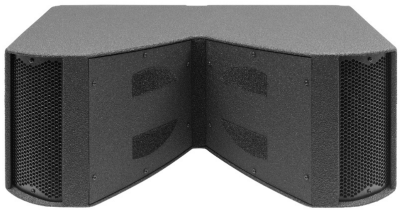

outline SCALA 90 Constant Curvature Array User Manual

Contents

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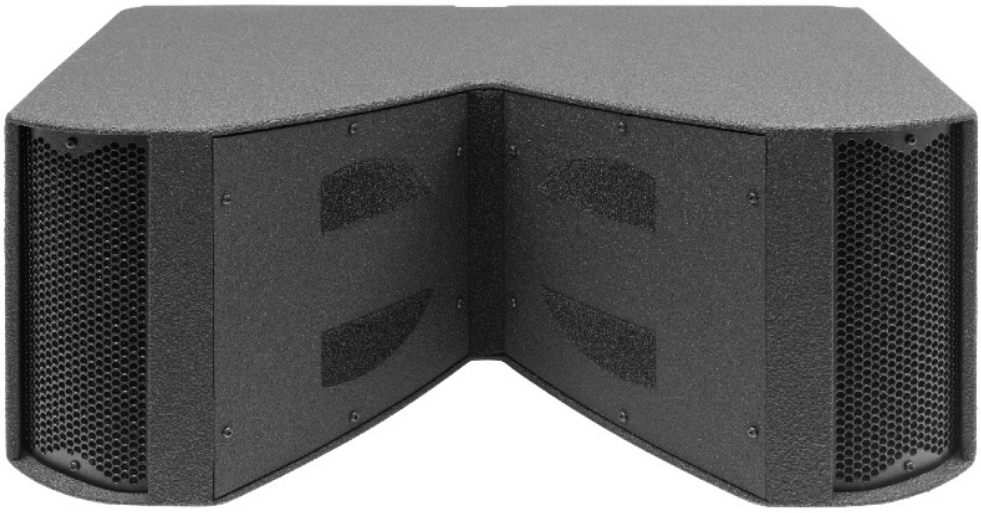


SAFETY REGULATIONS

Please read this manual carefully and in its entire-ty. It contains important information regarding safety issues, including guidelines for general safe use of rigging systems as well as advisories on govern-ment regulations and liability laws. The suspension of large, heavy objects in public places is subject to numerous laws and regulations at the national/federal, state/provincial, and local levels. The user must assume the responsibility for making sure that the use of any rigging system and its components in any particular circumstance or venue conform to all applicable laws and regulations in force at the time.

GENERAL SAFETY RULES

- Carefully read this manual in all its parts
- Respect the working load limits and maxi-mum configurations of the elements and of any third-party component (such as suspension points, motors, rigging accessories, etc…)
- Do not incorporate any accessory not designed in compliance with current safety regulations by qualified personnel or not provided by Outline; all damaged or defective components must be re-placed only by equivalent parts approved by Out-line
- Ensure personnel health and safety, ensure that no one is standing under the system during the installation, ensure that all personnel involved in the installation are equipped with personal safety devices
- Always double check that the elements are cor-rectly connected before suspending the system.

The rigging elements are easy to use, however the installation shall be carried out only by qualified personnel that are familiar with the rigging tech-niques, safety recommendations and with the in-structions described in this manual.

All mechanical components are subject to wear and tear over prolonged use as well as corrosive agents, impacts or inappropriate use. For this rea-sons users have the responsibility to adopt and ad-here to a schedule of inspections and maintenance. Key components (screws, connecting pins, welded points, rigging bars) must be inspected before every use. Outline strongly recommends to carefully in-spect the system components at least once a year, reporting in a written document the date, the name of the inspector, the points checked and any anom-alies discovered.

DISPOSAL OF WASTE MATERIALS

Your product is designed and manufactured with high quality materials and components, which can be recycled

and reused. When this crossed-out wheeled bin symbol is attached to a product, it means the product is covered by the Euro-pean Directive 2012/19/EU and subsequent amend-ments. This means that the product must NOT be disposed of with other household-type waste. It is the users' responsibility to dispose of their waste electrical and electronic equipment by handing it over to an approved reprocessor. For more infor-mation about where you can send your equipment for recycling, please contact your local distributor. The correct disposal of your old product will help prevent potential negative consequences for the environment and human health.

