



vaddio®

AUDIO IN **CONFERENCE ROOMS**

What you need to know to ensure everyone is properly heard during audio and video conferences.

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Table or Ceiling Microphones: The Basics for Selection

A simple checklist of questions will determine if an organization would benefit from adoption of huddle rooms. Several KPIs can validate the decision.



The ability to clearly capture voice audio is the hallmark of a productive meeting.

When setting up a conference room, attention is rightfully paid to the video equipment, the display and the furniture – tangible items that immediately define the atmosphere of a space.

Equally as important is the audio for the room – specifically the microphones for the meeting participants. The ability to clearly capture voice audio is the hallmark of a productive meeting, and there are few things more distracting than poor sound quality. Sound quality involves more than just capturing voices at an acceptable level. Background or ambient noise – either from non-speaking meeting participants or environmental factors such as air vents – also must be minimized.

When designing a conference room audio system, there are two types of microphones to consider: table mics and ceiling mics. Which one to use depends on several conditions, including the height of the ceiling, the aesthetics of the room, whether there's a control panel present or not, and whether there are existing audio equipment standards within the same building.

While both table and ceiling mics have their pros and cons, it's important to weigh all considerations to select the form factor microphone that will work best.

Table Mics: Advantages and Disadvantages

Table mics do have significant advantages, particularly when the mics are set up to provide 360-degree coverage of a conference room. Ideally, three table mics strategically placed on a table make it relatively easy to get 360-degree coverage.



Table microphones offer convenient placement for control interfaces.

Vaddio's TableMIC microphone includes a built-in array of three discrete microphones that provide 360-degree voice pickup. With a table mic, the voices of the speakers are amplified due to sound reflected off the table. The same reflection occurs with PZM (pressure zone) microphones, especially if the setup includes a piece of plexiglass. There's a certain acoustic gain in efficiency if the mic serves to focus like an antenna on the reflections of sound coming off the table surface.

Another advantage: table mics offer convenient placement for control interfaces. The participants in the room can easily access mute buttons, volume controls and level indicators to adjust audio output accordingly. This feature can be particularly useful in BYOD environments; when table mics with standard controls are installed across rooms within a building, the user experience remains the same in all meeting rooms. There's no learning curve as users move from meeting space to meeting space, simplifying the conferencing experience considerably.

There are a few caveats with table mics. With wired models, the wires run on the table, which isn't always visually appealing. There could be additional table clutter such as cables for other equipment. A more significant drawback is the potential for ambient noise – people tapping their fingers, shuffling papers, clicking on their mouse, typing on their laptop keyboards – activities that take place near the mic can cause issues with ambient noise.

Ceiling Microphones: Pros and Cons

For pure aesthetics, ceiling mics are often preferred by designers. Many ceiling mics offer streamlined, modern pendant designs that suspend from a ceiling, are unobtrusive and complement the conference room décor. Ceiling mics don't contribute to table clutter, and there is much less potential for the ambient noise from a table to be picked up by ceiling mics given their location.

However, ceiling mics – due to their placement – have limitations. The sound at the table level is different from the sound at the ceiling. Sound essentially can hang in a room before it dissipates. At the ceiling, the sound of voices can be less clear due to echoes caused by the size of the room and surfaces found in the room. Vaddio's CeilingMIC™ overhead microphones include integrated echo cancellation and digital signal processing (DSP) to deliver crisp, clear sound.



Ceiling microphones reduce table clutter and are aesthetically pleasing.

Using the same table microphones in all meeting rooms can simplify the conferencing experience.

Another issue that can crop up with ceiling mics is the presence of other equipment on the ceiling. Projectors with fans and HVAC systems create noise that can be picked up by a nearby ceiling mic.

To get wide coverage of the room, the collection pattern of ceiling mics should overlap in a way that also causes the mics to listen relatively well up toward the ceiling tiles, which in turn accentuates the HVAC and other noise problems – such as radiated noise that travels across the ceiling from other rooms. While there are ways to mitigate these issues, it's important to acknowledge them when evaluating the use of table mics or ceiling mics. As for volume and mute functions, there are a number of ways to handle these with ceiling mics. For example, ceiling mics can be linked to a control panel that enables adjustments via serial or IP connections.

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Installation Tips for Table and Ceiling Microphones



Using the same table microphones in all meeting rooms can simplify the conferencing experience.

When installing either table or ceiling mics, there are some general placement guidelines to follow to optimize functionality.

Setting Up a Table Microphone

For table setups, mics should be approximately two feet (0.6 meters) away from a presenter – a placement that optimizes voice pickup while minimizing ambient noise. This is fairly easy to accomplish when dealing with smaller spaces such as huddle rooms that are designed to accommodate a small group of people sitting around one table. Typically, with Vaddio audio products, a single wire Category-5 style cable plugs into the mic interface (whether table or ceiling) and whatever equipment that mic is connected to – essentially a plug-and-play installation.

