Gradient

REVOLUTION

USER GUIDE
Congratulations on your purchase of the Gradient Revolution loudspeakers which represent the latest in loudspeaker technology. The Gradient Revolution is handcrafted and individually tested in Finland using the best possible materials available. It will provide you with enjoyable musical experiences for years to come.

We recommend you to read this manual entirely to fully utilize the high performance capacity of your speakers.
INSTALLATION

Carefully remove the loudspeakers from their packaging boxes on the floor, on a soft surface such as a carpet.

· connecting the loudspeaker leads
Connections are on the base of the speaker. Connect the speaker cables before assembling the top part. Turn the speaker body gently to the floor (“Woofers are on this side” marking against the floor). Connect the positive lead to the red binding post of the speaker and the negative (ground) lead to the black binding post.

· attaching the feet of the loudspeaker base
The base of the speaker is equipped with adjustable feet. Attach the feet (3pcs / speaker) to the base of the speaker. Tighten the feet with nuts using a 10mm wrench. If necessary, the adjustable feet can be replaced by M6 spikes. The bottom part can then be turned upright.

· attaching the spike for the top part of the speaker
Fix the spikes to the top plate of the bottom unit and adjust the height (35 mm or 1 3/8”) such that there will be a gap of 1-2mm between the bottom and top part of the speaker. (The three black rubber pads of the top part will be laying on the spikes.) Lock the spikes with the nuts. The top part needs no tilting.
The most accurate stereophonic illusion is obtained if the listener sits at equal distances to both loudspeakers. However compared to standard speakers Gradient Revolutions, being a point sound source, can be listened to at a much shorter distance. In this case the stereo stage will be wider.

The farther from the speakers the listener goes, the more room colourations will be added to the sound. Thanks to Gradient Revolution's directivity properties it can be listened to at much longer distance without loosing the accuracy and spectral balance.

Standing waves have different amplitudes at different places in the room. This means that besides the loudspeaker placement also the positioning of the listening spot has equal importance. Near the wall all standing wave modes are emphasized and heard most effectively. When the listener moves towards the centre of the room the amplitude relationships between different frequencies will change. The lowest room mode cannot be heard at all in the middle of the room. The best listening spot will be found between the back wall and the centre of the room.

A dipole loudspeaker has features that are quite unique. When the distance between the speakers and the front wall is similar to that of the listener and the back wall, the first reflection will be cancelled at the listening place.
CORRECT PHASING

The bottom and top part of the speaker can be installed in three different ways with respect to each other. In order to guarantee the correct phasing to the listening area it is important to note that the plug of the top part is in a correct position. There are two positions to choose between.

· **basic or panel positioning**
  In this case the midrange & treble driver of the top part is on the same side as the woofers of the bottom part (marked with “Woofers are on this side” text). The plug will be directed to the “Woofers are on this side” text.

· **against the wall positioning**
  In this case the midrange & treble driver is not on the same side as woofers. The plug will be directed away from the “Woofers are on this side” text.
USE AS A PANEL SPEAKER

The Gradient Revolution speakers can be positioned in a free space as any panel speakers. In this case it is recommendable that the distance from the rear wall will be minimum one meter (3'). In theory increasing the distance from the rear wall will allow the speaker to go lower in frequency. In practice however this rule can be oversimplified. It is always a good idea to try different distances. Proper starting points are one meter and two meters.

The basic set-up - where midrange & treble driver is on the same side as woofers - is a good starting point. First direct the speakers as in the Fig. 1. Also try to turn the speakers towards the listener step by step.

![Diagram](image)

*Fig 1. Basic set-up - where the woofers of the speaker are facing forward. The distance between the speakers and the wall should be at least one meter.*
USE AS A PANEL SPEAKER

It is also possible to direct the bodies as in the Fig. 2. In this case the low notes are radiated towards the rear and side walls and the midrange & treble drivers are towards the listener.

Please note to change the positioning of the plug (turn away from the “Woofers are on this side” text). Try different distances (1m...2m) from the rear wall and turn the speakers.

In a narrow room Gradient Revolution loudspeakers can be positioned quite near the side walls. The recommended minimum distance is about 50cm (20’’).