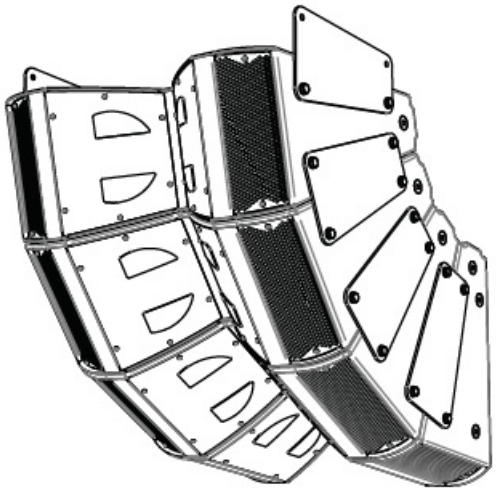
CONFORMITY AND WARRANTY

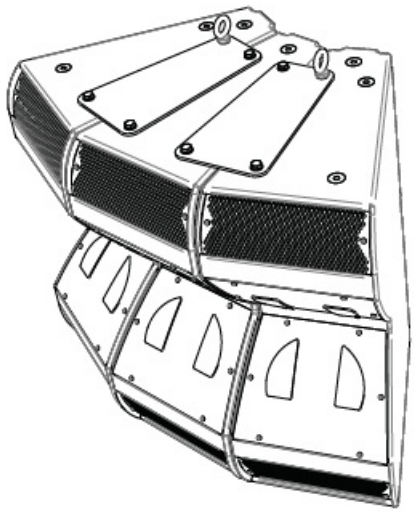
All the Outline electro-acoustic and elec-tronic devices are in conformity with the provisions of EC/EU directives (as stated in our CE declaration of conformity).

The CE declaration of conformity is attached to the product warranty certificate and is shipped with the product.

SCALA 90 DESCRIPTION

Outline SCALA 90 is a medium-throw, Constant Curvature Array enclosure weighing just 21 kg yet capable of a peak SPL of 139 dB.
Its usefulness is extended by its ability to be arrayed in either vertical or horizontal orientation, for example with just six cabinets providing a full 135-degree coverage in both deployments. A single element produces a nominal dispersion of 90° x 22.5° (H x V). Scala 90 is designed for venues such as theaters and opera houses, clubs, auditoriums and houses of worship. The enclosure mounts two 8" partially horn-loaded mid-woofers with neodymium magnets and a 3"-diaphragm compression driver (1.4" exit) loaded on a waveguide with a unique proprietary design, ensuring the lowest possible distortion levels and greater reliability.
Scala 90 implements the Outline V-Power concept to specifically control the coupling between the array modules, and all the radiating surfaces of the cabinet are perfectly symmetrical. The suspension hardware is designed to be unobstructive for installations.
The cabinets are constructed from birch plywood finished with high-tech black polyurea free scratch finish and the grill has an epoxy powder coating.
Scala 90 is fitted with ten M10 threaded rigging points made of corrosion-resistant anodized aluminium alloy (Ergal) allowing suspension and safety cable attachments.





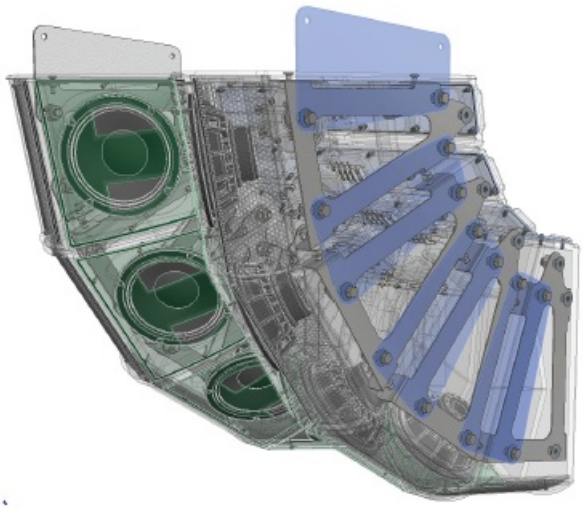
SAFETY PRECAUTIONS

Scala 90 is intended to be used in installations and must be installed following the local and regional safety rules. Specific rules must be applied to the rigging structures that have to hold the assembly of one or more devices and to the cables for the connection to the amplifier.
Periodic controls must be performed at regular time intervals according to local laws, to the presence of additional safety devices (such as tab washers against screw loosening) and to the working conditions of the components. An example of tests includes: a transducer test (i.e. to be performed before and after every use), a visual test for

the rigging safety (i.e. to be performed every six months), a visual test for the paint and wooden external parts (i.e. to be performed once a year).
The results of the periodic tests must be reported on a document like the one at the end of this manual.

