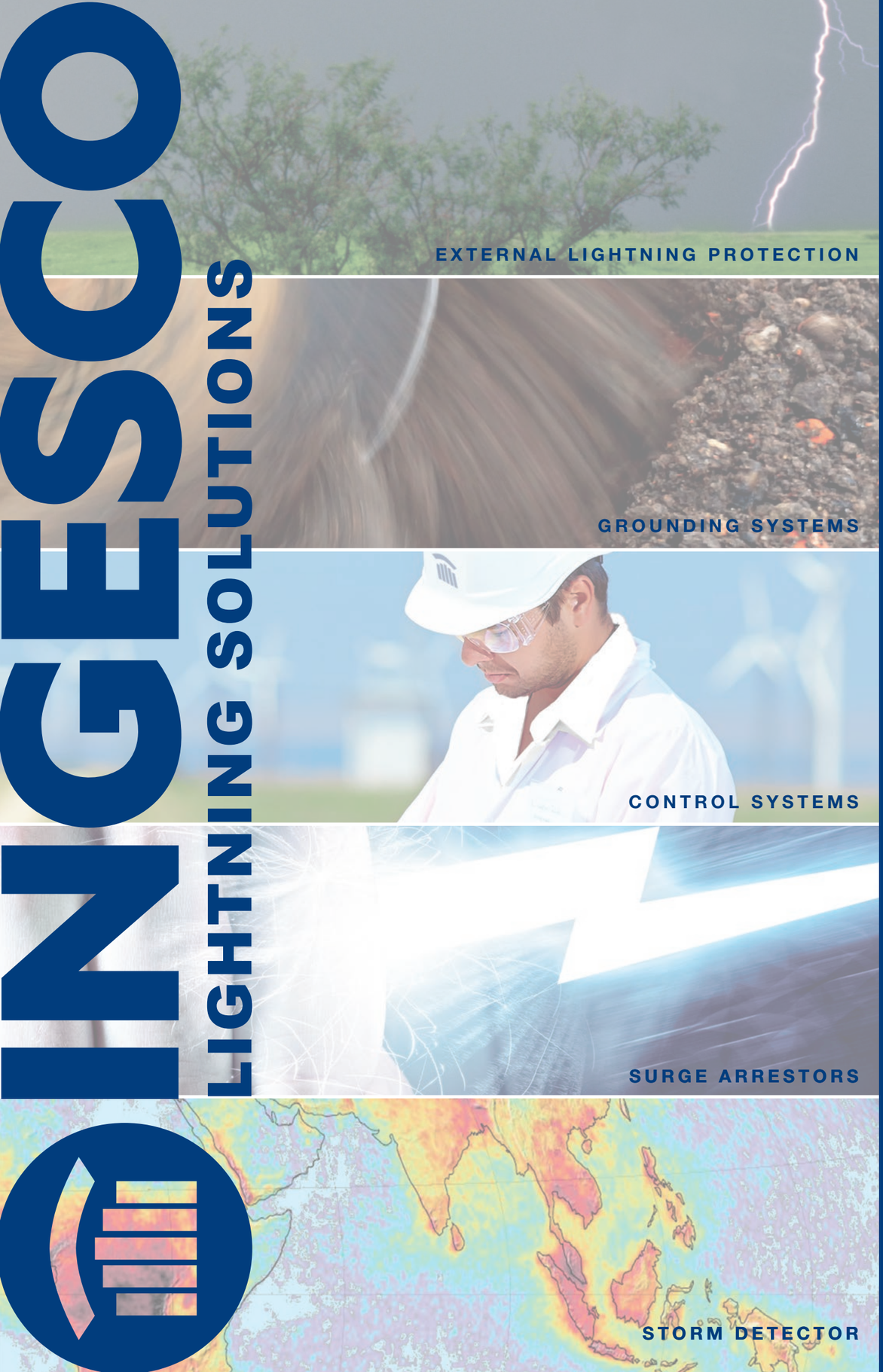


INGESCO LIGHTNING SOLUTIONS

PRODUCTS AND SERVICES . 2022

INGESCO LIGHTNING SOLUTIONS

TABLE OF CONTENTS

Since 1973, INGESCO has been a specialist in solutions for the prevention and protection against lightning.

Reference
We are the leading company in the design, manufacture and control systems for the prevention and protection against lightning.

International vocation
We export to over 50 countries worldwide. Our comprehensive and analytical view has made us one of the most advanced companies in the sector worldwide.

Comprehensive and transversal
We offer a comprehensive and transversal service. We cover all stages, from research and development to installation and certification.

Tailored Solutions
We offer a personalized service tailored to all needs, with prompt answers to your queries. We assist in the search and implementation of safe and effective solutions.

Training
We share the news and current events of lightning protection and prevention systems in a multidisciplinary field. Because knowledge improves your safety.

Research and innovation
Our engineering team works daily on new materials and devices for more efficient integrated solutions. Our challenge is to improve your lightning safety.

Design and manufacture
We manufacture lightning rods and capture meshes, surge protectors and preventive protection products. We test all our products in the LABELEC, high voltage laboratory accredited by ENAC, as well as actual test conditions in the natural environment. Our offer fits your needs to guarantee safety.

