



# **CMCE MARINE**

## ***INSTALLATION GUIDE***

# DETERMINATION OF THE MODEL TO BE USED IN THE BOAT

To determine the model to be used, the dimensions of the boat should be taken into account, a general rule that can be followed is to verify the distance from the tip of the main mast to the fore-end (DF) and from the tip of the mast to the stern end (DP), thus also the height of the mast measured from the keel (DH).

- If  $DF; DP; DH < 25\text{m}$  the CMCE-Gold model is used.
- If  $25 < DF; DP; DH < 55\text{m}$  the CMCE-Platinum model is used.
- If  $55 < DF; DP; DH < 120\text{m}$  the CMCE-Diamond model is used.



But this is determined by the boat manufacturer's data such as hull type, hull construction material, surface finish, mast material, and function of the boat.

There are special cases where the protection must be oversized for greater security, for these cases the manufacturer is consulted.

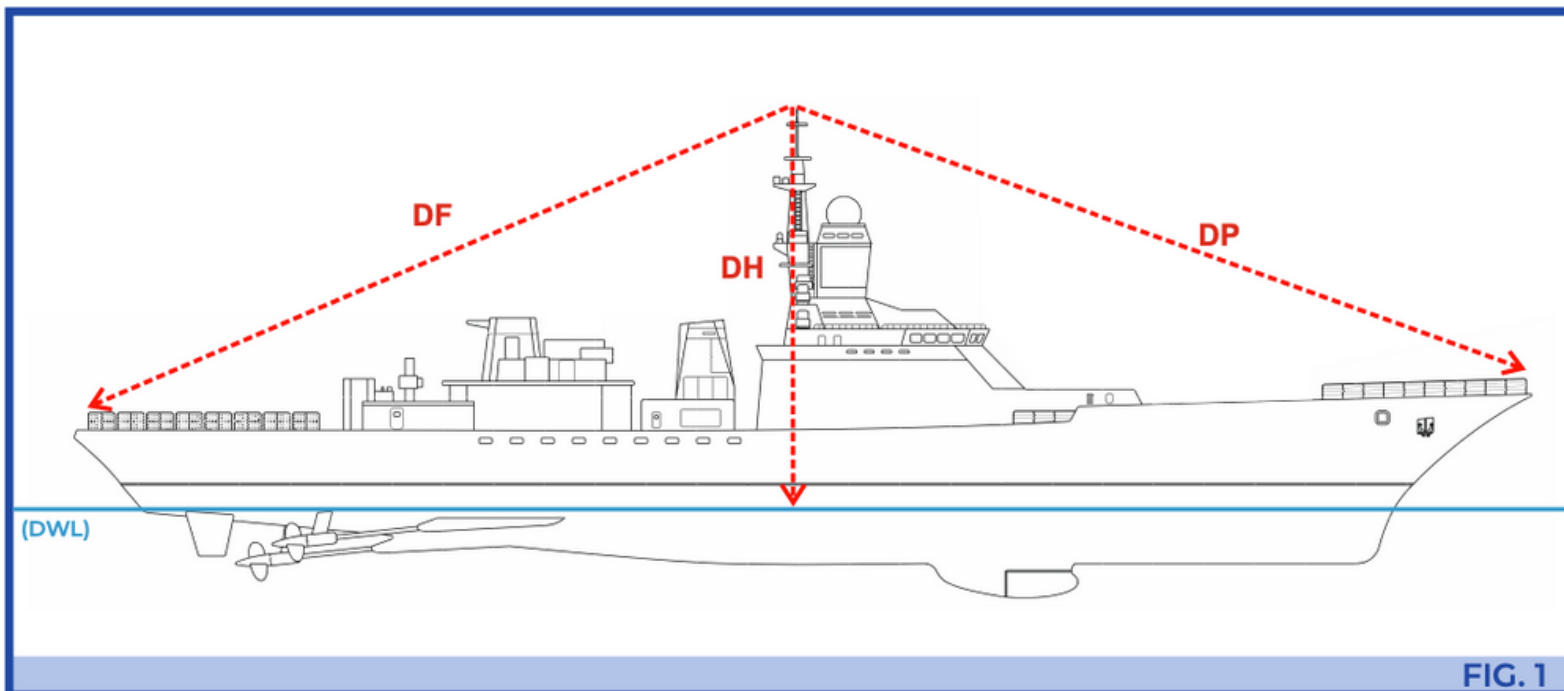


FIG. 1

# HEIGHT OF MOUNTING

A support will be prepared to adapt the CMCE device and install it at the highest point of the mast, protruding at least 30cm/1 ft (measured from the bottom plate of the CMCE Marine-backup chart) above any existing antenna (see simulation) on sailboats or catamarans. For other vessels, a minimum of 180cm/6ft (measured from the bottom dish of the CMCE Marine-backup chart) must protrude above any existing equipment or antenna. To do this, the antennas and other elements will be adapted and rearranged, so that they are in a plane less than 180cm/6ft below the lower dish.

In exceptional cases in which antennas or objects such as outriggers are difficult to exceed in height by the CMCE device, it is not a complication if these elements are made of plastic material, covered with fiberglass or any insulating material, they do not affect the functioning of the CMCE device.

If there is an element above the CMCE device made of conductive material, it is then covered with a non-conductive material such as heat shrink tubes or some insulating material that completely covers the conductive material (See figure 3).

For this purpose, the necessary anchors will be made to guarantee the mechanical support of the antennas and the protector tube, in the mast union/CMCE, adapters will be used to guarantee the electrical and mechanical connection of the CMCE device head with the mast and the socket earth, all of these should be lubricated with graphite grease. The mechanical assembly of the mast and supports will be calculated to support the weight of the CMCE device, the blows of the tide during navigation, and winds exceeding 180km/h.

