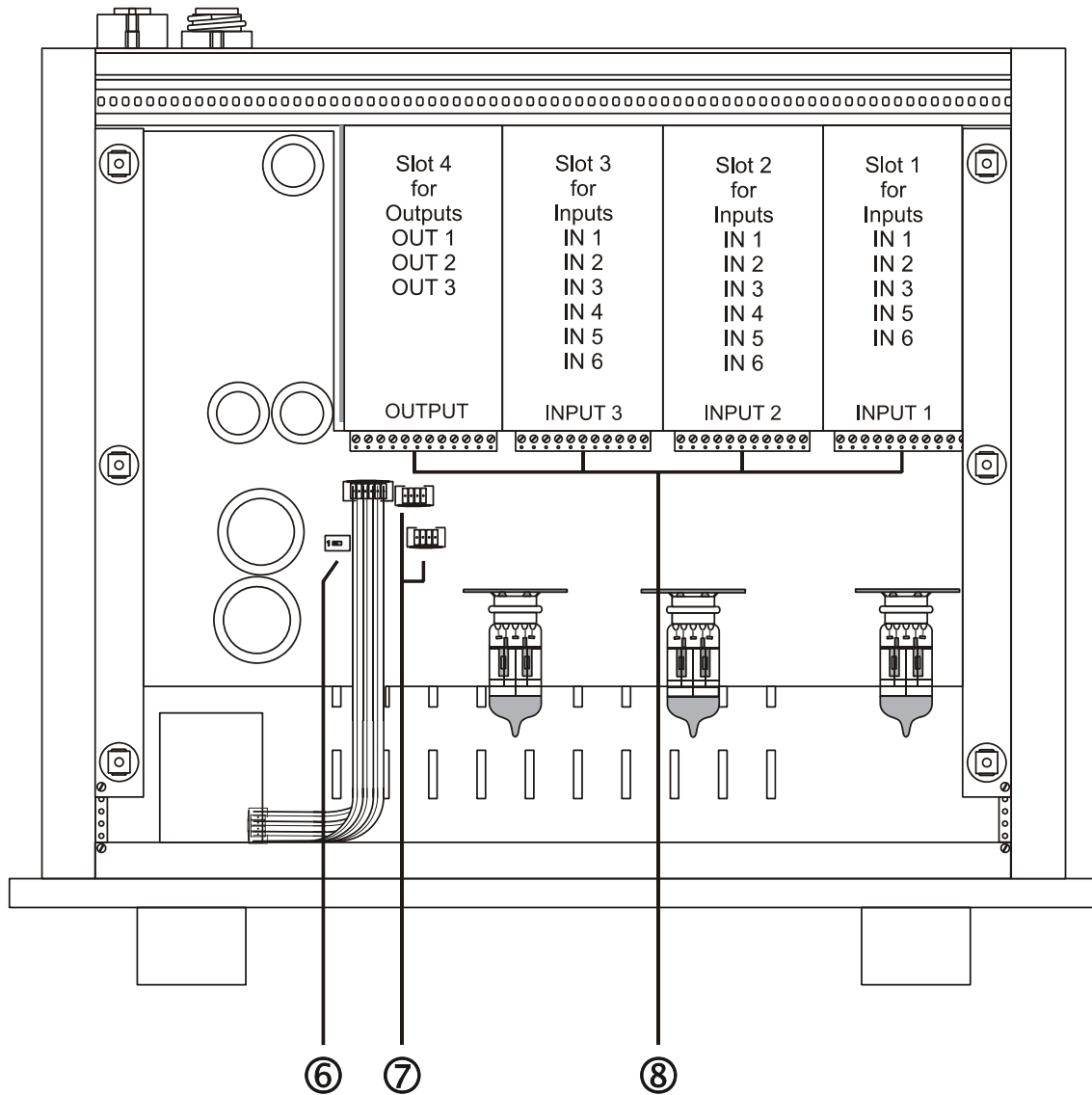
### 4.1. Front View



- ① **Level regulator, volume control**  
With the volume control, you can regulate the level of the variable output (see chapter 6).
- ② **LED status display**  
Operate: indicates that the unit is switched on.  
Warm Up: (yellow LED) indicates that the unit is in the warm up phase. During this phase, the outputs are shorted to ground.  
Muting: (red LED) switching between the Inputs IN1 – 2 – 3 causes the Automuting Electronic to mute the Output for 30 sec. This function eliminates switching disturbances and is indicated by the Muting LED (selector ⑤).
- ③ **IR-Sensor**  
For perfect operation of the remote control, the infrared receiver should not be covered.
- ④ **LED Display**  
The LEDs indicate the selected Input : INPUT 1, 2 or 3. If any slot is not equipped with an Input Module, the corresponding LED will not illuminate. The Automuting function is still active even if there is no Module in a slot.
- ⑤ **Selector**  
Selector for the Input Modules.

## 4. MAIN UNIT

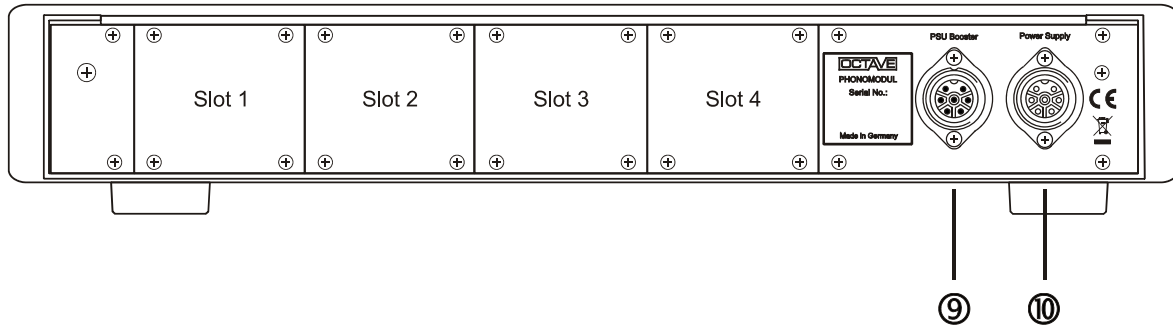
### 4.2. Top View



- ⑥ **Sliding switch for the Subsonic Filter**  
In delivery state where the Filter is on (see Chapter. 4.6.).
- ⑦ **Flat Wire Connector**  
Additional connections for the Line Input Module IN 4 (see Chapter. 5.4). You can connect one or two IN 4 Modules (maximum 2 pc)
- ⑧ **Screw terminal 1 - 4**  
For the connection of the Modules.  
There are three Slots available for the Input Modules (INPUT position 1, 2 und 3), and one Slot available for the Output Modules (Slot 4). The Output Module can only be mounted in Slot 4, while any of the Input Modules may be installed in any of the 3 available Input Slots except IN 4 which is provided for Slot 2 and 3.

## 4. MAIN UNIT

### 4.3. Rear View



- ⑨ **PSU Booster (Power Supply Unit Booster)**  
Connector for the optional external power supply enhancement module.
- ⑩ **Power Supply Connector**  
Connector for the external power supply.

### 4.4. Installing the Modules

#### Placement of the Modules:

- |      |   |  |       |   |             |
|------|---|--|-------|---|-------------|
| IN 1 | → | Slot 1, 2 or 3   | OUT 1 | → | Slot 4 only |
| IN 2 | → | Slot 1, 2 or 3   | OUT 2 | → | Slot 4 only |
| IN 3 | → | Slot 1, 2 or 3   | OUT 3 | → | Slot 4 only |
| IN 4 | → | Slot 2, 3 only (due to the number<br>of the connectors ⑦ ) |       |   |             |
| IN 5 | → | Slot 1, 2 or 3   |       |   |             |
| IN 6 | → | Slot 1, 2 or 3   |       |   |             |

#### Connecting the Modules



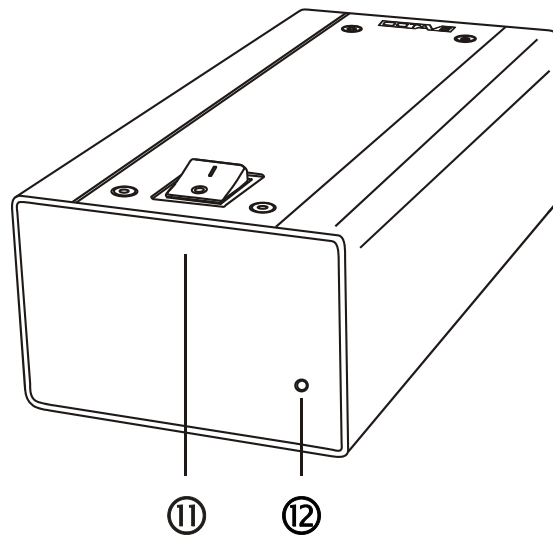
Please ensure that the unit is switched off and disconnected from the mains.

- 1) Unscrew the six TORX screws from the top cover plate and remove the plate.
- 2) Unscrew the four screws from the cover plate of the empty Slot.
- 3) Loosen the set screws of the corresponding Screw Terminal ⑧.
- 4) Insert the Module into the Screw Terminal.
- 5) First, screw in the four screws of the rear cover plate.
- 6) Tighten the screws of the Screw Terminal. Take care not to tighten the set screws too tightly!
- 7) Mount the top cover plate.

## 4. MAIN UNIT

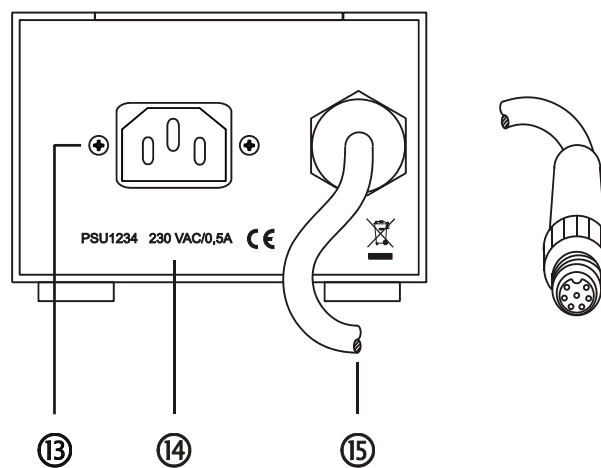
### 4.5. External Power Supply

#### Power Supply front



- ⑪ Mains power switch, I = On
- ⑫ Control LED

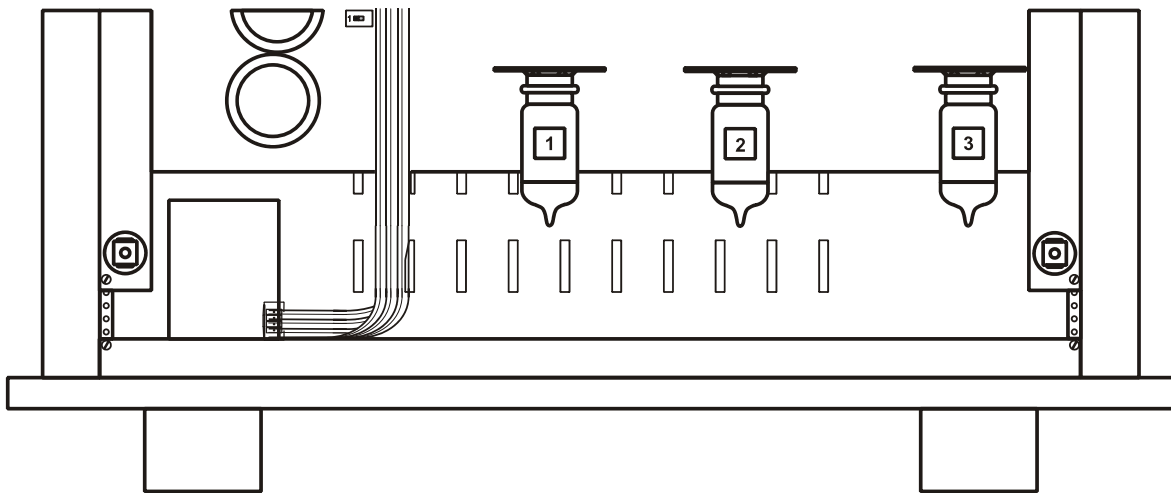
#### Power Supply rear panel



- ⑬ Mains Input, IEC receptacle
- ⑭ Serial Number and Mains Voltage
- ⑮ Connecting Cable with Plug Connector

## 4. MAIN UNIT

### 4.6. Tube layout, Replacing tubes



#### Tube Layout:

1 ECC88    2 ECC81    3 ECC83

- Tube 3 (ECC83, 12AX7) is the Input Tube. Please use Low Noise Tubes of high quality with matched systems.
- Tube 2 (ECC81, 12AT7) is for the Main Amplification Stage.
- Tube 1 (ECC88, 6922, 6N23, 6N1,) is for the Output Buffer.