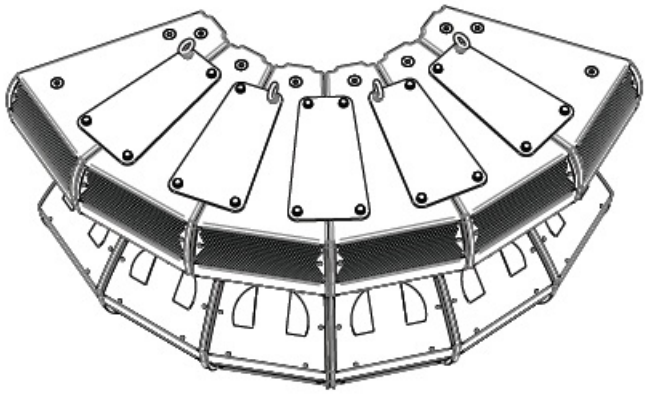
RIGGING INSTRUCTIONS

Scala 90 can be configured in different ways to achieve different coverage targets.
In order to create both vertical and horizontal arrays, external fixed hardware accessories are required. In both cases, the loudspeakers must always be connected on both sides with the dedicated accessory plates provided by Outline (the transparent blue ones in the image below) or with external hardware, structure. The external hardware must be approved by a licensed professional engineer.



For the vertical array it is possible to use either a load-bearing structure or lifting devices such as eyebolts. The bearing structure must be designed according to the local laws and local safety factors, considering the total load of the system, the dynamic factors inducted by vibrations, winds and mounting procedures (responsibility of the installer). If eyebolts are used, with Outline plates, please check the load capacity before the installation (The maximum capacity, indicated in kg, on the eyebolts refers to the straight throw; the capacity for the orthogonal pull at 90° is indicated on the package label).

For the horizontal array lifting devices must be used, certified for the weight to hang (the eyebolts shown in the following figure are just an example). At least one lifting devices for every two loudspeakers shall be guaranteed with alternate speakers (as shown in the figure below) in order to distribute the load, with relative chain (in this case it is possible to make a complete circle of loudspeakers and therefore have a coverage of 360°). Please note that is very important to consider also the inclination of the array.

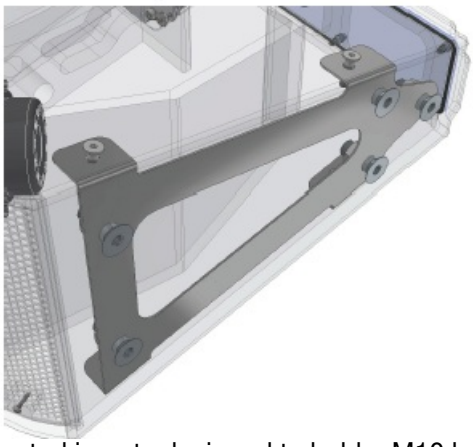


A fall protection system must be created with suitable devices such as rope or chains, the M10 points can be used for this purpose.
Safety devices must be used to guarantee the tightness of the assemblies over time, for example washers with folding tabs. In addition, tie rods must be provided to counteract the wind.
The cables and chains used for the installation shall be connected to the supporting structure on the vertical axis respect to the fixing points on the cabinet (or with an inclination of a few degrees) and they must all be tense to avoid overloading a single point.

