

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

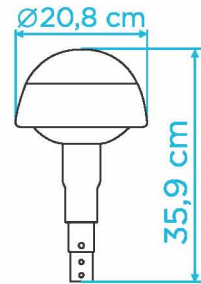
Made of
Aluminum &
POM

Weight
4,5 kg

Packaging:
Recycled
cardboard &
PELD



Measurements



Packaging:
26x26x47 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, tending to avoid the creation of an upward leader on the DDCE Plus and on to the protected structure.

Electromagnetic Protector

System specially designed for the external electromagnetic pulses protection, absorbing the variable radiofrequency waves and eliminating the noise that can generate interference in telecommunications.

The protection design is based on the installations of the DDCE 50 Plus in the areas where the waves can be coupled or in the areas where interferences can be generated. Depending on the case, the DDCE 50 Plus can be installed vertically or with a maximum angle of 5° to the vertical.

Maximum working voltage without lightning strikes

Progressive tension increase

705 kV are applied to 1,2 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 526 kV to 1.15 m, the leader appears on the ground or at the base of the mast, but always outside the DDCE 50 Plus.

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

DDCE 50 Plus 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 50 Plus 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

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

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

Test	I_{peak} (kA)	W/R (kJ/Ω)	Q (C)	t1 (µs)	t2 (µs)	Visual inspection
RI11-09	132,6	3064	43,2	23,9	277	OK
RI11-10	136,7	3899	52,4	23,9	341	OK
RI11-11	133,4	3085	43,7	24,0	272	OK

Figure 1. Tabulated results of the test.

Coverage radius

The calculation of the floor coverage radius of the DDCE 50 Plus model is carried out using the Rolling Sphere method described in the UNE EN IEC 62305 standard.

Depending on the level of protection required (Level I, II, III or IV) the following radii 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) and will result in a floor coverage radius r (figure 2) and a resulting protection area based on this radius r.

The radius of coverage in plan r may be extended up to a maximum of 50 m (figure 3) as long as all the conductive structures and/or existing buildings are within the defined protection area, are at the same electrical potential as the lower hemisphere of the DDCE, comply with the requirements set out in the UNE EN IEC 62305 standard in order to form part of the SPCR and, depending on the required level of protection, the maximum distances between the existing and/or arranged conductive elements are met. Natural structures (trees, land, lagoons, etc.) will remain outside the protected area (*). All protection designs using DDCE systems must be verified by the MANUFACTURER.

r / h	Level I (R=20 m)	Level II (R=30 m)	Level III (R=45 m)	Level IV (R=60 m)
2	8	11	13	15
4	12	15	18	21
6	14	18	22	26
8	16	20	25	29
10	17	22	28	33
20	20	28	36	44
30	20	30	42	52
45	20	30	45	58
50	20	30	45	59
60	20	30	45	60

h: Height from the reference plane

r: Radius of coverage in plan

Figure 2. Coverage radius r of the DDCE depending on the level of protection required.

Rolling Sphere Method

Installation height (m)	Coverage radius * (m)
2	19,89
5	31,22
7	37,22
10	43,58
13,4	50
20	50
30**	50
40**	50
50**	50

Figure 3. Radius of coverage r maximum in plan.

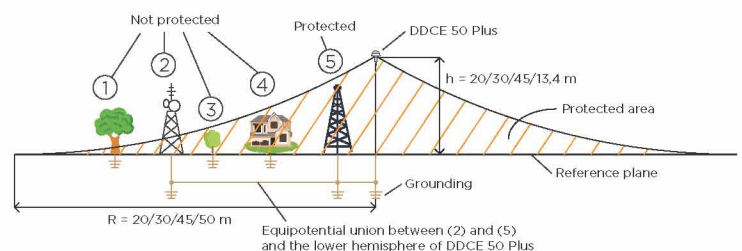


Figure 4. Example area protected by a DDCE. Profile view.

***Protected Area:** Only those structures that are within and in its entirety of the defined protection area and are at the same electrical potential as the lower hemisphere of the DDCE 50 Plus will be considered protected by the DDCE 50 Plus. Natural structures, such as trees, grass, land, lagoons or lakes of water or others, will not be considered protected in any case, even if they are within and in its entirety, the protection area defined by the DDCE 50 Plus (See figure 4). Those structures that are within the protection area and have ionizing protection systems (passive or active ionizing lightning rods of any type) will not be considered protected by the DDCE 50 Plus.

