CAL™ Column Array Loudspeaker

thinking sound Meyer Sound®

Keep these important operating instructions.
Check www.meyersound.com for updates.

DECLARATION OF CONFORMITY ACCORDING TO ISO/IEC GUIDE 22 AND EN 45014

Manufacturer's Name: Meyer Sound Laboratories Inc.

Manufacturer's Address: 2832 San Pablo Avenue
Berkeley, CA 94702-2204, USA

Declares that the product:

Product Names: CAL 96 Column Array Loudspeaker System
CAL 64 Column Array Loudspeaker System
CAL 32 Column Array Loudspeaker System

Product Options: All

Conforms to the following Product Specifications:

Safety: EN 60065:2002

Supplementary Information: The product herewith complies with the requirements of the Low Voltage Directive (LVD) 2006/95/EC.

Signature:

Ms. Margie Garza
Director of Quality
Meyer Sound Laboratories Inc.
Berkeley, California 94702 USA
Issued June 28, 2012

European Contact:
Your local Meyer Sound dealer or
Meyer Sound Germany, GmbH.

CAL Operating Instructions, PN 05.210.087.01 A3

SYMBOLS USED

These symbols indicate important safety or operating features in this booklet and on the chassis:

			
Dangerous voltages: risk of electric shock	Important operating instructions	Frame or chassis	Protective earth ground
Pour indiquer les risques résultant de tensions dangereuses	Pour indequer important instructions	Masse, châssis	Terre de protection
Warnung vor gefährlicher elektrischer Spannung	Wichtige Betriebsanweisung oder Gebrauchsanleitung	Rahmen oder Gehäuse	Masse Schutzleiter
Para indicar voltajes peligrosos	Instrucciones importantes de funcionamiento y/o manteniento	Armadura o chassis	Tierra proteccionista

IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this loudspeaker near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with Meyer Sound's installation instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
9. Do not defeat the safety purpose of the grounding-type plug. A grounding type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the loudspeaker. The AC mains plug or appliance coupler shall remain readily accessible for operation.
11. Only use attachments/accessories specified by Meyer Sound.
12. If applicable, use only with the caster rails or rigging specified by Meyer Sound, or sold with the loudspeaker. Handles are for carrying only.

    ⚠ **CAUTION:** Rigging should only be done by experienced professionals.

13. Unplug this loudspeaker during lightning storms or when unused for long periods of time.
14. Disconnect the mains plug before disconnecting the power cord from the loudspeaker.
15. Refer all servicing to qualified service personnel. Servicing is required when the loudspeaker has been damaged in any way, such as when the power-supply cord or plug has been damaged; liquid has been spilled or objects have fallen into the loudspeaker; rain or moisture has entered the loudspeaker; the loudspeaker has been dropped; or when for undetermined reasons the loudspeaker does not operate normally.

⚠ **CAUTION:** To reduce the risk of electric shock, do not expose this loudspeaker to rain or moisture. Do not install the loudspeaker in wet or humid locations without using weather protection equipment from Meyer Sound.

SAFETY SUMMARY

English

- To reduce the risk of electric shock, disconnect the loudspeaker from the AC mains before installing audio cable. Reconnect the power cord only after making all signal connections.
- Connect the loudspeaker to a two-pole, three-wire grounding mains receptacle. The receptacle must be connected to a fuse or circuit breaker. Connection to any other type of receptacle poses a shock hazard and may violate local electrical codes.
- Do not install the loudspeaker in wet or humid locations without using weather protection equipment from Meyer Sound.
- Do not allow water or any foreign object to get inside the loudspeaker. Do not put objects containing liquid on or near the unit.
- To reduce the risk of overheating the loudspeaker, avoid exposing it to direct sunlight. Do not install the unit near heat-emitting appliances, such as a room heater or stove.
- This loudspeaker contains potentially hazardous voltages. Do not attempt to disassemble the unit. The unit contains no user-serviceable parts. Repairs should be performed only by factory-trained service personnel.

Français

- Pour réduire le risque d'électrocution, débrancher la prise principale de l'haut-parleur, avant d'installer le câble d'interface allant à l'audio. Ne rebrancher le bloc d'alimentation qu'après avoir effectué toutes les connections.
- Branchez l'haut-parleur dans une prise de courant à 3 dérivations (deux pôles et la terre). Cette prise doit être munie d'une protection adéquate (fusible ou coupe-circuit). Le branchement dans tout autre genre de prise pourrait entraîner un risque d'électrocution et peut constituer une infraction à la réglementation locale concernant les installations électriques.
- Ne pas installer l'haut-parleur dans un endroit où il y a de l'eau ou une humidité excessive.
- Ne pas laisser de l'eau ou tout objet pénétrer dans l'haut-parleur. Ne pas placer de r´cipients contenant un liquide sur cet appareil, ni à proximité de celui-ci.
- Pour éviter une surchauffe de l'haut-parleur, conserver-la à l'abri du soleil. Ne pas installer à proximité d'appareils dégageant de la chaleur tels que radiateurs ou appareils de chauffage.
- Ce haut-parleur contient des circuits haute tension présentant un danger. Ne jamais essayer de le démonter. Il n'y a aucun composant qui puisse être réparé par l'utilisateur. Toutes les réparations doivent être effectuées par du personnel qualifié et agréé par le constructeur.

Deutsch

- Um die Gefahr eines elektrischen Schlages auf ein Minimum zu reduzieren, den Lautsprecher vom Stromnetz trennen, bevor ggf. ein Audio-Schnittstellensignalkabel angeschlossen wird. Das Netzkabel erst nach Herstellung aller Signalverbindungen wieder einstecken.
- Der Lautsprecher an eine geerdete zweipolige Dreiphasen-Netzsteckdose anschließen. Die Steckdose muß mit einem geeigneten Abzweigschutz (Sicherung oder Leistungsschalter) verbunden sein. Der Anschluß der unterbrechungsfreien Stromversorgung an einen anderen Steckdosentyp kann zu Stromschlägen führen und gegen die örtlichen Vorschriften verstoßen.
- Der Lautsprecher nicht an einem Ort aufstellen, an dem sie mit Wasser oder übermäßig hoher Luftfeuchtigkeit in Berührung kommen könnte.
- Darauf achten, daß weder Wasser noch Fremdkörper in das Innere den Lautsprecher eindringen. Keine Objekte, die Flüssigkeit enthalten, auf oder neben die unterbrechungsfreie Stromversorgung stellen.
- Um ein Überhitzen dem Lautsprecher zu verhindern, das Gerät vor direkter Sonneneinstrahlung fernhalten und nicht in der Nähe von wärmeabstrahlenden
- Haushaltsgeräten (z.B. Heizgerät oder Herd) aufstellen.
- Im Inneren diesem Lautsprecher herrschen potentiell gefährliche Spannungen. Nicht versuchen, das Gerät zu öffnen. Es enthält keine vom Benutzer reparierbaren Teile. Reparaturen dürfen nur von ausgebildetem Kundenienstpersonal durchgeführt werden.

Español

- Para reducir el riesgo de descarga eléctrica, desconecte de la red de voltaje el altoparlante antes de instalar el cable de señal de audio. Vuelva a conectar la alimentacion de voltaje una vez efectuadas todas las interconexiones de señalizacion de audio.
- Conecte el altoparlante a un tomacorriente bipolar y trifilar con neutro de puesta a tierra. El tomacorriente debe estar conectado a la protección de derivación apropiada (ya sea un fusible o un disyuntor). La conexión a cualquier otro tipo de tomacorriente puede constituir peligro de descarga eléctrica y violar los códigos eléctricos locales.
- No instale el altoparlante en lugares donde haya agua o humedad excesiva.
- No deje que en el altoparlante entre agua ni ningún objeto extraño. No ponga objetos con líquidos encima de la unidad ni cerca de ella.
- Para reducir el riesgo de sobrecalentamiento, no exponga la unidad a los rayos directos del sol ni la instale cerca de artefactos que emiten calor, como estufas o cocinas.
- Este altoparlante contiene niveles de voltaje peligrosos en potencia. No intente desarmar la unidad, pues no contiene piezas que puedan ser reparadas por el usuario. Las reparaciones deben efectuarse únicamente por parte del personal de mantenimiento capacitado en la fábrica.

CONTENTS

CHAPTER 1: INTRODUCTION

HOW TO USE THIS MANUAL

Make sure to read these operating instructions in their entirety before configuring a loudspeaker system with CAL loudspeakers. In particular, pay close attention to material related to safety issues.

As you read these operating instructions, you will encounter the following icons for notes, tips, and cautions:

NOTE: A note identifies an important or useful piece of information relating to the topic under discussion.

TIP: A tip offers a helpful tip relevant to the topic at hand.

CAUTION: A caution gives notice that an action may have serious consequences and could cause harm to equipment or personnel, and could cause delays or other problems.

Information and specifications are subject to change. Updates and supplementary information are available at www.meyersound.com.

Meyer Sound Technical Support is available at:

- **Tel:** +1 510 486.1166
- **Tel:** +1 510 486.0657 (after hours support)
- **Web:** www.meyersound.com/support
- **Email:** techsupport@meyersound.com

CAL COLUMN ARRAY LOUDSPEAKER

The CAL™ steerable column array loudspeaker combines over three decades of technological innovation and advanced research into the laws of physics and digital signal processing to achieve unprecedented accuracy in sound reproduction. Designed primarily for vocal reproduction in fixed installations, the self-powered CAL offers vertical beam spreads as narrow as 5 degrees and as wide as 30 degrees that can be digitally steered up or down by 30 degrees. CAL's beam steering takes the practice of directing sound to the next level, and with a smart, lean profile, CAL sets the standard for high-quality sound installations.

CAL 96, CAL 64, and CAL 32 (Shown without Grille Frames)

CAL is available in three models, each providing a different output level — up to a maximum peak SPL of 106 dB at 90 meters with CAL 96 — over an operating frequency range of 100 Hz to 16 kHz. Providing a horizontal coverage of 120 degrees, as well as the flexibility of vertical beam steering, a single unobtrusive CAL delivers clear vocal reproduction over a large area while minimizing undesirable reflections.

Discrete onboard Class D amplifier channels, processed by sophisticated algorithms, power each driver and tweeter. The amplitude and phase responses of each driver are engineered to produce interactions that yield the desired vertical spread. Controlling each element individually yields greater flexibility and precision than other beam steering systems that control modules comprised of multiple drivers.

The accuracy of CAL's vertical steering allows system designers to pinpoint coverage, even when mounting options in a venue do not allow for physically aiming a loudspeaker toward a coverage area. CAL 96 and CAL 64 include split beams that can be configured to fit the application, for example, to avoid hitting a reflective balcony surface. To meet the high intelligibility requirement for vocal reproduction, CAL has been engineered to maintain accurate beam steering up to 10 kHz, well beyond the benchmark of 4 kHz used in traditional single-driver loudspeakers.

