Optimal Audio

USER GUIDE

Cuboid

Loudspeaker

Loudspeakers

>

Cuboid

Loudspeakers

Optimal Audio

Congratulations on your choice of Optimal Audio for your latest sound system installation.

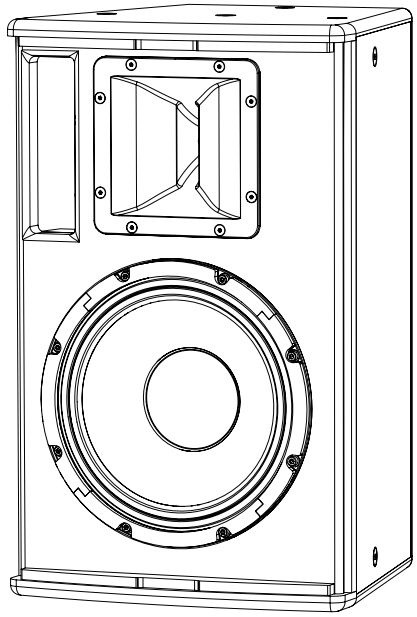
The Optimal Audio range of compatible audio zoners, amplifiers and loudspeakers are designed to work together simply and effectively. Our quick start guides will take you through the simple connection and set up procedure.

Cuboid consists of a series of full-range, high-powered loudspeakers designed to deliver great sound at an affordable price. When used in conjunction with the rest of the Optimal Audio eco-system Cuboid will surprise you with its performance, even coverage and professional aesthetic.

This Quick Start Guide will help you get your Cuboids rigged, positioned and connected correctly.

Cuboid

Loudspeakers



Rotatable high frequency horn, low frequency driver, bass reflex port, M8 fixings

Cuboid 8, 10, 12 and 15 are all passive, full-range, 2-way loudspeakers. This means that they have a high frequency driver loaded on to a horn, giving increased efficiency and directivity, and a low-frequency cone driver.

The loudspeaker is fed with a full-range output from an amplifier and an internal cross-over network divides the signal between the high and low frequency drivers.

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Cuboid Model	Wall bracket	Combined weight	U Bracket	Combined weight	Eyebolt fitting
Cuboid 8	A	10.64kg	A	13.0kg	M8 x 16
Cuboid 10	B	17.26kg	B	20.0kg	M8 x 21
Cuboid 12	B	21.26kg	C	25.5kg	M8 x 21
Cuboid 15	C	31.35kg	D	35.0kg	M8 x 19

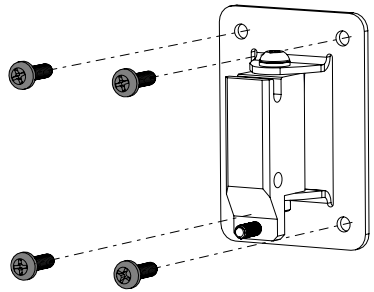
Cuboid can be mounted on a wall in either portrait or landscape mode using the appropriate wall bracket or suspended from a ceiling with the appropriate U bracket.

The above table lists the correct wall bracket for each Cuboid model, along with the combined weight of the loudspeaker and bracket.

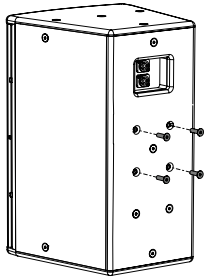
It is critical that the structure to which Cuboid is to be mounted is suitable for taking the weight of the loudspeaker/bracket assembly.

It is highly recommended that a secondary safety fixing be fitted. This can be achieved using a suitable rated M8 eyebolt and rated safety chain or steel wire rope.

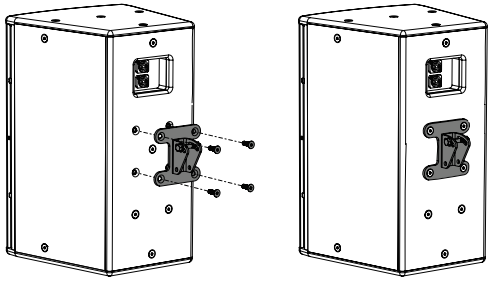
Wall Mounting – Portrait or Landscape



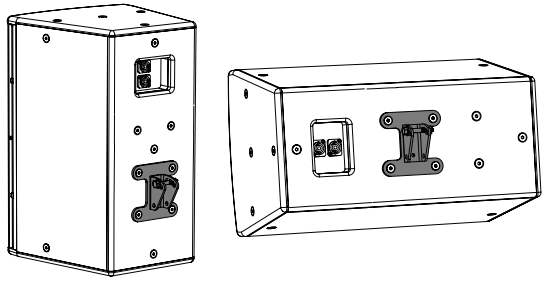
Once loudspeaker position has been decided, affix wall section of Wall Bracket (A,B or C depending on Cuboid model) securely to a suitable wall mounting point



