# ATOHM®

# USER MANUAL S500 & S250 MK2-X





Congratulations on your purchase of an Atohm product.

A great deal of effort has gone into designing and manufacturing this product to the highest possible standards to suit your requirements, whether it be for your stereo, multichannel, hi-fi or home theater system. Our products are renowned for their exceptional performance and unrivaled reliability. We are sure that they will provide you with complete satisfaction for many years to come.

# TO BE READ BEFORE ANY USE



## **PRECAUTIONS, WARNINGS:**

## Explanation of safety symbol :



The lightning bolt inside an equilateral triangle is intended to warn of the presence of high voltage inside the device, with a value sufficient to present a risk of electrocution.

The exclamation point inside an equilateral triangle is intended to warn of the existence of important instructions mentioned in the

user manual regarding the use and maintenance of this product.

Before installing your subwoofer, it is imperative to carefully read this manual. Follow and keep these instructions. Respect the warnings. If you are unsure about the connections to be made, consult your dealer :

- Do not expose to moisture (dripping, splashing) and do not insert foreign objects into the device.
- Do not use near a heat source (heating radiator, etc.).
- If the power cord does not fit perfectly into your electrical outlet, consult an electrician and replace the outlet. The power cord should not be able to be stepped on, crushed or pinched. The mains socket must stay accessible at all time.
- Do not overload wall outlets, power strips or extension cords as this may cause fire or electric shock.
- Turn off the unit when not in use (Rep 1). In case of thunderstorm or long absences, make sure to unplug the power cord (Rep 3).
- This amplifier module is equipped with a Class 1 protection. This means that it must be connected to the ground.
- Only connect the device to the type of power indicated on the device's screen printing or specific label. If in doubt, consult your electrician or the retailer of your device.
- Ventilation: Make sure the front of the amplifier is always in «open air» (do not cover, do not enclose in furniture...).
- Never remove the amplifier module rear cover when it is powered on (risk of electrocution). In case of technical problems, contact your retailer and/or a competent technical service.
- Fuse: the device does not contain a simple interchangeable fuse. In case of complete malfunction, contact your retailer and/or a competent technical service.
- Never connect an output terminal/wire of the module to ground/chassis.
- Never manipulate switches (Rep 3) and (Rep 4) when the power switch (Rep 1) is On. <u>Always do it when it</u> is OFF.
- Cleaning, maintenance: The module requires no particular maintenance. Only use a soft, non-fluffy, dry cloth (such as «microfiber») possibly slightly moistened with a alcohol glass cleaner. Never use solvents or detergents.
- Do not use accessories other than those provided with the device or explicitly recommended by the manufacturer.
- Transportation: When a cart is used, be careful when moving the device to avoid tipping over and injury.
- Do not leave packaging bags within reach of children, as there is a risk of suffocation.

# In the case of failure to observe the precautions for use, the manufacturer's warranty will be immediately canceled.

## Note about X-GUARD<sup>™</sup> active excursion control.

The X-GUARD<sup>™</sup> excursion control ensures that the excursions of the bass drivers never exceed an absolute limit (preventing too high distortion and any risk of damage). This excursion control device constantly compares the input signal and its parameters (including frequency/amplitude) to a specific 'set point'. When the signal becomes greater than the set point, it immediately intervenes to limit the signal amplitude without inducing audible artifacts.

Unlike a classic subsonic filter, X-GUARD<sup>™</sup> preserves the signal integrity and phase, and does not induce group delay while providing much more effective protection for the speakers. Its presence is undetectable in any measurement when it does not intervene on the signal. This technology allows the full dynamic range of the bass drivers to be exploited without putting them in danger.

In theory, the "set point" should be precisely adapted to each system according to the speaker and load used. This is what we do for our subwoofers and the kits we offer. In practice, to make this device compatible for a wide range of uses, we have equipped our modules with 12 settings, including 6 internal ones.

## Note about U-GUARD<sup>™</sup> clipping control

The U-GUARD<sup>™</sup> device aims to reduce the formation of square signals (clipping distortion) at the output of the device and to avoid saturation of the power stages at maximum power. When the signal exceeds the set threshold, U-GUARD<sup>™</sup> limits the formation of harmonics. This is particularly important for subwoofer applications, as the harmonics (odd order) created by clipping are located at higher frequencies and make the subwoofer(s) perfectly locatable. The process is calibrated so that the power stages are never fully saturated. Unlike some circuits placed in a feedback loop, U-GUARD<sup>™</sup> intervenes from the first rising edge, maintaining a signal shape that is closer to the original and more pleasant-sounding to the ear.