Certification and control
Our inspection body is accredited by ENAC and certifies all phases of the process: design and construction management, installation and periodic inspection of facilities. We offer an impartial and objective assessment of any protection system.

EXTERNAL LIGHTNING PROTECTION

ACTIVE RODS:
PDC (ESE) LIGHTNING RODS

standards

Implementing rules for an effective person and property protection system:

· **UNE 21186:2011:** Lightning protection - Lightning rods with priming device.

· **NF C 17-102:2011:** Early streamer emission lightning protection systems.

· **NP 4426:2013:** Lightning protection - systems with non-radioactive ionization device.

In addition to these, there may be legislation or rules of each country that must be taken into account.

risk index calculation

Annex A (risk analysis) of the UNE 21186: 2011 determines the need or not to install external lightning protection and the level of protection applied to reduce the risk of damage caused by lightning.

INGESCO has an online tool which allows the calculation of risk and the implementation of protective measures quickly and easily. Introducing the characteristics of the structure to be protected, geographical location, activity, etc ..., provides protection levels to be applied, and generates a report of the information provided.

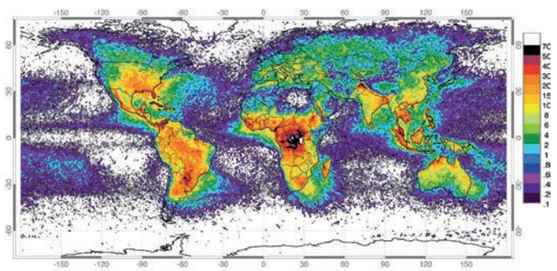


Fig. 1 – Lightning distribution map.

Fig. 2 – https://calculus.ingesco.com/

protection radius calculation

Lightning rods with an early steamer emission priming device (ESE), have a protection radius depending on the necessary protective level to be obtained by performing tests in accordance with UNE 21186: 2011 or NF C 17102: 2011, and must be certified by an accredited high voltage laboratory.

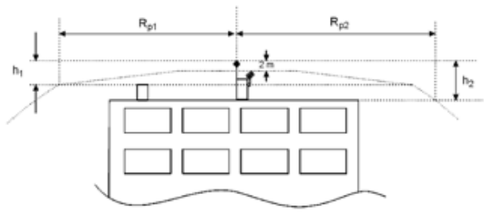
Model	PDC 3.1	PDC 3.3	PDC 4.3	PDC 5.3	PDC 6.3	PDC 6.4
Ref.	101000	101001	101003	101005	101008	101009
Δt	15µs	25µs	34µs	43µs	54µs	60µs

Tabla 1 – Early streamer ΔT(µs) INGESCO ESE lightning rods.

UNE 21186: 2011 (paragraph C.2.2) indicates that a ESE lightning rod must obtain an early steamer emission ΔT > 10 µs minimum.

Also, the maximum permissible value is 60µs although tests were obtained with superior results.

The area to be protected by a ESE arrester is delimited by a surface of revolution that is defined by the radius of the corresponding protection to different heights (h) considered, whose axis is the same ESE arrester.



Protection Level	Notional sphere radius (r)
I	20 m
II	30 m
III	45 m
IV	60 m

Table 2 – The rolling sphere radius r based on the level of protection.

a) If **2m**≤ **h** ≤ **5m**: $Rp=\frac{h*Rp(5)}{5}$

b)If **h** ≥ **5m**: $Rp=\sqrt{[(2*r*h)-(h^2)]+[\Delta*(2*r+\Delta)]}$

Whereas:

Rp: Resulting protection radius.

r: The radius of the rolling sphere. Predetermined standard value according to the applicable security level (see Table 2).

h: The height from the tip of the ESE to the point where we want to calculate the radius of protection.

Δ: Advance arrester priming considered (ΔT) in meters.

example radius protection calculation Rp (model INGESCO PDC 3.1):

To calculate the different radii of protection of a ESE lightning rod, we must know the variables involved in the formulation:

· INGESCO PDC 3.1 model has ΔT=15 µs and thus **Δ=15 m**.

· Apply level II protection, the notional sphere radius corresponds to **r = 30m**.

· Consider the height **h = 20m**.

Each Rp_n radii are calculated, for each reference point, using the formula:

$Rp_n = \sqrt{[(2*r*h_n)-(h_n^2)]+[\Delta*(2*r+\Delta)]}$

For the given model the radii are shown in table 3:

h (m)	Radius (m) Level II
2	15
4	30
6	38
10	40
20	43

Table 3 protection radii for an ESE 3.1

The total volume of protection can be represented graphically (See Fig.3).

Once each radius is calculated Rp, verify that the building remains within the lightning rod protection radius (see Fig.4).

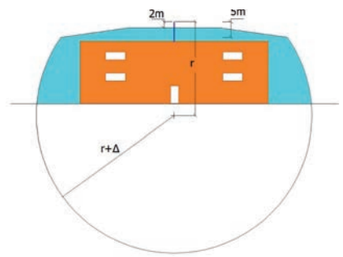


Fig. 3 – Volume protected with ESE lightning rod.

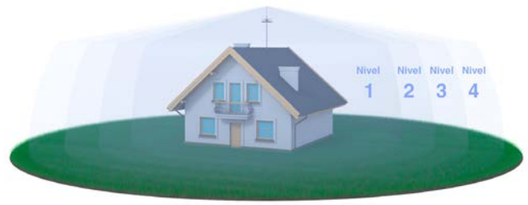


Fig. 4 – ESE protection volume.

