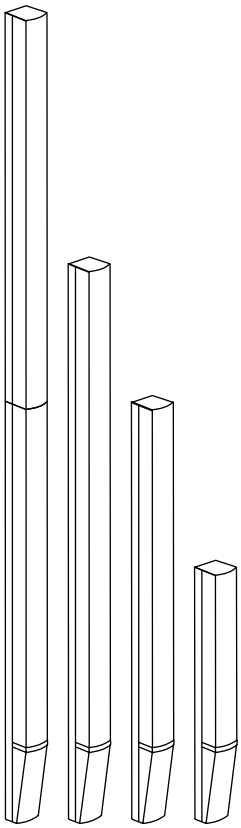
# StepArray

Digitally steerable column loudspeakers

# Technical manual



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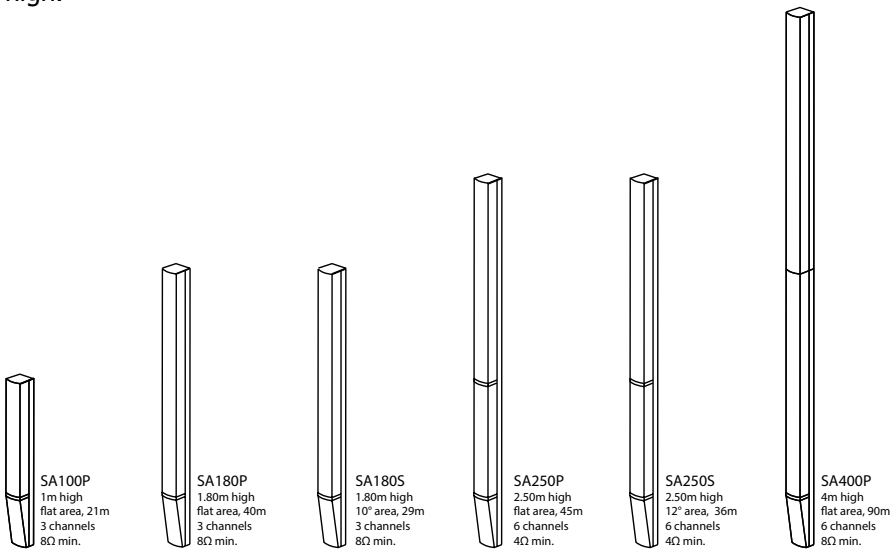
# 1. Introduction

StepArray column speakers ensure perfect speech intelligibility and optimal acoustic comfort, even in noisy and reverberant venues. They are based on the DGRC (Digital & Geometric Radiation Control) principle patented by Active Audio.

Compared with a classic sound system in which each loudspeaker is controlled independently, the DGRC method makes it possible to decrease the number of channels to be controlled, thereby enhancing economic efficiency.

The StepArray range includes 6 models of column speakers, from 1m to 4m high.








# 2. Installation of the columns

StepArray columns are mounted verticaly, usually on a wall, using the supplied brackets. Figure 1 illustrates the steps to follow for column mounting. See also figure 8 on page 13 for technical drawings of the brackets.