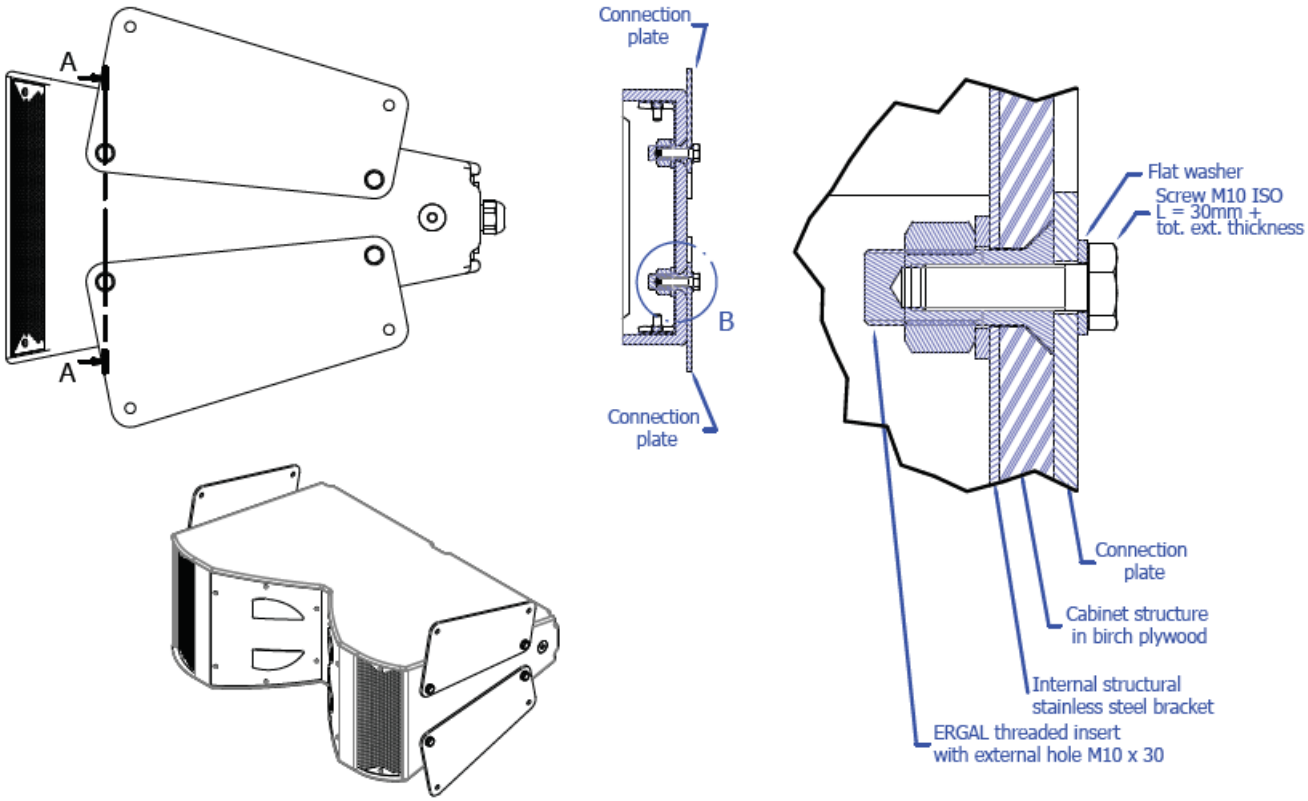
The maximum number of cabinets per array is strictly related to the hanging method used.

RIGGING POINTS DETAILS

Each Scala 90 offers ten M10 threaded female points. Four rigging points are available on each side of the Stadia cabinet. Two of them are close to the front panel (as shown in the picture below) and three are close to the rear panel. Standard utilization involves the use of the point closer to the rear panel for the safety cable attachments, but depending on the support structure all 10 threaded inserts have the same capacity and can be used for any purpose. Please refer to the overall dimensions drawings for the exact position of each point.

