



STSUB-215

High Power Outdoor Subwoofers



USER MANUAL

SAFETY REGULATIONS

Please read this manual carefully and in its entirety. It contains important information regarding safety issues, including guidelines for general safe use of rigging systems as well as advisories on government 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 maximum configurations of the elements and of any third-party component (such as suspension points, motors, rigging accessories, etc...)
- Do not incorporate any accessory not provided by Outline; all damaged or defective components must be replaced only by equivalent parts approved by Outline
- 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 correctly 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 techniques, safety recommendations and with the instructions 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 reasons users have the responsibility to adopt and adhere 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 inspect 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 anomalies discovered.

DISPOSAL OF WASTE MATERIALS

 Your product is designed and manufactured with high quality material 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 European Directive 2002/96/EC and subsequent amendments. This means that the product must NOT be disposed with other waste. It is the user's respon-

sibility to dispose of their electrical and electronic equipment by handing it over to an approved re-processor. For more information 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

CE All the Outline electro-acoustic and electronic devices are in accordance with objects stated by CEE/EU directives.

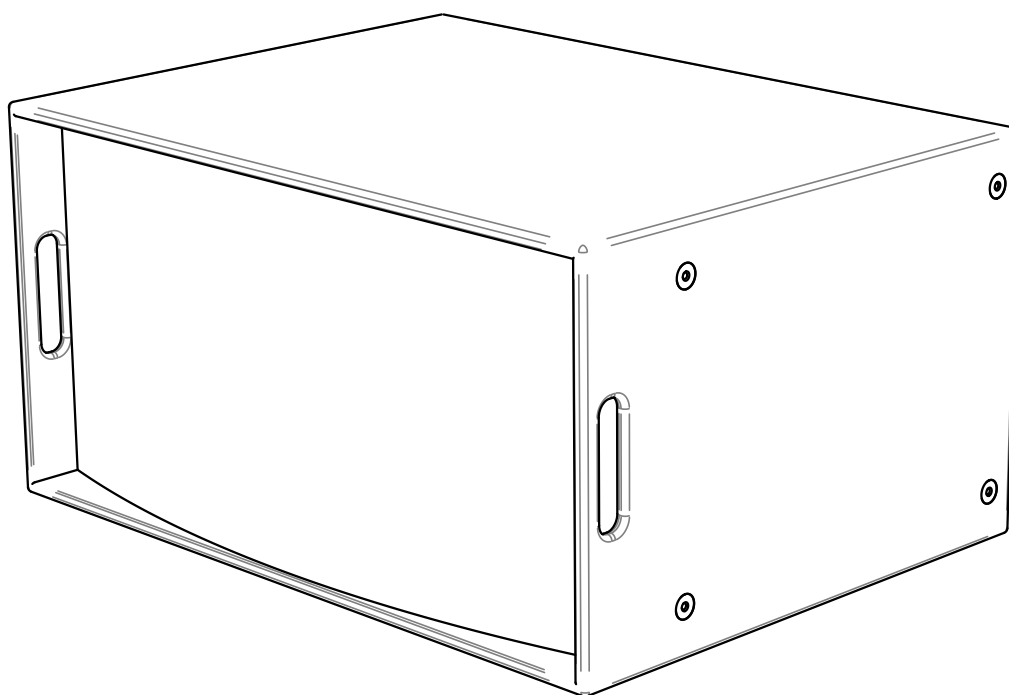
The CE declaration of conformity and the warranty are printed on a document that is shipped with the product.

STSUB-215 DESCRIPTION

The STSUB-215 loudspeaker mounts two bass-reflex loaded 15" neodymium woofers.

The enclosures are constructed with birch ply finished with 'outSIDE', an extraordinarily tough and waterproof elastoplastic coating which interacts with the cabinet material to provide extreme levels

of long-term protection. The outSIDE coating is just one of the fundamental parts of the outSIDE concept, which is a set of conceptual and implementative operations leading the product to be suitable for exposure to aggressive weather conditions.



