

Protection System against Atmospheric Discharges and Electromagnetic  
Pulses avoiding direct lightning strike on the protected structure

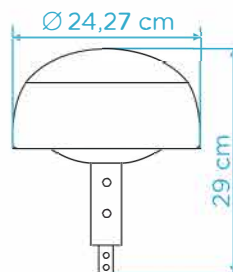
Made of  
SS & POM

Weight  
7,6 kg

Packaging:  
Recicled  
cardboard &  
PELD



Measurements



Packaging:  
26 x 26 x 47 cm

Passive Collector System of electrostatic currents on time, that takes them to the ground, whose operating principle is based on balancing or compensating the variable electric field on it's surroundings, avoiding the creation of an upward leader on the DDCE MARINE and on to the protected structure.

### Electromagnetic Protector

Sole and effective system for protecting against external electromagnetic pulses (Absorbs the Electromagnetic Pulses between 60 and 90% minimizing damage by indirect effects). The protection design will depend on the type of installation. The DDCE will be placed laterally in isolated structures. As protection of areas or multiple structures will be placed along the perimeter. The DDCE works like thermal fuse, absorbing part of the energy of the Electromagnetic Pulses up to 124,5 KA.

### Maximum working voltage without lightning strikes

#### Progressive tension increase

705 KV are applied to 1 m progressively without lightning discharge (maximum applied by the laboratory). According to the high voltage tests carried out at the Electrical Engineering Laboratory of the University of Pau (University Center for Scientific Research),

### Application of instantaneous voltage (comparison with Franklin Rod)

With peak voltage (kV) U100 from 427,5 KV to 1.15 m, the leader always appears at the Franklin Rod.

With peak voltage (kV) U50 from 530.8 KV to 1.15 m, the leader appears on the ground or at the base of the mast, but always outside the DDCE MARINE.

According to the high voltage tests of the Official Central Electrotechnical Laboratory (LCOE) of Getafe (Madrid)

### DDCE MARINE performance

Tests carried out in the Official Laboratory INTA (National Institute of Aerospace Technology) belonging to the Ministry of Defense of Spain, certifies the optimal performance of the DDCE MARINE in the spectrum between 0.4 to 2 GHz as compensator of variable electric fields, behaving as a sink of variable radio frequency electric fields without sending radiant electric fields in this frequency spectrum.

Current impulses of 100 kA. Waveform 10 / 350µs

Tests of Electrical current Impulses to 100 kA with waveform 10 / 350µs according to the UNE 21186: 2011 regulation, section C3.4. The waveforms applied correspond to the UNE-EN 62561 standard

- Ip (kA) = 100 kA ± 10 %
- W/R = 2500 kJ/µ ± 35%
- Q = 50 C ± 20 %
- Duration < 5 ms

Realized in the Official Central Laboratory of Electrotechnics (LCOE) of Getafe (Madrid) with satisfactory result.

Coverage radius

The coverage radius calculation of the DDCE MARINE model is based on the rolling sphere method and is calculated according to the requirements of the UNE EN IEC 62305 (Part I), taking into account the pulse test data 100KA current shorts and 10 / 350µs curve. The DDCE MARINE has been certified for currents slightly higher than 100 KA (124 kA), for which this limit has been established as the maximum current supported by the DDCE MARINE model. Calculating the radius of the resulting rolling sphere by means of the following equation established by the UNE EN IEC 62305 standard:

$$R = 10 * I^{0,65}$$

Applying the formula:

$$(2 * R * h - h^2)^{1/2}$$

- where:
- A: Rolling sphere radio
- h: Height of the DDCE MARINE with respect to the reference plane
- Is obtained:

Installation height (m)	Coverage radius * (m)
5	44,4
10	62,4
15	76
20	87,2
25	96,8
26,79	100
30**	100
40**	100
50**	100

\* The coverage radius of the DDCE MARINE will be given provided all the metallic structures existing within this radius are at the same potential as the lower semi-sphere of the DDCE and there are not structures of equal or greater height.

In case of requiring levels of protection defined in the standard UNE EN IEC 62305 (Level I, II, III or IV), for the calculation of the radius of protection of the DDCE MARINE and of all existing protection systems against lightning, the following radius of the rolling sphere will be applied: Level I (R = 20 m), Level II (R = 30 m), Level III (R = 45 m) and Level IV (R = 60 m). In this case, the protection radius of the DDCE MARINE can also be 100 m, as long as the regulatory requirements are met (Consult the manufacturer or official distributor).

