Dolby

Dolby DSR1090

Owner's Manual

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Notices

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

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Product model

THIS DOCUMENTATION APPLIES TO THE DOLBY DSR1090 SPEAKER (MODEL: CID1028).

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 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 speaker(s). The installer assumes all risk of loss and/or injury arising out of the use of the supplied rigging hardware with any other speaker. 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.

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.

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.

This product is intended for indoor use only.

Do not block any ventilation openings. Install in accordance with the instructions as detailed in this manual and the Product Information document.

When a rolling cart is used to transport the speaker, use caution when moving the cart/speaker system to avoid injury.

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way.

This product may require installation in a restricted access location. Please refer to this manual and to the Product Information document.

Caution: Hearing damage can occur by prolonged exposure to excessive sound pressure level (SPL); the speaker 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.

Caution: Vibration from this type of speaker system may cause cabinets to shift. Failure to secure the speaker cabinet to the building structure may result in the speaker system tipping or falling, which may cause damage or injury.

Caution: 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.

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

High temperature warning: The speaker system may reach elevated temperatures during operation. **Always remove all drive signals and allow ample time for the system to cool down prior to handling.**

To reduce electric shock, do not expose the apparatus to dripping or splashing; no objects filled with liquids, such as mugs, shall be placed on the apparatus.

Caution: Troubleshooting must be performed by a trained electrician. To reduce the risk of electric shock, do not attempt to service this equipment unless you are qualified to do so.

SAFETY SYMBOL KEY

Caution: This symbol that appears on the unit and/or instruction manual is intended to alert the user to the presence of important safety operating and maintenance instructions.

Warning:

This symbol that appears on the unit and/or instruction manual is intended to alert the user to the presence of uninsulated "dangerous" voltage within the product enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

High temperature warning:

This symbol that appears on the unit and/or the instruction manual is intended to alert the user that the item can be hot and that care must be taken accordingly.

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.

EAC RoHs requirements

This product complies with EAC RoHS requirements.

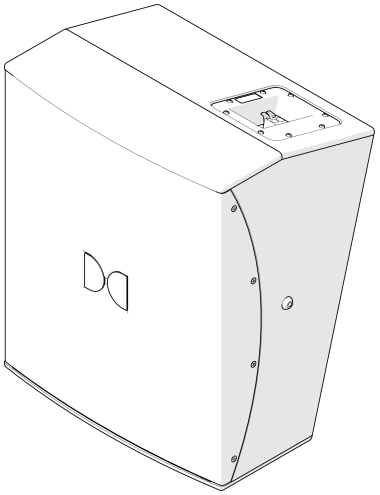
2

Introduction to the Dolby DSR1090 Speaker

The DSR1090 is a high-performance cinema surround speaker for use in 5.1 and Dolby Surround 7.1 cinema auditoriums, as well as small to medium-sized Dolby Atmos equipped auditoriums. The DSR1090 provides a 90° horizontal × 60° vertical acoustic coverage pattern, which works well for general-purpose surround applications and can be used for sidewall or overhead installations.

The DSR1090 utilizes a high-performance 10-inch low-frequency driver and a 1-inch exit high-frequency compression driver. Both transducers are finite element modeling (FEM) optimized, which allows the transducers to deliver high-sound pressure levels with minimal distortion. These advanced drivers, coupled with the Dolby industry-leading system design and support philosophy, allow for exceptional performance, and quick, easy installation and service.

Figure 1: Dolby DSR1090



Following is an outline of this chapter:

2.1 About this documentation

This documentation describes the key features and benefits of the Dolby DSR1090, provides important preinstallation information, and shows you how to install the system in a typical cinematic exhibition environment.

2.2 DSR1090 key features and benefits

The DSR1090 is a compact surround speaker for general-purpose cinematic exhibition that provides several key features and benefits.

- The 90° horizontal × 60° vertical acoustic coverage pattern provides good distribution of audio for small to medium theaters.
- 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.
- The high-frequency driver is a low-distortion 25.4 mm high-temperature polymer dome with a frequency response up to 20 kHz.
- The low-frequency driver is a 10-inch transducer with a finite element modeling (FEM) optimized motor and suspension, optimized cooling for low power compression, and a high excursion rating.
- An industry-standard four-hole mounting point on the rear of the enclosure allows for simplified and flexible mounting solutions.
- Holes on the sides of the speaker cabinet are provided for installation of a mounting yoke.

2.3 DSR1090 preinstallation information

In a typical auditorium, the DSR1090 is installed in various locations throughout the auditorium, including possible locations on side and rear walls, and overhead locations. Information is provided on the placement of the DSR1090 in a standard auditorium and in a Dolby Atmos auditorium.