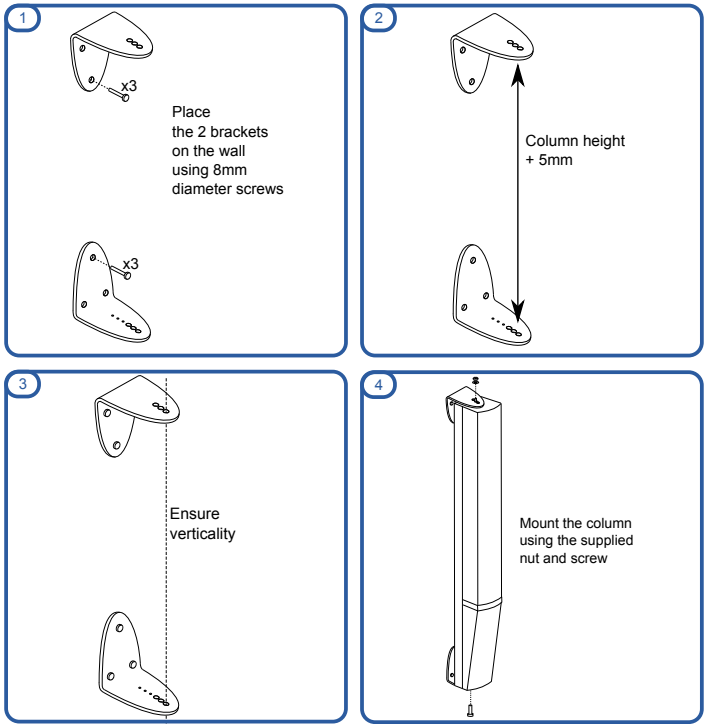



Figure 1 : *Column mounting on a wall (Important : to **ensure vertically** when mounting StepArray columns)*

# 3. Wiring

## 3.1. NUT processor to MPA8200 amplifier

A NUT processor can be connected to one or several StepArray columns via amplifiers (see figure 2). When a NUT is used with several amplifiers (to feed several columns with the same signal), the inputs are simply daisy chained (see figure 2b).

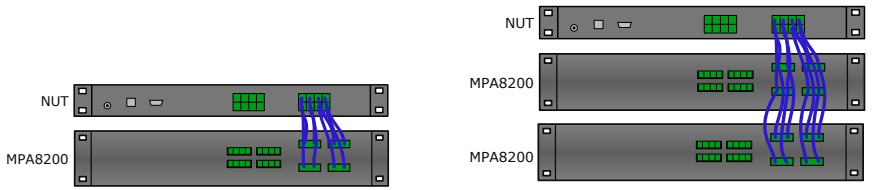



Figure 2 : *NUT to MPA8200 wiring*

## 3.2. MPA8200 amplifier setup

MPA8200 amplifiers should be tuned with all gains to max, and microswitches set for independent channels, as described in figure 3.

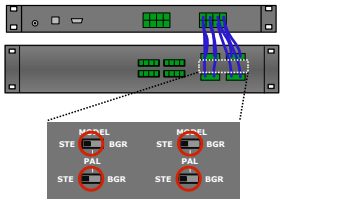



Figure 3 : *MPA8200 amplifier set-up*





## 3.3. Wiring amplifiers to columns

Wiring amplifiers to columns is straightforward: simply connect each channel of the MPA8200 amplifier to the corresponding channel of the column and provide a common ground, as illustrated by figure 4.

