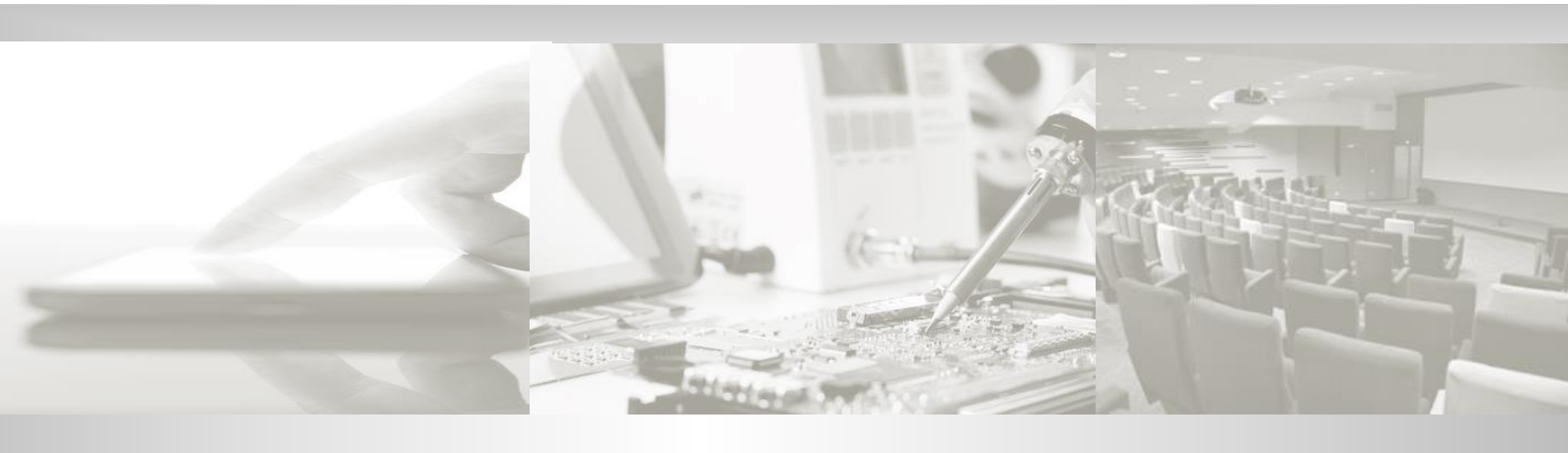


Manual Ray-On

For column models
R70TC, R110TC, R210TC





Identification number : 1438

Active Audio
8 Rue Johannes Gutenberg,
44340 Bouguenais, France

14
1438-CPR-0337

EN 54-24:2008
Type B

Loudspeaker for voice alarm systems for
fire detection systems and fire alarm in
buildings

RayOn models
Rmini-b, Rmini-w, R70TC-w,
R70TC-b, B70TC-b, B70TC-w
R110TC-w, R110TC-b, R210TC-
w, R210TC-b

EU Conformity declaration



We, **Active Audio SAS**
8 rue Johannes Gutenberg
44340 Bouguenais
France



Hereby declare under our own responsibility that the following product:

Type : **70/100V Loudspeaker**
Range : **Ray-On**
Model : **R70 TC**

Is in conformity with the directive :

2014/35/UE ("Low Voltage")

In respect of the following norms and standard:

EN62368-1 (October 2014)

and with the directive

2014/30/EU (Equipment EMC)

In respect of the following norms and standard:

EN55020/2007+A12/2016

Bouguenais, 06th of June 2022,

Mr Mathieu POBEDA, Technical Director

EU Conformity declaration



We, **Active Audio SAS**
8 rue Johannes Gutenberg
44340 Bouguenais
France



Hereby declare under our own responsibility that the following product:

Type : **70/100V Loudspeaker**
Range : **Ray-On**
Model : **R110 TC**

Is in conformity with the directive :

2014/35/UE ("Low Voltage")

In respect of the following norms and standard:

EN62368-1 (October 2014)

and with the directive

2014/30/EU (Equipment EMC)

In respect of the following norms and standard:

EN55020/2007+A12/2016

Bouguenais, 06th of June 2022,

Mr Mathieu POBEDA, Technical Director

EU Conformity declaration



We, **Active Audio SAS**
8 rue Johannes Gutenberg
44340 Bouguenais
France



Hereby declare under our own responsibility that the following product:

Type : **70/100V Loudspeaker**
Range : **Ray-On**
Model : **R210 TC**

Is in conformity with the directive :

2014/35/UE ("Low Voltage")

In respect of the following norms and standard:

EN62368-1 (October 2014)

and with the directive

2014/30/EU (Equipment EMC)

In respect of the following norms and standard:

EN55020/2007+A12/2016

Bouguenais, 06th of June 2022,

Mr Mathieu POBEDA, Technical Director

A handwritten signature in black ink, appearing to read 'Mathieu Pobeda'.

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1 General Presentation

R70, R110 and R210 columns exist in 3 versions :

- R70TC, R110TC, R210TC : passive columns working in 8Ω and 70V/100V, with the EN5424 certification
- R70+, R110+, R210+ : active columns with DANTE interface and amplifier

All versions of a each column (for instance R110TC and R110+) same dimensions. For changing the version (for instance from R210TC to R210+), send back the product to the distributor.

The Ray-On column loudspeakers are passive, and based on the DGRC principle. The range includes three column models, and a proximity speaker:

- R70, height 70cm;
- R110, height 1.1m;
- R210, height 2.1m;
- Ray-On Mini, a proximity speaker.



This technical manual is for column speakers R70TC, R110TC and R210TC. A specific technical manual is devoted to the Ray-On Mini, R110 and R110T. Another specific manual is devoted to active versions R70+, R110+ and R210+ and PoE versions (R70PoE, R110PoE and B70PoE).

Using the DGRC principle ensures an optimal sound coverage and intelligibility on the listening zone; it is illustrated in figure 1. For every model, the range depends on the installation height (see section 2).



Figure 1 – DGRC principle illustration

Ray-On loudspeakers are ideal for speech reinforcement in small to large spaces where the listening zone is horizontal (slope <math>< 5^\circ</math>). Made of aluminum, Ray-On loudspeakers can be installed outdoor. They are suited for airports, railway stations, churches, conference rooms, shopping malls, amusement parks, etc.

Models R70TC, R110TC, and R210TC are compliant with standard EN5424 type B. They can be used in PA systems for safety announcements.

2 Positioning

The most important parameter for the installation of Ray-On loudspeaker is its mounting height because the range of the column directly depends on it.