PASSIVE SYSTEMS: FRANKLIN RODS – CAPTURE MESHES

standards

In order to design an effective lightning protection system with Franklin rods or capturing meshes, the following rules shall apply:

· **IEC 62305:2010** Lightning protection (Parts 1, 2, 3 y 4).

· **UNE - EN 62305:2011** Protection against lightning (Parts 1, 2, 3 y 4).

· **NFPA 780:2020** Standard for the installation of lightning protection systems.

In addition to these rules, legislation may exist in each country to be taken into account.

risk calculation

INGESCO has an online tool that allows the risk calculation according to IEC 62305 (Part 2), which allows the calculation of risk and the implementation of protective measures quickly and easily (see Fig.2).

calculation methods of the protection zone

Accepted methods for determining the area of passive protection systems according to IEC 62305 (Part 3) are:

• Protective angle method

It is best suited method for buildings with simple shapes, although it is limited to a maximum height to the level of protection applied (Fig.5).

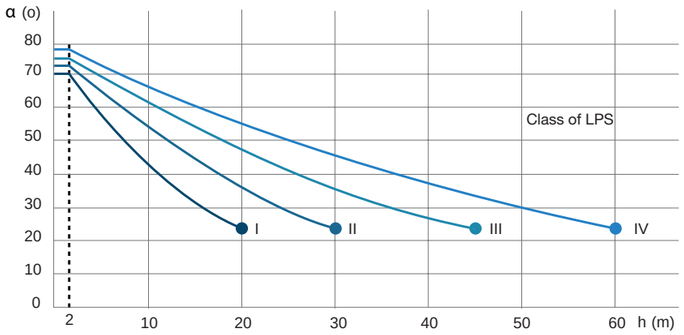


Fig. 5 – Angles corresponding to protection classes of IEC 62305-3 LPS.

The volume of protection resulting from the application of the protection angle method in a termination rod is shown in Fig.6.

Once calculated, the different angles of protection of the termination rods that make up the system verifies that the building is fully protected (Fig 7).

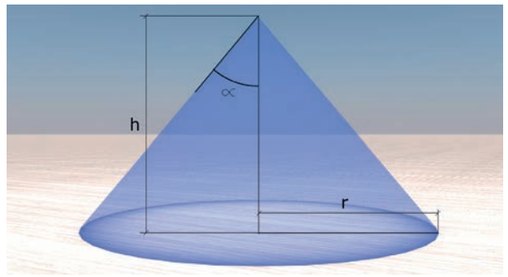


Fig. 6 – Protected volume by a vertical point. IEC 62305-3.

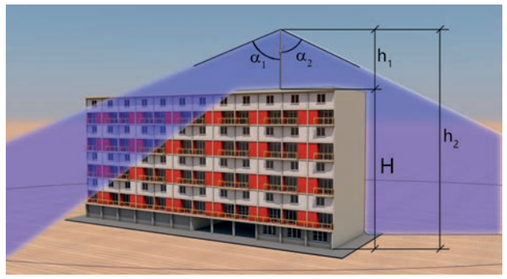


Fig. 7 – Protection volume angles α_1 and α_2 depending on heights h_1 and h_2.

• Rolling sphere method and the mesh method

When a structure has a height higher than indicated in Figure 5, the protection angle method is not applicable. For these cases, IEC 62305-3 indicates to use: **rolling sphere method** (valid for all types of buildings), or **mesh method** (indicated when flat surfaces are protected) (see Fig.9).

Protection method		
Class of LPS	**Radius of rolling sphere r (m)**	**Size of the mesh W_m (m)**
I	**20**	**5x5**
II	**30**	**10x10**
III	**45**	**15x15**
IV	**60**	**20x20**

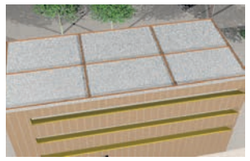
Table 4 – Maximum values of rolling sphere and mesh size for each class of LPS.

Fig. 8 – Protected volume by the rolling sphere method.

Applying the rolling sphere method. The location of the capture system (point or mesh) is adequate if any point of the protected structure comes into contact with a rolling sphere of radius r (see Table 4).

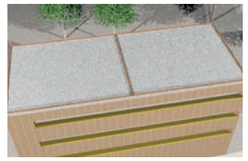
Taller structures remaining above the Faraday cage should be protected with lightning rods (see Fig. 10).

LEVEL I



LEVEL II

LEVEL III



LEVEL IV

Fig. 9 – Protection grids based on the levels of protection.

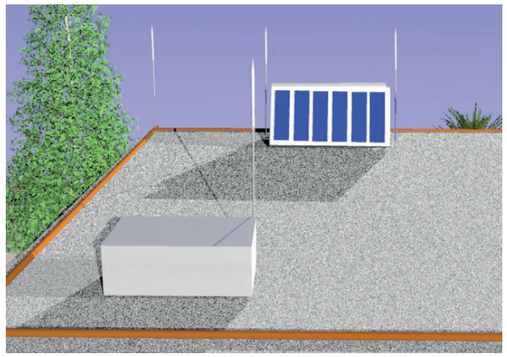


Fig. 10 – Protection of protruding structures with a capture mesh system by lightning rods.

