



SLS[™] CS1090 Speaker User's Guide

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PRODUCT MODEL:

THIS DOCUMENTATION APPLIES TO MODEL CID1012.



IMPORTANT SAFETY INSTRUCTIONS



1. **INSTALLER ASSUMES ALL RESPONSIBILITY AND LIABILITY FOR THE INSTALLATION OF THIS PRODUCT.**
2. 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.
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 this product.
5. Use proper personal 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. 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 five times the static weight of the speaker, or greater if a higher requirement is mandated per local laws.
10. 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.
11. Prior to installation, always inspect all hardware components for wear, deformations, corrosion, and missing or damaged parts.
12. This product is intended for installation in dry indoor locations only. Premature product failure or serious personal injury could occur if this product is used outdoors or in wet indoor environments.
13. 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.

14. Prior to suspending any system, always inspect all components (enclosures, rigging frames, pins, eyebolts, track fittings, and so on) for cracks, deformations, corrosion, and missing, loose, or damaged parts that could reduce its strength. Do not suspend the system until the proper corrective action has been taken.
15. 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 produces heat.
16. Only clean product with a dry or damp cloth.
17. Do not block any ventilation openings.
18. 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.
19. This product is intended for installation in dry indoor locations only and is 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 rain or direct moisture. Premature product failure or serious personal injury could occur if this product is used outdoors or in wet indoor environments.
20. Keep speakers out of extended or intense direct sunlight.
21. The loudspeaker can generate considerable acoustical energy and may move during use. The system must be mounted in a way that allows sufficient 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.
22. Installed systems should be inspected at least annually or as required by local laws. The inspection shall include a visual survey of all corners and load-bearing surfaces for signs of cracking, water damage, delamination, or any other condition that may decrease the strength of the rigging frame and speakers. The rigging hardware must be inspected for fatigue at least annually or as required by local laws. The inspection shall include a visual survey of the hardware for signs of corrosion, bending or any other condition that may decrease the strength of the hardware.
23. Prior to suspending the system, an expert, 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.
24. THIS APPARATUS IS NOT INTENDED FOR FLOOR-STANDING INSTALLATIONS.
25. 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. Product abuse, use of the product not in accordance with SLS instructions, or use in an application for which the product has not been designed is not covered under any SLS warranty, nor is SLS liable for any loss or damage.

Table of Contents

Chapter 1 Introduction	1
1.1 CS1090 Overview.....	1
1.2 CS1090 Specifications	2
1.3 CS1090 Processor Settings	2
Chapter 2 Installing the CS1090	3
2.1 Installing the CS1090 Using the YK-1090 in 5.1 and 7.1 Auditoriums.....	3
2.1.1 Tools Required.....	3
2.1.2 Identifying the YK-1090 Rigging Kit Parts.....	3
2.1.3 Installing the CS1090 in a 5.1 or 7.1 Sidewall Configuration	4
2.1.4 Connecting the Safety Cable	6
2.1.5 Connecting Audio.....	6
2.2 Installing the CS1090 Using the YK-1090 and MMA-1090 in Dolby Atmos Auditoriums....	7
2.2.1 Tools Required.....	7
2.2.2 Identifying the MMA-1090 Rigging Kit Parts	8
2.2.3 Installing the CS1090 in a Dolby Atmos Overhead Configuration	8
2.2.4 Connecting the Safety Cable	11
2.2.5 Connecting Audio.....	12
2.2.6 Installing the CS1090 in a Dolby Atmos Sidewall Configuration.....	12
2.2.7 Connecting the Safety Cable	15
2.2.8 Connecting Audio.....	15
2.3 Dimensions	16
Appendix A Environmental Compliance and Regulations.....	21
A.1 EU Environmental Regulations and Compliance.....	21
A.2 Russian Environmental Regulations and Compliance.....	21
Appendix B Setting System Limiters	23
B.1 Setting up System Limiters	23

Introduction

1.1 CS1090 Overview

The SLS™ CS1090 is a high-performance cinema surround loudspeaker for use in 5.1 and 7.1 cinema auditoriums and small to medium Dolby Atmos® equipped auditoriums. When ordering, note that these speakers ship in pairs.



Figure 1-1 SLS CS1090

Two optional rigging kits are available for the CS1090:

- YK-1090 kit: Sold in pairs for sidewall installations and adds vertical tilt adjustment
 - This kit includes a yoke for use in auditorium mounting installations and the hardware used to connect the yoke to the speaker.
 - A shoulder eyebolt that replaces a dedicated 1/4"-20 insert on the speaker to attach a safety cable.
- MMA-1090 kit: Sold in pairs for Dolby Atmos installations that require three-axis aiming
 - This add-on kit to the YK-1090 kit enables three-axis adjustments for ceiling installations and two-axis adjustments for sidewall installations. It includes U brackets, screws, and other hardware.
 - You can also use the MMA-1090 rigging kit along with the YK-1090 kit for installations of the FCT-24 flat-mount or RCT-24 recessed-mount ceiling tile rigging kits (to enable the CS1090 to fly from the ceiling tile grid). However, the RCT-24 may restrict the available aiming angle. 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**.

For third-party hardware rigging installations, four 1/4"-20 attachment points in a standardized layout are available on the back of the CS1090. The four bolts that are already installed in these positions on each speaker may be reused for fastening a third-party mounting plate to the CS1090. All enclosure fasteners must be in place to ensure that the speaker cabinet is air-tight for proper performance

1.2 CS1090 Specifications

Following are the CS1090 general specifications:*

- Frequency response: 55 Hz to 20 kHz
- Sensitivity: 1 watt @ 1 M: 94 dB
- Continuous power rating: 300 watts
- Maximum continuous rated SPL at 1 meter: 119 dB
- Coverage angle: 90 degrees horizontal, 60 degrees vertical
- Drivers: 10-inch low frequency; 1-inch compression driver high frequency
- Size:
 - Width: 15.48 inches (393 millimeters)
 - Height: 18.5 inches (470 millimeters)
 - Top depth: 11 inches (280 millimeters)
 - Bottom depth: 6.2 inches (157 millimeters)
- Net weight: 28 pounds (12.7 kilograms)
- Shipping weight: 64 pounds (29.03 kilograms)

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

1.3 CS1090 Processor Settings

Following are the CS1090 processor settings:

Crossover Section		Frequency	Slope	
Highpass filter		45 Hz	24 dB Octave (fourth order) Butterworth	

Equalization Section	Frequency	Q	Bandwidth	Level
	600 Hz	2.87	0.5	–1.5 dB
	2,000 Hz	1.41	1.0	+2.5 dB
	3,700 Hz	2.0	.71	– 2.0 dB
	4,820 Hz	2.87	0.5	– 2.0 dB
	6,800 Hz	3.0	0.48	+ 2.0 dB

Limiting Section ¹	Threshold/RMS Voltage	Attack	Release
	45 V	16 ms	256 ms

¹ See [Appendix B](#)

Installing the CS1090

The SLS™ CS1090 is a cinema surround loudspeaker that you can install with two optional rigging kits. This chapter covers both of these kit installations:

- [Installing the CS1090 Using the YK-1090 in 5.1 and 7.1 Auditoriums](#)
- [Installing the CS1090 Using the YK-1090 and MMA-1090 in Dolby Atmos Auditoriums](#)

2.1 Installing the CS1090 Using the YK-1090 in 5.1 and 7.1 Auditoriums

You can use the YK-1090 rigging kit for 5.1 and 7.1 auditorium sidewall mounting installations, where only the tilt axis requires adjustments.



