

operating instructions

# Mono poweramp EVOLUTION M2



**AVM**  
NEXT GENERATION

**Dear customer,**

thank You for purchasing this AVM product. You own now a versatile, excellent sounding hifi component. Before enjoying music, please read this manual carefully. After that You will know how to use Your new AVM component in the optimal way.

Sincerely Yours

Your AVM-Team

## **Declaration of conformity (for EC only)**

We herewith confirm, that the unit to which this manual belongs fulfills the EC rules necessary to obtain the sign



the necessary measurements were taken with positive results.

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<b>Table of contents</b>	<b>page</b>
<b>Preamble</b>	<b>2</b>
<b>Table of contents</b>	<b>2</b>
<b>1. Basic information</b>	<b>3</b>
1.1 Technical highlights of the M2	3
1.2 Basic principles of construction	3
1.3 Details about the circuitry	4
<b>2. Operation of the M2</b>	<b>6</b>
2.1 Overview	6
2.2 Placement and cooling	7
2.3 Power supply and initial check	7
2.4 Selecting operation mode	7
2.5 Connection to the preamplifier	8
2.6 Connection to the loudspeakers	8
<b>3. Cleaning</b>	<b>9</b>
<b>4. If something doesn't work.....</b>	<b>9</b>
<b>5. Conditions of warranty (EC only)</b>	<b>10</b>
<b>6. Technical data</b>	<b>11</b>

# 1. Basic information

## 1.1 Technical highlights of the M2

- extremely short signal paths for quick reaction. Rise- / fall times below 1 microsecond.
- RCA-cinch inputs as well as balanced XLR inputs. Fully insulated gold plated speaker terminals.
- two independent power supplies for driver and power stages make the circuits free of influences from load. drive capability down to 1 Ohm load.
- soft start circuitry avoids large current peaks when switching on.
- 300 VA power transformer, over 35.000 microfarads of capacitance, extremely fast rectifiers make a stable, quick power supply with huge reserves for powerful bass reproduction.
- protection circuitry against DC, overheat and short circuit ensure trouble free operation.
- automatic switch on and switch off circuitry makes the mono amps easy to use.
- environment friendly 3 watts stand by power consumption.

## 1.2 Basic principles of construction

A musical/physical guide to circuitry design

In the true physical sense audible music is comprised of variations in air pressure, regardless of space, that are converted by the ear and brain into a listening experience. Over- and under pressures alternate whereby, when observed over a long period of time, the energy produced by the over- and under pressures exactly balance. This means that there is symmetry with regard to the normal air pressure present in a quiet space.

Circuitry that amplifies the electronic image of music (AF signal) should therefore be so constructed that the symmetry of the music signals described above perfectly matches. The ideal topology of circuitry is therefore symmetrical to its electrical ground.

Besides the symmetry described above there is a second type of circuit-symmetry. This is achieved by the use of two amplifiers. One branch transmits the music signal, the other the electronic mirror-image of that signal. The English terminology "balanced" describes this type of circuitry very well, the common German term "symmetrical" is misleading. Acoustic pressure does not exist as a mirror-image, the pressures would equalize themselves out and there would be silence. Concerning musical transmission there is no real requirement for "balanced" signals unless you wish to eliminate interference along the transmission path, or compensate distortions (pre amplifier, long cabling).

It is quite normal to find relatively high signal levels in a power amplifier. Through consistent mechanical assembly (supply unit) significant disturbing influences of the music signal do not occur. A well manufactured circuit produces such minor distortion that, even from this point of view, a balanced circuit to amplify both the signal and its mirror-image is not necessary.

Pre amplifiers have to process high-impedance signals mostly at low level. There a "balanced" circuitry design can offer advantages. This problem does not exist with power amplifiers. Here a "balanced" circuitry assembly would even produce very grave disadvantages. A simple theoretical experiment helps to explain this. The output stages of a "balanced" power amplifier deliver the music signal to one of the loudspeaker connections. The second, on the other hand, is supplied with the electrical mirror-image.

To understand what that means for the individual output stages you can divide the voice coil into two equal portions, each possessing half of the total impedance. Because both are connected in series this arrangement gives, in our experiment, exactly the total impedance of the loudspeaker. Therefore when one output stage supplies positive voltage to the loudspeaker the other is providing an exactly equivalent negative voltage. At the point where both parts of the voice coil are connected, the signals compensate each other exactly. From this you can envisage that this point is "ground".