#### Replacing tubes



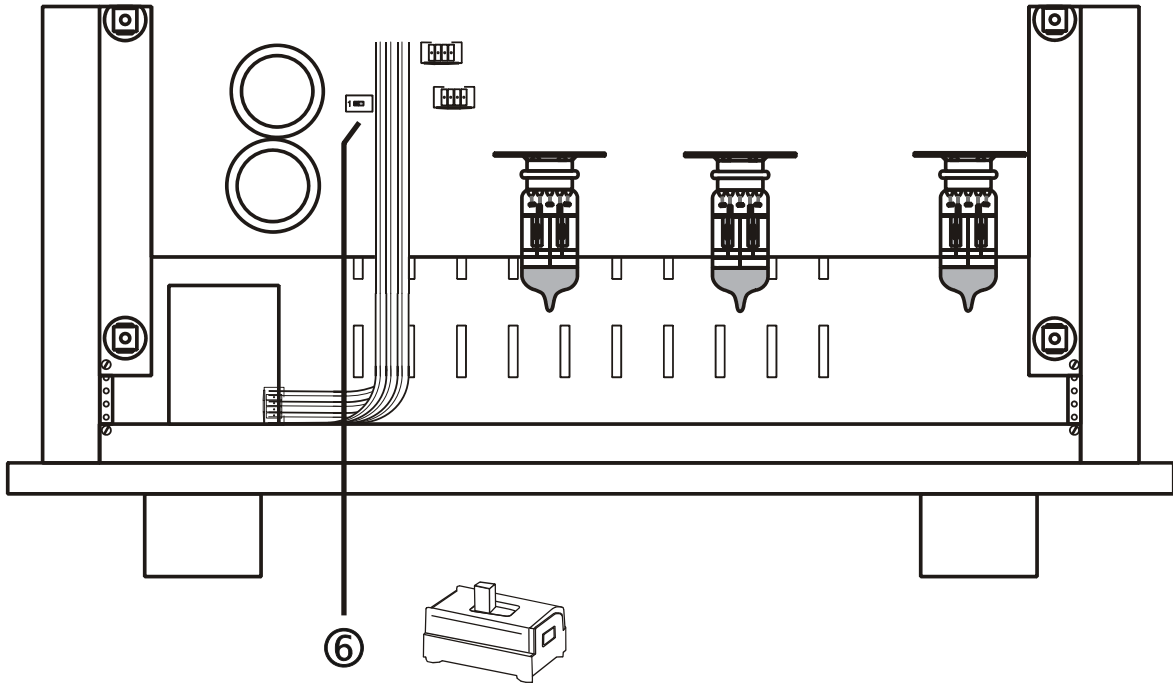
**Before removing the top cover plate, make sure that the Unit is switched OFF and that the Power Supply is disconnected from the mains!**

***Important! Changing tubes is a job for a qualified technician!***

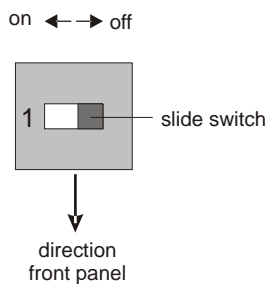
1. Unscrew the six TORX screws from the top cover plate and remove the plate.
2. Remove the old tubes. Carefully remove the tubes from their sockets, taking care not to exert sideward pressure on the sockets.
3. Insert the new tubes.  
Please ensure that the tube pins are all perfectly straight before inserting your new tubes. Straighten any bent pins very carefully by hand if necessary. No adjustments are necessary to your amplifier after fitting such with new tubes.
4. Cleaning tips  
Cleaning agents and contact liquids are not recommended for tube sockets. Clean dirty sockets with compressed air and carefully clean tarnished tube pins using a wire brush.

## 4. MAIN UNIT

### 4.7. Subsonicfilter



### Subsonic Filter



Uneven records and mismatched cartridge – tonearm combinations can result in low frequency signals in the range below 15Hz (additional to the music reproduction). Signals of this low frequency cause excessive swing of the bass driver membrane, especially if it's a bass-reflex system. Electrostatic speakers should be protected against such low frequencies in general, because the bandwidth of the input transformer of a wide band electrostatic speaker is normally limited to approximately 20Hz.

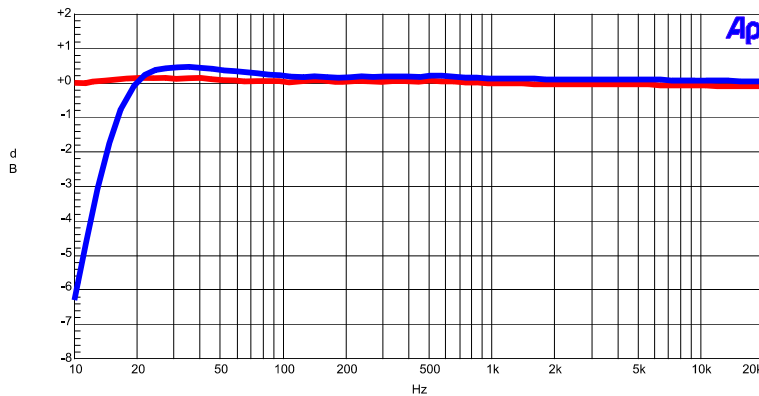
The low frequency signals can be reduced with the Subsonic Filter. The cut – off frequency of this Filter is 15 Hz / - 3 dB.

**Delivery State : Subsonic Filter ON**

## 4. MAIN UNIT

### 4.7. Subsonic Filter

Frequency Response of the Phono Module ( RIAA Curve ) with and without Subsonic Filter:

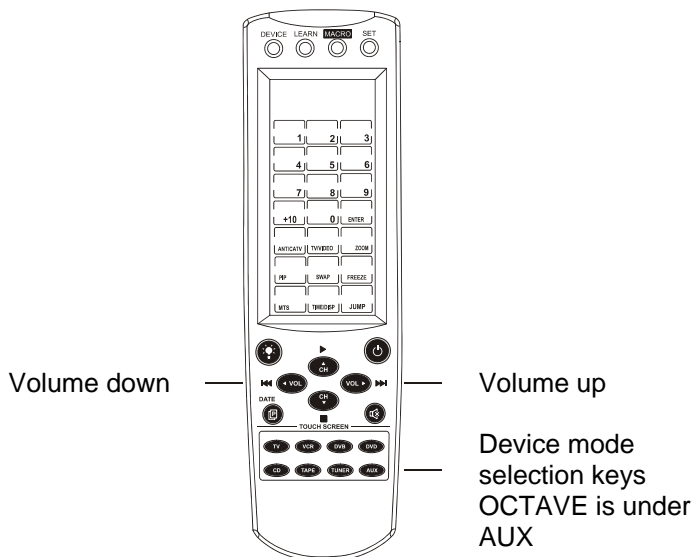


Flat Graph, Frequency Response without Subsonic Filter

Descending Graph, Frequency Response with Subsonic Filter

Low Frequency Signals below 20Hz will be reduced through the Subsonic Filter by 12dB / Octave. Acoustical feedback from the speaker to the cartridge is also eliminated (this effect occurs with speakers having an extended range in the bass).

### 4.8. Remote Control (optional)



Select the Phono Module by pressing the AUX button once. You can now adjust the volume by repeatedly pressing the VOL + and VOL - buttons. You will find more detailed information on programming the remote control in the separate operating instructions.



Please don't trash the old batteries. Batteries must be disposed of as special waste. Stores that sell batteries should provide containers for the collection of used batteries.

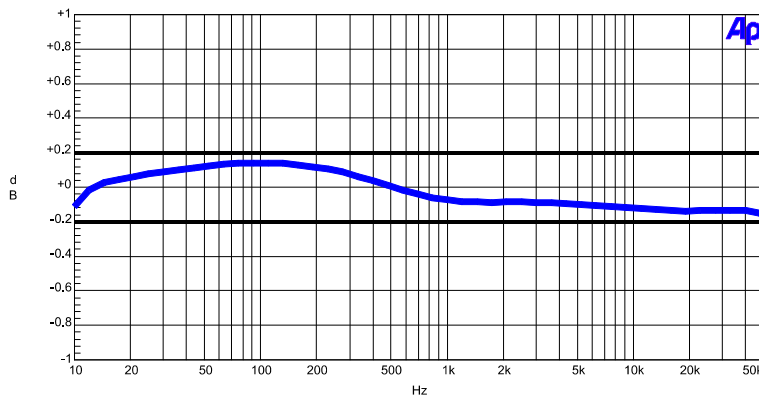


## 4. MAIN UNIT

### 4.9. Technical specs

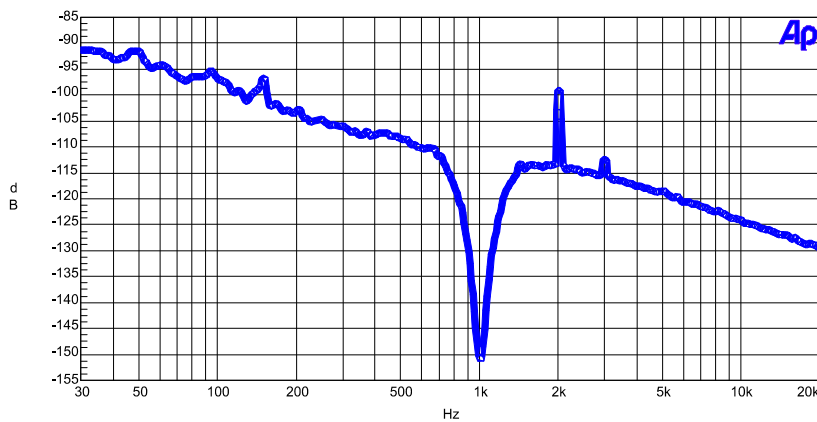
Tolerance of the RIAA-Equalization	$\pm 0.2$ dB / 50 kHz - 10 Hz
Crosstalk, L to R / Phono	> 60dB
Crosstalk, L to R / Line	> 80 dB
Crosstalk, Module to Module	> 100 dB
Subsonic Filter Cut Off Frequency	15 Hz / - 3 dB / 12 dB / Octave

Tolerance RIAA-Equalization



The Equalization follows the RIAA Curve within the Tolerance of  $\pm 0.2$  dB in the frequency range of 10Hz to 50kHz. This precision requires a equalization network with a maximum deviation of 0.1%.

FFT Analysis of the RIAA Phono Stage.  
Measurement : MC-RCA-Input to Fix-Out.  
2 V RMS Output , Frequency 1 kHz



The graph depicts the absence of hum caused by the mains. The RIAA Stage adds only second order distortion ( $k_2$  @ 2kHz) in the microscopic Level of  $-100$ dB. This corresponds to a THD+Noise of 0.001% (weighted).

## 4. MAIN UNIT

### 4.9. Specifications

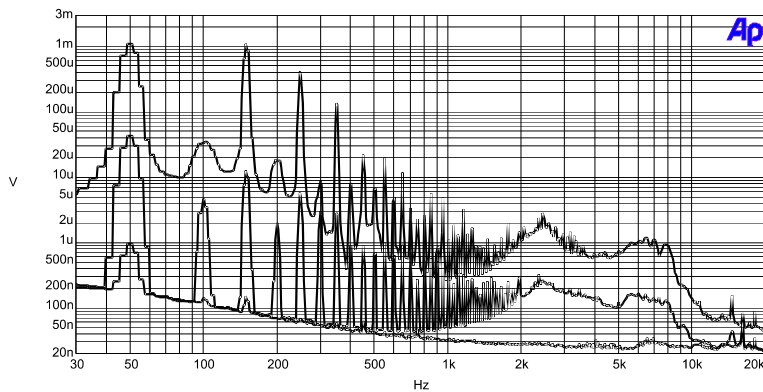
Why utilize a balanced input for MC systems?

Magnetic stray fields are always present in a room due to the mains cables and the power transformers of the components. The stray field induces hum and noise in the cartridge and the phono cable. If there is a hum in such a system, one has no means to minimize the level of the hum other than to possibly change the location of the turntable.

In contrast to common opinion, mains and transformer stray fields are not limited to only 50 Hz. The graph below depicts three different stray fields. First ( 1 ) the stray field of a room without transformer, the stray field of the shielded transformer of the Octave Phono Module ( 2 ), and the stray field of a conventional transformer ( 3 ). It is easy to see that the stray field extends to the midrange (with peaks up to 2 kHz). This causes interference with the signal of the MC pickup. A balanced input effectively reduces the hum and the interference. To ensure optimum sound quality and reproduction, the balanced connection is most effective, especially when the cable length and the placement of the turntable cannot be changed.

The Common Mode Rejection Ratio of the Balanced Input is shown in Diagram 2, the CMMR reaches 100dB / 50 Hz, meaning a stray pick up can theoretically be reduced by a factor of 100,000.

#### 1. Strayfield Graph of different Mains Transformers

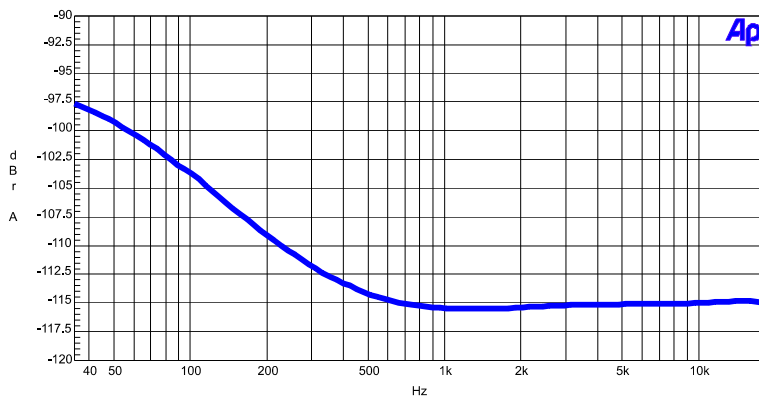


Top Graph (3):  
Strayfield of a conventional Transformer.