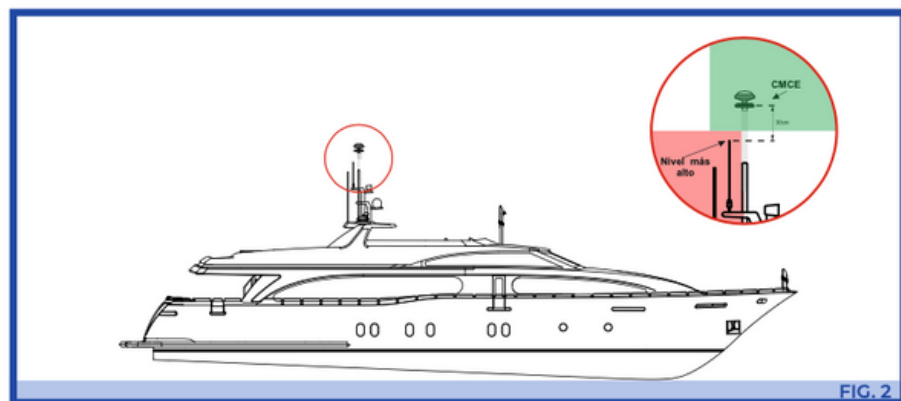


FIG. 2

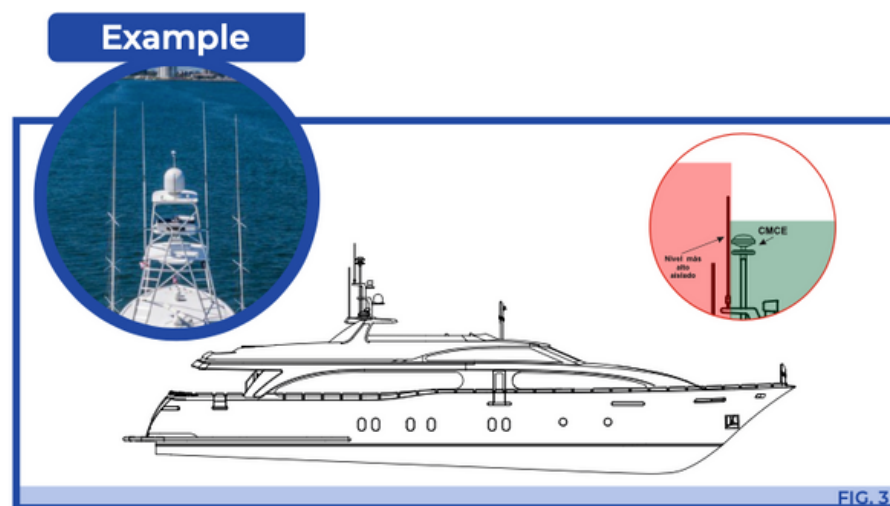


FIG. 3

# ATTACHING THE CMCE TO THE MAST OR FRAME OF THE BOAT

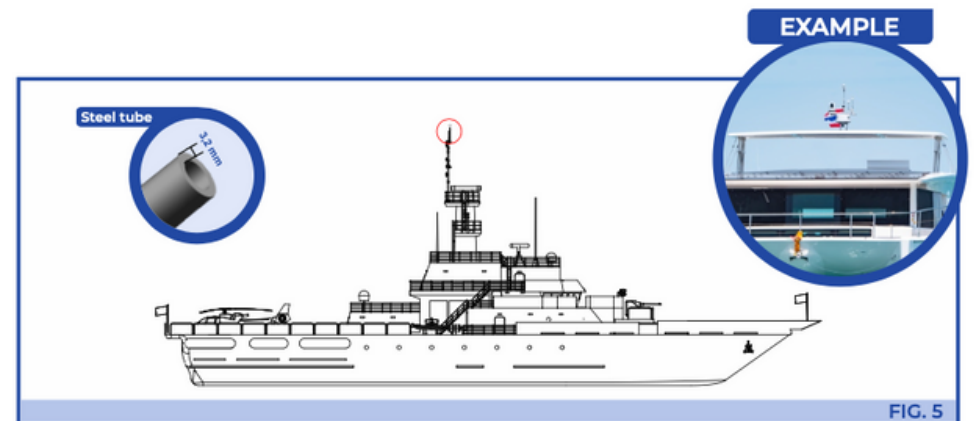
## MANUFACTURED SUPPORT:

A support can be manufactured according to need that would be attached to the end of the main mast, the CMCE device must exceed the highest point, stainless steel bolts must be used for fixing, and the support to be manufactured can be made of stainless steel, fiberglass, or aluminum. If you want a material with greater mechanical resistance, consult the manufacturer.



## NAVIGATION CABIN (BRIDGE):

You can use the aforementioned support and add a tube if you need to gain height to overcome the highest point. The tube must be made of stainless steel, fiberglass, galvanized steel with epoxy paint treatment. Hollow, with walls of a minimum thickness of 3.2 mm, and to this the CMCE device must be fixed using a through bolt with a self-braking nut at the end, the fixing of the tube with the manufactured support can be done with flanges, galvanized or stainless steel braces. If both parts are made of steel, they can be welded or by a fixing system suggested and approved by the factory. When the tube exceeds the fixing support by 1.5 meters, the use of steel rope tensioners will be used.



# ATTACHING THE CMCE TO THE MAST OR FRAME OF THE BOAT

## CHIMNEY:

Same consideration as in the navigation cabin, but taking into account the average working temperature and the maximum temperature, if these temperatures exceed 160 degrees Celsius (320 F), the marine ATs for high temperatures will be used. The equipment must be set in the opposite direction to the flow of gases in the normal direction of navigation. If you have cranes that reach or exceed a height, you must install a pivoting device (see figure).

