Gradient

R-5

USER GUIDE

Congratulations on your purchase of the Gradient R-5 loudspeakers which represent the latest in loudspeaker technology. The Gradient R-5 speaker 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.

· **attaching the feet of the loudspeaker base**
Attach the special rubber feet (3pcs / speaker) to the base of the bottom part of the speaker. If necessary, the standard feet can be replaced by M8 spikes.

· **connecting the loudspeaker cable**
For fast, easy and high quality connecting, Gradient R-5 is equipped with a professional four-pole speakON connector and cable housing. If you are not using dedicated Gradient cables, a speakON cable connector has to be connected to your cables. In that case follow instructions attached to the packing to prepare cables. The speaker connector is located on the base of the bottom part of the speaker, from where the speaker cable can be routed freely in the desired direction. Connect the speaker cable to the to the speaker before assembling the top part.

The speakON connector comes with a twist and lock feature. Press the cable connector into the connector on the bottom of the speaker and twist. The connector locks and establish a secure connection.

· **assembling the top part of the speaker**

Before assembling the top part it is good idea to find a preliminary location for the speaker in the room and install the bottom part of the speaker there.

While holding the top part, connect the cable connector of top part to the XLR-connector of the bottom part. The XLR-connector is situated inside the bottom part and is accessed through the opening in the top plate of the bottom part. You will hear a "click-sound" when the cable connector is locked properly.

Make sure that the cable between the top and bottom fits well inside the bottom part. The top part should rest firmly on the three silicone plugs. When repositioning the speaker, it is always recommended to remove the top part of the speaker to avoid damages.

The top part can be turned both horizontally and vertically. The unique feature allows fine-tuning for the sonic image and room reflections.

LAYOUTS FOR LISTENING

The most accurate stereophonic illusion is obtained if the listener sits at equal distances to both loudspeakers. However compared to standard speakers Gradient R-5, 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 directivity properties of Gradient R-5 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.

The Gradient R-5 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.

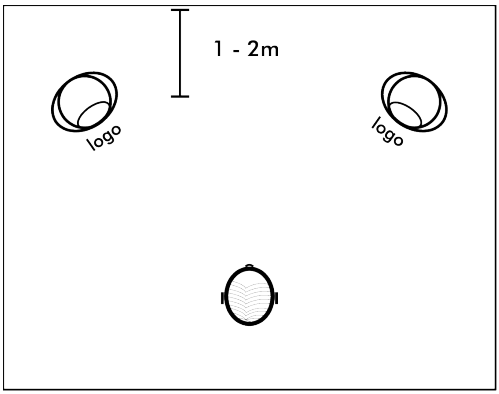


Fig. 1. Basic set-up where the woofers of the speaker are facing forward. The distance between the speakers and the wall should be at least one meter. The round Gradient logo indicates the direction of the woofers.

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 parallel to the side walls and the midrange & treble drivers are towards the listener.

Try different distances (1m...2m) from the rear wall and turn the speakers.

In a narrow room the speakers can be positioned even against the side walls.

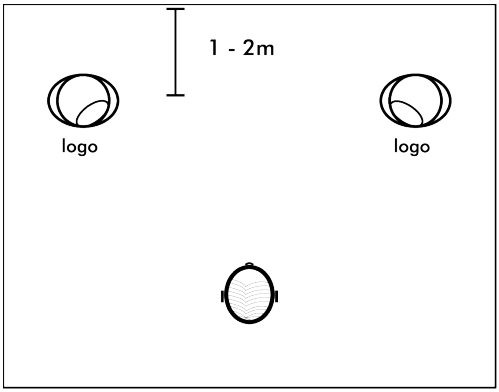


Fig. 2. The woofers can also be directed parallel to the side walls. If needed the side of the bottom part can be positioned against the side wall.

The Gradient R-5 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 bottom parts are directed as in the Fig. 3. The top parts of the speaker (midrange & treble) will be directed to the listening area.

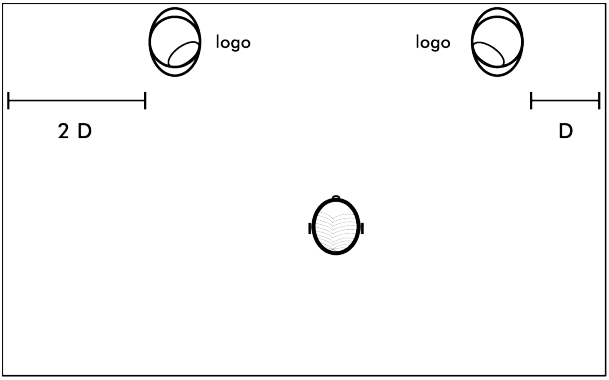


Fig. 3. The loudspeakers can also be positioned against the wall, see the location of the round Gradient logo.

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 bottom part slightly (Fig. 4).

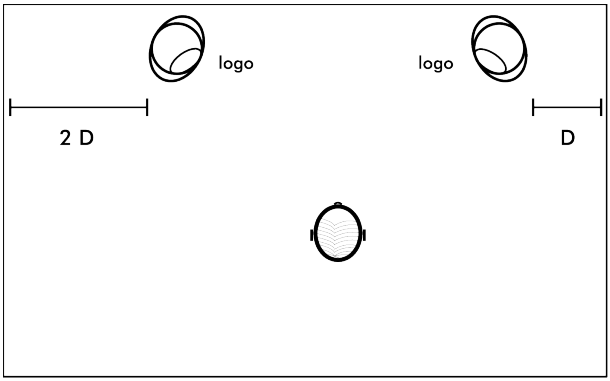


Fig. 4. For wall positioning, adjust the bass level and tone by moving the speaker slightly off the front wall and rotating the speaker.

