

# Waves CA2000

Commercial Audio DSP Engine

Getting Started Guide



# Waves CA2000

Waves CA2000 is designed to dramatically improve audio quality and clarity in AV installations. It integrates easily into an audio system using Dante® audio networking.

The CA2000 can process up to 64 bidirectional (64x64) audio channels. The DSP processing engine uses the Waves SuperRack application, which is fully integrated to run natively on the CA2000.

There are seventeen audio processing presets, each designed for professional AV installations, are included; they address challenges of playback quality, speech intelligibility, feedback suppression, and voice processing without loss of tonality, among others. The presets are based on over two dozen low-latency Waves premium plugins. They can be used with their factory settings or modified and saved as user presets for quick access to your custom settings.

Dante network audio channels are supported through the integrated Dante Virtual Soundcard driver (DVS), and audio can be routed easily to and from the CA2000 using the Dante network controller.

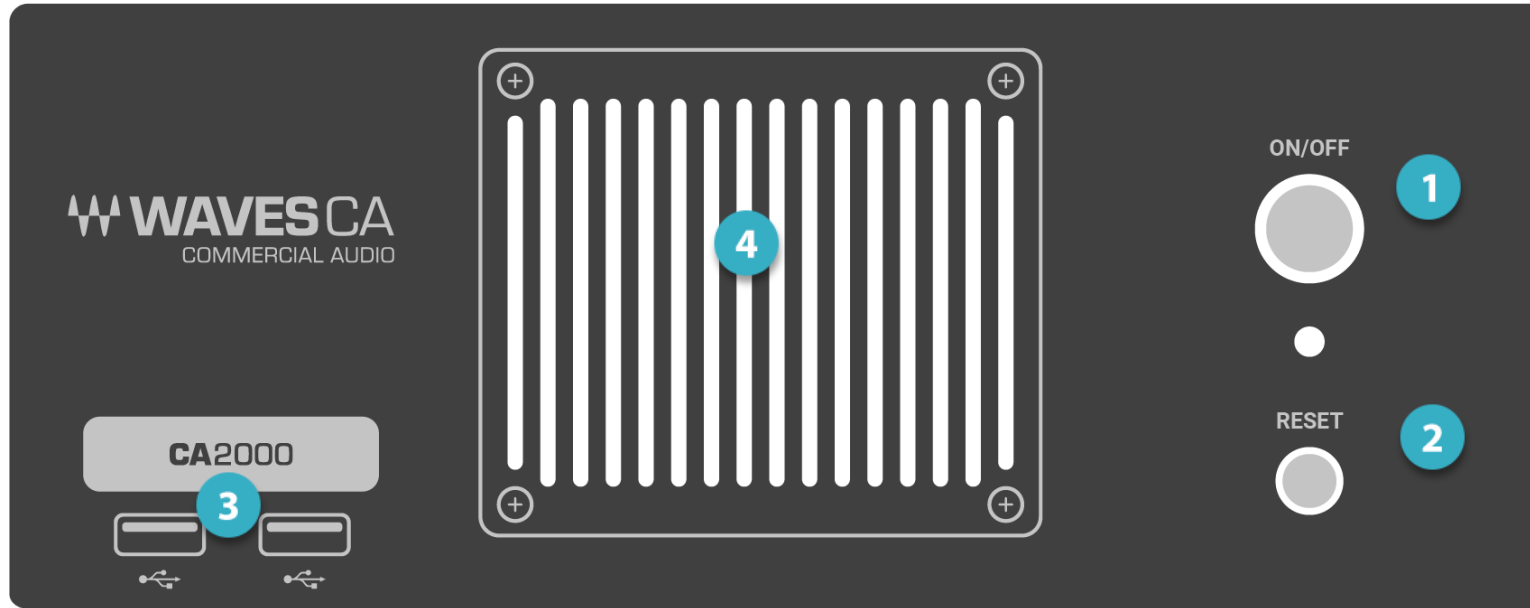
The CA2000 is physically rugged and operationally robust and is designed for surface or rack-mount installations. The hardware features include:

- Intel® i5 8500 Processor
- 16 GB DDR4 RAM
- 256 GB SSD internal storage
- 2 HDMI ports, 1 DisplayPort
- 2 Ethernet ports (one EtherCON connector and one RJ45 connector)
- 8 USB-2/USB-3 ports, 1 USB-C port
- Rack-mountable case, 2U half-rack