Warning: TO PREVENT INJURY, THIS APPARATUS MUST BE SECURELY ATTACHED TO THE BUILDING STRUCTURE CEILING/WALL 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. INSPECT ALL COMPONENTS BEFORE INSTALLATION. THIS APPARATUS IS NOT INTENDED FOR FLOOR-STANDING INSTALLATIONS. ALL LOCAL BUILDING AND SEISMIC CODES MUST BE ADHERED TO.

2.1.1 Tools Required

- 7/32-inch Allen wrench to remove the bolts for installation of the YK-1090
- #2 Phillips screwdriver for attaching speaker wire to the barrier strip

2.1.2 Identifying the YK-1090 Rigging Kit Parts

The following parts are included in the YK-1090 rigging kit:

- Two yokes (one for each speaker)
- Four neoprene washers
- Two ¼"-20 closed-shoulder eyebolts (not shown; attach directly to each CS1090)

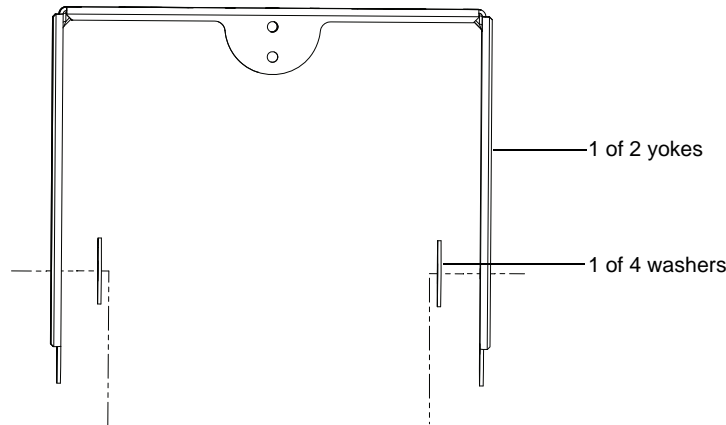


Figure 2-1 YK-1090 Rigging Kit Parts (Overhead View)

2.1.3 Installing the CS1090 in a 5.1 or 7.1 Sidewall Configuration



Warning: USE A MINIMUM OF FOUR FASTENERS TO SECURE THE HARDWARE TO THE BUILDING STRUCTURE. WE RECOMMEND M10 OR 3/8-INCH BOLTS. BASED ON THE WEIGHT OF THE APPARATUS, INSTALLER-SUPPLIED HARDWARE MUST HAVE A MINIMUM 5:1 SAFETY FACTOR, OR GREATER IF A HIGHER REQUIREMENT IS MANDATED BY LOCAL LAWS. HARDWARE MUST BE SECURELY TIGHTENED.

To install the CS1090, there are two yoke attachment options:

- If maximum adjustment on the tilt axis is needed, you need to mount the CS1090 to the attachment points that are farthest from the wall.
- If the maximum adjustment is not required, we recommend that you mount the CS1090 to the attachment points closer to the wall to avoid obstructing the line of sight to the screen.

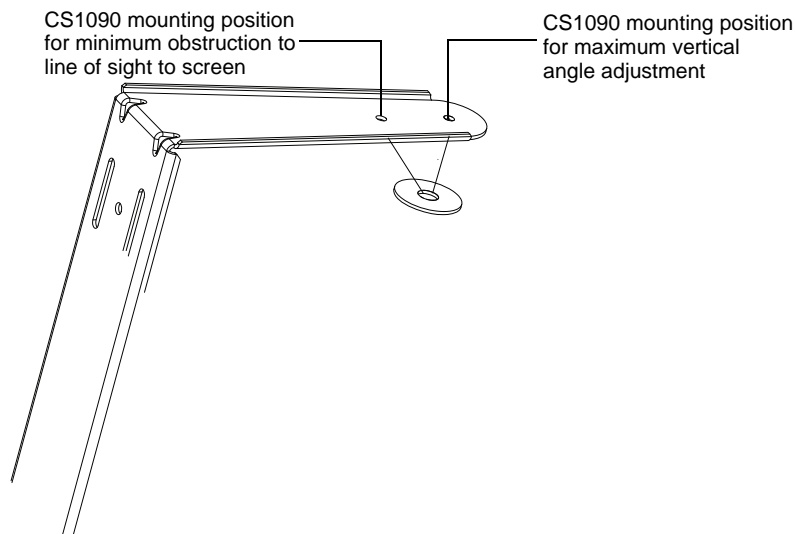


Figure 2-2 Yoke Placement Options

1. Remove the 1/4"-20 bolt at the back of the CS1090, and replace it with the provided 1/4"-20 shoulder eyebolt (or an installer-supplied eyebolt).

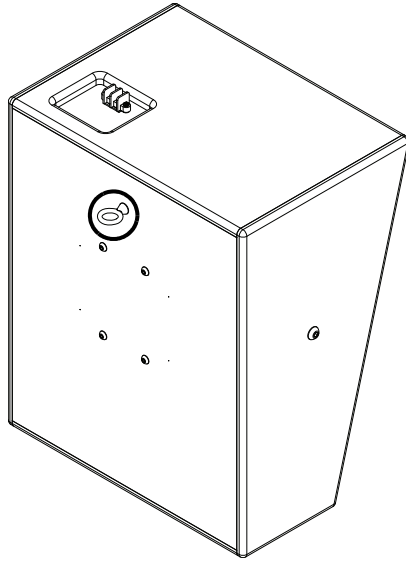


Figure 2-3 Eyebolt in Place for Safety Cable

To install the CS1090:

1. Mount the yoke to the wall with installer-supplied hardware using a minimum of four fasteners. We recommend M10 or 3/8" bolts.
2. Remove the two 3/8"-16 bolts from the sides of the CS1090.
3. Peel off the paper on the neoprene washers to expose the adhesive layer, and adhere the washers to the yoke in the desired yoke position holes.
4. Position the CS1090 between the yoke arms, and insert the two 3/8"-16 bolts and lightly tighten.
5. Adjust the tilt angle as needed, and securely tighten the bolts to complete the installation.