Figure 2 on the facing page shows the $\pm 5\text{dB}$ range ¹ versus to the mounting height, for the direct field ² at mid-frequencies (300Hz-3kHz).

¹ Range for a standing audience shown. For a seating audience, take off 40cm to the column height.

² Taking the reverberated field into account minimizes the influence of the floor's material.

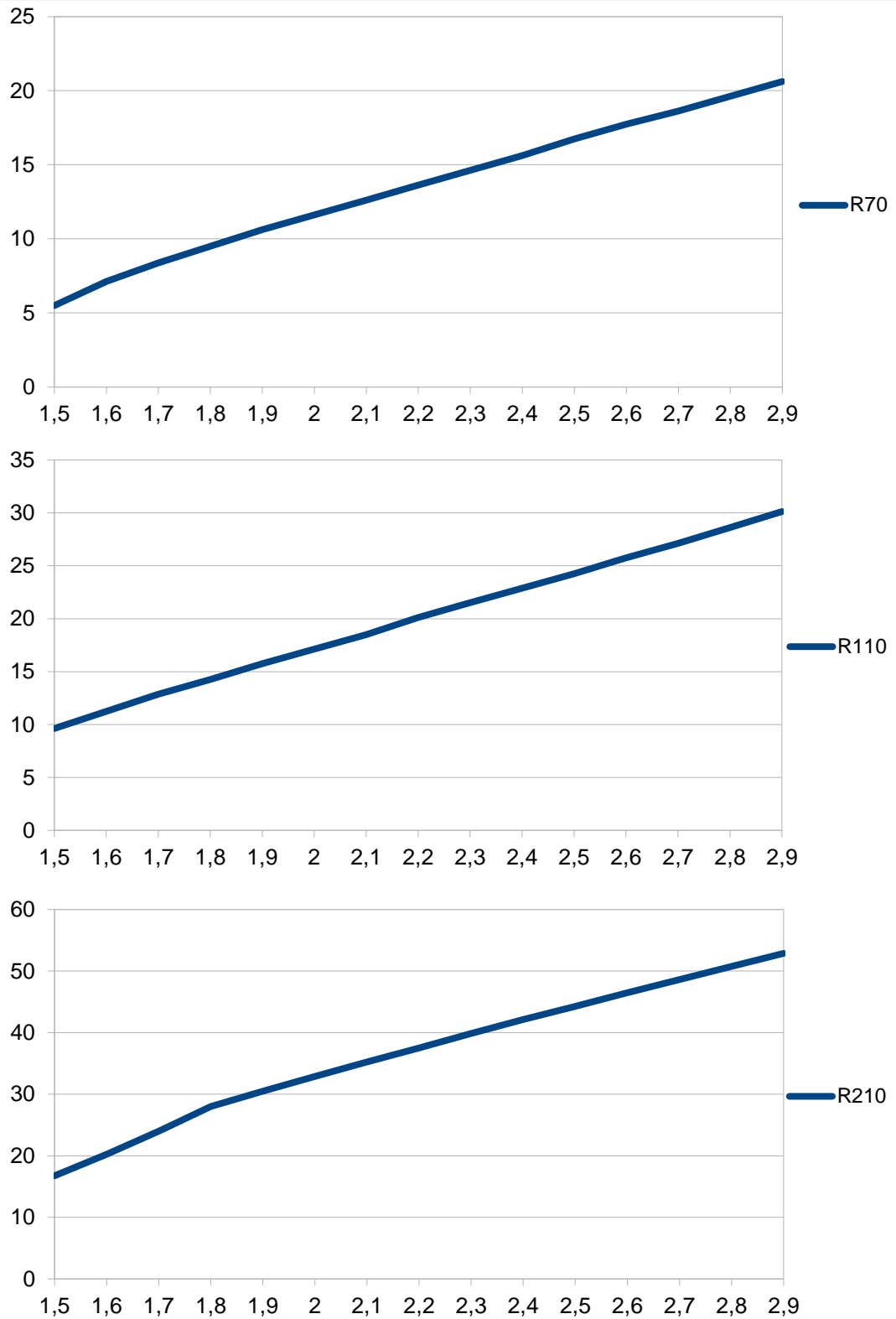


Figure 2 – ±5dB range (m) according to mounting height (from floor to bottom of column, in m).

Table 1 on the next page gives the minimum, maximum, and nominal values for Ray-On mounting height ³.

³ Ears are at 1.15m from floor for a seated audience, 1.55m for a standing audience.

		Mounting height		
		Minimal	Nominal	Maximal
Ray-On 70TC	Standing audience	1.55m	2.0	2.50m
	Seated audience	1.15m	1.60m	2.10m
Ray-On 110TC	Standing audience	1.55m	2.20m	2.70m
	Seated audience	1.15m	1.80m	2.30m
Ray-On 210TC	Standing audience	1.70m	2.30m	2.80m
	Seated audience	1.30m	1.90m	2.40m

Table 1 – Ray-On mounting height, from floor to bottom of column (meters).



The Ray-On wall-mounting system allows the subsequent adjustment of the columns height.
Cf § 5

3 CAD Modeling

There are powerful CAD software tools that can predict the acoustics of a room and accurately model the radiation of loudspeaker arrays. These tools can calculate various acoustic indices, such as reverberation time, sound pressure level, STI, etc.

The sound radiation of the Ray-On loudspeakers can be predicted directly using CATT-Acoustic or EASE softwares.



A simple direct sound simulation tool is directly accessible on www.activeaudio.fr.

Direct sound prediction is also given in the technical characteristics section 6 on page 10.

4 Equalization and tuning

Ray-On loudspeakers may be used without any equalization, but using one is advised. Equalization flattens the column's frequency response and protects the loudspeakers by filtering low frequencies.

The recommended equalization is the same for the 3 different models, which allow many columns to be put together on the same 100V line.

Two equalizations are specified:

- one for speech, which uses 4 cells (n°2-5);
- the other for music, which uses 6 cells (n°1-6).

The table 2 on the next page gives detailed information about these equalizations. The corresponding frequency curves are presented in figure 3 on the facing page.