Fig 2. The woofers can also be directed backwards. Note the position of the plug between the bottom and top part.
The Gradient Revolution has an unique feature for a panel speaker: it can also be positioned against the wall. The longer wall of the room is preferable.

When used against the wall the woofers are directed towards the side wall as in the Fig. 3. In this case “Woofers are on this side” texts are also on this side. Each top part plugs will be away from the “Woofers are on this side” text. The top parts of the speaker (midrange & treble) will be directed to the listening area.

Fig 3. The loudspeakers can also be positioned against the wall, whereby the woofers are directed towards the side walls.

Smoothness of the bass response depends on the distances to the side walls and on the construction and material of the walls. If the side walls are of similar construction the smoothest bass response will be obtained when one speaker is twice as far from the wall as the other speaker. For instance one meter (3’) and two meters (6’) from the side walls.
AGAINST THE WALL

If the speakers are placed too close to the side walls the lowest notes will be attenuated.

The wall positioning gives a unique feature of adjusting the bass level. When the speakers are taken 5cm...10cm (2"...4") of the wall, the bass level will be attenuated by about 2dB. It is also possible to fine-tune the bass by rotating the speakers slightly (Fig. 4).

When the Gradient logo on the base plate of the speaker will not be visible from the listening place the base can be turned. Remove and tighten the screws with an 4mm Allen key.

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Fig 4. For wall positioning, adjust the bass level and tone by moving the speaker slightly off the front wall and rotating the speaker.
The Gradient Revolution speakers can also be positioned in such a way that one speaker is against and another will of the wall (Fig. 5). Please check that the plugs of the top parts are correctly positioned.

Fig. 5. A mixed positioning where one speaker is attached to the wall and the other to an open space.

Attention! In this special case the speaker leads from amplifier must be reversed in one speaker only (the positive plus lead to the black binding post and the negative ground lead to the red binding post). This is to assure the correct phasing of low notes to the listening area.
CONNECTIONS TO THE AMPLIFIER

Gradient Revolution is equipped with two pairs of binding posts which are located on the base of the speaker. The red marked plus terminals are linked together by a jumper. The black marked minus terminals are connected in the same way. The speaker can be connected single-wired, bi-wired or bi-amped.

· normal or single-wired
Connect the positive or plus lead from the amplifier to one of the red binding posts of the speaker. Similarly connect the ground lead or negative lead from the amplifier to one of the black binding posts. Connect both speakers in the similar way. Check that the jumpers between the similar binding posts are connected and tightened.

· bi-wiring
For bi-wiring remove the jumpers between binding posts. Bi-wiring requires two pairs of loudspeaker cables in parallel between the amplifier and the speaker. One speaker cable pair drives the bass unit (upper binding posts) and the other the top unit (lower binding posts).
• bi-amping
In this case the speakers are driven by two amplifiers. One amplifier drives the bass part and another the midrange & treble part of the speakers. Disconnect the jumpers between binding posts (both channels similarly). Connect the leads from the bass amplifier to the upper binding posts. Connect the leads from the midrange & treble amplifier to the lower binding posts (both channels similarly). Bi-amping enables the bass level adjustment if one of the power amplifiers is equipped with volume control.

Attention: Power amplifiers can be either phase inverting or non-inverting. If amplifiers you use for bi-amping are not similar, check this detail in order to get correct phasing.
THE CHOICE OF AMPLIFIER AND CABLES

The amplifier power output needed depends on the listening level, the size of the room and many other factors having influence on the room acoustics. It is recommended to use an amplifier of 2 x 50W ... 250W / 8 ohms with Gradient Revolution. Also higher powered amplifiers can be used with caution due to their increased potential for speaker damage. We recommend to use thick enough cables to ensure minimal signal losses in transfer from the amplifier to the loudspeakers. A minimum thickness of 1.5mm2 is recommended for the speaker cables of five metres or shorter. If the cable length exceeds five metres a thicker cable is recommended.
POWER HANDLING

The efficiencies of Hi-Fi loudspeakers are well under 1 % (typically under 0,2 %). This means that over 99 percentage of all power produced by the amplifier will be converted into heat in the loudspeaker. Excessive heat may give rise to the over heating of crossover components and driver voice coils. When the power handling capability of the speaker is exceeded it is likely that the tweeter voice coil wound of a very thin wire will be burnt first.

