



# **SLS™ MA480AS and MA460AS 3-Axis Speaker System User's Guide**

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### **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>.

### **PRODUCT MODEL:**

THIS DOCUMENTATION APPLIES TO MODEL CID1000.

### **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>.



## IMPORTANT SAFETY INSTRUCTIONS



1. **INSTALLER ASSUMES ALL RESPONSIBILITY AND LIABILITY FOR THE INSTALLATION OF THESE PRODUCTS.**
2. Prior to installing these products, 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.
3. 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. Consult an installation professional if you do not understand the installation instructions.
4. Compliance with local building codes (and, where applicable, national codes) is the responsibility of the installer. Installers should consult with local regulatory authorities for specific codes and/or guidelines for the use of these products.
5. Use proper lifting techniques when working with heavy objects to avoid personal injury.
6. Any supplied rigging hardware is intended only for use with the specified loudspeaker. The installer assumes all risk of loss and/or injury arising from the use of the supplied rigging hardware with any other loudspeaker.
7. This guide is meant only for the purpose of instructing the installer in the intended use of SLS supplied rigging. All other rigging is considered part of the venue and/or installer supplied equipment and is not addressed in this guide.
8. 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 SLS supplied rigging hardware and follows at a minimum all applicable laws, rules, and regulations in force for each venue.
9. Do not install on a structure that is prone to abnormal vibration, movement, or chance of impact. Failure to do so could result in damage to the equipment and/or damage to the mounting surface.
10. Prior to suspending the system, an expert who is trained and experienced in suspending speaker systems should inspect all parts and components. 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.
11. These products are intended for installation in dry indoor locations only. Premature product failure or serious personal injury could occur if these products are used outdoors or in wet indoor environments.
12. No open flame sources should be placed on or near the apparatus.
13. Only clean product with a dry or damp cloth.
14. Do not block any ventilation openings.
15. Do not expose the product to rain or moisture.
16. Hearing damage may result from prolonged exposure to excessive sound pressure levels (SPL). The loudspeaker is easily capable of generating SPL sufficient to cause permanent hearing damage to performers, production crew, and audience members. Caution should be taken to avoid prolonged exposure to SPL in excess of 90 dB.

17. 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.
18. For ceiling installations, the loudspeaker can generate considerable acoustical energy and may move during use. The system must be mounted in a way that allows enough clearance for this movement without risk of contact with the building structure, rigging, or other equipment. Installer-supplied hardware must be intended for overhead suspension and comply with ASME B30.20 and be manufactured under product traceability controls. Compliant hardware will be referenced with a working load limit (WLL) and a traceability code. The hardware must be load rated to support a minimum of five times the static weight of the system, or greater if a higher requirement is mandated per local laws. Generally, this type of hardware is available from rigging supply companies, industrial supply catalogs, and specialized rigging distributors. Local hardware stores do not usually stock these products.
19. For ceiling installations, the system safety cable must be mounted to the structural steel above the suspended ceiling tile in an auditorium. Do not attach the system safety cable to any wood structure, wood roof joists, or wood frame. For wall installations, the system safety cable must be anchored to the building structure independent of the primary rigging device. In all instances, the safety cable must be mounted in a way that supports a minimum of 5 times the static weight of the speaker, or greater if a higher requirement is mandated as per local laws.
20. THIS PRODUCT IS NOT INTENDED FOR FLOOR-STANDING INSTALLATIONS.
21. No information contained in this guide is intended as a warranty on the part of SLS. Anyone using this information assumes all liability arising from its use. Abuse of these products, use of these products not in accordance with SLS instructions, or use in an application for which these products have not been designed is not covered under any SLS warranty, nor is SLS liable for any loss or damage.

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# Introduction

## 1.1 MA480AS and MA460AS Overview

The SLS™ MA480AS and MA460AS are high-performance cinema surround loudspeakers for use in 5.1 and 7.1 cinema auditoriums and medium-to-large size Dolby Atmos® equipped auditoriums. These speaker systems were primarily developed to reduce the time and expense required when installing speakers in Dolby Atmos cinema environments.