SAFETY PRECAUTIONS

STSUB-215 are 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 (exposure to heavy weather, heavy use, etc..).

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).

Additional tests must be performed after every unusual event such as incorrect use, very heavy storms, etc...

The results of the periodic tests must be reported on a document like the one at the end of this manual.

RIGGING INSTRUCTIONS

Each STSUB-215 speaker requires an external rigging structure to support each single element and the total weight of the cluster if more than one loudspeaker is used. The rigging hardware must be designed according to the local laws and local

safety factors and considering the total load of the system, the dynamic factors induced by vibrations, winds and mounting procedures. The rigging system shall allow also safe mounting and dismounting operations and easy visual control.

RIGGING POINTS POSITION

Each STSUB-215 offers eight M10 threaded female points. Four rigging points are available on each side of STSUB-215 cabinet. Two of them are close to the front panel (as shown in the picture below) and

two are close to the rear panel. Please refer to the overall dimensions drawings for the exact position of each point.

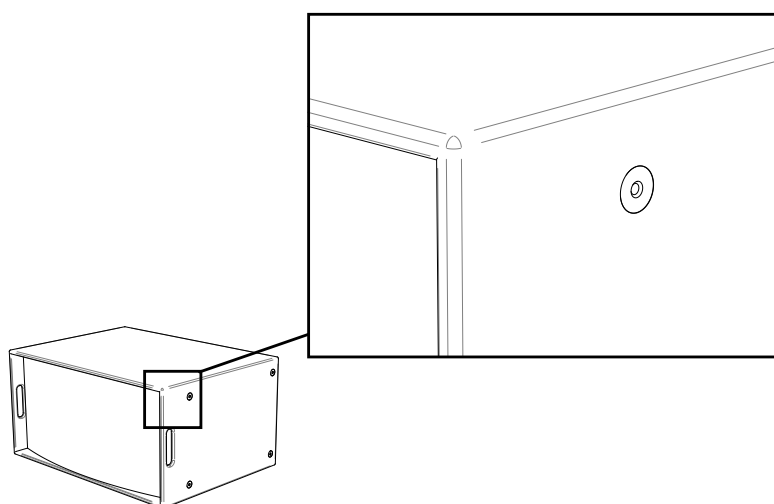
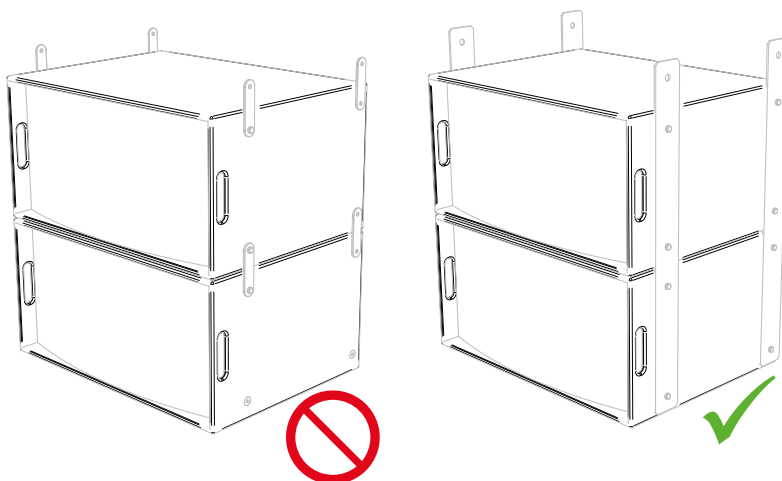


Figure 1: Detail of the position of a rigging point on a STSUB-215

RIGGING STRUCTURE

The external rigging hardware must provide support for each loudspeaker. This means that the loudspeakers are **NOT** intended to support other loudspeakers or other weights.

When multiple loudspeakers are used to build a so-called "line array", the external rigging must embrace each loudspeaker and the entire array, as shown in the picture below.



