

EVC Variable-Intensity Loudspeakers

EVC-1122-VIBTEN54 | EVC-1122-VIWTEN54

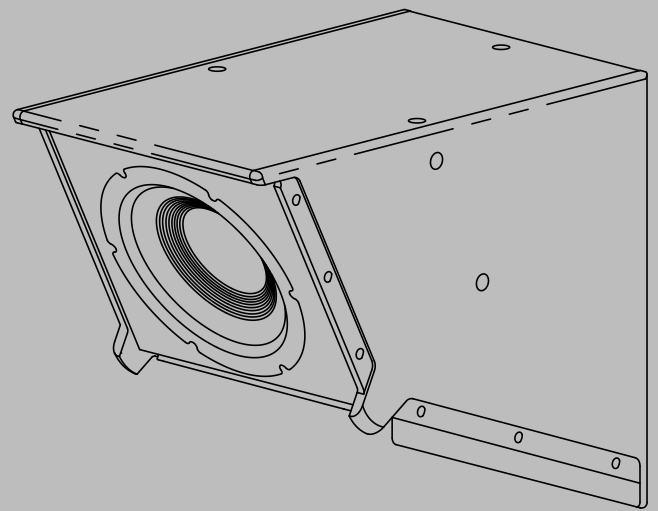
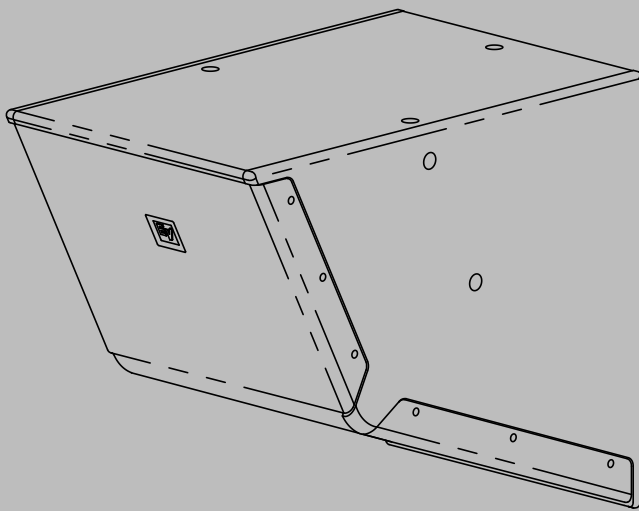


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1 Safety

In this manual, the following symbols and notations are used to draw attention to special situations:

**Danger!**

High risk: This symbol indicates an imminently hazardous situation such as “Dangerous Voltage” inside the product. If not avoided, this will result in an electrical shock, serious bodily injury, or death.

**Warning!**

Medium risk: Indicates a potentially hazardous situation. If not avoided, this may result in minor or moderate injury.

**Caution!**

Low risk: Indicates a potentially hazardous situation. If not avoided, this may result in property damage or risk of damage to the unit.

**Notice!**

This symbol indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.



Refer to the Installation Manual for instructions.

2 Introduction

EVC-1122-VI Variable Intensity loudspeaker

The EVC-1122-VI Variable Intensity loudspeaker is a two-way design with a unique compound waveguide that can evenly cover a defined rectangular audience area with almost no variation in sound quality and minimal change in level.

The high frequency section the EVC-1122-VI comprises a single 1¼-inch pure titanium dome compression driver directly coupled to a specialized waveguide that combines the functionality of long-throw and short-throw horns in a single acoustic device. The low frequency section employs a high-output woofer that was developed using state-of-the-art, computer-aided optimization to provide low distortion, high efficiency, and maximum intelligibility at high sound pressure levels. The passive crossover implements an enhanced fourth-order design with slopes of greater than 24 dB per octave for smooth off-axis response and improved definition through the critical vocal range.

The EVC-1122-VI enclosure is constructed of 15-mm plywood and finished with EVCoat for enhanced durability. The loudspeaker has been designed with M10 suspension points as well as attachment points for an optional U-bracket. EVC series loudspeakers accept wire gauges up to 10 AWG.

Constant directivity vs variable intensity

Most modern loudspeaker systems designed for installation are based on a constant-directivity approach. They are designed to provide a consistent, smooth transition from the low-frequency woofer to the high-frequency section. Constant-directivity systems typically have symmetrical vertical coverage patterns and constant horizontal coverage. Systems built around single or multiple constant-directivity loudspeakers are widely used in high quality installed sound reinforcement systems. While many implementations deliver excellent performance, one key drawback is that SPL can vary significantly over the audience area - from front-to-back and left-to-right. The front-to-back variation can be minimized by tilting the horn further back or by adding appropriately delayed fill speakers, but these remedies often result in noticeable slap echo, decreased dynamic range, and poor intelligibility because of excessive excitation of the reverberant field.

The EVC-1122-VI attacks these shortcomings by producing a wide near-field coverage angle and a narrow far-field angle from a single loudspeaker system. The 12-inch woofer is installed in the enclosure at an angle so that its central axis is directed toward the last row of the audience, using the natural off-axis roll-off the driver to deliver more consistent level to every seat. And the unique, asymmetrical waveguide replaces a short-throw/long-throw horn combination to evenly cover the audience area with a single device. The resulting coverage characteristic ensures a well-defined rectangular listening area, and the more gradual intensity change compensates for the drop in SPL over the longer distance to the back of the room. The size of the coverage area is determined by the height at which the loudspeaker is mounted, as well as the vertical angle at which the system is aimed. This single-box solution reduces material costs and labor time while increasing performance with higher intelligibility and more uniform coverage.