Figure 2: Standard Dolby Surround installation example (5.1/7/1)

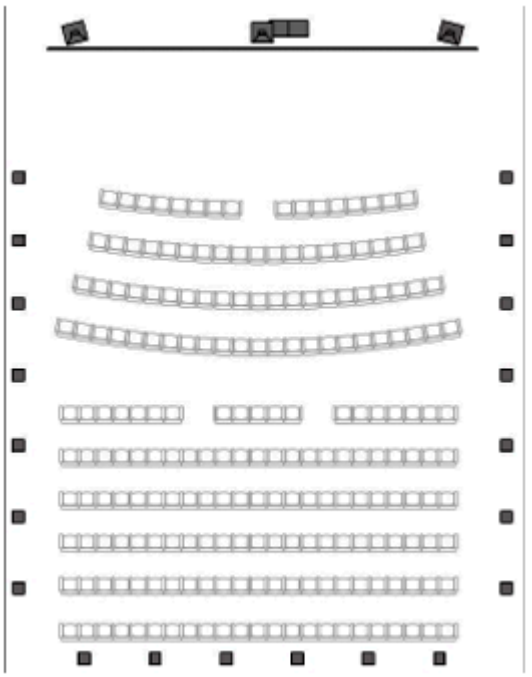
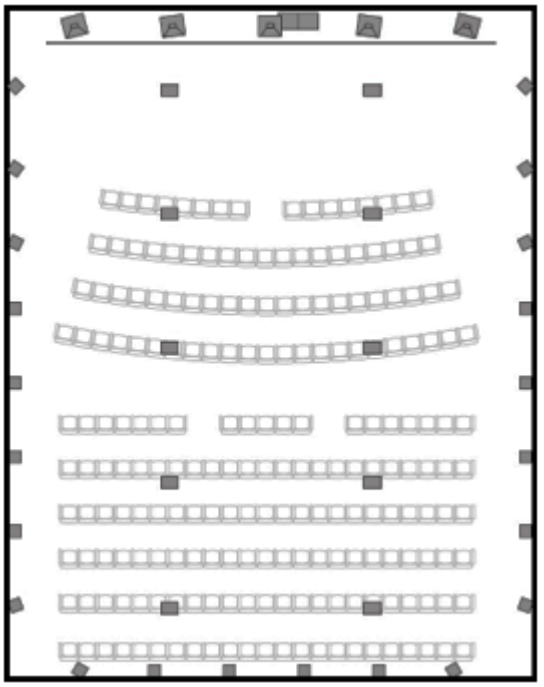


Figure 3: Dolby Atmos installation



2.3.1 Placing the DSR1090 on a wall or ceiling

You can attach the DSR1090 to a wall or ceiling.

For 5.1 or 7.1 Dolby Surround auditoriums, you should follow standard industry practices for speaker placement and aiming. For Dolby Atmos auditoriums, follow the instructions in the *Dolby Atmos Specification Guide*, which you can download at https://professional.dolby.com/siteassets/cinema-products---documents/dolby-atmos-specifications.pdf.

2.3.2 Determining horizontal aiming for side and rear speakers

For Dolby 5.1 or 7.1 surround installations, there is no requirement for horizontal angling of the side and rear surrounds when speakers point toward the central listening area (CLA).

For Dolby Atmos installations, to determine the proper horizontal aiming for the side and rear surround speakers, you need to define a rectangle within the CLA that includes the reference listening position (RLP).

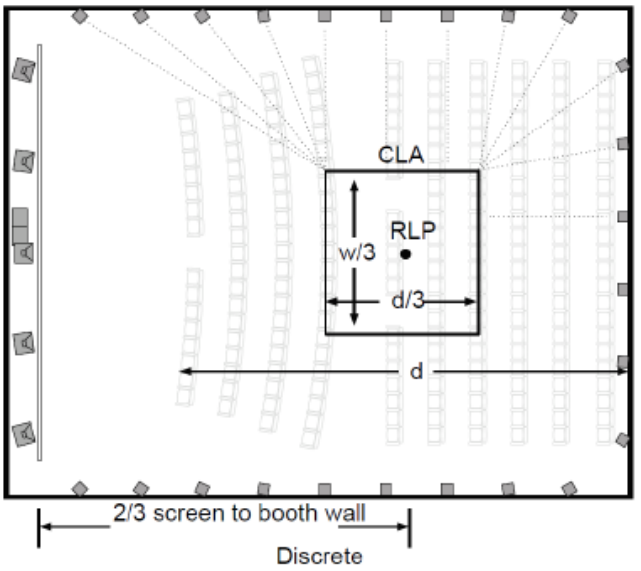
For side and rear surround speakers that are adjacent to the CLA, aim the speakers directly into the auditorium (that is, 0° from perpendicular), ±10°.

For installations that utilize speaker pairing, splay the paired speakers to improve sound coverage. For all speaker pairs, we recommend these aiming parameters, which are based on the CLA:

- Aim the forward-paired speaker to the near-side forward corner.
- Aim the rearward-paired speaker to the near-side rear corner.

  The following figure is an example of proper horizontal aiming for side and rear speakers.