RIGGING POINTS DETAILS

The rigging points consist of unperforated inserts designed to hold a M10 bolt while protecting the speaker from water. The inserts are made of galvanized steel to prevent corrosion and are oiled to offer further protection. Even with these features it is suggested to protect against water the points that are not used.

The length of the screw must allow the effective use of 22 mm of thread and must not exceed the maximum depth of the insert (27 mm), 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.

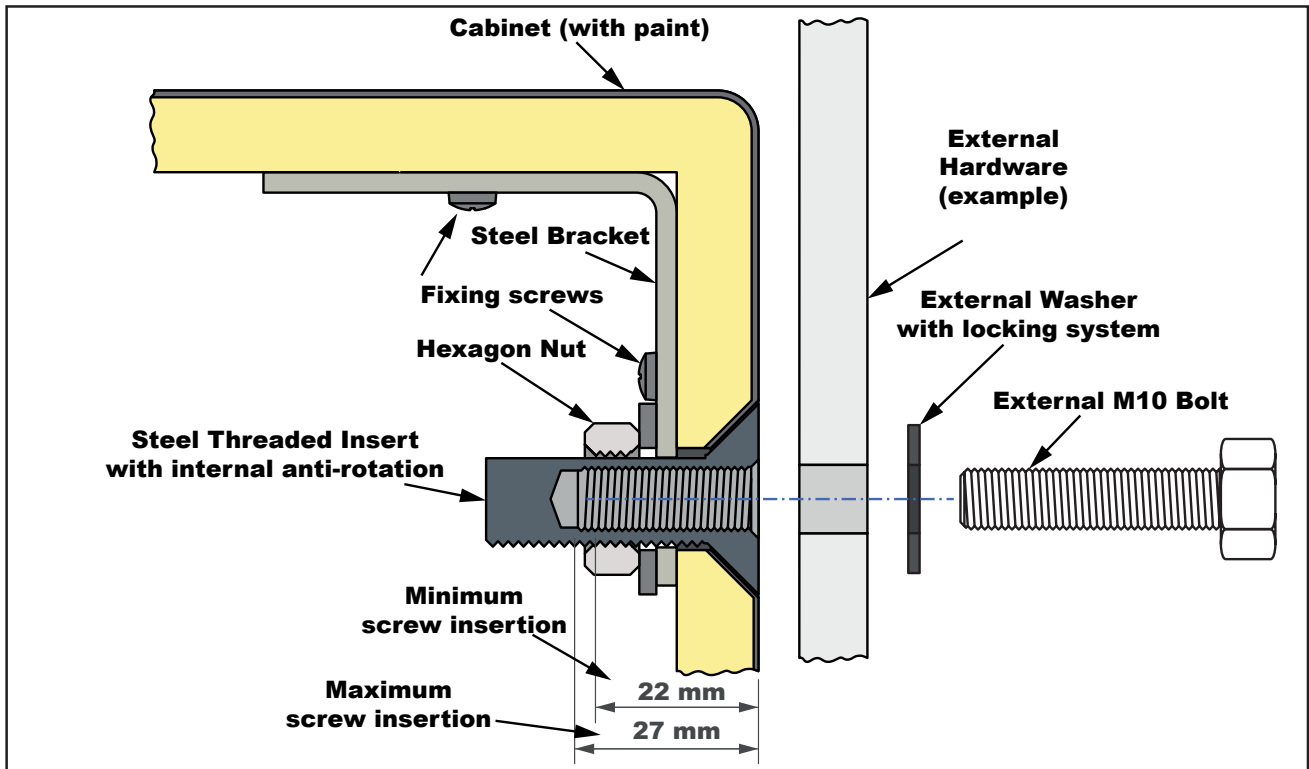


Figure 2: Rigging points details: each rigging point is made of a special insert that can receive a M10 bolt and ensure no water penetration inside the loudspeaker.