DOWN CONDUCTORS

ESE down conductors

The down conductors are intended to conduct lightning current from the collection devices to the grounding.

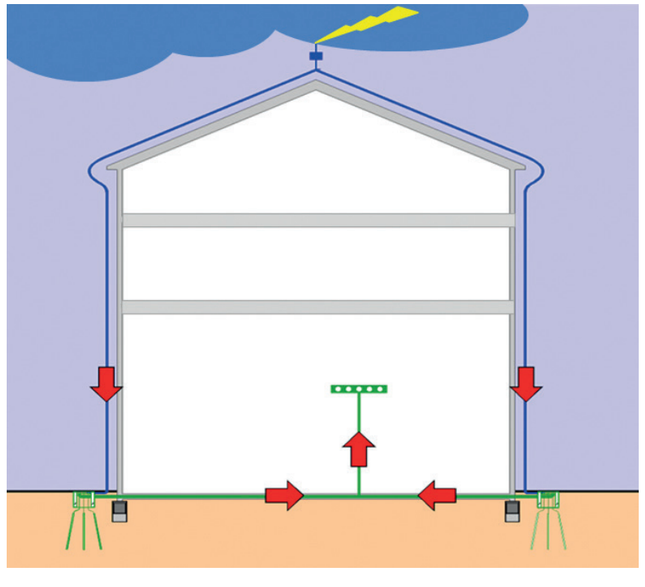


Fig. 11 – Down conductors of LPS by ESE.

The lightning rod is connected to ground with at least two down conductors located on opposite facades whenever possible (Fig.11).

The down conductors must be installed outside the building, avoiding the proximity of electrical cables and gas.

Its path must be as straight as possible, using the shortest path to earth, avoiding any sharp bend or lift.

When several ESEs are installed on the same building they can share down conductors.

Due to the nature of the lightning strike, down conductors should respect the materials and dimensions specified in **IEC 62561-2**. Those indicated in table 5 are the most recommended materials.

Material	Format	Minimum section mm²
Copper	Cable	50 (Ø1,7 mm per cable)
Copper	Round	50 (Ø8 mm)
Copper	Tape	50 (Minimum thickness 2 mm)

Table 5 – Material Table IEC 62561-2.

The down conductor ground shall be properly secured and tightened, with reference driver three clips per meter.

Protect the bottom of the down conductor by a protective tube of at least 2 m.

The installation of a lightning counter above the protective tube is recommended to perform the verification and maintenance of the facility.

LPS passive down conductors

In order to reduce the likelihood of damage due to lightning currents circulating in the LPS, down conductors must be arranged so that from the point of impact grounding is:

Protection Level	Distance between conductors
I	10 m
II	10 m
III	15 m
IV	20 m

Table 6 – Distance between down conductors IEC 62305-3.

It is also advisable to place the down conductors on exposed corners of the building whenever constructively possible.

The dimensions and materials of the ground down conductors, must meet the requirements contained in **IEC 62561-2** (Table 5).

The conductors that form the mesh must be properly set, taking as reference 1 conductor clamp per meter.

Protect the bottom of the down conductor with a protective tube of at least 2 m.

Install section elements in each of the down conductors to allow for measurement of the ground (see Fig. 12).

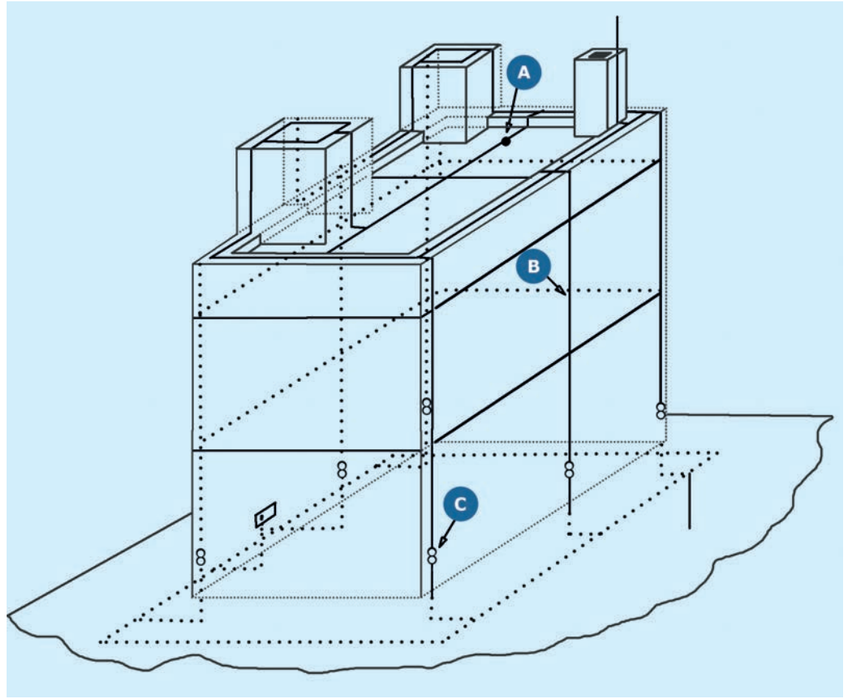


Fig. 12 – LPS passive scheme:
A: Horizontal conductor cover
B: Grounded conductor
C: Down conductor isolator

INGESCO® PDC (ESE) LIGHTNING RODS

Non-expendable

5 year warranty

Natural field trials

UL test

Max. current 200kA

No maintenance

Stainless steel 316 L

UNE 21186:2011

NFC 17-102:2011

NP 4426:2013

Modelo PDC6.4

technical specifications

Lightning rod with **non-electronic** streaming.

