Dolby Speaker System 136 Owner’s Manual

8 February 2021
Issue 2: Part number 8800255

Notices

Copyright

Dolby Laboratories, Inc.
1275 Market Street
San Francisco, CA 94103-1410 USA
Telephone 415-558-0200
Fax 415-645-4000
http://www.dolby.com

Trademarks

Dolby and the double-D symbol are registered trademarks of Dolby Laboratories.

The following are trademarks of Dolby Laboratories:

Dialogue Intelligence™
Dolby®
Dolby Advanced Audio™
Dolby Atmos®
Dolby Audio™
Dolby Cinema®
Dolby Digital Plus™
Dolby Digital Plus Advanced Audio™
Dolby Digital Plus Home Theater™
Dolby Home Theater®
Dolby Theatre®
Dolby Vision®
Dolby Vision IQ™
Dolby Voice®
Feel Every Dimension™
Feel Every Dimension in Dolby™
Feel Every Dimension in Dolby Atmos™
MLP Lossless™
Pro Logic®
Surround EX™

All other trademarks remain the property of their respective owners.

Patents

THIS PRODUCT MAY BE PROTECTED BY PATENTS AND PENDING PATENT APPLICATIONS IN THE UNITED STATES AND ELSEWHERE. FOR MORE INFORMATION, INCLUDING A SPECIFIC LIST OF PATENTS PROTECTING THIS PRODUCT, PLEASE VISIT http://www.dolby.com/patents.

Product model

THIS DOCUMENTATION APPLIES TO MODEL: CID1024 and MODEL: CID1025.

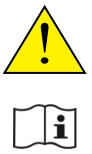
Limited warranty and warranty exclusions

THE LIMITED WARRANTY AND WARRANTY EXCLUSIONS MAY BE FOUND AT THE FOLLOWING URL: https://www.dolby.com/us/en/about/warranty-and-maintenance-policies.html

Contents

1

Important safety and regulatory information



Safety

INSTALLER ASSUMES ALL RESPONSIBILITY AND LIABILITY FOR THE INSTALLATION OF THIS PRODUCT.

No information contained in this guide is intended as a warranty on the part of Dolby. Anyone using this information assumes all liability arising from its use. Product abuse, use of the product not in accordance with Dolby instructions, or use in an application for which the product has not been designed is not covered under any Dolby warranty, nor is Dolby liable for any loss or damage.

Installation must be performed by qualified, licensed, and insured installers, and installed in accordance with all laws, rules, and regulations applicable to the installation site. Failure to do so could result in serious personal injury or even death. Prior to installing this product, read and completely understand the installation instructions. You must read these instructions to prevent personal injury and property damage. Keep the installation instructions in an easily accessible location for future reference.

A licensed professional engineer must approve the placement and method of attachment to the building structure prior to the installation of the system.

All information presented herein is based upon materials and practices common to North America and may not directly apply to other countries because of differing material dimensions, specifications, and/or local regulations. Installers in other countries should consult with appropriate engineering and regulatory authorities for specific guidelines.

Any supplied rigging hardware is intended only for use with the specified loudspeaker(s). The installer assumes all risk of loss and/or injury arising out of the use of the supplied rigging hardware with any other loudspeaker. All other rigging is considered part of the venue and/or installer-supplied equipment and is not addressed in this guide. This guide is not a comprehensive source for rigging in general. Installer assumes all responsibility for ensuring that accepted rigging and safety practices are employed. Installer assumes all responsibility for the appropriate use of Dolby supplied rigging hardware and follows at a minimum all applicable laws, rules, and regulations in force for each venue.

For Dolby Cinema theatres only: If your installation is deemed to require the use of safety cables by Dolby or a certified engineer, refer to the information in the *Dolby System 136 Additional Safety Cable Installation Requirements* document, which is available from your Dolby Cinema technical representative.

Make sure that no water pipes, natural gas lines, electrical wire, or conduit are present where the speaker is to be installed. Cutting or drilling into water pipes, natural gas lines, electrical wire, or conduit could cause serious personal injury or property damage.

Dolby is not responsible for the application of its products for any purpose or the misuse of this information for any purpose. Furthermore, Dolby is not responsible for the abuse of its products caused by avoiding compliance with inspection and maintenance procedures or any other abuse.

BKT.136 tie (coupling) plates (included with CS136MH) are used to connect the two CS136LF speakers together to prevent movement or shifting of the cabinets due to vibration from high levels of sound. These brackets must be installed prior to system use. Dolby disclaims any liability, including damages or injury, if installer fails to comply with these instructions.

BKT.FLR floor brackets are available (sold separately) to secure the entire speaker system to the auditorium mounting surface. Vibration from this type of speaker system is high and may cause cabinets to shift. Failure to secure the bottom speaker cabinet to the mounting surface may result in the entire system tipping or falling, which may cause damage or injury. Proper selection of mounting hardware is not included; proper assembly and installation of mounting hardware, including, but not limited to, selection of appropriate weight-bearing support and bracket use, are the exclusive responsibility of the installer. Dolby disclaims any liability, including damage or injury, for the selection of i) non-Dolby manufactured mounting hardware or ii) third-party manufactured mounting hardware not previously approved in writing by Dolby, and/or third-party bracket installation. Any modification to the speaker system hardware provided by Dolby (for example, mounting by drilling holes into the speaker system) will render the product warranty null and void.

Use proper lifting techniques when working with heavy objects to avoid personal injury.

No open flame sources should be placed on or near the apparatus. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.

Storage temperature: -4 to +140°F (-20 to +60°C). The products covered by this manual are not intended for use in high-moisture environments. Moisture can damage the product and cause corrosion of electrical contacts and metal parts. Avoid exposing the speakers to direct moisture. Keep speakers out of extended or intense direct sunlight. Premature product failure or serious personal injury could occur if this product is used outdoors or in wet indoor environments.

Hearing damage can occur by prolonged exposure to excessive sound pressure level (SPL); the loudspeaker is easily capable of generating SPL sufficient to cause permanent hearing damage to performers, production crew, or audience members. Caution should be taken to avoid prolonged exposure to SPL in excess of 90 dB.

EU environmental regulations/compliance and product disposal information

Restriction of Hazardous Substances Directive (RoHS): All Dolby products comply with the requirements of the EU RoHS Directive. This product is electronic equipment and should be disposed of in accordance with all applicable laws.

Do not dispose as household waste. Do not dispose of the product in a fire. Please dispose of this product by taking it to your local electronic waste collection point or recycling center. For information regarding where to recycle electronic equipment, contact your local dealer. For additional information regarding Waste Electrical and Electronic Equipment (WEEE) and product disposal go to http://www.dolby.com/us/en/about/environmental-commitment.html.

Russian environmental regulations and compliance

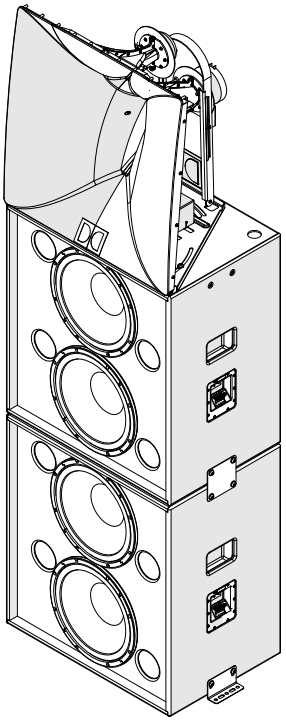
This product complies with Russian EAC RoHS requirements.

2

Introduction to Dolby Speaker System 136

The Dolby Speaker System 136 is designed to meet the needs of a high-performance screen speaker in a large Dolby Atmos or premium large format (PLF) cinema. System 136 delivers consistent audio coverage and uniform volume shading for every seat in the venue up to approximately 165 feet (50.3 meters) in depth. The Dolby System 136 consists of one CS136MH loudspeaker for mid and high frequencies and two CS136LF loudspeakers for low and low/mid frequencies, providing greater intelligibility and enhanced low-frequency extension. With intuitive ergonomic design and features, Dolby System 136 enables quick, easy installation and service. Built on the foundation of the Dolby industry-leading system design and support philosophy, Dolby System 136 provides elevated premium large format (PLF) performance and streamlines speaker integration. These components are coupled together to create a screen speaker system that provides better audience coverage, lower distortion (discomfort), and increased low-frequency response.

Figure 1: System 136 full speaker stack



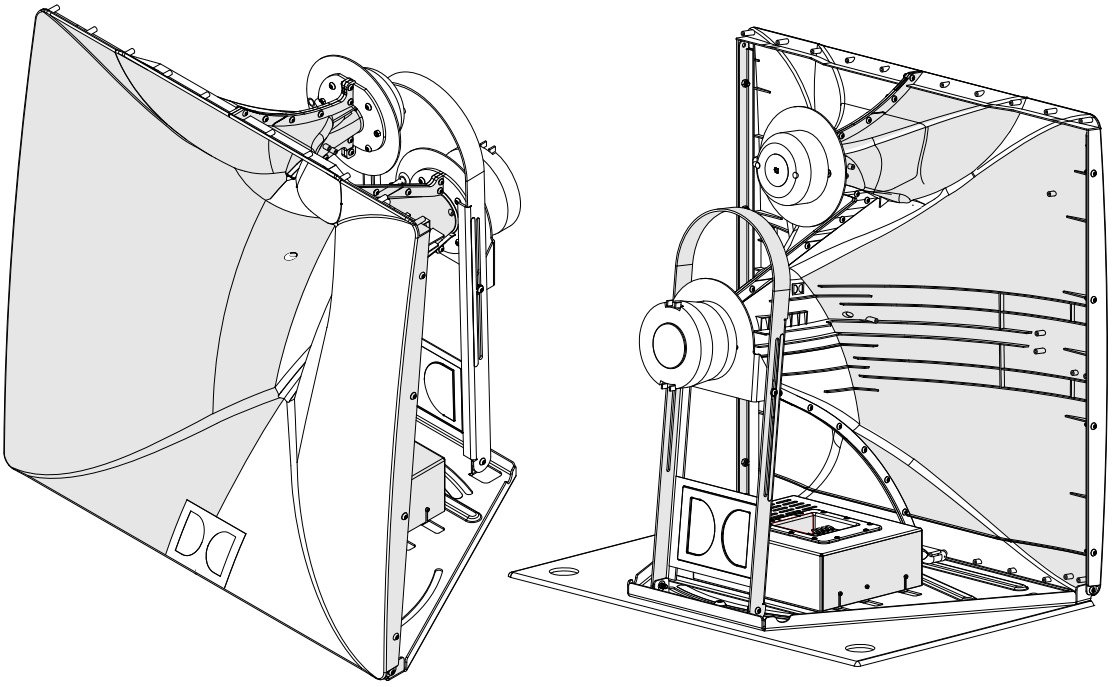
2.1 About this documentation

This documentation shows you how to install a Dolby Speaker System 136.

2.2 CS136MH key features and benefits

Dolby Speaker System 136 uses one CS136MH unit, which reproduces mid- and high-frequency audio using a dual-entrant horn (two drivers in the same horn structure) that enables close proximity of the mid- and high-frequency drivers in the vertical plane. This configuration yields improved pattern and amplitude control around the crossover frequency, yielding smoother full-frequency response coverage to all seats in the auditorium.