If we now look at the arrangement in a different way the result is that each of the output stages work on a load that exactly makes half of the loudspeaker impedance and is grounded at the other end. The consequences of this: The damping factor is halved, distortion increases and the slew rate can deteriorate.

To achieve optimal musical quality in the essential series power amplifiers we use a circuitry concept that is constructed in symmetry to "ground" but works "unbalanced". A damping factor of over 500 from DC up to and exceeding 10 kHz and complete load stability, even with critical loudspeakers, are two of the essential pre conditions required for the perfectly natural music reproduction that our power amps produce.

People who concern themselves with music know that the human ear reacts much more sensitively to signal falsifications than any measuring instrument. One of these falsifications occurs when an amplifier operates too slowly: An insufficient slew rate leads to erosion of the edges of the signals. The human ear orientates itself on the first wave front (in other words the first rising edge of an impulse) to locate the source of sound. Amplifiers with insufficient speed very often produce an unprecise image and some instruments do not produce clarity. To avoid this only an extremely fast cascode technique, current control and field effect transistors (FETs) in the output are considered.

Fast circuits can also cope far better with a second form of signal falsification: Harmonic distortion. Instruments produce their tonal quality through the harmonics that exist alongside the fundamental tone. These harmonics are responsible for ensuring, for example, that we can instantly distinguish the tone of a flute from that of a trumpet.

If an amplifier produces such distortions then they are not as harmonic as their name suggests. This has to do with the fact that the amplifier must reproduce signals simultaneously from several instruments. Besides harmonic waves in octave bands (distortion) there also arise blends of sound (intermodulation) that sound inharmonic and disturb the enjoyment of the music. Especially the high frequency distortions sound unpleasant to the ear because the height of tone has separated itself unnaturally from the original signal and is therefore instantly identifiable.

Can it really be said that a distortion-free amplifier is musical? Experience has shown us that this is not so. A certain level of artificially produced harmonic waves, correctly composed helps the ear to identify instruments better and results in a much more lively sound. This is related to the fact that when listening to music from a hi-fi unit the support afforded by visual impressions is missing. For this reason a visit to a concert provides a genuine live experience - even when your point of listening doesn't provide optimal acoustics.

With due regard to its almost distortion free circuitry and following extensive periods of aural testing of the essential series with different loudspeakers we have enhanced the quality of listening by installing "musical" distortion characteristics which almost approach the ideal of "live performance" - regardless of the model of loudspeaker.

### **1.3 Details about the circuitry**

The M2 has two separate supply units with discrete, independent transformers. One transformer exclusively supplies the input- and driver stages as well as the protective circuitry. The second is solely responsible for the delivery of power to the output stage.

The toroidal transformer of the main power supply unit can deliver a continuous power output of 300VA and contains two galvanic separated windings. One transformer winding is responsible for the positive, the other for the negative supply voltage. The total available capacitance of the M2 exceeds 35,000  $\mu\text{F}$ . The extravagant construction of the power supply components and the high filter capacitance of the voltage supply ensure that even complex signals, large phase shifts and low-impedance loudspeakers do not detrimentally affect the exactness and low disturbance levels of the input- and driver stages through reactions from the power section. The mono amp retains its well balanced and permanently well defined sound impression under all prevailing conditions.

A highly precise, extremely fast operational amplifier is installed in the input. This input receiver is responsible for impedance conversion and the conversion of balanced signals (received through the XLR-socket) into unbalanced signals. At the same time it raises the signal level by 6 dB.

The subsequent power amplifier circuitry incorporates at the front end two "mirror image constructed" differential stages, the bias of which is stabilized by current sources with extremely high internal impedance. The subsequent current mirrors and cascode stages ensure extremely fast reaction because, in contrast to simple voltage boosters, they are completely immune to stray capacitance. This permitted to incorporate a ground plane in the pc-board without suffering loss of speed. The ground plane disconnects the individual amplifier stages by absorbing their stray fields. In this way it was possible to exclude unwanted mutual influences which provoke parasitic oscillations. To support this the supply voltage was stabilized at strategic, important points through electrolytic/film capacitor combinations.

Together the output FETs have a current delivery capability of over 50 Amperes. TO-220 types were deliberately chosen (internally they use the same chip as the mechanically somewhat larger TOP-3 housing) because a very good electrical contact is provided by the existing metal tag when screwed to the heat sink.