CAL loudspeakers include two AVB-enabled Ethernet ports for receiving AVB audio streams as source signals. The ports also provide computer control of CAL via Meyer Sound's Compass® control software, allowing beam control and RMS™ real-time monitoring of each loudspeaker on the network.

CAL comes standard with adjustable mounting brackets for installation on walls or columns. The low-profile aluminum enclosure is available in white, black, and custom colors, allowing it to blend easily into any background. Weather protection permits outdoor installations in most environments.

CAL INSTALLATION OVERVIEW

Below is a basic overview for installing and using the CAL loudspeaker. It is recommended that you read the remainder of this document in its entirety before proceeding.

1. Use CAL's included mounting brackets to mount the loudspeaker on a wall or column. For more information, see Chapter 6, "Mounting CAL Loudspeakers."
2. Remove CAL's user panel cover. For more information, see "User Panel Cover" on page 17.
3. Connect CAL to an appropriate power source with the included power cable. For power requirements, see Chapter 2, "Power Requirements."
4. Connect an audio source to one of CAL's three analog balanced audio inputs, to its AES/EBU digital input, or to one of its two Network / AVB ports. For more information, see "Audio Input" on page 13.

   TIP: You can connect a second audio source to one of the audio inputs to be used as an override signal.

5. Connect to CAL's logic I/O ports any external devices you want to use for muting and overriding audio sources, detecting loudspeaker faults, and changing presets. For more information, see "Logic I/O Ports" on page 15.
6. Connect CAL to your computer's Ethernet port or to a network router or network switch using a CAT-5e cable. For more information, see "Network / AVB Ports" on page 17.
7. Install the Compass control software and any supporting software. For installation details, refer to the Compass documentation included with CAL (also available at www.meyersound.com).
8. Launch the Compass control software and configure CAL's audio inputs, vertical beam spread, vertical beam steering, and processing. For more information, refer to the Compass documentation included with CAL (also available at www.meyersound.com).
9. Reattach CAL's user panel cover. For more information, see "User Panel Cover" on page 17.

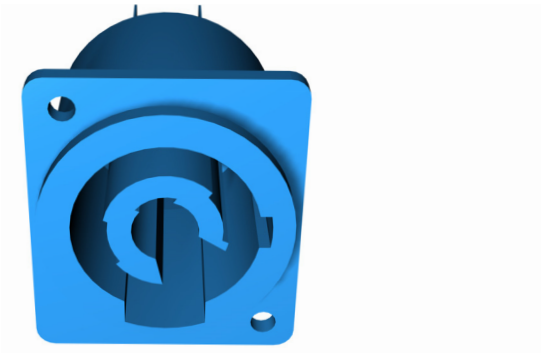
   CAUTION: When installing CAL outdoors, the user panel cover should always be attached to protect the user panel connectors from the weather elements.

CHAPTER 2: POWER REQUIREMENTS

CAL loudspeakers combine advanced loudspeaker technology with equally advanced power capabilities. Understanding voltage and current requirements, as well as electrical safety issues, is critical to CAL's safe operation.

AC INPUT CONNECTOR

The CAL user panel includes a 3-pole, PowerCon AC Input connector. The AC Input connector supplies power to the CAL loudspeaker. The connector is rated at 20 amps and uses a PowerCon3 AC mains locking connector that prevents accidental disconnections. A 10-foot AC power cable, rated at 15 amps, is included with each CAL loudspeaker.



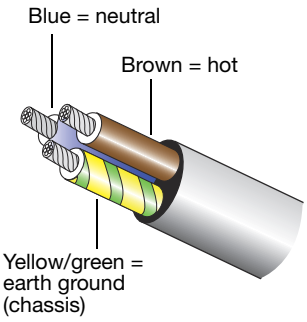
CAL AC Input Connector

CAL loudspeakers require a grounded outlet. To operate safely and effectively, it is extremely important that the entire system be properly grounded.

If you replace the included AC power cable, make sure to use a cable that is wired correctly and equipped with the appropriate power plug (on the other end) for the area in which you will operate the unit.

WIRING FOR AC CONNECTIONS

CAL loudspeakers require a grounded outlet. To operate safely and effectively, it is extremely important that the entire system be properly grounded.



AC Cable Wiring Scheme

When wiring international or special-purpose AC power cables and connectors, use the following wiring scheme:

- Connect the blue wire to the black terminal, or the terminal marked with an N.
- Connect the brown wire to the red terminal, or the terminal marked with an L.
- Connect the yellow and green wire to the green (or green and yellow) terminal, or the terminal marked with an E.

⚠ **CAUTION:** When creating AC power cables, it is important to preserve AC line polarity and connect the earth ground on both ends of the cable. CAL requires a grounded connection. Always use a grounded outlet and plug. It is extremely important that the system be properly grounded in order to operate safely and properly. Do not ground-lift the AC cable.

CAL VOLTAGE REQUIREMENTS

CAL operates safely and continuously when the AC voltage stays within 100–265 V AC at 50 or 60 Hz. The loudspeaker can withstand continuous voltages up to 265 V and allows any combination of voltage to GND (neutral-line-ground or line-line-ground).

If the voltage drops below 90 V (brownout), CAL uses stored power to continue operating temporarily; the loudspeaker shuts down if the voltage does not rise above the low boundary before the stored power is used.

If the voltage rises above 265 V, the power supply immediately shuts off to prevent damage to the unit.

If CAL shuts down due to either low or high voltage, its power supply automatically powers up again after three seconds, so long as the voltage has returned to its normal operating window. If CAL does not power up after 10 seconds, remove AC power immediately and contact Meyer Sound Technical Support.

⚠ **CAUTION:** The power source for CAL should always operate within the required voltage range, at least a few volts from the upper and lower ranges. This will ensure that AC voltage variations from the service entry — or peak voltage drops due to cable runs — will not cause the loudspeaker's amplifiers to cycle on and off or cause damage to the power supply.

🕮 **NOTE:** When voltage fluctuates within CAL's operating range, automatic tap selection stabilizes the operating voltage. This tap selection is instantaneous with no audible artifacts.

🕮 **NOTE:** Since CAL does not require a dedicated neutral line, and it can tolerate elevated voltages from the ground line, it can be connected to line-line terminals in 120 V, 3-phase Wye systems. This results in 208 V AC between lines (nominal) and therefore draws less current than when using 120 V AC (line-neutral). Make sure that the voltage remains within CAL's recommended operating window (100-264 V AC). The ground line must always be used for safety reasons and the line-to-ground voltage should never exceed 264 V AC (typically 120 V AC from line-to-ground).

Powering Up CAL Loudspeakers

When AC power is applied to CAL, its Intelligent AC™ power supply automatically selects the correct operating voltage, allowing it to be used internationally without manually setting voltage switches. In addition, Intelligent AC provides soft-start power up, eliminating high inrush currents; suppresses high-voltage transients up to several kilovolts; filters common mode and differential mode radio frequencies (EMI); and sustains operation temporarily during low-voltage periods.

When powering up CAL, the following startup events occur over several seconds.

1. Audio output is muted.
2. Voltage is detected and the power supply mode is automatically adjusted as necessary. The power supply ramps up.
3. After the power up sequence and system check have completed, the ON/Status LED turns solid green, indicating the loudspeaker is ready to reproduce audio.

⚠ **CAUTION:** If the ON/Status LED does not turn solid green after powering up and audio is muted, the loudspeaker has encountered a failure and may need to be serviced. Contact Meyer Sound Technical Support.

CAL CURRENT REQUIREMENTS

The current draw for CAL is dynamic and fluctuates as operating levels change. Since different cables and circuit breakers heat up at varying rates, it is important to understand the following types of current ratings and how they affect circuit breaker and cable specifications.

- **Idle Current** — The maximum rms current during idle periods.
- **Maximum Long-Term Continuous Current** — The maximum rms current during a period of at least 10 seconds. The Maximum Long-Term Continuous Current is used to calculate temperature increases for cables, to ensure that cable sizes and gauges conform to electrical code standards. The current rating is also used as a rating for slow-reacting thermal breakers.

- **Burst Current** — The maximum rms current during a period of around one second. The Burst Current is used as a rating for magnetic breakers. It is also used for calculating the peak voltage drop in long AC cable runs according to the following formula:

  V pk (drop) = I pk x R (cable total)

  The Burst Current can also be used to calculate the AC looping capability of CAL.

- **Ultimate Short-Term Peak Current** — A rating for fast-reacting magnetic breakers.

- **Inrush Current** — The spike of initial current encountered when powering on.

You can use the following table as a guide for selecting cable gauges and circuit breaker ratings for the system's operating voltage.

CAL Current Draw

Current Draw	Model	115 V AC	230 V AC	100 V AC
Idle Current	CAL 96	1.98 A rms	1.63 A rms	2.32 A rms
	CAL 64	1.24 A rms	0.99 A rms	1.42 A rms
	CAL 32	0.58 A rms	0.45 A rms	0.65 A rms
Maximum Long-Term Continuous Current	CAL 96	8.3 A rms	4.2 A rms	9.4 A rms
	CAL 64	6.1 A rms	3.1 A rms	6.9 A rms
	CAL 32	3.3 A rms	1.7 A rms	3.7 A rms
Burst Current	CAL 96	14.7 A rms	7.3 A rms	18.5 A rms
	CAL 64	10.8 A rms	5.4 A rms	13.6 A rms
	CAL 96	5.9 A rms	2.9 A rms	7.4 A rms
Ultimate Short-Term Peak Current	CAL 96	33 A peak	18 A peak	40 A peak
	CAL 64	24 A peak	13 A peak	29 A peak
	CAL 32	13 A peak	7 A peak	16 A peak

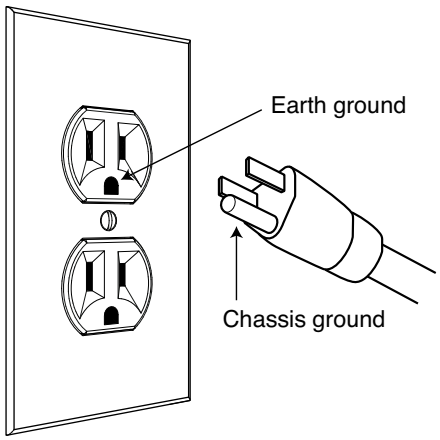
The minimum electrical service amperage required by a CAL loudspeaker system is the sum of the Maximum Long-Term Continuous Current for each loudspeaker. An additional 30 percent above the minimum amperage is recommended to prevent peak voltage drops at the service entry.

NOTE: For best performance, the AC cable voltage drop should not exceed 10 V, or 10 percent at 115 V and 5 percent at 230 V. Make sure that even with AC voltage drops that the AC voltage always remains within the operating windows.