Figure 4: Horizontal aiming for side and rear surrounds

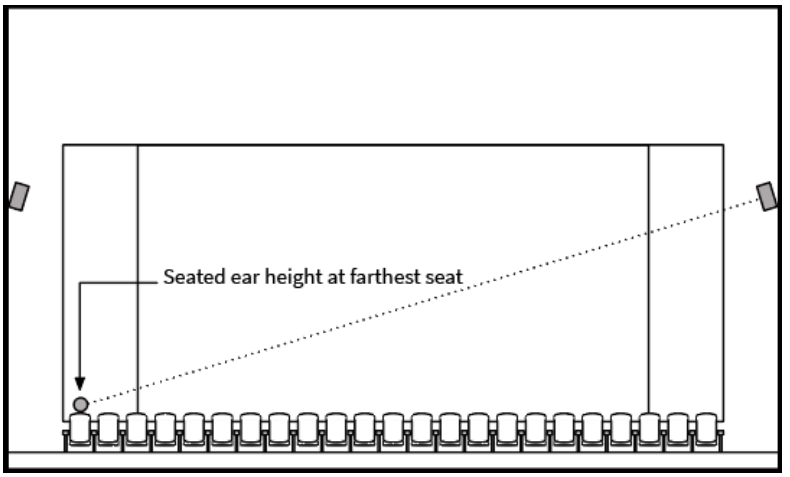


2.3.3 Determining vertical aiming for side and rear speakers

For side and rear surround speakers, you should tilt the speakers vertically to orient the axis of each speaker to the ear height of a seated listener in the farthest seat. You can aim the speaker higher, but not by more than half the vertical coverage angle of the speaker. Typically, rear surround speakers should have the same downward tilt. The tilt of the side surround speakers should not change abruptly (>10°) from speaker to speaker along the array.

This figure is an example of side and rear vertical aiming.

Figure 5: Side and rear speakers vertical aiming



2.3.4 Determining the top surround position

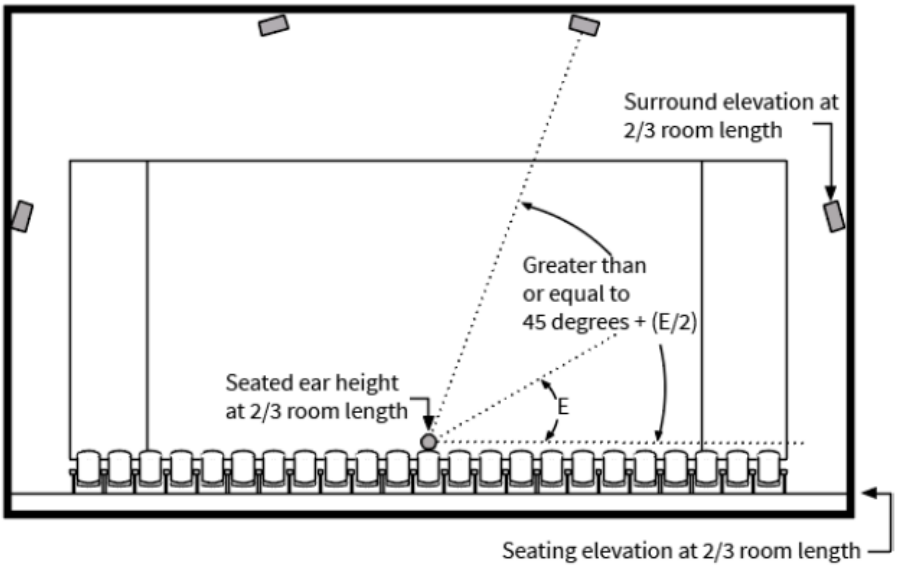
You must always place top surround speakers as left/right pairs, with the left speaker and right speaker located at the same distance from the front wall.

You must place the top surround speaker pairs symmetrically with respect to the screen center line. Typically, the top surround arrays are placed in line with the left center and right center screen speakers.

We recommend wider spacing for tall auditoriums, which is also acceptable for typical auditoriums when standard placement is unachievable. You should then determine the maximum width between top surround speakers by elevation angles as follows, and is shown in the next figure:

1. Let E be the elevation angle of the nearest side surround speaker measured from the reference listening position (RLP).
2. The elevation angle of the corresponding top surround array should be greater than or equal to 45 degrees plus half of angle E. For example, if E is 20 degrees, then the elevation angle of the top surround array should be greater than or equal to 55 degrees.
3. If there is no side surround speaker directly adjacent to the RLP or it is unclear which speaker to reference, you can obtain angle E from the midpoint between two side surround speakers, a unit slightly in front and a unit slightly behind the RLP. Likewise, for the top surround elevation angle, 45 degrees + E/2, you can use an interpolated point between two top surround speakers.

Figure 6: Determining top surround position



2.4 Selecting the DSR1090 bracket and yoke

Mounting brackets and yokes for the DSR1090 are sold separately (YK1090, MMA1090), or you can purchase them from a party other than Dolby, such as Adaptive Technologies or MN Mounting Solutions. You should choose a mounting bracket or yoke that meets the mounting requirements of the auditorium, allowing for the required vertical and horizontal angle adjustment. The bracket or yoke must support the weight of the DSR1090 (31 lb, or 14 kg) with at least a 5:1 safety factor.

Related information

Dolby DSR1090 dimensions on page 23

2.5 Selecting the wire for the DSR1090

It is important that you select the correct wire gauge for the DSR1090.