In summary, the major advantages of the EVC-1122-VI are:

- **Rectangular coverage pattern.** Traditional waveguides deliver an elliptical pattern to the floor. VI horns deliver a rectangular pattern, which helps to fill in the corners of the room. No more costly delay lines.
- **Even SPL front-to-back.** The unique, patented throat and flare structure of the VI waveguide delivers more consistent sound levels throughout the room, eliminating ear strain at the back of the seating area and painful ears at the front.

- **Greater Intelligibility.** VI waveguides deliver sound to fill only the floor plan, providing uniform direct-field SPL and an order of magnitude less energy into the reverberant field. This provides an increase in mid- to high-frequency intelligibility of 6 dB in most applications.
- **One horn replaces two.** With VI technology we've eliminated the destructive interference which occurs between long- and short-throw loudspeakers. We've also eliminated the cost of a properly designed two-box system, which needs to include another power amplifier channel for proper power control and impedance matching.
- **Labor savings in the box.** Variable Intensity systems will fly more conveniently and in less time than many competitive products. In addition, less time is spent on aiming and repositioning. This will save you additional money.

Finishes and colors available

EVC-1122-VI loudspeakers are finished in tough EVCoat. Unlike other EVC models, there are no weatherized versions of the variable-intensity speaker. Like all EVC systems, the EVC-1122-VI is available in black or white.

To find current user documentation visit our product related information at www.electrovoice.com.

3 Planning the installation and aiming of the EVC-1122-VI loudspeaker

The remarkably even coverage of the EVC-1122-VI is due not only to the unique, compound waveguide, but is also the result of the woofer mounting angle, the spacing between woofer and horn, and the enclosure configuration. The speaker is designed to be mounted with the waveguide on the bottom and the woofer facing forward. This means that when installed in the proper orientation, the grille will cover the bottom and the angled front baffle. Another visual indicator for confirming that the loudspeaker is oriented correctly is that the EV logo is attached to the grille in front of the woofer, and should therefore be on the front face of the loudspeaker when viewed head on. The largest rectangular surface of the speaker should face upward. Note that the waveguide cannot be rotated, and the loudspeaker will only exhibit its characteristic, predictable coverage when installed as described above.

The size of the rectangular area that the loudspeaker will cover is determined by its mounting height, as measured from the bottom rear of the loudspeaker. The horizontal coverage pattern will maintain a width that is approximately twice as wide as the mounting height measurement; the vertical throw will be about three times the mounting height. There is a small area of reduced coverage on the floor directly in front of the loudspeaker, which will help increase the gain-before-feedback margin in the area where the presenter or musicians will likely be located. Full coverage starts at a distance equal to 6/10 of the mounting height. These combined coverage parameters can be approximated with a simple 3:2:1 rule that makes it easy to estimate coverage during the design phase of a project.

You can extend or reduce the vertical throw by adjusting the aiming angle of the loudspeaker. Note that this will change both the front and rear boundaries of the coverage area, since both are affected by aiming. The new vertical coverage extremes are defined by the following equations:

$$\text{Beginning of vertical coverage} = \tan(31.0^\circ \pm \text{tilt angle}) \times \text{mounting height}$$

$$\text{Limit of vertical coverage} = \tan(71.6^\circ \pm \text{tilt angle}) \times \text{mounting height}$$

These values can easily be determined with the help of a scientific calculator with trigonometric functions. The tilt angle should be entered in degrees, but the mounting height can be in either English or metric units. Vertical aiming has no material effect on horizontal coverage over the audience area.

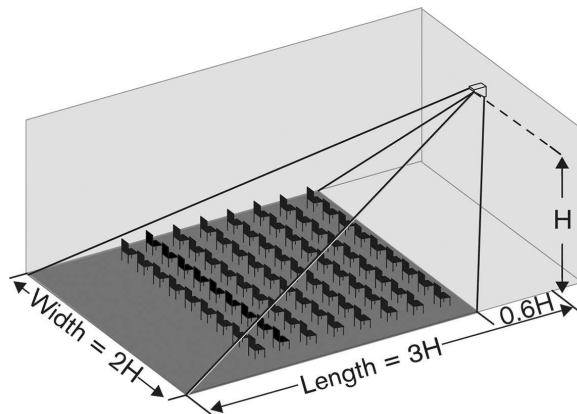


Figure 3.1: Coverage area determined by mounting height and angle

4 Installation

**Warning!**

This speaker shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the speaker.

**Warning!**

A safety cable must always be attached to one of the rigging points.

4.1 Tools list

The tools required to prepare the system for installation are:

- 3/16-inch (5 mm) flat blade screwdriver
- 6 mm Allen wrench
- Phillips #2 screwdriver

4.2 Preparing the EVC loudspeakers for installation

4.2.1 Unpacking and inspection

Carefully open the packaging and take out the loudspeaker. Inspect the loudspeaker's enclosure for any damage that might have happened during transportation. Each loudspeaker is examined and tested in detail before leaving the manufacturing site. Please inform the transport company immediately if the loudspeaker shows any damage. Being the addressee, you are the only person who can claim damages in transit. Keep the cardboard box and all packaging materials for inspection by the transport company.

Keeping the cardboard box including all packing materials is also recommended, even if the loudspeaker shows no external damage.

When shipping the loudspeaker, make sure to always use its original box and packaging materials. By packing the loudspeaker exactly as it was packed by the manufacturer, you will guarantee optimum protection from transport damage.

4.2.2 Scope of delivery

Keep the original invoice that states the purchase/delivery date in a safe place.