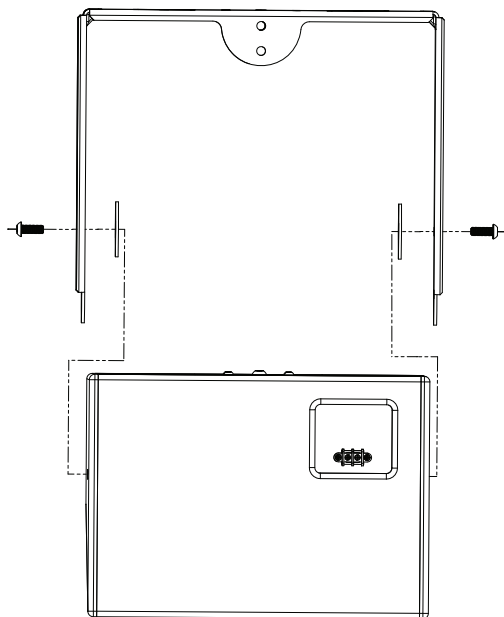


Figure 2-4 CS1090 Placement

2.1.4 Connecting the Safety Cable

After the CS1090 is attached to the building structure, you must connect a secondary safety cable to an independent point on the building structure. The 1/4"-20 eyebolt is provided to attach an installer-supplied safety cable. Based on the weight of the CS1090, all installer-supplied safety rigging hardware must have 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.



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.

2.1.5 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.

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



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

2.2 Installing the CS1090 Using the YK-1090 and MMA-1090 in Dolby Atmos Auditoriums

The MMA-1090 rigging kit is an add-on to the YK-1090 rigging kit. You need both of these kits to mount the speakers in Dolby Atmos auditoriums, where both vertical and horizontal axis adjustment is required. In addition to the yokes, neoprene washers, and eyebolts that are included with the YK-1090 kit, you need additional hardware that is included in the MMA-1090 kit for overhead installations.



Note: The CS1090 provides a front baffle that is tilted 15 degrees relative to an overall box tilt of 0 degrees. When using the Dolby Audio Room Design Tool (DARDT) specification for aiming angle calculations in Dolby Atmos installations, subtract 15 degrees from the down-angle data provided for side surrounds. For overheads, subtract 15 degrees from the axis that the front baffle slope is angled toward.

The YK-1090 bracket enables you to change the vertical tilt. Adding the MMA-1090 bracket enables you to adjust the horizontal pan.

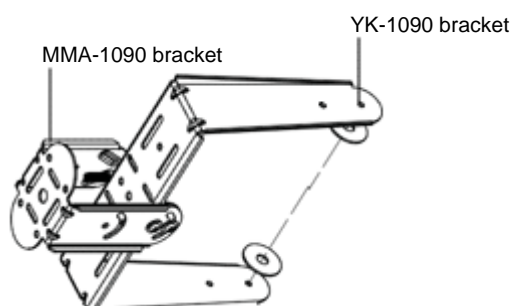


Figure 2-5 MMA-1090 and YK-1090 Brackets



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2.2.1 Tools Required

- 7/32-inch Allen wrench or socket
- #2 Phillips screwdriver for attaching speaker wire to barrier strip
- 9/16-inch wrench or socket

2.2.2 Identifying the MMA-1090 Rigging Kit Parts

The following parts are included in the MMA-1090 rigging kit:

- Two U brackets
- Six 3/8-inch nylon lock nuts
- Twelve 1-inch washers
- Six 3/8"-16 screws

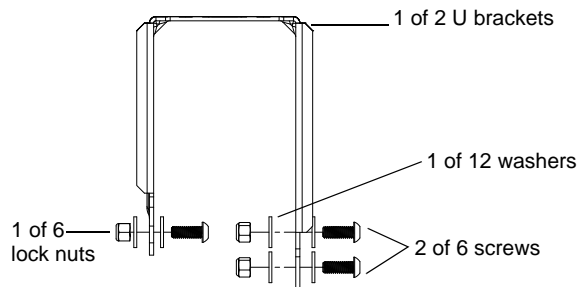


Figure 2-6 MMA-1090 Rigging Kit Parts

2.2.3 Installing the CS1090 in a Dolby Atmos Overhead Configuration



Warning: USE A MINIMUM OF FOUR FASTENERS TO SECURE THE HARDWARE TO THE BUILDING STRUCTURE. WE RECOMMEND M10 OR 3/8-INCH BOLTS. BASED ON THE WEIGHT OF THE APPARATUS, INSTALLER-SUPPLIED HARDWARE MUST HAVE A MINIMUM 5:1 SAFETY FACTOR, OR GREATER IF A HIGHER REQUIREMENT IS MANDATED BY LOCAL LAWS. HARDWARE MUST BE SECURELY TIGHTENED.

To install the CS1090:

1. Mount the yoke to the wall with installer-supplied hardware using a minimum of four fasteners. We recommend M10 or 3/8" bolts. You can install the MMA-1090 with an M20 hollow bolt if needed.
2. Attach the U bracket to the building structure using installer-supplied hardware using a minimum of four fasteners. We recommend M10 or 3/8" bolts. You can utilize any of the attachment points on the back of the U bracket.
3. If three-axis aiming (vertical, horizontal, rotational) is required, use only the attachment point in the center. If the U bracket is attached directly to the ceiling, you must use all four points for two-axis aiming.

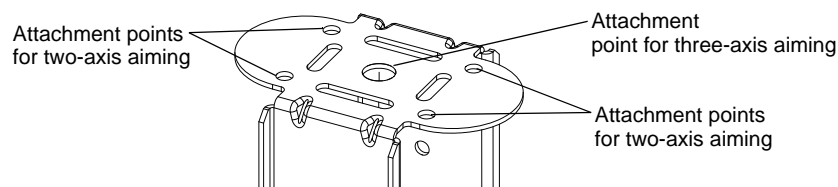


Figure 2-7 Multiple Attachment Points

To allow the CS1090 to hang from the ceiling tile grid, you can use the MMA-1090 rigging kit with the FCT-24 flat-mount or RCT-24 recessed-mount ceiling tile rigging kit. However, the RCT-24 may restrict the available angle. You insert the M20 hollow bolt from the ceiling tile kits, as shown in the following figure (FCT-24 shown in figure).