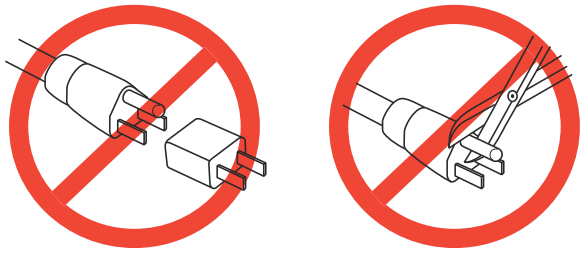
ELECTRICAL SAFETY ISSUES

Pay close attention to these important electrical and safety issues.

- CAL requires a grounded outlet. Always use a grounded outlet and plug.



- Do not use a ground-lifting adapter or cut the AC cable ground pin.



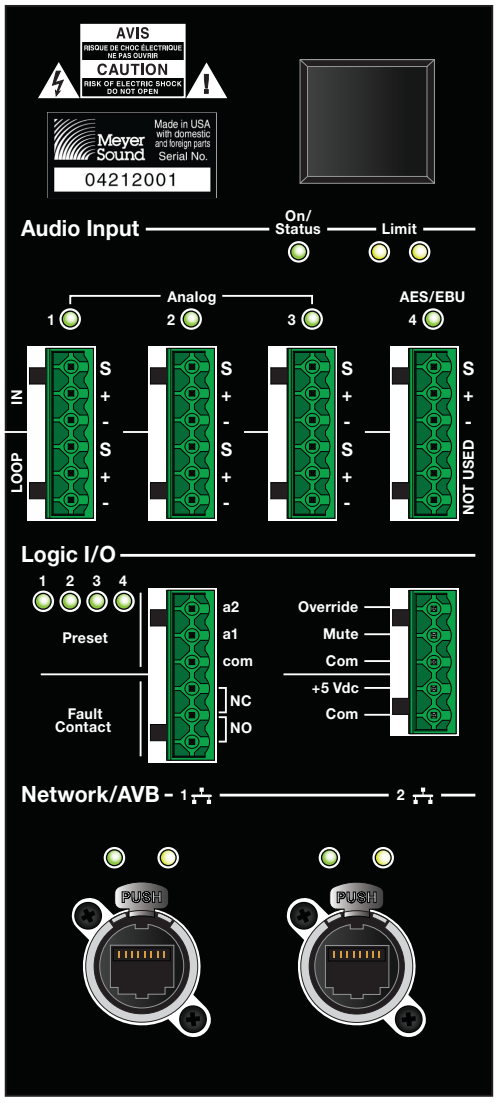
- Make sure the AC power cable for the loudspeaker has the appropriate power plug (on the other end) for the area in which you will operate the loudspeaker. In addition, the AC power cable must be rated for the total current draw of all loudspeakers looped from the power source.

- Do not operate the unit if its power cable is frayed or broken.

- Keep all liquids away from CAL loudspeakers to avoid hazards from electrical shock.

CHAPTER 3: CAL USER PANEL

The CAL user panel includes audio input connectors, both analog and digital (AES/EBU), for receiving audio source signals; logic connectors for selecting presets, overriding and muting audio output, and monitoring loudspeaker faults; and network ports for interfacing to a Mac or Windows-based computer running the Compass control software. The network ports can also be used for receiving AVB audio streams as audio source signals.



CAL User Panel

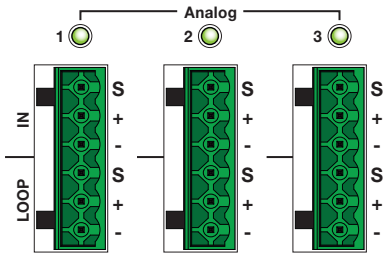
AUDIO INPUT

CAL includes four numbered audio inputs: three analog and one digital. The three analog inputs also provide loop output for looping multiple loudspeakers from a single audio source. In the Compass control software, a single input is specified as the active input, and another input can be specified as an override input (when the installation requires CAL to function as part of a fire alarm or evacuation system).

NOTE: AVB audio streams received from the Network / AVB ports can also be used as audio sources. For more information, see “AVB Audio Stream Input” on page 17.

NOTE: CAL ships from the factory with Analog Input 1 selected as the active input, and no input selected for the override input. These inputs can be changed with the Compass control software. For more information, refer to the Compass documentation included with CAL (also available at www.meyersound.com).

Analog Inputs (1–3)



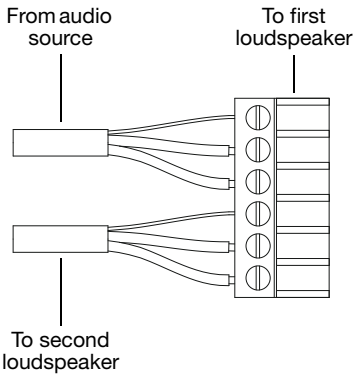
Analog Audio Input and Loop Output Connectors

The three analog inputs use Phoenix 6-pin male connectors and accept balanced audio signals with an input impedance of 10 kOhm. The analog audio source is received via the connector’s top three pins (shield, positive, and negative). The signal is looped to the connector’s bottom three pins (also shield, positive, and negative) for output when looping multiple loudspeakers from a single audio source. The pins for the analog connectors are clearly labeled on the CAL user panel.

The positive (+) and negative (–) pins carry the input as a differential signal. The shield (S) pin is connected to earth through a 1 kOhm, 1000 pF, 15 V clamped network. This circuitry provides virtual ground lift for audio frequencies while allowing unwanted signals to bleed to ground. When assembling cables, make sure all three pins are connected on both ends. Telescopic grounding is not recommended, and shorting an input connector pin to the case may cause a ground loop, resulting in hum.

Looping CAL Loudspeakers

The Analog input connectors allow multiple CAL loudspeakers to be looped from a single audio source. Connect the loop output pins of the first loudspeaker to the input pins of the second loudspeaker, and so forth. The loop output pins are wired in parallel to the input pins and transmit the unbuffered source signal even when the loudspeaker is powered off.



Phoenix cable wired for looped audio

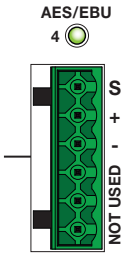
To avoid distortion when looping multiple CAL loudspeakers, make sure the source device can drive the total load impedance of the looped loudspeakers. In addition, the source device must be capable of delivering 20 dBV (10 V rms into 600 ohms) to yield the maximum peak SPL over the operating bandwidth of the loudspeaker.

To calculate the load impedance for the looped loudspeakers, divide 10 kOhms (the input impedance for a single CAL) by the number of looped loudspeakers. For example, the load impedance for 10 CAL loudspeakers is 1000 ohms (10 kOhms / 10). To drive this number of looped loudspeakers, the source device should have an output impedance of 100 ohms or less.

NOTE: Most source devices are capable of driving loads no smaller than 10 times their output impedance.

NOTE: Make sure that cabling for looped loudspeakers is wired correctly (shield to shield, positive to positive, and negative to negative) to prevent the polarity from being reversed. If one or more loudspeakers in a system have reversed polarity, frequency response and coverage can be significantly degraded.

Digital AES/EBU (4)



AES/EBU Input Connector

The digital input uses a Phoenix 6-pin male connector and accepts an AES3 digital audio signal. The digital audio source is received via the connector's top three pins (shield, positive, and negative). The connector's bottom three pins are not used. The pins for the digital connector are clearly labeled on the CAL user panel.

NOTE: The AES/EBU port accepts single-channel (mono) digital audio sources. When connecting AES/EBU audio sources to CAL, you must specify in the Compass control software whether the left channel (AES L) or right channel (AES R) will be used.

ON/STATUS LED

On/Status LED

During normal operation, CAL's On/Status LED is green. If the loudspeaker's internal temperature reaches 75° C (167° F), the LED turns solid yellow and the loudspeaker's gain is reduced by 3 dB. Though CAL will continue to operate normally with the lower gain, when the On/Status LED is yellow, this is an indication that the loudspeaker is reaching its maximum heat dissipation and a reduction in SPL is rec-

ommended. When the loudspeaker's internal temperature cools to 60° C (140° F), the amplifier returns to normal operation.

TIP: When CAL is connected to a computer running the Compass control software, the RMS tab provides additional feedback and warnings, if encountered, on the loudspeaker's operating temperature.

LIMIT LEDS

Limit LEDs

When source levels for CAL exceed the maximum input levels for its drivers, limiting is engaged and is indicated by the two Limit LEDs on the CAL user panel. The left LED indicates limiting for low-frequency channels while the right LED indicates limiting for high-frequency channels. When engaged, limiting not only protects the drivers, but also prevents signal peaks from causing excessive distortion in the amplifier channels, thereby preserving headroom and maintaining smooth frequency responses at high levels. When source levels return to normal, below the limiter's threshold, limiting ceases.

CAL performs within its acoustical specifications when the Limit LEDs are unlit, or if the LEDs are lit for two seconds or less and then turn off for at least one second. If an LED remains lit for longer than three seconds, the loudspeaker enters hard limiting where:

- Increases to the input level have no effect.
- Distortion increases due to clipping and nonlinear driver operation.
- Drivers are subjected to excessive heat and excursion, which will compromise their life span and may eventually cause damage over time.

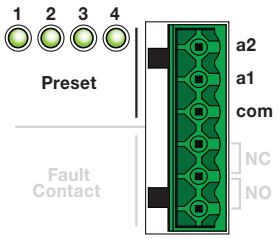
CAUTION: The Limit LEDs indicate when a safe, optimum level is exceeded. If a CAL loudspeaker begins to limit before reaching the required SPL, consider replacing it with a CAL model with more amplifier channels, or consider adding more CAL loudspeakers to the system to achieve the desired SPL without exposing the loudspeakers to excessive levels and possible overheating.

LOGIC I/O PORTS

The Logic I/O connectors provide a range of control and monitoring for CAL, including changing presets, overriding and muting the input signal, monitoring loudspeaker faults, and providing voltage output. The Logic I/O connectors are optically isolated from the CAL loudspeaker circuitry. The three COM pins are isolated from each other to set the reference voltage for their associated logic pins. A logic pin is triggered when it receives a voltage of 3 to 20 V DC greater than its associated COM voltage.

CAUTION: Do not send voltages greater than 20 V DC to the Logic I/O pins as this may damage the input circuitry.

Presets 1–4



Preset Pins

CAL presets recall loudspeaker settings for beam control and processing (5-band parametric EQ, gain, and delay). Presets are edited in the Compass control software. An unlimited number of presets can be saved and stored on your computer but only four presets can be stored in the CAL loudspeaker. When CAL is not connected to a computer, presets can be selected by sending control voltages to the A1 and A2 pins.

Table 1 illustrates the logic for selecting presets with control voltages.

Table 1: CAL Preset Selection Logic

	A1	A2
Preset 1	0	0
Preset 2	1	0
Preset 3	0	1
Preset 4	1	1

For example, to select preset 2, a voltage of 3 V DC is sent to the A2 pin while 0 V DC is sent to the A1 and COM A2.

NOTE: The A1 and A2 pins are triggered when receiving a voltage of 3 to 20 V DC greater than their associated COM voltage.