This makes it possible to directly connect the filter capacitors to the heat sink thereby optimally providing the FETs with low impedance current directly through the casing. This eliminates the need for cable runs or conducting paths between the electrolytic capacitor and FET. Furthermore an excellent thermal coupling between the FETs is assured by the absence of the otherwise usually incorporated mica insulators. All FETs are selected with a tolerance of +/- 5mV to provide optimal current distribution.

The optimal circuit layout, allows very short signal paths between the circuit board and speaker terminals. This results in extreme damping factors which are necessary to control the loud speaker and architectural acoustics. The damping factor of a power amplifier controls the tone of a loud speaker - not just through attenuation of oscillations of the speaker itself.

Just as important is the ability to absorb the acoustic energy that is reflected back from the room to the membrane of the speaker. Namely loudspeakers are, in complete reversal of their principle of operation, at the same time microphones.

The acoustic energy that occurs in the vicinity of room resonance can be attenuated if it is absorbed by the amplifier. Audio tests have shown that the high damping factor of the essential mono makes it very capable of minimizing room resonance. The bass reproduction remains extremely controlled and clear, even to the deepest bass tone.

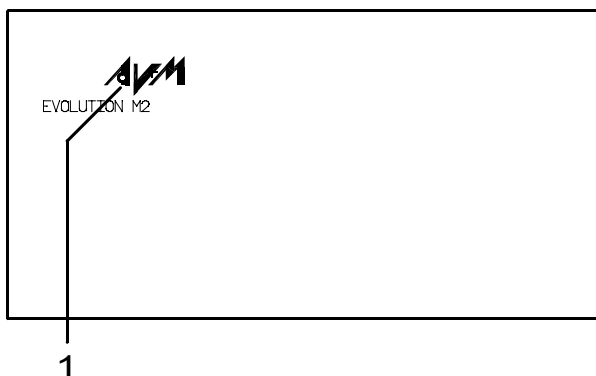
Safety circuits against overheating, short circuit, direct voltage and extreme ultra sonic frequencies ensure that should such faults occur your amplifier and any loudspeakers connected to it are reliably protected.

## 2. Operation of the M2

**A first request:** Please follow the instructions stated in this manual in their given sequence before you initially take this equipment into use. In this manner you will get to know all the capabilities of your amplifier and reduce faults through self-made operating mistakes. In the text you will find a number behind the names of the individual controls. These refer to the numbering of the following drawings:

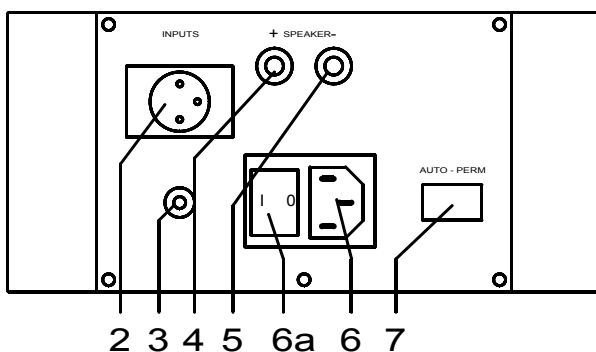
### 2.1 Overview

#### Front panel



- 1 control LED, glows in stand by, lights up when operating

#### Rear panel



- 2 Balanced XLR input  
3 RCA-Cinch input  
4 Speaker terminal "+" (red)  
5 Speaker terminal "-" (white)  
6a, 6 Mains switch with mains connector  
7 Mode selector "auto / permanent"

#### Connection of the balanced XLR- input (pin numbers are printed on the socket)

- 1 Ground shield  
2 Signal – plus  
3 Signal – minus

## 2.2 Placement of the unit / cooling

The M2 can warm up considerably - depending on the required output power. It is therefore very important that air circulation is possible to both the sides and underside of the unit and that heated air can vent upwards. This will allow good heat dispersion. Locate the M2 in such a way, that a minimum of 10 cm free space is maintained around the unit to any other equipment or walls. If the unit is placed on a carpet you should ensure that the feet do not sink into the pile (if necessary place blocks underneath) and that air vents are not sealed by the pile of the carpet. Please also ensure the unit is protected from direct sunlight.

