

# Constellation

WHAT SETS CONSTELLATION APART



San Francisco Symphony at SoundBox • San Francisco, CA • Alan Karchmer

## System Benefits & Design Objectives

With more than 140 systems installed worldwide and endorsements from globally renowned artists, Constellation has proven to be the right choice for discerning customers demanding the very best in flexible, natural-sounding acoustics for a wide variety of applications. Constellation excels against the competition in many ways.

## A Complete Package

Constellation combines hardware, software, and design services in one package. The system includes digital signal processors and loudspeakers manufactured by Meyer Sound and microphones calibrated against a reference standard at our Berkeley, California factory. Design, technical services, and calibration are based on rigorous scientific principles, and system tuning is performed by globally renowned experts.

## A Scientific Approach

Constellation is not a simple in-line sound effect in which sound input is gathered on a comparatively small number of microphones and then returned to the auditorium via a digital reverberation system. This method does not change the hall's acoustics and delivers a compromised experience for the audience, which is effectively in a different acoustic environment from the performers onstage.

Instead, Constellation uses several microphones and loudspeakers to capture and redistribute sound throughout the venue. The system changes the stage and auditorium's acoustics by increasing reverberation and adding beneficial reflections that help reinforce direct sound. This process results in a beautiful, natural sound that's indistinguishable from the world's finest concert halls.



## Loudspeaker & Microphone Density

Constellation system design principles ensure that practically every seat (including boxes, underbalconies, and stages) falls within system coverage patterns, facilitating evenly distributed acoustic energy throughout the venue.

Constellation's speaker arrangement is strategically designed to prevent localization to a single loudspeaker. Lateral speaker placement and height is key to providing envelopment. Constellation loudspeaker layouts retain the imaging from stage sources by ensuring that early reflections are perceived as arriving laterally in keeping with the finest concert halls.

Systems include a full complement of microphones on stage, in the house, and in underbalconies. Using input from many independent microphone channels, Constellation can achieve long Early Decay Times (EDT)\*, which are essential for both clarity and pleasant room acoustics. Using multiple rows of microphones onstage allows the ability to adjust levels from upstage to downstage (and vice-versa) and side-to-side, improving stage communication in every direction.



Karolinska Institute • Solna, Sweden

## Acoustic Control

Constellation is immersive; it changes the acoustics everywhere in the room. Reverberation from one section of the room can be sent to several others, which enhances sonic envelopment and regenerative gain. With Constellation, controlling the acoustics on stage or in the house is easy: Manipulate reflection strength to enhance performances onstage or in the house, increase reverberation to elevate audience applause, etcetera.

### REVERBERATION\*\*

Constellation systems manipulate reverberation in two ways:

1. Increasing system gain introduces regeneration, effectively reducing the absorption of physical surfaces in the hall, increasing reverberation in both the auditorium and stage areas.
2. By manipulating gain in conjunction with our patented 32-channel D-VRAS multichannel digital reverberators, the perceived size of the auditorium and stage can be changed dramatically. For example, adding long, natural reverberation times can create cathedral-like acoustics.

### EARLY REFLECTIONS

Controlled and well-distributed early reflections are fundamental for good acoustics. Early Reflections (ER) “bridge the gap” between direct sound and reverberation, helping the audience feel more connected to the musicians, and musicians to each other.

Constellation varies ER strength, distribution, and density independently of reverberation, allowing EDT control and enhancing clarity throughout the room. ER can be manipulated in zones for perfectly synchronized time arrivals for everyone in the auditorium as well as on opposite sides of the stage, giving musicians a more satisfying performance environment and improving interaction within ensembles.

### WARMTH (BASS RATIO)

According to world-renowned acousticians, the concert halls with the best acoustics exhibit a high Reverb Time (RT) at low frequencies, a characteristic that is often described as “warmth.” In Constellation, this metric is simple to adjust via custom RT, Strength, and Warmth presets.

Constellation systems accommodate the lowest audible frequencies; subwoofers are an essential part of every Constellation system, and systems accommodate several independent subwoofers.





## LATERAL FRACTION

A venue's lateral fraction, or ratio of lateral to overhead acoustic energy, is regarded by experts to be more important than overhead acoustic energy when it comes to determining the "spaciousness" of a room. Constellation offers full control of lateral fraction, both onstage and in the auditorium.

## CONNECTING SPACES

Spaces that are not part of a hall's main auditorium, such as underbalconies, stages, loges, and boxes, tend to feel disconnected because they have different acoustic profiles. Constellation can shape the acoustics of those isolated spaces to provide an audience experience consistent with the main auditorium.

Underbalconies, for example, are notoriously challenging acoustic spaces, often exhibiting a dramatically different ratio of reverberation to early reflections than the main body of the auditorium. This problem can be addressed by extending a Constellation system into underbalcony areas: Constellation's underbalcony RT and ER ratios and levels are independently controllable during system tuning and calibration to create an acoustic environment that matches both the main auditorium and visual cues.