CAL Factory Presets

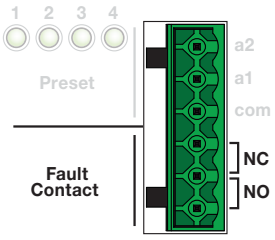
A summary of the beam settings for the CAL factory presets is shown in Table 2. CAL ships from the factory with these presets loaded into the loudspeaker. The presets can be edited and overwritten with the Compass control software. For more information, refer to the Compass documentation included with CAL (also available at www.meyersound.com).

Table 2: CAL Factory Presets

	Vertical Spread	Vertical Steering
Preset 1	20°	0°
Preset 2	20°	+20°
Preset 3	—	—
Preset 4	—	—

NOTE: Factory presets 3 and 4 are blank and if selected will yield no output for the loudspeaker.

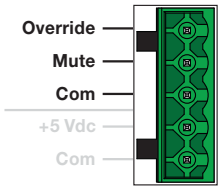
Fault Contact



Fault Contact Pins

The Fault Contact pins report when CAL shuts down or is no longer active. When CAL is powered on and working normally, the NO (normally-open) pins are open and the NC (normally-closed) pins are shorted together. When the loudspeaker is powered off, its internal relays switch so that the NO (normally-open) pins are shorted and the NC (normally-closed) pins are opened. The three Fault Contact pins are provided to accommodate monitoring for either short circuits or open circuits.

Override and Mute



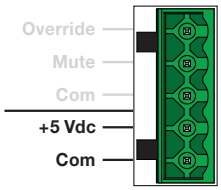
Override and Mute Pins

For installations where CAL is part of a fire alarm or evacuation system, the loudspeaker's active audio input (main program source) can be muted or replaced with an override input (alarm or emergency announcement source). The mute or override can be triggered with a relay closure attached to the Mute or Override pins.

The Mute pin is triggered when it receives a voltage of 3 to 20 V DC greater than its associated COM pin. When triggered, the Mute pin instructs CAL to mute its audio output.

The Override pin is triggered when it receives a voltage of 3 to 20 V DC greater than its associated COM pin. When triggered, the Override pin instructs CAL to override the active audio input with the override input. Both the active input and override input are specified in the Compass control software.

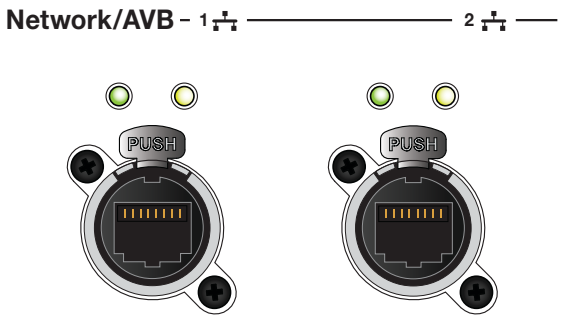
+5 V DC Power Source



+5 V DC Pins

CAL offers a local +5 V DC power source as a convenient means for controlling its Logic I/O features. The +5 V DC pins provide an isolated +5 V DC output that can be connected to any of the Logic I/O pins through an external relay or switch, eliminating the need for an external control voltage. The +5 V DC pin is fused at 0.35 A.

NETWORK / AVB PORTS



Network/AVB Connectors

CAL's two Network / AVB ports use RJ-45 Ethernet connectors and allow the loudspeaker to be connected to a standard computer Ethernet port, network router, or network switch with a CAT-5e cable. CAL's Network / AVB ports are AVB-enabled and use the IPv6 protocol for network communication. Two ports are provided for redundant control and each has an independent Media Access Control (MAC) address that is static and preassigned.

The yellow and green LEDs indicate connection and data traffic as on standard Ethernet ports.

When CAL is connected to a Mac or Windows-based computer, the Compass control software lets you configure beam spread and beam steering and upload the settings as a preset to CAL. Compass also includes an RMS tab for remote monitoring of all CAL loudspeakers on the network.

AVB Audio Stream Input

AVB audio streams received from CAL's Network / AVB ports can be used as audio sources. In the Compass control software, AVB audio streams for the connected port can be specified as the active input or override input.

OLED BUTTON

The OLED button is located in the upper right of the CAL user panel and provides visual feedback on the unit. During startup, the OLED displays CAL's Network port addresses. The addresses can also be viewed after startup.

To view CAL's Network port addresses:

1. Press and hold the OLED button until the addresses appear.

- The address for the left Network port is displayed when the OLED button displays a left arrow.
- The address for the right Network port is displayed when the OLED button displays a right arrow.

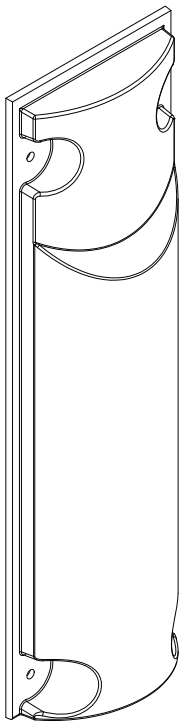
AMPLIFIER COOLING SYSTEM

CAL employs a combination of natural convection and forced air in its cooling system. The amplifier's heat sink provides natural convection cooling from the air flowing near its fins. In addition, a single-speed fan circulates air internally to ensure that CAL remains operational when exposed to high ambient temperatures or when driven continuously at high output levels.

⚠ **CAUTION:** The CAL heat sink can reach temperatures up to 85° C (185° F) during extreme operation. Use caution when approaching the rear of the loudspeaker.

USER PANEL COVER

A user panel cover is included with CAL to protect the connectors from dust in indoor installations and the weather elements in outdoor installations. The cover is installed by default and must be removed to gain access to the user panel.



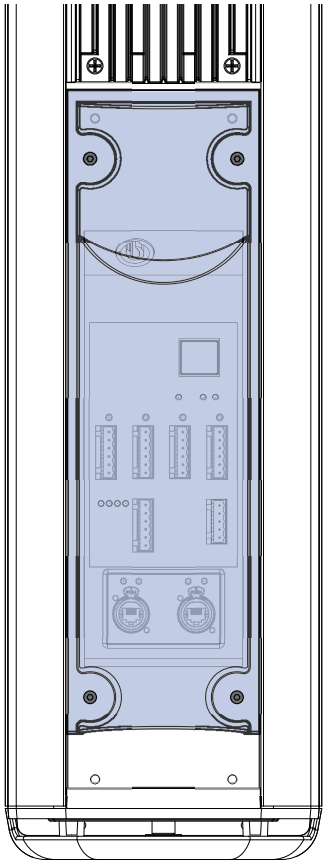
CAL User Panel Cover

⚠ **CAUTION:** When installing CAL outdoors, the user panel cover should always be attached to protect the user panel connectors from the weather elements.

Removing and Installing the User Panel Cover

To remove and install the user panel cover:

1. Use a hex wrench to remove the four hex screws, flat washers, and lock washers securing the user panel cover to the CAL loudspeaker.
2. Attach any required cables to the user panel connectors.
3. Reattach the user panel cover, securing it with the previously removed hex screws, lock washers, and flat washers. Install the flat washers before the lock washers so the user cover panel is adequately sealed.



CAL with User Panel Cover Attached (Shown Transparent)

CHAPTER 4: CAL COVERAGE

SUMMARY OF CAL COVERAGE

Below is a summary of the supported horizontal and vertical coverages for the three CAL loudspeaker models.

Table 3: CAL Coverage

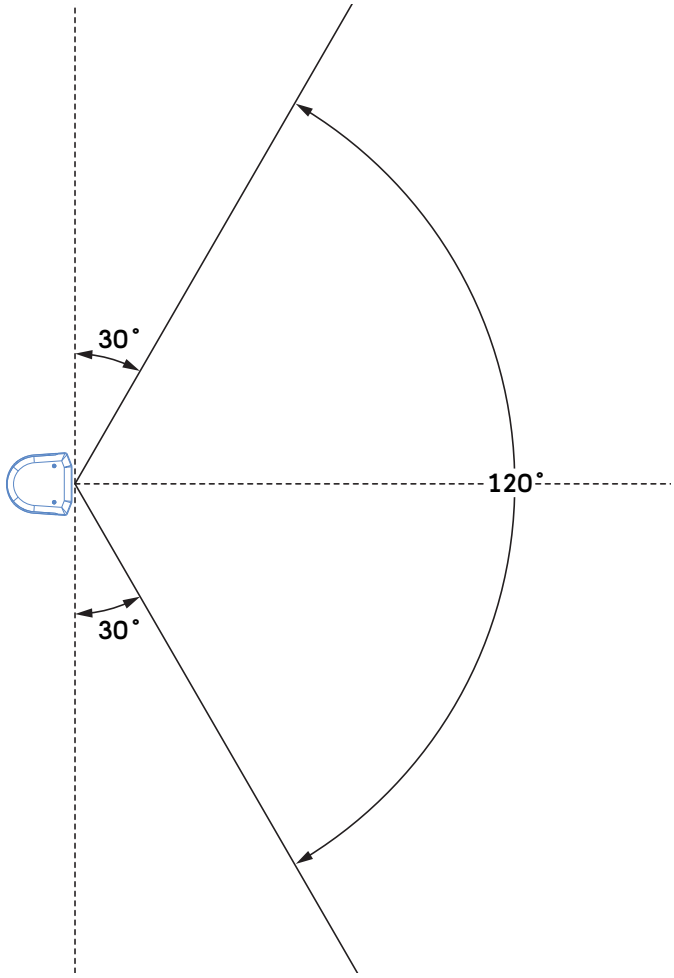
Model	Horizontal Fixed Coverage	Vertical Beam Spread	Vertical Beam Steering	Vertical Beam Splits
CAL 96	120°	5° to 30° (in 5° increments)	±30° (in 1° increments)	Top, bottom
CAL 64	120°	5° to 30° (in 5° increments)	±30° (in 1° increments)	Center
CAL 32	120°	5° to 30° (in 5° increments)	±30° (in 1° increments)	None

NOTE: Beam are configured in the Compass control software and can be saved as part of a preset. For more information, refer to the Compass documentation included with CAL (also available at www.meyersound.com).

NOTE: For a list of the beam coverages included with the CAL factory presets, see “CAL Factory Presets” on page 16.

.HORIZONTAL FIXED COVERAGE

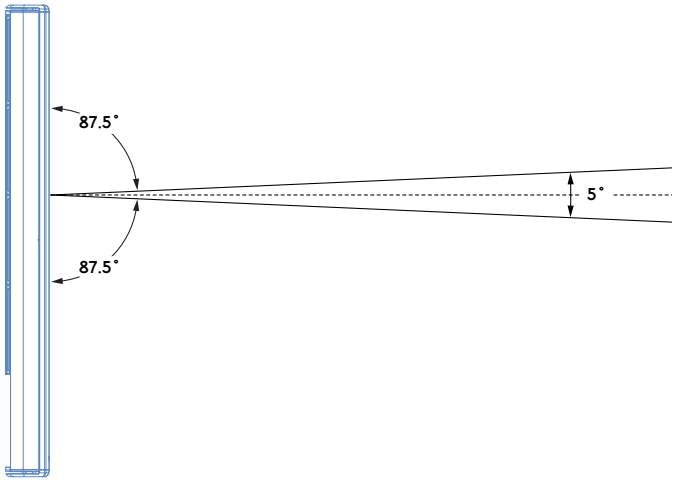
All CAL loudspeakers include 120 degrees of fixed horizontal coverage.