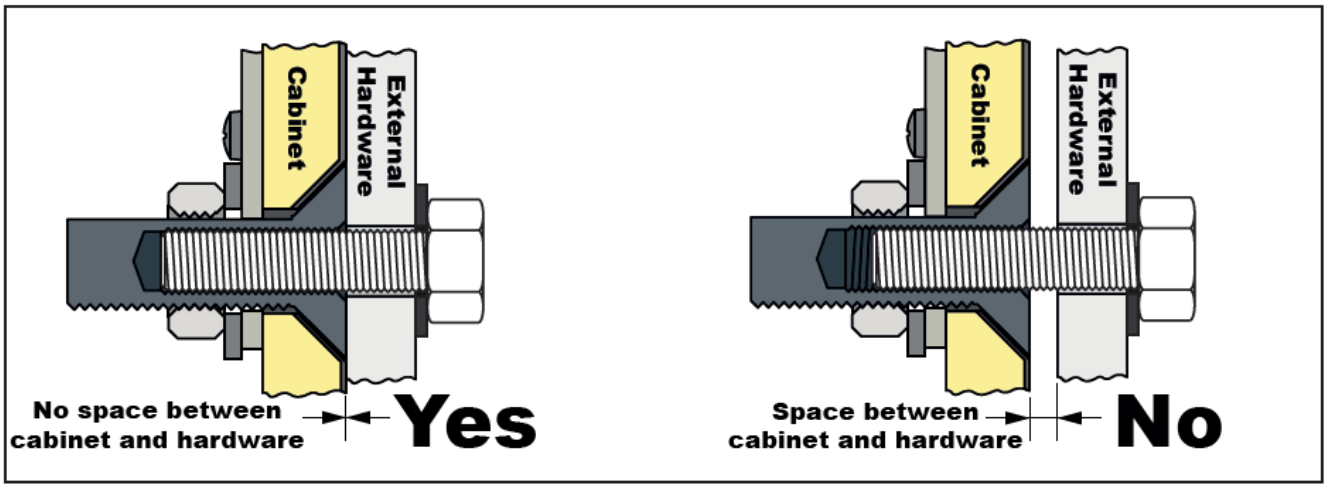


The rigging points consist of unperforated inserts designed to hold a M10 bolt. The inserts are made of anodized corrosion-resistant aluminium alloy (Ergal) but it is in any case suggested to protect against dust and any other external agents the points that are not used.
The length of the screw must allow the effective use of 30 mm of thread, as shown in the picture below. It is strictly forbidden to use a shorter screw for safety reasons and to avoid damages to the loudspeaker. The screw should be of the closest length (less than or equal) to the sum of 30 mm + the thickness of the external elements: for example for a 5 mm plate + 2 mm washer we would have 37 mm (length not commercially available); therefore the M10x35mm bolt must be used.



The external hardware must be placed in contact with the cabinet. Tightening the screw with hardware that is not in contact with the enclosure may result in damage to the rigging points or to the cabinet if excessive torque is

applied.



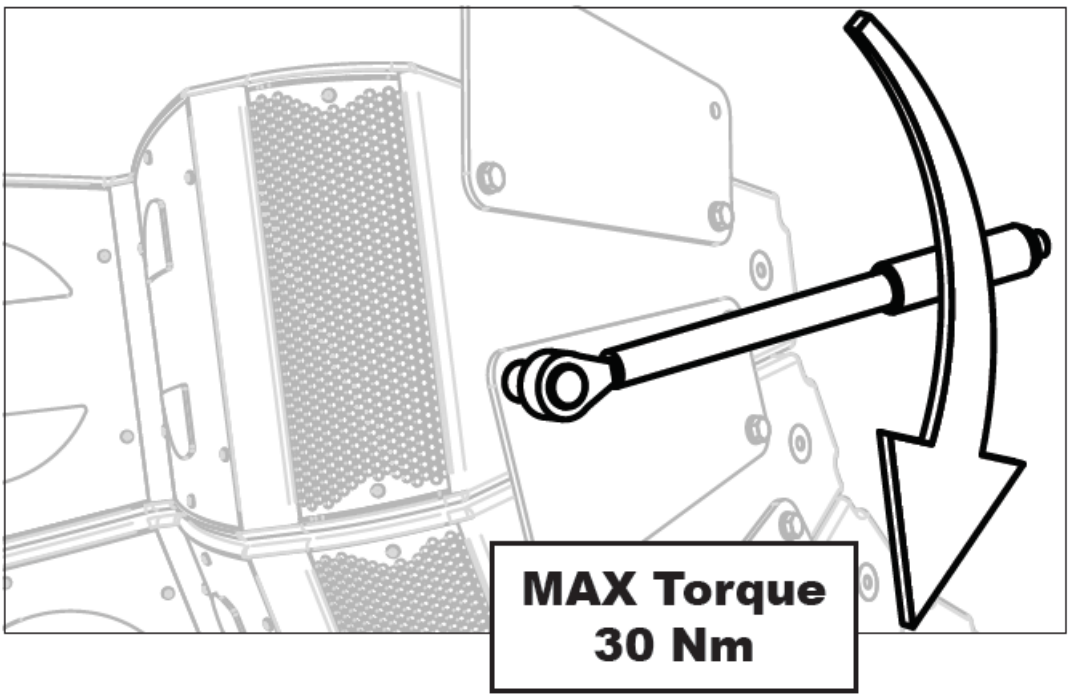
RIGGING POINTS MAXIMUM TORQUE

The connection of the external hardware to the rigging points must be made using proper bolts (the usual class is 8.8), following the above prescriptions and applying a controlled torque value with the help of a torque wrench (dynamometric key).
The tightening torque defines the axial force between the bolt and the insert and depends on the frictions with the washer and the thread of the insert. As a result of this, in order to apply the same

axial force, smaller torque is required if the parts are lubricated.