Remove M8 fixing bolts from the rear of the loudspeaker cabinet



Position loudspeaker cabinet section of Wall Bracket over the four M8 mounting points and secure with the four bolts from the back of the cabinet



Optional Wall Bracket mounting positions enable greater down-tilt, using the lower four M8 bolt position, or the loudspeaker can be mounted in landscape mode by rotating the bracket as shown:

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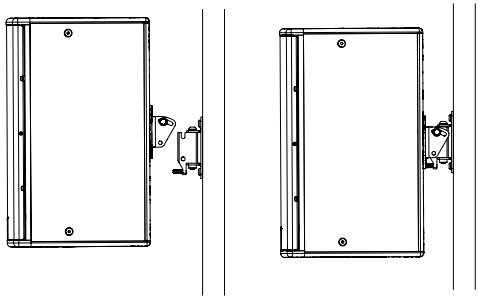
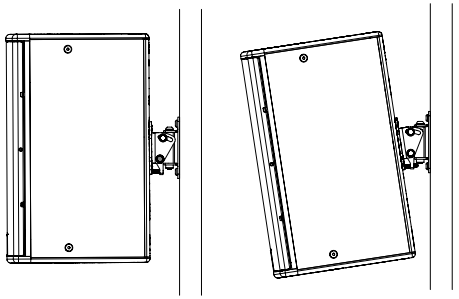
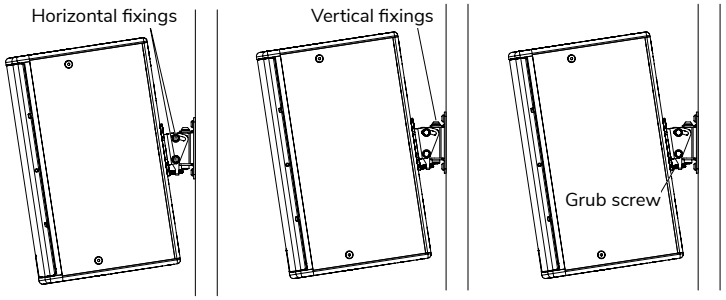


Lift loudspeaker into position making sure that the two halves of Wall Bracket line up – the adjustable bolt sits into the two 'U shaped' cups in the wall section of the bracket



Secure the assembly with the fixed bolt in the lower hole in the bracket – this provides the pivot for angling the loudspeaker. Adjust the grub screw to fix the down-tilt angle



Once the loudspeaker is in position and you are happy with the angle adjustments, tighten all fixings as shown to lock the cabinet in place.

Speaker positioning and aiming

Cuboid Model	Horizontal	Vertical
Cuboid 8	90°	50°
Cuboid 10	90°	50°
Cuboid 12	80°	50°
Cuboid 15	80°	50°

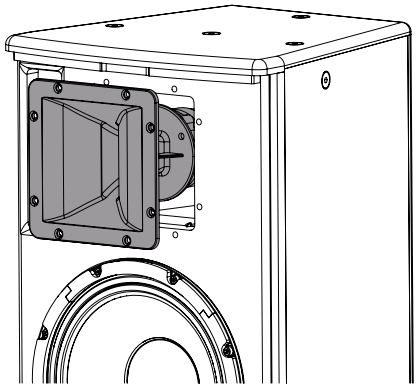
When installing horn loaded loudspeakers, it's worth taking a moment to understand how the loudspeaker projects sound and how to get the best coverage in your venue by careful aiming.

The above table lists the coverage angles of the high-frequency horns in the Cuboid range. These figures are quoted using the centre axis of the horn as 0° and measuring the angle off centre where the sound pressure level (SPL) drops by 6dB. The results given reflect horn symmetry, 90° = 45° horizontally off axis both sides of centre.