# Connections and Controls

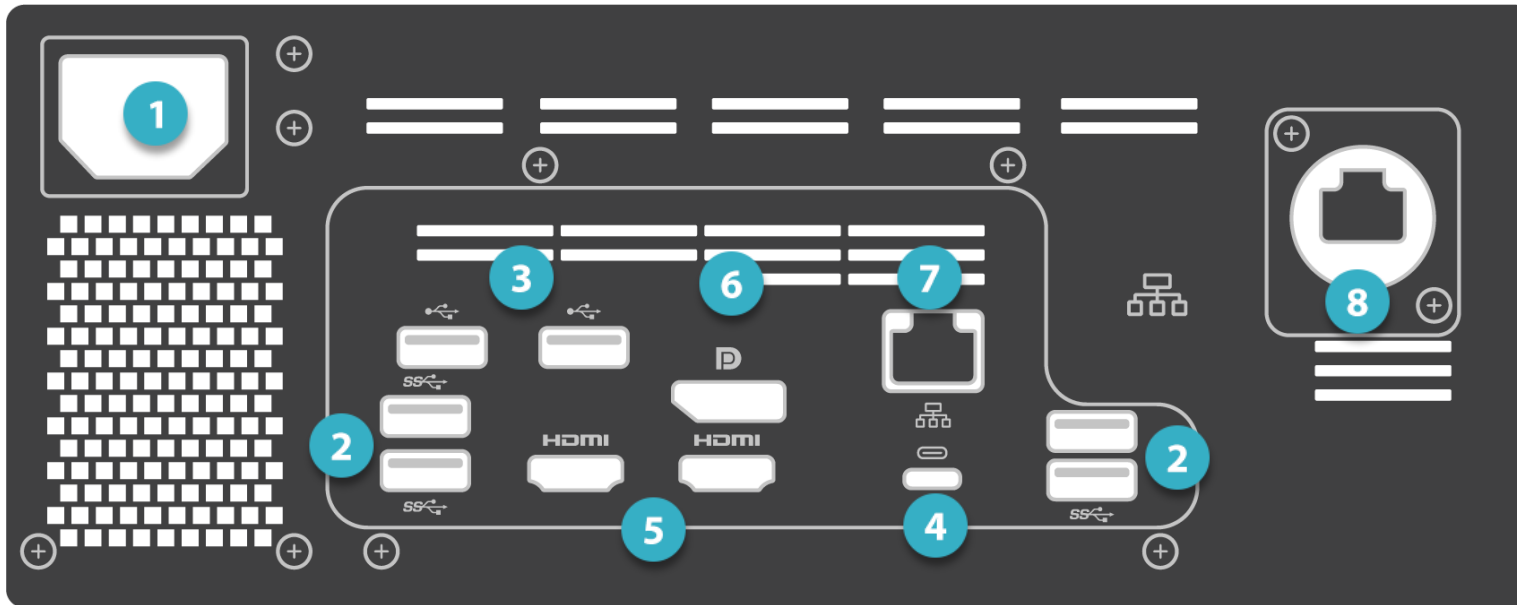
## Front Panel



1	Power switch and light	Hold for five seconds to shut down.
2	Computer reset switch	Hard reset: restarts the computer.
3	Two USB-3 ports	These ports support any USB-3 compatible external drive. Removable flash drives are limited to 32 GB in these ports.
4	Fan grill	Do not block fan grills on front or back panels.



## Real Panel



1	Power connector (C13)	110–220 volt auto-switching
2	Four USB-3 ports	
3	Two USB-2 ports	
4	One USB-C port	



5	Two HDMI ports	The HDMI ports and the DisplayPort can be used interchangeably, depending on display connections and adaptors. The ports support resolutions from 1280x768 to 1920x1080.
6	One DisplayPort	
7	Gigabit Ethernet port, RJ-45 connector	RJ-45 Gb Ethernet connector. Either this port or the EtherCON connector (see “8” below) may be used for connection to the Dante network.
8	Gigabit Ethernet port, EtherCON connector	EtherCON connector: either this port or the standard RJ-45 connector (see “7” above) may be used for connection to the Dante network.