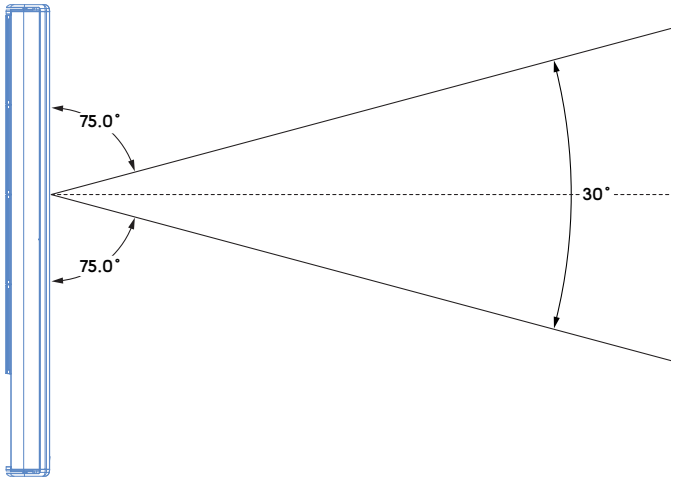
Horizontal Coverage

VERTICAL BEAM SPREAD

All CAL loudspeakers include vertical beams with variable spreads from 5 to 30 degrees in 5-degree increments. The vertical beams can also be steered.



Minimum Vertical Beam Spread, 5°



Maximum Vertical Beam Spread, 30°

Figure 1 illustrates the vertical, acoustical center points for the three CAL models, from which the beams emanate. The acoustical center points also represent the axis for beam steering.

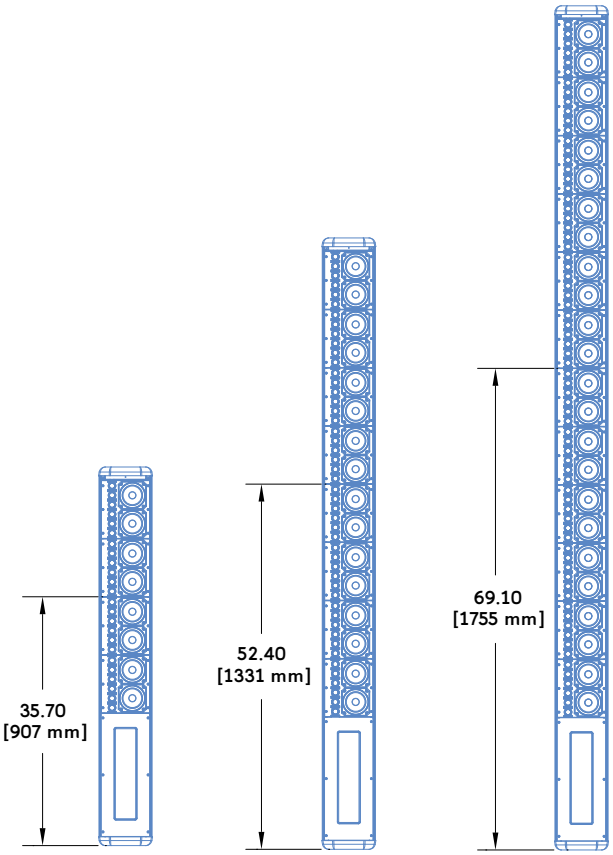
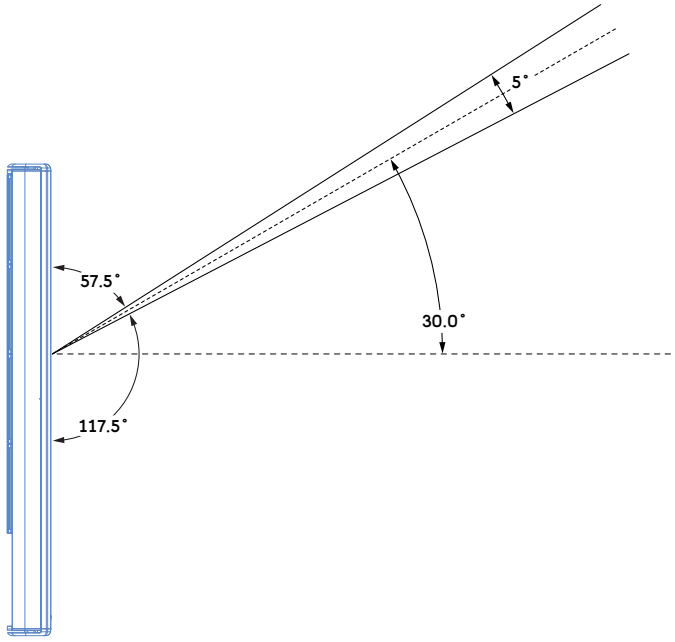


Figure 1: Acoustical Center Points for CAL 32, CAL 64, and CAL 96

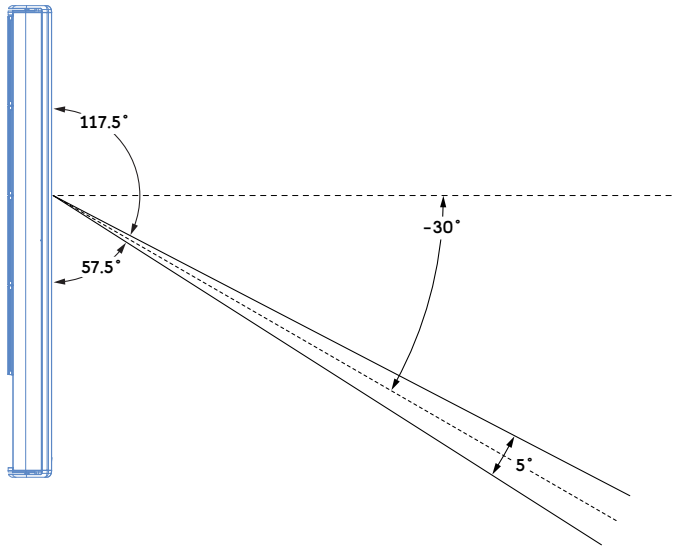
NOTE: For the acoustical center points of split beam configurations, see “Split Beams” on page 21.

VERTICAL BEAM STEERING

All CAL loudspeakers include vertical beam steering of ±30 degrees in 1-degree increments. The steered beams can also be of any supported vertical spread (from 5 to 30 degrees).



+30° Beam Steering with 5° Beam Spread



–30° Beam Steering with 5° Beam Spread

SPLIT BEAMS

The CAL 64 and CAL 96 models include split beam coverage modes to aim sound toward two destinations or to avoid reflective surfaces such as a balcony. The split beams can also be configured with the desired vertical spread (see “Vertical Beam Spread” on page 20) and steering (see “Vertical Beam Steering” on page 21).

CAL 64 Center Split Beams

The CAL 64 model includes a center split beam coverage with the top beam emanating from the top 32 drivers and the bottom beam emanating from the bottom 32 drivers. Figure 2 shows a CAL 64 with center split beams, each with 5-degree beam spread (no steering). Also illustrated are the beams’ acoustical center points.

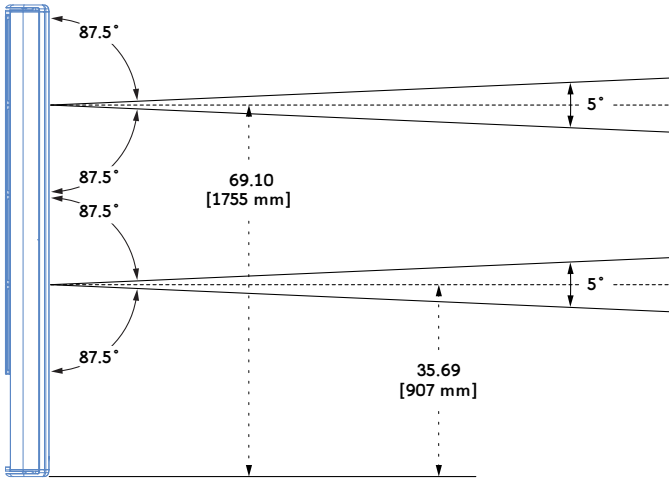


Figure 2: CAL 64 Center Split Beams with 5° Beam Spread

CAL 96 Top Split Beams

The CAL 96 model includes a top split beam coverage with the top beam emanating from the top 32 drivers and the bottom beam emanating from the bottom 64 drivers. Figure 3 shows a CAL 96 with top split beams, each with 5-degree beam spread (no steering). Also illustrated are the beams' acoustical center points.

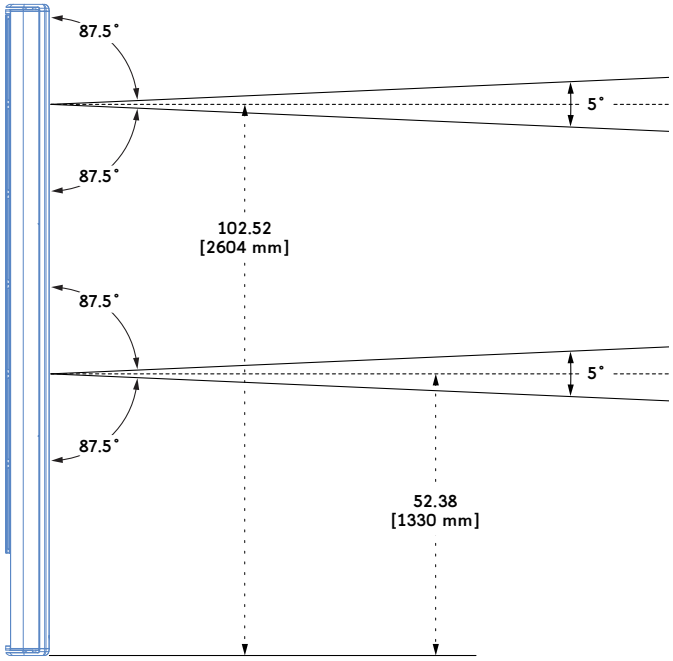


Figure 3: CAL 96 Top Split Beams with 5° Beam Spread

NOTE: When using the CAL 96 top split beam configuration, the bottom beam utilizes more driver channels and therefore yields greater SPL than the top beam.

CAL 96 Bottom Split Beams

The CAL 96 model also includes a bottom split beam coverage with the top beam emanating from the top 64 drivers and the bottom beam emanating from the bottom 32 drivers. Figure 4 shows a CAL 96 with bottom split beams, each with 5-degree beam spread (no steering). Also illustrated are the beams' acoustical center points.