## **CONTROL PANEL :**



- 1- Main power On/Off switch
- 2- Power socket (cable provided)
- 3- X-GUARD adjustment switch
- 4- EQ adjustment switch
- 5- Filter slope switch: 24dB/oct -12 dB/Oct LFE
- 6- 0-180° phase inverter
- 7- High cutoff frequency potentiometer (40 to 150 Hz)
- 8- Input level adjustment potentiometer (volume)
- 9- Power-on indicator light
- 10- Left and right low-level inputs
- 11- Left and right high-level (speaker) inputs
- 12- XLR input
- 13- Rear cover fixing screw
- 14- Power outputs



(Provided accessories: 1 power cord / 1 set of 80cm speaker cables / 10 screws 4\*25mm type «pozidrive»)

## **INTERNAL ADJUSTMENTS**

Internal adjustments require removing the cover of the device. Therefore, the device must be turned off and the power cable must be disconnected.

Using a Pozidrive 1 screwdriver, unscrew the 2 cover fixing screws (Rep 13). Then, tilt the cover to the side to access the adjustments on the preamp board located on the top of the device. Use a Brucelle pliers if necessary to remove and place the jumpers on the desired positions (pins).

Pins P5 and P4 relate to the setting of the sealed mode (sealed mode 1 or sealed mode 2).

Pins P1, P2, P6, P7 relate to the setting of the X-GUARD action frequency (X25-X30 and X35).

Pins P3 and P8 relate to the setting of the X-GUARD action amplitude (amplitude 1 and amplitude 2).

<u>Important note 1</u>: Always ensure that the jumpers are properly positioned «riding» on 2 pins and not just one only. Check this before replacing the cover.

**Note 2 :** When reassembling the cover, make sure to tighten the 2 screws (Rep13) moderately. Once the module is installed and screwed onto the cabinet, check and, if necessary, slightly tighten these 2 screws.

#### CLOSED/SEALED Enclosure mode 1 and 2 / LINEAR mode

The 2 closed modes are intended to extend the response to very low frequencies of the speaker(s) mounted in **a closed/sealed enclosure**. It is not a simple boost but an equalization by transformation. The choice of mode 1 or 2 is made by internal adjustment.

CLOSED mode 1 provides maximum compensation. In principle, it is intended for closed-type enclosures with a very low ratio of load volume/speaker diameter.

CLOSED mode 2 provides intermediate compensation. In principle, it is intended for closed-type enclosures with a more balanced ratio of load volume/speaker diameter.

The closed mode is activated when the EQ selector (Rep 4) on the front panel is in the «CLOSED» position. The choice of compensation type «1» or type «2» is made by internal adjustment with the P5 and P4 series jumpers.

The LINEAR mode (EQ selector Rep 4 on the front panel) is intended for all bass-reflex enclosure, transmission line, band-pass or with active- passive speakers design.

### X-GUARD mode

X-GUARD<sup>m</sup> is designed to limit excursions at very low frequencies of the speaker(s) used. The choice of frequency and amplitude is made by internal adjustment.

AMPLITUDE 1 provides maximum limitation amplitude. In principle, this setting is intended for <u>ported type enclosures</u> where the speaker(s) is no longer «held» (as in free air) below the enclosure tuning frequency.

 $\label{eq:amplitude} \begin{array}{l} \mathsf{AMPLITUDE~2} \ \text{provides intermediate limitation amplitude. In principle, this} \\ \text{setting is intended for } \underline{\mathsf{closed-type~enclosures}} \ \text{in which the speaker(s) is "held"} \\ \text{down to the lowest frequencies.} \end{array}$ 

The amplitude choice is made via pins P3 and P8. The AMPLITUDE 1 mode (maximum) is obtained by leaving both jumpers in place.

The AMPLITUDE 2 mode is obtained by removing both jumpers.

The X25-X30-X35 settings determine the frequency below which the device comes into action. For ported enclosures, this is roughly equivalent to the



CLOSED MODES 1 AND 2 : P4 - P5



#### X-GUARD AMPLITUDE : P3 - P8



tuning frequency of the load. For closed-type enclosures, this is roughly equivalent to the frequency at which maximum excursion is reached at maximum level.

Depending on the capabilities and behavior of the speaker(s) used at high excursion, it is possible to lower or increase the selected frequency.