	Type	Parameters
1	Parametric	Freq = 100 Hz ; Gain = +6dB ; Width = 1.5 oct (Q=0.92)
2	2nd order high-pass	Fcut = 130 Hz ; Gain = -3 dB @ Fcut (Butterworth)
3	Parametric	Freq = 280 Hz ; Gain = -3.0 dB ; Width = 1.0 oct (Q=1.4)
4	Parametric	Freq = 5 000 Hz ; Gain = +6 dB ; Width = 1.0 oct (Q=1.3)
5	Parametric	Freq = 10 700 Hz ; Gain = -7.0 dB ; Width = 0.25 oct (Q=4.0)
6	Parametric	Freq = 15 500 Hz ; Gain = +6.0 dB ; Width = 0.5 oct (Q=1.2)

Table 2 – Recommended equalization

A subwoofer may be used to extend the low-frequency response, especially for diffusion of music. It is advised not to activate the cell 1, frequencies under 180Hz being rendered by the sub. Model SB110 is ideally suited to the Ray-On columns. See the SB110 user manual for the equalization of the system.

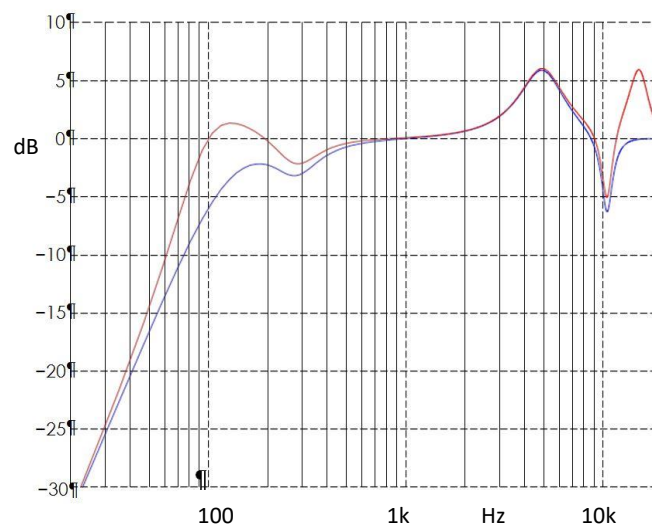