4.2.3 Recommended pre-installation procedures

For any sound system, certain checks made at the installer's place of business can prevent expensive on-site delays. EV recommends that you take the following steps:

1. Unpack all loudspeakers in the shop.
2. Check for proper model numbers.
3. Check the overall condition of the loudspeakers.
4. Check for continuity at the loudspeaker inputs.

Once you are on site and the loudspeakers are connected, it is a good idea to check again for continuity at the power-amplifier end of each cable run.

4.3 Working with mounting accessories

Warning!

Read and fully understand the manual and all safety instructions before attempting to suspend this loudspeaker. Qualified professionals must carry out suspension and installation. Follow all applicable local laws and regulations. Incorrect or improper suspension could expose persons to serious injury or death. Carefully inspect loudspeakers and associated hardware for defects or signs of damage before proceeding to suspend the speakers. Inspect all components at least once per year or as local laws and regulations require. If any parts are damaged or suspect, or if there is any doubt as to the proper functioning and safety of the items, stop using them immediately. It is the responsibility of the person installing the assembly to make sure the wall, ceiling, structure, and any attachments are capable of supporting all objects suspended overhead. Any hardware used to suspend a loudspeaker not provided by Electro-Voice is the responsibility of others. Electro-Voice assumes no liability for any damage or personal injury resulting from improper use, installation, or operation of the product.



4.3.1 Mounting with a U-bracket

Caution!

It is the installer's responsibility to determine and use the proper mounting hardware for the wall construction type. Disregarding this caution could result in damage to the product and personal injuries may occur.



The EVC-1122-VI can be mounted on a wall or ceiling with an accessory U Bracket. The bracket attaches to the sides of the loudspeaker in the same axis as the center of gravity to simplify aiming and reduces the tendency to drift from the correct angle after installation.

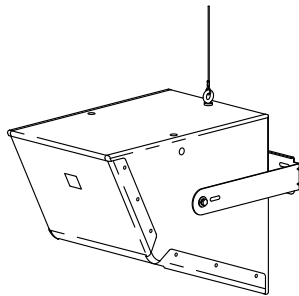


Figure 4.1: EVC U-bracket installed vertically

EVC U-Bracket	EVC loudspeaker models
EVC-UB3 is an optional U-Bracket kit for mounting a single EVC-1122-VI system to a wall or ceiling. Available in black or white: <ul style="list-style-type: none"> - EVC-UB3-BLK - EVC-UB3-WHT 	The EVC-UB3 fits EVC-1122-VI models: <ul style="list-style-type: none"> EVC-1122-VIB EVC-1122-VIW EVC-1122-VIBTEN54 EVC-1122-VIWTEN54

Tab. 4.1: EVC U-Bracket mounting models

For more information, see EVC-UB3 Adjustable U-Mount Mounting Bracket Installation Instructions (F.01U.349.928).

4.3.2

Mounting with rigging points

The EVC-1122-VI can also be suspended from the three insert points on the top of the loudspeaker enclosure. A safety cable must always be attached to one of the rigging points. EVC loudspeakers are designed to be installed individually. There are no factory-approved accessories for creating clusters by connecting an EVC loudspeaker to any other loudspeaker.

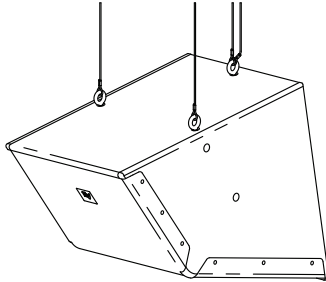


Figure 4.2: Suspending EVC systems, including a safety cable

Eyebolt accessory kits

EVC loudspeakers do not ship with eyebolts. To suspend the speaker, it is necessary to order one of the accessory eyebolt kits (sold separately).

- EBK-M10-3PACK: optional eyebolt kit, consisting of three M10 shoulder eyebolts and three fender washers, used when eyebolts are needed to suspend any of the full-range EVC loudspeakers. For more information see, EBK-M10 Eyebolt Attachment Kit Installation Instructions (F.01U.303.870).

Installing the eyebolts



Caution!

No eyebolt should be mounted in the sides of an EVC enclosure in order to suspend a system. Doing so may result in damage to the enclosure, leading to installation failure, and personal injury.

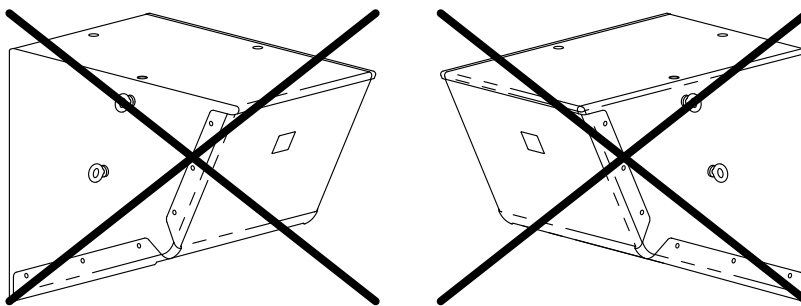
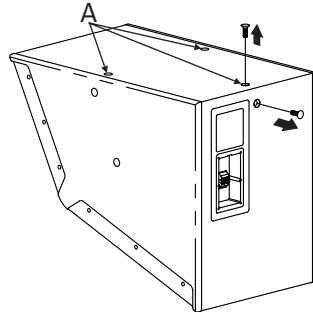


Figure 4.3: Eyebolts installed incorrectly in the sides of an enclosure in order to suspend it from above

All hardware supplied by the user must be rated for overhead lifting to suspend the loudspeaker system.