X-GUARD is activated via the selector (Rep 3) on the front panel. Position «2» corresponds to nominal protection. This position will be used in the majority of cases. Position «1» reduces the limitation level by 2.5dB across the entire band. This setting can be used for speakers with very high excursion capabilities, for example. It can also be used for intermediate settings.

# <u>NOTE 1:</u> When the X-GUARD function is not used (Selector Rep 3 in the «OFF» position), we recommend setting the jumpers to «X25» and the AMPLITUDE to «2».

NOTE 2: Unless otherwise indicated, the factory internal settings are: CLOSED Mode «1», «X30», and AMPLITUDE «1».

In conjunction with our subwoofer products, the internal settings are as follows:

- VR1-X /KIT VR1-X /KIT VR2-X /KIT VR3-X /EURUS SWB: CLOSED Mode «1», «X30», and AMPLITUDE «1» (LINEAR/X-GUARD2) KIT SL1-X: CLOSED Mode «1», «X30», and AMPLITUDE «1» (CLOSED/X-GUARD2)
- GT-SW2-HD / KIT EURUS-SW-X / KIT RAFALE SL3M-X: CLOSED Mode «2», «X30», and AMPLITUDE «2» (CLOSED/X-GUARD2)

#### Associated settings (Rep 3 and Rep4)



Once the internal settings have been made, the X-GUARD (Rep 3) and EQ (Rep 4) selectors need to be adjusted by loosening the 2 screws of the sliders (Pozidrive 1 screwdriver). Tighten the screws moderately when the selectors are in their final position, making sure they do not shift to an intermediate position when tightened.

## Warning, the selectors (Rep 3) and (Rep 4) should only be manipulated when the module is turned off.





**IMPORTANT NOTE**: The accurate setting of the X-GUARD<sup>™</sup> function requires knowing the type of load, the maximum excursion of the speaker(s), and using a sine wave generator (or a series of test frequencies) to approach this maximum value at all test frequencies (typically 15-20-25-30 and 35 Hz). In the absence of this information and given the powers involved, we advise you to be cautious and to use the highest protection setting (X35). Then, through experience with sustained use and iteration, gradually lower to a slightly lower threshold (X30). Given the operating principle, the available settings, and the numerous variables of speaker/load characteristics, we decline any responsibility in case of speaker(s) damage due to incorrect settings.

## 1) CONNECTIONS

### POWER CORD AND CONNECTION

Designed with a «double insulation» architecture, your amplification module is nevertheless equipped with a Class 1 protection. <u>This</u> <u>means that it must be connected to the ground</u>. By default, it is intended to operate with a mains voltage between 220-240 V (50 Hz-60 Hz). However, it can be configured for a mains voltage of 100-110 V (50-60 Hz). Contact us to learn about the procedure.

The power cord supplied with the device is distinguished by a section (H05VV-F type 0.75MM2-3G section  $3*0.75^2$ ) with a ground connection. It must not be replaced with a smaller section cord (including the export version) or with a model that does not have a ground connection.

To optimize performance, we recommend verifying that the power outlet to which your device is connected is wired to European standards. (see diagram >>>)

**NOTE :** Complex home theater installations with multiple interconnected devices (including via HDMI connectors) can in very rare cases lead to ground loop problems. This often results in a «humming» noise in the absence of an audio signal. It may then be necessary to use an audio isolation transformer. Contact your dealer in case of such problems.



#### **SPEAKER CABLES & MODULATION CABLES**

We recommend using the speaker cable provided together with the device. These cables have fast-on connectors adapted to be connected to the power outputs (Rep 14).

The output connectors (Rep 14) of your module are not intended to be soldered. If you wish to use other types of speaker cables, the connection to the power outputs must be made through female «fast on» connectors (4.8mm ep 0.8mm).

#### \*Modifications to the board or solder voids the warranty!

The cable connection to the speaker is made by soldering. If you need to connect 2 speakers in parallel, you must ensure that the total impedance is never less than 4 ohms (minimum Rcc = 3 ohms).

If necessary, consult your dealer to obtain an additional speaker cable.



The connections to the high-level inputs are made by speaker cable. Since the input impedance is greater than 800 ohms, no power is transmitted on these cables. A section of 1 to  $1.5^2$  is therefore sufficient (however, be sure to use a flexible and mechanically strong cable).

Connections by asymmetrical RCA or symmetrical XLR modulation cables will not exceed 7 meters. Be sure to use high-quality modulation cables with braided + screen shielding.

**NOTE:** The short-circuit protection located on the power stage protects the device only against short circuits between the output terminals (+) and (-). It does not protect the device in the event of one of its terminals being connected to the chassis or ground.