Typically, no more than 0.5 dB (or 11%) of power should be lost in the cabling. The DSR1090 input plates accept an American Wire Gauge (AWG) of 18 AWG to 6 AWG (1 mm^2 to 16 mm^2). When selecting the wire gauge, you should always follow industry-standard practices, based on the rated impedance of the speaker and the cable length.

For the DSR1090, we recommend a wire gauge of 16 AWG to 12 AWG (1.5 mm^2 to 4 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. 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.

2.6 DSR1090 design simulations

There are `.gll` files that you can use to simulate the DSR1090 in acoustical simulation software.

You can download a folder (`Dolby_Surround_DSR1090_GLL_Files.zip`) that contains the `.gll` files at https://professional.dolby.com/product/cinema-audio-products/DSR1090/. To run the `.gll` files, use EASE or EASE Focus software. You can download the software from https://focus.afmg.eu/index.php/fc-downloads-en.html.

Note: Dolby provides simulations for the DSR1090 in sidewall and overhead positions to meet the needs of an installation.

DSR1090 .gll file descriptions

There are two DSR1090 `.gll` files. The `Dolby_DSR1090_Sidewall.gll` file is for sidewall simulations only. The zero-degree vertical aiming reference is at the back of the enclosure, and therefore the polar has a built-in 15-degree downward angle from the transducers. The `Dolby_DSR1090_Overhead.gll` polar file references the zero-degree vertical aiming reference to the front of the enclosure so that the transducers directly point to the aiming location in the `.gll` file.

2.7 Additional information

There is additional information regarding the DSR1090 that you need to consider.

- System weight for stability calculations is approximately 14.1 kg (31 lb).
- Amplifier selection is aided by additional data, as indicated in the DSR1090 specifications.
- 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 the 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 speaker maximum dynamic performance. Some amplifier companies provide this data in their respective technical data sheets (or provide the data by request).

Related information

Dolby DSR1090 specifications on page 22

2.8 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
  ASIA, CHINA, and PACIFIC RIM: +86-400-810-5850
  EMEA: +44-33-0808-7700
  JAPAN: +81-3-4520-9798

Access documentation

Visit https://customer.dolby.com.

Submit feedback about this documentation

Send an email to documentation@dolby.com.

3

Assembling and installing the DSR1090

Instructions are provided for assembling and installing the DSR1090. Each section of instructions specifies the tools that are necessary to complete the required tasks.

⚠ **Caution:** Dolby disclaims any liability, including damage or injury, for the use of mounting hardware, supports, and brackets not supplied by Dolby. Any modification to the speaker system (for example, mounting by drilling holes into the speaker system) will render the product warranty null and void.

Following is an outline of this chapter:

3.1 Installing a bracket

You can install the DSR1090 using an industry-standard speaker bracket that is designed to support the weight of the speaker and is in compliance with Section 2.4 in this manual or the optional YK1090 yoke or MMA1090 multipoint. (See the link at the end of this section.) The rear panel has an industry-standard hole pattern and will accept a variety of brackets for mounting and aiming.

About this task

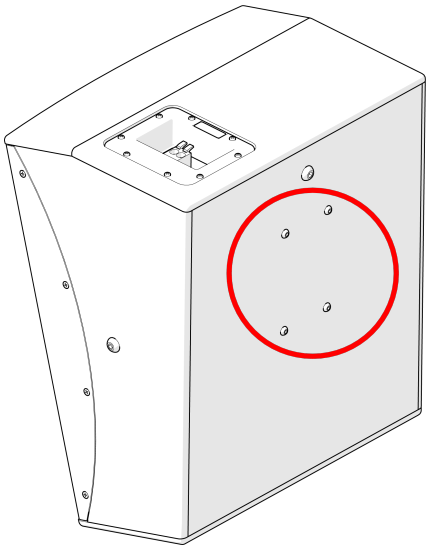
This tool is required to install the bracket:

- 4 mm hex driver

Procedure

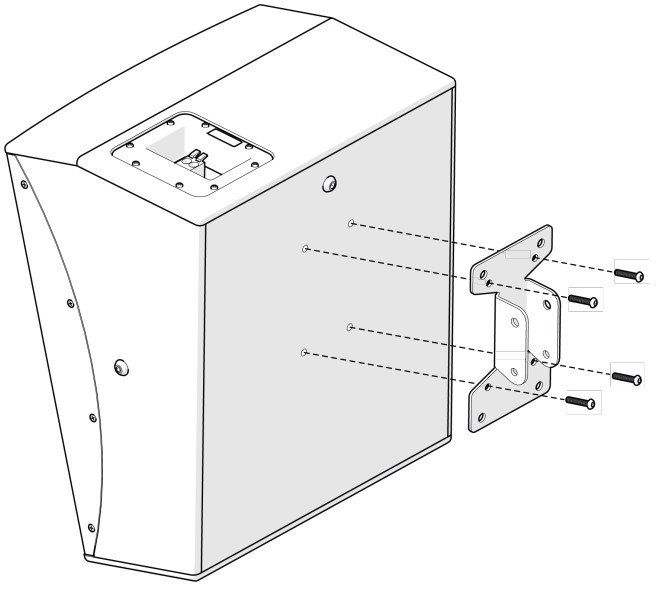
1. Locate the four-hole mounting location on the back of the DSR1090.