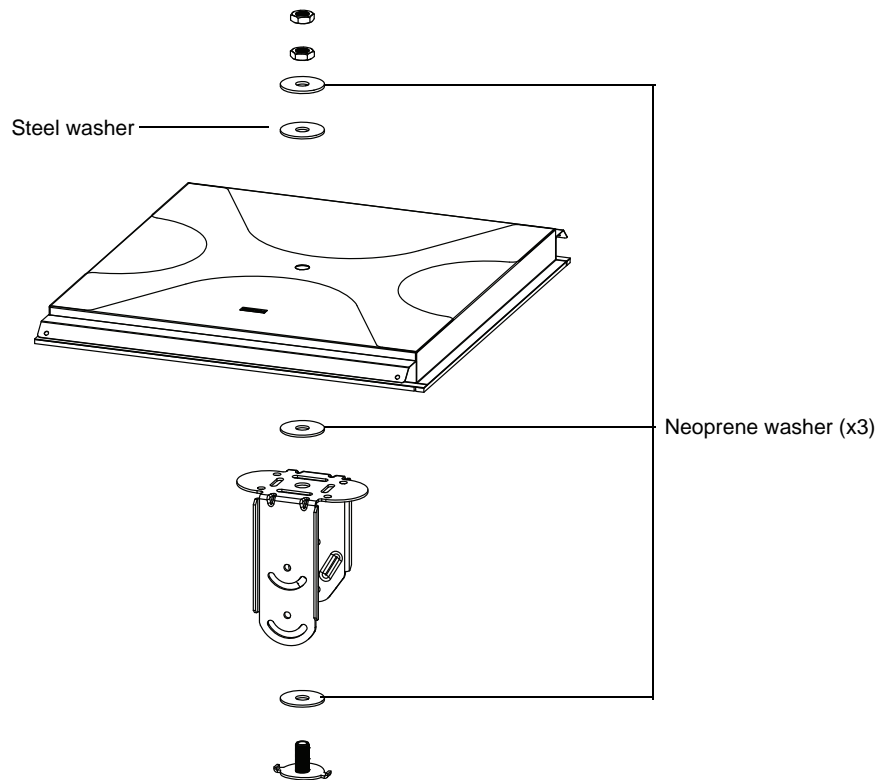


Figure 2-8 MMA-1090 with FCT-24 or RCT-34 Rigging Kit

For detailed information on FCT-24 and RCT-24 ceiling tile installations, you can download the *SLS Ceiling Tile Rigging Kits User's Guide* at <http://customer.dolby.com/cinema/>. After you log in, click on **Download Updates/patches/manuals**.

4. Remove the two 3/8"-16 bolts from the sides of the CS1090, place the speaker into the yoke, then position the neoprene washer between the speaker and yoke, and reinstall the bolts.

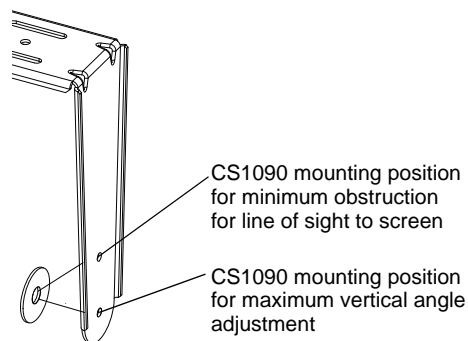


Figure 2-9 Neoprene Washer Positions

5. Remove the ¼"-20 bolt at the back of the CS1090, and replace it with the provided ¼"-20 shoulder eyebolt (or an installer-supplied eyebolt). An eyebolt is provided with the YK-1090 rigging kit.

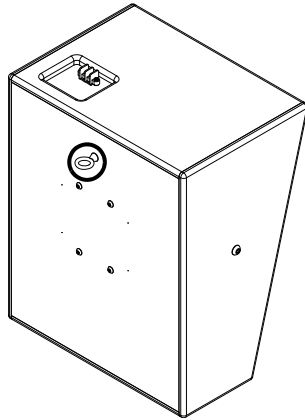


Figure 2-10 Eyebolt in Place for Safety Cable

6. Attach the U bracket to the yoke, as shown in the following figure, adjust any of the angles as needed, and then tighten all bolts.

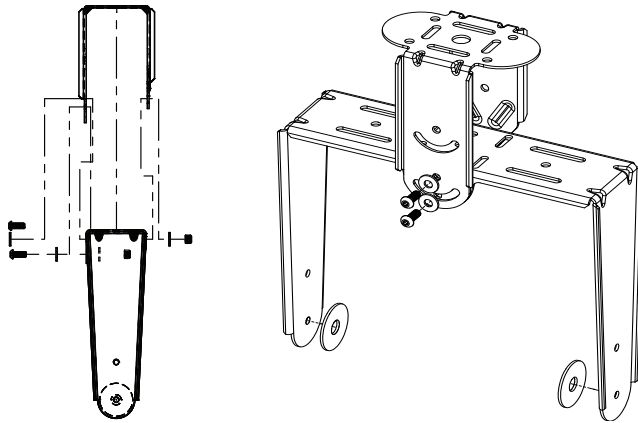


Figure 2-11 Attach Yoke to U Bracket

The U bracket also provides two options for attachment to the yoke:

- For maximum vertical and horizontal angle adjustment, use the holes on the yoke and U bracket, as shown in [Figure 2-12](#).
- In cases where minimal vertical or horizontal angle adjustment is needed, use the holes on the yoke and U-bracket shown in [Figure 2-13](#) to avoid blocking the image projected to the screen.

You can also use a combination of both of these examples.

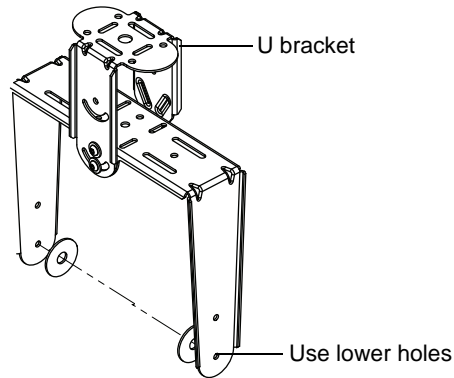


Figure 2-12 Attachment Points for Maximum Vertical and Horizontal Angle Adjustment

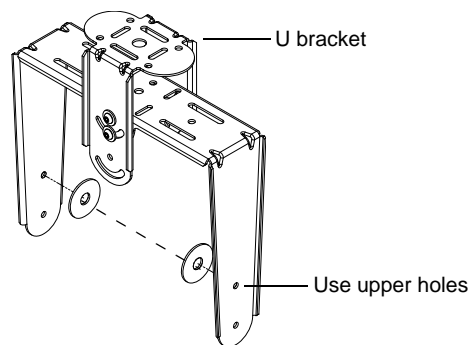


Figure 2-13 Attachment Points for Improved Sight Lines to Minimize Projector Light-Beam Blockage

2.2.4 Connecting the Safety Cable

After the CS1090 is attached to the building structure, you must connect a safety cable to an independent point on the building structure. The 1/4"-20 eyebolt is provided to attach an installer-supplied safety cable. Based on the weight of the CS1090, all installer-supplied safety rigging hardware must have 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.