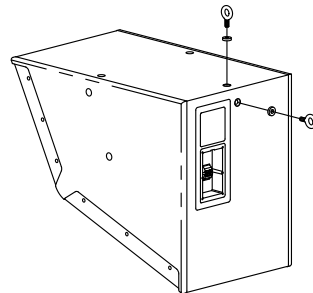
To install the eyebolts, do the following:

1. Remove the **three M10 flat-head bolts (A)** from the fly points on the top of the enclosure.



2. Screw the lifting **eyebolt with fender washer** into the threaded attachment point until the fender washer makes contact with the enclosure.

Never install the eyebolt without the washer included with the eyebolt kit.



3. Finger tighten the **eyebolt** until the correct alignment position is obtained.
A maximum of one complete turn.
4. Install a **safety cable**.

Eyebolts orientated in the plane of pull



Caution!

Eyebolts must be fully seated and oriented in the plane of pull. Always use the fender washer included with the eyebolt kit to distribute the load on the enclosure.

Excessive tightening of the eyebolt with a wrench, screwdriver or other tool, can result in a system failure and possible injury.

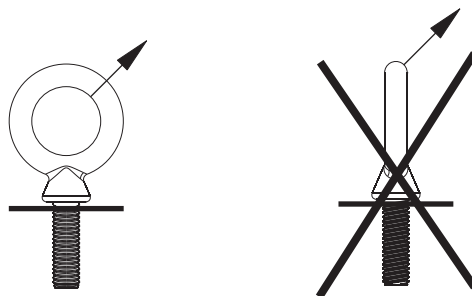


Figure 4.4: Fully seated eyebolts with washers, with correct orientation in the plane of pull (Correct; left, Incorrect; right)

5 Rigging strength ratings and safety factors

Working load limit and safety-factor definitions

The structural ratings for all EVC rigging components and loudspeaker systems are based on test results in which parts were stressed to failure. Manufacturers typically present the structural-strength ratings of mechanical components or systems as either the Working Load Limit (WLL) or the ultimate-break strength. Electro-Voice chooses to present the structural-load ratings of loudspeaker systems as the WLL. The WLL rating represents the maximum load that should ever be applied to a mechanical component or system.



Warning!

Never exceed the limitations or maximum recommended working load for Electro-Voice loudspeakers.

Disregarding this warning could result in serious injury or death.

The WLL for the rigging components and loudspeaker systems described in this manual is calculated with a 10:1 safety factor, which exceeds the minimum 8:1 safety factor normally specified by Electro-Voice. The safety factor is defined as the ratio of the ultimate-break strength divided by the WLL, where the ultimate-break strength represents the force at which a part will structurally fail. For example, if a part has a WLL of 100 lb (45.4 kg), it would not structurally fail until a force of at least 1,000 lb (453.6 kg) was applied, based on a 10:1 safety factor. However, the user should never apply a load to that part that exceeds 100 lb (45.4 kg). The safety factor provides a margin of safety above the WLL to accommodate normal dynamic loading and normal wear.

Cautions for working load limits and safety factors

The WLL defined by the manufacturer of any rigging component should never be exceeded. Other manufacturers of rigging components may base their WLL on safety factors other than 10:1. For example, 5:1 safety factors are fairly common among rigging manufacturers because many regulatory agencies call for a minimum safety factor of 5:1.

When an EV loudspeaker system is installed where local regulations only require a safety factor of 5:1, Electro-Voice insists that the WLL of the loudspeaker rigging never be exceeded and that an 10:1 safety factor be maintained.

The user is cautioned that some local regulations may require safety factors higher than 10:1. In those circumstances, Electro-Voice insists that the user maintain the higher safety factor as required by the local regulations throughout the entire loudspeaker installation. It is the responsibility of the user to make sure that any loudspeaker installation meets all applicable local, state or federal safety regulations.

Recommended practice for eyebolts

Eyebolts can be used to suspend individual loudspeakers when attached through the integral M10 attachment points. It is a good idea to orient the suspending cable so that it hangs within 30° of the straight-up position in the plane of pull (left illustration), and within 15° against the plane of pull (right illustration).

Suspension line angle limits for individual eyebolts

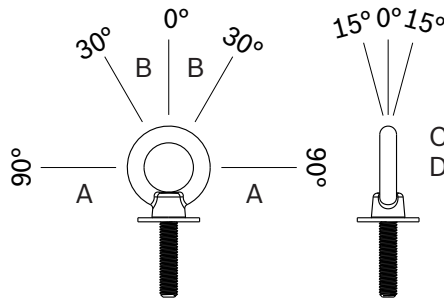


Figure 5.1: Suspension line angle limits for individual eyebolts, both in plane of pull (left) and against plane of pull (right)

- A Above 90° NOT TO BE USED
- B 0° to 30° recommended for main suspension line angle
- C ±15° for all applications
- D Above 15° NOT TO BE USED

Suspension line angles

Refer to WLL for M10 eyebolts and EVC loudspeakers and *Suspension line angle limits for individual eyebolts, page 13* for specific eyebolt angle and weight limitations when using eyebolt suspension. These limits are not to be exceeded under any circumstances. If a safety factor higher than 10:1 is required, the angle limits for each eyebolt may actually decrease to a number less than what is shown in *Suspension line angle limits for individual eyebolts, page 13*.

Working load limit for M10 eyebolts and EVC loudspeaker

Model	WLL Each Point (10:1)	WLL Speaker (10:1)
EVC-1122-VITEN54	55 lb	55 lb

Tab. 5.2: WLL for M10 eyebolts and EVC loudspeaker

Always ensure that the suspension line is in the plane of the eyebolt, as shown in *Eyebolts orientated in the plane of pull, page 11*. Readjust the eyebolt during the installation if necessary to maintain this alignment.