   Figure 7: Mounting hole locations

2. Loosen the M6 fasteners using the 4 mm hex driver, and then remove them.
3. Place the bracket on the rear of the speaker.

   Figure 8: Install bracket

4. Add washers to the M6 bolts, and then attach the bracket with the M6 washer combination.

5. Tighten the M6 bolts to the brackets to a torque value of 2.5 Nm. We recommend using a removable thread-locking compound (for example, Loctite) on the fasteners.

Related information

Selecting the DSR1090 bracket and yoke on page 11

3.2 Installing a yoke

You can install the DSR1090 using an using industry-standard speaker bracket that is designed to support the weight of the speaker and is in compliance with Section 2.4 in this manual or the optional YK1090 yoke or MMA1090 multipoint. (See the link at the end of this section.)

About this task

This tool is required to install the yoke:

- 6 mm hex driver

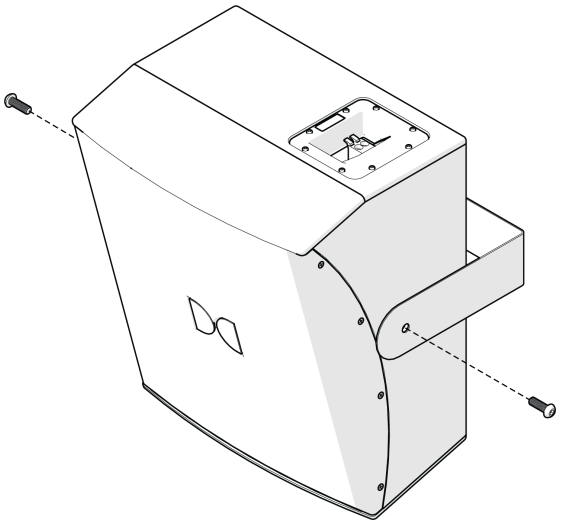
Procedure

1. Remove the M10 bolts from the side of cabinet, and then adjust and place the yoke according to the instructions from the manufacturer.

   Important: If washers are required to properly fit the bolt, the installer must provide them.

2. Insert the M10 bolts through the yoke, and then into the cabinet.
3. Angle the cabinet if needed.
4. Tighten the bolts to 10 Nm.

Figure 9: Yoke installed



Related information

Selecting the DSR1090 bracket and yoke on page 11
Aiming the DSR1090 on page 17

3.3 Aiming the DSR1090

When aiming the DSR1090, you can use a laser for accuracy.

3.3.1 Using a laser for horizontal aiming

Instructions are provided for horizontal aiming using a laser.

About this task

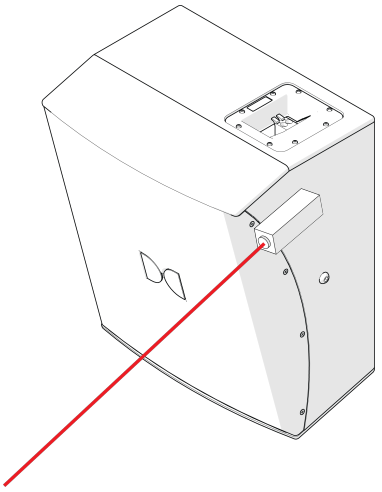
This tool is required for horizontal aiming:

- Installer-provided laser pointer

Procedure

1. Place the laser pointer on the outside left or right side of the DSR1090 enclosure.
2. Align the laser parallel to the side of the speaker. You may find that there is some vertical (up/down) drift, but this will not affect how you obtain the horizontal angle.
3. Angle the DSR1090 horizontally until the laser is directed at the specified aiming point.

Figure 10: Aiming the DSR1090 horizontally



3.3.2 Using a laser for vertical aiming

Instructions are provided for vertical aiming using a laser.

About this task

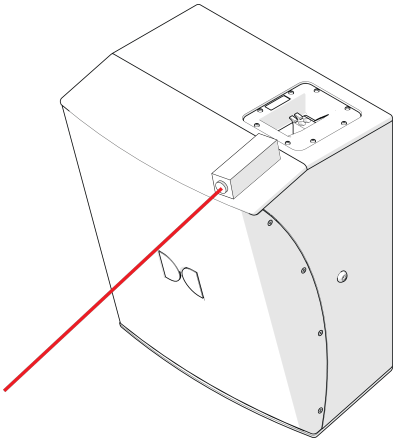
This tool is required for vertical aiming:

- Installer-provided laser pointer

Procedure

1. Place the laser pointer on top of the DSR1090 enclosure.
2. Align the laser level with the top of the speaker. You may find that there is some side-to-side drift, but this will not affect how you obtain the vertical angle.
3. Angle the DSR1090 vertically until the laser is directed at the specified aiming point, as shown in the following figure.

Figure 11: Aiming the DSR1090 vertically



3.4 Installing the safety cable

About this task

After mounting the DSR1090 to the building structure with a bracket or yoke, you must follow instructions for connecting a safety cable to an independent point on the building structure.