# Setup Guide

Follow these steps to prepare the CA2000 for operation in an AV installation with a Dante network audio.

## HARDWARE CONNECTIONS

1. Connect the power cables to mains. For the computer and all devices use the enclosed power cables.
2. Connect the keyboard and mouse (used for CA2000 setup and configuration).
3. Connect one of the LAN Ethernet ports to the switch on the Dante audio network.
4. Connect up to two displays to the video ports. There is one HDMI port and one DisplayPort.

## WAVES CA2000 SOFTWARE

The Waves CA2000 comes with the software activated and is ready to use. The following applications are included with the Waves CA2000 system:

- Waves SuperRack
- Audinate Dante Virtual Soundcard (DVS)

Waves plugins that are used in the Waves CA preset library are installed and activated on the CA2000.

## *Routing Setup*

*All devices should be properly connected and powered on.* The CA2000 will automatically load all required drivers and software and launch SuperRack.

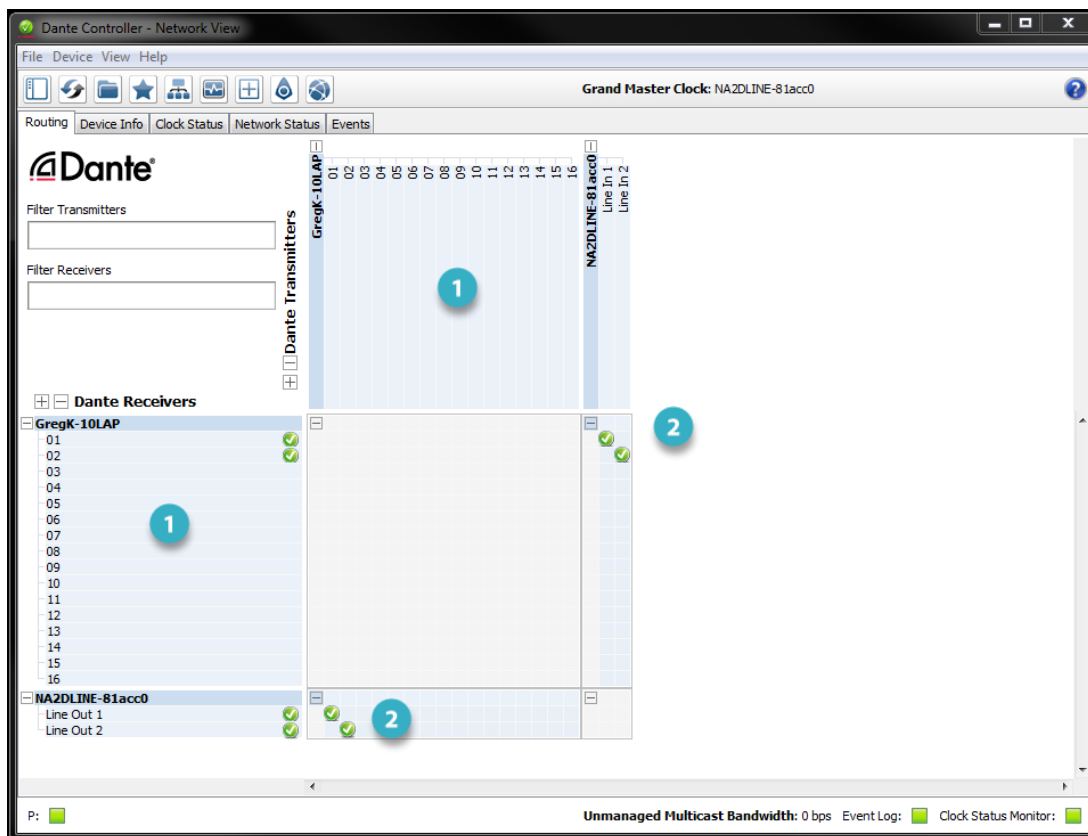
## Channel Patching and Routing Overview

All audio channels are routed to and from the CA2000 using the Dante network. Audio channel routing is completed using the internal rack audio patching on SuperRack and the external Dante patching, using the Dante Controller (or another compatible routing application).



