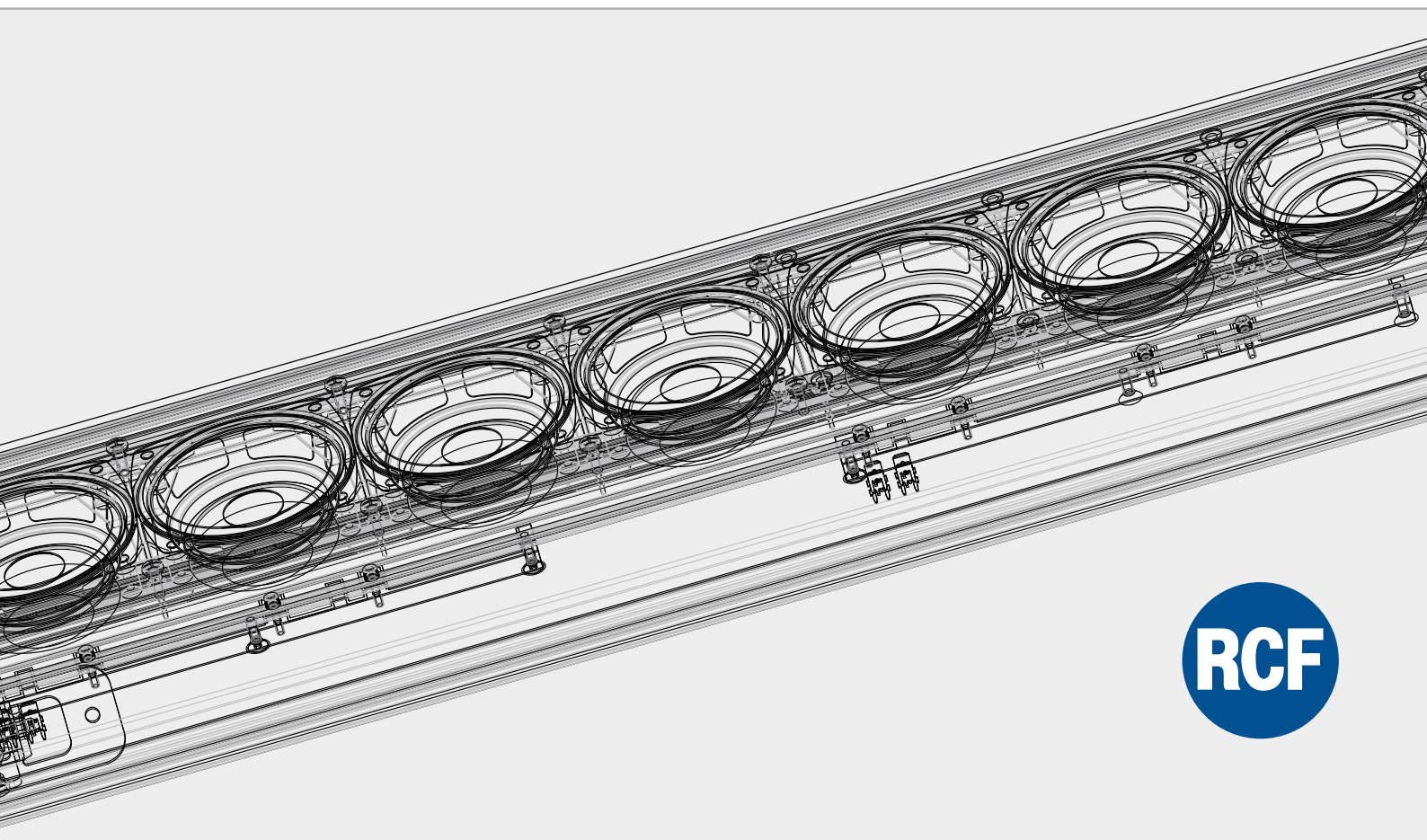


digital multi-amplified vertical steerable array



■ description

The powerful DSP circuit is directly connected in digital domain to the TWENTY 50 W each Class-D technology power amplifiers, which are able to drive the 20 transducers with

VSA Vertical Steerable Array Series represents one of the most recent applications of the RCF digital technology. Powerful DSPs (Digital Signal Processor) process the audio signal sent to each speaker for controlling its vertical acoustic dispersion.

VSA speakers are the ideal choice for indoor installations where a critical acoustic environment is an issue or where a moderate visual impact is required.