The torque to apply has been defined considering the resistance of the insert, of the wood and the interaction between the parts. The maximum tightening torque is 30 Nm for lubricated parts.

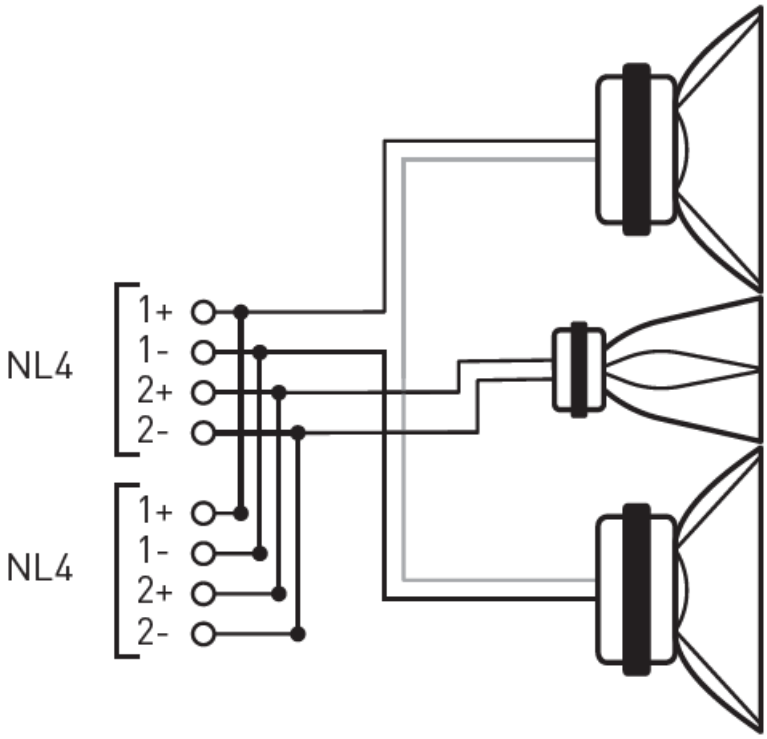
Tightening the bolts with higher or not controlled torque might result in damages and risk for the safety.



AMPLIFICATION

Scala 90 is two-way systems designed to be used with two amplifier channels. It features two 8” woofers and one 3” compression driver.

The connections are available on two NL4 speakON connectors.The mid-low frequency section is using pin 1+/1- while the high frequency section is using pin 2+/2-.
The system shall be used with the suggested Outline amplifier and presets DSP ensuring safe working condition and expansive dynamics..
However it is possible to control parameters such as levels, delay, polarity and input EQ.