Suitable for external lightning protection of all types of structures and open areas.

- **Level of protection rated very high.**
- **100% effective in discharge.**
- Guaranteed **electrical continuity.**
- **Retains all its initial properties after each discharge so does not require specific maintenance.**
- No batteries or external power. No electronic. **Not fungible.**
- **Operation guaranteed** in any atmospheric condition.
- Made of **AISI 316L** stainless steel and polyamide (PA66).
- **Authentication system** using QR code.

standards | tests | specifications

INGESCO® PDC, meets the requirements in the following standards:

- CTE SUA 8
- UNE 21.186:2011
- NFC 17-102:2011
- IEC 62305
- IEC 62.561/1
- NP 4426:2013

Evaluation tests of ESE (Annex C UNE 21186: 2011) in the LABELEC High Voltage Laboratory.

Certificate of current supported IEC 62561/1, issued by the LABELEC High Voltage Laboratory.

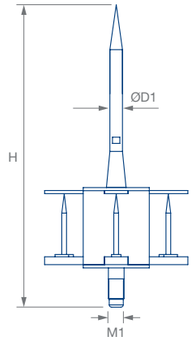
Certificate product issued by the international certification organization Bureau Veritas.

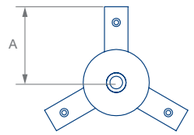
Tested by UL test report number: 4789563988.1.

coverage radius by protection level

Model	PDC 3.1	PDC 3.3	PDC 4.3	PDC 5.3	PDC 6.3	PDC 6.4
Ref.	101000	101001	101003	101005	101008	101009
Δt	15µs	25µs	34µs	43µs	54µs	60µs
LEVEL I	35 m	45 m	54 m	63 m	74 m	80 m
LEVEL II	43 m	54 m	63 m	72 m	83 m	89 m
LEVEL III	54 m	65 m	74 m	84 m	95 m	102 m
LEVEL IV	63 m	75 m	85 m	95 m	106 m	113 m

Protection radius calculated according to UNE 21.186: 2011, NFC 17.102: 2011 and NP 4426: 2013. (Calculated as a difference in height between the tip of the lightning rods and the considered horizontal plane 20 m.).





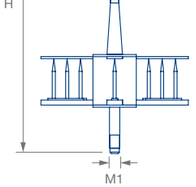
INGESCO® PDC 3.1 LIGHTNING ROD

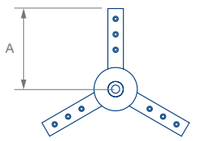
Coverage radius (m) INGESCO® PDC 3.1 according to protection level and height (UNE 21186:2011, NFC 17-102:2011 and NP 4426:2013)

Ref.	Material	H (mm)	D1 (mm)	M1 (mm)	A (mm)	Weight (g)
101000	SST	380	16	M20	95	2.280

h (m)	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
2	13	15	18	20
4	25	30	36	41
6	32	38	46	52
10	34	40	49	56
20	35	43	54	63

Δt : 15μs
r: Radius of the rolling sphere
L-I : r = 20 m
L-II : r = 30 m
L-III : r = 45 m
L-IV : r = 60 m





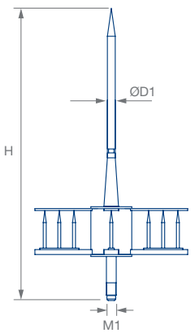
INGESCO® PDC 3.3 LIGHTNING ROD

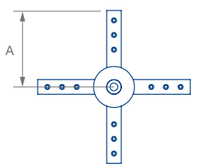
Coverage radius (m) INGESCO® PDC 3.3 according to protection level and height (UNE 21186:2011, NFC 17-102:2011 and NP 4426:2013)

Ref.	Material	H (mm)	D1 (mm)	M1 (mm)	A (mm)	Weight (g)
101001	SST	554	16	M20	156	3.060

h (m)	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
2	17	20	23	26
4	34	39	46	52
6	43	49	58	66
10	44	51	61	69
20	45	54	65	75

Δt : 25μs
r: Radius of the rolling sphere
L-I : r = 20 m
L-II : r = 30 m
L-III : r = 45 m
L-IV : r = 60 m





INGESCO® PDC 4.3 LIGHTNING ROD

Coverage radius (m) INGESCO® PDC 4.3 according to protection level and height (UNE 21186:2011, NFC 17-102:2011 and NP 4426:2013)

Ref.	Material	H (mm)	D1 (mm)	M1 (mm)	A (mm)	Weight (g)
101003	SST	554	16	M20	156	3.250

h (m)	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
2	21	24	27	30
4	41	47	54	61
6	52	59	69	77
10	53	61	71	80
20	54	63	74	85

Δt : 34μs
r: Radius of the rolling sphere
L-I : r = 20 m
L-II : r = 30 m
L-III : r = 45 m
L-IV : r = 60 m