VSA arrays once they are installed flat to the wall allow you to virtually but effectively address the audio signal exactly to the listening area, avoiding to send the acoustic energy to ceilings and empty floors, thus not introducing bad reflections that would affect the speech intelligibility, mainly in critical environments with high reverberation time.

Said that the control characteristic of any array is proportional to its length, the three models available in the VSA range, VSA 850, VSA 1250 and VSA 2050 offer suitable solutions in terms of acoustical dispersion, low frequency control, visual impact and audio performance for different environments in size and with possible installation constraints.

The powerful DSP circuit is directly connected in digital domain to the 50 W each Class-D technology power amplifiers, which are able to drive the transducers with the optimal headroom. The amplification circuits include several protections and controls, so to always operate in safe mode.

A 1,4 Tesla flux density has been foreseen by using a massive neodymium magnet to get an incredible mid frequency dynamic range. The use of a neodymium magnet results in very lightweight transducers and in very compact size of the overall system.

The target of the VSA array series has been to offer voice directivity and control over all the voice reproduction range, to give high intelligibility performance, with wide frequency response and high dynamics as in a PRO-Audio speaker, and coherence at distance. We are to reach this goal for the three models according to the relevant length, the number and size of the speakers, the choice to use a dedicated amplifier for each transducer and other innovative details.

The beam-shaping and other audio setups can be quickly configured by using a dedicated infrared touch-screen remote control, in real-time and in a very easy and convenient way. To avoid any possible interference relevant to the configuration procedure the I/R receiving diode has been designed to receive commands just from the remote control located in front of the column axis, then the I/R code is unique RCF encrypted.

Tilting and beaming are not affected by the steering process and the horizontal coverage is very wide and not impaired by discontinuities.

Thanks to the integrated high capacity power supply device, to the accurate speaker design and to the high efficiency of the digital technology, the VSA 2050 for instance is able to obtain a very long coverage, up to and over 30 meters preserving a precise intelligibility and a smooth horizontal dispersion as well.

To allow the installation of the VSA steerable arrays in the security paging applications as well, an advanced self-monitoring feature according to the most severe voice alarm systems norms is provided, together with DC power supply facility; in fact during the development of the VSAs, high priority has been given to critical signal paths and self-monitoring components, so to provide easier installation, simpler maintenance and maximum safety in Voice alarm applications.

Digital technology has been intensively applied also to the massive built-in power supply unit and to its management: it is interfaced in digital domain with the main DSP board, so to continuously exchange the status relevant to voltage, current and temperature of the several circuits.

Power supply can be from the AC mains (230V and 115V versions are available per each model) or from 24VDC, which can work also as back-up.

State of the art transducers have been developed specifically for the VSA, in order to offer the highest possible intelligibility and wider frequency response, according to RCF philosophy.

A 1,4 Tesla flux density has been foreseen by using a massive neodymium magnet to get an incredible mid frequency dynamic range. The use of a neodymium magnet results in very lightweight transducers and in very compact size of the overall system.





■ features & applications

VSA 2050

- Twenty 3" 1/2 full-range speakers
- Twenty 50 W Class D power amplifiers
- 48 kHz 32 bit processing
- Horizontal dispersion 130°
- Vertical dispersion controlled up to 10° till 30°
- Power Supply 115/230 Vac (600VA);24 Vdc
- Extruded aluminium body
- Ceramic block terminals and thermal fuse on 0 dB balanced priority input
- Indicators and control for EN 60849 monitoring facility
- Extended frequency response
- Improved directivity control
- Simple and quick set-up
- High SPL and Dynamic
- Standard installation accessories included
- Compact and lightweight

- Intelligible audio transmission in critical acoustical environments:
 - Transportation halls
 - Sports arenas
 - Convention centres
 - Conference halls
 - Auditoriums
 - Houses of worship

■ features & applications

VSA 1250



- Twelve 3" 1/2 full-range speakers
- Twelve 50 W Class D power amplifiers
- 48 kHz 32 bit processing
- Horizontal dispersion 130°
- Vertical dispersion controlled up to 10° till 30°
- Power Supply 115/230 Vac (600VA); 24 Vdc
- Extruded aluminium body
- Ceramic block terminals and thermal fuse on 0 dB balanced priority input
- Indicators and control for EN 60849 monitoring facility
- Extended frequency response
- Improved directivity control
- Simple and quick set-up
- High SPL and Dynamic
- Standard installation accessories included
- Compact and lightweight