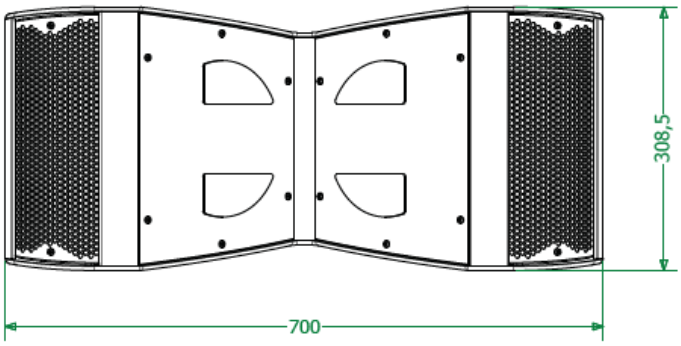
CABLE SELECTION AND AMPLIFIER CONNECTION

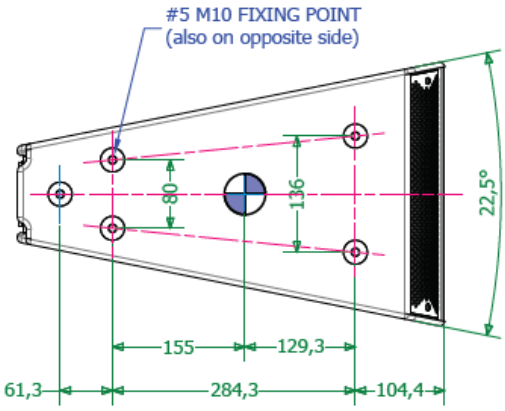
The connection from the amplifier to the loudspeakers must ensure proper energy transmission and small losses. A general rule is that the cable's resistance should not be greater than the 10% of the minimum impedance of the components to be connected. Each Scala 90 has a nominal impedance of 8 Ω (LF) and 8 Ω (HF).
The resistance of the cable can be found in the catalogues of the cable manufacturers. These usually report the resistance of the length of one conductor, so this value shall be multiplied by 2 to consider the total round trip distance.

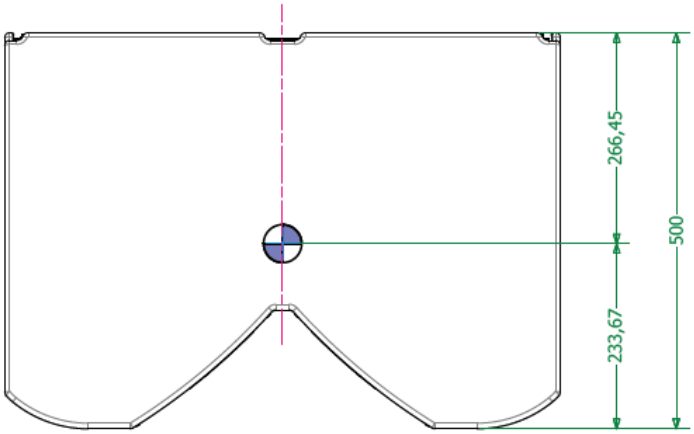
The resistance of the cable (round trip) can also be estimated with the following formula:
R = 2 x 0.0172 x l / A
Where 'R' is the resistance in ohm, 'l' is the length of the cable in meters and 'A' is the section area of the wire in square millimeters.
The following table reports the resistance in ohm per kilometer for different wire sections (calculated with the formula above) and the recommended maximum length of the cable.
Please, note that these values refer to driving a single element per channel.

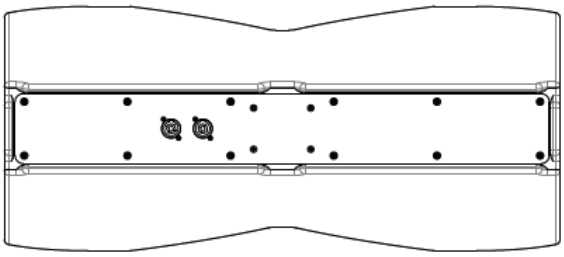
Wire area [mm2]	AWG	Round trip cable resistance [Ù/km]	max cable length [m] (R < = 0. 8 Ù)
2.5	~13	13.76	58
4	~11	8.60	93
6	~9	5.73	139
8	~8	4.30	186