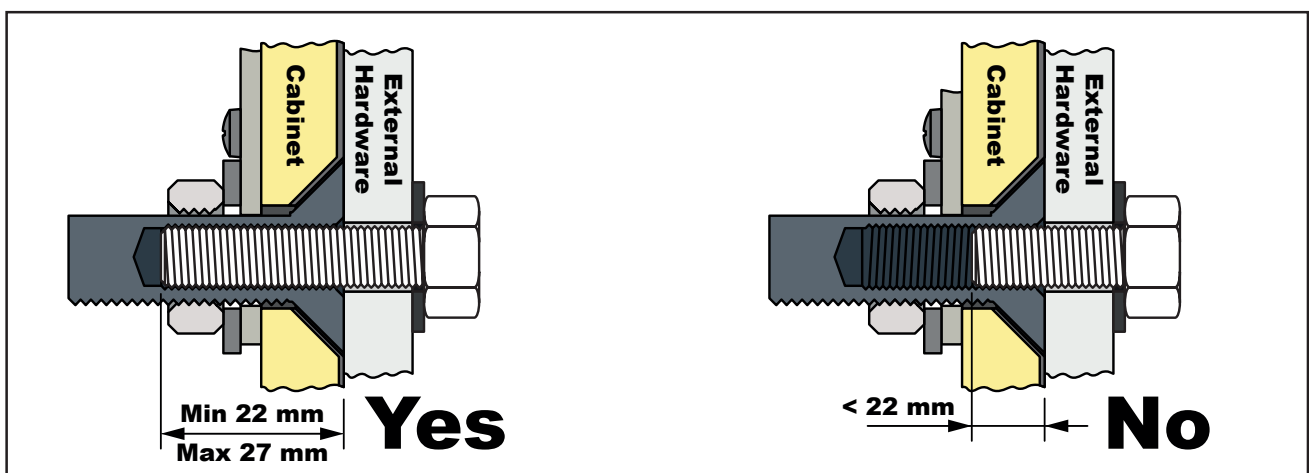


Figure 3: Correct use (on the left) and incorrect use (on the right) of the rigging points. The bolt must be long enough to fully engage the internal thread considering also the external hardware and accessories.

The external hardware must be designed to be placed as close as possible to the loudspeaker. It is strictly forbidden to use rigging hardware that is at any distance from the loudspeaker at the rigging

points. 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.

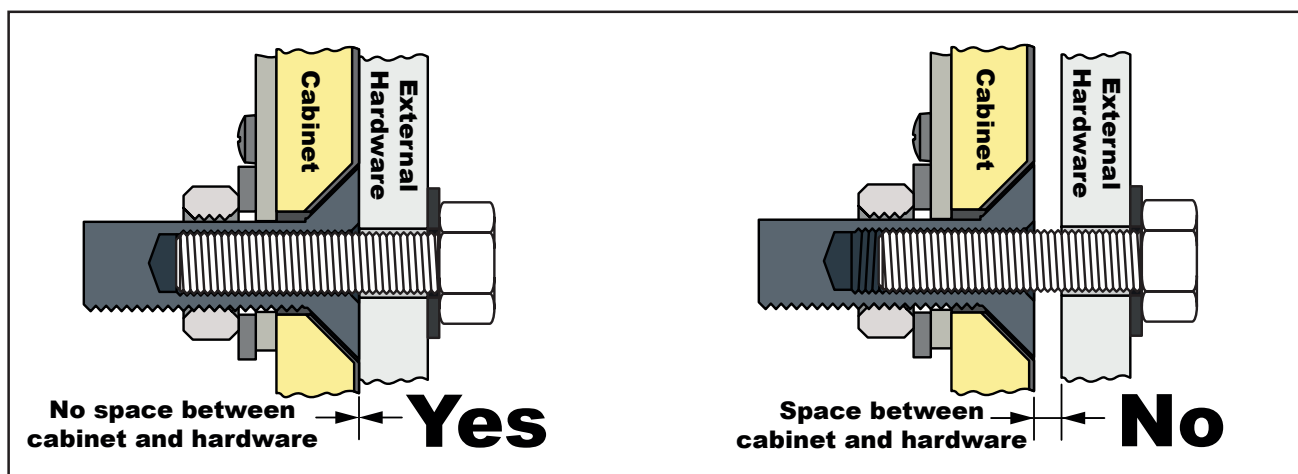


Figure 4: Correct use (on the left) and incorrect use (on the right) of external hardware.