- Intelligible audio transmission in critical acoustical environments:
 - Transportation halls
 - Sports arenas
 - Convention centres
 - Conference halls
 - Auditoriums
 - Houses of worship



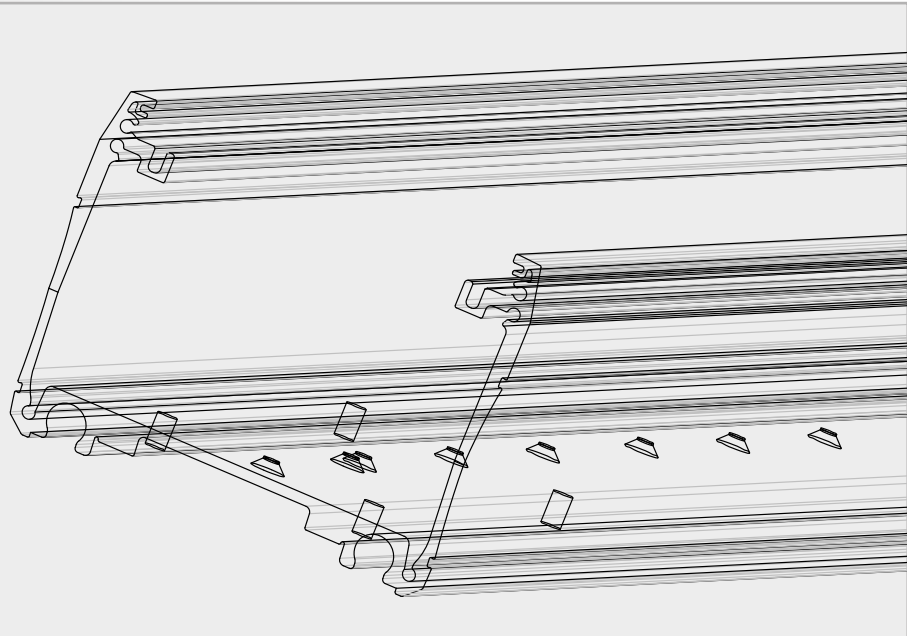
■ features & applications

VSA 850

- Eight 3" 1/2 full-range speakers
- Eight 50 W Class D power amplifiers
- 48 kHz 32 bit processing
- Horizontal dispersion 130°
- Vertical dispersion controlled up to 10° till 30°
- Power Supply 115/230 Vac (600VA);24 Vdc
- Extruded aluminium body
- Ceramic block terminals and thermal fuse on 0 dB balanced priority input
- Indicators and control for EN 60849 monitoring facility
- Extended frequency response
- Improved directivity control
- Simple and quick set-up
- High SPL and Dynamic
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■ enclosure



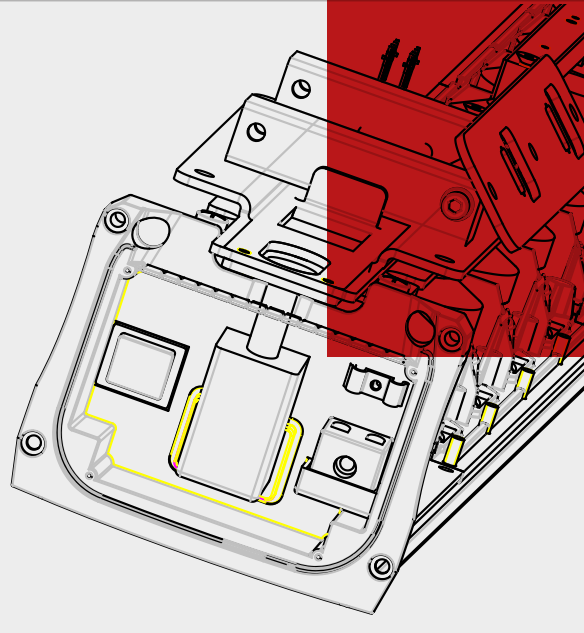
The body is made in extruded aluminum, to offer a product with very limited architectural impact, light weight and easy to install. Standard colour is RAL 9002, other colours are available on request. The front grille is transparent to sound.

The installation is particularly simple thanks to the drilling template on the wooden package and to the weight, which is only 20 Kg for the bigger model till around half for the eight speaker solution.