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2.2.5 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.

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



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

2.2.6 Installing the CS1090 in a Dolby Atmos Sidewall Configuration



Warning: USE A MINIMUM OF FOUR FASTENERS TO SECURE THE HARDWARE TO THE BUILDING STRUCTURE. WE RECOMMEND M10 OR 3/8-INCH BOLTS. BASED ON THE WEIGHT OF THE APPARATUS, INSTALLER-SUPPLIED HARDWARE MUST HAVE A MINIMUM 5:1 SAFETY FACTOR OR GREATER, IF A HIGHER REQUIREMENT IS MANDATED BY LOCAL LAWS. HARDWARE MUST BE SECURELY TIGHTENED.

To install in a sidewall configuration:

1. Mount the yoke to the wall with installer-supplied hardware using a minimum of four fasteners. We recommend M10 or 3/8" bolts.
2. Attach the U bracket to the wall with installer-supplied hardware, using the holes and orientation as shown in [Figure 2-14](#). We require that you use a minimum of four fasteners. We recommend M10 or 3/8-inch bolts.

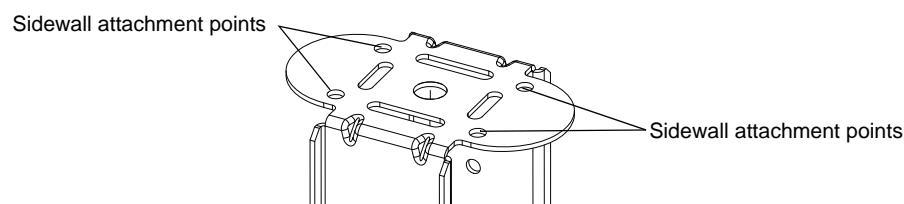


Figure 2-14 Four Side-Wall Mounting Attachment Points (and Required Orientation)

3. Remove the two 3/8"-16 bolts from the side of the CS1090, and place the speaker into the yoke.

4. Position the neoprene washer between the speaker and yoke (using the adhesive on the washer to adhere to the yoke at the desired position), and then reinstall the bolts.

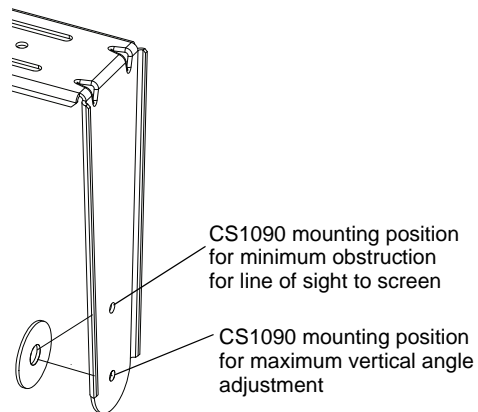


Figure 2-15 Neoprene Washer Position

5. Remove the $\frac{1}{4}$ "-20 bolt at the back of the CS1090, and replace it with the provided $\frac{1}{4}$ "-20 shoulder eyebolt (or an installer-supplied eyebolt). An eyebolt is provided with the YK-1090 rigging kit.

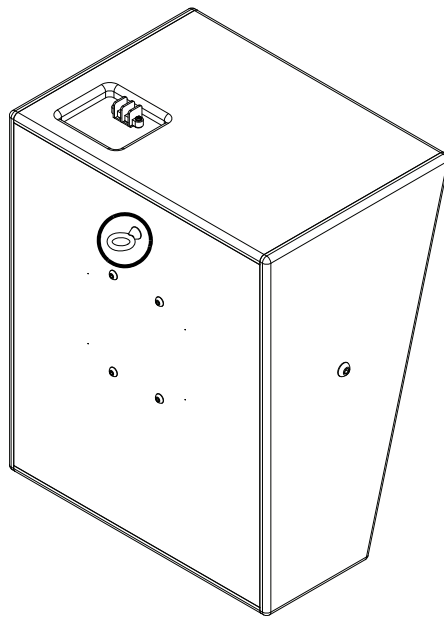


Figure 2-16 Eyebolt in Place for Safety Cable

6. Connect the U bracket to the yoke, as shown in [Figure 2-17](#).

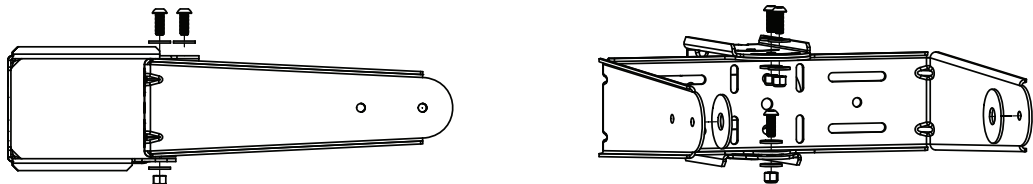


Figure 2-17 Connecting the U Bracket to the Yoke

7. Adjust the angles as needed, and tighten all bolts.

The U bracket also provides two options for attaching the yoke:

- For maximum vertical and horizontal angle adjustments, use the holes on the yoke and U-bracket, as shown in [Figure 2-18](#).
- In cases where minimal vertical or horizontal angle adjustment is needed, use the holes as shown in [Figure 2-19](#) to prevent the blocking of any lines of sight to the screen. You can also combine both of these approaches.

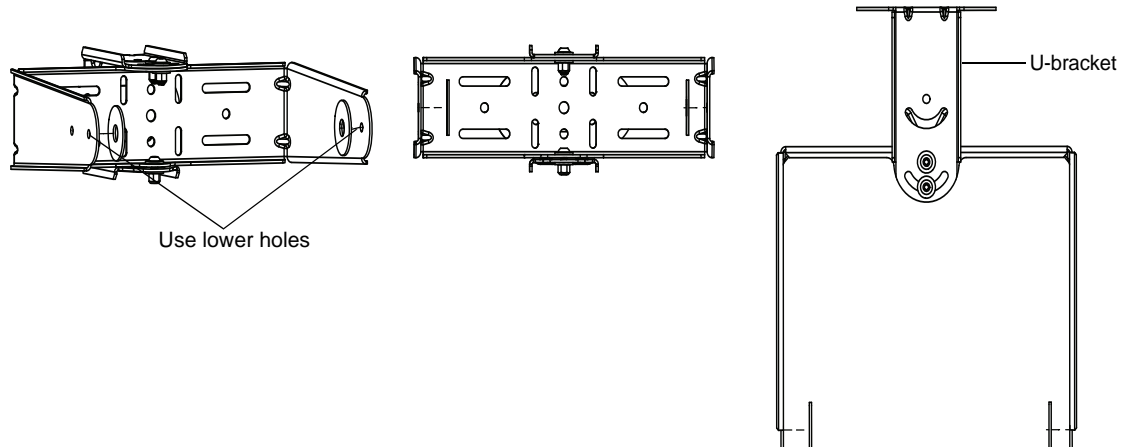


Figure 2-18 Attachment Points for Maximum Vertical and Horizontal Angle Adjustment (Top View)