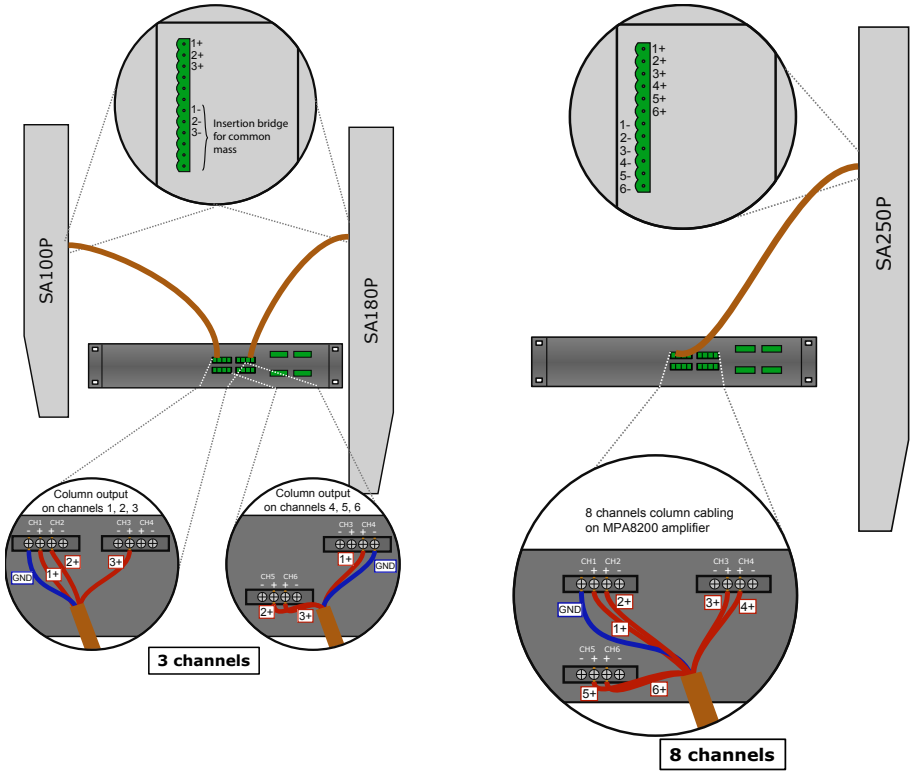



Figure 4 : *MPA8200 to column wiring*

# 4. Test before powering up

Before powering up an installation, it is good practice to ensure that the column cable is properly connected to the column. Therefore, the electrical resistance of each channel of the column must be controlled at the end of the cable connected to the amplifier side. The measured electrical resistances values must correspond to the values below.

| **Channel** | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **SA100P** | 6,6Ω | 6,6Ω | 6,6Ω | - | - | - |
| **SA180P** | 6,6Ω | 6,6Ω | 6,6Ω | - | - | - |
| **SA250P** | 6,6Ω | 6,6Ω | 6,6Ω | 4,4Ω | 4,4Ω | 4,4Ω |
| **SA400P** | 6,6Ω | 6,6Ω | 6,6Ω | 6,6Ω | 6,6Ω | 6,6Ω |
| **SA180S** | 6,6Ω | 6,6Ω | 6,6Ω | - | - | - |
| **SA250S** | 3,3Ω | 6,6Ω | 6,6Ω | 4,4Ω | 4,4Ω | 3,3Ω |

**Warning** : When measuring the electrical resistance, the cable resistance must be taken into account (about 1,3Ω for 100 meters of *1,5mm²* ; 0,7Ω for 100 meters of *2,5mm²*)

# 5. NUT control software

The NUT control software is used to tune the filtering and directivity parameters of StepArray columns, it is available as free download on Active Audio's web site:
http://www.activeaudio.fr/en/public-address-sound-reinforcement/digital-signal-processor-nut



Technical manual - StepArray series

# 6. Troubleshooting

| **Symptom** | **Possible cause** | **Solution** |
|---|---|---|
| The power LED of the NUT processor is not ON | A fuse burned | Replace inside the NUT processor (1A delayed fuse) |
| The sound is not homogeneous or distorted | Amplifier to column connection is incorrect | Make sure columns are properly connected, as described in section 3.3 |
| | Input signal level is too high | Reduce input signal level (Max signal input is ±8V rms as described in 7.1 on the following page). |
| | Filtering parameters are wrong | Reduce the gain (Mixer Block). Correct the equalization. |
| | There is a wiring problem. | Make sure the wiring is correct (see 3.3 on the preceding page). |
| | The parameters of the StepArray block are wrong | Check that the parameters in the StepArray block of NUT control are correct. |
| | The column model of the StepArray block in NUT control doesn't match the real column model. | Correct the column model in the StepArray block. |

# 7. Hardware specifications

## 7.1. NUT processor

| | |
|---|---|
| **Audio data** | |
| **Inputs** | 8 symetrical analog inputs, Euroblock connectors<br>Max input voltage: 8V rms (+20dBU)<br>Phantom power ON/OFF on each input<br>Selectable line/mic level for each input |
| **Outputs** | 8 symetrical analog outputs, Euro-block connectors<br>Max output voltage: 8V rms (+20dBU) |
| **Dynamic range** | 114dB |
| **Processing** | 28bits / 48kHz to 192kHz |
| **General data** | |
| **Communication** | Ethernet 10/100MB<br>USB (no driver needed)<br>RS232 for remote control |
| **Mains** | 24V DC. 230V / 50Hz power supply included. |
| **power consumption** | < 10W |
| **Dimensions** | 480 x 44 x 251mm (Rack 19” - 1U) |
| **Color** | Black |
| **Weight** | 3.5 kg |