These specifications refer to the loudspeaker ex-factory. With the loudspeaker in portrait, the horn is fitted to deliver coverage as shown in the table above. If you intend to mount your Cuboid in landscape mode (when suspending horizontally from ceiling for instance), consider rotating the horn as shown in the following images:

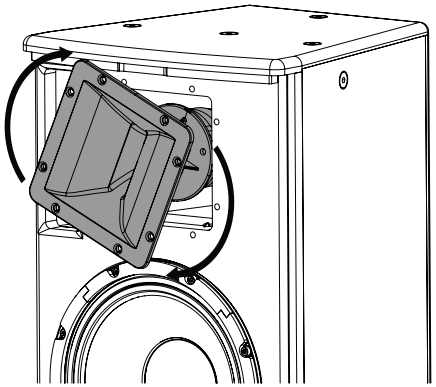
Rotating the horn

1.



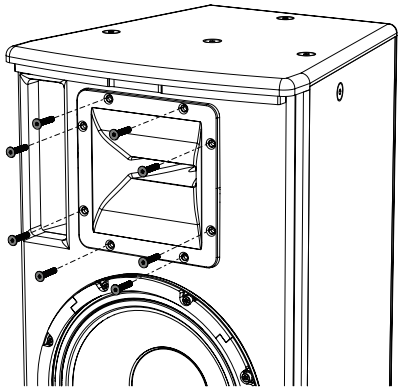
Remove horn

2.



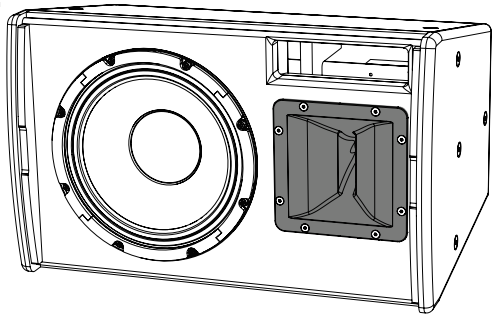
Rotate horn

3.



Replace fixings

4.



Rotate cabinet

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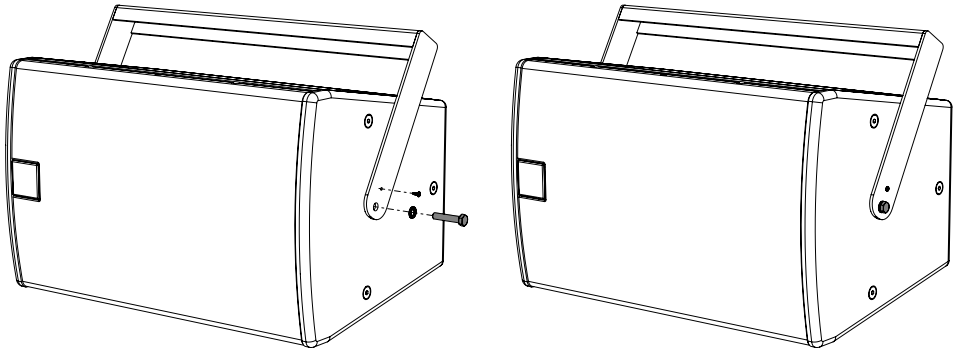
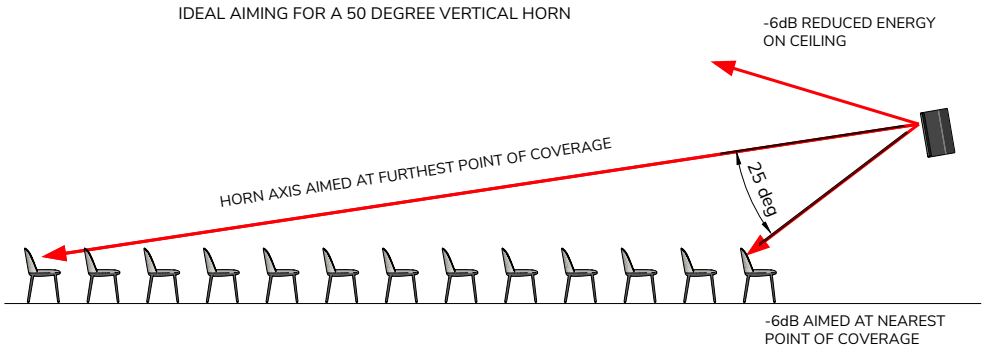
Ceiling mounting using the U bracket