## Routing Dante Channels to the CA2000 Using Dante Controller

The CA2000 appears on the Dante Controller application as a 64x64 channel device. The Routing View window is a common way to create audio routes in Dante, as shown below. Refer to the Audinate website ([www.audinate.com](http://www.audinate.com)) for more information.



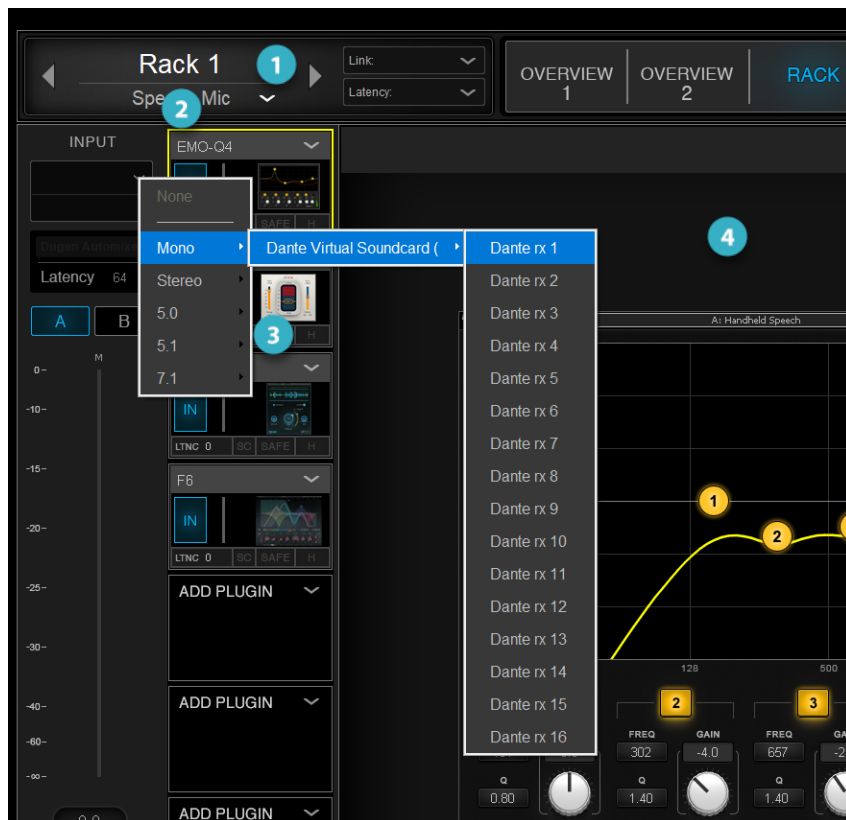
- 1 CA2000 Tx/Rx channels (64x64): the first sixteen channels are shown in this image.
- 2 Patches select routing between Dante network devices



## Routing Dante Channels to CA2000 SuperRack Channels

Now you're ready to route the Dante channels in SuperRack. A rack must be routed to an input and an output Dante channel. Rack input and output routing is done in the SuperRack Rack window or Overview window. In the following example, we will route rack input from a Dante channel to a single rack in the Rack window. Use the tab at the top to open the Rack window.

### SUPERRACK CHANNEL ASSIGNMENT



- 1 Select a rack.
- 2 Click on the Input arrow. This opens the Input Device Assignment menu.
- 3 Select an input format (e.g., mono, Stereo, 5.0).
- 4 Select an input audio channel. Note that channels are displayed in the “Dante Virtual Soundcard.”

Rack outputs are routed in the same manner.

Confirm the routing in the Dante Controller for the network devices that will be connected to and from the CA2000.