The mounting accessories suitable for wall flat mounting are included with the columns while additional brackets are available on request if the array has to be oriented on the horizontal plan.



■ connections

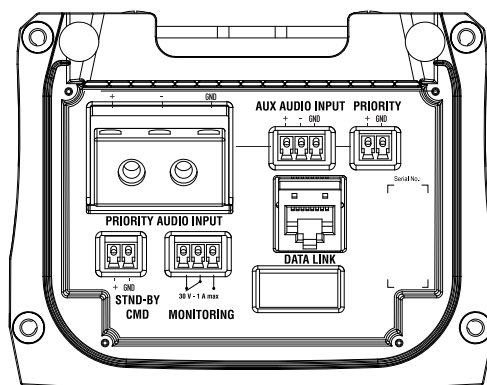
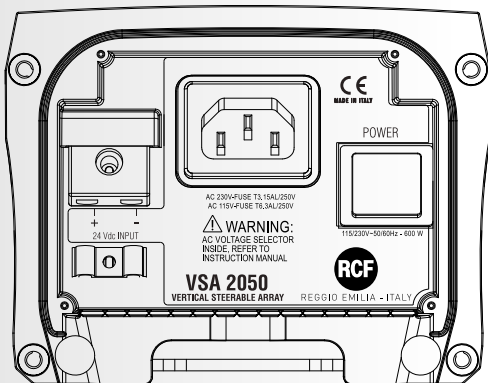


The audio connections are protected by a cover and are located on the bottom-end of the column. Two balanced inputs are available for independent wiring for main and priority audio sources. The priority one is available on ceramic terminal blocks with thermal fuse for voice alarm applications.

A fail-safe activation command supports the commutation between inputs. An output logic control allows remotely manage the over-all status of the arrays, for instance when any fault must be addressed to a central system.

AC and DC Power supply connections are positioned on top of the column and protected by a plastic cover. Connectors are VDE type for AC and ceramic terminal block for DC. Digital technology has been used also for the power supply which is regulated both in voltage and current and it is equipped with active protections against over-voltage and over-current. The power supply module is digitally interfaced with the DSP main board to communicate voltage, current and temperature status data. It operates with both AC and 24 VDC power supply sources.

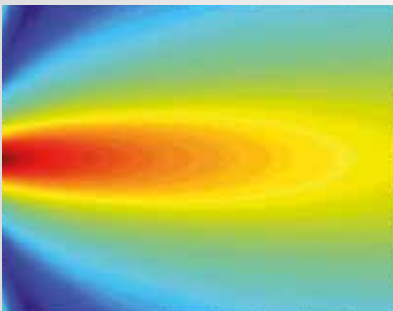
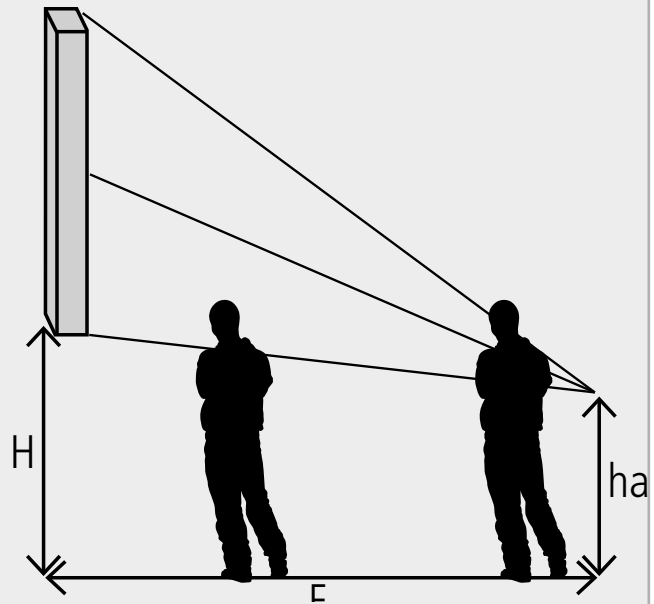
On the rear surface of the extruded aluminum body there are two recessed to be used as wire-ways in order to wire the cables coming from the wall to top and bottom of the column. .