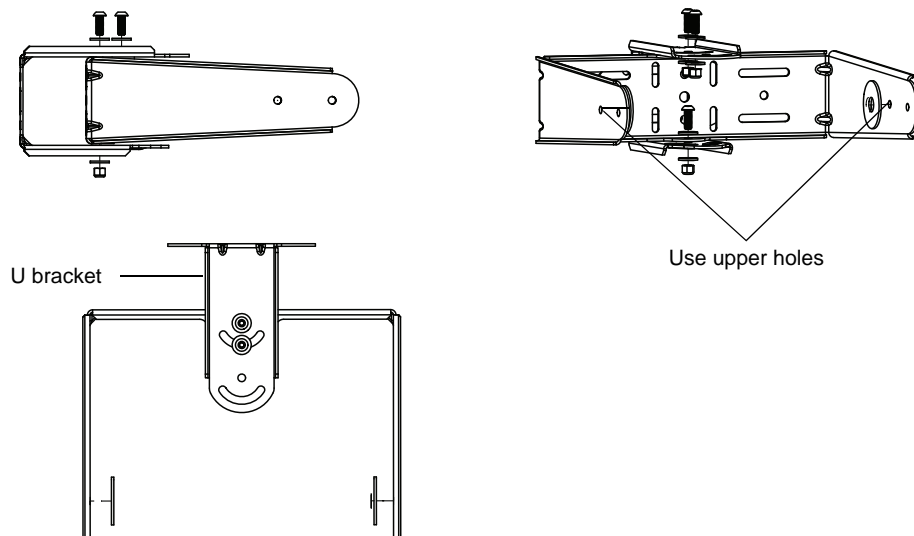


Figure 2-19 Attachment Points for Improved Sight Lines (Top View)

2.2.7 Connecting the Safety Cable

After the CS1090 is attached to the building structure, you must connect a safety cable to an independent point on the building structure. The 1/4"-20 eyebolt is provided to attach an installer-supplied safety cable. Based on the weight of the CS1090, all installer-supplied safety rigging hardware must have 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 if there is a primary rigging failure.



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.

2.2.8 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.