Middle Graph (2):  
Strayfield of the Phono Module Transformer.

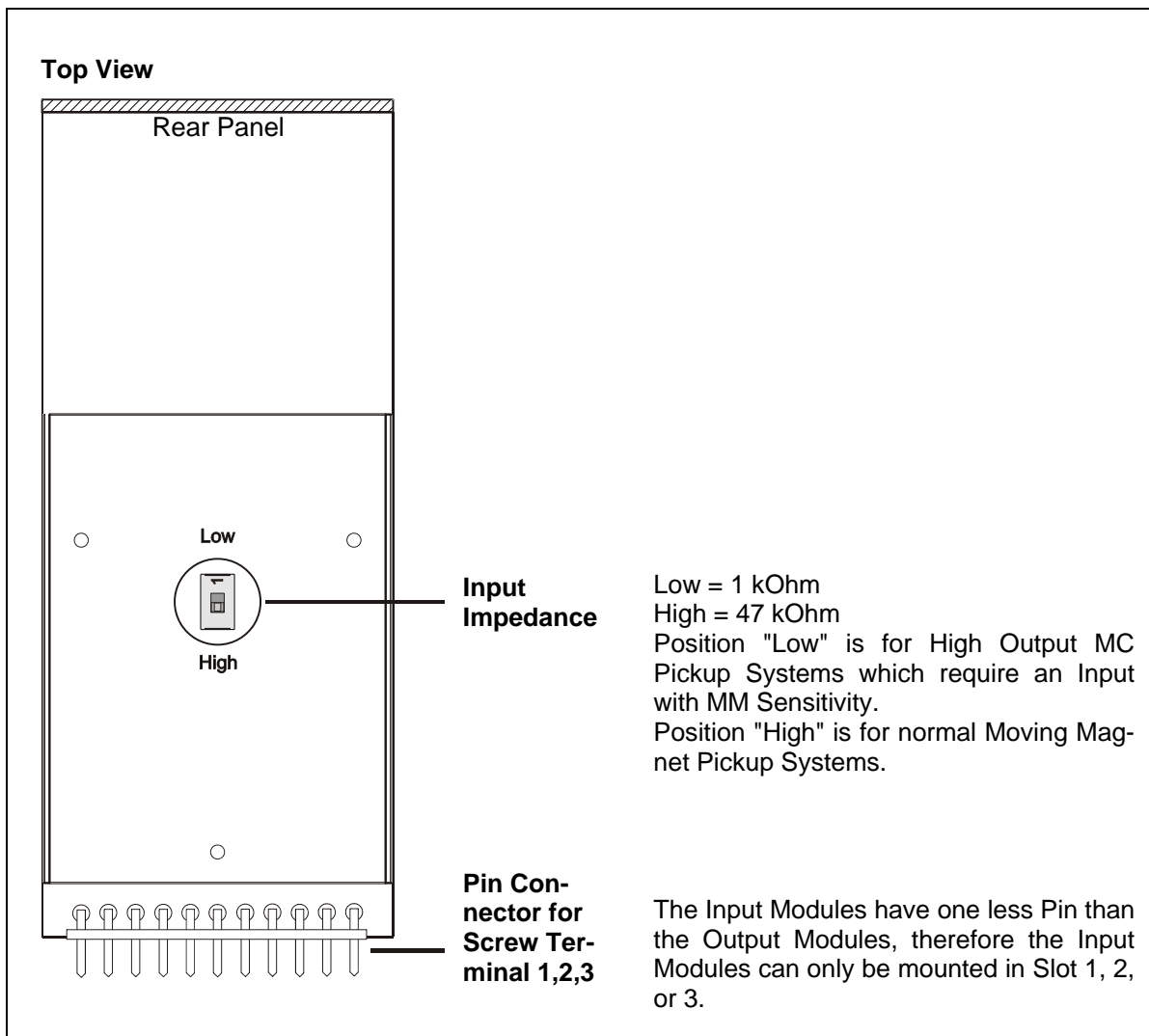
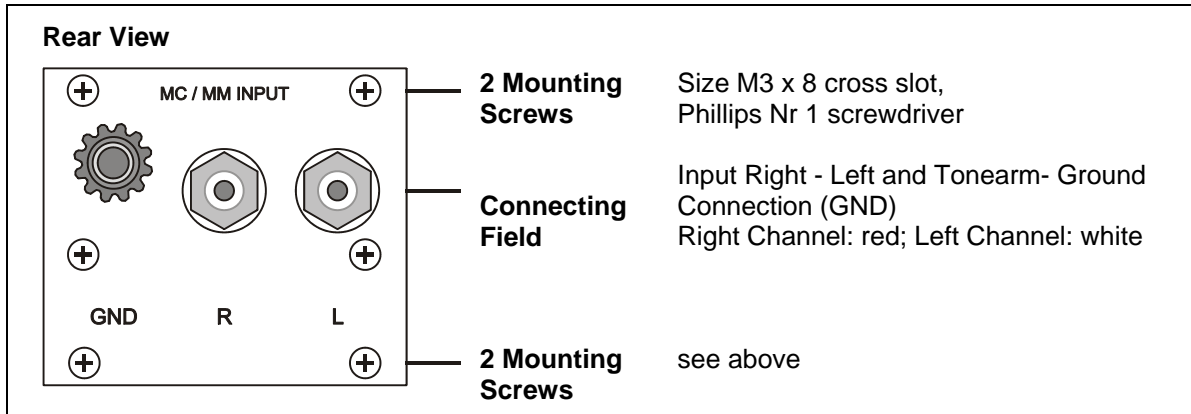
Lower Graph (1):  
Strayfield in a room without a Transformer.

#### 2. Common Mode Rejection Ratio MC XLR- Input



## 5. INPUTS

### 5.1. Input IN 1: MM RCA



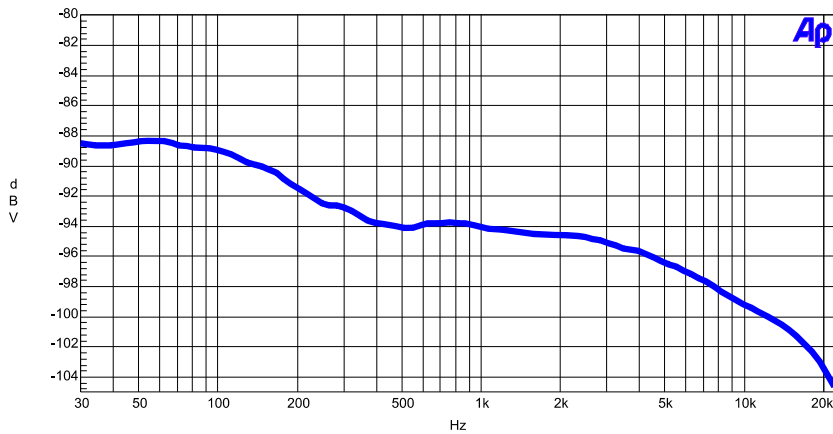
## 5. INPUTS

### 5.1. Input IN 1: MM RCA

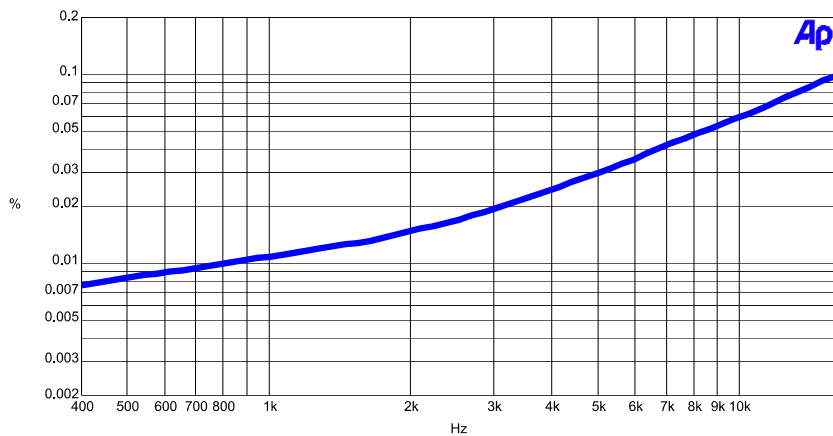
#### Specifications

Sensitivity	3 - 5 mV
Input Impedance	1 kOhm / 47 kOhm / 220 pF
Gain Factor	38 dB
Signal to Noise Ratio	- 94 dB / 1 kHz Bandpass Measurement

Static Noise Level MM-Input  
Reading on the FIX Output

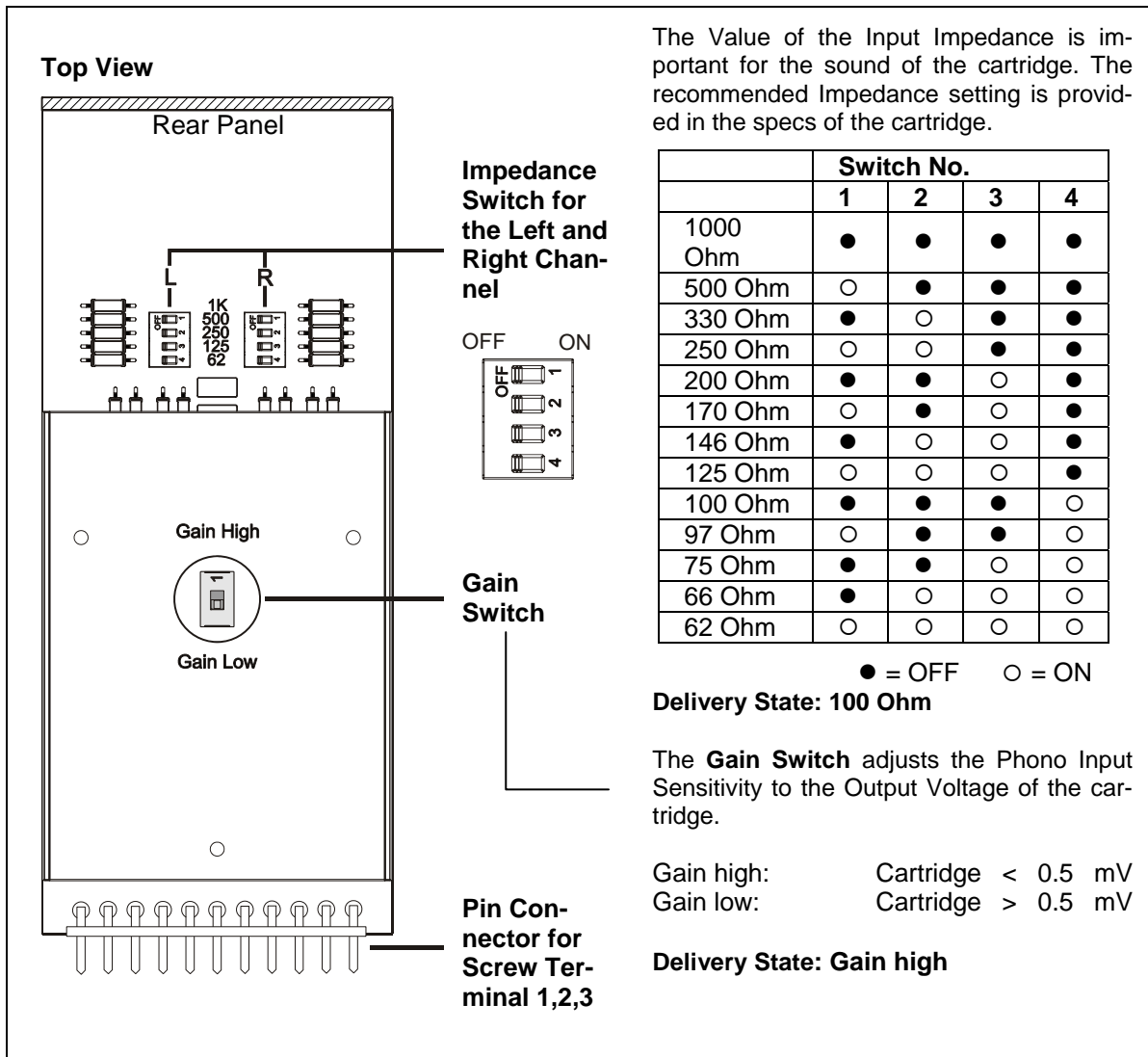
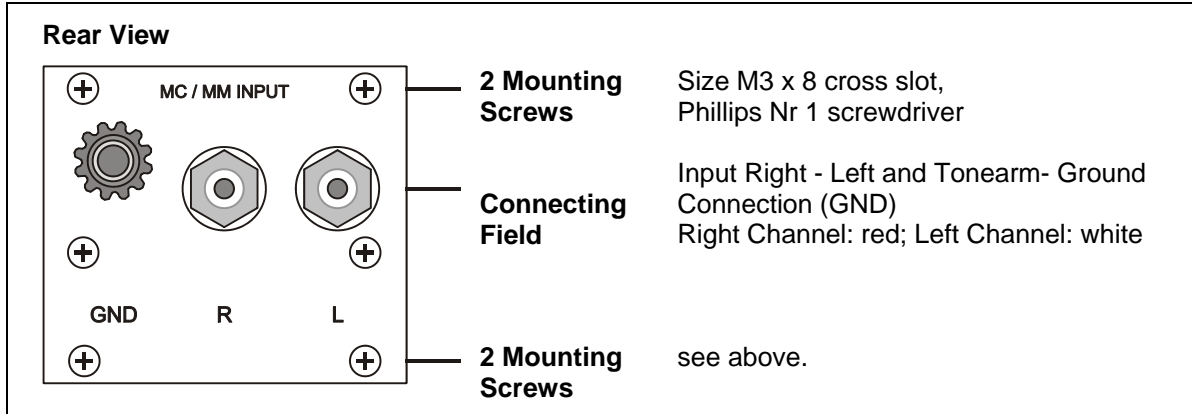