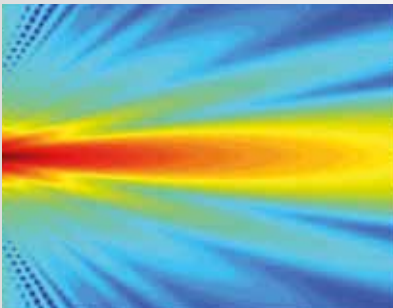
Status indicators

All basic status indications are provided through LEDs, visible on front of the bottom panel. LEDs indicate the correct presence of AC and DC power supply and the overall monitoring of the amplifiers, DSP, transducers and power supply unit. The ability to detect high and low frequencies at the input allows to monitor the connection between the RCF main Voice Alarm system and the column itself.

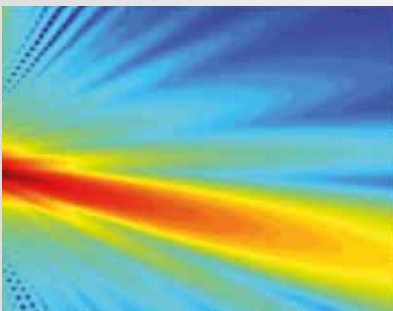
■ acustical beam



VERTICAL BEAM 30°
VERTICAL TILT 0°

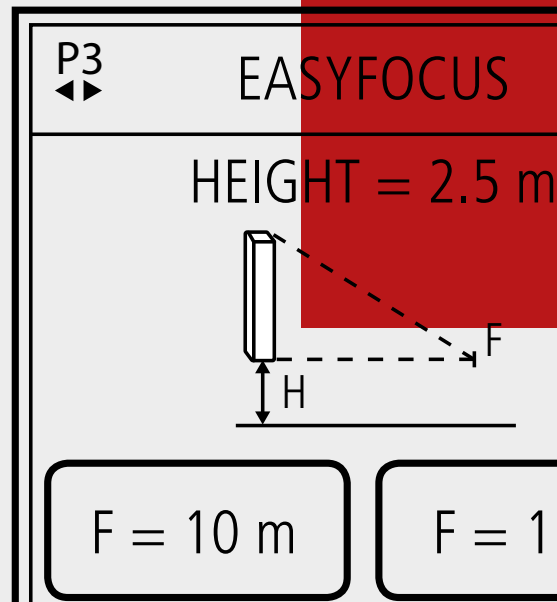


VERTICAL BEAM 10°
VERTICAL TILT 0°



VERTICAL BEAM 10°
VERTICAL TILT -30°

■ configuration



The set-up of the VSA 2050, VSA 1250 and VSA 850 can be carried-out in a quick and simple way through the dedicated touch-screen remote control or by using a Personal Computer equipped with VSA User Control software and linked to the RS 485 serial communication port present on the bottom-end of each column, under the plastic cover.

The configuration kit including both the remote control VSA-RC and the USB-RS 485 adapter is available as VSA RC-USB with p/n 13360173. The most updated version of the PC software can be freely downloaded on the RCF web site.

The user-friendly interface of the Infrared control allows to select between two different presets that offer a remarkable easiness in the VSA columns configuration process.

The only parameters that the operator has to insert using the EASY FOCUS operation mode, in fact, are the installation height of the column and the depth of the area to cover.

Easy focus With this series of configurations it is possible to obtain a uniform dispersion in the area between the column and a desired focus point, minimizing the amount of sound after it. By reducing the reflections outside the audience area, the Easy Focus mode is very useful in highly reverberant rooms.

Free beam These configurations allow to freely select tilt and beam angles from the presets, in order to make a custom set up.

The following data are configurable on each VSA array through the VSA-RC remote control:

- Select the proper tilting/beaming configuration
- Delay in meters
- Voice and Music optimization filters
- Phase shift
- Mute
- Volume
- Stand-By
- Input channel.channel.