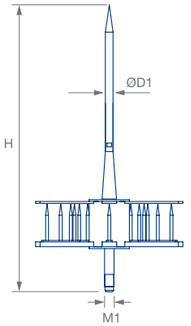
INGESCO® PDC 5.3 LIGHTNING ROD

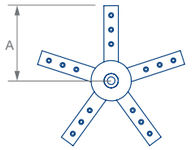
Coverage radius (m) INGESCO® PDC 5.3 according to protection level and height (UNE 21186:2011, NFC 17-102:2011 and NP 4426:2013)

Ref.	Material	H (mm)	D1 (mm)	M1 (mm)	A (mm)	Weight (g)
101005	SST	554	16	M20	156	3.460

h (m)	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
2	24	27	31	35
4	49	55	63	70
6	61	69	79	88
10	62	70	81	90
20	63	72	84	95

Δt : 43μs
r: Radius of the rolling sphere
L-I : r = 20 m
L-II : r = 30 m
L-III : r = 45 m
L-IV : r = 60 m





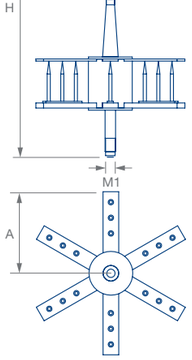
INGESCO® PDC 6.3 LIGHTNING ROD

Coverage radius (m) INGESCO® PDC 6.3 according to protection level and height (UNE 21186:2011, NFC 17-102:2011 and NP 4426:2013)

Ref.	Material	H (mm)	D1 (mm)	M1 (mm)	A (mm)	Weight (g)
101008	SST	554	16	M20	156	3.660

h (m)	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
2	29	32	36	40
4	58	64	72	80
6	73	80	91	100
10	73	82	93	102
20	74	83	95	106

Δt : 54μs
r: Radius of the rolling sphere
L-I : r = 20 m
L-II : r = 30 m
L-III : r = 45 m
L-IV : r = 60 m



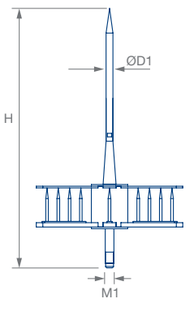
INGESCO® PDC 6.4 LIGHTNING ROD

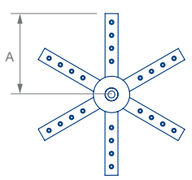
Coverage radius (m) INGESCO® PDC 6.4 according to protection level and height (UNE 21186:2011, NFC 17-102:2011 and NP 4426:2013)

Ref.	Material	H (mm)	D1 (mm)	M1 (mm)	A (mm)	Weight (g)
101009	SST	554	16	M20	186	4.030

h (m)	NIVEL I	NIVEL II	NIVEL III	NIVEL IV
2	31	35	39	43
4	63	69	78	85
6	79	87	97	107
10	79	88	99	109
20	80	89	102	113

Δt : 60μs
r: Radius of the rolling sphere
L-I : r = 20 m
L-II : r = 30 m
L-III : r = 45 m
L-IV : r = 60 m





INGESCO® PDC.E LIGHTNING ROD

Modelo PDC.E 60

5 year warranty

Natural field trials

UL Test

Testable

Stainless steel 316 L

UNE 21186:2011

NFC 17-102:2011

NP 4426:2013

technical specifications

Lightning rod with **ELECTRONIC** streaming.

Suitable for external lightning protection of all types of structures and open areas.

- **Level of protection rated very high.**
- **100% effective in discharge. Maximum durability.**
- Requires no external power source.
- **Guaranteed operation** after lightning strike and in any weather condition.
- Made of **AISI 316L** stainless steel.
- **Authentication system** using QR code.
- **Laser** recording of the information in the head.

standards | tests | specifications

INGESCO® PDC.E, meets the requirements in the following standards:

- CTE SUA 8
- UNE 21186:2011
- NFC 17-102:2011
- IEC 62305
- IEC 62561/1
- IEC 62561/3
- NP 4426:2013

Evaluation tests of ESE (Annex C UNE 21186: 2011) in the LABELEC High Voltage Laboratory.

Mechanical test (traction and flexing until breakage).

Certificate of current supported IEC 62561/1, issued by the LABELEC High Voltage Laboratory.

Certificate product issued by the international certification organization Bureau Veritas.

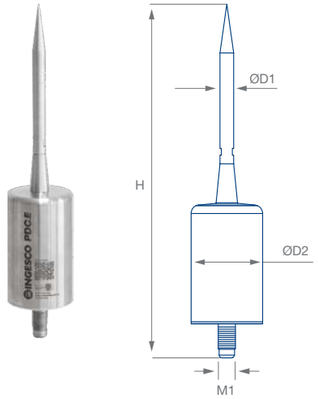
Tested by UL test report number: 4789563988.1.

coverage radius by protection level

Model	PDC.E 15	PDC.E 30	PDC.E 45	PDC.E 60
Ref.	102004	102005	102006	102007
Δt	15µs	30µs	45µs	60µs
LEVEL I	35 m	50 m	65 m	80 m
LEVEL II	43 m	59 m	74 m	89 m
LEVEL III	54 m	70 m	86 m	102 m
LEVEL IV	63 m	81 m	97 m	113 m

Protection radius calculated according to UNE 21186: 2011, NFC 17-102: 2011 and NP 4426: 2013. (Calculated as a difference in height between the tip of the lightning rods and the considered horizontal plane 20 m.).