Figure 3 – Recommended equalization curve with (red) and without (blue) cells n°1 and n°6.

5 Installation and Wiring

Ray-On loudspeakers are vertically mounted, usually on a wall, using the supplied wall-mounting system. The next two pages illustrate the steps to follow for column mounting.

An accessory is available for mast mounting.



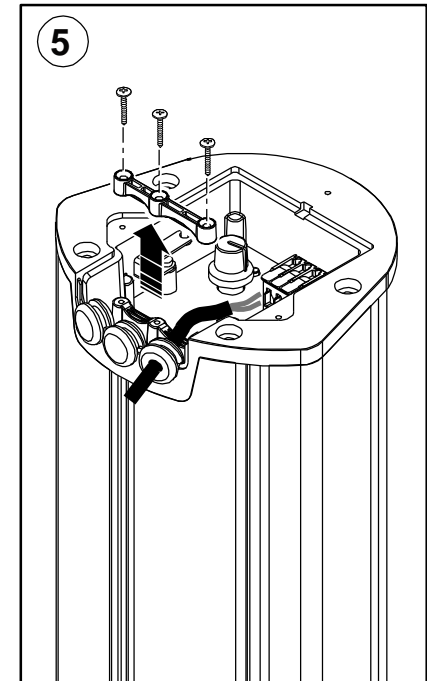
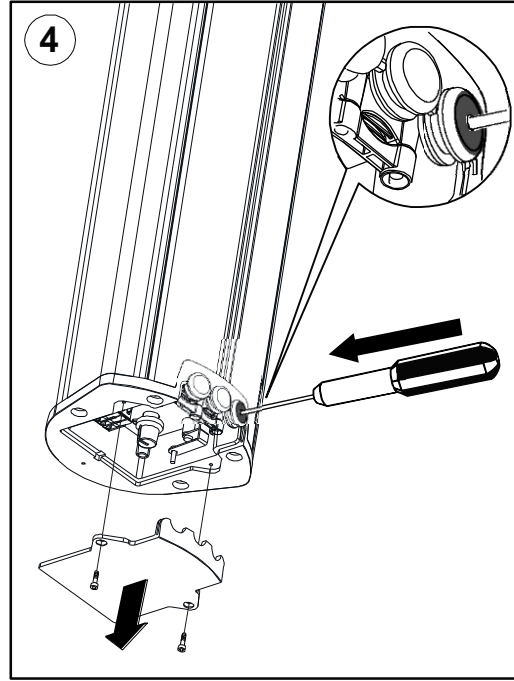
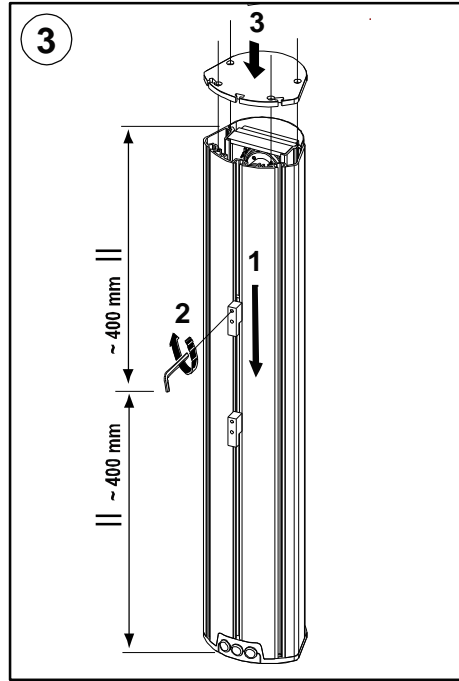
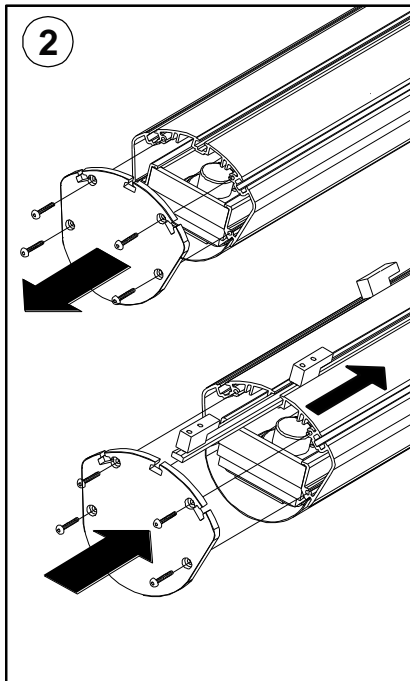
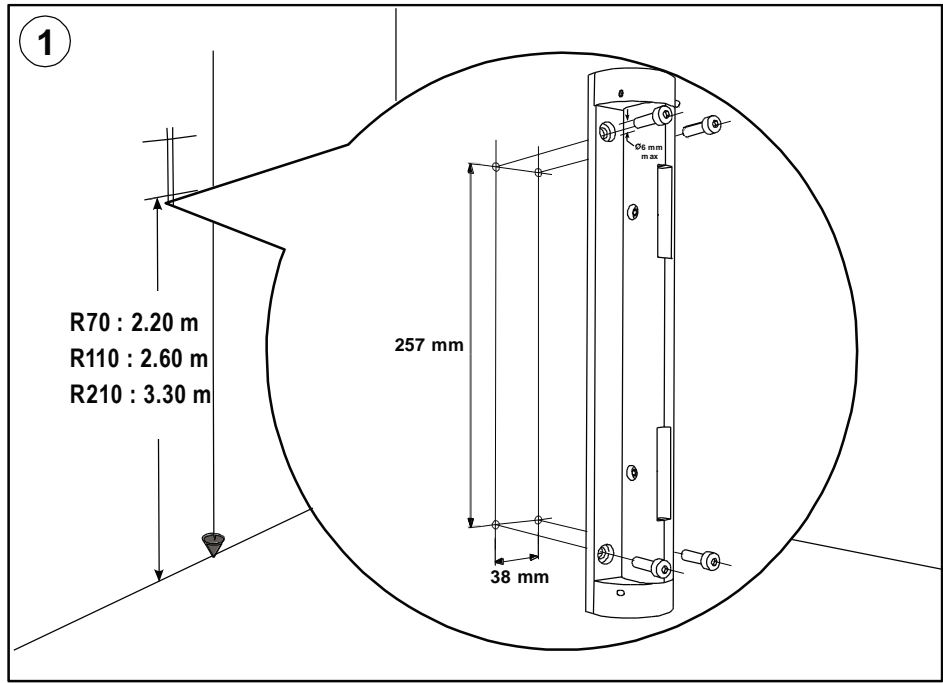
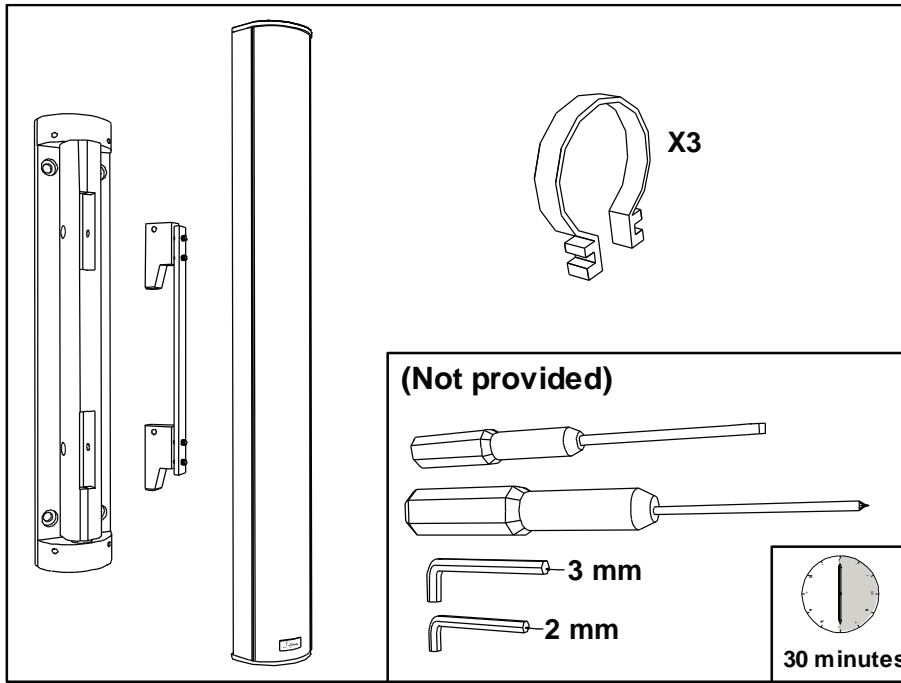
Height adjustment: If changing the column's height is necessary, take the column off its wall-mounting system, move the «hook-slide» along the backside rail, then put the column back on its wall-mounting system.