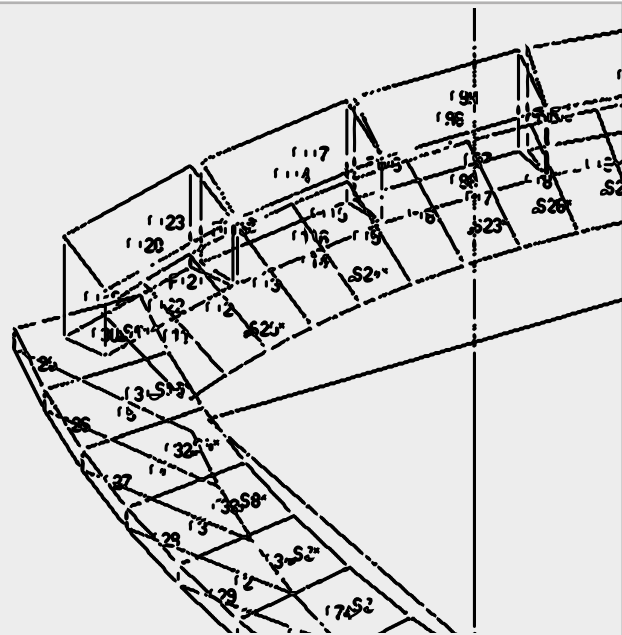
The PC allows the access to the following further detailed functions:

- Set-up of 3 different groups of 8 parametric filters each
- A more precise tilting approach of the audio beam
- Additional tools for installation and maintenance

A remote switch-on facility is available to avoid to power ON and OFF the columns through electric switches, when the speakers are not part of a voice-alarm system. By detecting the audio presence, the column is able to switch itself ON automatically, and then OFF after a period of time in which it is not used at all.



■ A&E specifications



Digital controlled array, electronically steerable, equipped with 3.5" high efficiency high intelligibility neodymium midhigh frequency RCF precision transducers driven by 50W digital amplifiers.

Particularly indicated for acoustically critical environments and where a limited visual impact is required.

A very uniform undistorted sound pressure level can be reached on a wide frequency range.

The digital tilting and beaming operate respectively within 0° and -40° and from 10° to 90°.

Since the fully digital approach /design supported by high-power digital processors, the over-all latency is within 2 ms.

The 500W high dynamic digital power supply working with both AC and 24Vdc sources is digitally interfaced with the other circuits for monitoring purpose.

For energy saving the power supply and so the column itself can be remotely switched to stand-by mode through a dedicated logic input. Less than 3 seconds are necessary to ON the whole speaker.

It is also possible to set an automatic stand-by mode where the presence of audio signal drives the state.

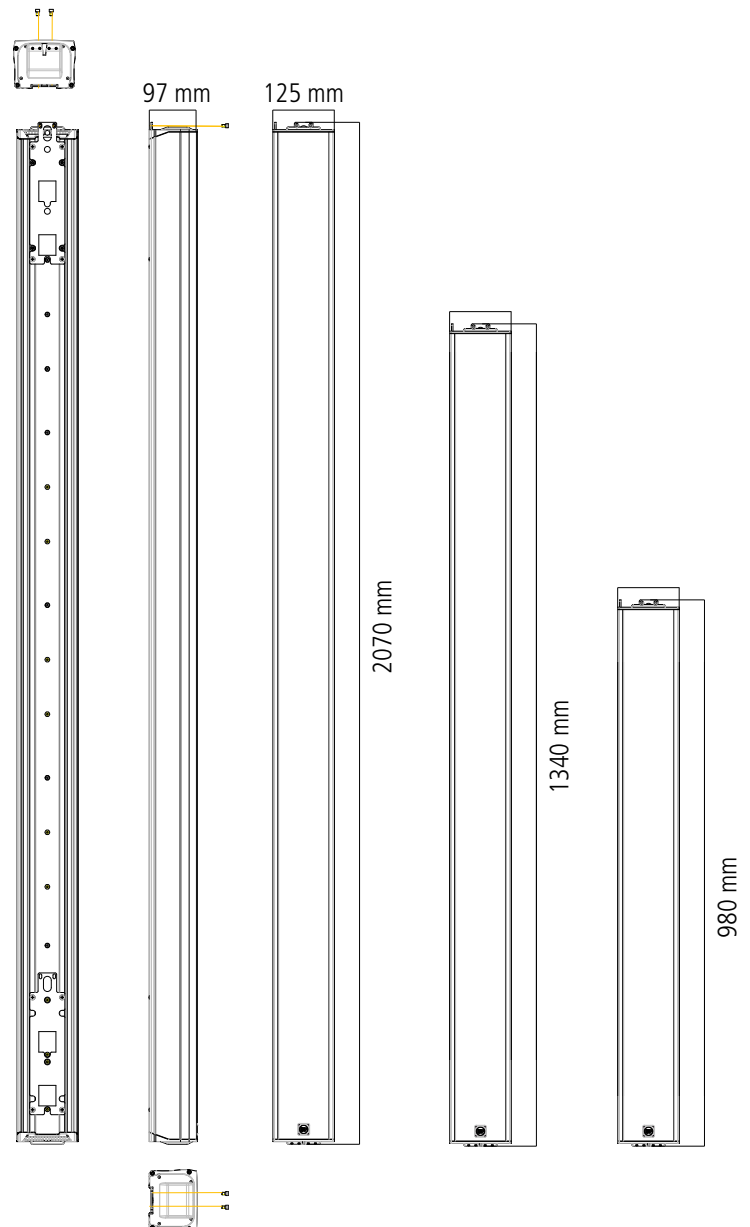
Thanks to the fully monitored design, to the dedicated priority input on ceramic terminals equipped with thermal fuse and to local and remotable indications the steerable array is suitable for voice alarm applications such as in transportation halls, shopping malls and congress centres.