Eyebolt suspension-line angle limit

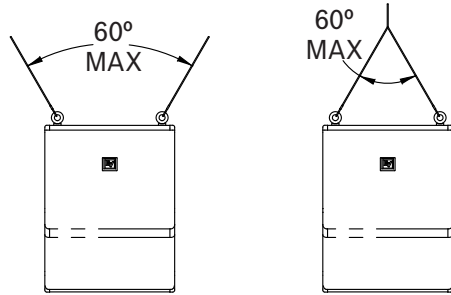


Figure 5.2: All-eyebolt suspension-line angle limit, independent (left) or bridled (right) suspension lines

Left-to-right all-eyebolt suspension angles

The suspended all-eyebolt cluster must be perpendicular (plumb) to within $\pm 5^\circ$.

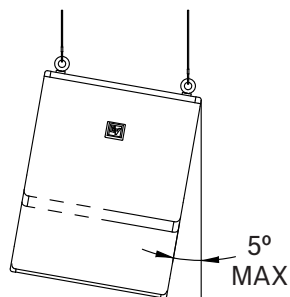


Figure 5.3: Left-to-right angle limits for an all-eyebolt suspension (visual angle shown exaggerated for illustration purposes)

6 Electrical connection

6.1 Connection

All EVC full-range systems are passive, meaning that the internal crossover/equalizer network sends low frequencies to the woofer and high frequencies to the compression-driver/waveguide combination. In addition, the network tailors the frequency response and level of each individual driver so that the overall frequency response of the loudspeaker is essentially flat over its intended range of operation. There is no bi-amp option for EVC full-range loudspeakers.

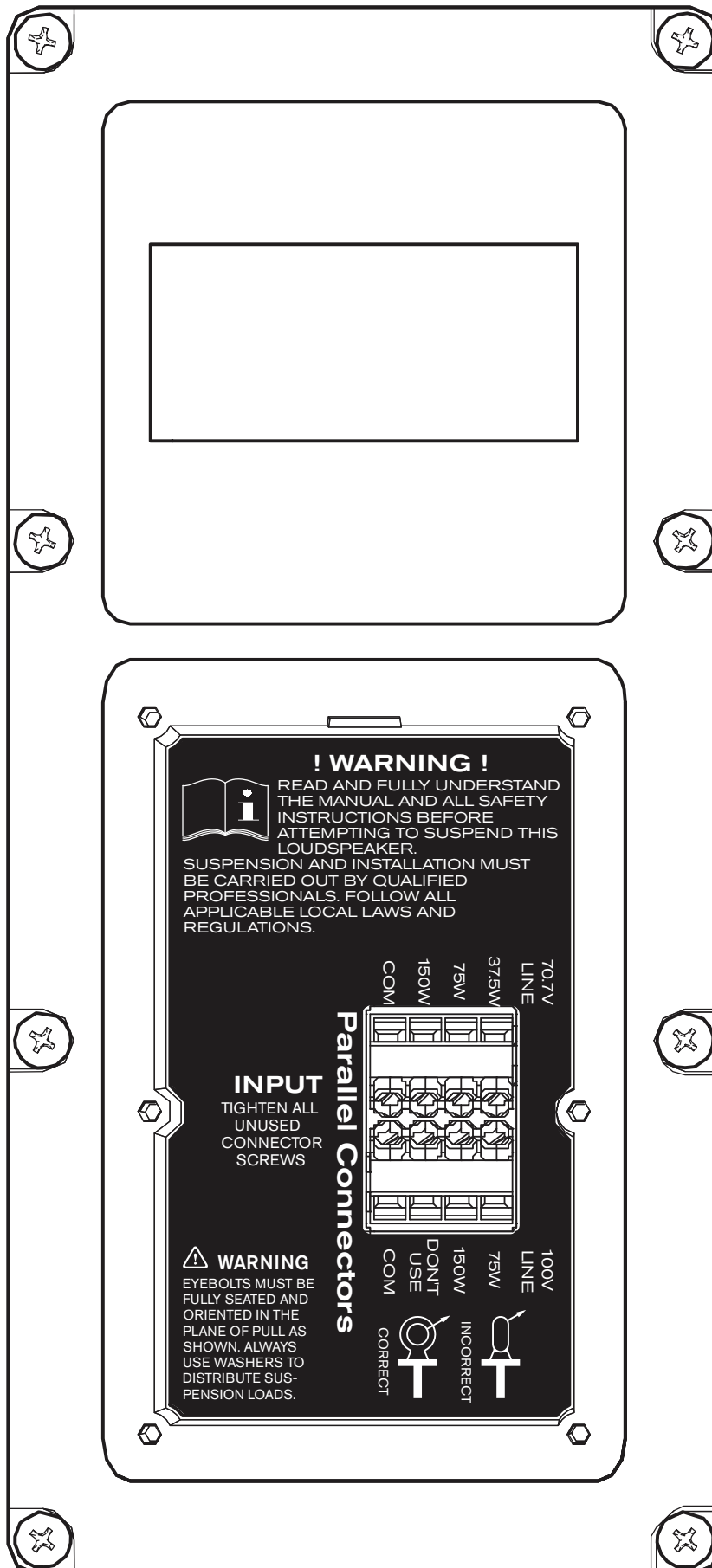


Figure 6.1: EVC Variable-Intensity Loudspeaker rear panel

To **connect the loudspeaker to the power source**, do the following:

1. Connect the **(-) input line to the COM input terminal**.
2. Connect the **(+) input line to the terminal corresponding to the desired wattage** in either the 70.7 V or 100 V column.