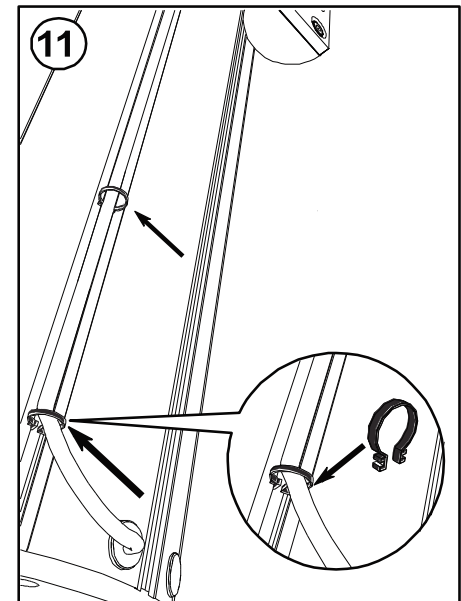
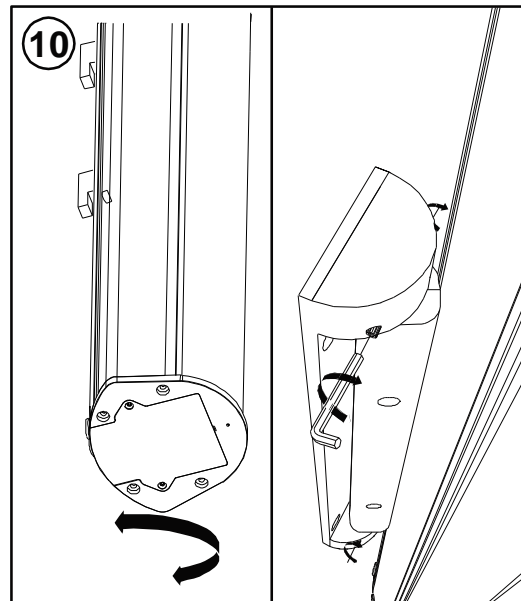
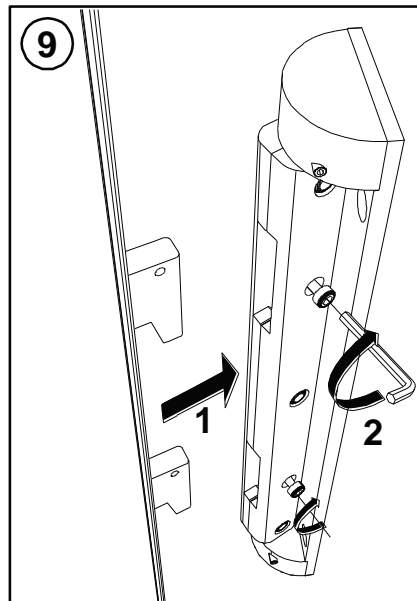
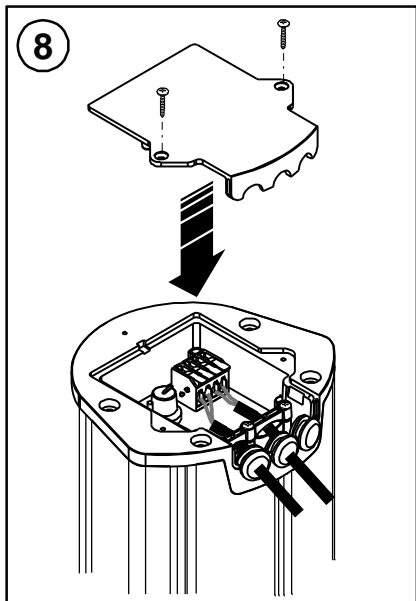
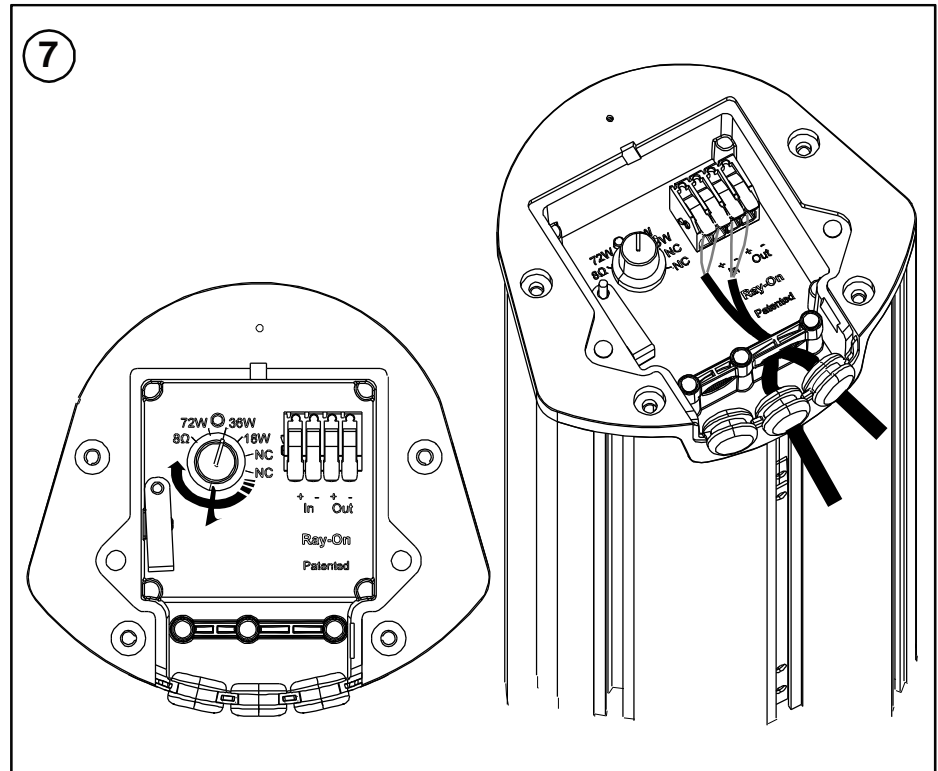
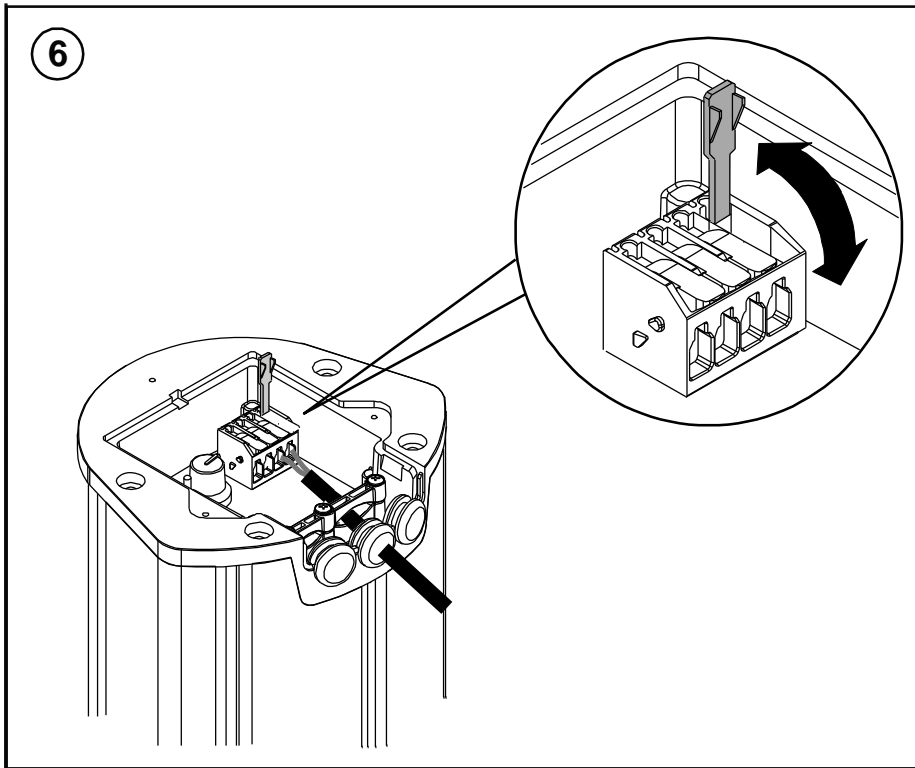
100V: Power selection is made with the rotary switch.