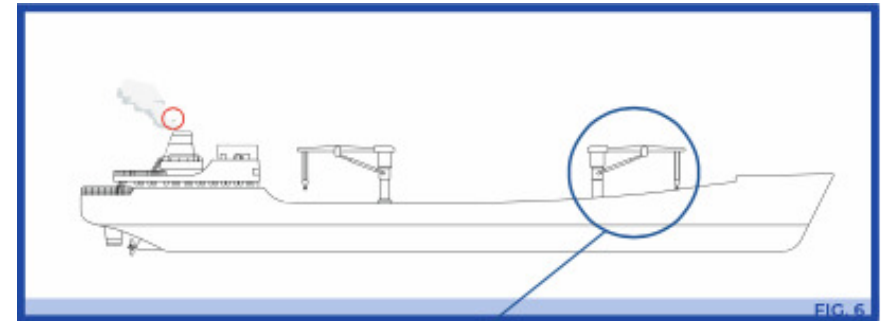
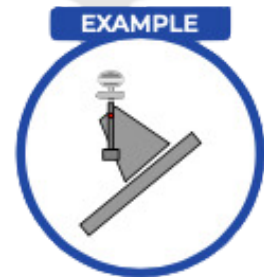


FIG. 6



FIG. 6.1



EXAMPLE

## TWO OR MORE MASTS OF EQUAL HEIGHT:

The equipment must be located on the mast where the most optimal coverage is obtained. In this particular case, the height of the masts should exceed at least 50cm, in case of separation distance between masts close to the highest point of the boat, it will be necessary to exceed the mast by 1 meter.