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 15 Nm for lubricated parts.**

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

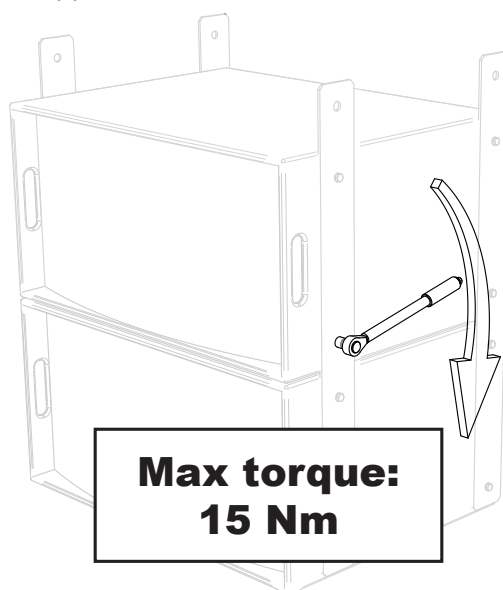


Figure 5: Tighten the bolts at MAX 15 Nm using a torque wrench (dynamometric key).

USE OF THE HANDLES

The handles, which make part of the side panels of the cabinet, have been made for handling STSUB-215 easily during the connection to the

external hardware. **Warning! The handles must not be used neither for rigging, nor for the connection to safety locking systems.**

RESISTANCE TO WATER

The STSUB-215 loudspeakers have been designed to resist to outdoor environment in all weather conditions. This is the result of a technology called "outSIDE" which is a set of conceptual and implementative operations leading the product to be suitable for exposure to aggressive weather conditions. The outSIDE coating technology is a special procedure which implements two layers of polyurea paint plus one layer of UV-resistant

finish with calibrated elasticity. This kind of finish avoids polymerization and yellowing of the polyurea, whereas the calibrated elasticity helps keeping in time the perfect adherence between the layers in order to adapt to the dimensional variations of wood caused by "wet-dry" cycles of outdoor environment. It is to consider that the total thickness of the layers is of 2 mm (to add to the overall dimensions given in the technical drawings).

The external rigging hardware must be approved by a licensed professional engineer

AMPLIFICATION

STSUB-215 uses two 15" woofers and a single amplifier channel is required. The wiring to these components is available on a 4-conductor barrier strip on the side of the loudspeaker.

The woofers are connected as shown in the picture below, in standard operations the links between pins 1 and 4 and between pins 2 and 3 allow the use with a single amplifier channel. It is also possible

to remove the links and use all four connectors, i.e. to use a double wire connection (useful for long cables to reduce the cables' resistance) or to drive independently each woofer.

A proper size amplifier and DSP are required to operate the loudspeaker ensuring safe working condition and expansive dynamics.

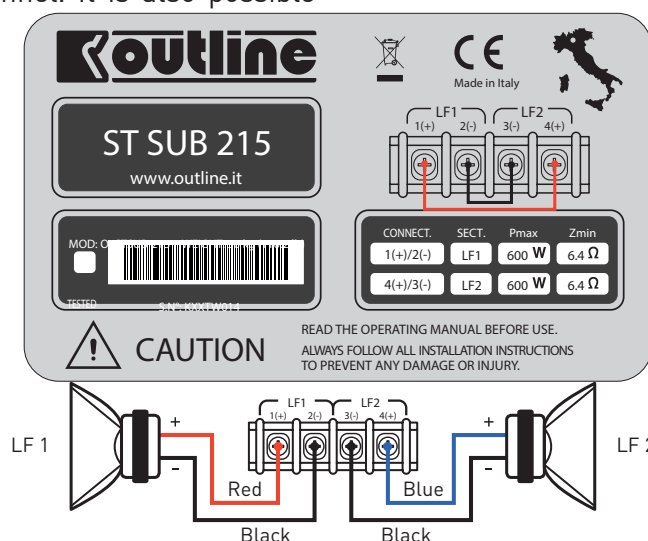


Figure 6: STSUB-215 wiring as shown on the loudspeaker's label (in thick black and red are represented the link cables for standard 1-channel mode) and the internal wiring