**Figure 1-1** SLS MA480AS and MA460AS

The MA480AS is typically used for overhead installations. The vertical dispersion angle is 80 degrees. The horizontal axis has an asymmetrical dispersion pattern of 80 degrees at the top and 130 degrees at the bottom.

The MA460AS is typically used for side-wall installations. The vertical dispersion angle is 60 degrees. The horizontal axis has an asymmetrical dispersion pattern of 60 degrees at the top and 150 degrees on the bottom.

For graphic depictions of the MA480AS and MA460AS angles, see [Chapter 2](#).

Three optional rigging kits are available for the MA480AS and MA460AS. If you are using one of these kits, please follow the installation instructions in the applicable rigging kit user's guide.

- FCT-24 kit
  - This kit includes a flat metal ceiling tile and accessories for installing the MA480AS and MA460AS in an overhead ceiling grid. Detailed documentation on these ceiling tile installations is provided in the *SLS Ceiling Tile Rigging Kits User's Guide*, which is available for download at <http://customer.dolby.com/cinema/>. After you log in, click on **Download Updates/patches/manuals**.
- RCT-24 kit
  - This kit includes a recessed metal ceiling tile and accessories for installing the MA480AS in an overhead ceiling grid where the projector light beam is close to the ceiling. Detailed documentation on these ceiling tile installations is provided in the *SLS Ceiling Tile Rigging Kits User's Guide*, which is available for download at <http://customer.dolby.com/cinema/>. After you log in, click on **Download Updates/patches/manuals**.
- WMA-15 kit
  - This kit enables the MA460AS to be wall mounted for three axis adjustments. Detailed documentation on this wall mount installation is provided in the *SLS Wall Mount Rigging Kit User's Guide*, which is available for download at <http://customer.dolby.com/cinema/>. After you log in, click on **Download Updates/patches/manuals**.

THIS EQUIPMENT MUST BE INSTALLED BY LICENSED PROFESSIONAL INSTALLERS.

## 1.2 Specifications

Following are the MA480AS and MA460AS general specifications. SLS Audio reserves the right to make changes to existing products without notice.

### 1.2.1 MA480AS

These are the MA480AS general specifications:

- Frequency response: 60 Hz to 20 kHz
- Sensitivity: 1 watt @ 1 meter: 98 dB
- Nominal impedance: 8 ohms
- Continuous power rating: 400 watts
- Maximum continuous rated SPL at 1 meter: 124 dB
- Coverage angles:
  - 80 degrees vertical, 80 degrees horizontal at top of coverage, 130 degrees horizontal at bottom of coverage
- Drivers: 12-inch low-frequency driver with coaxially mounted 2.4-inch high-frequency driver
- Barrier strip: Accepts 16- to 12-gauge wire
- Size (including yoke positioned over input plate and yoke fasteners):
  - Width: 21.7 inches (551 millimeters)
  - Height: 20 inches (508 millimeters)
  - Depth: 17.8 inches (453 millimeters)
- Net weight (including yoke mount): 25 pounds (11.3 kilograms)
- Shipping weight: 33.25 pounds (15.1 kilograms)



## 1.2.2 MA460AS

These are the MA480AS general specifications:

- Frequency response: 60 Hz to 20 kHz
- Sensitivity: 1 watt @ 1 meter: 99 dB
- Nominal impedance: 8 ohms
- Continuous power rating: 400 watts
- Maximum continuous rated SPL at 1 meter: 125 dB
- Coverage angles:
  - 60 degrees vertical, 60 degrees horizontal at top of coverage, 150 degrees horizontal at bottom of coverage
- Drivers: 12-inch low-frequency driver with coaxially mounted 2.4-inch high-frequency driver
- Size (including yoke positioned over input plate and yoke fasteners):
  - Width: 21.7 inches (551 millimeters)
  - Height: 20 inches (508 millimeters)
  - Depth: 17.8 inches (453 millimeters)
- Net weight (including yoke mount): 25 pounds (11.3 kilograms)