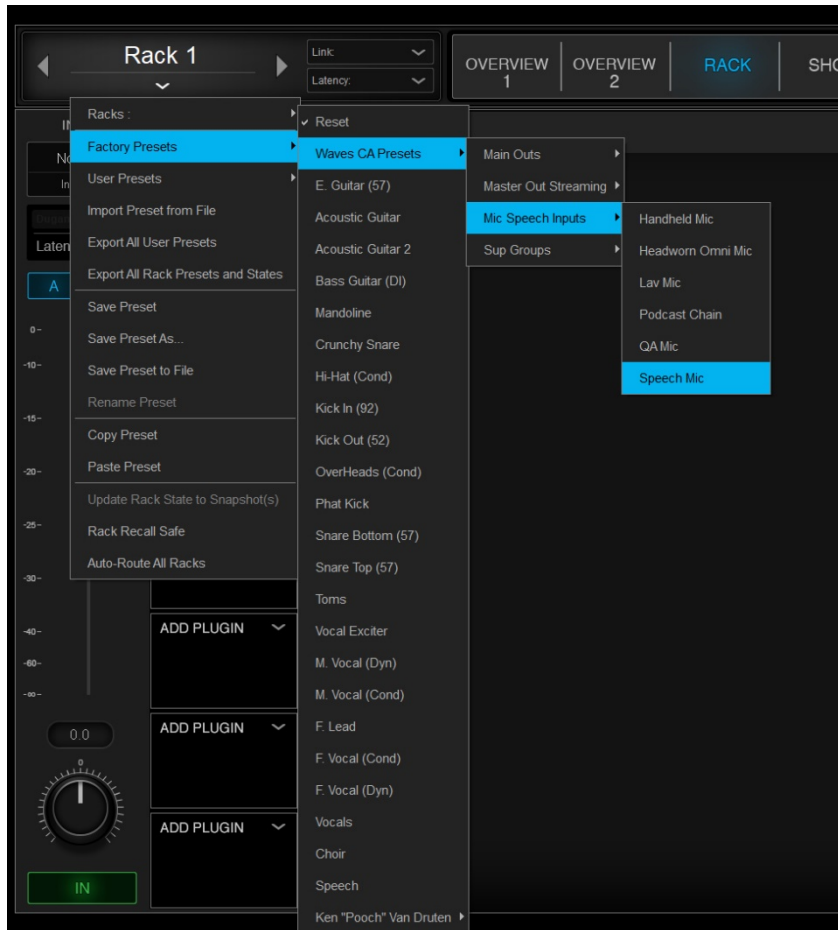




## Inserting the CA2000 Presets (Plugin Chains)

Each plugin rack can support a single Waves CA preset. A preset includes several plugins, which are automatically loaded when the preset is selected.

### SUPERRACK RACK MENU



1. To insert a preset in a rack, click on the down arrow (Rack window). This opens the drop-down menu.
2. Select “Factory Presets”, then “Waves CA Presets”.
3. Choose a preset category, then the desired preset.



Please refer to the [Waves SuperRack user guide](#) for comprehensive instructions about setting up and using the Plugin rack. Download user guides for Waves plugins from the [Waves Download Pages](#).

## Waves CA Preset Descriptions (Plugin Chains)

The Waves CA Presets are arranged in four groups in SuperRack. The groups and corresponding presets are shown below:

- Main Outs
  - Main Out PA
  - Main Out PA with Subs
- Master Out Streaming
  - Main Out Generic
  - Main Out Streaming 1
  - Main Out Streaming 2
  - Podcast Master
- Mic Speech Inputs
  - Handheld Mic
  - Head-worn Omni Mic
  - Lav Mic
  - Podcast Chain
  - QA Mic
  - Speech Mic



- Sub Groups
  - Handheld Group
  - Lav Group
  - Mic Group
  - Music Ducking Control
  - Playback Group

The following sections provide a brief description of the presets and plugins used to create them. Please refer to the [Waves website](#) for detailed documentation for each plugin.



## Mic Speech Input Presets

### Handheld Mic Preset

**Designed to** support a broad range of handheld mics used for any purpose, including singing and speaking. Some adjustments may be needed to fine-tune for a specific installation.

#### Processing Chain by Plugins:

- **Q10** provides the front-end EQ to reduce low frequencies (typically troublesome with handheld mics) and reduce/eliminate “thumps” and “pops.” It also treats vocal sibilance that can occur in the 4-5 kHz range.
- **F6-RTA** helps add polish to the voice after the main EQ settings of the Q10.
- **C1 Comp** is the final plugin that balances the voice dynamics using very subtle compression settings.

### Head-worn Omni Mic Preset

**Designed to** support common head-worn omnidirectional mics as used by an individual speaker (e.g., main presenter, pastor, master of ceremonies). Some adjustments may be needed to fine-tune a specific installation.