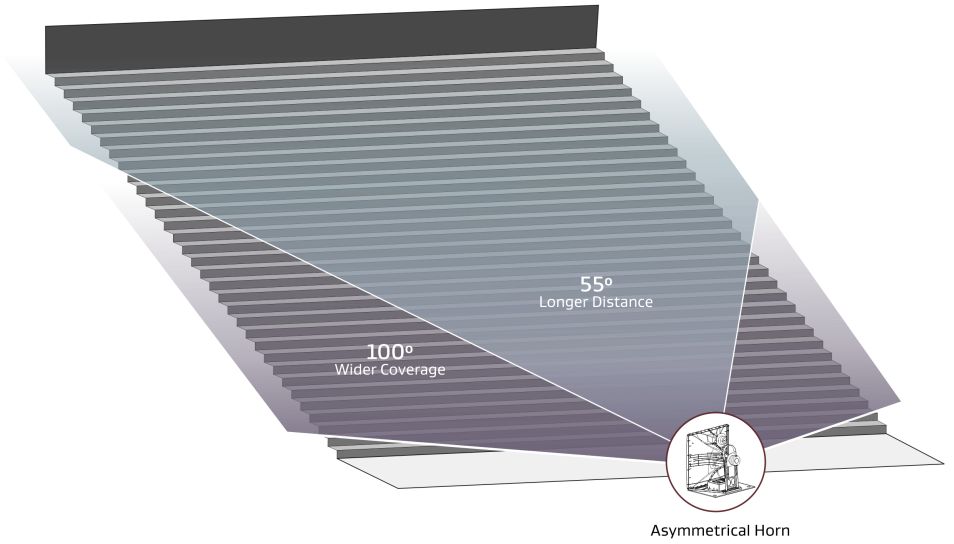
Figure 2: CS136MH front (left) and rear (right)



- A sculpted front horn enables closer placement of the horn to the screen (even when the horn is tilted forward), which minimizes interference from screen reflections while achieving downward angles to cover the entire audience.
- The high-frequency driver is a very low-distortion 75 mm titanium dome driver with a frequency response up to 20 kHz.
- The mid-frequency driver is a specially designed ring-radiator compression driver providing high sensitivity and power handling while covering the entire primary vocal range (400 Hz to 4 kHz), greatly enhancing intelligibility, even in the largest auditoriums.
- The advanced input plate features a high-current, spring-loaded terminal block that enables quick installation without the need for spade lugs or a crimping tool.
- To easily select a passive crossover or directly amplify each driver, a unique flip-card circuit board enables simple electrical routing and tool-free configuration.
- The entire assembly mounts directly to the CS136LF unit and features independent horizontal and vertical aiming adjustments.
- A convenient aiming mechanism uses an installer-provided common laser pointer for accurate pointing of the mid-/high-frequency horn to achieve maximum coverage.
- The dual-entrant asymmetrical horn enables close transducer proximity in the vertical plane, which yields improved pattern and amplitude control around the crossover frequency.

- The unique asymmetrical mid-/high-frequency horn design provides long-distance coverage to the back of the cinema from the top of the horn, while the bottom of the horn provides wider coverage and volume shading for the audience closer to the screen. This provides greatly improved coverage for the entire auditorium in comparison to conventional horn designs.

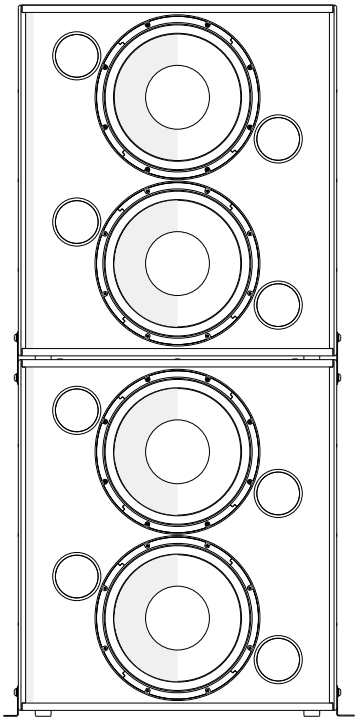
Figure 3: Dolby asymmetrical horn coverage



2.3 CS136LF key features and benefits

Dolby Speaker System 136 utilizes two CS136LF units to produce the low frequencies and low/mid frequencies. Each cabinet receives differently processed audio.

Figure 4: CS136LF two units stacked



- Each unit contains two 15-inch woofers that can be driven in parallel, or driven individually to maximize available amplifier power.
- Each 15-inch driver is contained in an independent chamber within the cabinet that provides improved performance and reliability.
- On the CS136LF, the unique flip-card printed circuit board enables electrical routing for parallel wiring of the drivers powered from a single amplifier channel, or individual wiring to the amplifier channel on each driver. With the CS136LF flip card, you can select either bi-amplifier mode or single-amplifier mode.
- The close spacing of the woofers combined with the individual processing of each cabinet improves system vertical dispersion.
- Rubber feet on the bottom of each cabinet align with recesses on the top that help align stacked cabinets and provide overall vibration control.
- Integrated handles on the sides of the speaker cabinet are positioned at the center of gravity to improve safety and comfort during handling and installation.
- Included tie plates couple two CS136LF cabinets together safely and securely.
- Optional BKT.FLR floor bracket kit (available from Dolby) enable secure installation of the entire system to the building structure or a screen platform attached to the building structure. The kit includes two brackets.
- The CS136LF attachment points are for stacking and connecting to the auditorium mounting surface only; they are not intended for hanging or flying the speaker. Always be sure to adhere to local building codes in your region.
- The advanced input plate features a high-current, spring-loaded terminal block, which enables quick installation with no crimp tools or spade lugs needed, vastly simplifying installation.

2.4 Selecting the wire

This section can assist you in selecting the correct wire gauge.

Typically, no more than 0.5 dB (or 11%) of power should be lost in the cabling. The System 136 input plates accept an American wire gauge (AWG) of 18 AWG to 6 AWG (1 mm^2-16 mm^2).

Note: The input terminals are marked with indicators to show the polarity. Per International Electrotechnical Commission (IEC) standards, a positive voltage on the positive marked input results in the transducers moving outward (with the exception of the high-frequency channel in passive mode only, which will have a negative polarity). The CS136MH and CS136LF differ in the order of negative and positive terminations. You must verify the positive and negative markings for each respective product. Always tie the cable down to the available hardware to minimize any buzzing or pullouts. If possible, after wiring is completed, play sound through the speaker to identify any connection issues, buzzing, or rattling.

Related information

Connecting electrical components on page 22

2.5 Contacting Dolby

You can contact Dolby Cinema Solutions and Support using email or regional telephone numbers. You can also access documentation by visiting the Dolby customer portal.

Contact Dolby Cinema Solutions and Support

- Send an email to cinemasupport@dolby.com.
- Call:

  Americas: +1-415-645-4900
  Europe/Middle East/Africa (EMEA): +44-33-0808-7700
  Asia-Pacific (APAC): +86-400-692-6780
  Japan: +81-3-4540-6782

Access documentation

Visit https://customer.dolby.com.

Submit feedback about this documentation

Send an email to documentation@dolby.com.

3

Assembling System 136

The following sections provide instructions on how to assemble and install System 136.

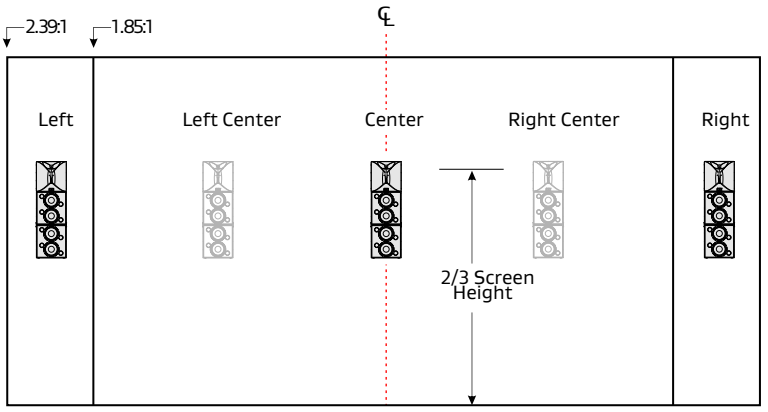
3.1 Installing System 136 in a typical auditorium

In a typical auditorium, System 136 is installed behind the screen, with the acoustic center of the speaker located two-thirds of the distance from the bottom of the screen.

The following figure shows the placement of the speaker behind the screen, as indicated in the Dolby Atmos Specifications. To position the speakers at the correct height, you should build a platform and attach it to the building structure.

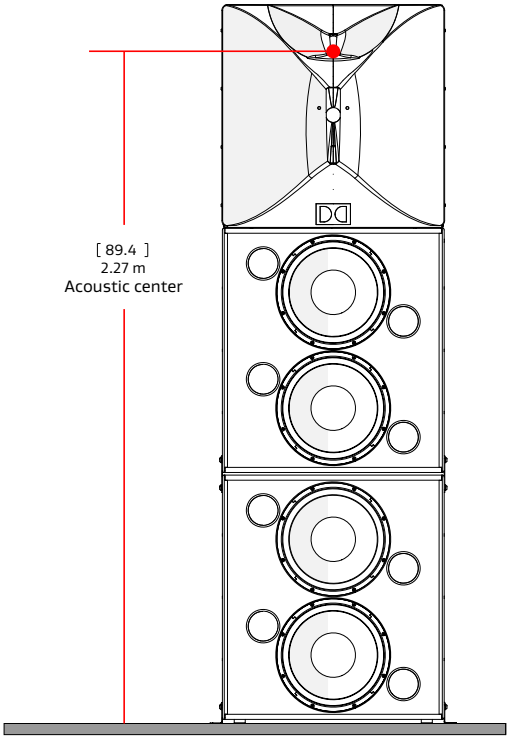
To improve localization and smooth pan-throughs, larger cinemas can benefit by adding left-center and right-center screen speakers.

Figure 5: Typical auditorium installation



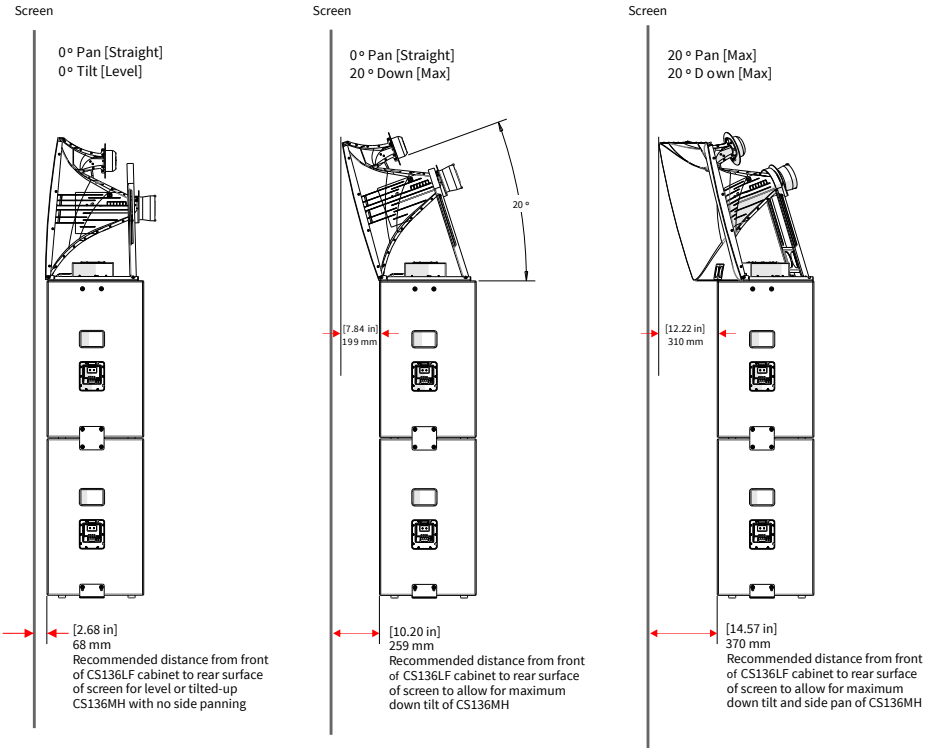
The following figure shows the exact placement of the System 136 acoustic center. The elevation of the platform (attached to the building structure) that secures the speaker stack should be located with the acoustic center of the horn positioned exactly two-thirds the distance from the bottom of the screen. The acoustic center of the speaker is 2.27 meters (89.4 inches) above the platform.