## Commissioning Process

### CALIBRATION AND TUNING

Constellation systems are calibrated using customized scientific procedures developed by Meyer Sound's senior scientists and acousticians, and tuned by our team of voicing experts headed by Grammy-winning recording engineer John Pellowe, a former Decca/London engineer and sound engineering director for Luciano Pavarotti and The Three Tenors. We perform follow-up voicings typically six to 12 months after the system is commissioned to accommodate new presets, or make other desired adjustments.

### SYSTEM INTEGRATION

Constellation systems allow a minimum of 8 inputs that can also be used for external audio routing, theatrical surround, cinema surround sound mixing, or other uses; we tailor user presets to accommodate individual requirements. Constellation can be used with a Meyer Sound Sound Reinforcement system



# Cost & Labor Savings

Because Constellation controls stage acoustics electronically, it eliminates the need for a large, heavy, expensive physical acoustic shell, resulting in significant labor cost savings and faster changeovers. Constellation speakers are self-powered; they require very few electrical circuits, lowering electrical infrastructure costs.

# Physical Performance

## POWER HANDLING

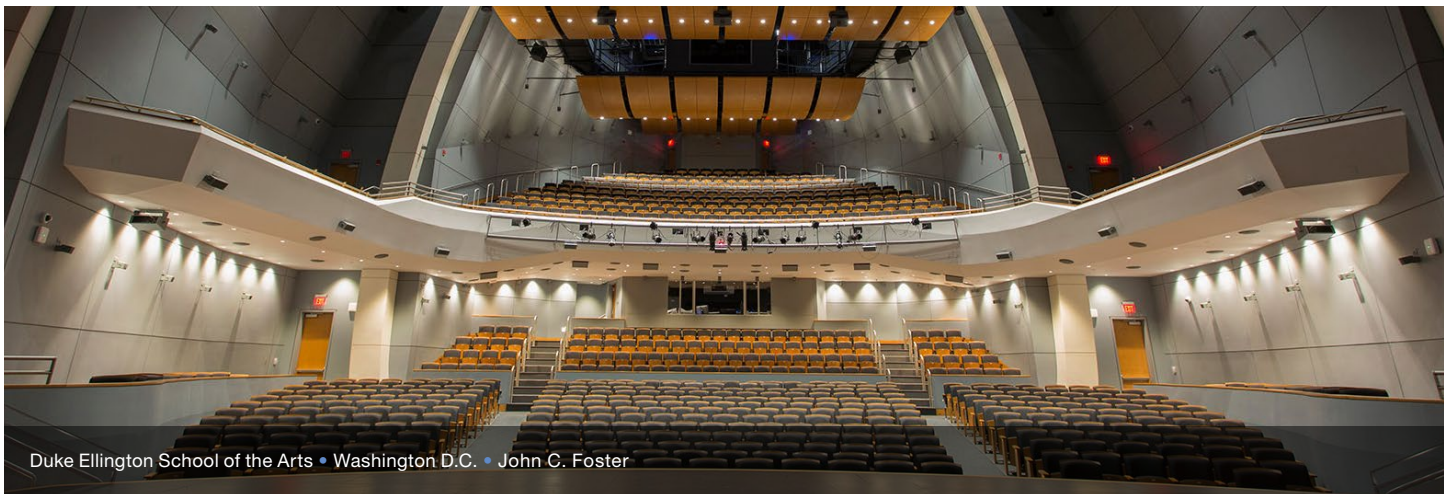
Constellation supports continuous reverberant SPL of 105 dB and peak reverberant SPL of 120 dB. The system does not add any coloration to the hall's acoustics or employ any audio modulation effects to achieve higher sound levels. It's designed to accommodate the largest and loudest acoustic musical ensembles, including those emphasizing brass, percussion, and bass.

## QUALITY COMPONENTS

Every part of the Constellation system is provided and warranted by Meyer Sound. Constellation speakers are handmade in our Berkeley, California factory; each speaker undergoes 25 stages of quality control before leaving the factory. Constellation microphones are of the highest quality, tested under very strict standards and tolerance limits.

## CUSTOMER SUPPORT

We offer 24/7 technical support, provided by technicians around the world. We encourage customers to provide remote access to allow us to periodically log in to ensure the system is operating correctly.



## DEFINITIONS

\*Early Decay Time (EDT), defined as the time it takes for a direct sound to decay 10 dB, is a significant metric of perceived quality of performing arts venues. EDT comprises relatively few but strong Early Reflections (ER), which are essential for clarity (C80), acoustic strength (G), and perception of reverberation “envelopment” in music.

\*\*RT60 is a measure of the time it takes direct sound to decay 60 dB. If the EDT is significantly shorter than RT60, this rapid initial decay is interpreted as short reverb, and the reverberation will only be perceived at the end of musical phrases, not throughout the music. Venues exhibiting a disproportionately short EDT are generally perceived as unsatisfactory for acoustic music.