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



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

2.3 Dimensions

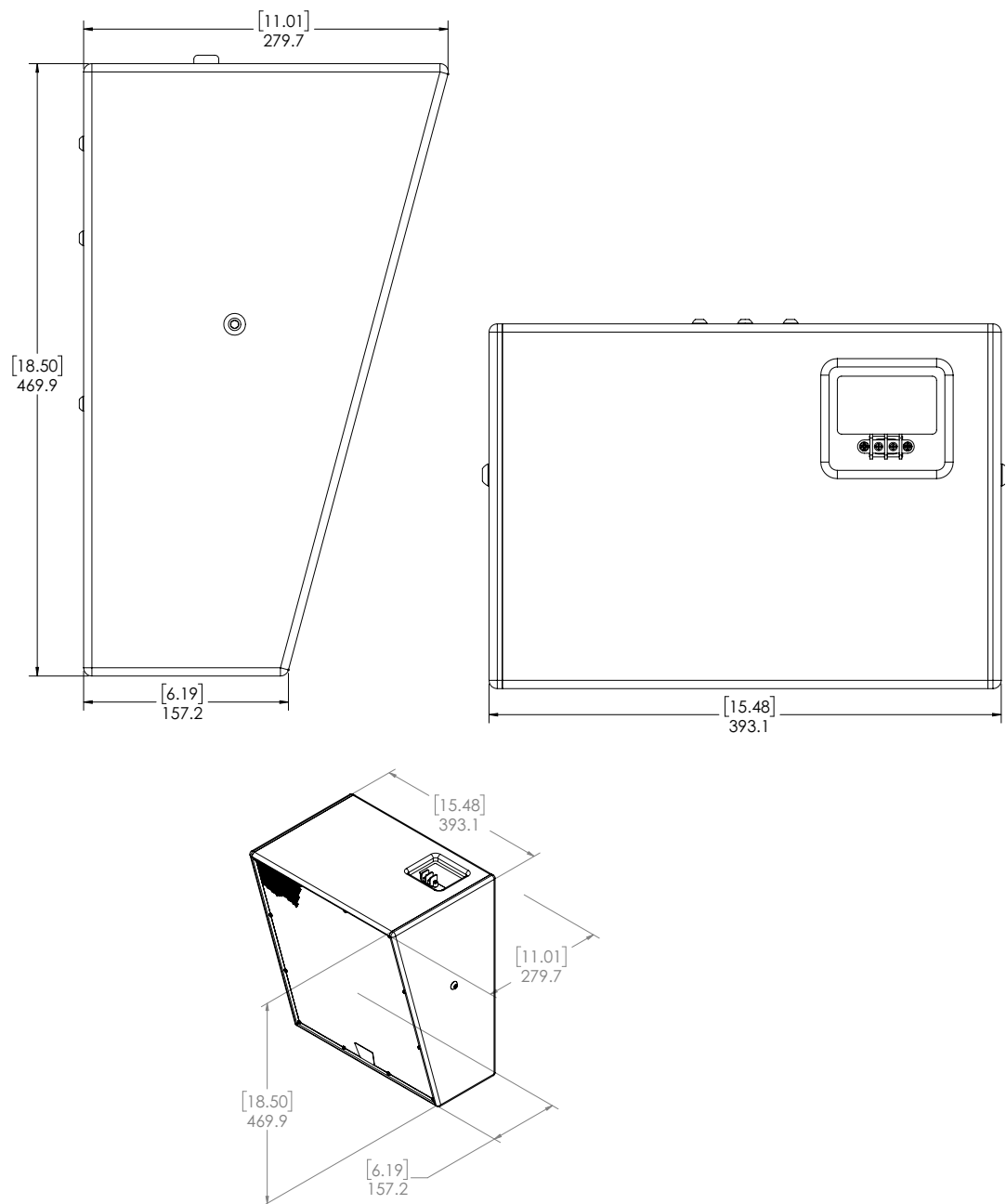


Figure 2-20 CS1090 [Inches] Millimeters

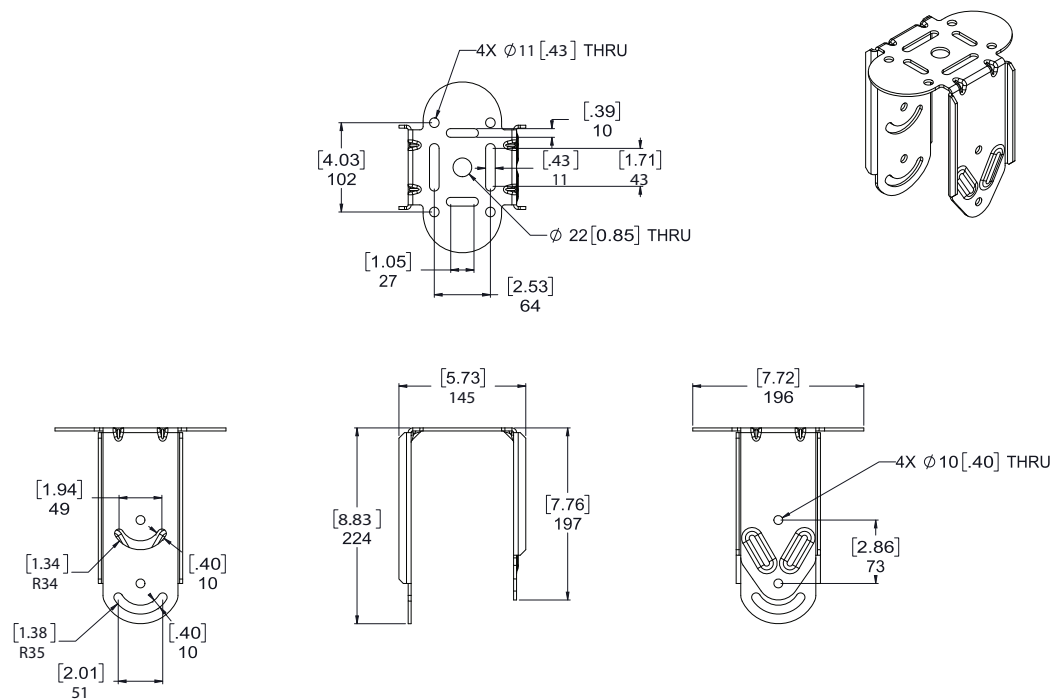


Figure 2-21 MMA-1090 Yoke [Inches] Millimeters

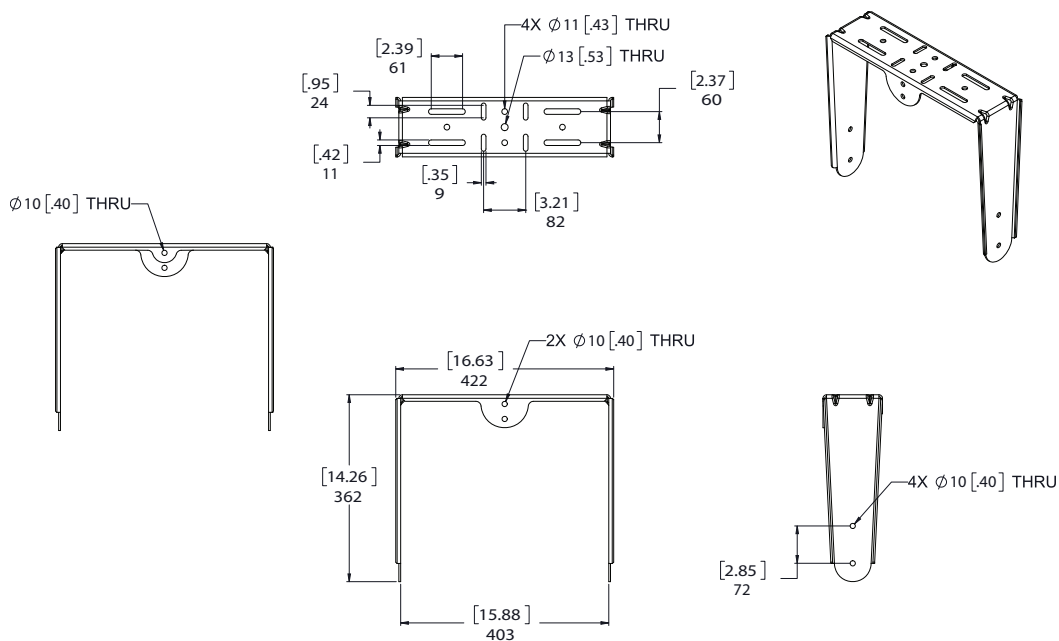


Figure 2-22 YK-1090 Yoke [Inches] Millimeters

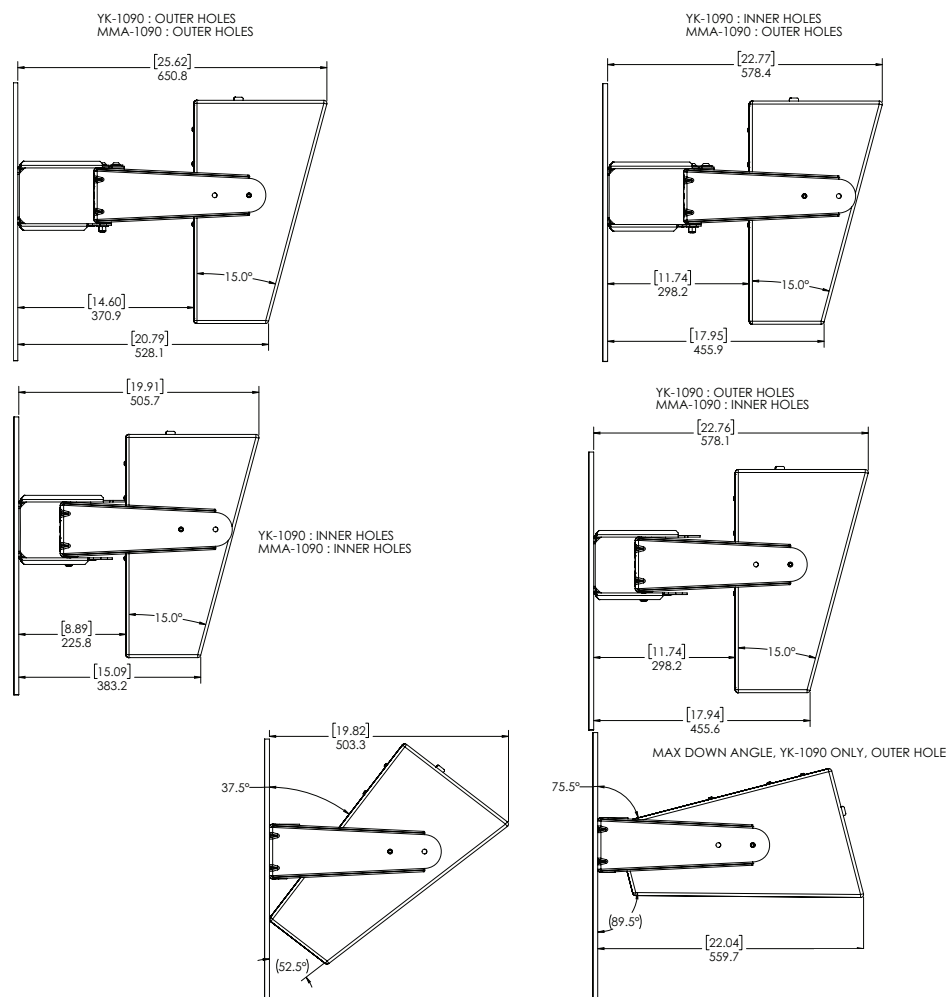


Figure 2-23 CS1090 YK-1090 and MMA-1090 Extended Positions with YK-1090 Maximum Down Angles [Inches] Millimeters