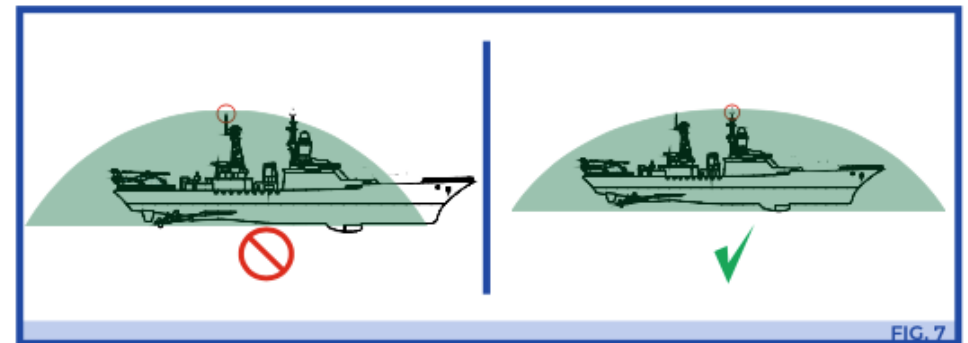


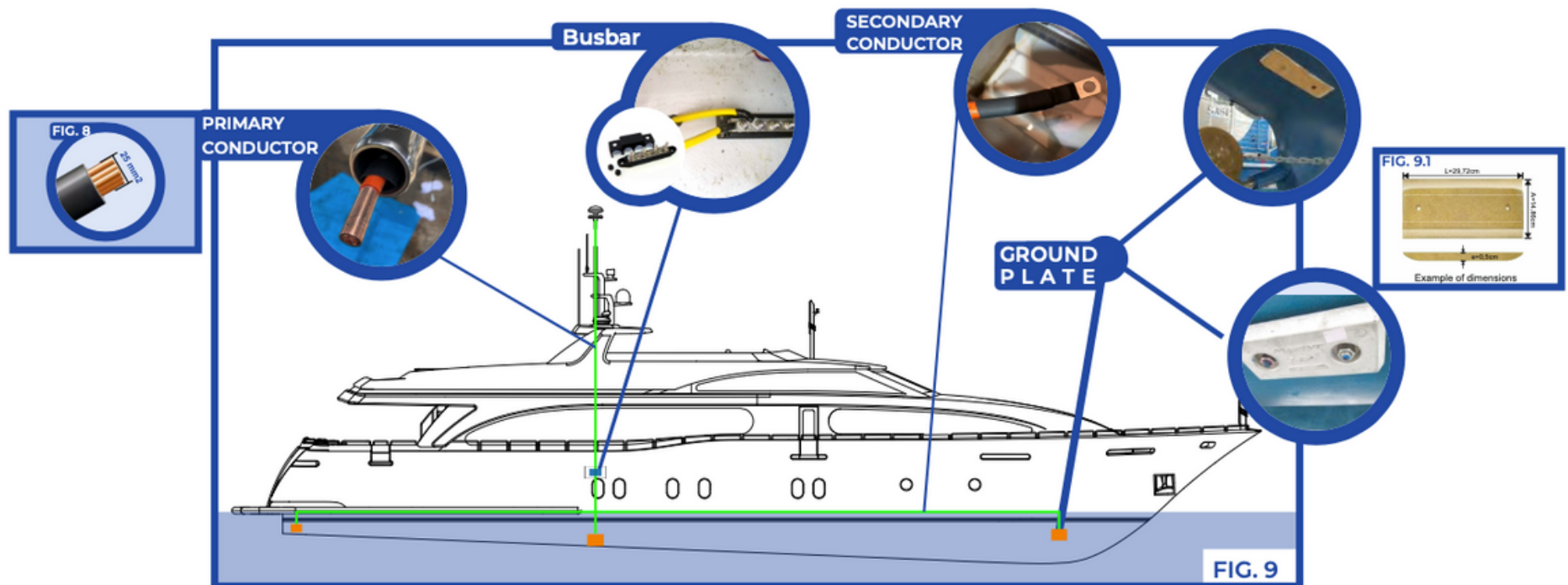
FIG. 7

# GROUNDING

Compliance with the following specifications is required for the CMCE Lightning Suppressor grounding system:

- You must have a main conductor down from the CMCE device to a busbar/link from which the secondary conductors are derived to the earth plates.
- The conductors must be coated copper, must have at least 95% purity to ensure electrical conductivity and a minimum of  $25\text{mm}^2$  (4 AWG).
- Conductive materials can be used, apart from copper, such as aluminum, stainless steel, and zinc, as long as they comply with the section equivalence with copper.
- The materials used in the installation of the lightning protection system must be resistant to corrosion in a maritime environment.

- The ground plates must be installed on the non-metallic hull of a boat in order to provide multiple trajectories for the drained charges to be dissipated in the water.
- If possible, the chain plates, rudder, and keel should be grounded.
- Each grounding plate must be connected either directly to a main conductor or to a distribution busbar. The ground system must have a total area of  $929.03\text{ cm}^2$  (plates + busbar).
- The grounding electrodes must consist of a submerged plate with a water contact area of at least  $0.09\text{ m}^2$  (1 ft<sup>2</sup>), a thickness not less than 5mm (3/16 in.), and a minimum width of 19mm.
- All sacrificial anodes or ground plates must be submerged below the waterline.
- It is recommended that copper conductors should have a tin galvanic coating.