The Gradient R-5 speakers can also be positioned in such a way that one speaker is against and another will of the wall (Fig. 5).

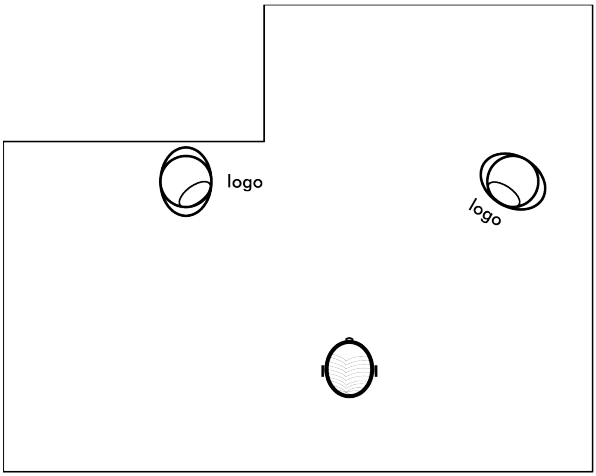


Fig. 5. A mixed positioning where one speaker is attached to the wall and the other to an open space.

CONNECTIONS TO THE AMPLIFIER

Gradient R-5 can be connected single-wired, bi-wired or bi-amped. With the speaker, we supply high-quality cables in different lengths or, alternatively, a speakON cable connector that can be connected to any speaker cables having wire size 6mm^2 maximum.

· **normal or single-wired**
Dedicated Gradient speaker cables have following colour codes:

Black = minus
Red = plus

Connect red lead to positive or plus terminal of the amplifier. Similarly connect the black lead to negative or minus terminal of the amplifier. Connect both speakers in the similar way.

If you are not using the dedicated Gradient speaker cables, connect the speakON cable connector to the cable as follows:

1 - = minus
1+ = plus

In speakON connector connect 1- and 2- together as well as 1+ and 2+ with a jumper, for example a short wire.

· **bi-wiring**
Bi-wiring requires four-pole speaker cable or two pairs of normal two-pole loudspeaker cables where one speaker cable pair drives the bass unit and the other the midrange/treble unit of the speaker.

Dedicated four-pole Gradient speaker cables have following colour codes:

Black = bass minus
Red = bass plus
Blue = midrange/treble minus
Yellow = midrange/treble plus

Connect red and yellow lead to positive or plus terminal of the amplifier. Similarly connect the black and blue lead to negative or minus terminal of the amplifier. Connect both speakers in the similar way.

If you are not using the dedicated Gradient speaker cables, connect the speakON cable connector to the cable as follows:

1 - = bass minus
1+ = bass plus
2 - = midrange/treble minus
2+ = midrange/treble plus

· **bi-amping**

Bi-wiring requires four-pole speaker cable or two pairs of normal two-pole loudspeaker cables. The speakers are driven by two amplifiers. One amplifier drives the bass units and another the midrange/treble units of the speakers. Bi-amping enables the bass level adjustment if one of the power amplifiers is equipped with volume control.

Dedicated four-pole Gradient speaker cables have following colour codes:

Black = bass minus
Red = bass plus
Blue = midrange/treble minus
Yellow = midrange/treble plus

Connect red lead to positive or plus terminal of the amplifier 1. Similarly connect the black lead to negative or minus terminal of the amplifier 1. Connect both speakers in the similar way.

Connect yellow lead to positive or plus terminal of the amplifier 2. Similarly connect the blue lead to negative or minus terminal of the amplifier 2. Connect both speakers in the similar way.

If you are not using the dedicated Gradient speaker cables, connect the speakON cable connector to the cable as follows:

1 - = bass minus
1+ = bass plus
2 - = midrange/treble minus
2+ = midrange/treble plus

When using two power amplifiers, the following should be considered:

• The voltage gain of the amplifiers must be the same. Otherwise the volume ratios of the sound ranges are changing.

• If only one amplifier has a volume control, its gain must be equal to or greater than that of the other amplifier. Otherwise the sound level cannot be adjusted the same.

• If the power amplifiers are different, make sure whether they are phase inverting or non-inverting 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 R-5. 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 2.5mm^2 is recommended for the speaker cables of five metres or shorter. If the cable length exceeds five metres a thicker cable is recommended.

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 R-5 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 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.

· **rotatable dipole bass**

The bass part of Gradient R-5 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 R-5 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 R-5 can be rotated and directed in many 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 reed-paper coned driver which receives its radiation characteristics from an acoustic resistance enclosure.

Thanks to the cardioid radiation patter 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.

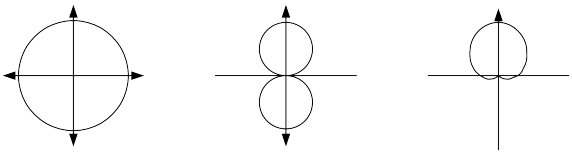
· **acoustic waveguide at high frequencies**

The Mg-Al 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

Model:	Gradient R-5
Loading principle:	Bass: open baffle (f<200Hz), Midrange: acoustic resistance enclosure (f>200Hz)
Radiation patterns:	dipole (bass), cardioid (midrange & treble)
Frequency response:	50-25000Hz +/-2dB -6dB@30Hz.
Drivers:	2×300mm long throw woofer, 1x176mm pre-coated reed- paper midrange, 1x25mm coaxial Al/Mg-dome
Crossover frequencies:	200Hz and 2500Hz
Dimensions (WHD):	42 × 104 × 32cm
Weight:	25kg

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 base of the bottom part of the speaker.

MADE IN FINLAND ®

Gradient Labs Ltd Kisällintie 8 FI-06150 Porvoo Finland
www.gradient.fi


Gradient