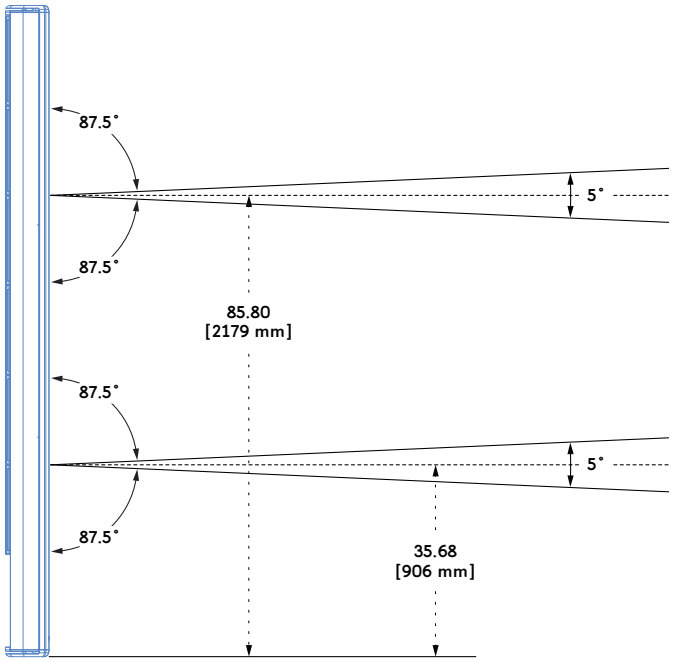


Figure 4: CAL 96 Bottom Split Beams with 5° Beam Spread

NOTE: When using the CAL 96 bottom split beam configuration, the top beam utilizes more driver channels and therefore yields greater SPL than the bottom beam.

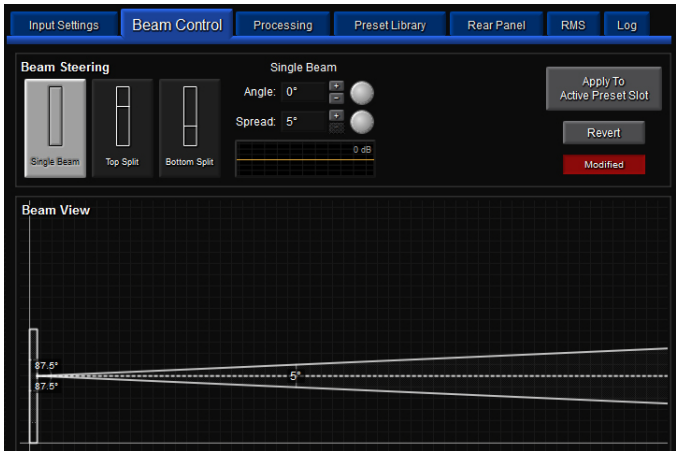
CHAPTER 5: COMPASS CONTROL SOFTWARE

The Compass control software provides comprehensive control of CAL through a graphical user interface. The software enables easy access to all CAL features and even provides control of multiple units. Compass runs on a Mac or Window®-based computer.

With Compass you can:

- Set the active input and override input
- Configure vertical beam spread, beam steering, and beam splits
- Assign processing to beams, including gain, delay, and parametric EQ
- Edit, store, recall, and organize CAL presets
- Test logic I/O, including input mute, input override, fault contact, and preset selection
- Monitor loudspeaker system status and performance data from the RMS tab

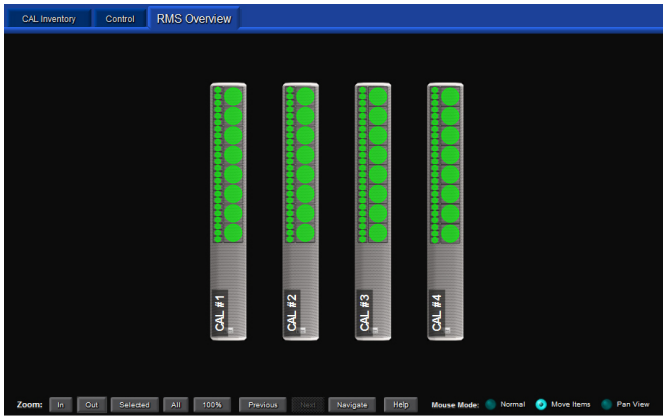
Compass includes full copy and paste of all settings and groups of settings, and multiple levels of undo. The tabbed interface can be scaled to any display resolution and the colors can be configured for day or night. Compass has the same user interface, whether running on a Mac or Windows-based computer, so switching between platforms is completely transparent.



Compass Control Software, Beam Control Tab

The Beam Control tab displays CAL's vertical beam spread and vertical steering, both of which can be altered by entering angle values or by dragging in the beam view area. Split beams can also be configured on the Beam Control tab (CAL 64 and CAL 96 only).

The RMS tab reports extensive system status and performance data for each CAL loudspeaker on the network, including amplifier voltage, limiting activity, power output, driver status, and temperature. The RMS Overview tab displays all CAL loudspeakers on the network with loudspeaker icons with color-coded feedback for the different loudspeaker components.



Compass Control Software, RMS Overview Tab

TIP: For information on installing and using the Compass control software, refer to the Compass documentation included with CAL (also available at www.meyersound.com).

CHAPTER 6: MOUNTING CAL LOUDSPEAKERS

CAL comes standard with adjustable brackets that allow it to be mounted on walls or columns.

NOTE: Before mounting CAL, make sure to allow for the necessary cable runs to its audio sources, host computer, and any control devices or switches you intend to use.

IMPORTANT SAFETY CONSIDERATIONS!

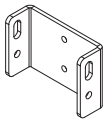
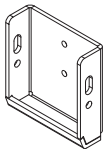
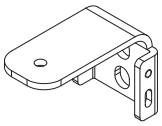
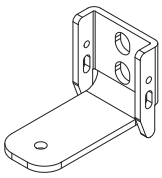
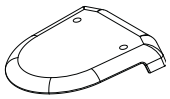
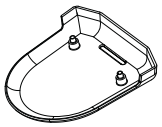
When installing Meyer Sound loudspeakers, the following precautions should always be observed:

- All Meyer Sound products must be used in accordance with local, state, federal, and industry regulations. It is the owner's and user's responsibility to evaluate the reliability of any rigging or mounting method for their application. Rigging should only be carried out by experienced professionals.
- Use mounting and rigging hardware that has been rated to meet or exceed the weight being hung.
- Make sure to attach mounting hardware to the building's structural components (studs or joists), and not just to the wall surface. Verify that the building's structure and the anchors used for the installation will safely support the total weight of the mounted loudspeakers.
- Use mounting hardware appropriate for the material where the loudspeaker will be installed.
- Make sure bolts are tightened securely. Meyer Sound recommends using Loctite® on bolt threads.
- Inspect mounting and rigging hardware regularly. Immediately replace any worn or damaged components.

CAL WALL MOUNT BRACKETS

CAL comes standard with wall mount brackets that include the following components.

CAL Wall Mount Bracket Components

Item		Part Number	Fasteners Included?
Wall Mount Plate (Top)		64.210.018.01 (Black) 64.210.018.02 (White)	No (Use fasteners appropriate for wall material)
Wall Mount Plate (Bottom)		64.210.031.01 (Black) 64.210.031.02 (White)	No (Use fasteners appropriate for wall material)
Loud-speaker Bracket (Top)		64.210.015.01 (Black) 64.210.015.02 (White)	Yes (Hardware included to attach bracket to loudspeaker)
Loud-speaker Bracket (Bottom)		64.210.032.01 (Black) 64.210.032.02 (White)	Yes (Hardware included to attach bracket to loudspeaker)
Endcap (Top)		60.210.012.01 (Black) 60.210.012.02 (White)	Yes (Hardware included to attach endcap to loudspeaker)
Endcap (Bottom)		60.210.013.01 (Black) 60.210.013.02 (White)	Yes (Hardware included to attach endcap to loudspeaker)
5/16 x 5" Quick-release pins (2)		134.046	—

MOUNTING CAL LOUDSPEAKERS

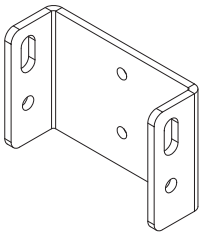
CAL loudspeakers come preconfigured with its loudspeaker brackets already installed. After installing the wall mount plates, install CAL onto the wall, rotate the loudspeaker to adjust its horizontal coverage, tighten the top and bottom nuts, and attach the endcaps.

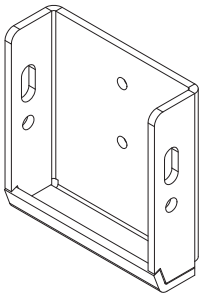
To mount CAL on a wall:

1. Mount the top and bottom wall mount plates on the wall:

- Mark two holes on the wall for each wall mount plate using their center mounting holes as a guide.
- If you are mounting CAL on a wall with wood studs, locate the wall stud.
- Orient the wall mount plates with the side slots up and make sure the top plate (the smaller one) is mounted the appropriate distance above the lower plate for your CAL loudspeaker.

Top wall mount plate

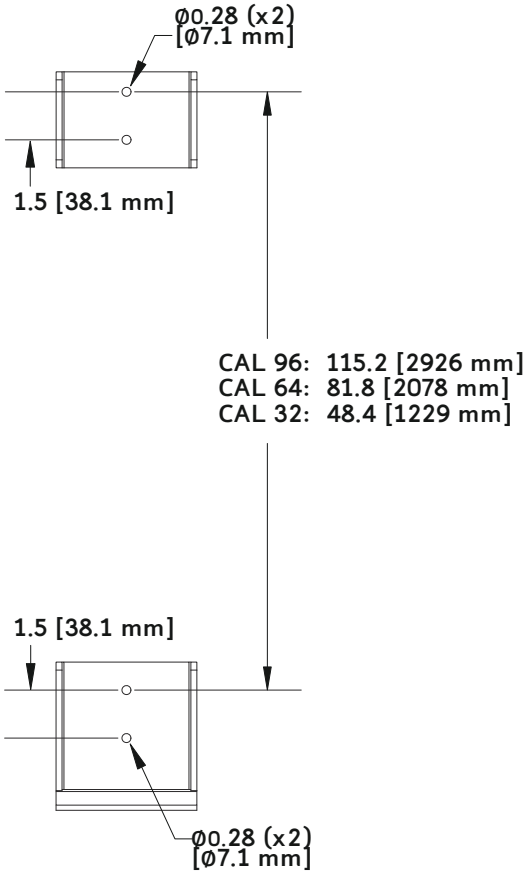




Bottom wall mount plate

NOTE: Orient the wall mount plates with the side slots up.

- Use a level and straight edge to make sure the top and bottom wall mount plates are vertically aligned.