### A TIP

It should also be remembered that heat sensitive objects such as candles, plastics, records or CD's may be damaged by the generated heat. The installed transformers emit magnetic stray fields. To prevent interference you should under no circumstances place the M2 either directly on or near the pre amplifier or record player.

### NOTE

**Great care should be taken to ensure that small children do not burn themselves by accidentally touching the Mono amp. The casing does not feel extremely hot to adults but small children generally react more sensitively.**

## 2.3 Power supply and initial check

Do not connect your loudspeakers when taking the unit into use for the first time. Set the mains switch (6a) to "0", set the mode selector switch (7) to "auto", and leave the inputs open. Connect the power supply socket (6) with a cable to the mains and set the mains switch to "I". The control LED (1) glows. The unit is now in "stand-by" mode. Operating voltage is only being supplied to the automatic start up circuitry. The remaining amplifier circuitry is without power.

Set the mode selector (7) to "perm". Now the LED (1) lights up. At this moment you will hear clicks in short succession from the switching relays of the supply unit and speaker output. The amp is activated. When this initial check is passed, switch the amp off.

## 2.4 Selecting operation mode

The incorporated automatic start circuitry relieves you of switching the Mono amp on and off when the mode selector (7) is set to "auto". For this the main supply switch (6a) must always be set to "I". Your M2 then switches on automatically as soon as the pre amplifier delivers musical signals and off when the pre amplifier has not delivered a signal for more than 5 to 10 minutes.

If you wish to switch the M2 personally on or switchable mains sockets are used you can set the mode selector (7) to "perm" and activate the unit with the main supply switch.

### NOTE

**If the M2 is in stand-by mode and the automatic start circuitry is activated, the device is not completely separated from the mains supply. To protect your unit from damage during a thunderstorm or prolonged absence, it is recommended that you disconnect the mains plug (6).**

## **2.5 Connection to the pre amplifier**

Your M2 is equipped with both an RCA-cinch (3) and balanced XLR input socket (2) which can be used as desired. Merely connect the pre amplifier with the relevant cable. The input resistance of the essential mono is 10 kOhm and its sensitivity is 1.25 V. These are suitable values for all pre amplifiers.

The output resistance of your pre amplifier, together with the capacitance of the cable leading to the mono amp, form a low pass. When selecting your cable (particularly for long connection paths) you should choose the lowest possible pre amplifier output resistance and lowest cable capacitance to allow non-influenced transmission of the high frequency portions of the music signal.

## **2.6 Connection to the loudspeakers**

Only use loud speaker cable of good quality and with sufficient diameter to connect your loud speaker to the output clips (4, 5). In case of doubt ask your dealer for the optimal cable for your loud speaker. Take care of the correct polarity when connecting. The red marked output clip (4) of the M2 must be connected to the red loud speaker clip or marked with a plus sign. Right and left channels must be the same polarity.

### **TIPS**

If you are using banana plugs secure the outer parts of the sockets (by clockwise turning) before inserting the pin. This will prevent rattling. On delivery you may find that plastic plugs cover the 4mm holes of the loud speaker clips. These can be removed with a thin screwdriver. To be able to fully appreciate the tonal qualities of the 2 you should place the unit as close as possible to the loudspeaker. In this way extremely short paths between the power amplifier and the loudspeaker, for the transport of electrical power, are achieved. This saves you not only expensive loudspeaker cable but also makes the reproduction insensitive to influences from the cable.

There are loud speakers that react through a short cable with tense, although weak, bass tones. This results from long cables being used during the development of the loud speakers. You might say the cable is a component of the frequency-dividing network and therefore responsible for the tone. This type of loud speaker is best operated through long cables. In case of doubt ask your dealer.



### 3. Cleaning

The surface and printed text on the casing is largely scratch resistant. The casing may be cleaned with a mild soap solution or spirit based glass cleaner (use economically) and a soft lint free cloth.

#### NOTE

**Care should be taken during cleaning to ensure that no liquids can ingress into the casing. It is advised for safety reasons to remove the power cable from the electrical supply before cleaning the casing with a damp cloth. Do not use solvents or abrasives for cleaning. This could damage the surface.**

### 4. If something doesn't work...

Some suspected defects of the equipment are very often found to have been caused by faulty operation. Before you consult us please check the functioning of your mono amp according to the following checklist:

#### Loudspeakers remain inoperative

- Test initially whether the pre-amplifier and the selected signal source are operating correctly. This is best achieved by checking the functioning of the pre-amplifier with head phones. Remember to remove the head phones jack after use, otherwise the pre-amplifier will not emit a signal.
- Ensure that there are no breaks or short circuits in the signal cable between the mono amp and the pre-amplifier.
- Test the connecting cable between the Mono amp and the loudspeaker for a short circuit or break.