THD + Noise in the Range of 400 Hz - 20 kHz  
Reading on the FIX Output, Output Voltage 1 V RMS



## 5. INPUTS

### 5.2. Input IN 2: MC RCA



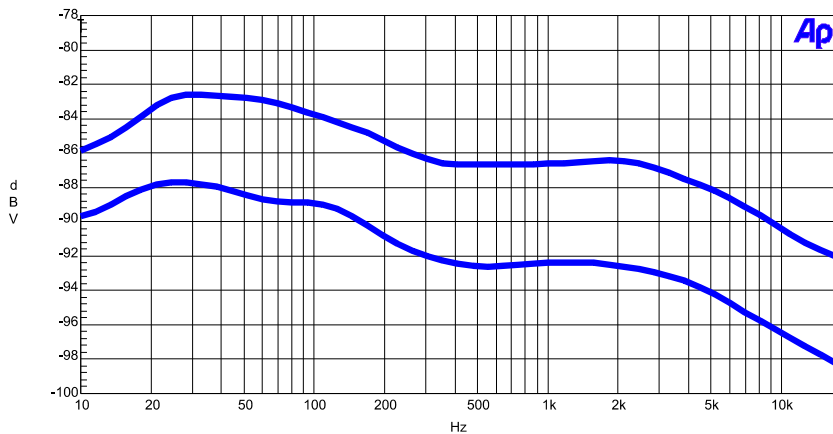
## 5. INPUTS

### 5.2. Input IN 2: MC RCA

#### Specifications

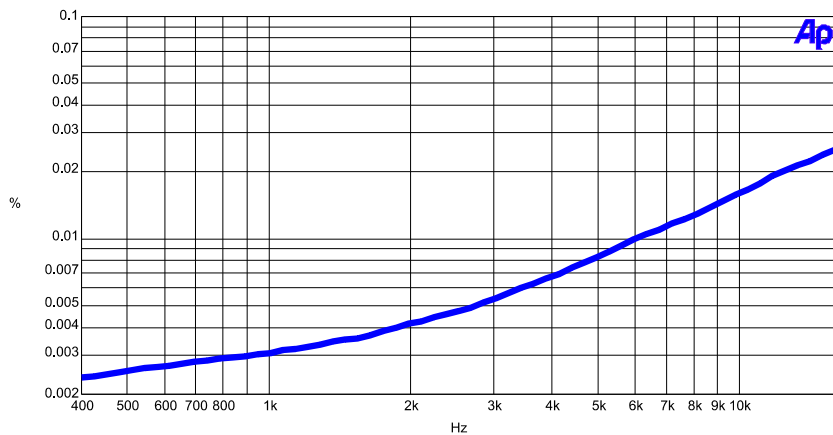
Sensitivity	0.1 - 1 mV
Input Impedance	60 Ohm - 1 kOhm / 4.7 nF
Gain Factor	68 dB / 60 dB
Signal to Noise Ratio	- 86.5 dB / -92.5 dB / 1 kHz Bandpass Measurement
Noise Factor	0.5 $\mu\text{V} / \sqrt{\text{Hz}}$ / Gain low 1.27 $\mu\text{V} / \sqrt{\text{Hz}}$ / Gain high

Static Noise Level MC-RCA Input  
Reading on the FIX Output



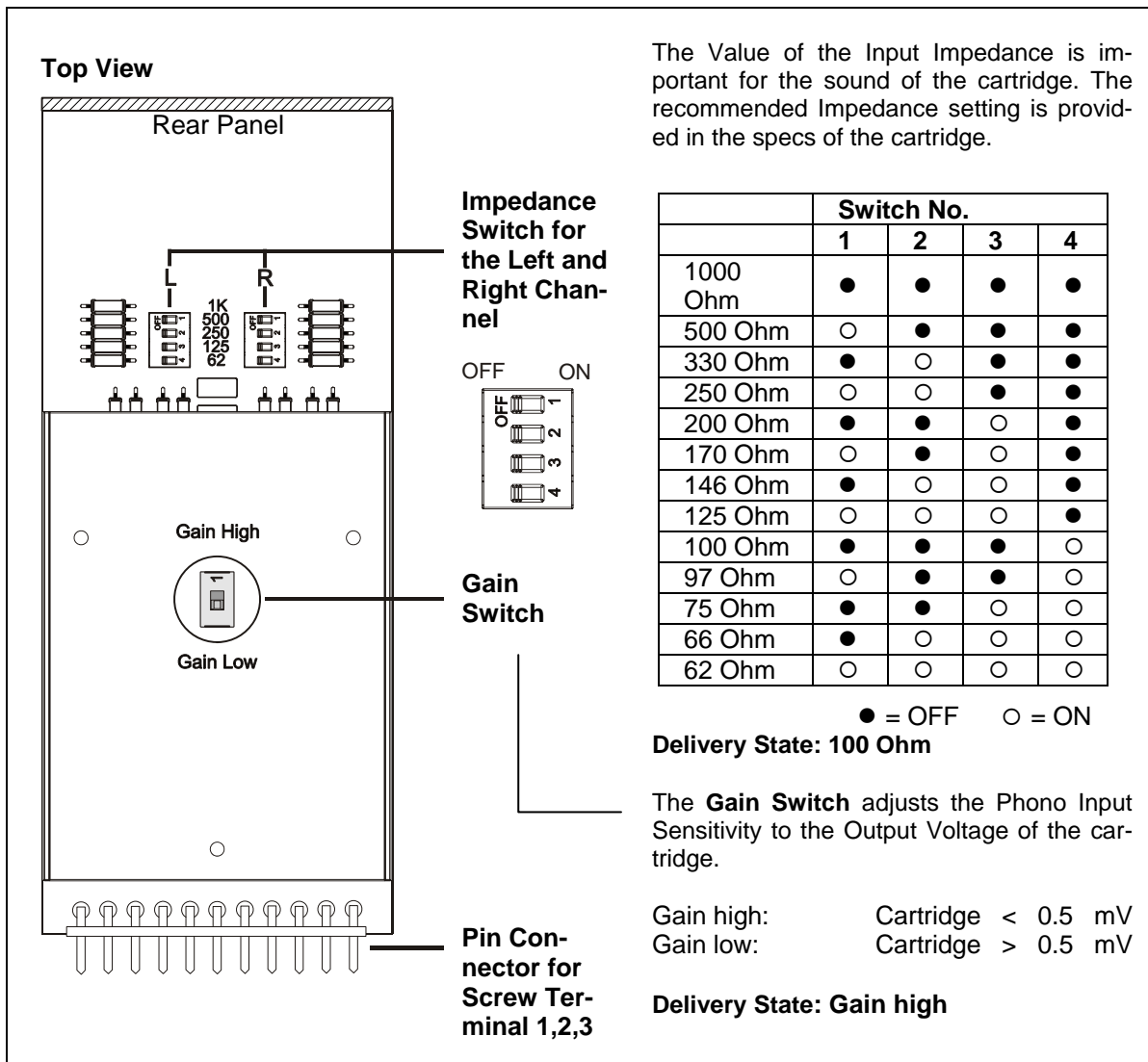
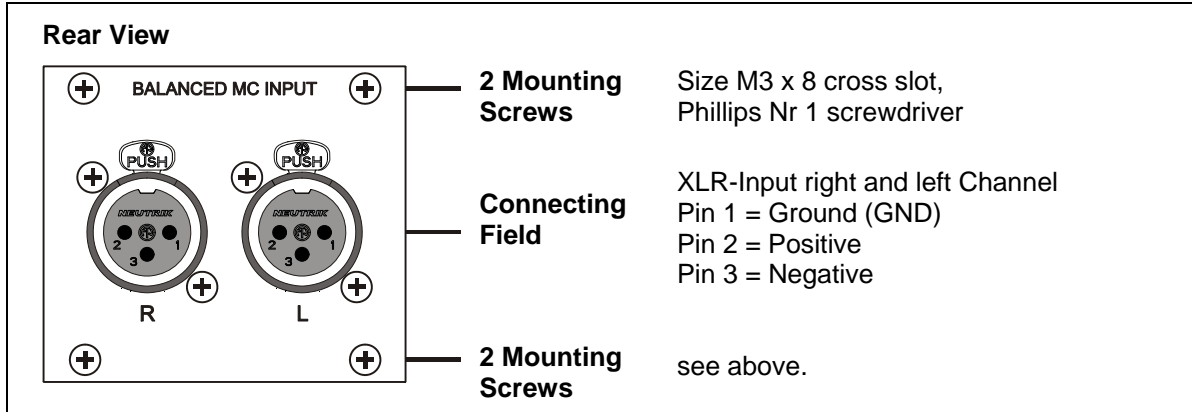
Upper Graph: Gain high  
Lower Graph: Gain low

THD + Noise in the Range of 400 Hz - 20 kHz  
Reading on the FIX Output, Output Voltage 1 V RMS



## 5. INPUTS

### 5.3. Input IN 3: MC XLR



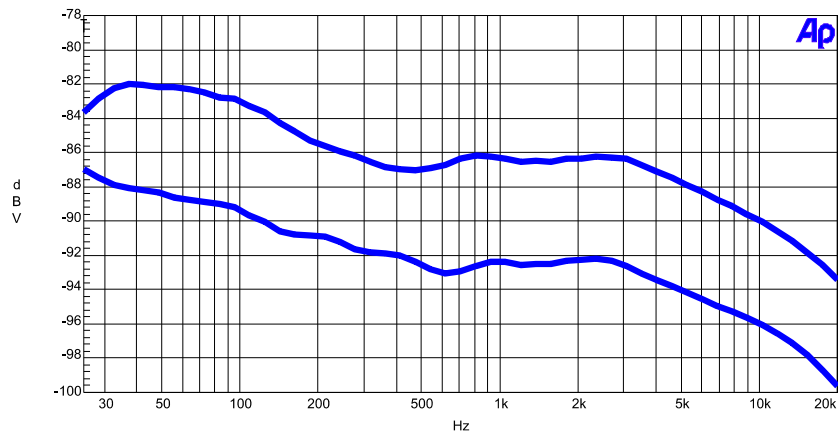
## 5. INPUTS

### 5.3. Input IN 3: MC XLR

#### Specifications

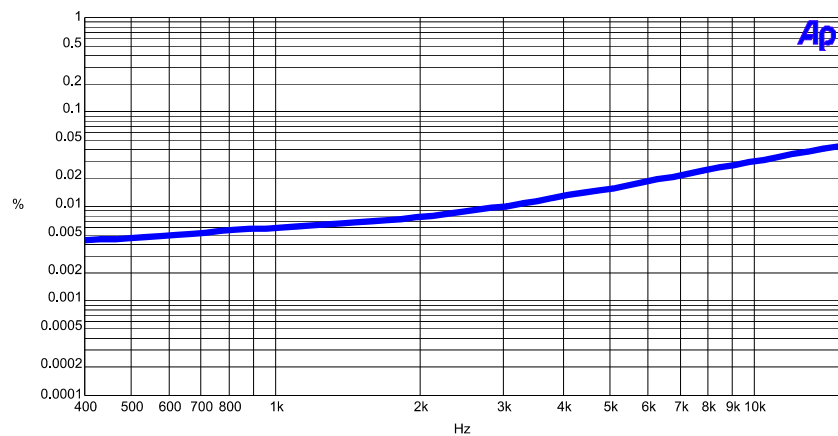
Sensitivity	0.1 - 1 mV
Input Impedance	60 Ohm - 1 kOhm / 4.7 nF
Gain Factor	68 dB / 60 dB
Signal to Noise Ratio	- 86.5 dB / -92.5 dB / 1 kHz
	Bandpass Measurement
Noise factor	0.4 $\mu\text{V} / \sqrt{\text{Hz}}$ / Gain low
	1.0 $\mu\text{V} / \sqrt{\text{Hz}}$ / Gain high