These tools and additional parts are required to install the safety cable:

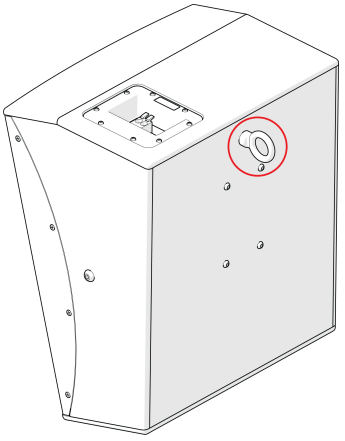
- 6 mm hex driver.
- An M10 shoulder-style eyebolt. The eyebolt can be provided by the installer, or you can purchase an appropriate M10 eyebolt (separately) from Dolby (Part number: 6009242).
- Installer-provided safety cable.

Attention: To properly fit into the DSR1090 threaded inserts the eyebolt must contain a threaded shaft that is at least 20 mm long. Based on the weight of the DSR1090 (31 lb [14 kg]), all installer-supplied safety rigging hardware must be rated at a minimum 5:1 safety factor, or greater if a higher requirement is mandated per local laws. Remove all slack to avoid any shock loading of the cable in the event of a primary rigging failure.

Procedure

1. Locate the safety eyebolt mounting location on the back of the DSR1090.
2. Remove the corresponding M10 bolt from the cabinet using the 6 mm hex driver.
3. Remove the M10 eyebolt from the packaging, and then place it in the selected M10 threaded hole.
4. Secure the eyebolt firmly, and then attach the installer-provided safety cable to the building structure.

Figure 12: Attach the eyebolt



Important: Size all hardware to allow at least a 5:1 safety factor, and remove slack from the safety cable. Consult building plans and a licensed professional engineer, and follow all local laws for overhead mounting.

3.5 Connecting and configuring the DSR1090

About this task

After mounting the DSR1090 to the building structure and connecting a safety cable, you must follow instructions for connecting and configuring the DSR1090.

Required tool:

Wire stripper

Caution: Turn off all amplifiers when connecting speaker wiring.

Note: The input terminals are marked with indicators to show their polarity. Per IEC standards, a positive voltage on the positive marked input causes the transducers to move outward.

Procedure

1. Locate the input plate on the top of the DSR1090.
2. Strip back the wire insulation/sheath to 18 mm.
3. Locate the spring-loaded orange terminal tab on the input plate, and then push it inward. Pushing it inward opens the gap in the hole directly below the tab.
4. Insert all of the stripped wire into the terminal tab hole (observing proper polarity).
5. Release the terminal tab to secure the wire with the spring mount clamp.
6. Remove any stray wire strands in and around the terminal tab.

Figure 13: DSR1090 input plate location and connections

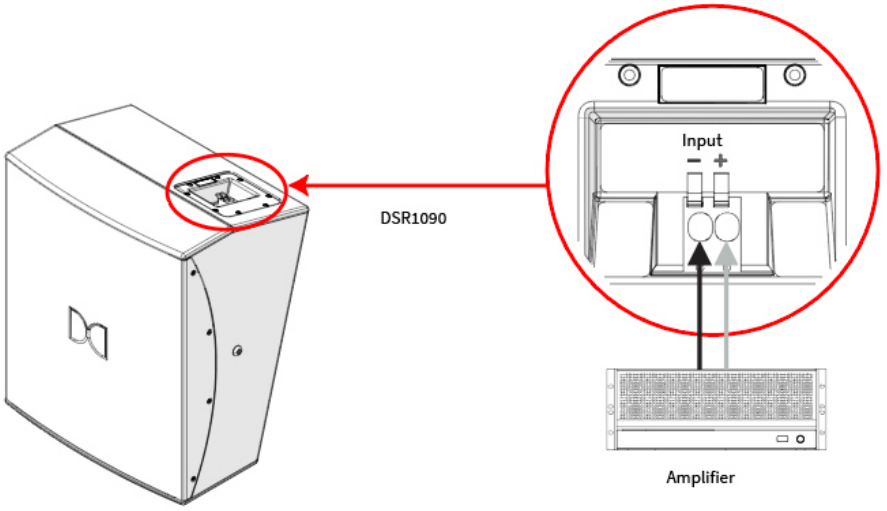
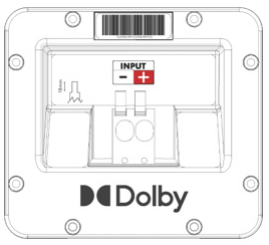


Figure 14: DSR1090 input plate



Note: In 5.1 and Dolby Surround 7.1 installations, it may be better to daisy-chain (series/parallel) several DSR1090 speakers. You can do this by twisting the wire pairs and inserting them into the input connector following steps 3 and 4 of the preceding procedure. When daisy-chaining speakers, always verify that the driving amplifier specifications rate the amplifier at the appropriate level to handle the resulting load impedance of the combined daisy-chained speakers.

Note: 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.

4

Dolby DSR1090 specifications

The specifications for the Dolby DSR1090 are provided.

Following is an outline of this chapter:

4.1 Dolby DSR1090 specifications

Specifications are provided for the Dolby DSR1090.