The U brackets A,B,C & D are specifically designed for hanging Cuboid from a ceiling in landscape mode. Fixing the U bracket is a simple process:

- Remove the centre M8 bolt from the top and bottom of Cuboid
- Place the U bracket over the loudspeaker and line up the holes with the centre M8 bolt hole
- Use the supplied bolts to fix the bracket to the loudspeaker
- When the angle is set, fix with the supplied locking screw

Loudspeaker aiming



The coverage specifications are useful for informing where the loudspeakers should be aimed. In any horn-loaded loudspeaker, the optimum output is the centre axis of the horn where you have maximum level from the system. It therefore follows that the horn axis should be aimed at the furthest point of the audience.

Sound level however decreases by 6dB for every doubling of distance. This means that 96dB at 5m from a loudspeaker will reduce to 90dB at 10m – a significant drop in energy.

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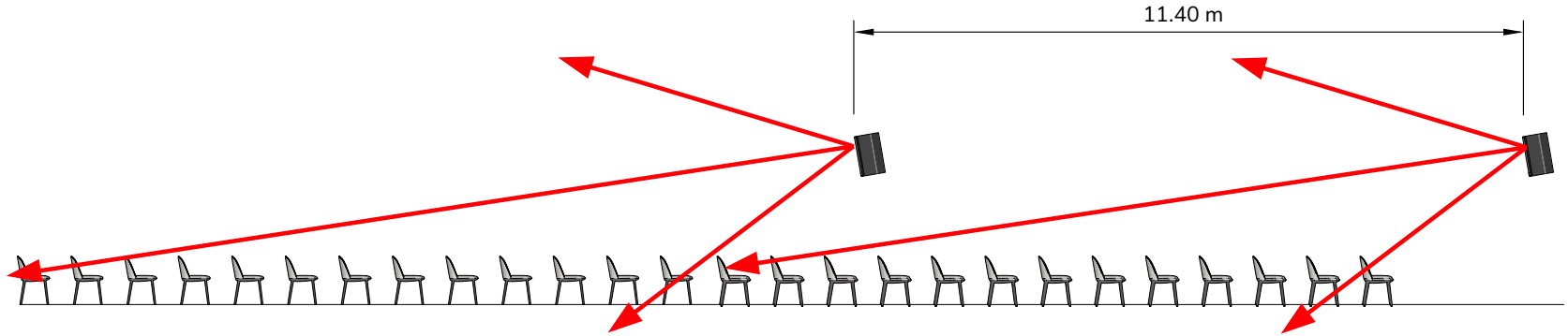
IN THIS EXAMPLE THE ROOM IS TOO BIG FOR ONE SPEAKER TO BE ABLE TO COVER RIGHT TO THE BACK. A SECOND SPEAKER IS ADDED AT THE POINT WHERE THE FIRST AND SECOND CROSS OVER.
THE SECOND IS DELAYED BACK TO THE FIRST USING THE FORMULA:

distance/speed of sound (334m/s @ 20 degrees C)

IN THIS CASE:

11.4/334 = 0.033 seconds, 33 milliseconds



Because of this level drop over distance, in larger rooms it's well worth considering additional loudspeakers to counter this effect, maintaining volume and intelligibility. In this case, it is important that the second row of loudspeakers down the room are delayed to match the arrival of the sound from the first pair of speakers, as shown above.

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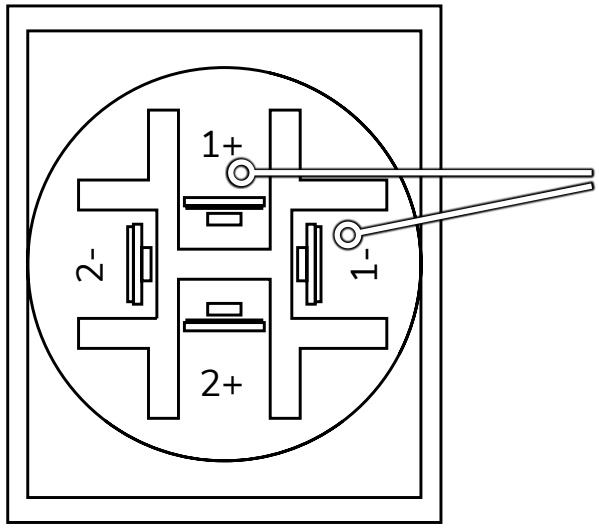
Connecting Up



Cuboid connector viewed from rear

Cuboid uses these terminals

When wiring loudspeaker cables be careful to observe the correct polarity of the cable and connector at both ends.