Static Noise Level MC-XLR Input  
Reading on the FIX Output



Upper Graph: Gain high  
Lower graph: Gain low

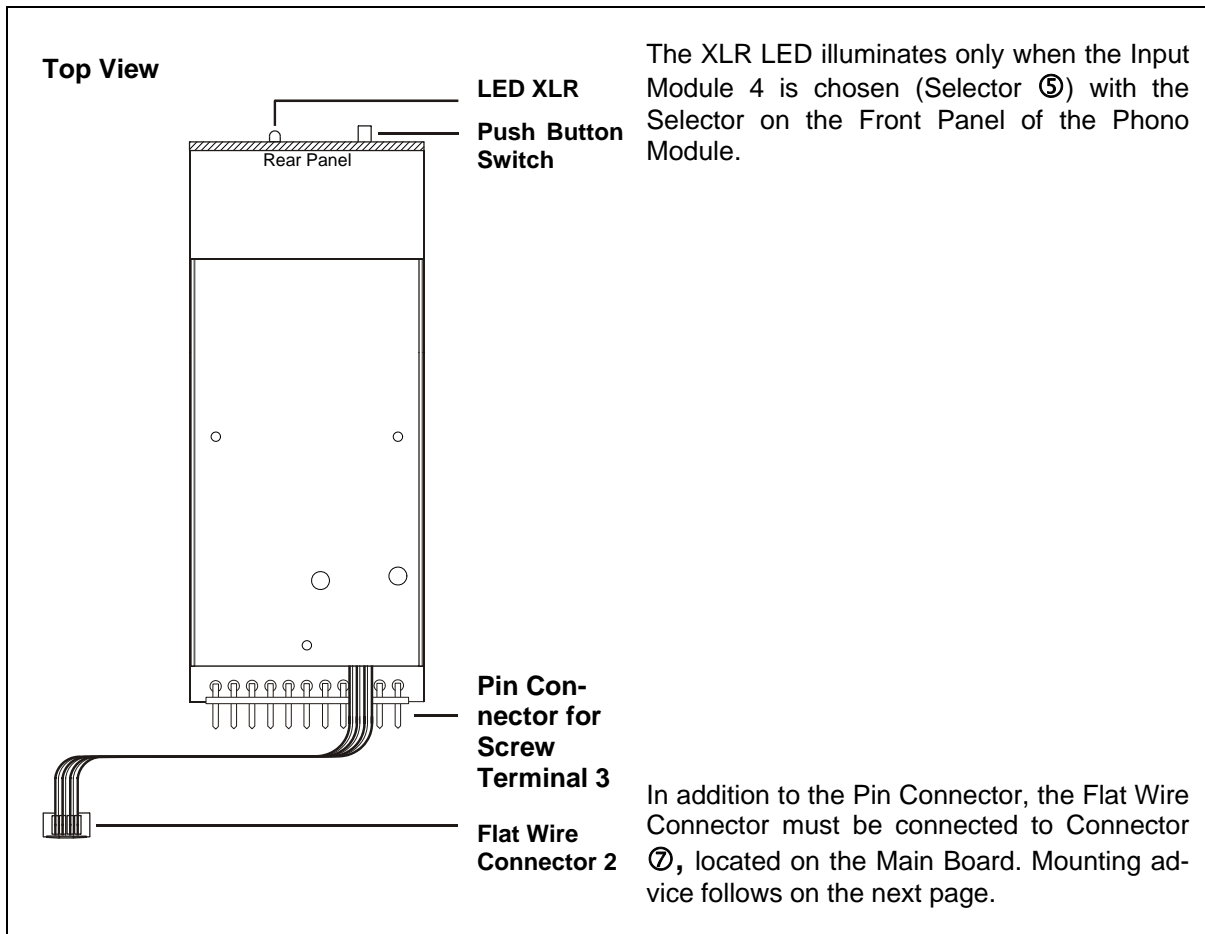
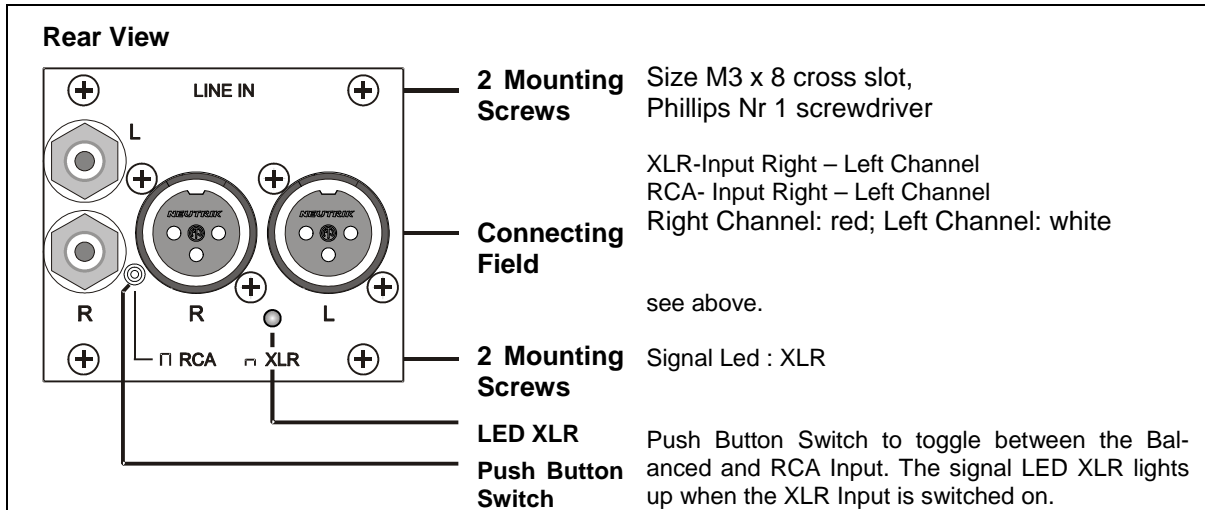
THD + Noise in the Range of 400 Hz - 20 kHz  
Reading on the FIX Output, Output Voltage 1 V RMS





## 5. INPUTS

### 5.4. Input IN 4: Line In



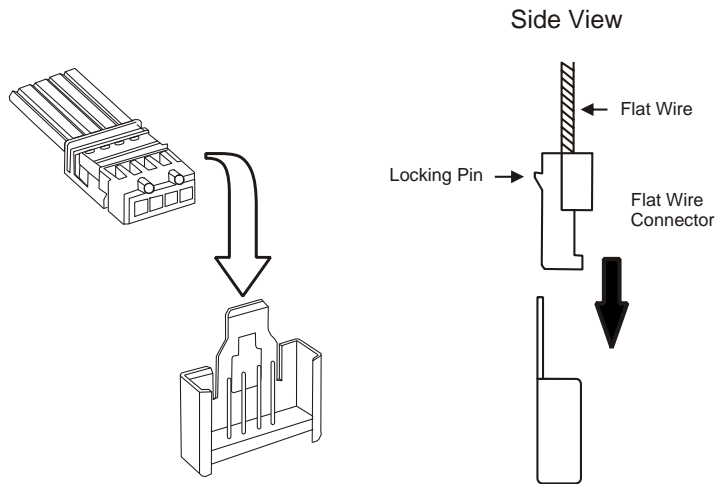
## 5. INPUTS

### 5.4. Input IN 4: Line In

#### Installation

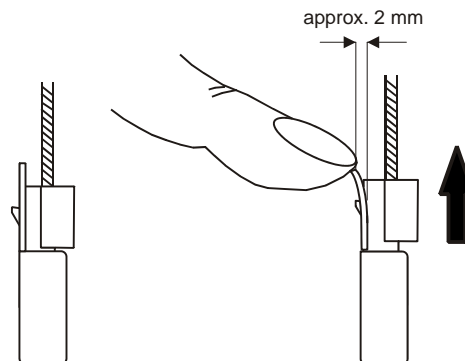
##### Connecting the Flat Wire Plug In Connector:

Insert the Flat Wire Connector. The locking pin should click into the locking lever.



##### Removing the Flat Wire Connector:

- 1) Carefully bend the Locking Lever 2mm to the back.
- 2) Pull out the Connector. Do not pull out the Connector with the cable.



#### Specifications

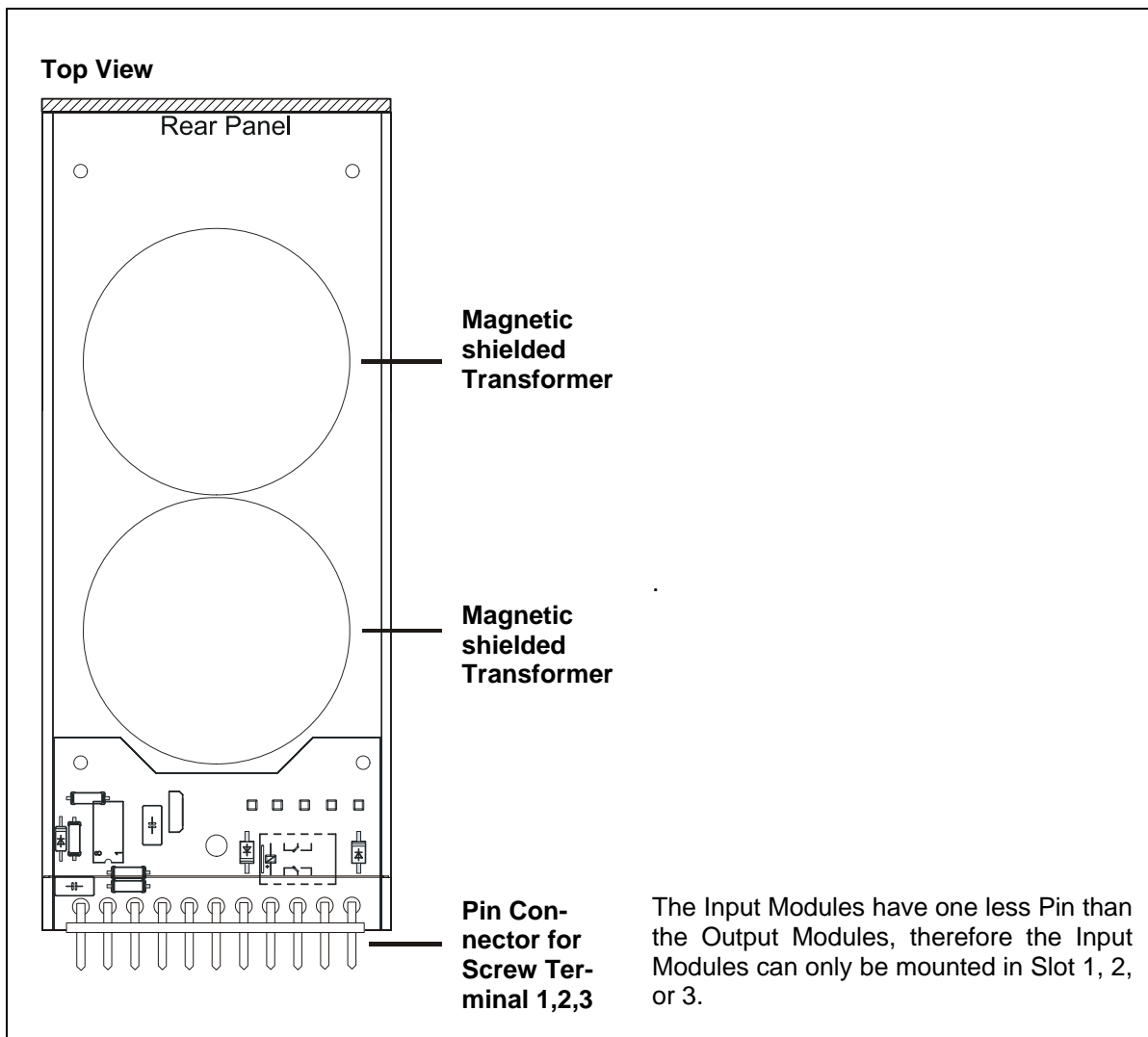
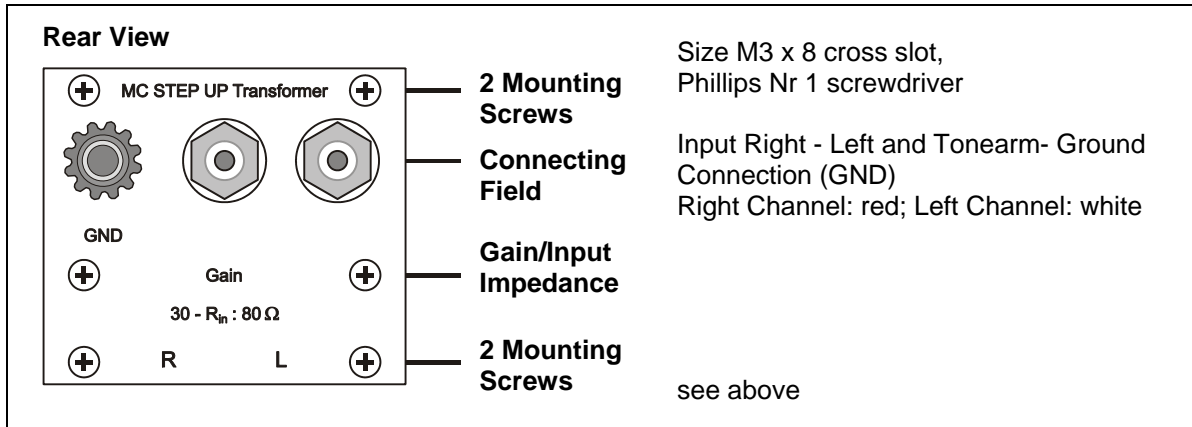
Sensitivity	100 mV - 2 V
Input Impedance RCA / XLR	50 kOhm / 25 kOhm
Gain Factor RCA / XLR	0 dB / + 6 dB – FIX Output
Crosstalk L - R	> - 60 dB
Signal to Noise Ratio RCA / XLR	- 120 dB      FIX Output
THD + Noise, RCA / XLR	- 125 dB      FIX Output

#### Description

The Line In Module upgrades the Phono Module to a full Preamplifier with one single-ended (RCA) and one XLR (balanced) Line Level Input. The Balanced Input allows the connection of sources featuring the latest audio technology. The signal to noise ratio and the distortion of the input circuitry correspond to the latest technical developments in high-end audio.