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 Stadia 100 LA, when used in bi-wiring has a nominal impedance of 4 Ω (LF) and 8 Ω (HF) and a minimum impedance of 3.2 Ω (LF) and 8.1 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.

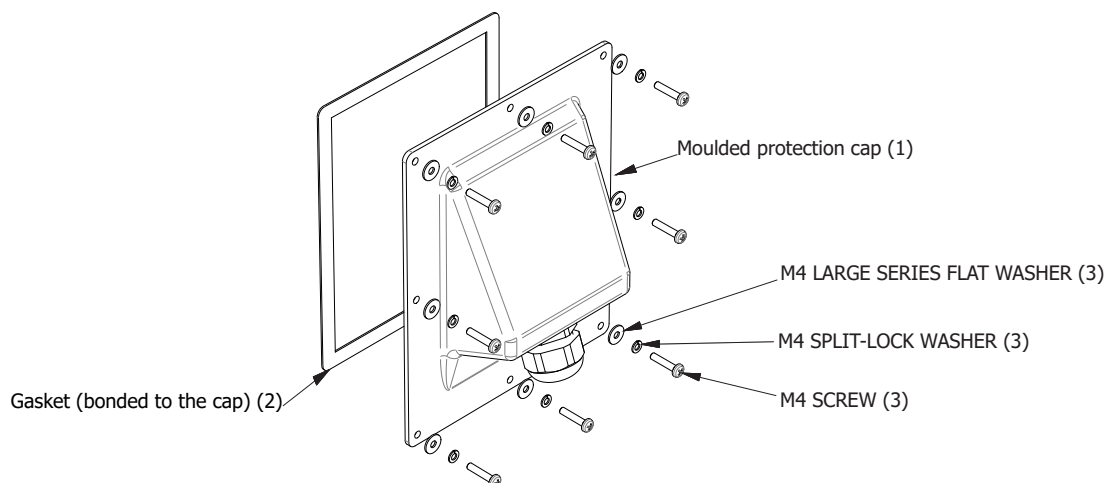
The resistance of the cable (round trip) can also be estimated with the following formula: $R = 2 \times 0.0172 \times l / A$. Where 'R' is the resistance in ohm, 'l' is the length of the cable in meters and 'A' is the section area of the wire in square millimeters.

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.

Wire area [mm ²]	AWG	Round trip cable resistance [Ω /km]	max cable length [m] ($R \leq 0.335 \Omega$)
4	~11	8.60	39
6	~9	5.73	58
8	~8	4.30	78
10	~7	3.44	97
16	~5	2.15	156

WEATHERPROOF CABLE PROTECTION

The weatherproof cable protection consists of a moulded protection cap (1), a neoprene gasket (2) and a set of screws (3) (see figure below), with the cable gland already mounted on the cap.



The neoprene gasket serves for the protection of the cable connections from water and dust ingress, so it is necessary to check the gasket conditions and integrity before mounting the protection cap. Please respect the sequence when mounting the

washers: first the large series flat washer (for the protection of the cap from scratching), and to follow the split-lock washer in order to prevent the unwanted unscrewing.

APPENDIX - PERIODIC CONTROLS

All the loudspeakers, before the shipment, are fully tested at the end of the production line, but before the system is installed an overall check shall be performed to ensure that the system has not been damaged during the shipment. Periodic controls

shall be performed at regular time intervals. The following table represents an ideal check list and shall be completed 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								

NOTES



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 philosophy. 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.

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