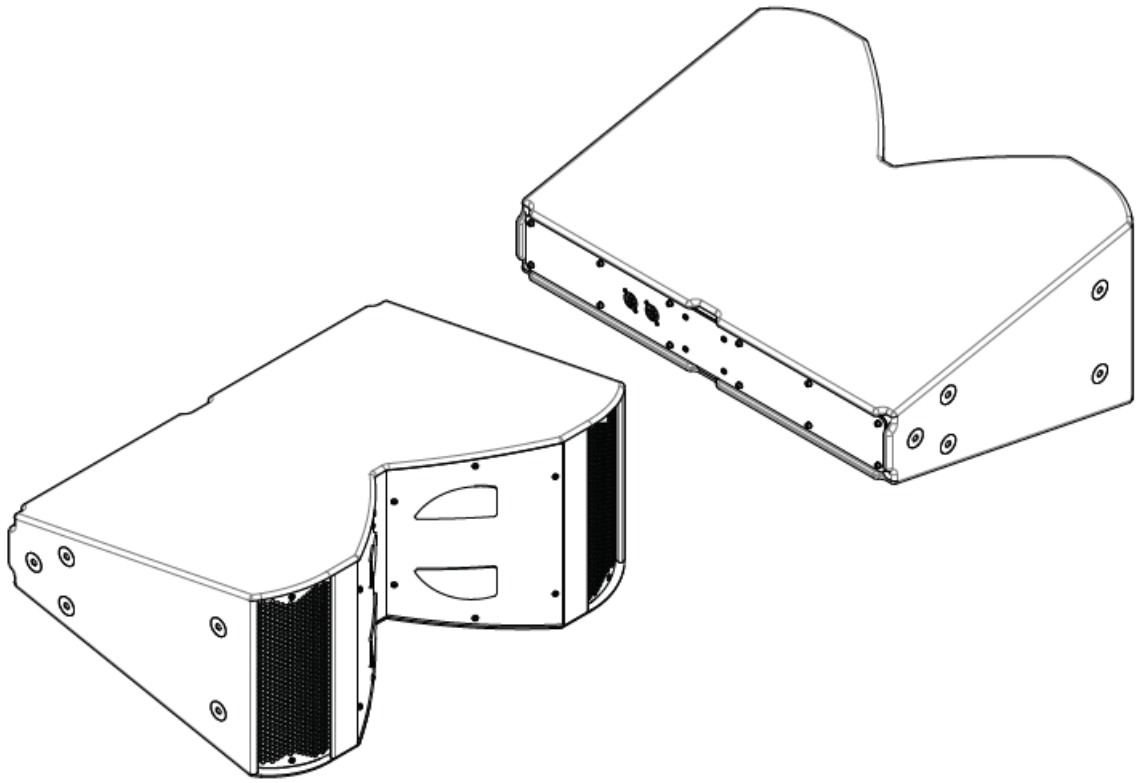
OVERALL DIMENSIONS











TECHNICAL SPECIFICATIONS

PERFORMANCE SPECIFICATIONS	
Frequency Response (-10 dB)	65 Hz – 20 kHz
Horizontal Dispersion	90°
Vertical Dispersion	22.5°
Operating Configuration	Bi-amplified
Impedance Midrange (Nom.)	8 Ω
Impedance High (Nom.)	8 Ω
Watt AES Midrange (continuous / peak)	500 W / 2000 W
Watt AES High (continuous / peak)	120 W / 480 W
Maximum SPL Output*	139 dB SPL
**calculated using a +12 dB crest factor signal (AES2-2012)*	

PHYSICAL	
Component Midrange	2 x 8” NdFeB midwoofer
Component High	1 x 3” diaphragm NdFeB compression driver (1.4” exit)
Midrange Loading	Partially horn, bass-reflex
High Loading	Proprietary waveguide
Connectors	2 x NL4 in parallel
Cabinet Material	Baltic birch plywood
Cabinet Finish	Black polyurea coating
Grill	Epoxy powder coated
Rigging	10 x M10 threaded points
Height	309 mm – 12 1/8”
Width	700 mm – 27 4/8”
Depth	500 mm – 19 5/8”
Weight	21.5 kg – 47.4 lb

APPENDIX – PERIODIC CONTROLS

All the loudspeakers, before the shipment, are ful-ly tested at the end of the production line, but before the system is installed an overall check shall be per-formed to ensure that the system has not been damaged during the shipment. Periodic controls shall be performed at regular time intervals. The following ta-ble represents an ideal check list and shall be com-pleted with the external rigging elements.

Loudspeaker Serial Number:			Position:					
Date								
Transducers Impedance								
Amplifier								
Loudspeaker cabinet								
Loudspeaker grills								
Grills screws								
Hardware								
Hardware bolts								
Main rigging structure								
Safety devices								
Additional notes								
Signature								

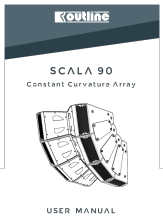
Outline carries out on-going research for product improvement. New materials, manufacturing methods and design upgrades are introduced to existing products without prior notice as a routine result of this phi-losophy. For this reason, any current Outline product may differ in some aspect from its description, but will always equal or exceed the original design specifications unless otherwise stated.

Operating manual product code: Z OMSCALA90 Release: 20211124
Printed in Italy

Tel.: +39 030.3581341 Fax +39 030.3580431 **info@outline.it**

OUTLINE S.R.L.
Via Leonardo da Vinci, 56 25020 Flero (Brescia) Italy

Documents / Resources

	**outline SCALA 90 Constant Curvature Array** [pdf] User Manual SCALA 90, Constant Curvature Array, SCALA 90 Constant Curvature Array, Curvature Array, Array