## 1.3 Processor Settings

Following are the MA480AS and MA460AS processor settings:

Crossover Section	Frequency	Slope
Highpass filter for 5.1 and 7.1 configurations	60 Hz	24 dB octave (fourth order) Butterworth
Highpass filter for Dolby Atmos with bass management configurations <sup>1</sup>	150 Hz	24 dB octave (fourth order) Butterworth

<sup>1</sup> Applicable only for Dolby Atmos with bass management. When using the 150 Hz highpass filter, the limiter is intended to protect the system from cinematic dynamic events. It is not intended as a long term continuous duty power limiter.

Limiting Section	Threshold/RMS Voltage	Attack	Release	Peak Stop Voltage
See <a href="#">Appendix B</a>	46.5 V	8 ms	128 ms	150 V

SLS Audio reserves the right to make changes to existing products without notice.

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# Installing the MA480AS and the MA460AS

## 2.1 Installing the Speakers

To install the speakers, you can use one of the optional rigging kits that are described in [Chapter 1](#) or suspend the speakers to a single point on the building structure with an M10 hollow bolt. This guide provides installation steps for using a single mount point. If you are using an optional rigging kit, please follow the installation instructions in the rigging manual.



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**Warning:** TO PREVENT INJURY, THIS APPARATUS MUST BE SECURELY ATTACHED TO THE BUILDING STRUCTURE IN ACCORDANCE WITH THE INSTALLATION INSTRUCTIONS. CONSULT A PROFESSIONAL MECHANICAL OR STRUCTURAL ENGINEER TO OBTAIN APPROVAL FOR ALL ATTACHMENTS TO THE BUILDING STRUCTURE. THIS APPARATUS MUST BE INSTALLED BY LICENSED PROFESSIONAL INSTALLERS. IF NOT ATTACHED TO THE BUILDING STRUCTURE PROPERLY, THIS APPARATUS COULD FALL AND CAUSE PERSONAL INJURY OR DEATH. SUSPENSION OF HARDWARE COMPONENTS MUST BE CALCULATED WITH A GIVEN SAFETY FACTOR TO BE WITHIN THEIR RESPECTIVE LOAD LIMITS. INSPECT ALL COMPONENTS BEFORE INSTALLATION. THIS APPARATUS IS NOT INTENDED FOR FLOOR-STANDING INSTALLATIONS. ALL LOCAL BUILDING AND SEISMIC CODES MUST BE ADHERED TO.

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### 2.1.1 Tools Required

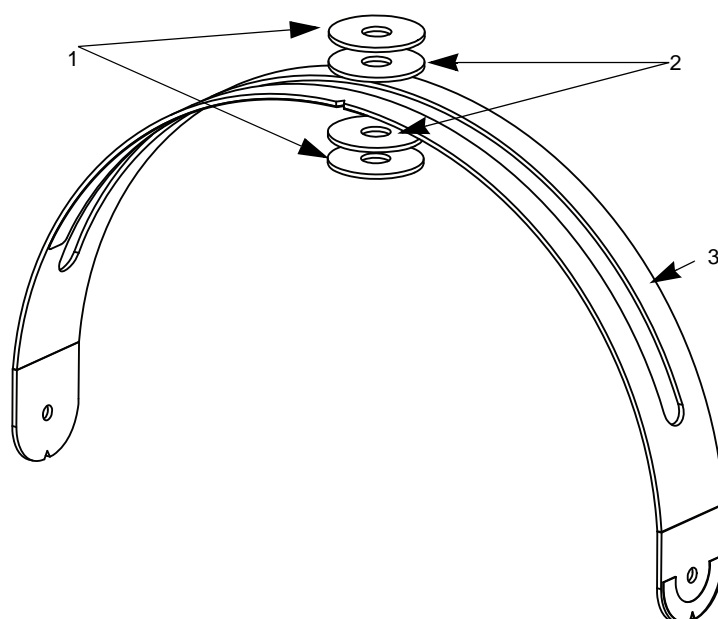
- M8 Allen wrench for main yoke attachment point (M10 bolt)
- #2 Phillips screwdriver for attaching speaker wire to barrier strip