Figure 6: System 136 acoustic center



System 136 is designed to be placed as close to the screen surface as possible with a minimum distance of 5-7 cm. This minimizes high frequency reflections (screen loss) but does not locate the speaker too close to the screen and prevents air flow disturbance to the surface. When aiming the system, angling of the CS136MH may require that the entire system be set back from the screen to accommodate proper tilting and aiming. If you are unsure of the angle needed for the CS136MH, it may be advisable to temporarily place the CS136MH onto the screen-frame platform that is attached to the building structure and perform a rough vertical and horizontal aiming, which can help you determine the placement of the entire system.

Figure 7: System 136 screen planes



GLL format files for software simulation modeling

There are *.GLL* files that you can use to simulate System 136 in acoustical simulation software. You can download the *.GLL* files at https://www.dolby.com/us/en/professional/cinema/products/sys136.html. To run the *.GLL* files, use EASE or EASE Focus software. EASE Focus software is free, and can be downloaded from https://focus.afmg.eu/index.php/fc-downloads-en.html.

Following are descriptions of the System 136 *.GLL* files:

- **CS136LF (x2) for Screen Channel System 136**

  To create the System 136 screen channel, select the CS136LF double stack. The file name is: *Dolby_CS136LF-Two_Cabinets_For_System_136_vx.gll*.

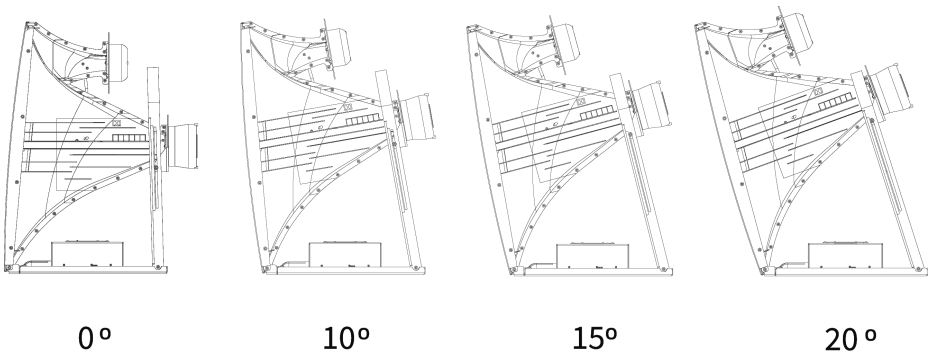
  For correct simulation, place the LF stack height entry point (z axis) at the platform height in the auditorium.

- **CS136MH GLL**

  To finish the Dolby System 136 screen channel, use the CS136MH *.GLL*. The loudspeaker entry point into the simulation is at the acoustic center of the system. Place the CS136MH height entry point (z axis) at 2.27 m (89.4 in) above the height entry point of the CS136LF double stack *.GLL*. The x and y axes should match the companion CS136LF double stack.

The CS136MH *.GLL* files can then pan +/-20 degrees horizontally, and tilt +15/-20 degrees, independent of the CS136LF stack, as it would in a typical configuration.

Figure 8: System 136 vertical down-tilt and proximity to screen



System 136 additional information

- System weight for platform stability calculations is approximately 162.61 kg (358.5 lb).
- The CS136MH is switchable between bi-amp mode or passive mode (where one amplifier channel is used to drive both transducers). We recommend bi-amp mode for maximum performance.
- Amplifier selection is aided by additional data, as specified in the System 136 and system components specifications. (See the link at the end of this section.)
- The power-draw specification provides the actual power draw in watts at the rated V_{rms} in the design, instead of calculated power. This can aid in optimizing amplifier power budgets, as the measured power is almost always lower than calculated power (sometimes significantly).
- The maximum voltage peak specification is useful for selecting an amplifier that has a voltage rail at or above the rating for the loudspeaker maximum dynamic performance. Some amplifier companies provide this data in their respective technical data sheets (or provide the data by request).
- Wire gauge selection should always use industry-standard practice based on the loudspeaker rated ohms and cable length. Typical maximum acceptable power loss is 0.5 dB, or less than 11%.

Related information

System 136 and system components specifications on page 30

3.2 Assembling and Installing System 136

This section shows you how to set up a Dolby System 136 speaker system.

About this task

You need these parts and tools:

- Installer-provided 6 mm hex driver.
- BKT.136 (two tie [coupling] plates provided in the CS136MH packing kit).
- BKT.FLR brackets or third-party angle brackets (optional, but recommended). These two brackets are available in a separate Dolby kit to secure the speaker stack to the auditorium building structure platform. When using the BKT.FLR brackets, you need screws, washers, and other components to connect to the speaker platform that is attached to the building structure. The holes in the bracket are sized for M10 or 3/8-inch bolts. (To connect the bracket to the CS136LF, you repurpose the M10 bolts from the speaker.)
- Installer-provided laser pointer to help with aiming the CS136MH.
- Installer-provided serviceable thread-locking compound (optional).
- Installer-provided acoustic or nonhardening caulking (optional).

To perform this task safely:

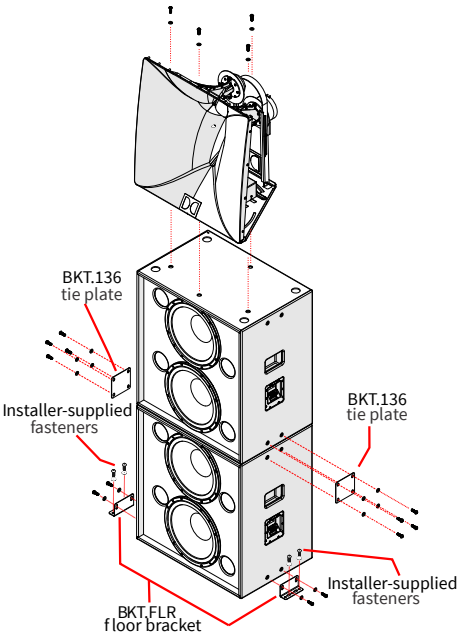
CAUTION: BKT.FLR floor brackets are available from Dolby (sold separately) to secure the entire speaker system to a platform that is attached to the building structure. Vibration from this type of speaker system is high and may cause the cabinets to shift. Failure to secure the bottom speaker cabinet to the platform attached to the building structure may result in the entire system tipping or falling, which may cause damage or injury. Proper selection of mounting hardware is not included; proper assembly and installation of mounting hardware, including, but not limited to, selection of appropriate weight-bearing support and bracket use, are the exclusive responsibility of the installer. Dolby disclaims any liability, including damage or injury, for the selection of non-Dolby manufactured mounting hardware or third-party manufactured mounting hardware not previously approved in writing by Dolby, and/or third-party bracket installation. Any modification to the speaker system hardware provided by Dolby (such as mounting by drilling holes into the speaker system) will render the product warranty null and void.

Securing the bottom low-frequency cabinet

Procedure

1. Once you determine the proper placement of the system relative to the screen, secure System 136 to the building structure, using a platform on the screen frame. For this purpose, we recommend the use of the BKT.FLR kit or a third-party equivalent. Check with local building codes, and always refer the installation to a qualified professional.
2. Remove the four M10 bolts from the sides of the CS136LF speaker cabinet, as shown in the following figure.
3. Reinstall these bolts with the BKT.FLR brackets (or equivalent), using the included M10 washers (packaged with BKT.FLR) or third-party hardware, and then retighten. You must supply the bolts to secure the bracket to the mounting surface. We recommend using a serviceable thread-locking compound (for example, Loctite 243). We also recommend applying acoustic or other nonhardening caulking to the bottom side of the bracket to isolate vibration from the speaker to the platform that is attached to the building structure. Install all fasteners back into their threaded inserts to prevent air leaks.

Figure 9: System 136

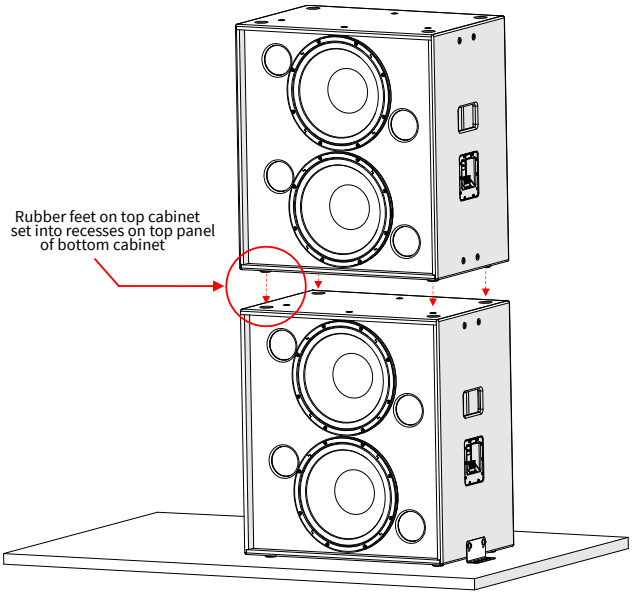


Installing the top low-frequency cabinet

1. Align the top cabinet with the bottom cabinet that you secured to a platform attached to the building structure. The rubber feet on the top cabinet must align into the recesses on the bottom cabinet.

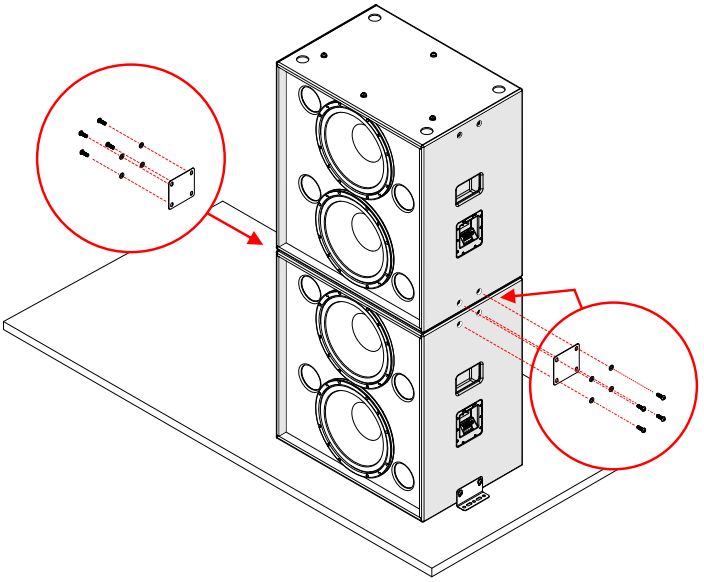
2. Remove the four M10 bolts from each side of the respective cabinets, and add the washers included with BKT.136 kit.