## 5. INPUTS

### 5.5. Input IN 5: MC Step Up Transformer Fixed Impedance



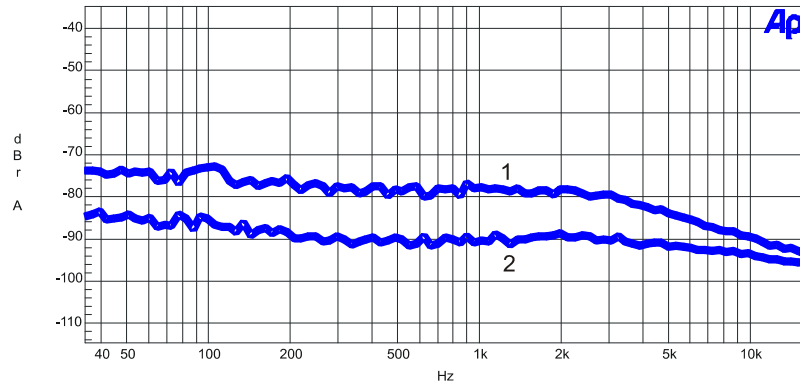
## 5. INPUTS

### 5.5. Input IN 5: MC Step Up Transformer Fixed Impedance

#### Specifications

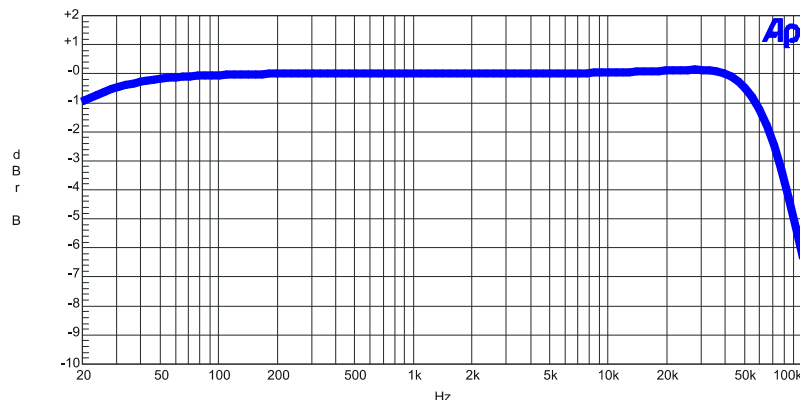
Sensitivity	0.2 - 1 mV
Input Impedance	< 80 Ohm / 30 Hz – 40 kHz
Gain Factor	30
Cartridge Resistance	0.5 - 5 Ohm
Signal to Noise Ratio	- 100 dB / 1 kHz Bandpass Measurement

Noise of a Transformer (graph 2) compared to an electronic MC-Input (graph 1)



The noise of the Transformer is around 10 dB lower than the noise of a low noise electronic MC preamplifier design.

Frequency response with a cartridge DC resistance of 5 Ohm

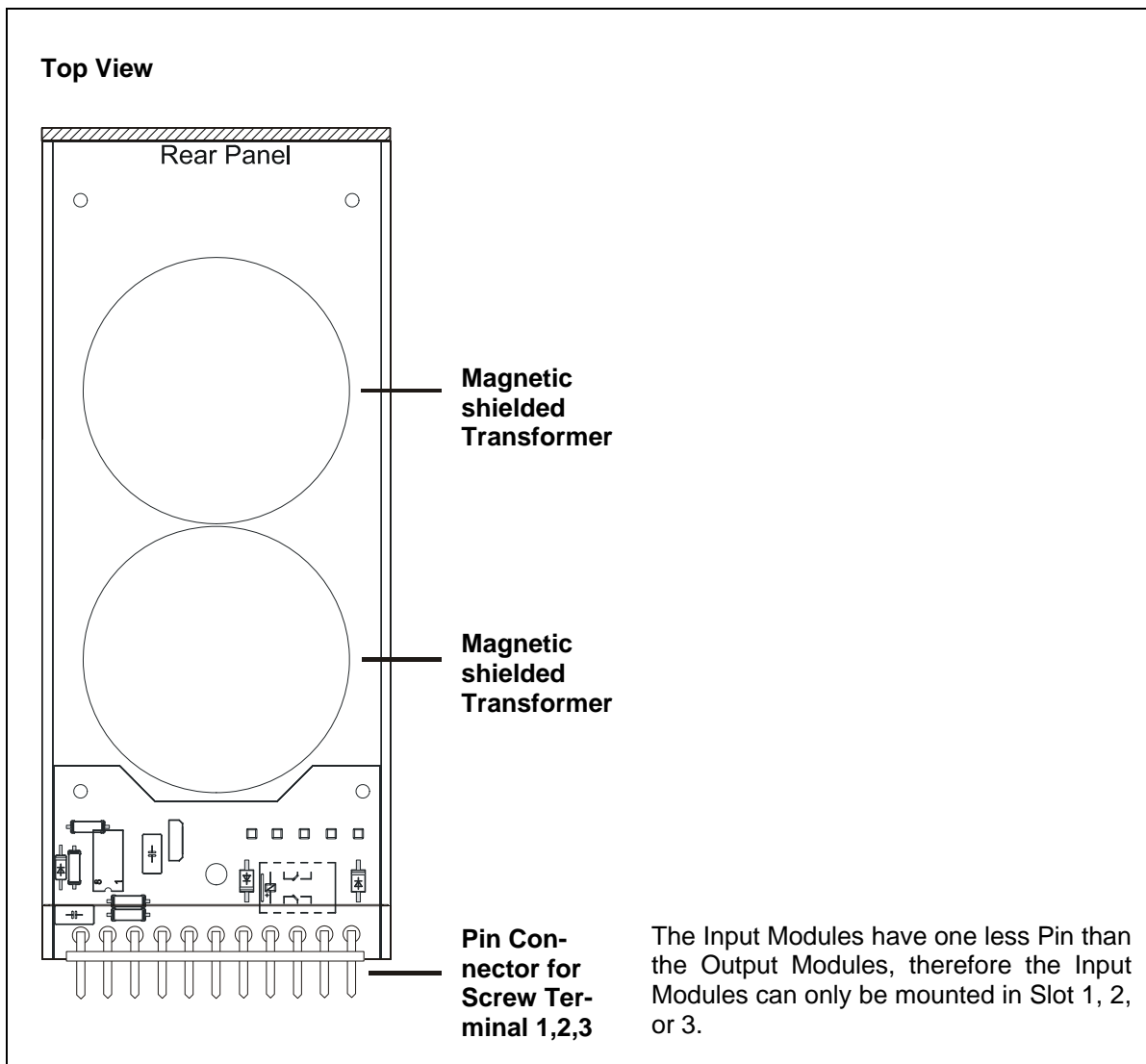
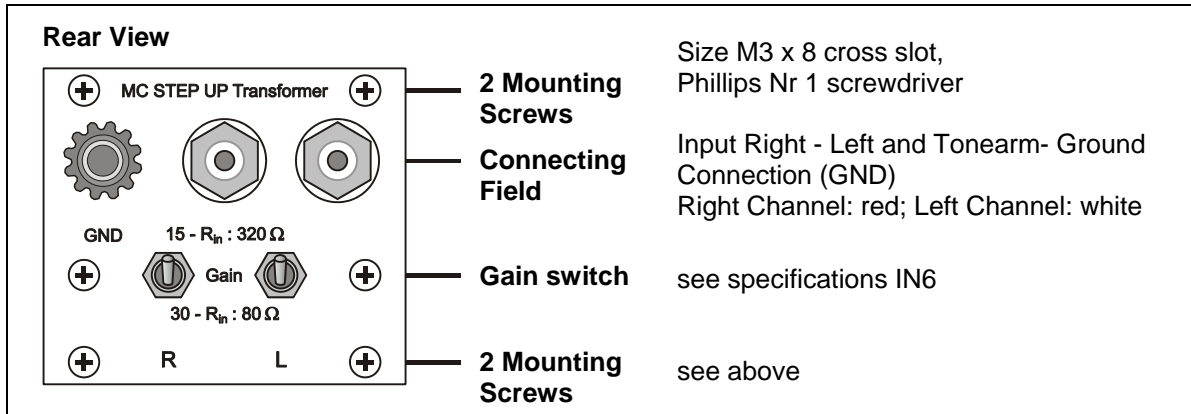


Due to the lossless core of the Transformer the input impedance is high and constant. This results in the flat frequency response of 20 Hz - 75 kHz (-1/-3 dB) even with a cartridge resistance up to 5 Ohm.

**Advice:** Due to the low frequency filter characteristic of a Transformer it is acceptable to switch off the subsonic filter of the Phono Module if the tonearm resonance is below 8 Hz.

## 5. INPUTS

### 5.6. Input IN 6: MC Step Up Transformer Switchable Impedance



## 5. INPUTS

### 5.6. Input IN 6: MC Step Up Transformer Switchable Impedance

#### Specifications

##### Gain Factor 15:

Sensitivity	0.2 - 2 mV
Input Impedance	< 320 Ohm / 30 Hz – 40 kHz
Gain Factor	15
Cartridge Resistance	5 - 25 Ohm
Signal to Noise Ratio	- 100 dB / 1 kHz Bandpass Measurement

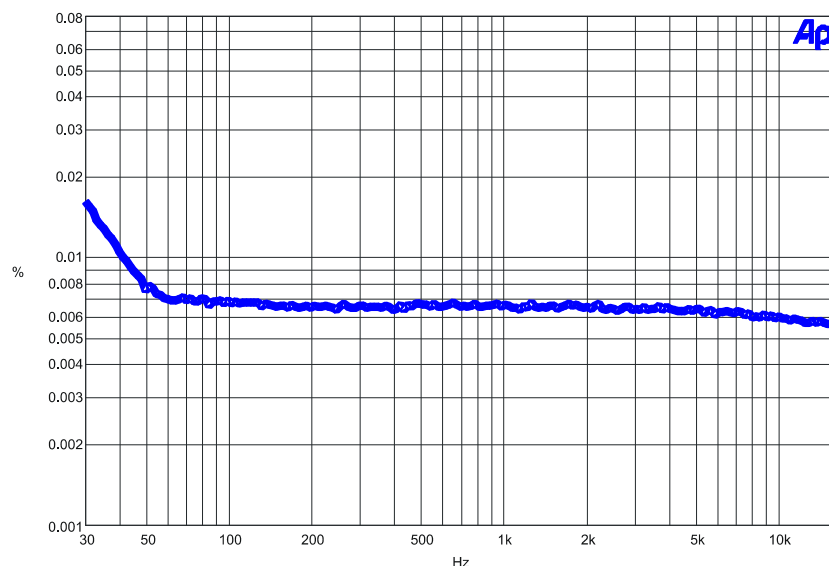
Recommended for medium and high level MC cartridges

##### Gain Factor 30:

Sensitivity	0.2 - 1 mV
Input Impedance	< 80 Ohm / 30 Hz – 40 kHz
Gain Factor	30
Cartridge Resistance	0.5 - 5 Ohm
Signal to Noise Ratio	- 100 dB / 1 kHz Bandpass Measurement