Gradient Revolution loudspeakers can handle high powered peaks of short duration. Music of varying dynamics (even huge) can be listened to at a high volume level. If the music sounds continuously loud (heavy rock, etc.) and it is played for a long time, it is highly probable that the heat builds up faster than the drivers can dissipate it. The result of this may be damaged drivers.

A loudspeaker can be damaged also by low powered amplifier when over-driven (loaded). In this case amplifier will clip and cause high ordered distortion components (high notes) which easily burn the treble driver voice coil.
A BRIEF DESCRIPTION OF TECHNOLOGIES

· rotatable dipole bass
The bass part of Gradient Revolution loudspeaker consists of two 300mm custom made long throw woofers. They are assembled on an open baffle giving the low frequencies a "figure eight" or dipole radiation pattern similar to most panel loudspeakers. These two woofers operate at frequencies below 200Hz.

An ordinary box speaker radiates in all directions at low frequencies. This has the unfortunate effect of generating standing waves in all dimensions. In the typical listening room, standing waves distort the sound at frequencies below 200Hz. Gradient Revolution does not excite standing waves between the floor and the ceiling, it can only generate them in the direction of the radiation pattern.

The woofer section of the Gradient Revolution can be rotated and directed in three different ways, to minimize undesirable standing waves in the listening area. This ability to "tune" out standing waves in the bass is unique. The result is a smooth articulate bass response which has correct musical pitch and dynamics.

· acoustic resistance enclosure at mid frequencies
Frequencies higher than 200Hz are reproduced by the top part of the speaker. It employs a coaxial midrange & treble driver which is a virtual point source. The main unit is a 176mm glass-fibre coned driver which receives its radiation characteristics from an acoustic resistance enclosure.
A BRIEF DESCRIPTION OF TECHNOLOGIES

Thanks to the cardioid radiation pattern the speaker radiates frequencies over 200Hz mainly to the forward direction. The backward radiation is dampened most effectively being in power only one percentage of the forward radiation. Unwanted reflections from the nearby boundaries will be minimized and the midrange will sound clean without colourations.

· acoustic waveguide at high frequencies
The aluminium dome tweeter placed at the apex of the cone uses midrange diaphragm as a waveguide to control treble dispersion. The resulting radiation pattern at high frequencies is therefore very similar to that of the cardioid midrange. Of course the tweeter is equipped with a voice coil/ magnet system of its own.

· a point source at mid & high frequencies
A point source is generally accepted as an ideal sound source. It enables excellent frequency response and phase properties over a wide listening window. The result of this will be stable and accurate stereo picture with good three dimensionality. The quality of a recording will be easily discovered.

DIFFERENT RADIATION PATTERNS

SPHERE

DIPOLE

CARDIOID
**TECHNICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model:</th>
<th>Gradient Revolution MK IV</th>
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<tbody>
<tr>
<td>Loading principle:</td>
<td>Bass: open baffle ( (f&lt;200\text{Hz}) ), Midrange: acoustic resistance enclosure ( (f&gt;200\text{Hz}) )</td>
</tr>
<tr>
<td>Radiation patterns:</td>
<td>dipole (bass), cardioid (midrange &amp; treble)</td>
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<tr>
<td>Frequency response:</td>
<td>50-25000Hz +/-2dB, -6dB@30Hz</td>
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<tr>
<td>Drivers:</td>
<td>2\times300\text{mm} long throw woofer, 1\times176\text{mm} glass-fibre midrange, 1\times25\text{mm} coaxial Al-dome</td>
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<tr>
<td>Crossover frequencies:</td>
<td>200Hz and 2800Hz</td>
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<tr>
<td>Dimensions (WHD):</td>
<td>36 \times 102 \times 32\text{cm}</td>
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<tr>
<td>Weight:</td>
<td>30\text{kg}</td>
</tr>
</tbody>
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Designed and manufactured in Finland by Gradient Labs Ltd.
QUALITY CONTROL

Gradient loudspeakers are manufactured from high quality materials and components. The performance of the drivers used have been tested before the assembly. After the assembly a precision measuring system ensures that all speakers are of a similar high standard. The inspection marking and the serial number are located at the top of the bass unit.

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