## 2.1.2 Identifying the Rigging Parts

The following parts are included in the packing kit. Use these parts along with your desired mounting method (typically, all-thread mounted to building structure). The MA480AS and MA460AS ship with the yoke installed, but the speaker body is not shown here for clarity:

1. Two 20 mm steel washers
2. Two 20 mm neoprene washers
3. One yoke with slot for angle adjustments
4. Two M10 bolts to mount the speaker to the yoke
5. Stickers with angle indications to help position the speaker correctly

In addition, a safety cable and zip ties are required for the installation, but are not included in this kit. These parts must be provided by the installer. (See [Section 2.2.](#))



**Figure 2-1** Rigging Assembly

### 2.1.3 Installing with Installer-Supplied Hardware

Safe overhead rigging practices require an understanding of the proper methods and are outside the scope of this guide. All installer-supplied rigging hardware should have a minimum 5:1 safety factor based on the weight of the speaker.

If the optional rigging kits are not used, the yoke slot and supplied washers can accept up to M20-size hardware, such as all-thread. Attaching the yoke to a single point enables three-axis speaker aiming.




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**Warning:** BASED ON THE ARRAY WEIGHT, INSTALLER-SUPPLIED RIGGING HARDWARE MUST HAVE A MINIMUM 5:1 SAFETY FACTOR, OR GREATER IF A HIGHER REQUIREMENT IS MANDATED PER LOCAL LAWS. HARDWARE MUST BE SECURELY TIGHTENED.

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### 2.1.4 Positioning

The MA460AS and MA480AS provide three-axis aiming adjustments when using a single mount point to the building structure. To properly aim the speaker, you must correctly position the horn.

Each of the three-axis adjustment angles (D, C, and G) are identified with the same letter as they are by the angle requirements in the Dolby® Audio Room Design Tool (DARDT) spreadsheet (applicable for both overhead and sidewall positions). The DARDT is an Excel-based tool that is used to help design a room and plan equipment to ensure that the design meets Dolby requirements. Authorized users can download this tool at <http://customer.dolby.com>. If you do not have access, please contact [cinemasupport@dolby.com](mailto:cinemasupport@dolby.com) to request the tool.

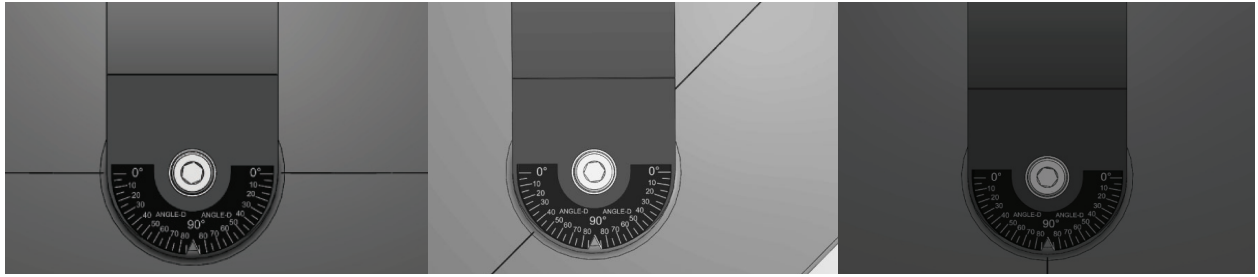
Before starting the installation, you need to understand the speaker-aiming angles. The DARDT provides this information for accurate speaker aiming. This table provides an example from the DARDT.