#### Processing Chain by Plugins:

- **X-FDBK** provides real-time feedback suppression.
- **PSE** helps to decrease ambient noise and potential phasing issues from other nearby mics.
- **Q4** provides the front-end EQ to reduce low-end frequencies (typically troublesome with head-worn mics) and reduce/eliminate “pops” in the voice processing.
- **RVox** provides light compression and limiting to smooth the voice dynamics and tame any loud or overly dynamic speakers.



- **Sibilance Live** greatly reduces the “S” and “Sh” sounds that occur in speech, which can be overemphasized when amplified. It maintains the natural timbre and resonance of the speaker’s voice.
- **F6** is the final plugin in the chain; it adds polish to the speaker’s voice before amplification.

## Lav Mic Preset

**Designed to** support lavalier (lav) mics; those typically used by speakers such as presenters and pastors. Some adjustments may be needed to fine-tune for a specific installation.

### Processing Chain by Plugins:

- **Q10** provides the front-end EQ to reduce low- and mid-range frequencies that are typically troublesome with lav mics, as well as to reduce/eliminate “thumps” and “pops.”
- **F6-RTA** helps add polish to the voice, after the main EQ settings of the Q10.
- **C1 Comp** is the final plugin in the chain. It balances the voice dynamics using very subtle compression settings.

## Podcast Chain Preset

**Designed to** provide an audio feed that is ready for online streaming or podcasts, such as community forums or educational streaming. This chain is typically used as a subgroup of multiple mics or playback channels that are sent to the podcast.

### Processing Chain by Plugins:

- **NS1** provides noise suppression to substantially reduce background noise without, affecting the primary audio source.
- **GW VoiceCentric** provides final processing of the voice feed.



- **Playlist Rider** provides automatic levelling of all audio sources to maintain a consistent audio level for the stream.
- **WLM Plus** offers integrators a method to monitor the feed in order to fine-tune the input source and maximize the streaming volume.

### QA Mic Preset

**Designed to** support a broad range of handheld mics that may be used for audience Q&A. These mics are usually placed in the room and thus “in front” of the main PA. Some adjustments may be needed to fine-tune for a specific installation use case.

#### **Processing Chain by Plugins:**

- **X-FDBK** provides real-time feedback suppression.
- **PSE** helps to decrease ambient noise and potential phasing issues from other nearby mics.
- **Q4** provides the front-end EQ to reduce low frequencies (typically troublesome with handheld mics) and reduce the “thumps” and “pops” that occur when the mic and/or stand is handled.
- **D5** is the final plugin in the chain. It provides a rich suite of dynamics processing (i.e., de-esser, compression, limiting) to smooth voice dynamics and tame loud or overly dynamic speakers.

### Speech Mic Preset

**Designed to** support a broad range of handheld mics or conference table mics, as used by an individual speaker (e.g., main presenter, pastor, forum speaker, master of ceremonies). Some adjustments may be needed to fine-tune for a specific installation.

#### **Processing Chain by Plugins:**



- **Q4** provides the front-end EQ to reduce low frequencies (typically troublesome with handheld mics) and reduce/eliminate “thumps” and “pops”.
- **RVox** provides light dynamics processing (such as gate, compression/limiting) to smooth voice dynamics and tame any loud or overly dynamic speakers.
- **Sibilance Live** greatly reduces the “S” and “Sh” sounds that occur naturally in speech; those which can be overemphasized when amplified. Sibilance Live maintains the natural timbre and resonance of the speaker’s voice.
- **F6** is the final plugin in the chain adding polish to the speaker’s voice before amplification.



## Sub Groups Presets

### Handheld Group Preset

**Designed to** optimize the PA for the summation of multiple handheld or table mics used in a typical installation environment. This preset should be used to ring out the system prior to setting the individual input channel presets. Some adjustments may be needed to fine-tune for a specific installation.

#### Processing Chain by Plugins:

- **F6-RTA** is first in the chain to help focus the audio processing tasks.
- **X-FDBK** provides real-time feedback suppression that may occur from multiple open mics in the group. It should be set up at installation to capture the specific needs of the room.
- **GEQ Modern** is the final plugin in the chain. It is used to remove any remaining problem frequencies in the handheld mic group. Although basic generic EQ notches are provided for many common problematic frequencies, these should be adjusted as needed during installation system tuning.

### Lav Group Preset

**Designed to** optimize the PA for the summation of multiple lavalier (lav) mics used in a typical installation environment. This preset should be used to ring out the system prior to setting the individual input channel presets. Some adjustments may be needed to fine-tune for a specific installation.