Protection effectiveness

100% reduction of direct lighting impacts on the protected structure.

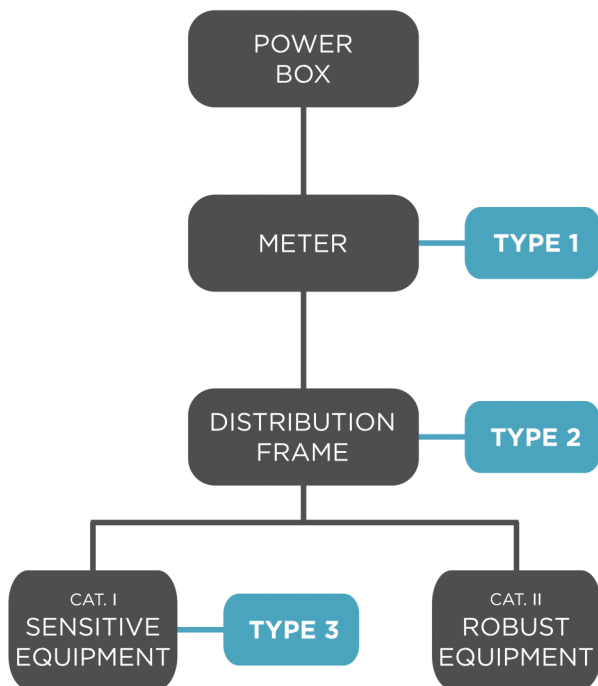
Protection against indirect effects from lightning

If indirect effects due to external induced overvoltage reach the DDCE MARINE, whether by ground or radiated by air (electromagnetic pulses), the DDCE MARINE behaves like a thermal fuse, absorbing part of the energy, and may suffer damage.

For protection against these indirect effects to the DDCE, the protection element model DNNF will be available as a sheath in the down wire just after the end of the axis of the DDCE MARINE, if the mast is made of fiber, or it will be arranged in the cable down just after the end of the mast, if this is metallic (consult installation manual).

For installations that are very exposed to these indirect effects, a ground filter model DNNFT50 will be installed. This passive device will also be used for protection against high-frequency earth-induced surges of all electrical and electronic equipment of the protected structure (see installation manual).

Finally, it will also be necessary to have overvoltage protectors to the electrical installation, according to the following scheme:



#### Type 1 Protectors:

For nominal voltage of 230 V, 50 KA,  $\leq 4\text{KV F+N}$  Type 1 + 2

#### Type 1 + 2 Protectors:

For nominal voltage of 230/400 V, 50 KA,  $\leq 4\text{KV 3F+N}$

#### Protection for telephone line or ADSL Type 1:

20 KA

#### Type 2 Protectors:

Nominal discharge current C2 (8/20 us) 2,5 KA Type 1 + 3

#### Protector for TV/SAT Antenna:

Nominal discharge current C2 (8/20 us) 10 KA

#### Applications

All kind of structures in land and sea

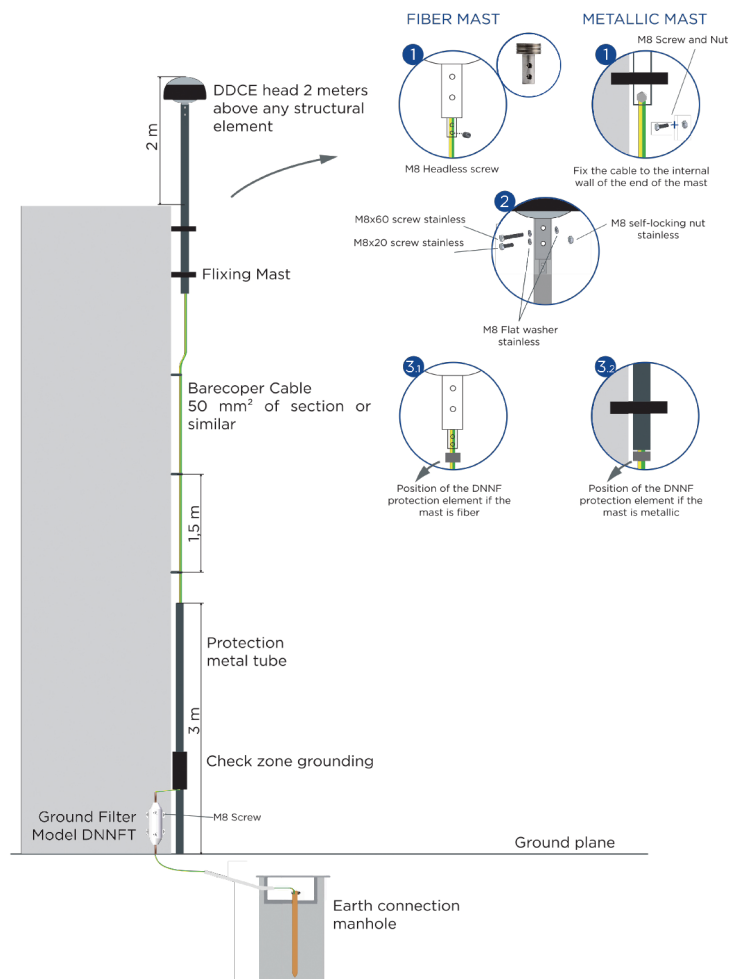
Unique and effective system for the protection of structures within saline and / or corrosive environments, such as ships, ports and all types of chemical industries.