## 2) STEREO CONFIGURATION

If your integrated amplifier (or preamplifier) has «pre-out» low-level outputs, connect them to the module's low-level inputs at the (L & R) outputs. If your integrated amplifier does not have «pre-out» low-level outputs, you need to connect the speaker outputs of your device to the «high level» inputs of the subwoofer's amplifier module. (This is a parallel connection to the speakers).

<u>Note 1:</u> When the module is connected via the high-level inputs, it is imperative to respect the polarity (there is a potential risk of destruction of both devices)!! It is also not recommended to connect the device simultaneously via its low-level and high-level inputs.

<u>Note 2:</u> The high-level inputs can be connected to amplifiers whose power does not exceed 150W/8 ohms. Beyond this, and in the case of (very) high volume play, it is necessary to use the low-level inputs. \* Failure to adhere to this VOIDS WARRANTY!





#### Associated settings



5- Filter slope switch: 24dB/oct -12dB/oct - LFE

- 6- Phase inverter 0-180°
- 7- High cutoff frequency adjustment potentiometer (40 to 150 Hz)
- 8- Input level adjustment potentiometer (volume)

In order to facilitate connections with any type of speaker and maximize SPL capabilities in the overlap band, your module is equipped with adjustable Butterworth filters with a slope of 12 or 24 dB/oct.

With this type of filter, a connection made at -3dB provides a summing at +3dB at the connection point. In order to linearize the response, it is always possible to reduce the cutoff frequency by one third of an octave on the subwoofer. (Example: the speakers cut off at 60 Hz (-3dB) and the subwoofer is set to 40 Hz (-3dB)).



The responses of the speakers in the low spectrum are quite variable. However, their

behavior is relatively close to that of a Butterworth-type high-pass filter or one of its variants. In general, ported speakers cut off at 24dB/oct below their tuning frequency. Closed speakers, on the other hand, cut off with a 12dB/oct slope.

As a first approximation, the following filter connections can be made:

### With closed-type speakers:

12dB filter (Rep 5) - phase inverter at 180 ° (Rep6) - depending on the speakers, cutoff frequency adjustment at -3dB (Rep7) equal to that of the speakers or up to 1/3 octave lower in frequency. Adjust the level (Rep 8) to your liking.

#### With bass-reflex / acoustic line / passive speaker(s) speakers:

24 dB filter (Rep 5) - phase inverter at 0 ° (Rep6) - cutoff frequency adjustment at -3dB (Rep7) equal to that of the speakers or up to 1/3 of an octave lower in frequency. Adjust the level (Rep 8) to your liking.

<u>Note 1:</u> Potentiometer assemblies are not entirely linear by nature. The following table gives the exact filtering values depending on the slope chosen and the position of the filter potentiometer.

	Position :	12 dB/Oct (-3dB)	24 dB/Oct (-3dB)
(7)	Mini	43 Hz	36 Hz
(r)	-15	44 Hz	37 Hz
0	-10	49 Hz	42 Hz
-5 5	-5	55 Hz	48 Hz
-10, 10	0	67 Hz	57 Hz
-15-	5	83 Hz	72 Hz
	10	99 Hz	90 Hz
Min Uz Max	15	145 Hz	139 Hz
FIZ MUX	Maxi	178 Hz	164 Hz

Note 2: The cutoff frequencies of the speakers mentioned in the

manufacturer's data are often very indicative and may be inaccurate. The position in the listening room also greatly affects the response of the speakers and the subwoofer. Therefore, it is advisable to perform tests with different settings, including at slightly higher frequencies, and to choose the one that provides the best satisfaction.

## 3) HOME CINEMA SETUP

According to the options available on the audio-video amplifier or preamplifier processor, connect the «SUB PRE OUT» output to one of the «low level» inputs or to the XLR input of the amplification module. If you want to adjust the cutoff frequency via your audio-video processor, you should set the filter slope selector (Rep 5) to the «LFE» position. In this position, the variable low-pass filter of the subwoofer is bypassed and the frequency can be adjusted via the «setup» menu of your audio-video device.



## 4) MIXED STEREO / HOME CINEMA CONFIGURATION

In this configuration, the RCA low-level inputs (L&R) are connected to the PRE-OUT outputs of a stereo amplifier or preamplifier. The XLR input is connected to the «SUB PRE OUT» output of the audio-video processor.