Figure 10: Mount top low-frequency cabinet to bottom low-frequency cabinet



3. Reinstall the bolts with the BKT.136 coupling plates, and retighten the M10 bolts to 12 newton meters (Nm) [8.9 ft-lb, 106 in-lb]. We recommend using a serviceable thread-locking compound (for example, Loctite 243) to prevent the screws from vibrating out of position. All supplied fasteners must be in place to avoid air leaks in the speaker enclosure.

Figure 11: Couple top and bottom low-frequency cabinets



Installing the CS136MH onto the top low-frequency cabinet

1. Remove the four M10 bolts from the top CS136LF cabinet. Add four washers from the CS136MH hardware kit.

2. Place the CS136MH cabinet on top of the CS136LF cabinet, and then reinstall the four M10 bolts and washers through the bottom plate. We recommend a serviceable thread-locking compound (for example, Loctite 243). Do not fully tighten the bolts until aiming is completed.

Figure 12: Mount mid/high speaker to top low-frequency cabinet

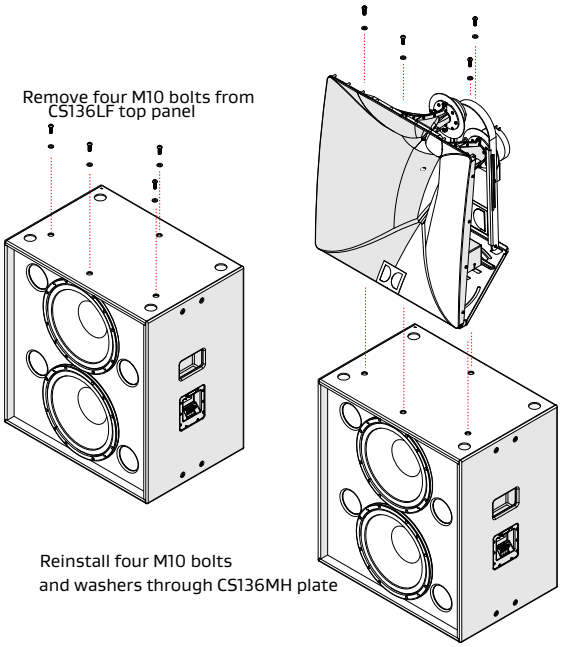
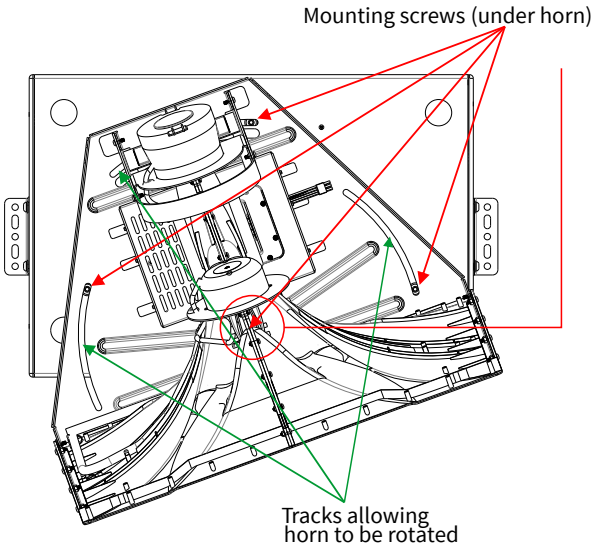


Figure 13: CS136MH overhead view



3.3 Aiming System 136

This section describes proper aiming procedures for System 136.

About this task

You need to use the laser-pointer placement shelf to illuminate a typical aiming point that is located two-thirds back and centered in the auditorium seating area. To aim the system, you can use any type of laser pointer, as long as the beam shines through the hole in the CS136MH horn and the laser body is parallel to the shelf.

Figure 14: Aiming for the reference listening position overhead view

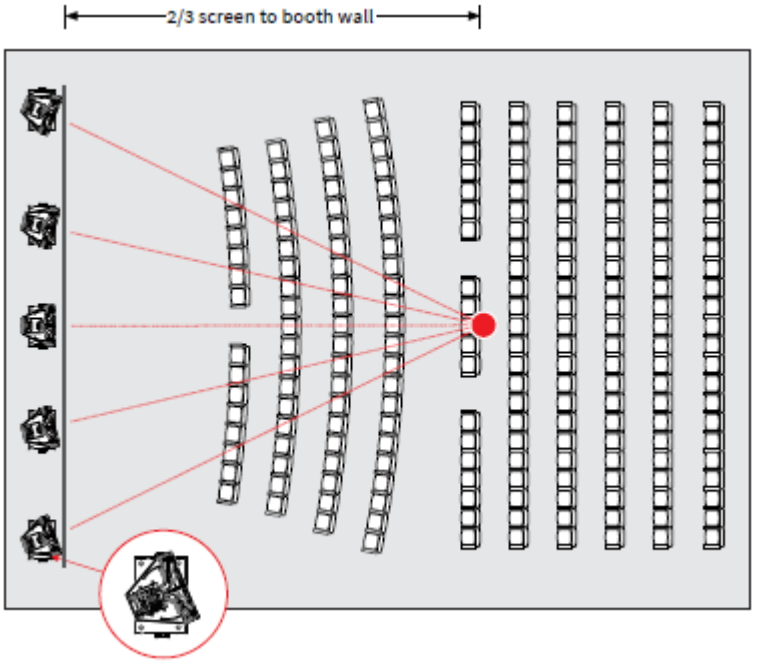
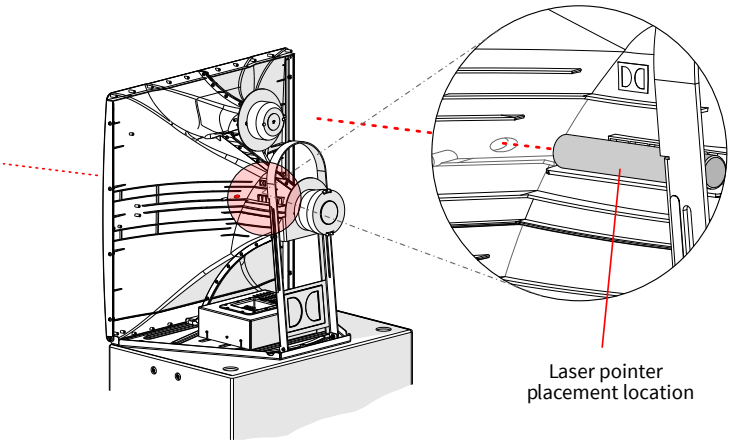


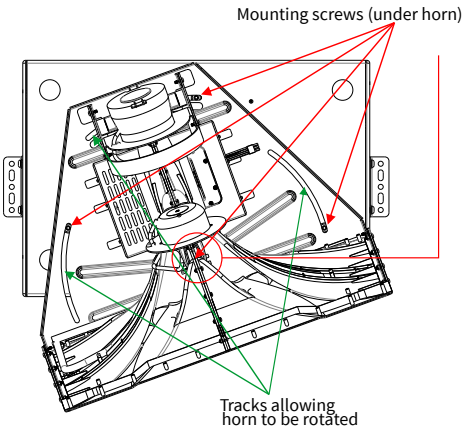
Figure 15: Placing the laser



Procedure

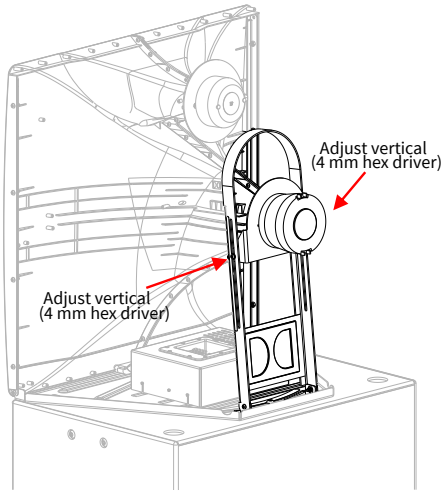
1. After assembling System 136, adjust the speaker horizontal axis by rotating the CS136MH on the cabinet. The angle adjustment range is +/- 20 degrees from the center, as shown on the provided decal stickers.

   Figure 16: Adjust CS136MH horizontal axis



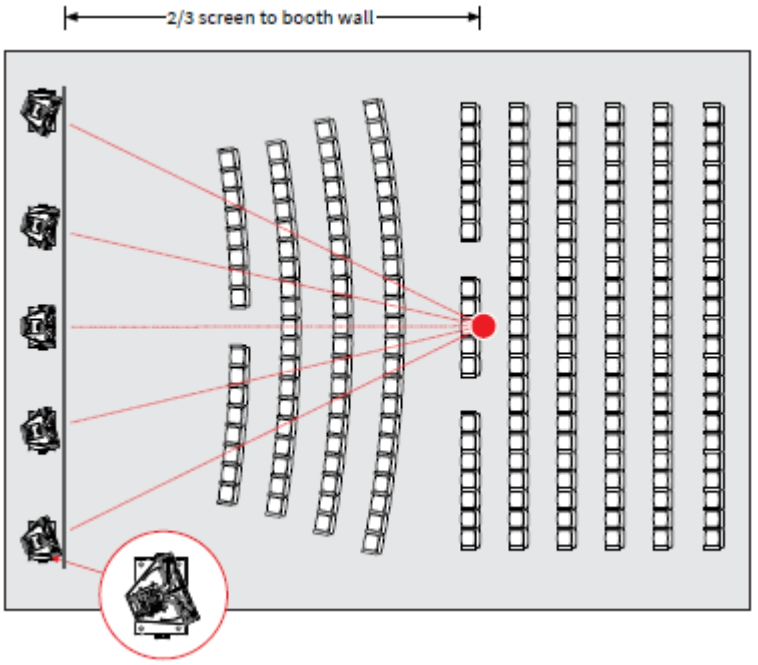
2. Tighten the bolts so the horizontal adjustment is locked to 12 Nm [8.9 ft-lb, 106 in-lb].
3. Loosen the vertical angle adjustment points, and tilt the horn. The angle adjustment range is +15/-20 degrees.

   Figure 17: Loosen vertical adjustment points



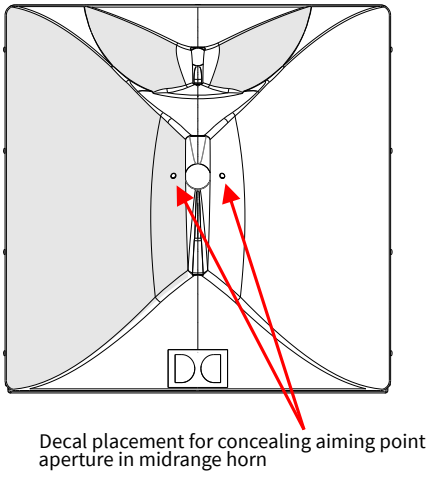
4. Tighten the vertical aiming screws and bottom-front pivot screws to 5.5 Nm [4.1 ft-lb, 49 in-lb] to lock in this angle.