#### Processing Chain by Plugins:

- **F6-RTA** is first in the chain to help focus the audio processing tasks.
- **X-FDBK** provides real-time feedback suppression that may occur from multiple open mics in the group. It should be setup at installation to capture the specific needs of the room.





- **GEQ Modern** is the final plugin in the chain. It is used to remove any remaining problem frequencies in the handheld mic group. Although basic generic EQ notches are provided for many common problematic frequencies, these should be adjusted as needed during installation system tuning.

## Mic Group Preset

**Designed to** optimize the PA for the summation of multiple mics used by multiple speakers. This preset helps to even out and level the mics for sound consistency. Some adjustments may be needed to fine-tune for a specific installation use.

### Processing Chain by Plugins:

- **C6** provides dynamic compression for general shaping of the mic subgroup, including additional processing to help with de-essing and de-popping.
- **MaxxVolume** provides additional final processing to smooth and level the audio.

## Music Ducking Control Preset

**Designed to** provide a special processing chain for one subgroup (typically mics) that can override another chain (typically background music). In this case, the background music is automatically compressed when a mic is being used. This chain requires the use of the sidechain feature to trigger the chain's music ducking control.

### Processing Chain by Plugins:

- **Vitamin** provides multiband processing of the background source (music).
- **Playlist Rider** provides automatic levelling of all audio sources to maintain a consistent audio level for the stream.
- **D5** compresses the background music audio when there is audio signal on the sidechain input. This should be connected to the appropriate mic subgroup.



## Playback Group Preset

**Designed to** provide consistent volume level and sound for source audio players assigned to the subgroup.

### **Processing Chain by Plugins:**

- **C1 Comp** is first in the chain and provides moderate compression when the overall input signal is too high.
- **Playlist Rider** provides automatic levelling of all audio sources to maintain a consistent audio level without adding coloration to the sound.
- **F6** is the final plugin in the chain. It adds polish to the playback group audio before amplification.



## Main Out Presets

### Main Out PA Preset

**Designed to** provide final processing of the audio signal before amplification in the PA for an installation without subwoofers. Some adjustments may be needed to fine-tune for a specific installation.

#### Processing Chain by Plugins:

- **C1 Comp** is first in the chain and provides very light compression to smooth the overall input signal.
- **GEQ Modern** is provided to remove any particular problem frequencies for the room.
- **F6 RTA** is the final plugin. It adds final polish to the audio mix before routing to the main PA.

### Main Out PA with Subs Preset

**Designed to** provide final processing of the audio signal before amplification in the PA for an installation that includes subwoofers. Some adjustments may be needed to fine-tune for a specific installation.

#### Processing Chain by Plugins:

- **C1 Comp** is first in the chain and provides very light compression to smooth the overall input signal.
- **GEQ Modern** is provided to remove problem frequencies that are specific to the room.
- **F6 RTA** is the final plugin. It adds final polish to the audio mix before routing to the main PA.
- **Sub Align** aligns the PA subs and tops for the specific room installation to add punch and clarity to the low frequencies.



## *Master Out Streaming Presets*

### Main Out Generic Preset

**Designed to** provide final processing of the audio signal for any generic online streaming.

#### **Processing Chain by Plugins:**

- **NLS Channel** is first in the chain. It adds warmth and a smooth analog style to the signal.
- **Abbey Road TG Mastering** provides professional mastering of the audio stream, including a modern compression/limiting algorithm, to deliver pristine sound with higher levels of perceived loudness.
- **L2 Ultramaximizer** is the final plugin. It provides clean brick-wall limiting to the stream.



## Specifications

### Electrical

110/220v, 60 Hz or 50 Hz, auto-switching

Typical power consumption:

@120 VAC: 37 watts (+/- 20 watts), 0.37 A

@220 VAC: 35 watts (+/-20 watts), 0.27 A

### Dimensions

Width: 22 cm / 8.66 in

Length (front to back): 25.2 cm / 9.9 in

with rear connector: 25.6 cm/10.7 in

Height: 8.6 cm / 3.39 in

### Software Enclosed

Windows 10

Waves SuperRack

Audinate Dante Virtual Soundcard