The compact extruded aluminium structure and the lightweight acoustically transparent steel grille limit the total weight; the standard mounting accessory is included.

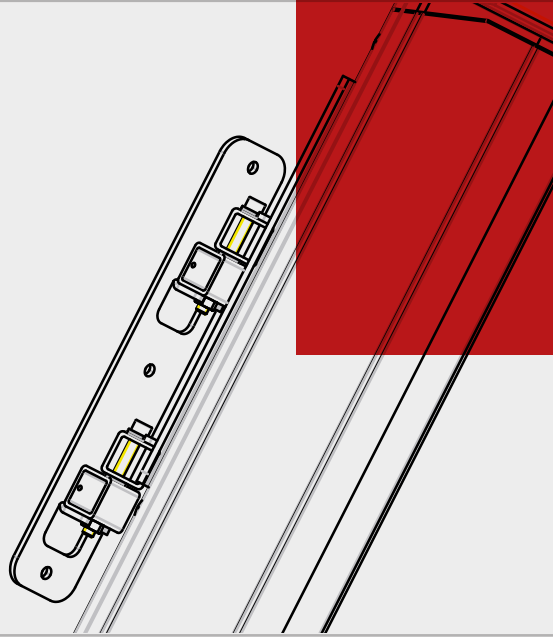
It is available in standard RAL 9002 colour or in any other RAL colour on request.

The complete set-up is supported in real-time through a dedicated interactive and intuitive touch-screen I/Red remote control. Detailed configuration from PC is possible as well by using VSA User Control software.

Full parametric equalization points facility and a delay function till 99 meters increase the flexibility of the digitally controlled speaker applications range.



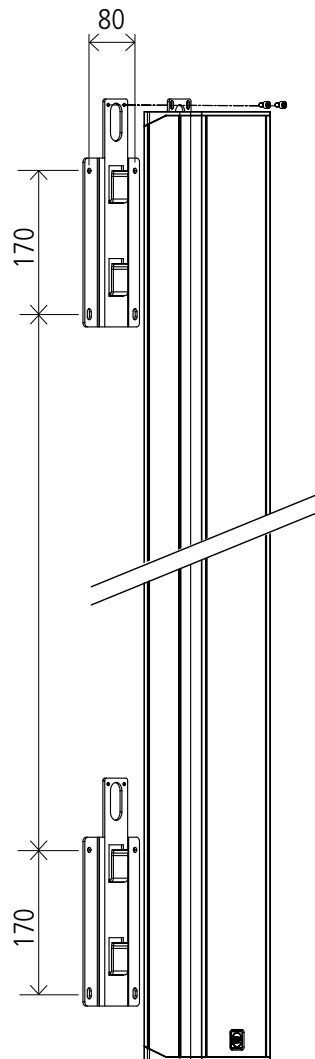
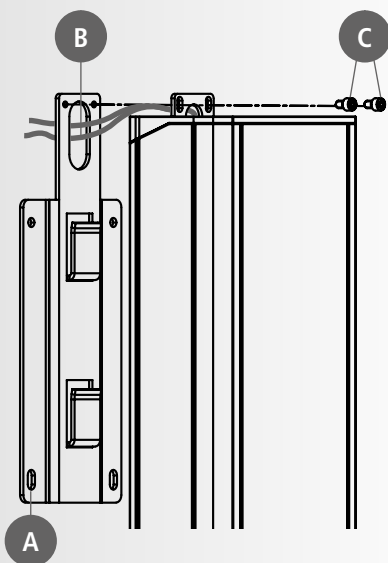
■ installation