Figure 18: Aiming for the reference listening position/overhead view)



5. After aiming is completed, install the decal stickers on the mid-range horn to hide the two laser-pointer openings.

Figure 19: Hide two openings with decals



3.4 Connecting electrical components

To be sure that the speakers work correctly, you must connect all electrical components properly.

Connecting audio
Required tool: Wire stripper

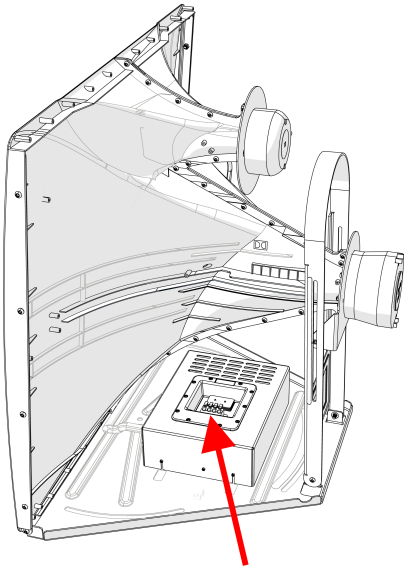
⚠ **CAUTION:** Turn off all amplifiers when connecting loudspeaker wiring.

System 136 connectors accept an American Wire Gauge (AWG) of 18 AWG to 6 AWG (1 mm^2 – 16 mm^2). Typically, a wire gauge of 16 AWG to 12 AWG (1.5 mm^2 – 4 mm^2) is recommended. The following sections provide basic information regarding System 136 input plates, choosing between the two modes of operation, installing the wiring, and detailed information regarding speaker operating modes.

Connecting and configuring the CS136MH

At the base of the CS136MH, there is a small box that contains an input plate with wiring inputs, flip card, and a passive crossover, as shown in the following figure.

Figure 20: CS136MH input plate location



CS136MH input plate

The CS136MH uses an advanced input plate with a flip card that determines whether the internal passive crossover is used. The flip card is a small circuit board that you can remove and reinstall in two configurations. The arrow on the flip card points to the current operation mode, as shown in the following figure. To remove the flip card, pull it straight up (rocking it a little if needed). Note that this input plate has a small driver icon to represent the high-frequency driver, and a larger driver icon for the mid-frequency driver, as shown in the following figure.

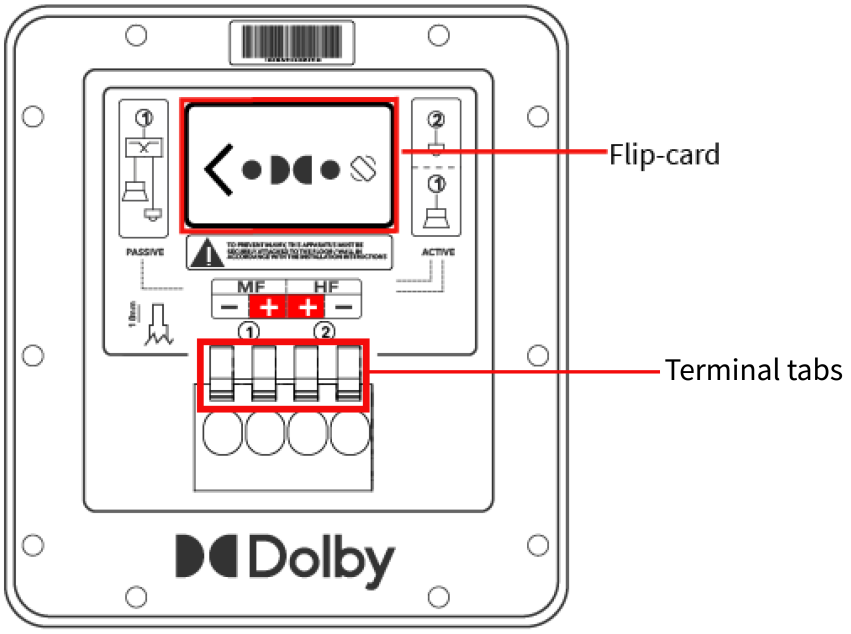
The flip-card arrow points to the type of speaker configuration. When pointing to the left, the passive crossover is engaged and you need to connect only the -/+ wires to position 1, as shown in the following figure. The crossover drives both the mid-frequency and high-frequency drivers from the same amplifier channel. For this type of configuration, you do not connect wires to position 2.

To install wires into the advanced input plate:

1. Strip back the wire insulation/sheath to 18 mm.
2. Locate the orange terminal tab and push it inward. This terminal tab is spring loaded, and pushing it inward opens the gap in the hole directly below the tab.

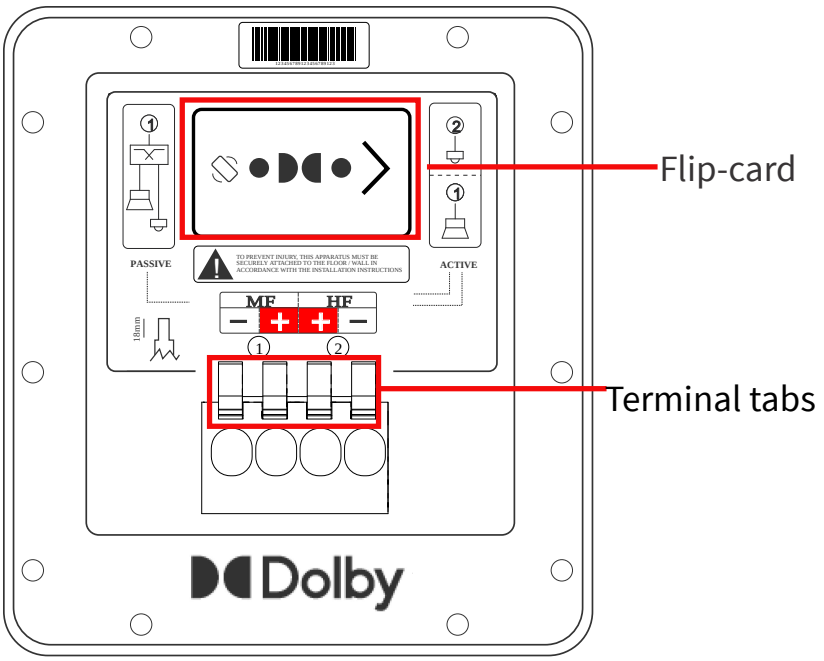
3. Insert the wire fully into the hole.
4. Release the terminal tab. The spring mount clamps the wire securely.
5. Inspect the terminal for any stray wire strands.

Figure 21: CS136MH input plate with flip card in passive mode



If you turn the flip card so the arrow points to the right, the internal passive crossover is not used. In this configuration, you must connect wires to position 1 for the mid-frequency driver (the larger icon), and position 2 for the high-frequency driver (the smaller icon), as shown in the following figure.

Figure 22: CS136MH input plate with flip card in active mode

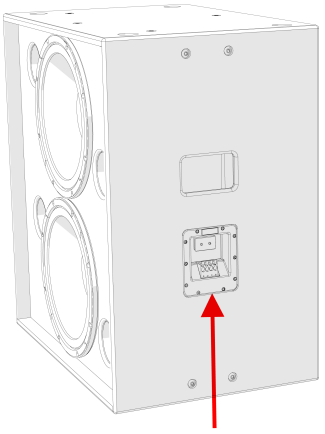


Note: The input terminals are marked with indicators to show their polarity. Per IEC standards, a positive voltage on the positive marked input results in the transducers moving outwards (with the exception of high frequency in passive mode only, which has a negative polarity). The CS136MH and CS136LF differ in the order of negative and positive terminations. You must verify the positive and negative markings for each respective product. Always tie the cable down to the available hardware to minimize any buzzing or pullouts. If possible, after wiring is completed, play sound through the speaker to identify any connection issues, buzzing, or rattling. Refer to the figures in the wiring sections that follow.

Connecting and configuring the CS136LF

The CS136LF input plate is mounted on the side of the speaker for easy access to the wiring and the flip card, as shown in the following figure.

Figure 23: CS136LF input plate location



The input plate contains a flip card that you can use to select the operation mode. To remove the flip card, pull it straight up (rocking it a little if needed). The flip card orientation determines whether the drivers are operated in parallel or individually. If you turn the flip card so the arrow points to the left, the wiring connection to position 1 drives both of the 15-inch speaker elements in parallel. If you turn the flip card so the arrow points to the right, each of the drivers is independent and must be powered individually by separate amplifier channels. This requires connections to both wiring position 1 and wiring position 2. (See the following two figures.)

Note that this input plate displays two LF connections and that their icons are the same size because the drivers are the same size. Icon 1 represents the top driver in the cabinet and icon 2 represents the bottom driver in the cabinet. There is no crossover in the CS136LF.

To install wires into the advanced input plate:

1. Strip back the wire insulation/sheath to 18 mm.
2. Locate the orange terminal tab and push it inward. This terminal tab is spring loaded and pushing it inward opens the gap in the hole directly below the tab.
3. Insert the wire fully into the hole.
4. Release the terminal tab. The spring mount clamps the wire securely.
5. Inspect the terminal for any stray wire strands.

Figure 24: CS136LF parallel operating mode

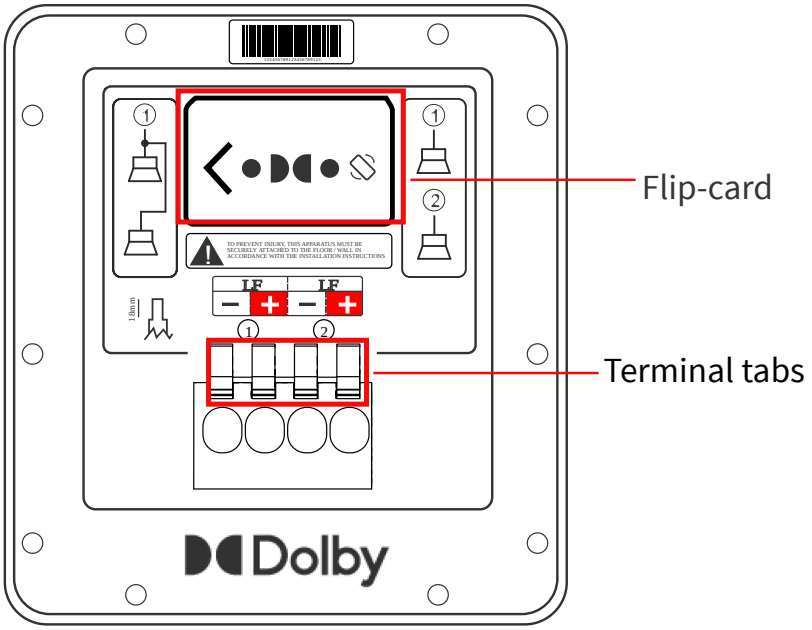
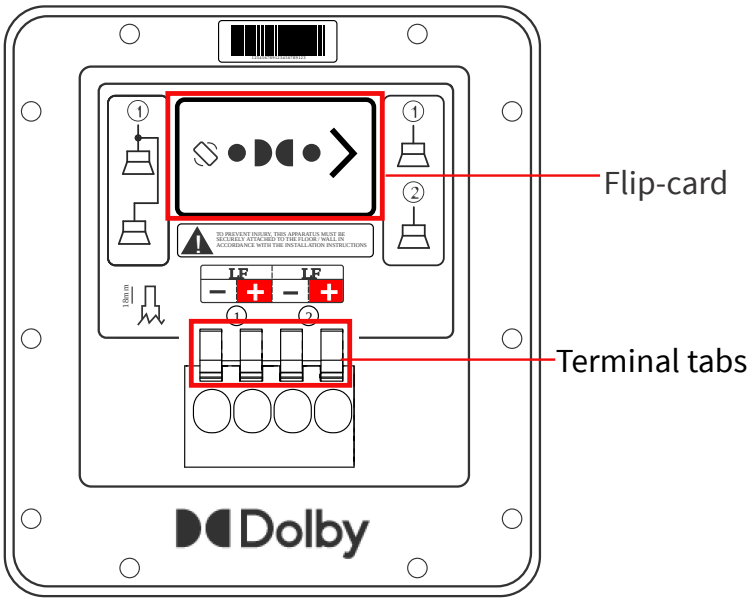