Table 1: Dolby DSR1090 specifications

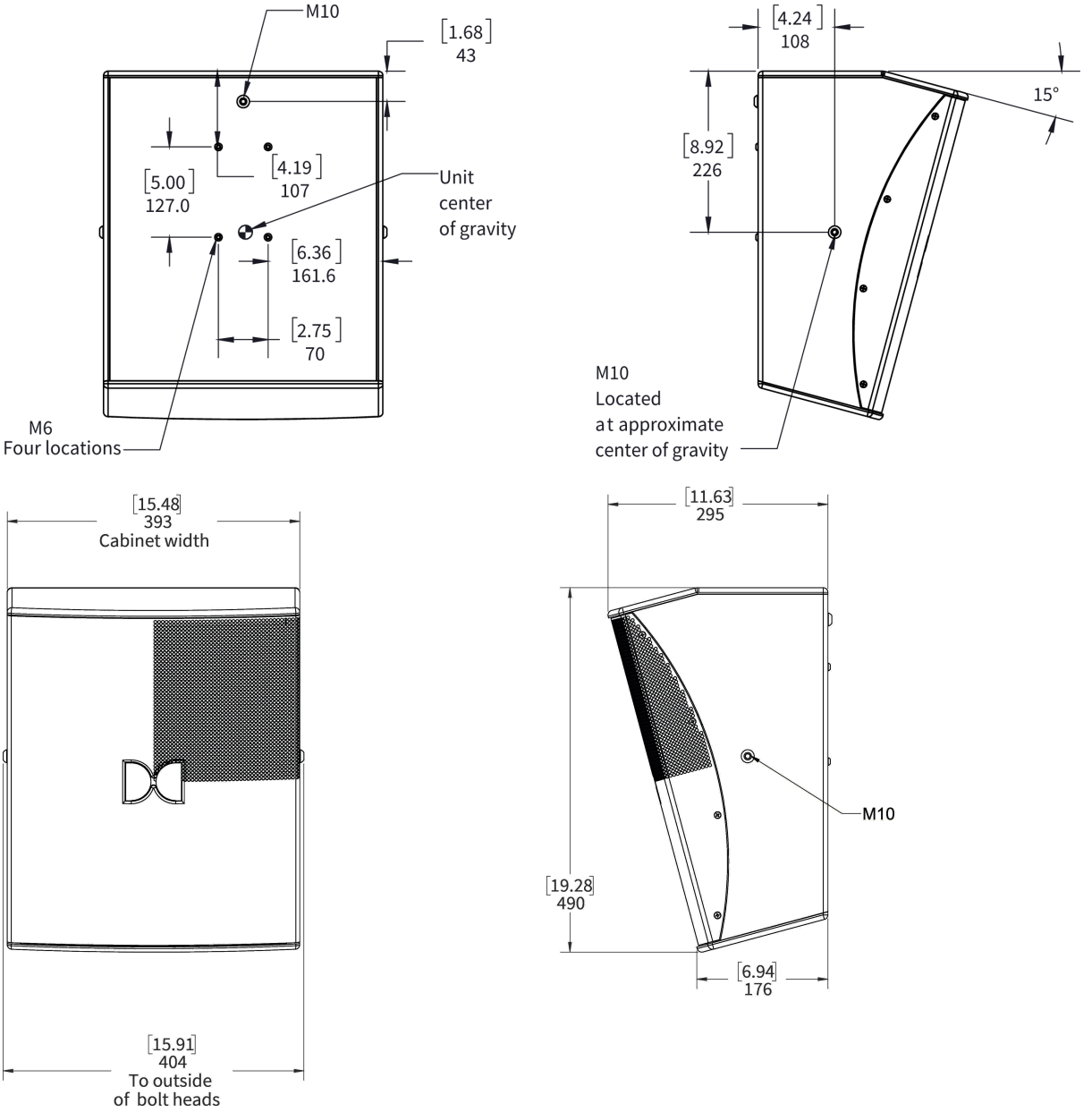
Specification	Technical data	Notes
Frequency range	60 Hz to 20 kHz	+3 dB/-6 dB in half-space conditions using required processing.
Usable LF response	50 Hz	-10 dB in half space conditions.
Coverage window	90 degrees horizontal, 60 degrees vertical	
Rated impedance	8 ohms	
Whole space sensitivity @ 1 W	95 dB	Measured with 12 dB crest pink noise at 2.83 V_{rms} in whole space conditions with an 80 Hz high pass filter (HPF) and 48 dB low pass filter (LPF) at the rated system high frequency. (80 Hz is a typical crossover point into Dolby Atmos surround bass management).
Half space sensitivity @ 1 W	97 dB	Measured with 12 dB crest pink noise at 2.83 V_{rms} in half space conditions with required high pass filter (HPF) and 48 dB low pass filter (LPF) at the rated system frequency range.
Power handling	250 W @ 40 V_{rms}	12 dB crest pink noise for two hours with required HPF and 48 dB low pass filter (LPF) at the rated system frequency range, calculated power based on minimum impedance.
Power draw	160 W	Measured average power over five 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	142 Vpk	Vpk over 100 hours using stepped Hann shaped sine wave bursts at 1/3rd octave spacing within the rated passband of the system. This data is useful for setting peak stop limiters and amplifier selection.
Whole space maximum continuous SPL @1 meter	119 dB	Calculated from rated sensitivity and power.
Half space maximum continuous SPL @ 1 meter	121 dB	Calculated from rated sensitivity and power.
Whole space measured acoustic peak SPL @ 1 meter	129 dB	Measured peak SPL over five seconds at rated $_{Vrms}$ using 12 dB crest pink noise with required HPF.