- Drill pilot holes at the four marked locations. Make sure not to over-drill the pilot holes. The depth and diameter of the pilot holes should be around 50 percent of the length and diameter of the fasteners.

NOTE: The center mounting holes for the wall mount plates are 0.28 inches (7.1 mm) in diameter.

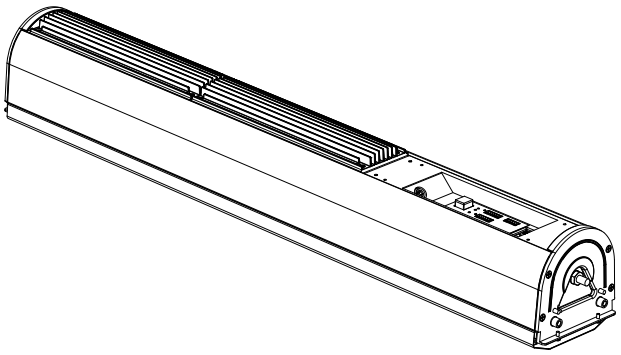
- If mounting CAL on a concrete or metal wall, install wall anchors (not included) in the pilot holes. Install the wall anchors so they are flush with the wall surface.
- Secure the wall mount plates to the wall with fasteners (not included) appropriate for the wall material and rated to hold the weight of the loudspeaker.

  CAL 96 weight: 173 lbs (78.5 kg)
  CAL 64 weight: 124 lbs (56.2 kg)
  CAL 32 weight: 80 lbs (36.3 kg)

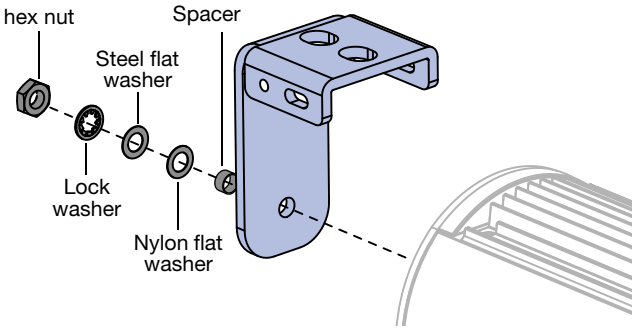
NOTE: Weights include top and bottom loudspeaker brackets, top and bottom endcaps.

2. If they have not already been attached, attach the loudspeaker brackets to CAL:

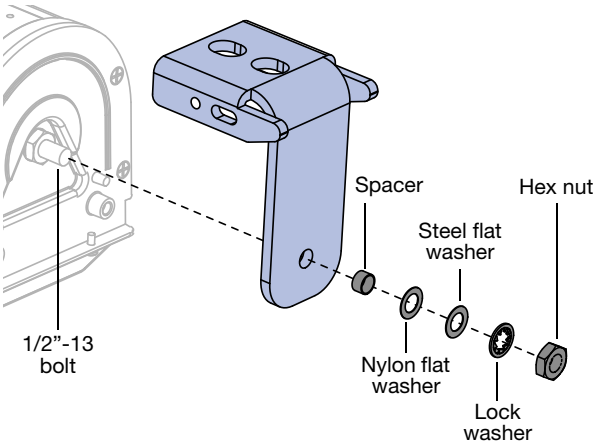
- Place the loudspeaker face down on a soft flat surface.



- Attach the top loudspeaker bracket (the smaller one) to the top of the loudspeaker and secure it with the included hex nut, lock washer, steel flat washer, nylon flat washer, and spacer. Hand-tighten the hex nut.

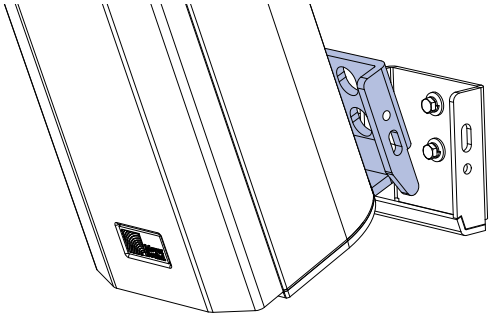


- Attach the bottom loudspeaker bracket (the larger one) to the bottom of the loudspeaker and secure it with the included hex nut, lock washer, steel flat washer, nylon flat washer, and spacer. Hand-tighten the hex nut.



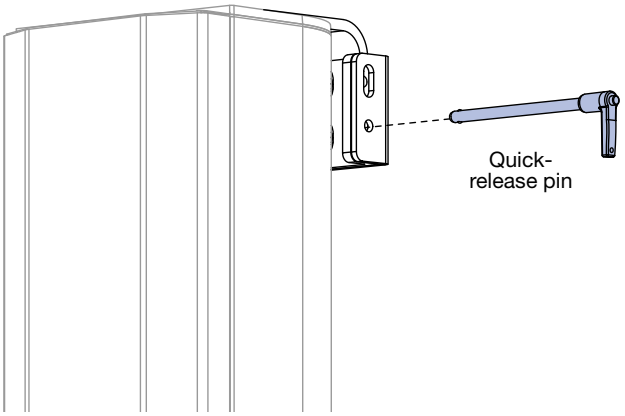
3. Mount CAL on the wall:

- Insert the bottom of the loudspeaker into the bottom wall mount plate. The loudspeaker bracket should rest cleanly in the wall plate.

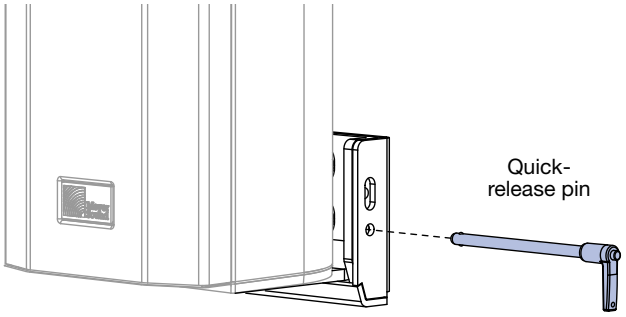


TIP: An eye nut (not included) can be temporarily attached to CAL's 1/2"-13 top attachment bolt (instead of the loudspeaker plate) to lift up the unit when inserting the bottom of the loudspeaker into the bottom wall mount plate. The eye nut can then be removed and replaced with the top loudspeaker bracket.

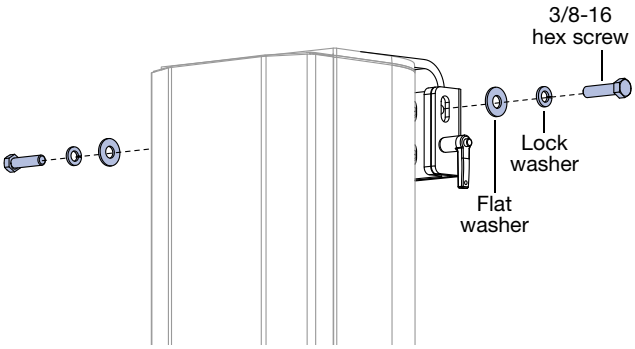
- While resting the bottom of the loudspeaker in the lower wall mount plate, slowly hinge the top of the loudspeaker toward the wall until it aligns with the top wall mount plate.
- Insert the included quick-release pin into the screw hole of the top loudspeaker bracket (either side). The quick-release pin holds the loudspeaker in place.



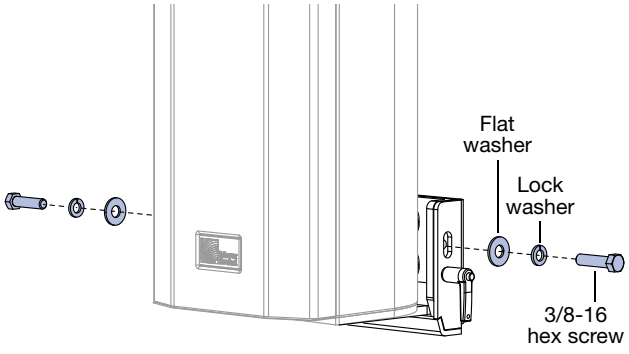
- Insert the included quick-release pin into the screw hole of the bottom loudspeaker bracket (either side). The quick-release pin holds the loudspeaker in place.



- Secure the top of the loudspeaker with the included 3/8-16 hex screws, lock washers, and flat washers (both sides).



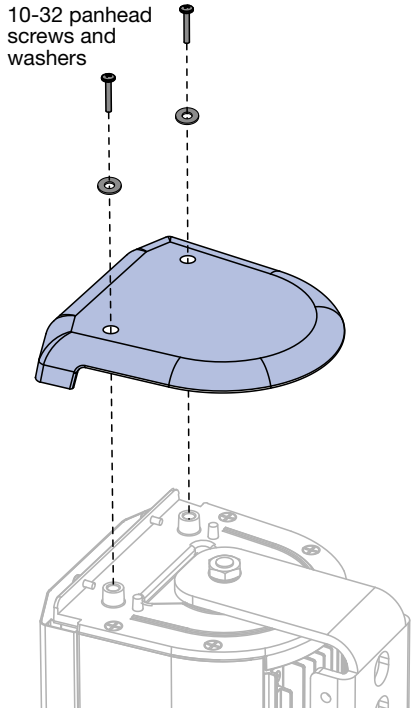
- Secure the bottom of the loudspeaker with the included 3/8-16 hex screws, lock washers, and flat washers (both sides).



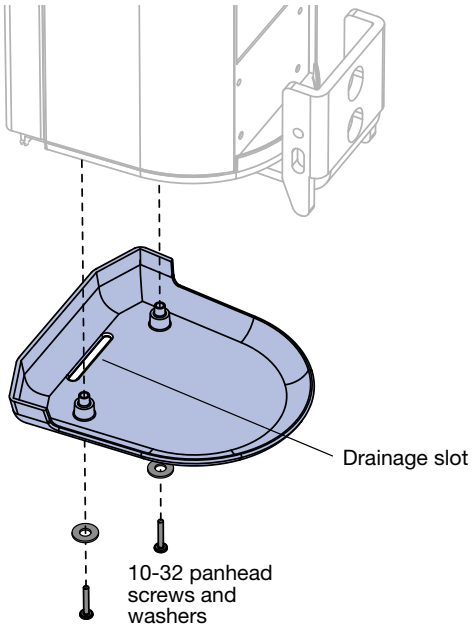
4. Rotate CAL left or right to position its horizontal dispersion for the desired coverage.
5. Fully tighten the hex nuts securing the top and bottom loudspeaker brackets.

6. Attach the endcaps to CAL:

- Align the top endcap (the one without the drainage slot) with the top screw holes and secure the endcap with the included 10-32 panhead screws and washers.



- Align the bottom endcap (the one with the drainage slot) with the bottom screw holes and secure the endcap with the included 10-32 panhead screws and washers.