## 7.2. MPA8200 amplifier

| | |
|---|---|
| **Audio data** | |
| **Operating modes** | 8 channels independent<br>4 channels independent bridged |
| **Power** | 8 x 200W under 8Ω<br>8 x 300W under 4Ω<br>4 x 600W under 8Ω (bridged) |
| **Power consumption** | Typical : 100W ; Max 1kW. |
| **Analog inputs** | Phoenix connectors MC1,5/12-ST-3,81 |
| **Outputs** | Phoenix connectors DFK-PC 4/8-G-7,62 |
| **Freuency response** | 20Hz - 20kHz @ 1W ±0,85dB |
| **Input Impedance** | 10kΩ unbalanced / 20kΩ balanced |
| **Sensitivity** | 1Veff |
| **Signal-to-noise ratio** | 94dB |
| **Damping factor** | > 300 |
| **Gain** | Adjustable with 8 knobs on face panel.<br>Max voltage gain : 37dB. |
| **Harmonic Distortion** | THD : 0,1 % @ 1kHz |
| **General data** | |
| **Cooling** | Variable speed fan |
| **Protection** | Protection against overload and overheat |
| **Indicators** | Clip and Protect LEDs |
| **Dimensions** | 483 x 88 x 315mm (Rack 19” – 2U) |
| **Weight** | 9kg |

For further information, see the MPA8200 owner’s manual.

## 7.3. Columns characteristics

### 7.3.1 Electrical characteristics of StepArray columns

| Channel | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **SA100P** | 6.6Ω | 6.6Ω | 6.6Ω | | | |
| **SA180P** | 6.6Ω | 6.6Ω | 6.6Ω | | | |
| **SA250P** | 6.6Ω | 6.6Ω | 6.6Ω | 4.4Ω | 4.4Ω | 4.4Ω |
| **SA400P** | 6.6Ω | 6.6Ω | 6.6Ω | 6.6Ω | 6.6Ω | 6.6Ω |
| **SA180S** | 6.6Ω | 6.6Ω | 6.6Ω | | | |
| **SA250S** | 3.3Ω | 6.6Ω | 6.6Ω | 4.4Ω | 4.4Ω | 3.3Ω |

Figure 5 : *DC resistance of StepArray columns.*

### 7.3.2 Mechanical characteristics of StepArray columns

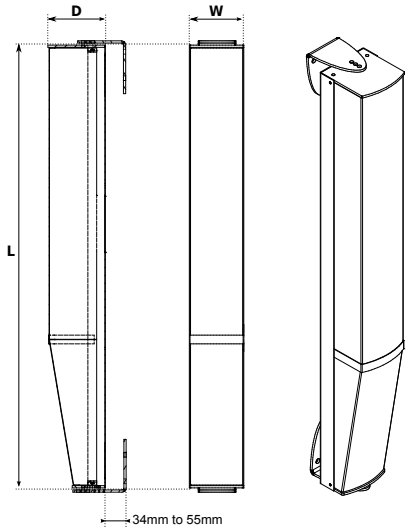



Figure 6 : *StepArray column dimensions*





| Model | Dimensions (L x W x D mm) | Weight (net/shipping) | Cable |
|---|---|---|---|
| SA100P | 1024 x 124 x 131 | 9kg / 12kg | 4G |
| SA180P | 1840 x 124 x 135 | 17kg / 21kg | 4G |
| SA180S | 1840 x 124 x 135 | 17kg / 21kg | 4G |
| SA250P | 2505 x 124 x 159 | 24kg / 29kg | 7G |
| SA250S | 2505 x 124 x 159 | 24kg / 29kg | 7G |
| SA400P | 4096 x 124 x 135 | 39kg / 46kg | 7G |

Figure 7 : *Mechanical and electrical characteristics of StepArray columns*

### 7.3.3 Fixing brackets

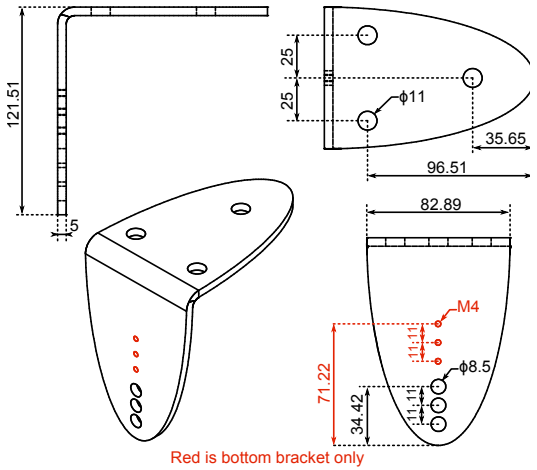



Figure 8 : *Fixing brackets for wall mounting of StepArray columns.*

# 8. Acoustical data

All data presented below is obtained with columns in their nominal position and using nominal DSP filtering param- eters (flat EQ, etc).