Side	Horizontal Angle C	Vertical Angle D
LSS/RSS 1	50	-5
LSS/RSS 2	40	-5
LSS/RSS 3	20	5
LSS/RSS 4	0	10
LSS/RSS 5	0	5
LSS/RSS 6	-15	10

**Figure 2-2** Aiming Angles

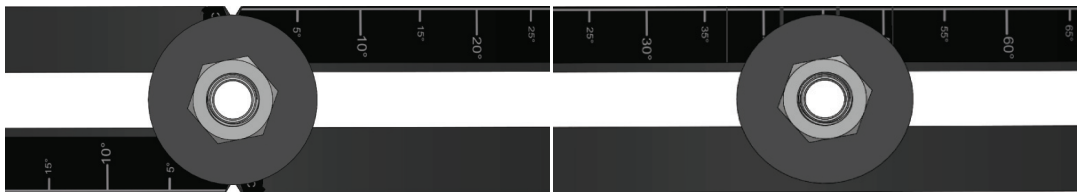
Stickers are shipped with SLS multi-axis speakers. These stickers provide angle information that should match the DARDT output values.

The provided yoke attachment to the speaker pivot point is labeled **Angle D**. The seam in the plastic speaker enclosure is the angle indicator.



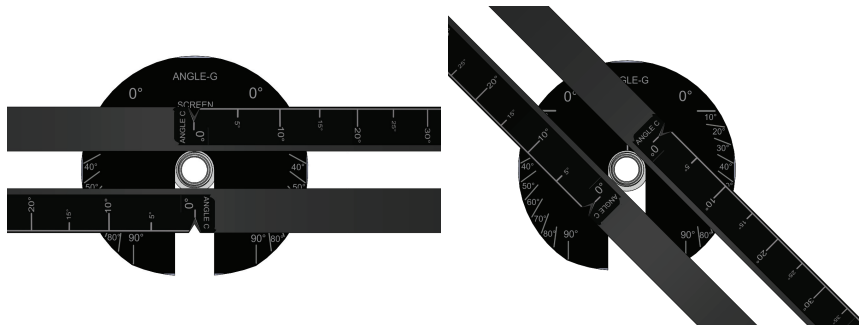
**Figure 2-3** Angle D at 0, 45, and 90 Degrees Using Speaker Body Seam as Indicator

The slot in the yoke sliding adjustment is labeled **Angle C**. The following figure exemplifies a single point to building structure rigging setup using the **Angle C** yoke sticker to indicate the desired degree. The center of the installer-provided suspension point is used as a reference to set the angle.



**Figure 2-4** Angle C at 0 and 45 Degrees (Up to 70 Degrees is Obtainable)

The single point attachment to the building structure pivot point is labeled **Angle G** (contained in the packing kit). The following figure is an example of using a single rigging point for suspension. This provided angle sticker needs to be adhered to a ceiling tile in the correct orientation as marked on the sticker (the arrow pointing to screen direction). The side of the yoke is used as the angle indicator.



**Figure 2-5** Angle G at 0 and 45 Degrees

It may be difficult to see this aiming sticker once the speaker is mounted. You can place a piece of tape (or other mark) at the final angle where the yoke will set. You can then align the speaker yoke to the tape (or mark) to help you make this final adjustment.