Recommended for low level MC cartridges

Total Harmonic Distortion (THD) + Noise of the Transformer in Gain setting 15

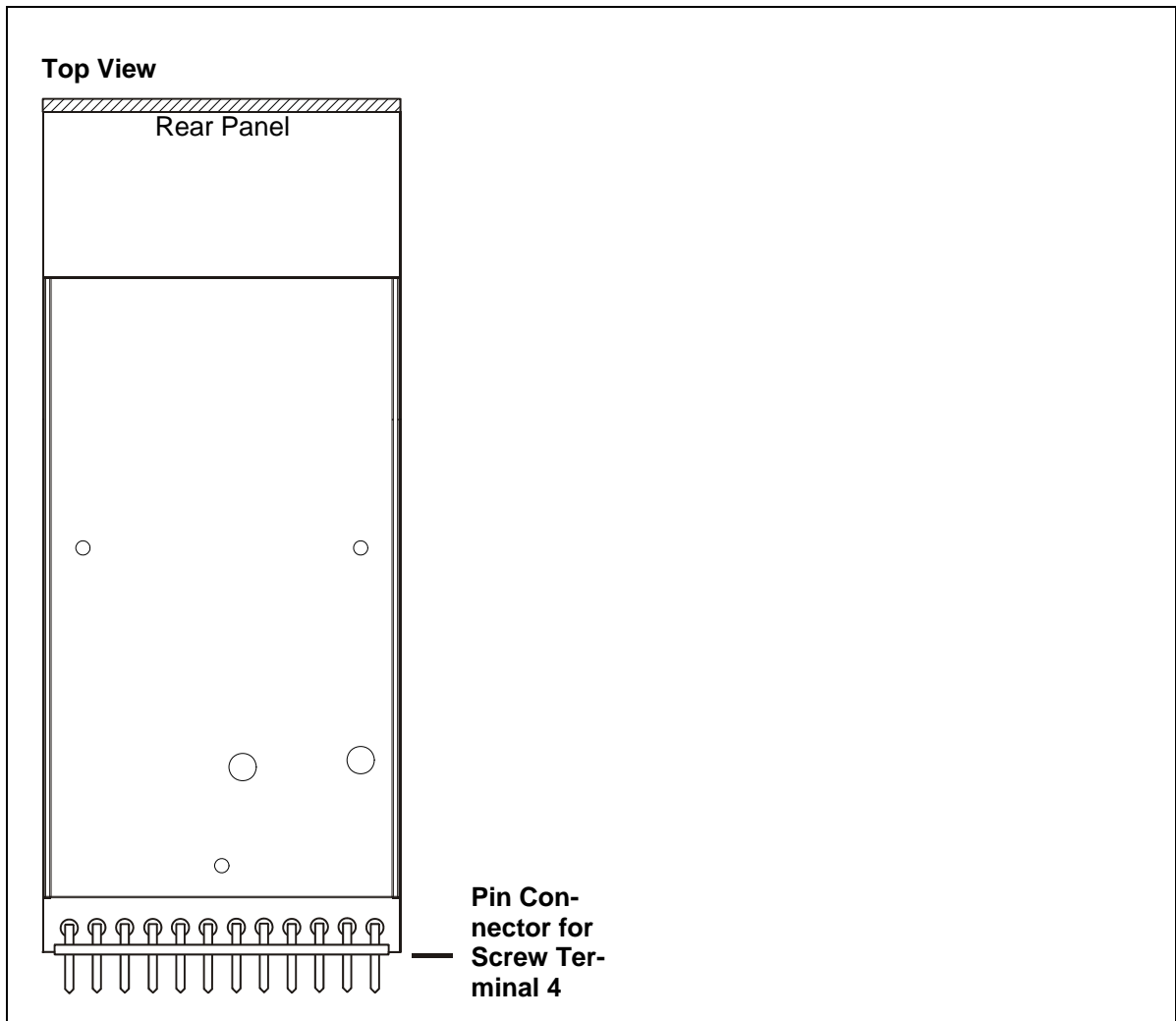
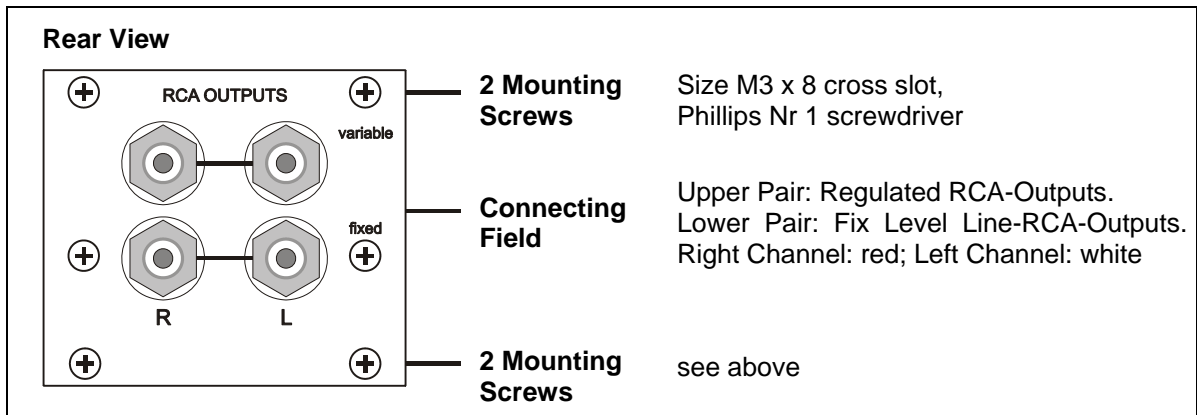


The THD is extremely low because of the optimized winding technology and the advanced core material of the Transformer.

**Advice:** Due to the low frequency filter characteristic of a Transformer it is acceptable to switch off the subsonic filter of the Phono Module if the tonearm resonance is below 8 Hz.

## 6. OUTPUTS

### 6.1. Output OUT 1: RCA standard



## 6. OUTPUTS

### 6.1. Output OUT 1: RCA standard

#### Specification

max. Output Voltage Fix Output	7 V RMS
max. Output Voltage variable Output	7 V RMS
Output Resistance Fix Output	300 Ohm
Output Resistance variable Output	300 Ohm
Signal to Noise Ratio	- 120 dB → variable Output

#### Regulated Variable Output

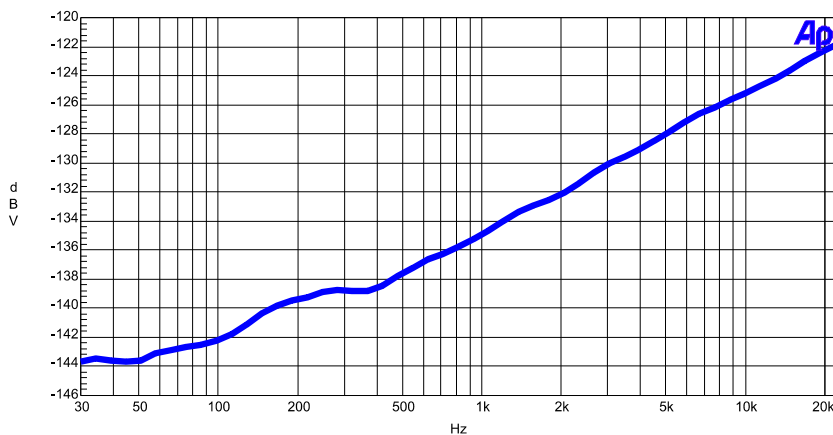
The regulated Output of the OUT 1 module is suitable for headphone amplifiers or analog-to-digital signal processing.

This Output is limited for directly driving a power amplifier, as the maximum output level is in the line level range. Additionally, this Output is not optimized for highly capacitive loads, which is often the case with short signal cables for power amplifiers.

#### Unregulated, Fixed Output

The fixed (FIX) Output is recommended for the connection to preamplifiers or integrated amps. The average output level is the same value as that of a CD Player. The regulated and the unregulated Outputs are both muted during the warm-up and the auto-muting phase.

Static Noise Level Variable Output Input, Volume Regulator "0"

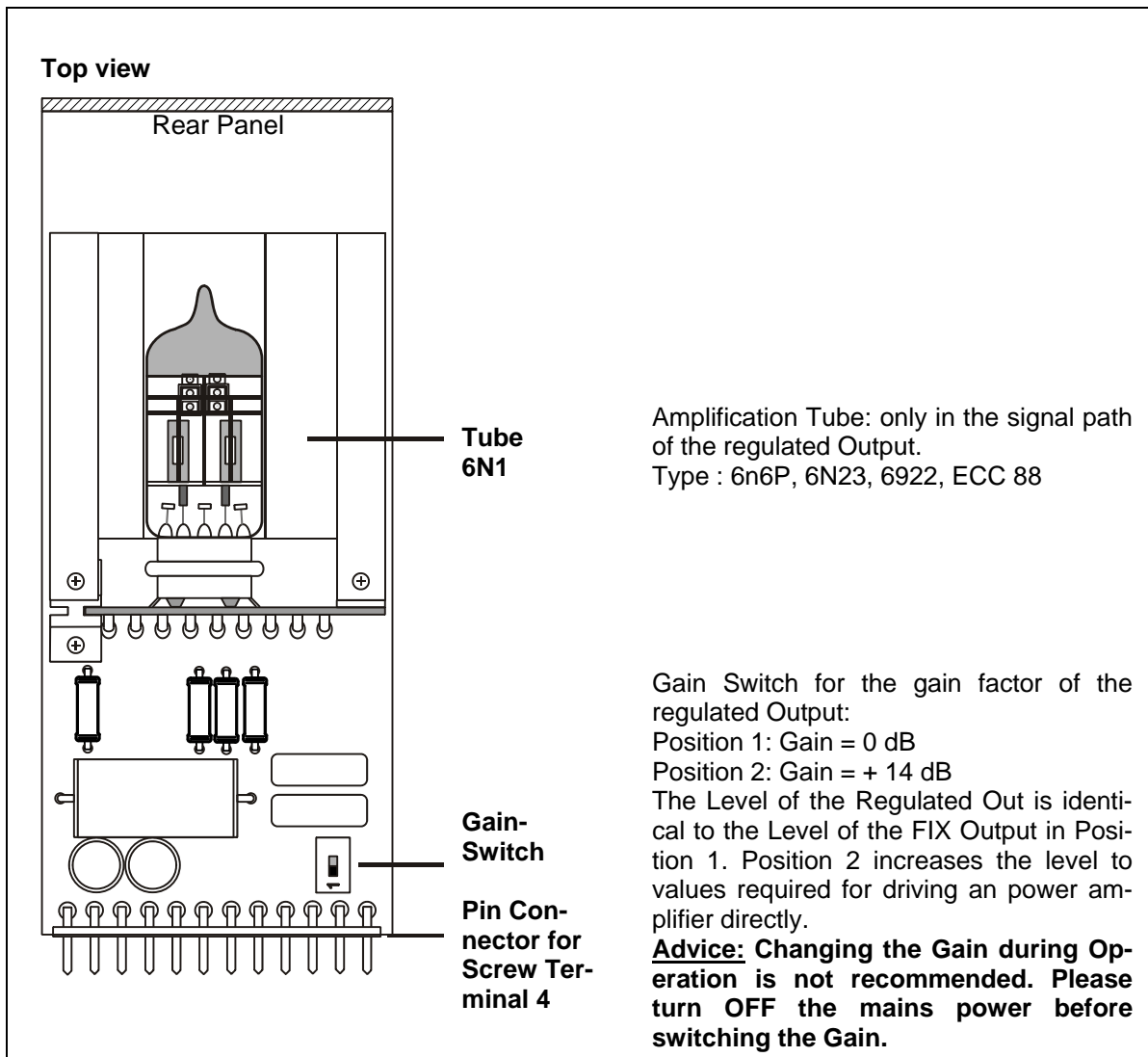
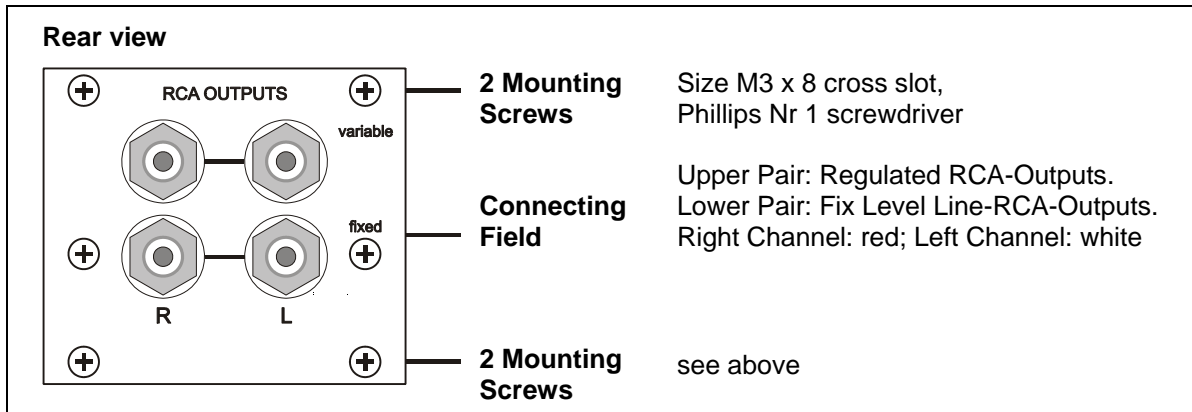


The bandpass reading of the signal-to-noise ratio depicts the exceptionally low noise floor of the Output Stage.



## 6. OUTPUTS

### 6.2. Output OUT 2: RCA Direct Drive (DD)



## 6. OUTPUTS

### 6.2. Output OUT 2: RCA Direct Drive

#### Specifications

max. Output Voltage Fix / Variable	7 V RMS
Output Resistance Fix / Variable	300 Ohm
Signal to Noise Ratio	- 120 dB → variable Output / 2 V /
Frequency Rseponse	10 Hz – 200 kHz / - 1 dB
THD + Noise	> 0.002 %

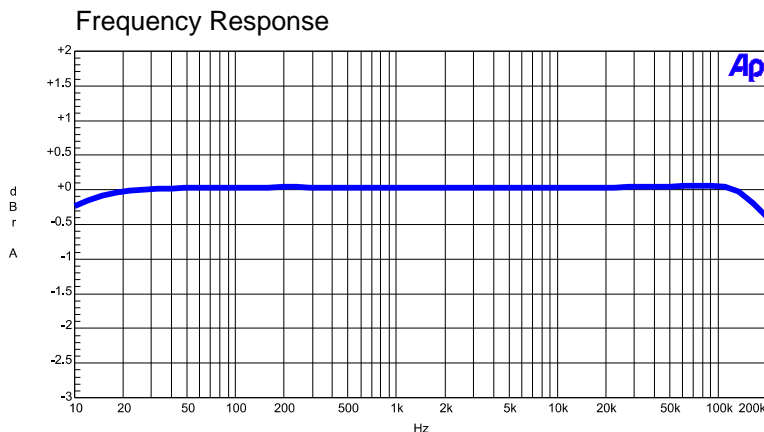
#### The Regulated RCA OUT Output of the OUT 2-Module

The OUT 2 Module comprises a single-ended line preamplifier stage. This preamplifier is able to drive an power amplifier or an active speaker direct via RCA connection. The gain of this stage is adjustable in two steps to match the level to the efficiency of the amplifier or loudspeaker.