Figure 25: CS136LF independent operating mode



Note: The input terminals are marked with indicators to show their polarity. Per IEC standards, a positive voltage on the positive marked input results in the transducers moving outwards (with the exception of high frequency in passive mode only, which has a negative polarity). The CS136MH and CS136LF differ in the order of negative and positive terminations. You must verify the positive and negative markings for each respective product. Always tie the cable down to the available hardware to minimize any buzzing or pullouts. If possible, after wiring is completed, play sound through the speaker to identify any connection issues, buzzing, or rattling. Refer to the figures in the wiring sections that follow.

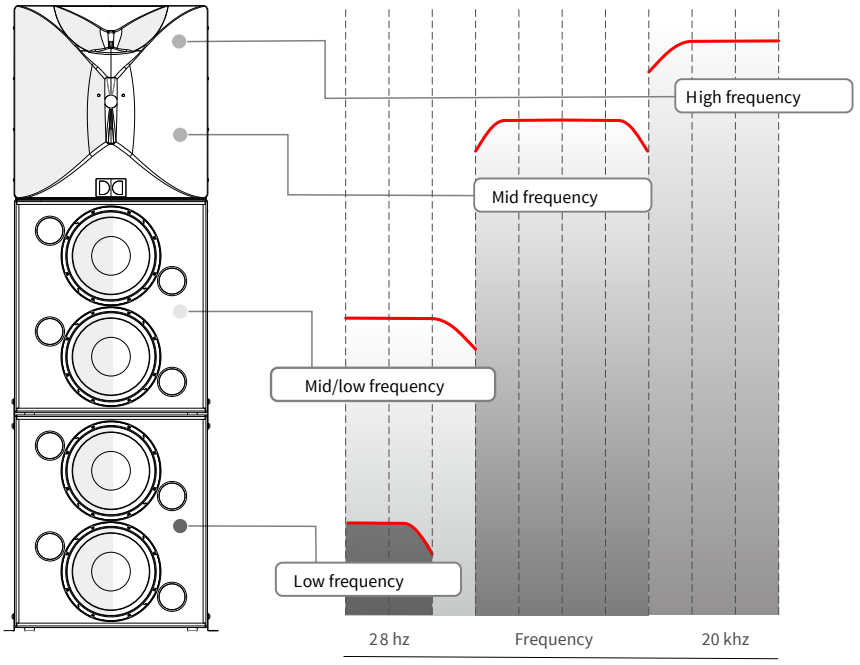
Configuring the speaker operating mode

You set the operating mode for each system component using its flip card. Remove the flip card by pulling it straight out, and then reinsert it with the arrow pointing to the desired operation mode.

The CS136MH ships in bi-amplifier mode (quad-amplifier screen channel as a whole), which requires external amplifier processing for crossovers and gain settings. The CS136LF ships in parallel mode (single amplifier channel for both drivers). Refer to the following diagrams for the various operating mode configurations.

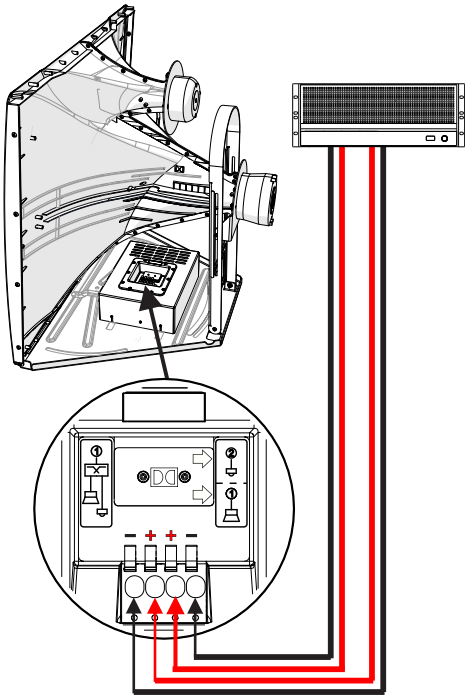
We recommend the quad-amplifier mode wiring configuration for maximum performance. In this mode, the CS136MH mid and high frequency drivers are processed and amplified independently. The top CS136LF covers some mid frequencies in addition to low frequencies. The bottom CS136LF is exclusively for low-frequency output.

Figure 26: System 136 quad-amplifier configuration



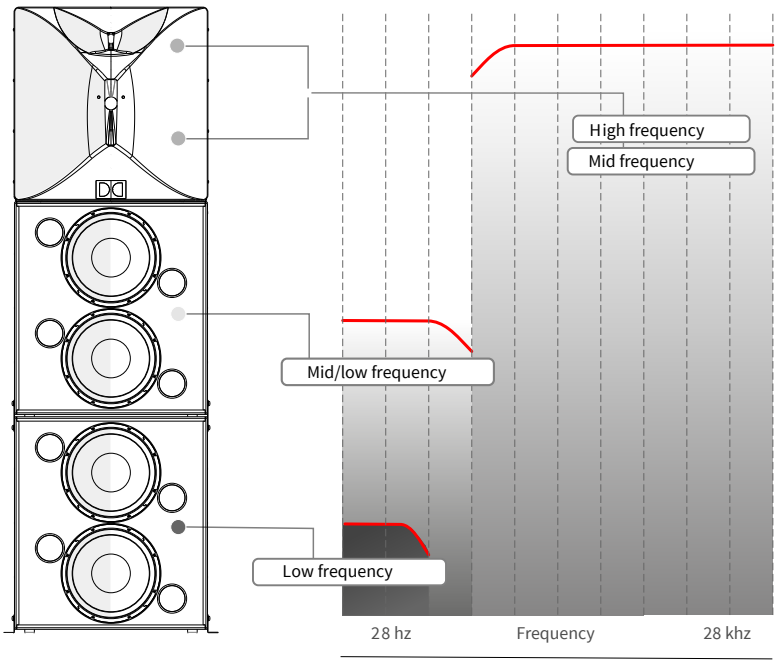
This CS136MH bi-amplifier configuration provides two 8-ohm loads that are driven by independent amplifier channels with independent DSP processing for each channel. The flip card is oriented to the right, and four wires are used to connect the CS136MH to the amplifier.

Figure 27: Mid/high bi-amplifier configuration



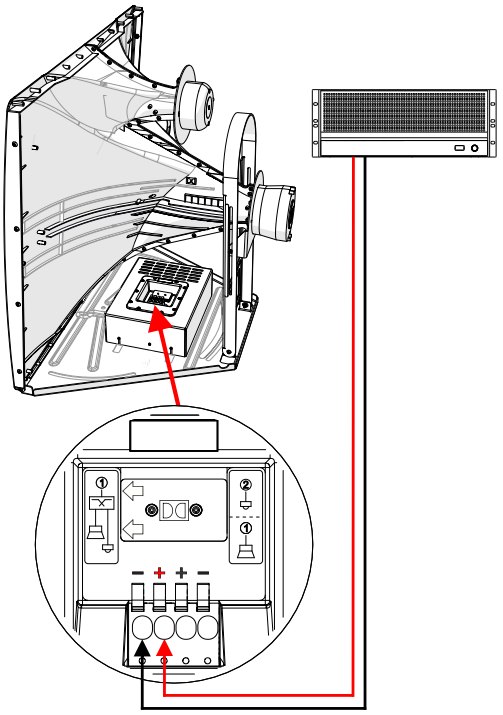
The tri-amplifier configuration for the entire system connects to three channels of amplification.

Figure 28: System 136 Tri-amplifier configuration



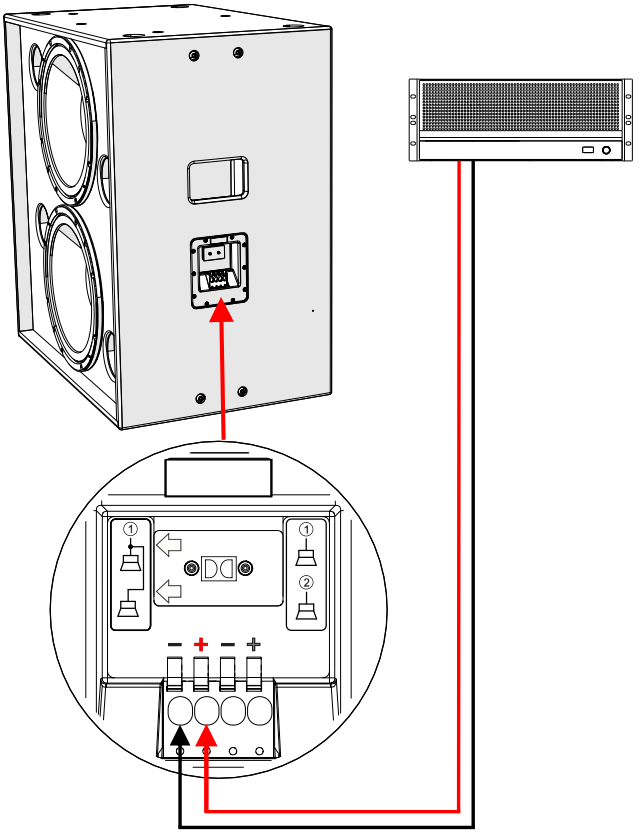
The mid/high-passive configuration is an 8-ohm load to a single amplifier channel.

Figure 29: Mid/high passive configuration



The low-frequency parallel configuration is a 4-ohm load to a single amplifier channel.