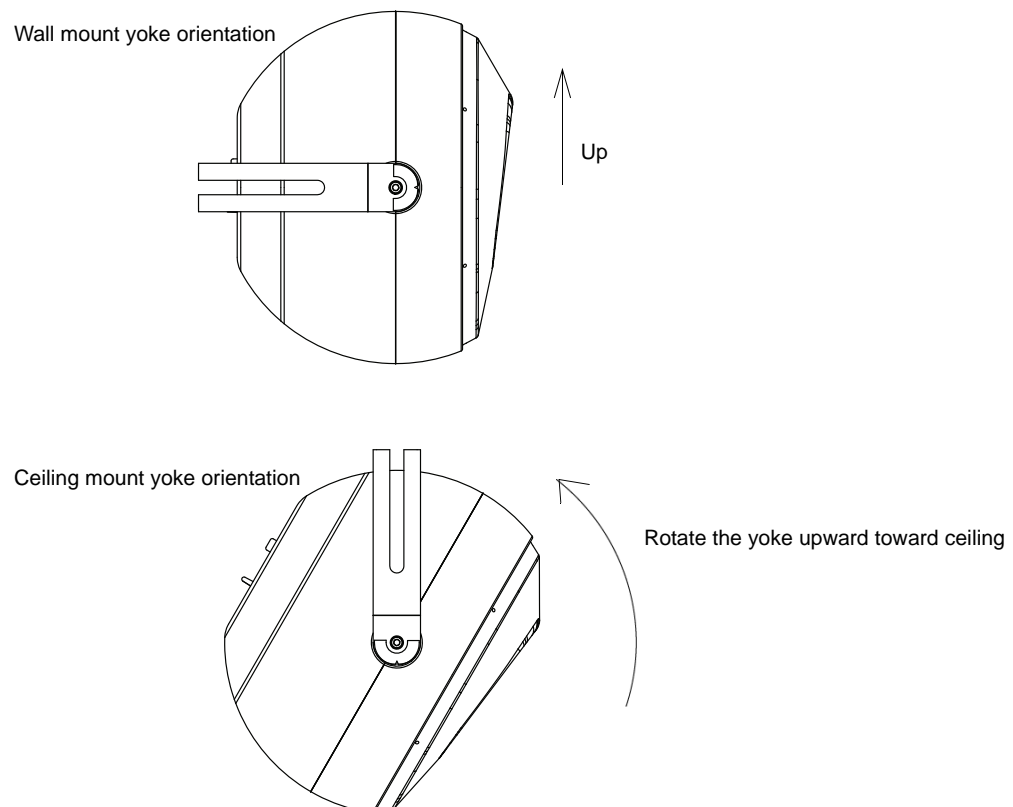
To position the unit:

1. Position and tighten the yoke for **Angle C** and **Angle G** with the loudspeaker removed from the yoke.
2. Reinstall the loudspeaker in the yoke.
3. Adjust **Angle D** (using the seam on the loudspeaker enclosure as the aiming point relative to the provided sticker), and then tighten the M10 bolts to set **Angle D**.



**Note:** The provided aiming sticker for **Angle G** is not calibrated for use with the WMA-15 wall mount kit. An inclinometer placed on the side of the yoke can provide the information needed for **Angle G** when installing on a side wall.

To help with aiming adjustments and to verify that the loudspeaker is not installed upside down, you can also use the grille shape. The furthest extruding formed edge of the grille is parallel with the top edge of the asymmetrical horn. As a result, aligning this formed grille edge with the seating rake for side-wall positions and the seating rows for overhead positions, properly orients the loudspeaker in this axis to the coverage area. This same formed grille edge must always be closest to the ceiling, whether in a side wall or overhead position. This ensures that the horn is not flipped upside down.



**Figure 2-6** Verify Axis Orientation

## 2.2 Connecting the Safety Cable

After attaching the MA480AS or MA460AS to the building structure, you must connect a safety cable from the speaker attachment point to an independent point on the building structure. An M6 eyebolt on the speaker is provided to attach an installer-supplied safety cable. Based on the weight of the supported speaker, all installer-supplied safety rigging hardware must have a minimum 5:1 safety factor, or greater if a higher requirement is mandated by local laws. Remove all slack to avoid any shock loading of the cable in a case where the primary rigging fails.

Make sure that the safety cable is secured so that it does not:

- Rattle against the speaker, speaker mount, or ceiling building structure.
- Come into contact with exposed speaker wiring or the terminal block. A metal cable could short the connection, resulting in an inoperable speaker.