INGESCO® PDC.E 15 LIGHTNING ROD



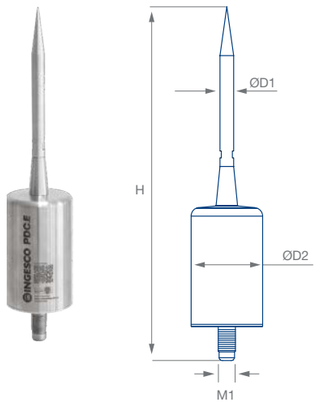
Coverage radius (m) INGESCO® PDC.E 15 according to protection level and height (UNE 21186:2011, NFC 17-102:2011 and NP 4426:2013)

Ref.	Material	H (mm)	D1 (mm)	D2 (mm)	M1 (mm)	Weight (g)
102004	SST	412	16	83	M20	3775

h (m)	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
2	13	15	18	20
4	25	30	36	41
6	32	38	46	52
10	34	40	49	56
20	35	43	54	63

Δt : 15µs
r: Radius of the rolling sphere
L-I : r = 20 m
L-II : r = 30 m
L-III : r = 45 m
L-IV : r = 60 m

INGESCO® PDC.E 30 LIGHTNING ROD



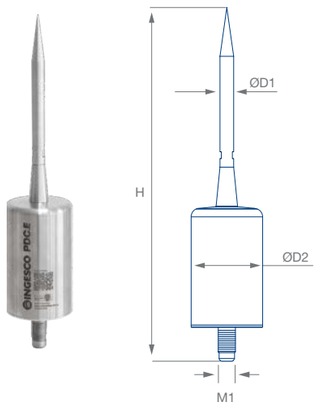
Coverage radius (m) INGESCO® PDC.E 30 according to protection level and height (UNE 21186:2011, NFC 17-102:2011 and NP 4426:2013)

Ref.	Material	H (mm)	D1 (mm)	D2 (mm)	M1 (mm)	Weight (g)
102005	SST	412	16	83	M20	3770

h (m)	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
2	19	22	25	28
4	38	44	51	57
6	48	55	64	72
10	49	57	66	75
20	50	59	70	81

Δt : 30µs
r: Radius of the rolling sphere
L-I : r = 20 m
L-II : r = 30 m
L-III : r = 45 m
L-IV : r = 60 m

INGESCO® PDC.E 45 LIGHTNING ROD



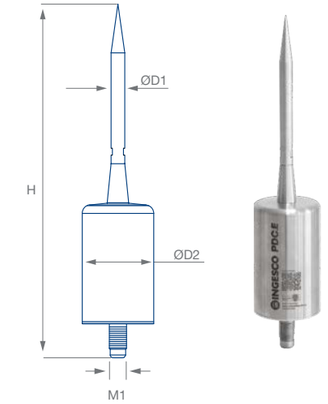
Coverage radius (m) INGESCO® PDC.E 45 according to protection level and height (UNE 21186:2011, NFC 17-102:2011 and NP 4426:2013)

Ref.	Material	H (mm)	D1 (mm)	D2 (mm)	M1 (mm)	Weight (g)
102006	SST	412	16	83	M20	3765

h (m)	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
2	25	28	32	36
4	51	57	64	72
6	63	71	81	90
10	64	72	83	92
20	65	74	86	97

Δt : 45µs
r: Radius of the rolling sphere
L-I : r = 20 m
L-II : r = 30 m
L-III : r = 45 m
L-IV : r = 60 m

INGESCO® PDC.E 60 LIGHTNING ROD



Coverage radius (m) INGESCO® PDC.E 60 according to protection level and height (UNE 21186:2011, NFC 17-102:2011 and NP 4426:2013)

Ref.	Material	H (mm)	D1 (mm)	D2 (mm)	M1 (mm)	Weight (g)
102007	SST	412	16	83	M20	3760

h (m)	LEVEL I	LEVEL II	LEVEL III	LEVEL IV
2	31	35	39	43
4	63	69	78	85
6	79	87	97	107
10	79	88	99	109
20	80	89	102	113

Δt : 60µs
r: Radius of the rolling sphere
L-I : r = 20 m
L-II : r = 30 m
L-III : r = 45 m
L-IV : r = 60 m

INGESCO ADVANCED ESE TESTER

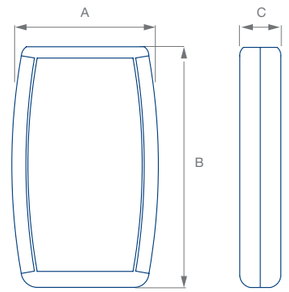
Ref.	Material	A (mm)	B (mm)	C (mm)	Weight (g)
102051	ABS	89	147	25	320

The INGESCO Advanced ESE Tester is a portable device for testing electronic lightning rods for ohmic contact.