If connecting more than one speaker, each group of four terminals is electrically connected in parallel to the directly adjacent group of four terminals. The wattages charted in these two columns represent the wattage available from each of the three transformer taps at the designated voltage.

The gland nut on the wiring cover is designed for cable jacket diameters of 6 mm to 12 mm in diameter. Only use wiring with a jacket diameter within this range.



Notice!

Wiring installation must be performed by a skilled technician.

Optional speaker processing

Once an EVC loudspeaker is installed in a venue, a digital signal processor (DSP) will typically be used to adjust the in-room frequency response. In addition, the DSP should be used to provide the high-pass filters recommended to protect the EVC-1122-VITEN54 from overdrive at frequencies below its operating range. Failure to do so could damage the low-frequency driver if the system is subjected to high-level signals below its operating range. The recommended high-pass filter frequencies for infrasonic protection of the EVC-1122-VITEN54 is:

Model	Recommended high-pass frequency (minimum)
EVC-1122-VITEN54	50 Hz, 4 th -order high-pass (24dB/octave)

Tab. 6.3: Recommended high-pass filter frequencies for infrasonic protection of EVC-1122-VITEN54 systems

The recommended high-pass filter can be implemented in a stand-alone DSP loudspeaker controller or in the processing section of a DSP-enabled amplifier. L Series and C Series amplifiers from Dynacord are recommended for use with EVC loudspeakers because they can also implement model-specific processing that optimizes loudspeaker performance. EVC loudspeaker settings can also be implemented in any IRIS-Net compatible digital signal processor.



Notice!

Preset EVC1122-VI(FR)FIR v1.0.SPS is available for download from www.electrovoice.com and is approved for use in EN54 installations.

7 TK-150 transformer

High Pass Filter Requirements:



Caution!

Failure to use the proper high-pass filter may result in damage to the amplifier.

The TK-150 audio transformer is designed to be used with Butterworth 24 dB/octave high-pass filter inserted in the signal chain at the input to the amplifier. The filter corner frequency should be set at 50 Hz for full-range models. This filter, in conjunction with the Automatic Saturation Compensation (ASC) feature, protects the amplifier from damage caused by transformer saturation at low frequencies and allows any number of transformers to be driven on the same 70V or 100V line, up to the rated power of the amplifier. At the same time, the ASC circuit preserves the low-frequency extension of the system by adding incremental filtering only to the extent required by the current level in the loudspeaker.



Notice!

Each group of four terminals is electrically connected in parallel to the group of four terminals directly across from it.

The wattages charted in these two columns represent the wattage available from each of the three transformer taps at the designated voltage.

	70V	100V	Z nom
Transformer: (Standard 50 Hz BW24 High-pass)	37.5 W	75 W	130 Ω
	75 W	150 W	65 Ω
	150 W	Do Not Use	33 Ω

Tab. 7.4: Transformer ratings and taps



Caution!

This transformer affects only the loudspeaker to which it is installed.

Improper connection may result in damage to the transformer, successive loudspeakers, the driving amplifier or any combination of these units.



Caution!

When daisy chaining additional systems, connect the wires to the next system only to those terminals directly opposite the input wires.

Improper connection may result in damage to the transformer, successive loudspeakers, the driving amplifier or any combination thereof.



Notice!

Tighten all unused connector screws to prevent rattles.

8 Technical data

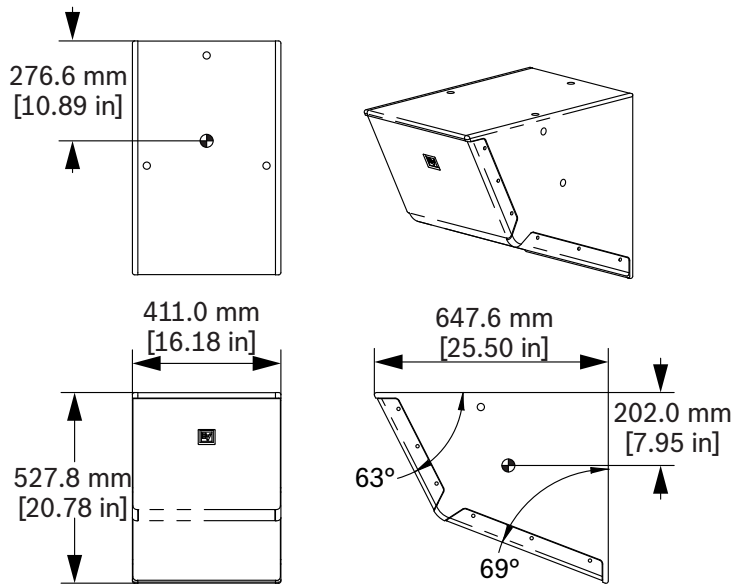
Frequency response (-3 dB) ^{1, 3} :	70 Hz - 20 kHz
Frequency range (-10 dB) ^{1, 3} :	50 Hz - 25 kHz
Rec. high-pass frequency:	50 Hz
Passive crossover frequency:	1.6 kHz
Axial sensitivity ¹ :	79 dB (1 W/4 m)
MAX SPL:	100.5 dB ¹
Power handling ² :	150 W (Continuous), 600 W (Peak)
LF transducer:	EVS-12M
HF transducer:	DH-3
Connectors:	Dual four-pin 10 AWG Phoenix/Euro Block screw-terminals
Enclosure:	15-mm plywood with EVCoat
Grille:	18 GA powder-coated steel with rotatable logo
Environmental:	INDOOR ONLY
Suspension:	(8) M10 suspension points
Color:	Black or white
Dimensions (H x W x D):	528 mm x 411 mm x 648 mm (20.78 in x 16.18 in x 25.50 in)
Net weight:	24.1 kg (53.1 lb)
Shipping weight:	26.8 kg (59.1 lb)

¹Full-space measurement.