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**Warning:** INSTALLER-SUPPLIED RIGGING HARDWARE MUST HAVE A MINIMUM 5:1 SAFETY FACTOR BASED ON THE WEIGHT OF THE APPARATUS. YOU MUST SECURELY TIGHTEN THE HARDWARE. DO NOT SECURE THE SAFETY CABLE BACK TO THE YOKE. REMOVE ALL SLACK FROM THE CABLE. REPLACE THE CABLE IF IT HAS BEEN PULLED DUE TO A PRIMARY RIGGING FAILURE.

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## 2.3 Connecting Audio

The input barrier strip accepts 16- to 12-gauge wire, with either #6 spade lugs or bare wire. Always use industry-standard practices for selecting wire gauge, based on the product power rating and cable length. Note that the barrier strip is marked with a plus (+) or red indicator to show the polarity. Per IEC standard, a positive voltage on the positive marked input results in the low-frequency drivers moving outward. Always tie down the cable to available hardware to minimize any buzzing or pullouts.



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**Warning:** TURN OFF ALL AMPLIFIERS WHEN CONNECTING THE LOUDSPEAKER WIRING.

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### 2.3.1 Testing the Speaker for Buzzing or Rattling

If possible, play sound through the speaker to check for any connection issues, buzzing, rattling, or vibrations.



## 2.4 Dimensions

Following are the MA480AS and MA460AS side and front views.