Safety: An M5 thread is available at the back of the column designed to accommodate a ring for mounting a safety cable.

«Daisy-chain» cabling: Several bushings are available on the back of the Ray-On columns, allowing to connect the column to another Ray-On.

Good to know: The cable diameter must be less than 7.5 mm, the wire's between 0.5 and 2.5 mm².





6.1 General Characteristics

	Ray-On 70TC		Ray-On 110TC		Ray-On 210TC	
Acoustical data ⁴	8Ω mode	100V mode	8Ω mode	100V mode	8Ω mode	100V mode
Continuous power	75W	18W / 36W / 72W	150W	25W / 50W / 100W	300W	25W / 50W / 100W / 200W
SPL max	91dB at 5m	85 / 88 / 91dB at 5m	92dB at 8m	84 / 87 / 90dB at 8m	94,5dB at 16m	84 / 87 / 90 / 93dB at 16m
Sensitivity	71dB / W at 5m		72dB / W at 8m		71dB / W at 16m	
Freq. bandwidth at -3dB/-10dB	150Hz - 14,5kHz / 120Hz - 18kHz		150Hz - 16,5kHz / 120Hz - 18kHz		150Hz - 16,5kHz / 120Hz - 18kHz	
Range ±3dB/±5dB	6.5 / 12m		15 / 20 m		31 / 42 m	
Vertical directivity	Wavefront synthesis					
Horizontal -6dB opening angle	360° at 500Hz / 190° at 1kHz 156° at 2kHz / 119° at 4kHz					
Loudspeakers	6 loudspeakers 70x70mm, outdoor		12 loudspeakers 70x70mm, outdoor		24 loudspeakers 70x70mm, outdoor	

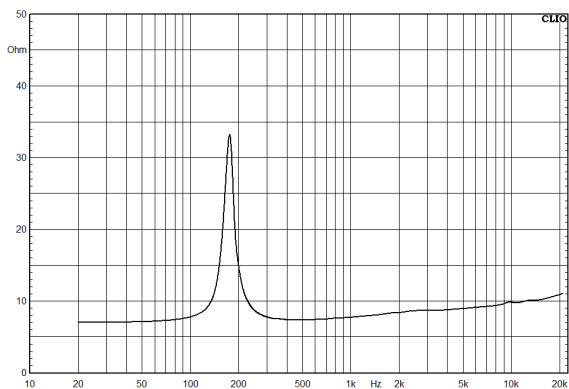
Electrical data	8Ω mode	100V mode	8Ω mode	100V mode	8Ω mode	100V mode
Nominal impedance	8	556 / 278 / 139	8	400 / 200 / 100	8	400 / 200 / 100 / 50
Amp. power recom.	75 W	-	150 W	-	300 W	-
Connectors	Lever terminal block, with "loop-through"					
Wire section	from 0,5 to 2,5mm ²					
Protection	Thermal fuse and protection against overload					

Mechanical data	8Ω mode	100V mode	8Ω mode	100V mode	8Ω mode	100V mode
Materials	Body: aluminum ; Grid: steel treated against rust and UV					
Dimensions H x L x P	706 x 128 x 117 mm		1115 x 128 x 117 mm		2086 x 128 x 117 mm	
Net / shipping weight	5.4 / 5.9 kg		8.5 / 9.3 kg		16.4 / 18 kg	
Environment	IP55 ; from -25°C to +55°C, indoor / outdoor					
Colors	White (RAL9016 paintable) and Black (RAL9005)					
Mounting	Vertical mounting on a wall or on a mast					

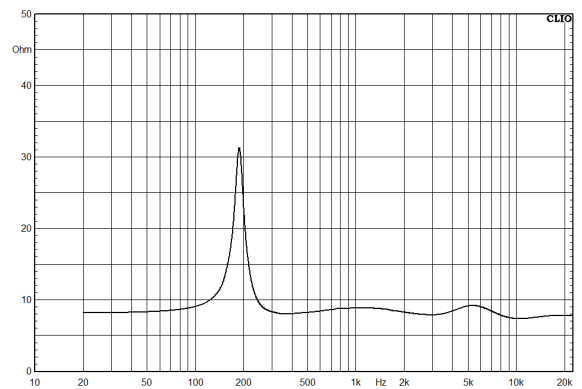
Tuning and exploitation	8Ω mode	100V mode	8Ω mode	100V mode	8Ω mode	100V mode
Mounting height (cm)	1.70 seating / 2.10 standing		1.80 seating / 2.20 standing		2.0 seating / 2.40 standing	
Recom. equalization	Speech: 4 parametric cells / Music: 6 parametric cells					
Modeling	EASE and CATT-Acoustic models available					

⁴ Unless specified otherwise, characteristics are measured with column at nominal mounting height on horizontal reflecting floor, and using recommended music equalization.

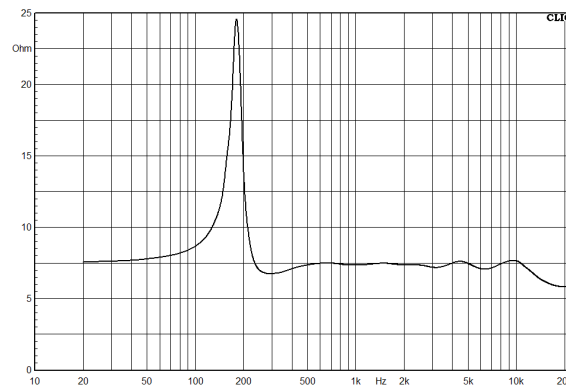
Miscellaneous	Ray-On 70TC		Ray-On 110TC		Ray-On 210TC	
	8Ω mode	100V mode	8Ω mode	100V mode	8Ω mode	100V mode
Warranty	5 years					
Maintenance	No maintenance required					
Serial number	YYMMXXXX (YY: year - MM: month - XXXX: serial)					
Certification	EN54-24 type B for indoor and outdoor VA systems					