# GROUNDING

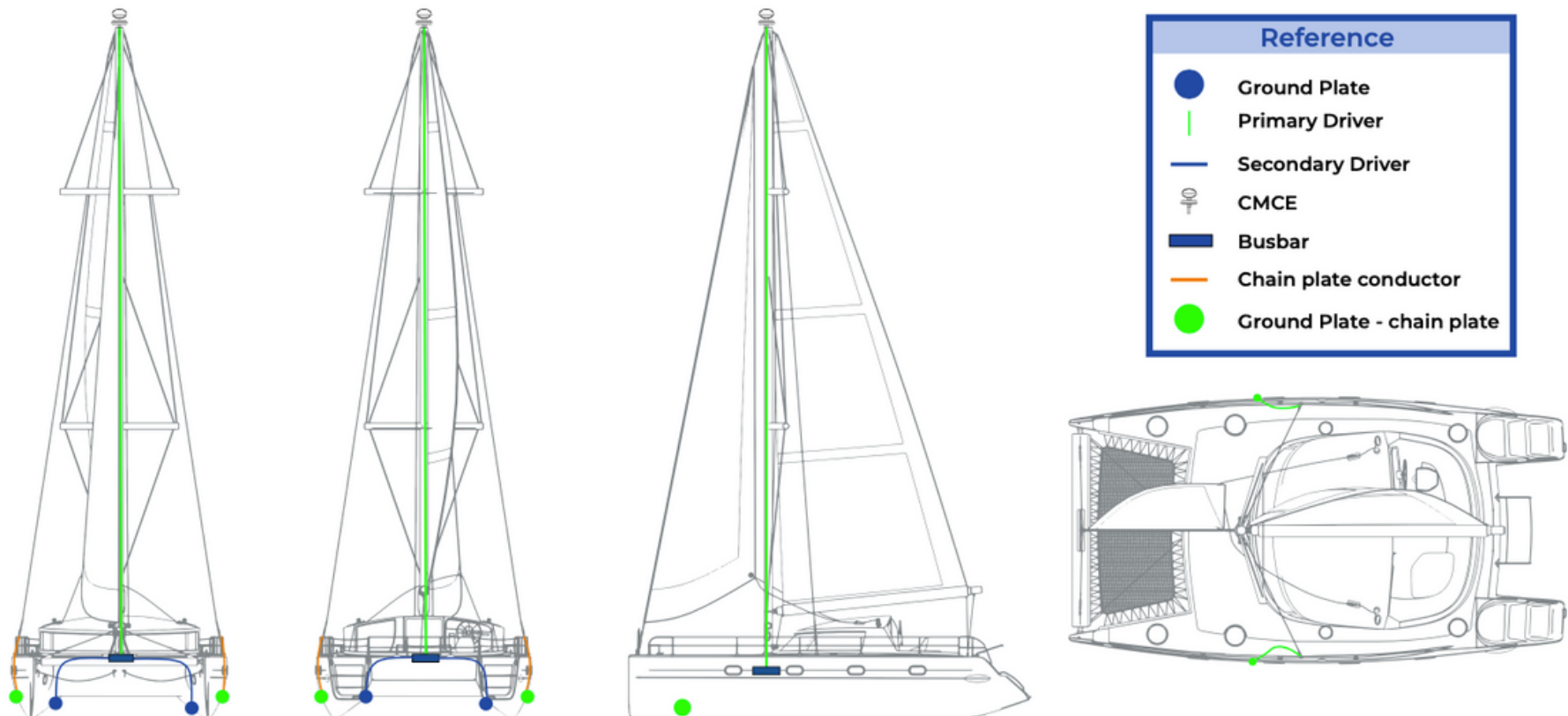
Starting from the (main) down conductor, a busbar is used that interconnects each (secondary) path that is connected to the ground plates, this distribution and sizing is carried out in relation to the type of vessel.

In general, from the busbar, at least two secondary conductors must be routed, one to the port side in a forward direction and the other to starboard in a stern direction, in which they must be connected to the earthing plates, one of these submerged and the other on the waterline. This must be added to the interconnection of existing bars of the boat if it has them.

Ships with metal hulls: When there is an electrical connection between a metal hull and a CMCE device of sufficient height to obtain the protection zone, no more than one connection to a grounding plate should be necessary. It must be the one found above the waterline.



In case of having a different scenario or not mentioned above, consult with the manufacturer.



# GROUNDING EXAMPLE



## OBSERVATIONS

- Chain plates must be grounded.
- The shaft, propeller, or rudders can be grounded.
- Never connect the grounding system of the CMCE with the negative of the motor and batteries.