Protective Angle Method

Installation height (m)	α (degrees)	Coverage radius * (m)
5	76,36	20,61
10	70,63	28,45
15	66,19	33,99
20	62,40	38,25
25	59,01	41,63
30	55,91	44,33
35	53,02	46,49
40	50,30	48,18
45	47,70	49,46
50	45,21	50,37

Figure 5. Protective Angle Method results.

Protection effectiveness

Prevents the impact of direct lightning in the protected area (*).

Protection against indirect effects from lightning

If indirect effects due to external induced overvoltage reach the DDCE 50 Plus, whether by ground or radiated by air (electromagnetic pulses), the DDCE 50 Plus 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 dinco model DNNF will be available as a sheath in the down wire just after the end of the axis of the DDCE 50 Plus, 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 exposed to these indirect effects, the DNNFT model dinfil earth filters will be installed. This device, when installed in the right place, significantly minimizes the effects

of high-frequency overvoltages induced by the ground that can be coupled to the protected structure (electrical and electronic installation and equipment, depending on each case). The dinfil filter is complementary to the standard overvoltage protectors, which will be necessary and mandatory, according to this schematic example:

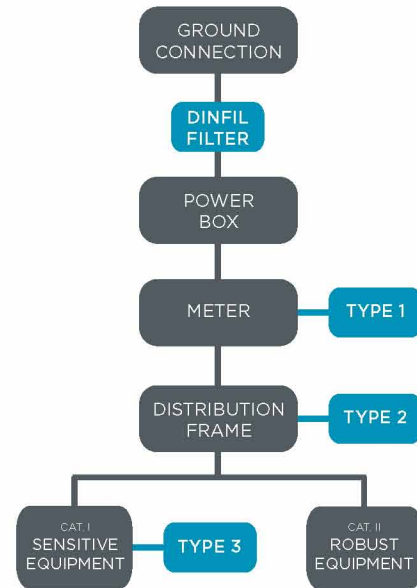


Figure 6. Electrical installation diagram.

Type 1 Protectors:

For nominal voltage of 230 V, 50 kA, ≤ 4 kV F+N Type 1 + 2

Type 1 + 2 Protectors:

For nominal voltage of 230/400 V, 50 kA, ≤ 4 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

High frequency protector:

Dinfil filter model DNNFT (10/350us) 200 kA

Applications

Model for the protection of all types of low-rise structures on land.

Effective for lateral protection of all types of ground structures and for electromagnetic protection.

Installation

Once the proper height and the mast with 42 mm inner section selected, to place the DDCE Plus must be made a thru-holes of M8x60mm at 17 and 37 mm from the top base of the mast, ensuring support and mechanical connection between DDCE Plus and the mast.

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

Guarantee that the layout of the cable is always descendant.