All Cuboid loudspeakers are fitted with two standard NL4 type connectors. These have two pairs of terminals.

Cuboid uses only pins 1+ and 1-. These are linked across the two connectors, providing a useful link to a second loudspeaker of the same model. No more than two Cuboids should be connected to a single amplifier channel.

2+ and 2- are not connected and are not linked through.

For connection, we recommend using a flexible cable with a minimum cross-sectional area of 1.5mm²

Matching Speakers and Amplifiers

To get the best from your loudspeakers, it's important to make sure the amplifier you are using is up to the job. Several factors have to be considered, and it's worth clarifying what they mean and how they affect the performance of a loudspeaker.

Loudspeakers tend to be quantified using Watts, but this is purely a measure of the amount of power a loudspeaker can take at its input over time, and not necessarily a measurement of how loud it might go.

Optimal Audio loudspeaker power handling is therefore quoted as Watts (AES) and Watts (Peak), Peak delivering 6dB(SPL) acoustic output higher than AES (AES2-2012 standard) and referring to the loudest transients a loudspeaker can handle without distortion.

In Watts, this means that the peak power handling of a Cuboid 8 for example is 800W, four times its continuous power handling of 200W.

So, give a Cuboid 8 200W of continuous power and you will get 115dB(SPL) out of it if you are standing 1m away from it. It will however be able to deliver transient peaks in the audio signal at 121dB(SPL(@1m)) without distortion or damage.

What this all means is that for the best performance from your loudspeaker, make sure you have an amplifier that is capable of delivering more than a loudspeaker's rated AES power handling ability at the nominal impedence of the loudspeaker – 8 Ohms in the case of all Cuboid speakers. A 200W amplifier will deliver 115dB(SPL) from a Cuboid 8 and nothing more, but a more powerful amplifier will have the headroom to deliver short musical transients at higher levels, thereby ensuring that faithful reproduction of the program material is maintained.

Accessories

Wall Bracket A (Black)	**WB1-B**	Wall bracket for Cuboid 8 (Black)
Wall Bracket B (Black)	**WB2-B**	Wall bracket for Cuboid 10 & 12 (Black)
Wall Bracket C (Black)	**WB3-B**	Wall bracket for Cuboid 15 (Black)
U Bracket A (Black)	**UB1-B**	U Bracket for Cuboid 8 (Black)
U Bracket B (Black)	**UB2-B**	U Bracket for Cuboid 10 (Black)
U Bracket C (Black)	**UB3-B**	U Bracket for Cuboid 12 (Black)
U Bracket D (Black)	**UB4-B**	U Bracket for Cuboid 15 (Black)