## 8.1. Common data

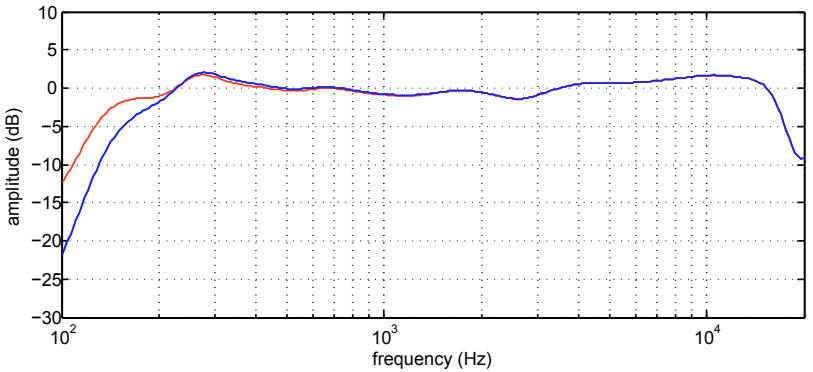



Figure 9 : *Frequency response (column SA250P). Average of the mesurements at 7, 10, 15, 20, 25, and 30m. In red: with bass high-pass on position «100Hz», in blue: with bass high-pass on position «200Hz».*

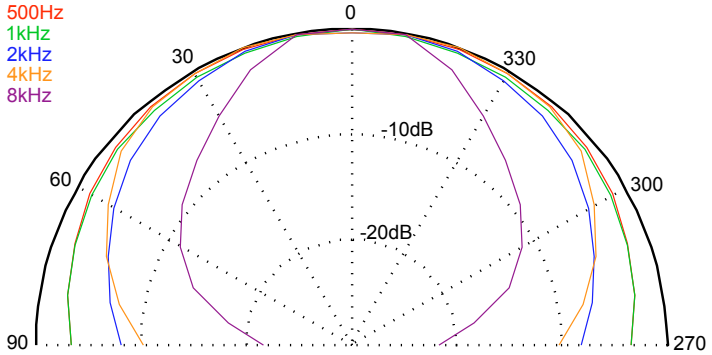



Figure 10 : *Horizontal directivity (column SA250P)*





## 8.2. SA100P : acoustical data[1]

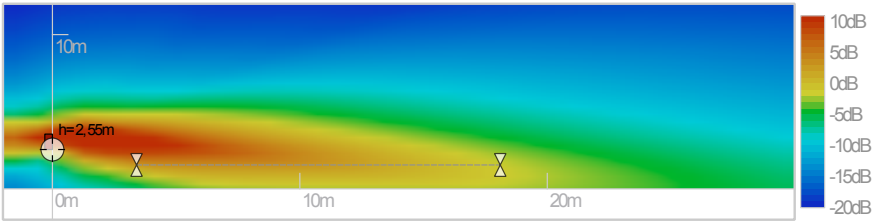



Figure 11 : *SA100P vertical directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) in the vertical median plane.*

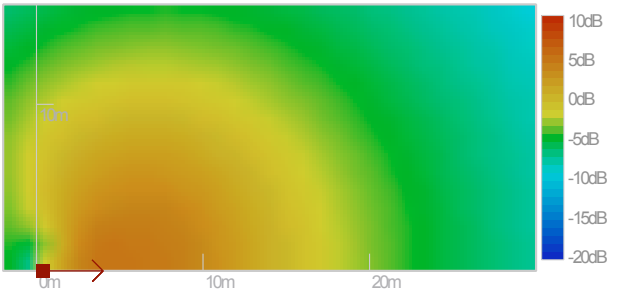



Figure 12 : *SA100P horizontal directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) on the listening plane.*