Each bracket shall be fixed to the wall by 4 dowels for 5 mm screws (passing through the 4 holes, see - **A**)

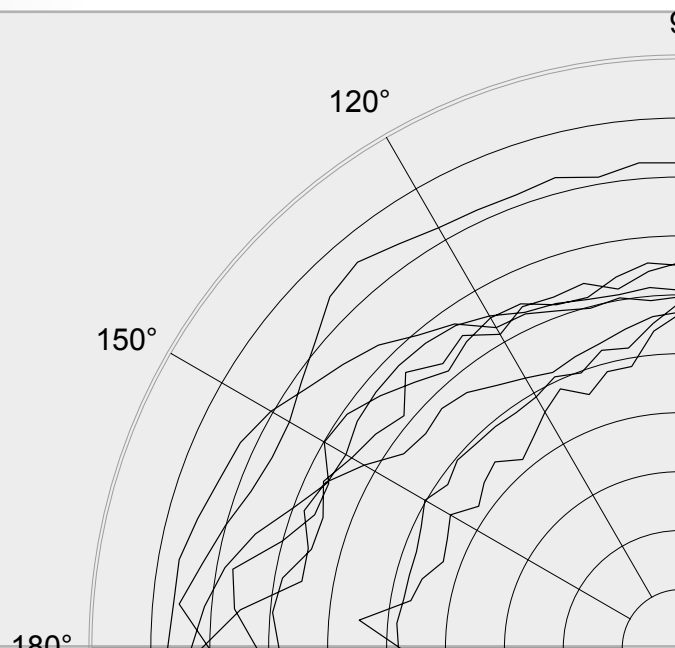
If put to recessed pipelines, the power cables (230-115 V ac and, separately, 24 V dc) can pass through the bracket and the loudspeaker holes (see 3 - **B**)

Put the loudspeaker on the bracket hooks and fix it with the security screws (see 3 - **C**), which prevent the speaker might accidentally slip off and fall.



Two wireways are present on the back of the aluminum enclosure to help a clear wiring process

■ technical specifications



acoustical specifications VSA 2050 - VSA 1250 - VSA 850

frequency response	100/120/130 hz - 18 khz
max SPL (avg)	96/94/93 dB (a-weighted at 30 m)
max SPL (peak)	100 dB (a-weighted at 30 m)
horizontal coverage angle	130°
vertical coverage angle	selectable from 10° to 30°
vertical steering angle	selectable from 0° to - 40°
directivity control frequency	from 150 hz to 8 kHz
transducers	20/12/8 x 3.5" full range speakers

input section

input sensitivity	0 dbu, (0,775 V RMS)
input impedance	15 k Ω unbalanced
input connectors	balanced screw terminal balanced screw terminal ceramic block, thermal fuse
input control	remote control dedicated i/r input priority input command status remote monitoring stand by remote command
input leds	active, communication, status, emergency, AC, DC, stand-by

processor section

processor	Texas Instruments TMS320C6726 32 bit floating point dsp Xilinx Spartan3A FPGA, BurrBrown A/D PCM 4202 24 bit 48 kHz 118 dB S/N ratio
processor operations	20 channel PEQS, compression, beam-forming, speaker limiter and protection

power amplifier

power	20 x 50 W RMS
class	D
technology	Purepath Digital ®
amplifiers protections	short circuit, thermal
audio inputs	remote control priority

S/N ratio	118 dB A-weighted
THD + N	0,04% @ 10 W RMS
protective circuit	soft start, temperature monitoring, short-circuit protection, overload
power supply	500 w switching type
power consumption	450 W RMS, 8 W standby
emergency power operation possible	24 V / 18 A, built-in fuse
power supply & connectors	115/230 Vac-Vde connector 24vdc back-up ceramic terminal block, thermal fuse

controller

eq	chain: cascade of 10 cells of II order type: Butterworth, Shelving, Parametric Band gain: \pm 24 dB
limiter compressor	signal compressor, power limiter
delay	range: 0 m - 99 m step: 3 m

remote control

infrared remote control	VSA RC
RS485 with software PC	yes

physical features

height	2070/1340/980 mm
width	125 mm
depth	97 mm
weight	19/14/10 kg
cabinet	powder coated aluminium extrusion
hardware	2 x speaker wall mounting flange

CAAD simulation data

simulation data	(in preparation)
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■ schematics