(a) R70TC impedance curve



(b) R110TC impedance curve



(c) R210TC impedance curve

Figure 4 – Ray-On loudspeakers impedance curves

6.2 Technical drawings

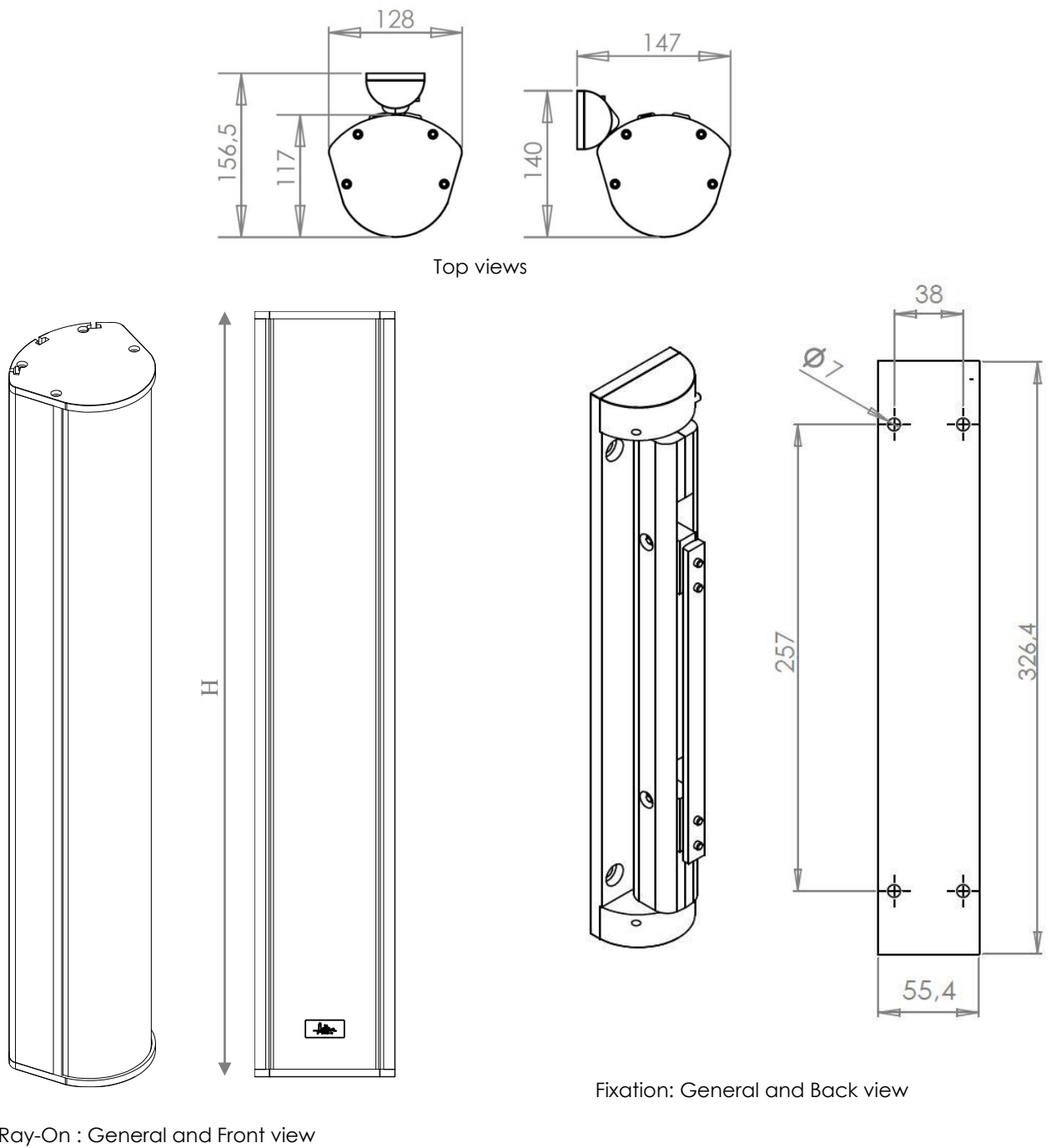
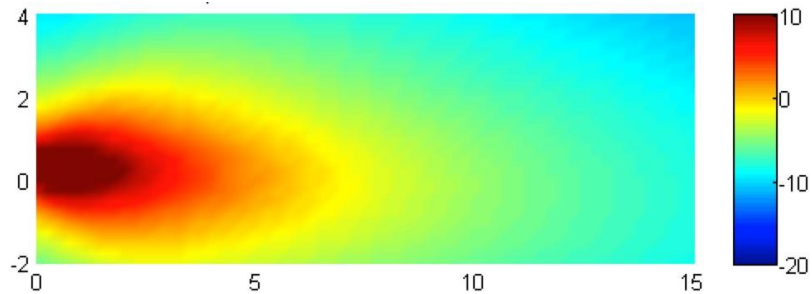


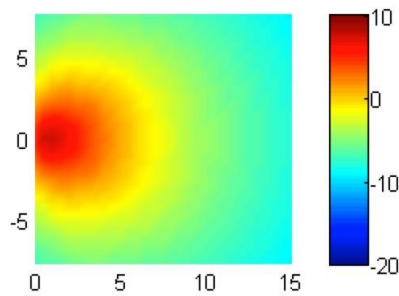
Figure 5 – Technical drawings

6.3 Acoustical data

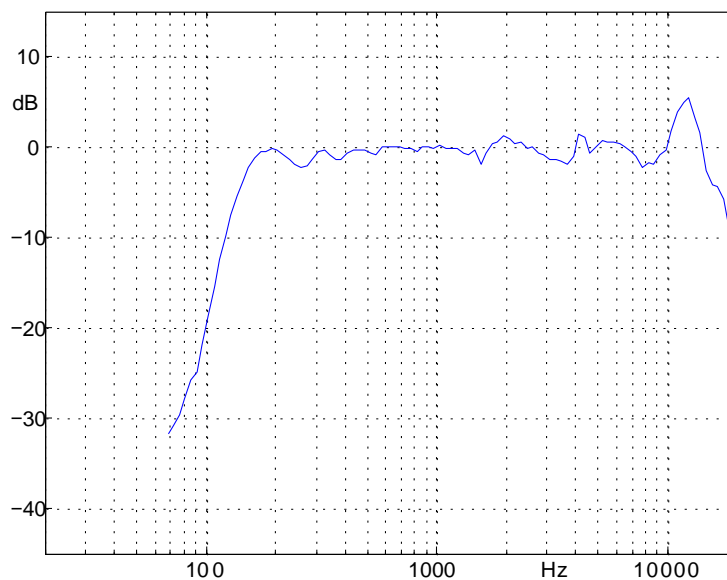
Acoustical data ⁵.



(a) R70TC vertical directivity : sound level for the speech octaves (500Hz,1kHz,2kHz) in the vertical median plane.



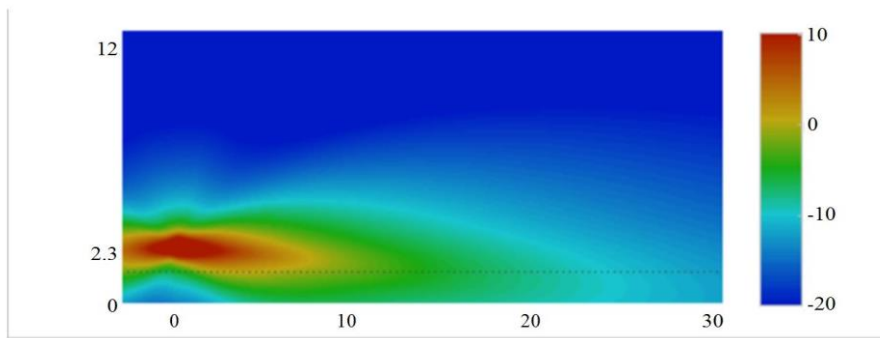
(b) R70TC horizontal directivity: sound level for the speech octaves (500Hz,1kHz,2kHz) on the listening plane (60cm below the column).