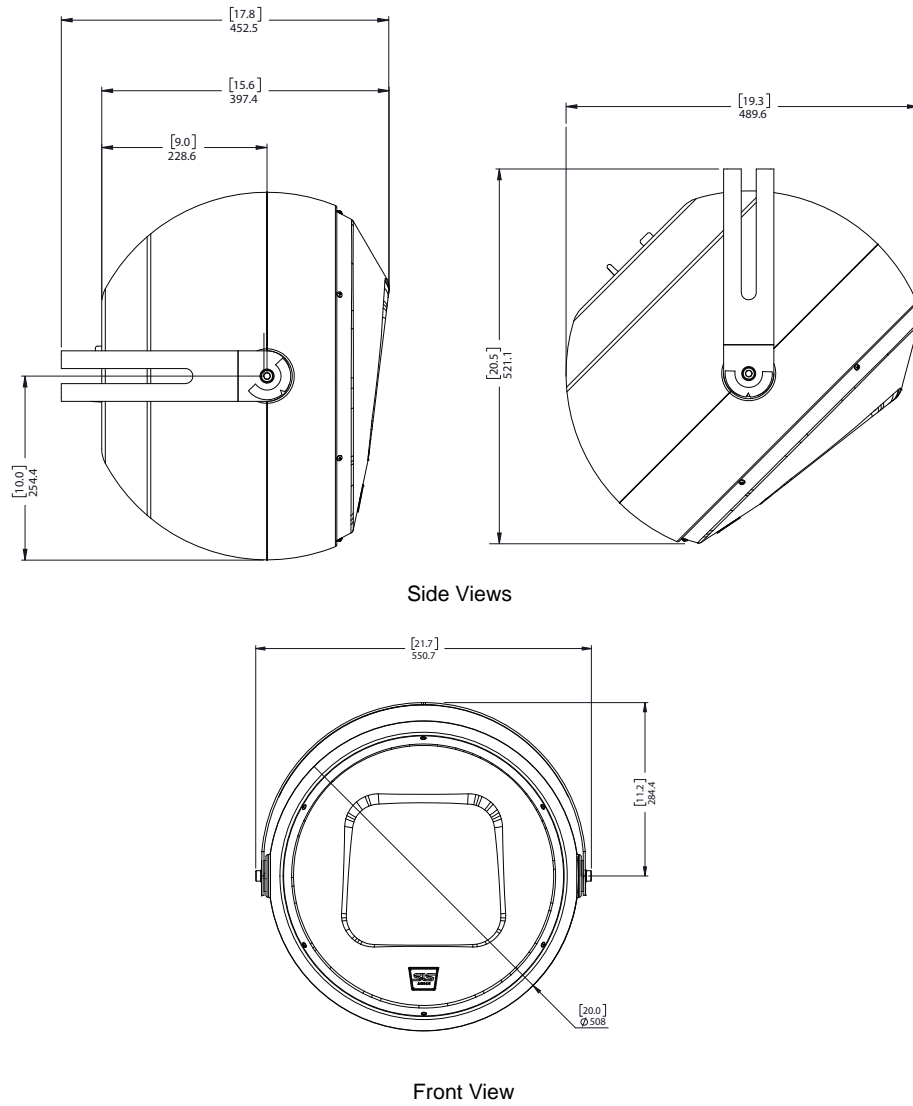


Figure 2-7 MA480AS and MA460AS Side and Front Views in [Inches] and Millimeters

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# Environmental Compliance and Regulations

## A.1 EU Environmental Regulations and Compliance

Following are the MA480AS and MA460AS environmental regulations and compliance information.

### Restriction of Hazardous Substances Directive (RoHS)

All Dolby® products comply with the requirements of the EU RoHS Directive. For the Dolby Declarations of Conformity, go to <http://www.dolby.com/us/en/about/environmental-commitment.html>

### Product End-of-Life Information

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>

## A.2 Russian Environmental Regulations and Compliance

Following is the MA480AS and MA460AS Russian environmental compliance information.

### Restriction of Hazardous Substances (RoHS) Directive

This product complies with Russian EAC RoHS requirements.



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# Setting System Limiters

## B.1 Setting up System Limiters

This documentation explains how to set up system limiters to protect your loudspeaker and provide maximum performance when the digital signal processor (DSP), amplifier, and loudspeaker hardware are all variables. The following procedure provides a limiter setting threshold that can protect loudspeakers in a majority of use cases. However, the speaker drivers may still be vulnerable to content issues, such as sustained feedback or large, low-frequency transients below box tuning. Good system design and common sense should be the rule.

1. Obtain an audio source (to generate pink noise) and a true RMS voltage meter with a bandwidth of at least 20 kHz that can average a reading over a period of at least 10 seconds.
2. Complete the room tuning and set the amplifier gain.  
To prevent future user error, consider setting the amplifiers at full gain, unless the amplifier gain setting is hardware or software protected. In such a case, you can optimize the amplifier gain to achieve the best signal-to-noise ratio.
3. After completing the room tuning and setting the amplifier gain, bypass the limiter on the DSP that you are using for protection, and leave all other DSP functions for that output engaged. For example, the highpass filter, crossovers, equalization, and so on.
4. Mute all system outputs except the output that is currently being calibrated.
5. Place the voltage meter across the amplifier +/- output terminals and turn up the pink noise source until the reading on the meter is slightly above the specified Threshold/RMS voltage rating for that speaker driver and its recommended processor settings (see [Section 1.3](#)).
6. Play the pink noise only long enough to obtain a stable RMS average voltage reading. For high-frequency drivers, this is typically five seconds, and for full range loudspeakers or subwoofers, it is typically ten seconds.
7. Set the limiter to a minimum ratio of 100:1, and then input the attack and release times recommended by the speaker manufacturer.
8. Engage the limiter, and decrease the threshold until the voltage is lowered to the specified rating, without changing the pink noise gain.
9. Repeat the above procedure for each driver and/or passive loudspeaker you are using.
10. If a predictive peak stop limiter is available on the DSP, engage it at 6 dB above the RMS setting.
11. Monitor for amplifier clipping. If clipping occurs during system use, lower the peak-stop threshold until the amplifier clips slightly. Alternatively, you can engage the self-contained limiter circuit in the amplifier (if it has such a limiter circuit).

You need to perform this procedure only once, as long as the combined amplifier-limiter does not change. However, amplifier gain changes modify the limiter action. If the amplifier gain is decreased, protection engages early, which limits driver output. If the amplifier gain is increased, protection engages only after the driver reading is above the safe RMS voltage.