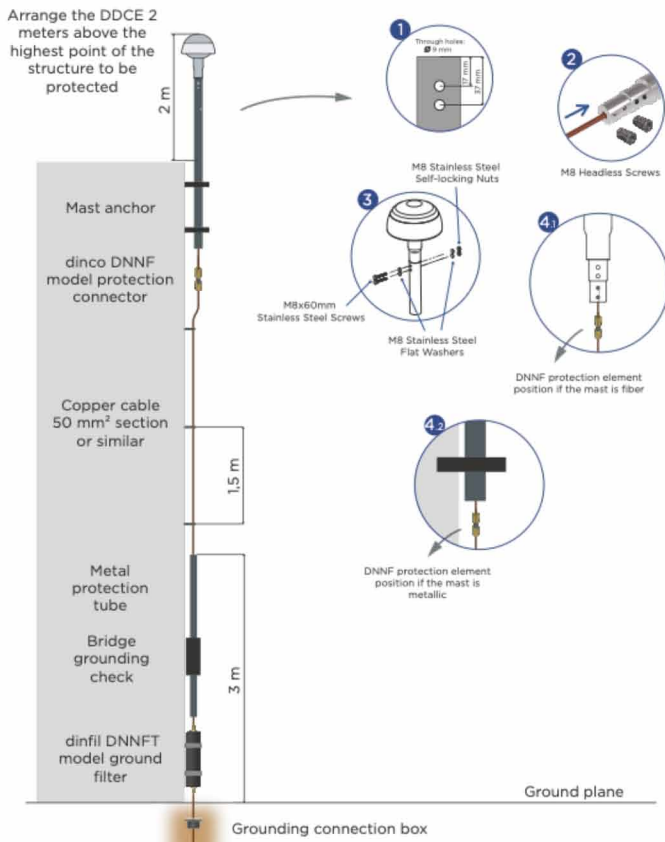


Figure 7. Installation of the DDCE Plus.

IMPORTANT NOTE: In installations with risk of receiving external induced surges (telecommunication towers, radars, substations, isolated structures, etc.), the dinfil filter will always be installed.

Bureau Veritas Certification (Es036861)

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

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

NBR 5419:2015 | 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 Compatibility | Directives 92/31/CEE

Low Voltage Equipment | Directives 72/23/CEE

Quality Management System

Dinnteco International works with the Quality Management System according to international standards ISO 9001: 2015 applied to: design, manufacture and sale of compensating devices for variable electric fields, variable radio frequency electromagnetic shield and electrostatic charge deionizers: DDCE models, DDCE Plus, dineol and PDCE. Design, manufacture and sale of dinfil high frequency earth filters and dinco protection connector.

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. The maintenance operations described in the document "Annual Maintenance Protocol" must be carried out and recorded.

Product warranty

1. Coverage

This warranty issued by Dinnteco Factory Gasteiz covers the replacement of the defective product with a new product.

The costs of shipping, handling and packaging of the defective product must be paid initially by the customer, but will be reimbursed by the manufacturer after verifying that the conditions for the repair or replacement of the defective product are met. It does not include the uninstallation of the defective product or the installation of the new product sent under warranty with its associated costs in accessories and personnel.

2. Warranty period

The products have a maximum warranty period of 5 years (1 year of start-up plus 4 years of annual maintenance), subject to mandatory compliance with the requirements of point 3 of the "product warranty protocol".

The application and exclusions of the product warranty, as well as the definition of a defective product resulting from a manufacturing defect are described in the product's Instruction Manual and/or warranty protocol.

Product Liability Insurance for defective products resulting from a manufacturing defect

Dinnteco Factory Gasteiz SLU has contracted a "Civil Liability Insurance" policy with GENERALI Insurance Company (Policy No. RSG286000224).

1. Guaranteed coverage in the event of a claim

Damages to third parties caused by the insured products, by a normal operation of the same, due to a manufacturing defect.

Maximum limit per claim and year: 6.000.000,00 euros with a sub-limit per victim in Employers' Liability of 600.000,00 euros. (Except USA, Canada, Mexico and Australia, which will be up to 3.000.000,00 euros).

2. Coverage time

2 years from the installation date recorded in the official start-up protocol.

The following are excluded from the coverage of this insurance policy, the effects that could appear on the

product, the installation, people and/or protected area, derived from indirect effects due to external induced overvoltages of any origin, as well as all those products declared as defective that do not have in force the product warranty provided by the manufacturer and having the aforementioned guarantee, more than 2 years have elapsed since the product was installed, counting from the date of installation registered in the official start-up protocol. Therefore, in the event that the conditions and requirements for the application of this insurance are met, it will only be able to be applied and claim, where appropriate, damages to third parties, during the first 2 years of the issuance of the product guarantee provided by the manufacturer.

3. Conditions of application of the insurance

The provisions of the preceding paragraph with respect to the warranted coverage shall be applicable in the event of a claim, taking into account "always" the technical characteristics of the insured product, and if, based on the same, the product should have fulfilled its purpose and did not do so due to a manufacturing defect.

4. Countries with coverage

Worldwide coverage.

This policy is subject, as applicable, to the Insurance Contract Law and its General Conditions are in accordance with the model subject to the control of the Directorate General of Insurance, as established in the Law of Regulation and Supervision of Private Insurance.