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Specifications

	Cuboid 8	Cuboid 10	Cuboid 12	Cuboid 15
TYPE	Two-way, full range, passive loudspeaker	Two-way, full range, passive loudspeaker	Two-way, full range, passive loudspeaker	Two-way, full range, passive loudspeaker
FREQUENCY RESPONSE (with preset)	90Hz - 18kHz ± 3dB -10dB @62Hz	65Hz - 20kHz ± 3dB -10dB @49Hz	62Hz - 20kHz ± 3dB -10dB @47Hz	58Hz - 18kHz ± 3dB -10dB @40Hz
DRIVERS	LF: 8" (200mm), ferrite motor system HF: 1" (25mm) exit/1" (25mm) voice coil, HT polymer dome compression driver	LF: 10" (254mm), ferrite motor system HF: 1" (25mm) exit/1.4" (36mm) voice coil, polyimide dome compression driver	LF: 12" (300mm), ferrite motor system HF: 1" (25mm) exit/1.4" (36mm) voice coil, polyimide dome compression driver	LF: 15" (380mm), ferrite motor system HF: 1" (25mm) exit/1.7" (44mm) voice coil, polyimide dome compression driver
RATED POWER	200W (AES) 800W (peak)	250W (AES) 1000W (peak)	300W (AES) 1200W (peak)	500W (AES) 2000W (peak)
NOMINAL IMPEDANCE	8Ω	8Ω	8Ω	8Ω
SENSITIVITY (1W/1m)	92dB	96dB	98dB	99dB
MAXIMUM SPL	115dB (cont), 121dB (peak)	120dB (cont), 126dB (peak)	123dB (cont), 129dB (peak)	126dB (cont), 132dB (peak)
CROSSOVER	2.9kHz passive	2.8kHz passive	2.5kHz passive	2.3kHz passive
DISPERSION (-6dB)	90˚ H x 50˚ V (user-rotatable)	90˚ H x 50˚ V (user-rotatable)	80˚ H x 50˚ V (user-rotatable)	80˚ H x 50˚ V (user-rotatable)
ENCLOSURE	Trapezoid wooden cabinet	Trapezoid wooden cabinet	Trapezoid wooden cabinet	Trapezoid wooden cabinet
FINISH	Black textured paint	Black textured paint	Black textured paint	Black textured paint
PROTECTIVE GRILLE	Black perforated steel with scrim cloth backing	Black perforated steel with scrim cloth backing	Black perforated steel with scrim cloth backing	Black perforated steel with scrim cloth backing
CONNECTORS	2x NL4 type	2x NL4 type	2x NL4 type	2x NL4 type
PIN CONNECTIONS (INPUT)	1+/1-	1+/1-	1+/1-	1+/1-
FITTINGS	16 x M8, inset bolts	21 x M8, inset bolts	21 x M8, inset bolts	19 x M8, inset bolts
DIMENSIONS	(W) 256mm x (H) 422.5mm x (D) 261mm (W) 10.08" x (H) 16.63" x (D) 10.28"	(W) 322mm x (H) 524mm x (D) 326mm (W) 12.68" x (H) 20.63" x (D) 12.83"	(W) 360mm x (H) 575mm x (D) 392mm (W) 14.17" x (H) 22.64" x (D) 15.43"	(W) 426.5mm x (H) 691.5mm x (D) 416mm (W) 16.79" x (H) 27.22" x (D) 16.38"
WEIGHT	10kg (22.05lb)	16kg (35.27lb)	20kg (44.09lb)	28kg (61.73lb)
ACCESSORIES (available separately)	Wall bracket A, U bracket A, M8 eye bolt	Wall bracket B, U bracket B, M8 eye bolt	Wall bracket B, U bracket C, M8 eye bolt	Wall bracket C, U bracket D, M8 eye bolt

WARNING!

DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

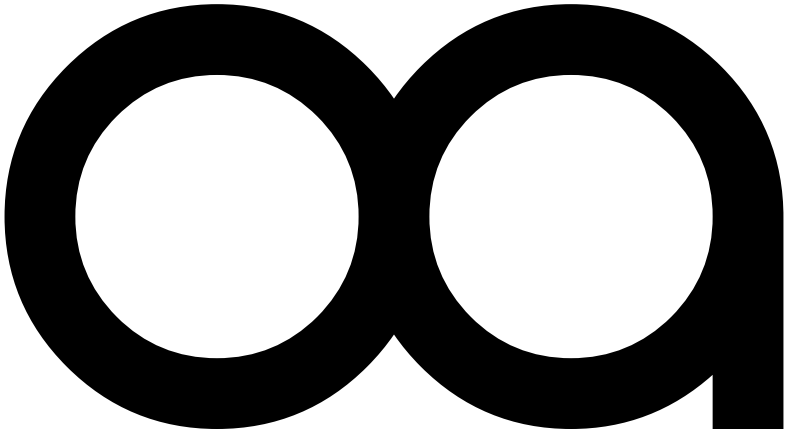
CAUTION

RISK OF ELECTRIC SHOCK DO NOT OPEN

This symbol is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of **sufficient magnitude to constitute a risk** of electric shock to persons.

Important Safety Instructions

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation opening. Install in accordance with the manufacturer’s instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Protect the loudspeaker cable from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
10. Do not unplug the unit by pulling on the loudspeaker cable, use the plug.
11. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
12. The apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.
13. Do not remove any covers, loosen any fixings or allow items to enter any aperture.
14. Ensure the loudspeaker is mounted with appropriately sized fixings of suitable load bearing capacity
15. Always ensure a secondary safety fixing is used where loudspeakers are mounted overhead.



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