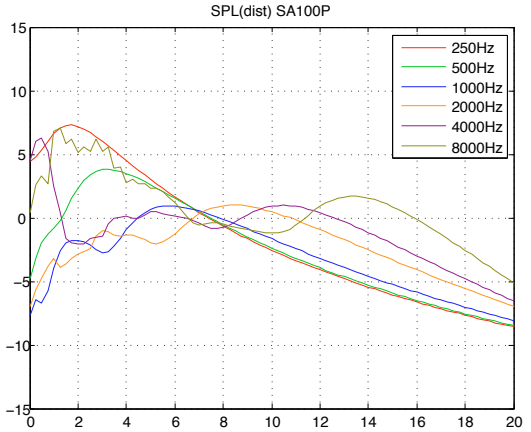



Figure 13 : *Sound level by octave in the axis of the listening plane in front of the column with respect to the distance from the column.*

## 8.3. SA180P : acoustical data[1]

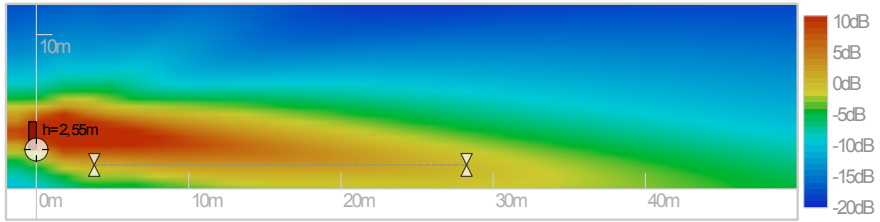



Figure 14 : *SA180P vertical directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) in the vertical median plane.*

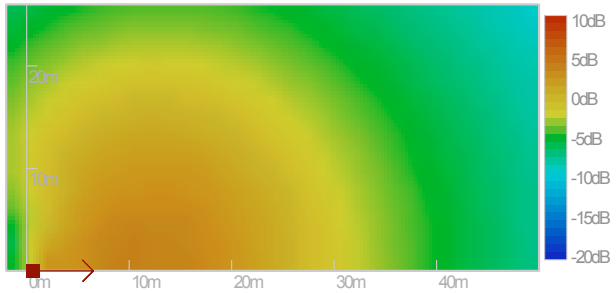



Figure 15 : *SA180P horizontal directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) on the listening plane.*

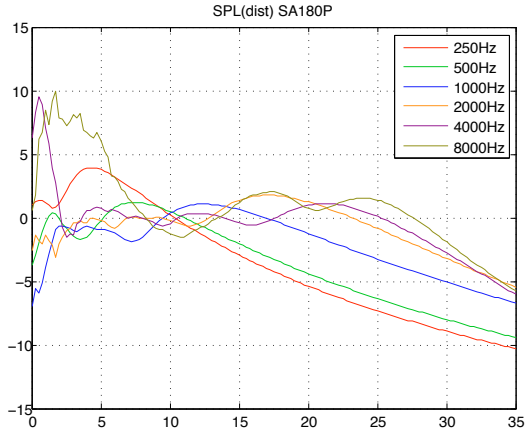



Figure 16 : *Sound level by octave in the axis of the listening plane in front of the column with respect to the distance from the column.*





## 8.4. SA250P : acoustical data[1]

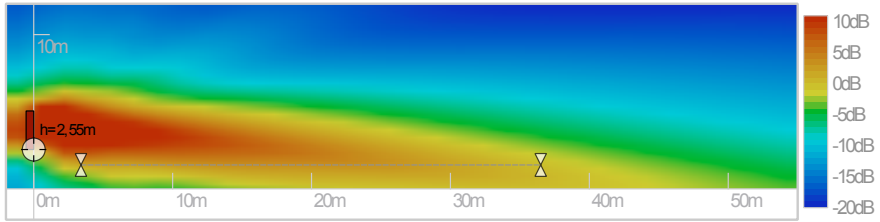



Figure 17 : *SA250P vertical directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) in the vertical median plane.*

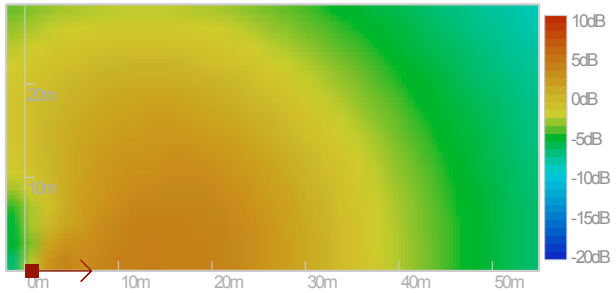



Figure 18 : *SA250P horizontal directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) on the listening plane.*