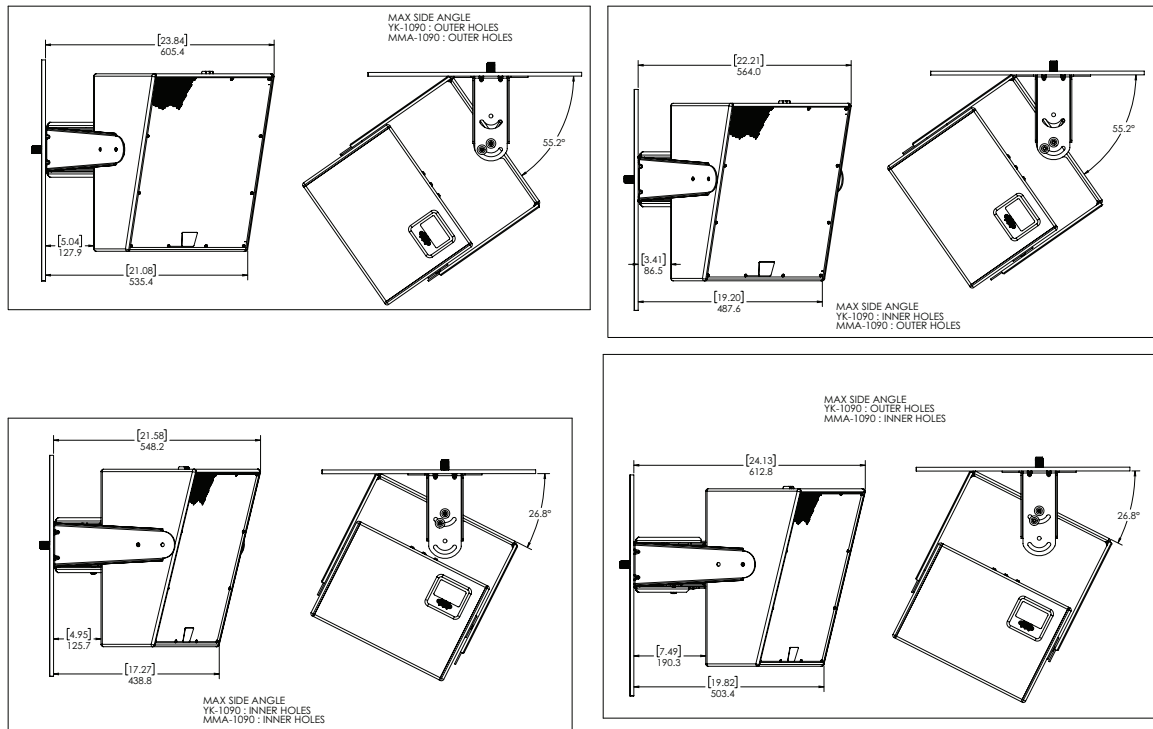


Figure 2-24 CS1090 YK-1090 and MMA-1090 Extended Positions with Maximum Side Angles [Inches] Millimeters

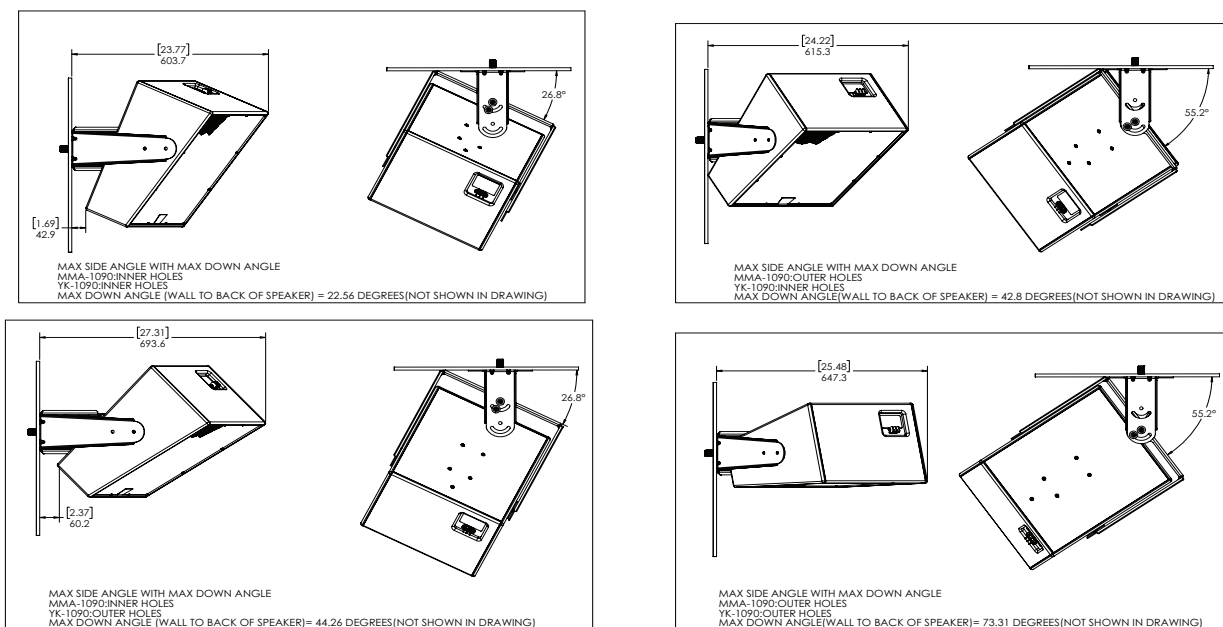


Figure 2-25 CS1090 YK-1090 and MMA-1090 Extended Positions with Maximum Side Angles and Maximum Down Angles [Inches] Millimeters



Figure 2-26 CS1090 YK-1090 and MMA-1090 Extended Positions with and Maximum Down Angles
[Inches] Millimeters

Environmental Compliance and Regulations

A.1 EU Environmental Regulations and Compliance

Following are the CS1090 EU 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 CS1090 Russian environmental compliance information.

Restriction of Hazardous Substances (RoHS) Directive

This product complies with Russian EAC RoHS requirements.



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.