APPENDIX A: CAL SPECIFICATIONS

CAL Specifications

ACOUSTICAL		
Operating Frequency Range	100 Hz – 16 kHz **Note:** Recommended maximum operating frequency range. Response depends on loading conditions and room acoustics.	
Frequency Response	105 Hz – 15 kHz ±4 dB **Note:** Measured free field with 1/3-octave frequency resolution at 4 meters.	
Phase Response	230 Hz – 16.9 kHz ±45 °	
Maximum Peak SPL	CAL 96	At 90 m (295 ft), 106 dB peak
	CAL 64	At 60 m (196 ft), 106 dB peak
	CAL 32	At 30 m (98 ft), 106 dB peak
	Note: Measured with single beam, 5-degree vertical spread, and no steering.	
COVERAGE		
Horizontal Coverage	120°	
Vertical Beam Spread	Variable, 5° to 30° in 5° increments	
Vertical Beam Steering	±30° in 1° increments	
Vertical Beam Splits	CAL 96	Top split, bottom split
	CAL 64	Center split
	CAL 32	None
CROSSOVER		
Crossover	2 kHz **Note:** At this frequency, the transducers produce equal sound pressure levels.	
TRANSDUCERS		
Low-frequency and high-frequency	CAL 96	(24) 4" cone drivers, (72) 20 mm tweeters
	CAL 64	(16) 4" cone drivers, (48) 20 mm tweeters
	CAL 32	(8) 4" cone drivers, (24) 20 mm tweeters
AUDIO / CONTROL		
Analog Audio	(3) Phoenix 6-pin male connectors for balanced audio input and loop output	
Digital Audio	(1) Phoenix 6-pin male connector for AES/EBU input **Note:** The connector's bottom three pins are not used.	
Network / AVB	(2) AVB-enabled Ethernet ports for audio streaming, and beam control and RMS monitoring via Compass control software **Note:** Second Ethernet port with provided for redundant control.	
Processing	Mute, gain, 5-band parametric EQ, and delay, stored in four onboard presets **Note:** Processing and beam settings can be edited in Compass control software and saved in four onboard presets.	
Logic I/O	Phoenix 6-pin male connector, recalls onboard presets, reports relay closures (and openings) for fault reports; Phoenix 5-pin male connector, triggers emergency mute and input override	
Display	OLED button displays CAL's network addresses during startup or when the button is pushed	
AMPLIFIER		
Type	Multichannel Class-D, one channel per driver	

CAL Specifications

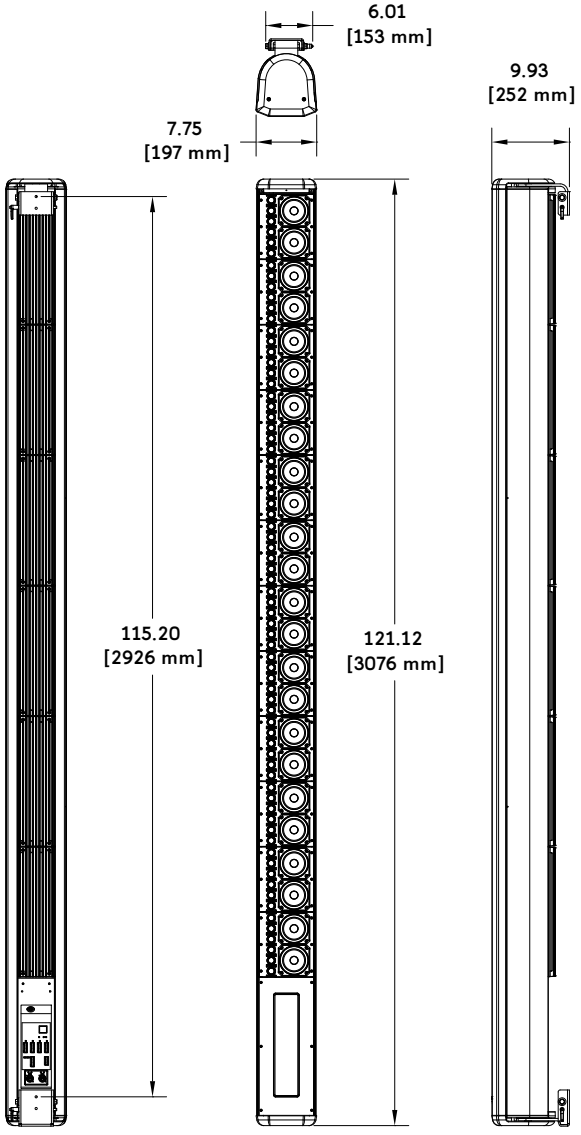
Number of Channels	CAL 96	96		
	CAL 64	64		
	CAL 32	32		
Cooling	Convection			
AC POWER				
Connector	PowerCon			
Voltage Selection	Automatic, continuous from 90–235 V AC			
Safety Agency Rated Operating Voltage	100–240 V AC, 50/60 Hz			
Current Draw				
Idle Current	CAL 96	1.98 A rms (115 V AC)	1.63 A rms (230 V AC)	2.32 A rms (100 V AC)
	CAL 64	1.24 A rms (115 V AC)	0.99 A rms (230 V AC)	1.42 A rms (100 V AC)
	CAL 32	0.58 A rms (115 V AC)	0.45 A rms (230 V AC)	0.65 A rms (100 V AC)
Maximum Long-Term Continuous Current (>10 sec)	CAL 96	8.3 A rms (115 V AC)	4.2 A rms (230 V AC)	9.4 A rms (100 V AC)
	CAL 64	6.1 A rms (115 V AC)	3.1 A rms (230 V AC)	6.9 A rms (100 V AC)
	CAL 32	3.3 A rms (115 V AC)	1.7 A rms (230 V AC)	3.7 A rms (100 V AC)
Burst Current (<1 sec)	CAL 96	14.7 A rms (115 V AC)	7.3 A rms (230 V AC)	18.5 A rms (100 V AC)
	CAL 64	10.8 A rms (115 V AC)	5.4 A rms (230 V AC)	13.6 A rms (100 V AC)
	CAL 32	5.9 A rms (115 V AC)	2.9 A rms (230 V AC)	7.4 A rms (100 V AC)
Ultimate Short-Term Peak Current	CAL 96	33 A peak (115 V AC)	18 A peak (230 V AC)	40 A peak (100 V AC)
	CAL 64	24 A peak (115 V AC)	13 A peak (230 V AC)	29 A peak (100 V AC)
	CAL 32	13 A peak (115 V AC)	7 A peak (230 V AC)	16 A peak (100 V AC)
PHYSICAL				
Enclosure	Extruded aluminum			
Finish	White, black, and custom colors			
Weather Protection	Suitable for outdoor installations, rain hood included			
Rigging	Adjustable brackets included for mounting on walls or columns			
Dimensions (with mounting hardware)	CAL 96	121.12" h x 7.75" w x 9.93" d (3076 mm x 197 mm x 252 mm)		
	CAL 64	87.72" h x 7.75" w x 9.93" d (2228 mm x 197 mm x 252 mm)		
	CAL 32	54.32" h x 7.75" w x 9.93" d (1380 mm x 197 mm x 252 mm)		
Weight (with mounting hardware)	CAL 96	173 lbs (78.5 kg)		
	CAL 64	124 lbs (56.2 kg)		
	CAL 32	80 lbs (36.3 kg)		
	Note: Weights include top and bottom loudspeaker brackets, top and bottom endcaps.			
ENVIRONMENTAL				
Operating Temperature	0° C to +45° C			
Non Operating Temperature	<–40° C or >+75° C			
Humidity	To 95% at 35° C			
Operating Altitude	To 4600 m (15,000 ft)			

CAL Specifications

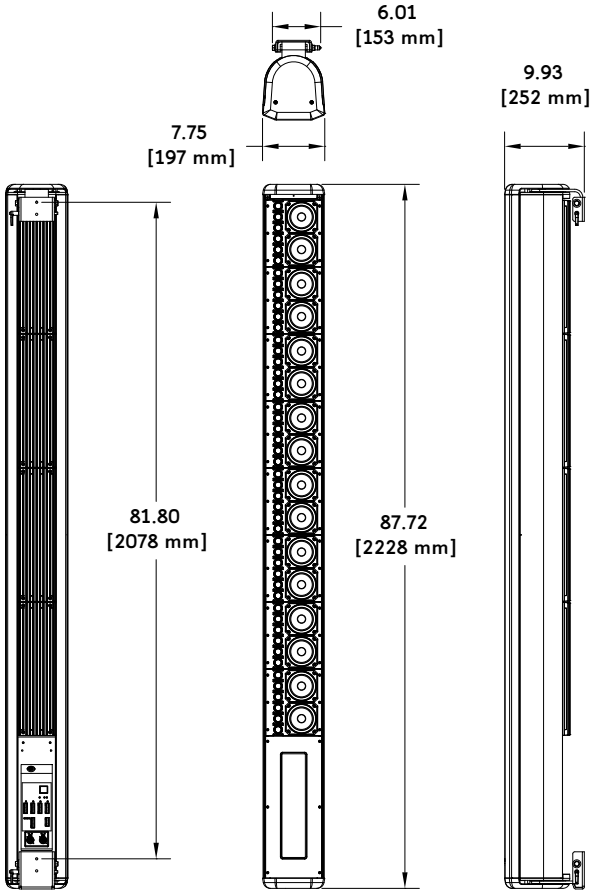
Non operating Altitude	To 6300 m (25,000 ft)
Shock	30 g 11 msec half-sine on each of 6 sides
Vibration	10 Hz – 55 Hz (0.010 m peak-to-peak excursion)

CAL COMPLIANCE

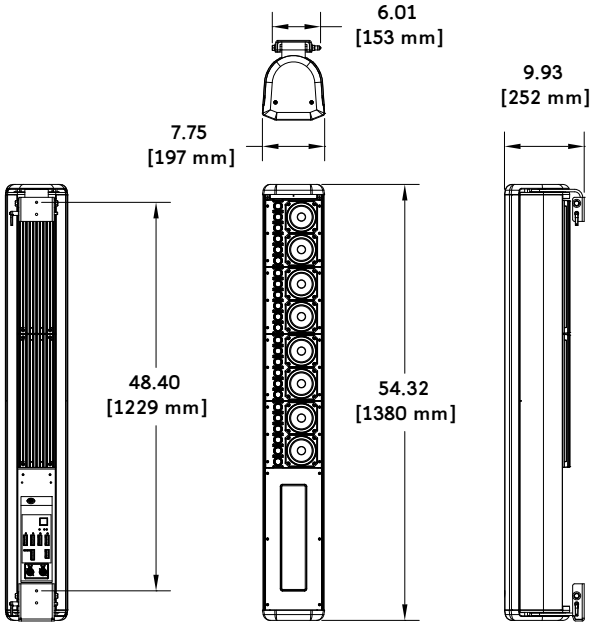
CAL DIMENSIONS



CAL 96 Dimensions (with Mounting Hardware)



CAL 64 Dimensions (with Mounting Hardware)



CAL 32 Dimensions (with Mounting Hardware)

thinking sound

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