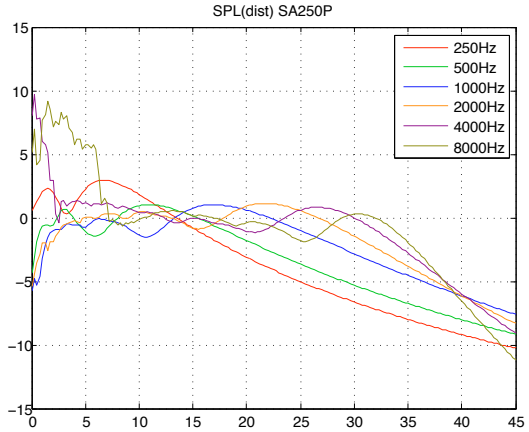
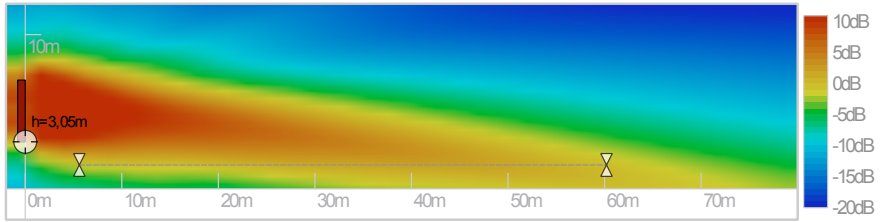



Figure 19 : *Sound level by octave in the axis of the listening plane in front of the column with respect to the distance from the column.*

## 8.5. SA400P : acoustical data[1]




SA400P vertical directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) in the vertical median plane.

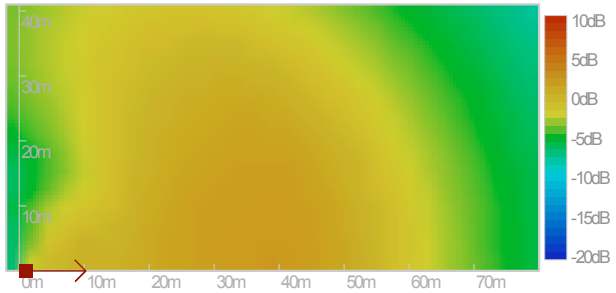



Figure 20 : *SA400P horizontal directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) on the listening plane.*

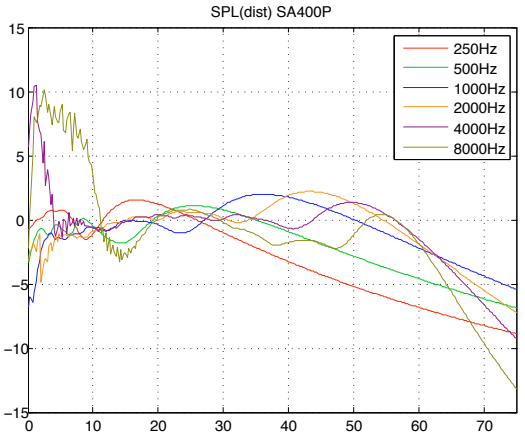



Figure 21 : *Sound level by octave in the axis of the listening plane in front of the column with respect to the distance from the column.*





## 8.6. SA180S : acoustical data[1]

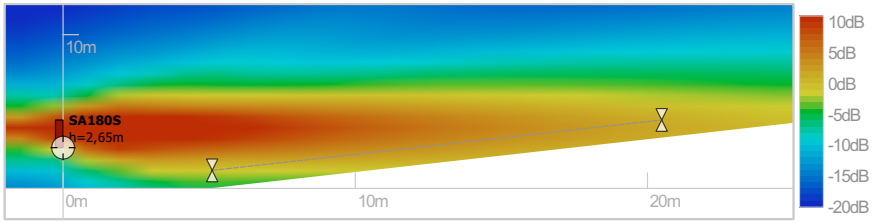



Figure 22 : *SA180S vertical directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) in the vertical median plane.*