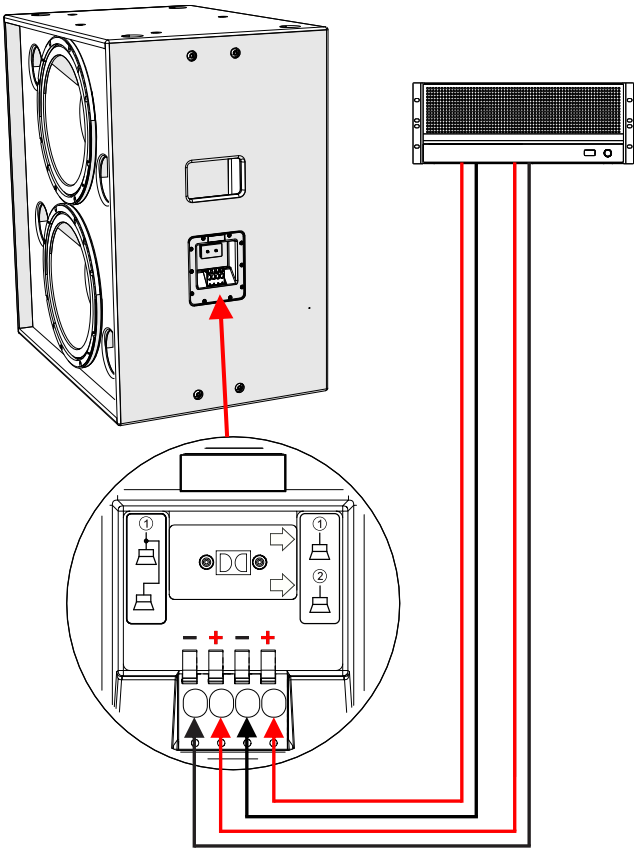
Figure 30: Low-frequency parallel-wiring configuration



The alternate low-frequency cabinet wiring configuration provides independent wiring of the two drivers for two 8-ohm loads that are driven by independent amplifier channels. You should use the same recommended processing for both channels. V_{rms} limiting remains the same as in parallel mode, as only the amplifier power requirement decreases by 50 percent for the respective amplifier channel.

In this configuration, you need to point the flip card to the right.

Figure 31: Low-frequency alternate-cabinet configuration



4

System 136 and system components specifications

Each of the following specifications includes technical data with additional annotated information.

System 136 specifications

Specification	Technical data	Notes
Frequency range	31 Hz -20 kHz	+3 dB/-6 dB in half-space conditions using required processing.
Usable LF response	28 Hz	-10 dB in half-space conditions.
CS136MH coverage window (asymmetrical)	55 degrees top horizontal, 100 degrees bottom horizontal, 50 degrees vertical	Horizontal top and vertical -6 dB averaged to on-axis response. Horizontal bottom -9 dB averaged to on-axis response for near-field proximity compensation.
Stacked CS136LF coverage window	120 degrees horizontal, 60 degrees vertical	Horizontal and vertical -6 dB relative to on-axis response using both LF cabinets operating with their respective required processing.
CS136MH passive mode rated impedance	8 ohms	
CS136MH bi-amp mode rated impedance	Mid frequency (MF) 8 ohms; High frequency (HF) 8 ohms	
CS136LF rated impedance (individual cabinets)	4 ohms	
CS136MH passive mode sensitivity @ 1 watt	104 dB	Measured with 12 dB crest IEC 60268-1 noise @ 2.83 V_{rms} in whole-space conditions with required high-pass filter (HPF) and 48 dB bandwidth (BW) low-pass filter (LPF) @ the rated system frequency range.
CS136MH bi-amp mode sensitivity @ 1 watt	MF 112 dB/HF 106 dB	Measured with 12 dB crest pink noise @ 2.83 V_{rms} in whole-space conditions. MF used required HPF and LPF. HF used required HPF and 48 dB BW LPF @ the rated system frequency range.
CS136LF stacked cabinet sensitivity @ 1 watt	Top 102 dB; bottom 100 dB	Measured with 12 dB crest pink noise @ 2 V_{rms} in half-space conditions with required HPF and LPF respectively, for top and bottom cabinets.

Specification	Technical data	Notes
CS136MH passive mode power handling	500 W @ 63.2 V_{rms}	12 dB crest IEC 60268-1 noise for two hours with required HPF, calculated power based on rated impedance.
CS136MH bi-amp mode power handling	MF 125 W @ 31.6 V_{rms}/HF 75 W @ 24.5 V_{rms}	12 dB crest pink-noise for two hours with required HPF and LPF, based on AES2-2012 standard, calculated power based on rated impedance. MF used required HPF and LPF. HF used required HPF and 48 dB BW LPF at the rated system frequency range.
CS136LF stacked cabinets power handling	Top 1400 W @ 74.8 V_{rms}; bottom 900 W @ 60 V_{rms}	12 dB crest pink noise for two hours with required HPF and LPF respectively, for top and bottom cabinets, respectively, based on AES2-2012 standard; calculated power based on rated impedance.
CS136MH passive mode maximum continuous SPL @ 1 meter	131 dB	Calculated from rated sensitivity and power.
CS136MH bi-amp mode maximum continuous SPL @ 1 meter	133 dB (MF 133 dB + HF 125 dB)	MF and HF calculated from rated sensitivity and power. Total SPL is a noncoherent summation.
CS136LF stacked cabinet maximum continuous SPL @ 1 meter	138 dB (top 133 dB + bottom 129 dB)	Top and bottom calculated from rated sensitivity and power. Total SPL is a coherent summation.
System 136 maximum summed continuous SPL @ 1 meter	139 dB	Dual LF coherent sum combined with MF and HF individually. Total SPL is a noncoherent summation.

CS136MH specifications

Specification	Technical data	Notes
Frequency range	400 Hz - 20 kHz	+3 dB/-6 dB in whole- space conditions using required processing.
Coverage window (asymmetrical)	55 degrees top horizontal, 100 degrees bottom horizontal, 50 degrees vertical	Horizontal top and vertical -6 dB averaged to on-axis response. Horizontal bottom -9 dB averaged to on-axis response for near-field proximity compensation.
Passive mode rated impedance	8 ohms	
Bi-amp mode rated impedance	MF 8 ohm/HF 8 ohm	
Passive mode sensitivity @ 1 watt	104 dB	Measured with 12 dB crest IEC 60268-1 noise @ 2.83 V_{rms} in whole-space conditions with required HPF and a 48 dB BW LPF at the rated frequency range of the system.
Bi-amp mode sensitivity @ 1 watt	MF 112dB/HF 106 dB	Measured with 12 dB crest pink noise @ 2.83 V_{rms} in whole- space conditions. MF used required HPF and LPF. HF used required HPF and a 48 dB BW LPF at the rated frequency range of the system.

Specification	Technical data	Notes
Passive mode power handling	500 W @ 63.2 V_{rms}	12 dB crest IEC 60268-1 noise for 2 hours with required HPF, calculated power based on rated impedance.
Passive mode power draw	195 W	Measured average power over 5 seconds at the rated V_{rms} using 12 dB crest IEC noise with required HPF and LPF. This measured power draw from the amplifier is useful for estimating amplifier sizing in overall system design.
Passive mode maximum voltage peak	126.6 Vpk	Measured Vpk over 100 hours using a Hann shaped sine-wave burst at the maximum excursion frequency of the system. This data is useful for setting peak stop limiters and amplifier selection.
Bi-amp mode power handling	MF 125 W @ 31.6 V_{rms} / HF 75 W @ 24.5 V_{rms}	12 dB crest pink noise for 2 hours using required HPF and LPF, based on AES2-2012 standard, calculated power based on rated impedance. MF used required HPF and LPF. HF used required HPF and a 48 dB BW LPF (LPF) at the rated frequency range of the system.
Bi-amp mode power draw	MF 100W/HF 60 W	Measured average power over 5 seconds at the rated V_{rms} using 12 dB crest pink noise with required HPF and LPF. This measured power draw from the amplifier is useful for estimating amplifier sizing in overall system design.
Bi-amp mode maximum voltage peak	MF 63.2 Vpk/HF 98 Vpk	Measured Vpk over 100 hours using a Hann shaped sine-wave burst at the maximum excursion frequency of the system. This data is useful for setting peak stop limiters and amplifier selection.
Passive mode maximum continuous SPL @ 1 meter	131 dB	Calculated from rated sensitivity and power.
Passive mode measured acoustic peak SPL @ 1 meter	142 dB	Measured peak SPL over 5 seconds at rated V_{rms} using 12 dB crest IEC noise with required HPF.
Bi-amp mode maximum continuous SPL @ 1 meter	133 dB (MF 133 dB + HF 125dB)	MF and HF calculated from rated sensitivity and power. Total SPL is presented as a noncoherent summation.
Bi-amp mode measured acoustic peak SPL @ 1 meter	143 dB (MF 142 dB + HF 135 dB)	MF and HF measured peak SPL over 5 seconds at rated V_{rms} using 12 dB crest pink noise. MF used required HPF and LPF. HF used required HPF and a 48 dB BW LPF at the rated frequency range of the system. Total peak SPL is presented as a noncoherent summation.

CS136LF specifications - top cabinet

Specification	Technical data	Notes
Frequency range	31 Hz - 400 Hz	-6 dB in half-space conditions, high frequency determined by required processing.
Usable LF response	28 Hz	-10 dB in half-space conditions
Coverage window	120 degrees horizontal, 80 degrees vertical	Horizontal and vertical 6 dB relative to on-axis response within rated frequency range.
Rated impedance	4 ohms	
Sensitivity @ 1 watt	102 dB	Measured with 12 dB crest pink noise @ 2 V_{rms} in half-space conditions with required HPF and LPF.
Power handling	1,400 W @ 74.8 V_{rms}	12 dB crest pink noise for 2 hours with required HPF and LPF, based on AES2-2012 standard, calculated power based on rated impedance.
Power draw	1,070 W	Measured average power over 5 seconds at the rated V_{rms} using 12 dB crest pink-noise with required HPF and LPF. This measured power draw from the amplifier is useful for estimating amplifier sizing in overall system design.
Maximum voltage peak	149.6 Vpk	Measured Vpk over 100 hours using a Hann shaped sine-wave burst at the maximum excursion frequency of the system. This data is useful for setting peak stop limiters and amplifier selection.
Maximum continuous SPL @ 1 meter	133 dB	Calculated from rated sensitivity and power.
Measured acoustic peak SPL @ 1 meter	142 dB	Measured peak SPL over 5 seconds at rated V_{rms} using 12 dB crest pink noise with required HPF and LPF.