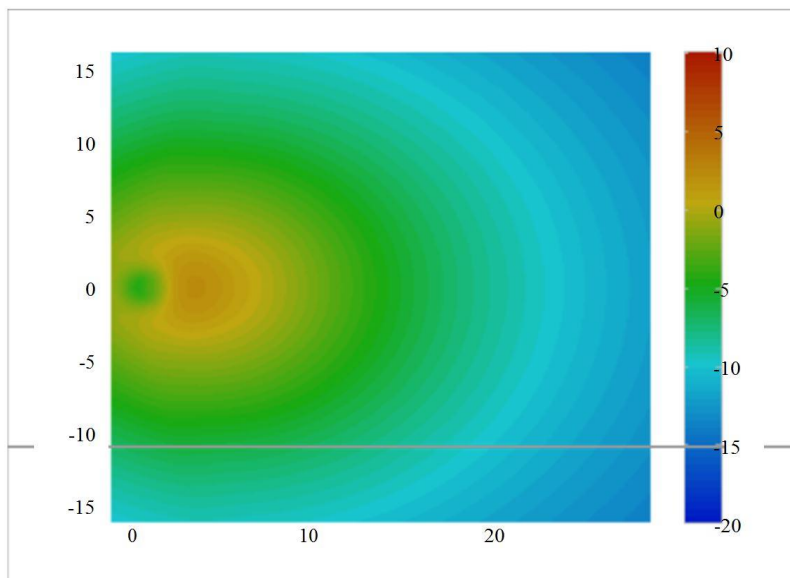
(c) R70TC frequency response, with recommended music equalization. Average from 2 to 10m in the axis.

Figure 6 – R70TC : acoustical data

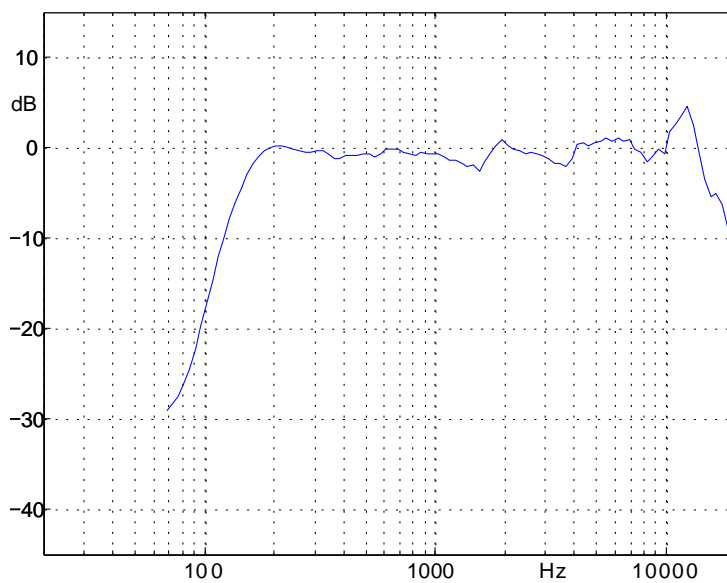
⁵ Column in nominal position at 2.30m from the floor. The reference SPL is the mean level in the listening zone.



(a) R110TC vertical directivity: sound level for the speech octaves (500Hz,1kHz,2kHz) in the vertical median plane.

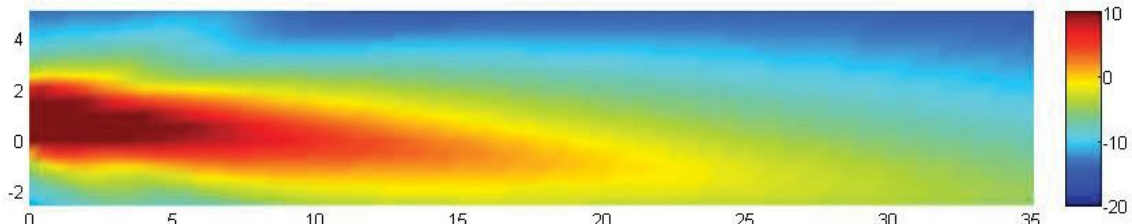


(b) R110TC horizontal directivity: sound level for the speech octaves (500Hz, 1kHz,2kHz) on the listening plane (80cm below the column).

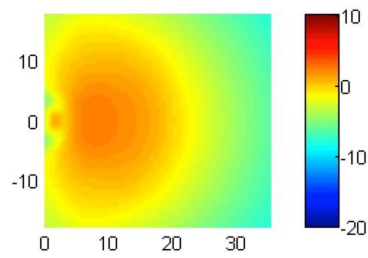


(c) R110TC frequency response, with recommended music equalization. Average from 2 to 15m in the axis.

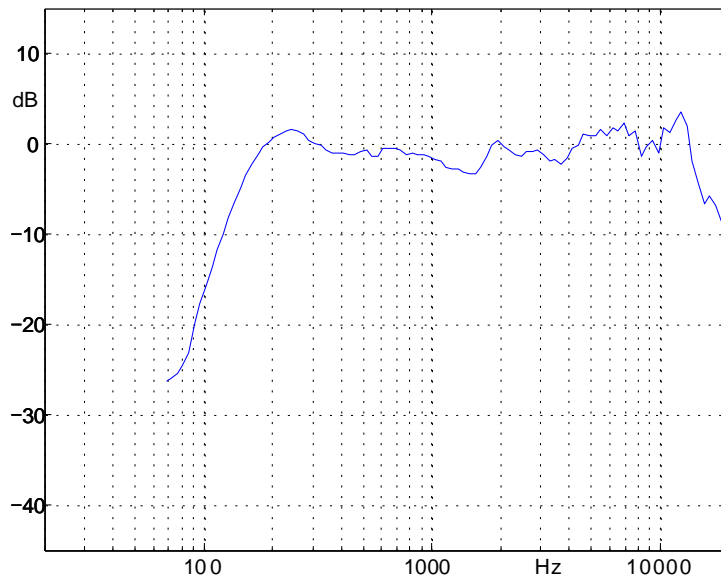
Figure 7 – R110TC: acoustical data.



(a) R210TC vertical directivity: sound level for the speech octaves (500Hz,1kHz,2kHz) in the vertical median plane.



(b) R210TC horizontal directivity: sound level for the speech octaves (500Hz,1kHz,2kHz) on the listening plane (100cm below the column).



(c) R210TC frequency response, with recommended music equalization. Average from 2 to 30m in the axis.

Figure 8 – R210TC: acoustical data

www.activeaudio.fr

info@activeaudio.fr

Tel: +33 (0)2 40 46 66 64