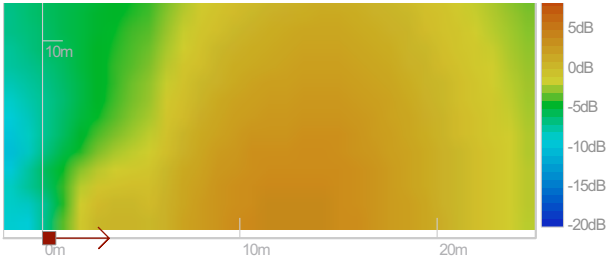



Figure 23 : *SA180S horizontal directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) on the listening plane.*

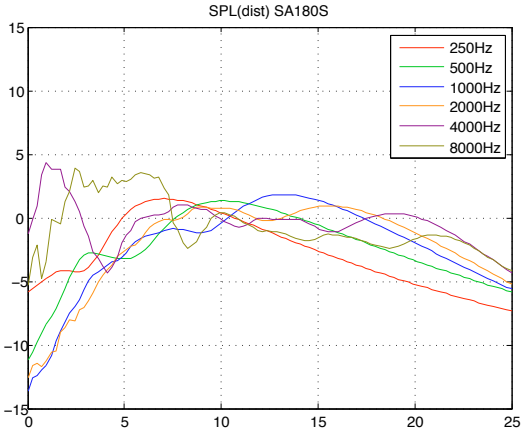
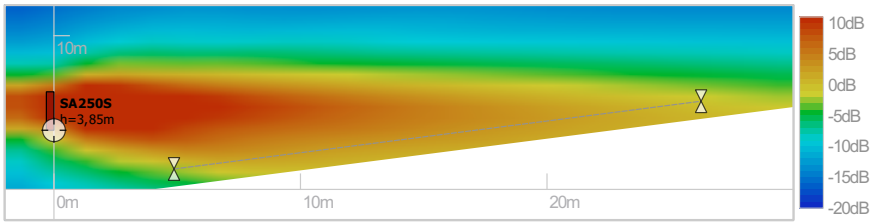



Figure 24 : *Sound level by octave in the axis of the listening plane in front of the column with respect to the distance from the column.*

## 8.7. SA250S : acoustical data[1]




SA250S vertical directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) in the vertical median plane.

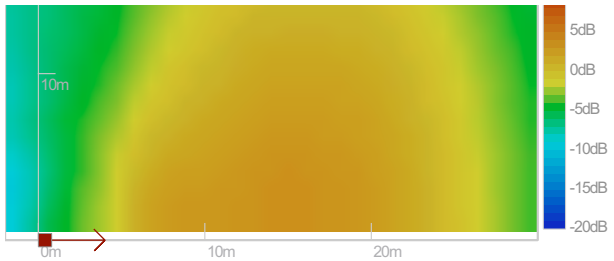



Figure 25 : *SA250S horizontal directivity: sound level for the voice octaves (500Hz,1kHz,2kHz) on the listening plane.*

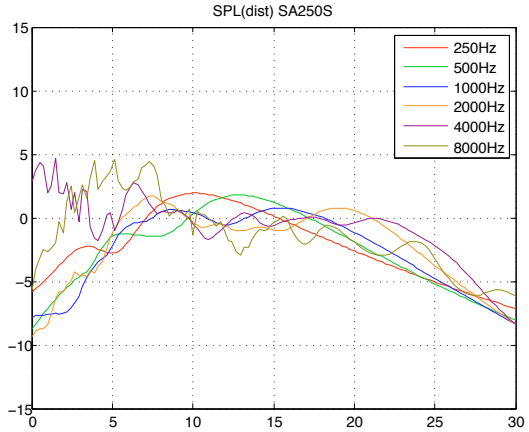



Figure 26 : *Sound level by octave in the axis of the listening plane in front of the column with respect to the distance from the column.*





# 9. Déclaration de conformité

CE

We,
ACTIVE AUDIO SAS,

8 Rue Johannes Gutenberg 44340 Bouguenais, France,

Declares under our sole responsability,
that the following products:

SA100P, SA180P, SA250P, SA400P,
SA180S, SA250S

complie with the council directive 2004/108/CE

Assessment of compliance is based on the following standards:
EN50081-1, EN61000, EN60065

Established on the 6th of January 2016
by Régis CAZIN, CEO.

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