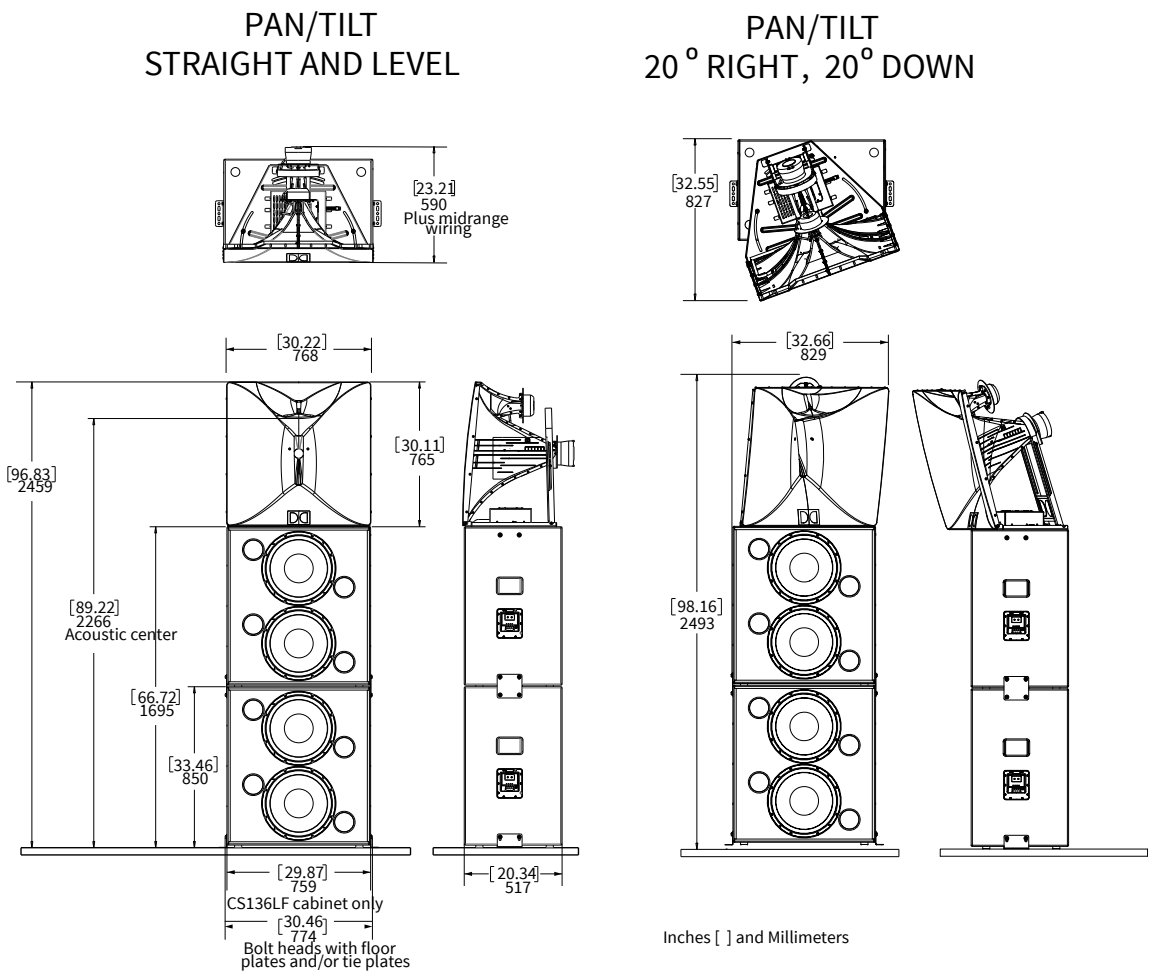
CS136LF specifications - bottom cabinet

Specification	Technical data	Notes
Frequency range	31 Hz - 170 Hz	-6 dB in half-space conditions, high frequency determined by required processing.
Processing sensitivity @ 1 watt	100 dB	Measured using 12 dB crest pink noise @ 2 V_{rms} in half-space conditions with required HPF and LPF.
Processing power handling	900 W @ 60 V_{rms}	12 dB crest pink noise for 2 hours with required HPF and LPF, based on AES2-2012 standard, calculated power based on rated impedance.

Specification	Technical data	Notes
Power draw	640 W	Measured average power over 5 seconds at the rated V_{rms} using 12 dB crest pink noise with required HPF and LPF. This measured power draw from the amplifier is useful for estimating amplifier sizing in overall system design.
Maximum voltage peak	149.6 Vpk	Measured Vpk over 100 hours using a Hann shaped sine-wave burst at the maximum excursion frequency of the system. This data is useful for setting peak stop limiters and amplifier selection.
Maximum continuous SPL @ 1 meter	129 dB	Calculated from rated sensitivity and power.
Measured acoustic peak SPL @ 1 meter	140 dB	Measured peak SPL over 5 seconds at rated V_{rms} using 12 dB crest pink noise with required HPF and LPF.

Note: These specifications provide typical values and do not represent absolute limits.

System 136 and system components dimensions



5

System 136 digital signal processing requirements

These tables show the System 136 digital signal processing requirements for the different modes of operation.

Note: *There are two principal implementations for parametric EQ filters in DSP processors. You need to select either the Constant Q or Constant Bandwidth mode in your DSP user interface (UI). The DSP UI may provide both **Q** or **BW** settings, or it may show only **BW** with no option to input or show **Q**. To correctly match the intended performance of this Dolby product, confirm with your DSP manufacturer which implementation is used. The Dolby CP850 and CP950 cinema processors use constant-bandwidth filters.

System 136 Quad-amplifier mode

System 136 CS136MH (bi-amplifier mode) high-frequency driver requirements				
High-pass filter	**Low-pass filter**	**Overall gain in dB**	**Delay in ms**	
4k Hz, 48 dB (8th order Butterworth)	None	-2.5 (+2.5 for Cinema preset)	1.042	
EQ frequency	**Constant Q***		**Constant bandwidth***	**EQ gain in dB**
4.8 kHz	2.87 Q	0.5 BW	0.7	-3
15 kHz	2.87 Q	0.5 BW	0.7	2
RMS limiting in V_{rms}	**Attack in ms**	**Release in ms**	**Peak stop in Vpk**	
24.5	0.3	4.8	98	

System 136 CS136MH (bi-amplifier mode) mid-frequency driver requirements				
High-pass filter	**Low-pass filter**	**Overall gain in dB**	**Delay in ms**	
400 Hz, 48 dB (8th order Linkwitz-Riley)	3.8 kHz, 48 dB (8th order Butterworth)	-7.5 (-2 for Cinema preset)	None	
EQ frequency	**Constant Q***		**Constant bandwidth***	**EQ gain in dB**
630 Hz	4.8 Q	0.3 BW	0.42	-3
1.25 kHz	1.41 Q	1 BW	1.25	-1.5
1.8 kHz	1.41 Q	1 BW	1.42	-4
RMS limiting in V_{rms}	**Attack in ms**	**Release in ms**	**Peak stop in Vpk**	
31.6	2	32	63.2	

System 136 CS136LF top cabinet requirements				
High-pass filter	**Low-pass filter**	**Overall gain in dB**	**Delay in ms**	
29 Hz, 24 dB (4th order Butterworth)	400 Hz, 48 dB (8th order Linkwitz-Riley)	0 (0 for Cinema preset)	1	
EQ frequency	**Constant Q***		**Constant bandwidth***	**EQ gain in dB**
55 Hz	2.87 Q	0.5 BW	0.7	3
125 Hz	1.41 Q	1 BW	1.3	-2
RMS limiting in V_{rms}	**Attack in ms**	**Release in ms**	**Peak stop in Vpk**	
74.8	45	720	149.6	

System 136 CS136LF bottom cabinet requirements				
High-pass filter	**Low-pass filter**	**Overall gain in dB**	**Delay in ms**	
29 Hz, 24 dB (4th order Butterworth)	170 Hz, 18 dB (3rd order Butterworth)	0 (0 for Cinema preset)	1	
EQ frequency	**Constant Q***		**Constant bandwidth***	**EQ gain in dB**
55 Hz	2.87 Q	0.5 BW	0.7	3
125 Hz	1.41 Q	1 BW	1.3	-2
RMS limiting in V_{rms}	**Attack in ms**	**Release in ms**	**Peak stop in Vpk**	
60	45	720	149.6	

System 136 Tri-amplifier mode

System 136 CS136MH (passive crossover) mid-frequency/high-frequency requirements				
High-pass filter	**Low-pass filter**	**Overall gain in dB**	**Delay in ms**	
400 Hz, 48 dB (8th order Linkwitz-Riley)	None	-3.5 (+2 for Cinema preset)	None	
EQ frequency	**Constant Q***		**Constant bandwidth***	**EQ gain in dB**
465 Hz	4 Q	0.36 BW	0.52	-4
770 Hz	8 Q	0.18 BW	0.24	3
890 Hz	9 Q	0.16 BW	0.2	-2
3.5 kHz	2.87 Q	0.5 BW	0.7	2
5.5 kHz	1.41 Q	1 BW	1.3	2
7.33 kHz	6 Q	0.24 BW	0.32	2
RMS limiting in V_{rms}	**Attack in ms**	**Release in ms**	**Peak stop in Vpk**	
63.3	2	32	126.6	

CS136LF settings are the same as those in the Quad-amplifier mode section.

Note: These specifications provide typical values and do not represent absolute limits.

6

Setting system limiters

You can run the system limiters process with the required digital signal processing engaged.

About this task

We recommended that you set up the system gain structure with the amplifier channel volumes turned all the way up if the volume setting is easily accessible by any user, such as via a front-panel knob that is not behind a security panel. Disconnecting the loudspeakers from the amplifier during this process will most likely result in conservative settings. You can connect the loudspeakers to the amplifier during this process if caution is observed when increasing the stimulus level and confidence in the measuring setup is secured.

⚠ **CAUTION:** Loudspeaker damage as a result of exceeding the power handling specifications defined in Chapter 4 is not covered under the warranty. In addition, we recommend wearing hearing protection when setting up system limiters via the following procedure.

The CS136MH in passive mode must use IEC noise to set the limiter threshold. High-frequency driver damage can occur if pink noise is used.

To set up system limiters:

Procedure

1. Connect a wide-bandwidth multimeter with averaging to the amplifier output. A wide-bandwidth meter has a rated measuring bandwidth of at least 20 kHz with an averaging function that is more than 5 seconds (very important for low-frequency outputs).
2. Position the bottom CS136LF enclosure in place on the screen platform that is attached to the building structure.
3. Access the RMS limiter setting in the DSP and set it to the maximum value, such that no limiting should occur.
4. Set the attack and release times based on the high-pass filter (HPF), according to the recommended digital signal processing settings for the respective loudspeaker being measured. If that data is not available, we recommend these settings:
   - HPF <30 Hz: attack 45 ms, release 720 ms
   - HPF 30 Hz to 59 Hz: attack 16 ms, release 256 ms
   - HPF 60 Hz to 99 Hz: attack 8 ms, release 128 ms
   - HPF 100 Hz to 224 Hz: attack 4 ms, release 65 ms
   - HPF 225 Hz to 449 Hz: attack 2 ms, release 32 ms
   - HPF 450 Hz to 999 Hz: attack 1 ms, release 16 ms
   - HPF 1 kHz to 1.99 kHz: attack 0.5 ms, release 8 ms
   - HPF >2k Hz: attack 0.3 ms, release 4.8 ms
5. Mute all outputs into the system, except for the output you are setting.

6. Play low-level pink noise into the amplifier channel and confirm that the expected loudspeaker is playing (if the loudspeaker is connected to the amplifier) and the multimeter is reading the voltage.
7. While monitoring the meter, slowly turn up the pink noise until the V_{rms} is at the published rating. For low-frequency outputs, an average of at least 5 seconds at the same pink-noise level is required for the reading to stabilize. Typically, some amplifier clipping will occur. However, if the amplifier clipping light is almost solid, stop increasing the pink noise and leave it at a V_{rms} level below the published rating.
8. While pink noise is playing at the rated V_{rms} (or there is heavy amplifier clipping), turn down the threshold on the root mean square (RMS) limiter block until the measured V_{rms} goes down slightly.
9. Turn up the stimulus gain and confirm that the V_{rms} does not increase beyond the rated V_{rms}. If it does, turn down the limiter threshold again until the V_{rms} is not above the loudspeaker rating when the stimulus is driven heavily.

   It is preferable and safe to measure each amplifier channel individually. However, to save time it is acceptable to copy the limiter settings to other channels that share identical loudspeaker models, identical amplifier models, and identical gain structure after the limiter in the signal path (including any amplifier front-panel volume controls). It is also acceptable to copy the limiter settings to identical channels if the auditorium equalization (EQ) and/or gain structure is different before the limiter in the signal path.