The volume setting should first be adjusted to correspond to the desired level when using in STEREO mode. Once the correct setting is obtained, the level adjustment for use in HOME CINEMA mode should be made from the audio-video processor.

For use in STEREO mode, refer to Chapter 1) STEREO CONFIGURATION for filtering settings.

For use in HOME CINEMA mode, switch the filter slope switch (Rep 5) to the «LFE» position. The audio-video processor then filters for the subwoofer.

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<u></u>	•	
	<u>Arma</u>	
		XLR INPUT

#### Note 1: When using in STEREO mode, the HOME CINEMA processor must be turned off.

Note 2: If the main speakers have good bass capabilities (column speakers with multiple 18cm or larger bass speakers), you can also set up your audio-video processor to indicate the absence of a subwoofer and configure the main speakers in «large» mode. In this case, there is no need to connect the «SUB PREOUT» output to the amplifier module. The LFE channel is reported on the 2 main output channels (front L and R) of the audio-video processor. It is then reproduced by the main speakers and the subwoofer. The filtering settings remain the same as in STEREO mode.

<u>Note 3:</u> The use of high-level inputs for this type of configuration is not recommended. When used for home cinema, the subwoofer is driven by the «SUB PRE OUT» output of the audio-video processor. If the module is also connected via the power outputs of the stereo amplifier, the signals received on the 2 high-level inputs mix with the LFE signal from the processor and degrade audio performance. This is particularly true if the audio-video processor filters the speakers with a high-pass filter ( «small» mode), resulting in a mix of LFE signal and filtered speaker signals!

## 5) « POWER AMPLIFIER » CONFIGURATION

It is possible to configure the modules as full range power amplifiers. In this version, only the input level adjustment (Rep 8) remains active (all other functionalities are bypassed). This mode is suitable for specific uses of our modules such as a full-range use of the module, or the creation of active monitoring speakers.

This type of configuration requires a small internal intervention by a specialist. If needed, please consult your dealer.

## 6) WARM-UP / SHUT-DOWN

The amplifier reaches its best performance a few minutes after being turned on. When uses are relatively close together, it is better to leave your device on so that it remains at a good temperature. However, at night and during periods of non-use, it is recommended to use the main switch (REP1) to turn off the device.

## 7) TECHNICAL SPECIFICATIONS AND DIMENSIONS

Model :	S250 MK2-X	S500 MK2-X
Nominal power /4ohms/20Hz to 250Hz (cold start/duration 80s)	220 Watts	500 Watts
Nominal Impédance Minimum load impédance	4-16 ohms 3 ohms	4-16 ohms 3 ohms
Frequency response	5Hz-200Hz (-1dB +/-3dB)	5Hz-200Hz (-1dB +/-3dB)
Signal-to-noise ratio (subwoofer use)	96dB (A weighted)	96dB ( A weighted)
Damping factor (8 ohms, 100Hz)	Up to 1000	Up to 1000
Total harmonic distortion (1W/8ohms)	Less than 0.1%	Less than 0.1%
Variable low-pass filters (Butterworth type)	36 to 178Hz 24dB/oct or 12dB/oct (« LFE » can be disengaged)	36 to 178Hz 24dB/oct or 12dB/oct (« LFE » can be disengaged)
Phase inverter	0 - 180°	0 - 180°
Subsonic filter :	None / X-GUARD™ technology (active excursion control)	None / X-GUARD™ technology (active excursion control)
Latency :	0 ms / analog circuits	0 ms / analog circuits
Clipping control :	Yes / U-GUARD™	Yes / U-GUARD™
	technology	technology
Protection against short circuit :	Yes	Yes
Thermal protection :	Yes	Yes
Protection against DC current :	Yes	Yes
« Soft start » delay	Yes – 2 sec.	Yes - 2 sec.
Low-level inputs :	2*RCA	2*RCA
(Impédance 16kohms)	1 * XLR	1 * XLR
High-level input :	2x4mm banana plugs	2x4mm banana plugs
(Impedance >800 ohms)	/direct clamping	/direct clamping
Power consumption :	320W max / 7W idle	700W max / 9.5W idle
Power supply voltage : set by internal jumper (factory settings)	115V/230V / 50 Hz	115V/230V / 50 Hz
Dimensions : (Including sealing rear can)	220 *190 *55 (mm)	220 *190 *55 (mm)
Weight	0.90 kg	1.2kg
Accessories provided	Power cord / 80cm speaker cables /10 screws 4*25mm « pozidrive »	Power cord / 80cm speaker cables/10 screws 4*25mm « pozidrive »





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