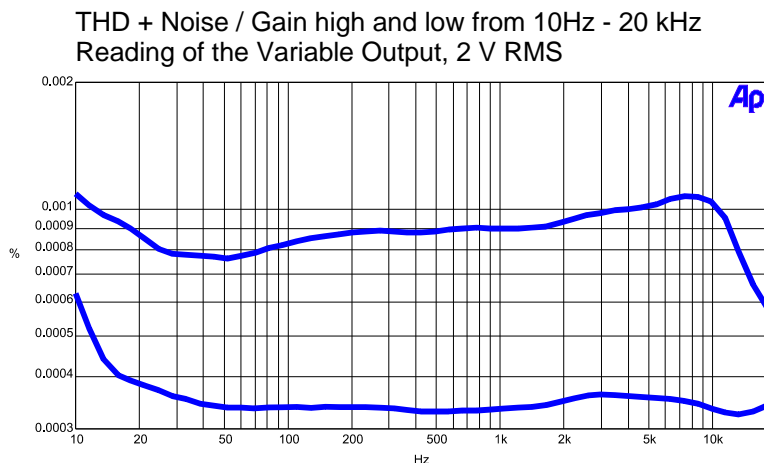
#### Unregulated, FIX Output

The FIX Output is recommended for the RCA connection of preamplifiers and integrated amps. The average output level is the same value as that of a CD Player. The regulated and the unregulated Outputs are both muted during the warm up and the auto-muting phases.

**Advice:** If two components are connected to the FIX and Regulated Outputs at the same time, there may be a degradation of the sound when the unit connected to the FIX Output is switched OFF. If the FIX Output is not selected by the connected unit, there also may be a degradation of the sound or lLevel on the signal of the regulated output. If this problem occurs, the component connected to the FIX Out should be disconnected from the Phono Module.



The Frequency Response of the Regulated Output Amplifier is flat far beyond the audible range.

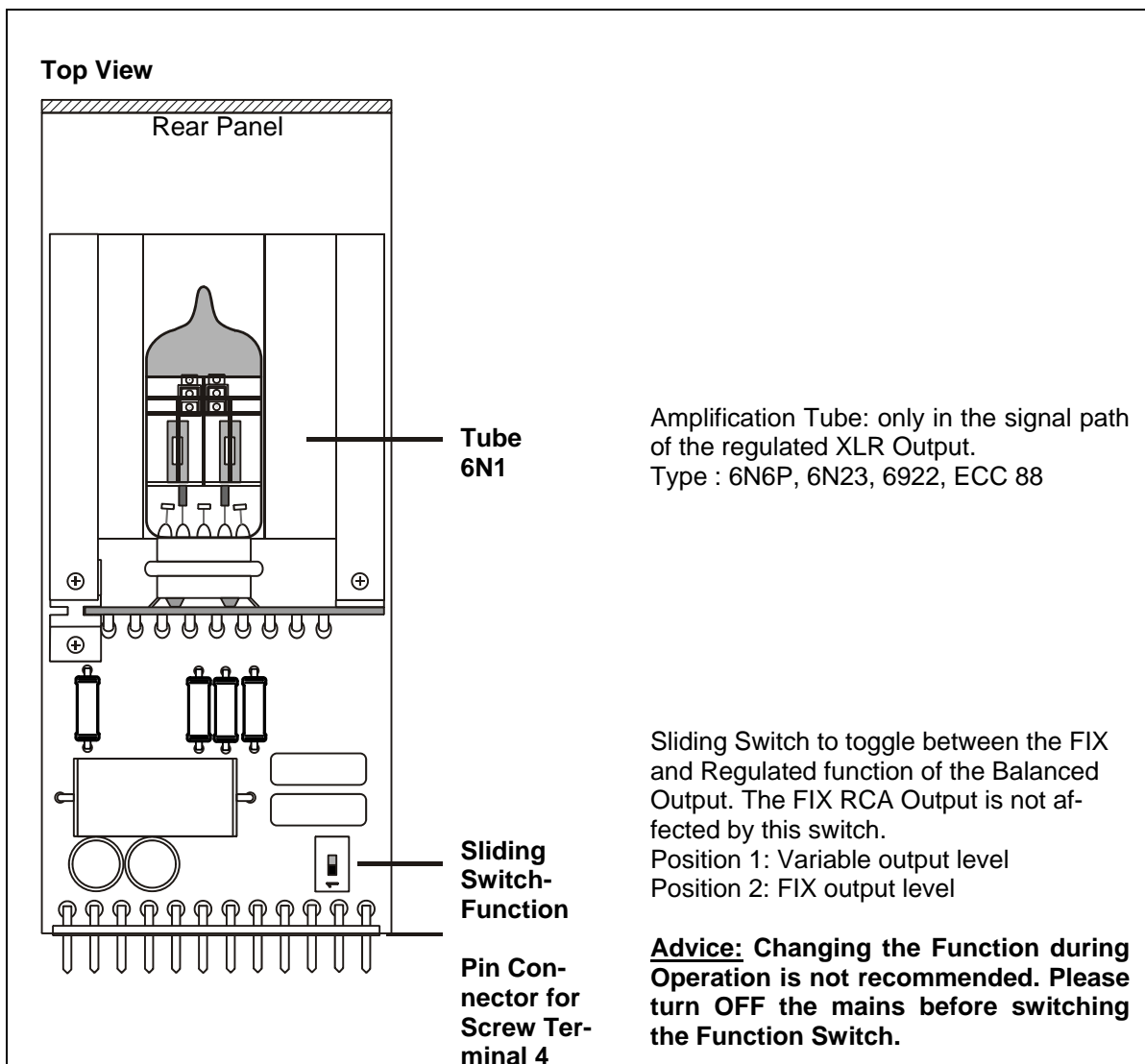
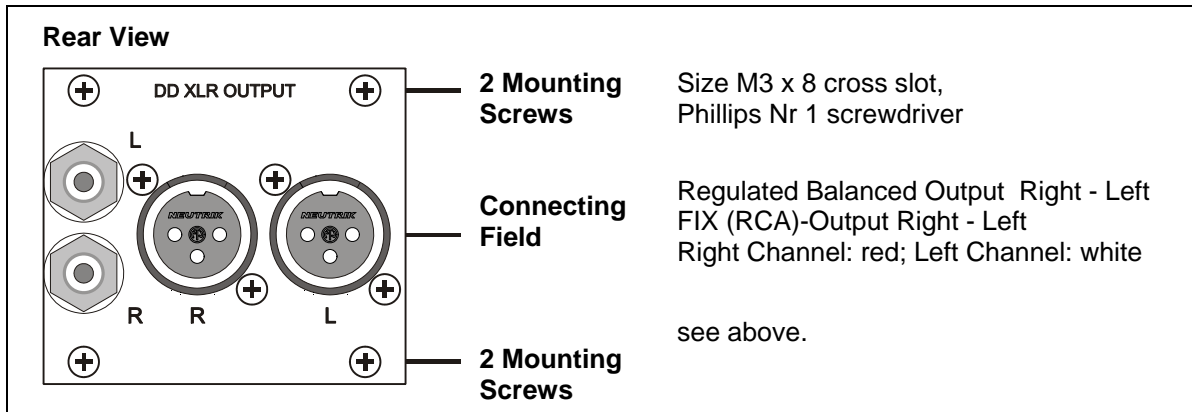


Upper Graph: Gain high  
Lower Graph: Gain low

The distortion is extremely low and remains nearly constant in the audible range.

## 6. OUTPUTS

### 6.3. Output OUT 3: XLR Direct Drive (DD)



## 6. OUTPUTS

### 6.3. Output OUT 3: XLR Direct Drive DD

#### Specifications

max. Output Voltage Fix / Variable	7 V RMS
Output Resistance Fix / Variable	300 Ohm
Signal to Noise Ratio	- 120 dB → variable Output / 2 V /
Frequency Rseponse	10 Hz – 200kHz / - 1 dB
THD + Noise	> 0.02 %

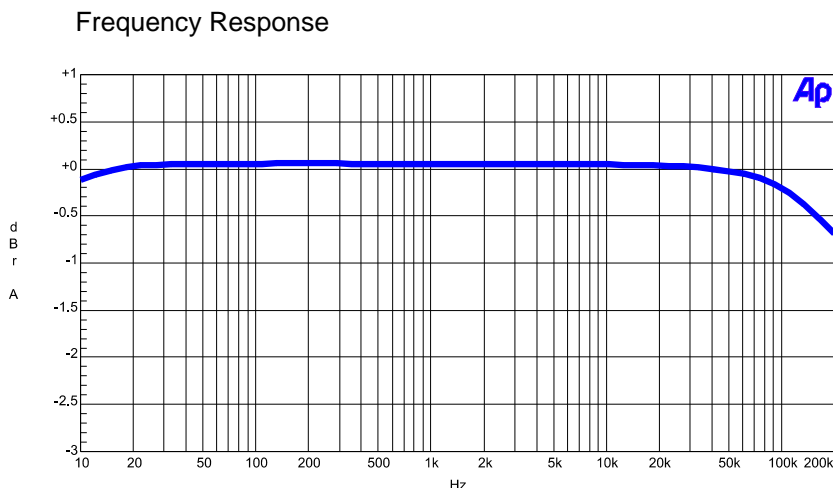
#### The Regulated XLR Output of the OUT 3-Module

The OUT 3 Module comprises a balanced line preamplifier stage. This preamplifier is able to directly drive a power amplifier or an active speaker via the XLR connection. The function of this stage is switchable between the Regulated and FIX level. The XLR Output Module can therefore be used for driving balanced power - and preamplifiers. The gain of this Module is also adjustable, but this should be left to a qualified technician, and instructions in this regard are not described in this Manual.

#### Unregulated, Fix Output

The FIX Output is recommended for the connection of preamplifiers and integrated amps via RCA. The average output level is the same value as a CD Player. The regulated and the unregulated outputs are both muted during the warm pp and the auto muting phases.

**Advice:** if there are two components connected to the FIX and Regulated Outputs at the same time, there may be a degradation of the sound if the unit connected to the FIX Output is switched OFF. Also, if the FIX Output is not selected by the connected unit, there may be a degradation of the sound or level on the signal of the Regulated Output. If this problem occurs, the component connected to the FIX Out should be disconnected from the Phono Module.



The Frequency Response of the Regulated Output Amplifier is flat far beyond the audible range.

## 7. TROUBLESHOOTING

### ■ Hum and crackling

Hum in an audio system is often caused by several system components being grounded individually. It is particularly common with tuners, VCRs or satellite receivers, where the grounded antenna cables cause a hum loop with other grounded units. Power amplifiers are normally grounded. Removing the ground on your mains plugs is not a solution. You can isolate the antenna ground connection with a special signal isolator. Such a device has no adverse affect on the sound or picture quality of tuners or TVs.

**The Phono Module is not grounded and therefore cannot cause ground loops.**

### ■ Clicks and pops

Older fridges and 12 V halogen lamps can cause cracking through the loudspeakers when they are switched on and off.

Solution: The only solution is to use a single power socket board for your entire system and to use a different power outlet in your listening room.

### ■ Channels are not balanced

Check that the RCA plugs are a tight fit. Bend the outer ground contact inwards slightly if necessary. Sometimes the internal pin in a RCA plug may not be a tight enough fit, in which case you should change either the interconnect or the socket.

1. Damaged cables and poorly fitting RCA plugs can create resistance in the signal path, enough to reduce the output level of one channel.

Solution: Try new cables or clean plugs and sockets with isopropyl alcohol. You could also try cleaning or contact fluid.

2. A faulty tube can cause a drop in output in one channel and generate distortion. Although a rare occurrence, the heater inside the particular tube may be the cause of the problem.

Solution: Replace the tube.

### ■ Increased Noise on one channel

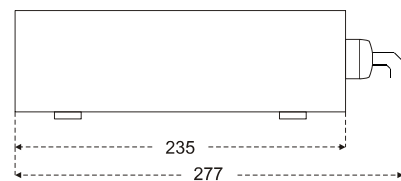
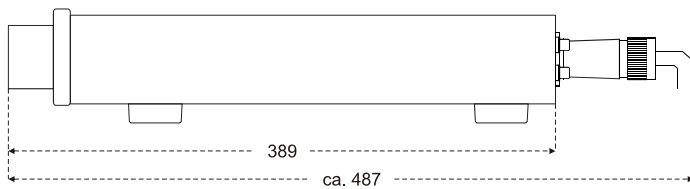
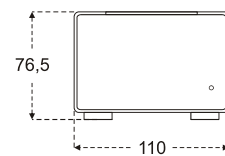
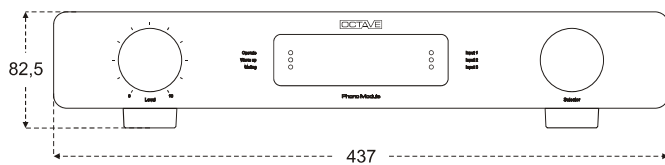
Noise that varies in level is a sign of a faulty or worn driver tube.

Solution: Replace the worn tube.

## 8. GENERAL DATA AND DIMENSIONS

### General data:

Power Consumption	35W
Weight Phono Module	7kg
Weight Power Supply	3 kg
Dimensions	
Phono Module	437 x 83 x 487 mm (W x H x D)
Power Supply	110 x 76.5 x 277 mm (W x H x T)







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