#### The amp switches while listening to music from OPERATE to STAND BY.

- If this should occur then one of the protective circuits (over heating, short circuit, ultra sonic or DC) has functioned. To ascertain the error proceed as follows: Switch off the M2 at the mains supply switch (6a) and wait for approx. 5 minutes. If the Mono amp can then be switched on correctly following this, the error was caused by overheating. If this is the case check whether you are fulfilling the conditions for location and cooling of your unit which have been described earlier in this manual.
- If the Mono amp switches on for only a few seconds and then reverts to STAND-BY then there is a short circuit in either the loudspeaker cable or in the speaker itself. This must be rectified before the unit is taken into use again. A further reason could be excessive direct voltage that is emitted from a (possibly defective) pre amplifier which disturbs the functioning of the M2.

#### After switching off the pre-amplifier the amp does not automatically switch to stand by (after approx. 5-10 min.) although the mode selector (7) was set to "aut".

- Check whether a low humming or chirping noise is heard from the loud speakers after switching off the pre-amplifier. If this is so then scattering emissions within the cable are interfering with the automatic switch-on circuitry. This is interpreting the interference as a music signal and reacts by not switching off the amp. Remedy: Place your cable so that no further interference is experienced. With balanced cables this fault can also arise from an error in the pin setting.

#### Humming during music reproduction

- This is mostly caused by a ground loop through the antenna amplifier or postal cabling. Check if the humming stops following removal of the aerial cable from the tuner (and, if connected, the TV set and video recorder too). If this is successful then fit a ground breaking filter to the aerial cables of these receivers. (Your dealer will supply).
- The shield of the AF-cable is interrupted, the cinch connector has poor ground contact. The use of a balanced cable with wrong setting.

## 5. Conditions of warranty (EC only)

If despite expectations a defect occurs that cannot be repaired by yourself or your dealer, we undertake the repair of your unit free of charge for up to two years from date of purchase. The warranty covers the costs of material and working time, transport costs are to be borne by the owner.

Provisions for this warranty are:

- The unit must have been purchased from an authorized dealer. Equipment from other sources will not be repaired, not even at charge.
- The warranty registration card, together with a copy of the bill of sale, must be received by us within four weeks of the date of purchase.
- The defect must not have been caused by improper handling or misuse.
- **Return the unit to us only in its original packing. If this is not possible we are entitled to refuse acceptance. We will not assume responsibility for transport damage under any circumstances.**
- **A short description of the defect is to be included with the returned unit.**
- **In cases of doubt we reserve the right to request a copy of the bill of sale.**
- **We also reserve the right to levy a handling charge for items returned without good or valid reason, or if the unit proves to be not defective.**

### NOTE

If you are returning the unit from a country other than Germany you should ensure that correct export documents are obtained. We cannot accept any charges for costs arising from improper or incomplete export documentation.

If you have purchased your unit from a dealer outside Germany please refer to him or the relevant importing firm to process the warranty.

## 6. technical data EVOLUTION M2

### inputs

sensitivity RCA cinch	1,1 Volts/5 kOhms (270 W / 4Ohms)
sensitivity balanced XLR	1,1 Volts/10 kOhms (270W / 4Ohms)

### output

power output in 8 Ohms	160 Watts
power output in 4 Ohms	270 Watts
power output in 2 Ohms	380 Watts
intermodulation 25 W/4 Ohms	<0,01 %
THD 25 W/4 Ohms	<0,005 %
S/N ratio 25 W/4 Ohms	>100 dB (A)
frequency response	<0,3 Hz - >400 kHz
load bandwidth 25 W/4 Ohms	<0,3 Hz - >400 kHz
rise time into 4 Ohms	<1 $\mu$ s
damping factor	>500 (1 kHz)
<b>power supply</b>	AC 230 Volts / 50 Hz / 300 VA (standby 3 VA)
<b>dimensions</b> (W x H x D)	210 mm x 105 mm x 285 mm
<b>weight</b>	8 kg

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We reserve the right to amend technical details and fittings in case of product improvements.