²Per EN-54 test standard.

³With recommended preset.

Dimensions:



9 EN54-24 technical information

Data measured and expressed as per EN54-24 requirements.

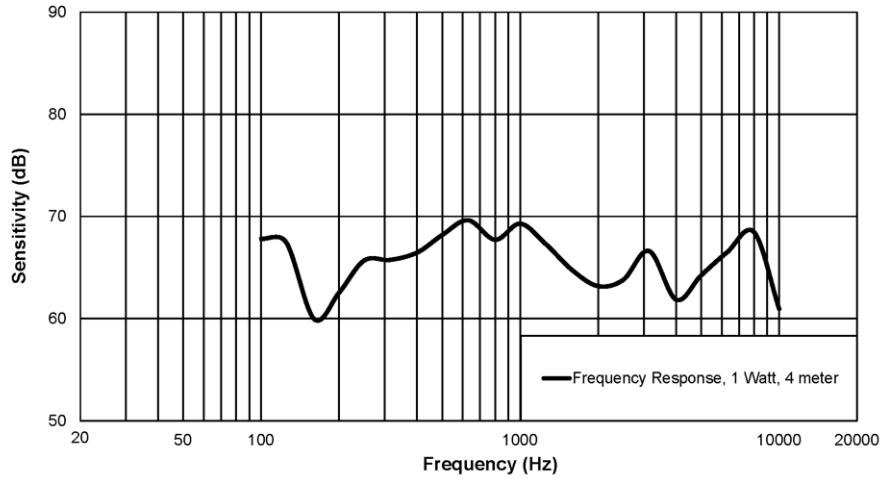


Figure 9.1: EVC-1122-VITEN54 frequency response 1 watt/4 meters

Frequency (Hz)	Reproducibility (dB/SPL)	Horizontal coverage Degrees	Vertical coverage Degrees
500	68	140	185
630	69.5		
800	67.5		
1000	69	110	140
1250	67		
1600	64.5		
2000	63	105	145
2500	63.5		
3150	66.5		
4000	61.5	85	100

Tab. 9.5: Reproducibility and coverage angles measured full-space at 4 meters Signal at 1 watt of 1/3 octave band filtered pink noise.

Technical data EN54

Sensitivity per EN54-24 standard (SPL 1 W/4 m):	79 dB
Max measured SPL per EN54-24 standard:	150 W Transformer coupled at 4 meters_ 100.5 dB
Impedance:	70 V Transformer coupled: 150 W/33 Ω, 75 W/65 Ω, 37.5 W/130 Ω

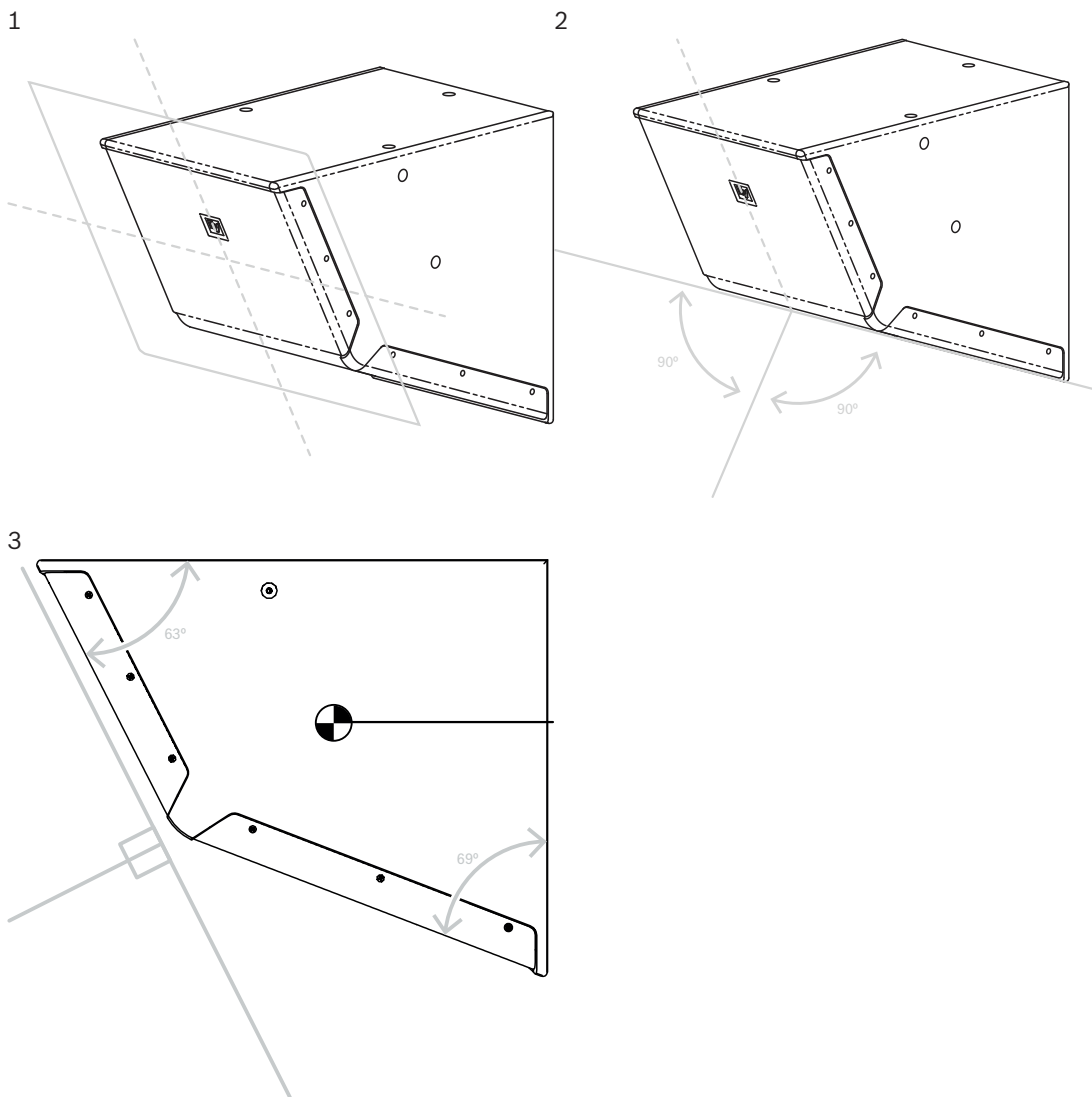
	100 V Transformer coupled: 150 W/65 Ω, 75 W/130 Ω
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Notice!