#### Installation

Once the proper height and the mast with 42 mm inner section selected, to place the DDCE MARINE must be made a thru-holes of 8 mm diameter and at 25 and 65 mm from the edge of the mast, ensuring support and mechanical connection between DDCE MARINE and the mast.

The down pipe that joins the DDCE MARINE to the grounding must be as straighter as possible, assuring the trajectory of the cable through flanges and, avoiding to make angles with a less than a 20 cm radius.

Guarantee that the layout of the cable is always descendant.



**IMPORTANT NOTE:** In installations with significant risk of receiving external induced surges (telecommunication towers, radars, substations, etc.), the FIBER mast will always be placed.

#### Bureau Veritas Certification (Es036861)

Lightning protection | UNE-EN (IEC 62305:2012)

Lightning strike risk security | TBC (Technical Building Code): SU8

NBR 5419:2005 | IRAM 2184:2011

NTC 4552:2008 | SANS 10313:2012

AS/NZS1768/2007

NFPA 780:2011 | CAN/CSA-B72-M87(R2013)

#### NATO Certification

The DDCE is officially certified by NATO in the concept of "Lightning Protection System and Electromagnetic Protector" with the NATO code DDCE:NCAGE:SYN37.

The DDCE has been selected to be part of the NATO Cataloguing System (NCS), by which it is guaranteed that a same article is known within the logistics field of the countries members of the system by one and sole denomination and a sole NATO Catalog Number (NOC).



**CE Labeling**

The DDCE device is compliant with General Law of Security Products 2001/95/CE and working limits of Electromagnetic Compatibility , under EC Labeling requirements:

Product Safety | Directives 2011/95/CE

Electromagnetic Compatibilty | Directives

92/31/CEE

Low Voltage Equipment | Directives 72/23/CEE

**Quality Management System**

Dinnteco International S.L, works with the Quality Management System according to international standards ISO 9001:2015, applied to: design, marketing, management, fabrication, installation and assembly of variable electric field lightning rod.

**Labor Risk Prevention**

The DDCE is compliant with the requirements of preventive action (Article 5) of the Law 31/1995 of November 8th of Labor Risk Prevention, as well as RD 614/2001 of June 8th about health and safety protection of workers from electric risk.

**Environmental Protection**

Rohs standards compliant.

**Maintenance**

Annual mandatory, executed and certified by the official installer.

**DDCE Warranty**

5 years product warranty (DDCE), subject to annual maintenance.

**Guarantee coverage**

The guarantee applies to the DDCE models manufactured by **Dinnteco International S.L.**

**Damage covered:** All damage caused to the installation protected by the impact of a direct lighting on the DDCE derived from a manufacturing defect of the product, up to a maximum value of 3,000,000 euros per equipment per year. Are excluded from this coverage, the effects that may appear on the installation and / or product and / or protected area, derived from indirect effects by external induced surges. It also covers damages to third parties for a value of up to 300,000 Euros per victim.

**Geographical scope of coverage:** Worldwide, including USA and CANADA

Note: once the product warranty has been completed and up to the tenth year of installation, subject to annual maintenance, in case of product breakage or operational damage, Dinnteco International will provide a new product to the customer.