Table 1: Dolby DSR1090 specifications (continued)

Specification	Technical data	Notes
Half space measured acoustic peak SPL @ 1 meter	131 dB	Measured peak SPL over five seconds at rated V_{rms} using 12 dB crest pink noise with required HPF.
Weight	31 lb (14 kg)	

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

4.2 Dolby DSR1090 dimensions



5

Dolby DSR1090 digital signal processing requirements

We recommend various digital signal processing elements for use with the DSR1090.

Following is an outline of this chapter:

5.1 Dolby DSR1090 digital signal processing requirements

We recommend specific digital signal processing parameters for the DSR1090.

Table 2: DSR1090 general filtration, gain, and delay requirements

Highpass filter	Lowpass filter	Polarity	Delay
50 Hz, 24 dB (fourth- order Butterworth)	None	Positive	None

Table 3: DSR1090 parametric equalization requirements

EQ frequency	Constant Q		Constant bandwidth	EQ gain
65 Hz	2.87 Q	0.5 bandwidth	0.66	+2 dB
2 kHz	4 Q	0.36 bandwidth	0.5	-3 dB
13.5 kHz	4 Q	0.36 bandwidth	0.53	-4 dB
5.3 kHz*	1.41 Q	1.0 bandwidth	1.44	-4 dB

*Optional for x-curve shaping

Note: There are two principal implementations for parametric EQ filters in DSP processors. You need to select either the Constant Q or Constant Bandwidth (BW) mode in your DSP user interface (UI). The DSP UI may provide both Q and 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 as to which implementation is used. The Dolby CP850 and Dolby CP950 cinema processors use constant-bandwidth parametric EQ filters.

Table 4: DSR1090 limiter requirements

RMS limiting	Attack time	Release time	Peak stop
40 V_{rms}	16 ms	256 ms	142 Vpk

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System limiters

We recommend using one or more system limiters to control and protect the DSR1090 speaker.

Following is an outline of this chapter:

6.1 Setting system limiters

You can use an RMS limiter in a digital signal processor (DSP) to perform the system limiting operation. We recommend setting up the system limiter thresholds with the proper DSR1090 digital signal processing parameters engaged. (For DSP parameter details, see the link at the end of this section.)

About this task

We recommend 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 speakers from the amplifier during this process will most likely result in conservative settings. You can connect the speakers to the amplifier during this process if caution is observed when increasing the stimulus level and confidence in the measuring setup is secured.

⚠ **Caution:** Speaker damage as a result of exceeding the power-handling specifications, as defined in the Dolby DSR1090 specifications, is not covered under the warranty.

⚠ **Caution:** Hearing damage can occur by prolonged exposure to an excessive sound pressure level (SPL); the speaker is easily capable of generating a SPL sufficient to cause permanent hearing damage to performers, production crew, or audience members. Make sure that you avoid prolonged exposure to SPL in excess of 90 dB.

We recommend that you set the system limiter for each amplifier channel individually. However, you can copy the limiter settings to other channels if those channels share identical speaker models, identical amplifier models, and identical gain structure in the signal path (including any amplifier front-panel volume controls).

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 five seconds (very important for low-frequency outputs).
2. Access the RMS limiter setting in the DSP, and set it to the maximum value, such that no limiting should occur.
3. Set the attack and release times based on the highpass filter (HPF), according to the recommended digital signal processing settings for the respective speaker being measured. If that data is not available, we recommend these HPF settings:
   - <30 Hz: Attack 45 ms, release 720 ms
   - 30 Hz to 59 Hz: Attack 16 ms, release 256 ms
   - 60 Hz to 99 Hz: Attack 8 ms, release 128 ms
   - 100 Hz to 224 Hz: Attack 4 ms, release 65 ms
   - 225 Hz to 449 Hz: Attack 2 ms, release 32 ms
   - 450 Hz to 999 Hz: Attack 1 ms, release 16 ms
   - 1 kHz to 1.99 kHz: Attack 0.5 ms, release 8 ms
   - >2 kHz: attack 0.3 ms, release 4.8 ms
4. Mute all outputs into the system except for the output you are setting.
5. Play low-level pink noise into the amplifier channel, and confirm that the expected speaker is playing (if the speaker is connected to the amplifier) and that the multimeter is reading the voltage.
6. 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 five 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.
7. 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.

8. Turn up the stimulus gain, and then 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 speaker rating when the stimulus is driven heavily.

Related information

Dolby DSR1090 digital signal processing requirements on page 25

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Documentation revision history

The documentation revision history lists the date, issue number, and description of all publications of the *Dolby DSR1090 Owner's Manual*.

Date	Issue	Description
16 October 2022	Issue 1	Initial release