The specifications data was measured in an anechoic chamber according to EN 54-24. See drawing for reference plane, reference axis, and horizontal plane.

9.1 Reference points



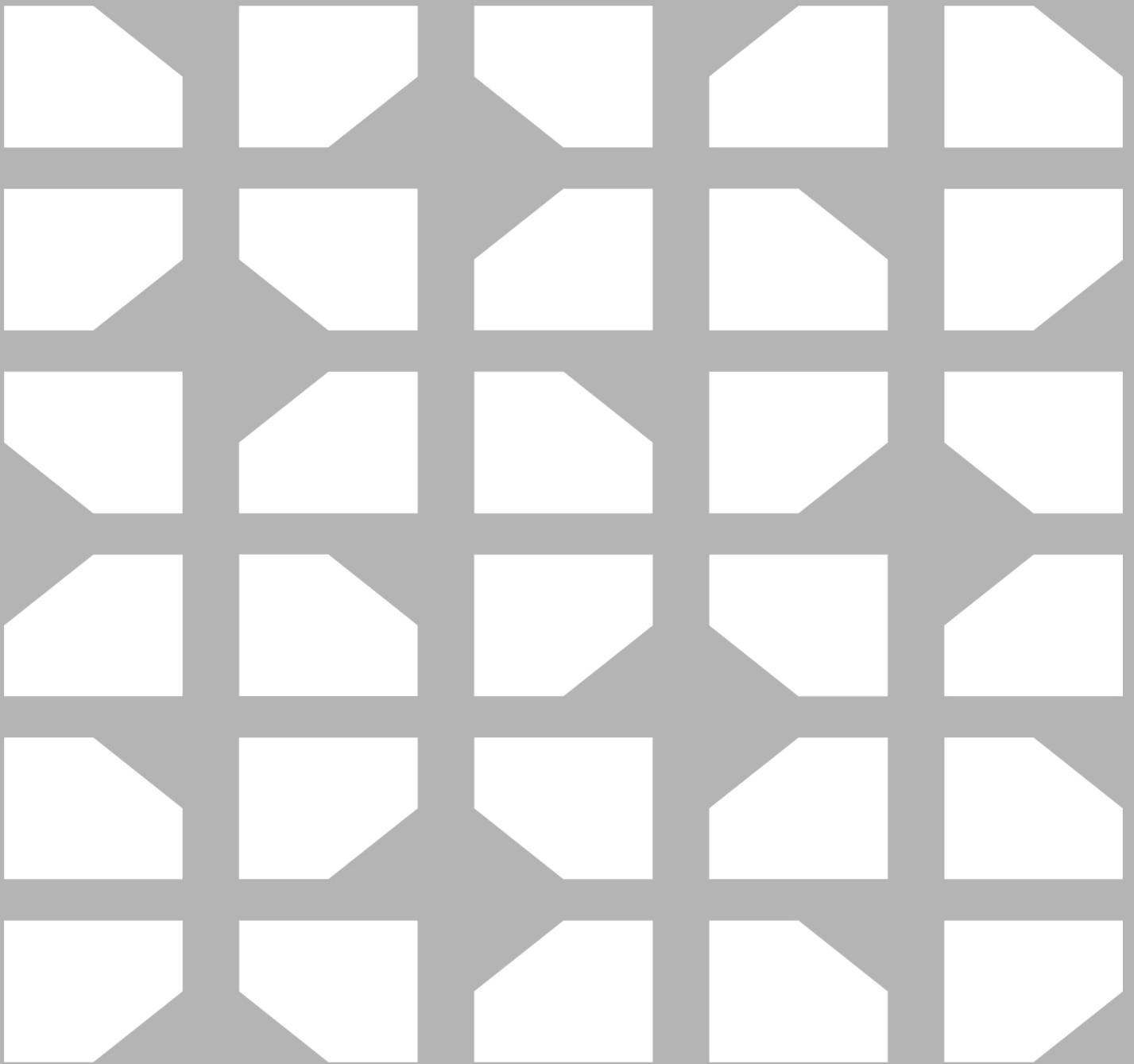
1	Reference Plane
2	Horizontal Plane
3	Reference Axis



0905

Bosch Security Systems Inc.
130 Perinton Pkwy, Fairport, NY, 14450, USA
19
0905-CPR-192014-01

EN 54-24:2008
Loudspeaker for voice alarm systems
for fire detection and fire alarm systems for buildings
Loudspeakers EVC-1122-VIBTEN54, EVC-1122-VIWTEN54
Type A
See product manual F.01U.378.116 for further installation information.



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