In the case of a Vaddio TableMIC, the cable can run under the table to easily connect to Vaddio equipment to generate USB connections. Direct USB connections work well in BYOD scenarios – a meeting attendee who brings a laptop can connect a USB cable and participate in the conference.

For best audio results, echo cancellation and processing should occur at the mic, rather than within a soft client application such as Zoom or Microsoft Teams. Vaddio's TableMIC microphone is easy to install and incorporates echo cancellation and digital signal processing (DSP) directly into the microphone itself, reducing complexity, enhancing consistency – and ultimately improving acoustic quality.

Ceiling Microphone Installation

For ceiling mics, installation requires an assessment of the immediate environment. Ideally, mics should descend to no more than approximately five feet (1.5 meters) above the person who is speaking. With higher ceilings, extension cables can be used but they should be no longer than 15 feet (4.6 meters) in length. Otherwise, the mic and cable will act as an antenna and pick up ambient noise.

Vaddio's CeilingMIC overhead microphone is designed to allow for custom ceiling drop cable length and easy installation. For situations where a 15-foot cable can't be suspended within five feet of a table, ceiling mics are not the best option. Whatever the length of the cable, however, make sure to avoid ceiling mic installation near other noise-producing ceiling elements such as projectors, air vents or AC units. Ceiling microphones should not be installed in front of projectors either, as they will obscure the image coming from the projector.

As with table mics, the cabling with ceiling mics needs to travel to connect with equipment – typically up the wall and over the ceiling tiles. In terms of room aesthetics, interior designers may prefer to center mics in the room above tables, yet that approach can cause echo problems depending on the dimensions of the meeting space. To mitigate issues, ceiling speakers can be placed diagonally across the room, improving performance by eliminating the potential for sound waves to hang in the space.



Make sure that audio speakers are further away from the microphones than the people speaking in room.

Purchasing Considerations



For many small to midsize spaces where audio solutions are needed – huddle spaces, conference rooms or boardrooms – either table mics or ceiling mics can be used. Setting up microphones for these compact “single zone audio” meeting rooms is relatively straightforward as both table mics and ceiling mics offer the performance and coverage needed for smaller venues.

Several exceptions where ceiling mics are not optimal for smaller spaces: the presence of high ceilings or an open concept space, or a room with three glass walls.

If the room is compact and enclosed, the pickup patterns for either style mic are very similar regardless of the number of people in the room, or the size of the table. Both TableMIC and CeilingMIC from Vaddio have three separate built-in microphone components to provide 360-degree pickup. The microphones also include integrated echo cancellation and digital signal processing (DSP), enabling reduction of ambient noise and improvement of audio quality respectively.

From an installation consideration, attendees should be seated within a 12-foot (3.6 meter) radius of microphones, even though coverage extends to 25 feet (7.6 meters) with the most efficient microphones. Placed evenly around the room, two table mics or two ceiling mics can easily cover a 20x40 foot (6x12 meter) area.

When creating audio system layouts for small to midsize rooms, a primary consideration is to make sure the audio speakers are farther away from the people who are speaking than the microphones. This is where echo cancellation comes in.

Echo cancellation improves voice quality by preventing echos from being captured or created. It is the process of essentially “cancelling” the delay that occurs when audio is played through the speakers, so that someone who is speaking into a microphone will not hear his or her own voice “echo” from that speaker. Sound takes time to travel and the ability to effectively cancel an echo has to occur within what’s known as a reference window – typically 200 or 250 milliseconds.

Microphones with integrated echo cancellation capability can compensate for any delay that occurs within that window and eliminate echo by essentially matching up microphone input with speaker output. When processing sound for echo cancellation, speakers that are closer to a person talking than the microphone effectively erode the available time to correct sound.

Digital signal processing (DSP) that takes place at the microphone (rather than at a soft client like Zoom or Teams, for example) is more efficient. Hence, microphones with built-in echo cancellation and DSP are ideal for eliminating auditory distractions in conference rooms.

In many situations, the ultimate choice comes down to whether ease of use (table mics) or aesthetics (ceiling mics) is the most important deciding factor. Table mics point sideways, while ceiling mics point down – yet processing capabilities are similar.

All things being equal in terms of the space, design requirements or installation considerations, the decision to choose a table mic or go instead with a ceiling mic tends to be based primarily on what features are needed by users at their fingertips. With table mics, mute buttons and other audio controls located on the mics are features that are readily accessible to attendees sitting at the table. Ceiling mics, on the other hand, have remote control capabilities via a control panel. In many situations where the audio quality of table mics and ceiling mics are comparable, the deciding factor of selecting one over the other for small to midsize rooms may come down to convenience and control.

The ultimate decision for ceiling mics versus table mics should be based on the features needed for your specific installation.



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