The INGESCO Advanced ESE Tester is designed exclusively for evaluating INGESCO electronic ESE arrester. ESE future electronic models INGESCO and lightning rods from other manufacturers may not be compatible with the technology of the INGESCO Advanced ESE Tester.

technical specifications

· Temperature range: -10°C to 40°C
· Power consumption: 30mA
· Power: Battery 9V IEC6LR61/IEC6F22/USA PP3
· Test terminals 1m long and 9V battery



LIGHTNING RODS

Termination rods suitable for external lightning protection. It can be used as single sensor element or part of passive protection, complementing the protection conductive mesh (Faraday cages).

Made of AISI 316L stainless steel or copper.

Tested by UL test report number: 4789563988.1.

Please consult for other materials or dimensions.

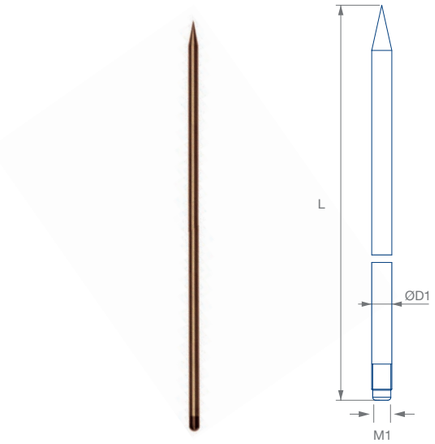
Simple rods

Multiple rods

IEC 62305-3

IEC 62561-1

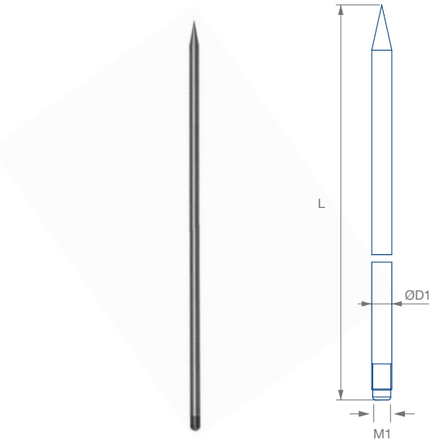
UL Test



SIMPLE RODS

COPPER simple lightning rods

Model	Ref.	Material	L (mm)	D1 (mm)	M1 (mm)	Weight (g)
CU300-16	110081	Cu	300	16	M16	440
CU500-16	110083	Cu	500	16	M16	800
CU600-16	110028	Cu	600	16	M16	980
CU1000-16	110035	Cu	1000	16	M16	1700
CU1500-16	110224	Cu	1500	16	M16	2600
CU2000-16	110034	Cu	2000	16	M16	3500
CU300-20	110089	Cu	300	20	M20	740
CU500-20	110091	Cu	500	20	M20	1310
CU1000-20	110093	Cu	1000	20	M20	2710
CU2000-20	110095	Cu	2000	20	M20	5530



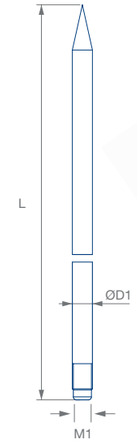
STAINLESS STEEL simple lightning rods

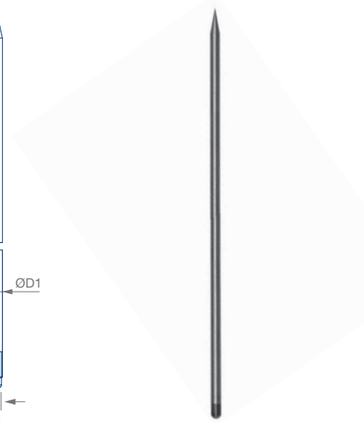
Modelo	Ref.	Material	L (mm)	D1 (mm)	M1 (mm)	Weight (g)
IN300-16	110080	SST	300	16	M16	420
IN500-16	110082	SST	500	16	M16	740
IN600-16	110032	SST	600	16	M16	900
IN1000-16	110084	SST	1000	16	M16	1530
IN1500-16	110215	SST	1500	16	M16	2370
IN2000-16	110086	SST	2000	16	M16	3110
IN300-20	110088	SST	300	20	M20	690
IN500-20	110090	SST	500	20	M20	1180
IN1000-20	110092	SST	1000	20	M20	2420
IN2000-20	110031	SST	2000	20	M20	4880

SIMPLE RODS

ALUMINIUM simple lightning rods

Model	Ref.	Material	L (mm)	D1 (mm)	M1 (mm)	Peso (g)
AL300-16	110245	Al	300	16	M16	170
AL500-16	110291	Al	500	16	M16	280
AL1000-16	110037	Al	1000	16	M16	560
AL1500-16	110292	Al	1500	16	M16	850
AL2000-16	110293	Al	2000	16	M16	1100
AL3000-16	110284	Al	3000	16	M16	1600

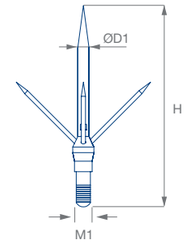




MULTIPLE RODS

Multiple lightning rod

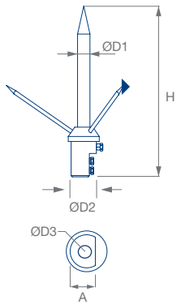
Modelo	Ref.	Material	H (mm)	D1 (mm)	M1 (mm)	Weight (g)
Multiple CU	110002	Cu	384	20	M20	855
Multiple IN	110001	SST	384	20	M20	795

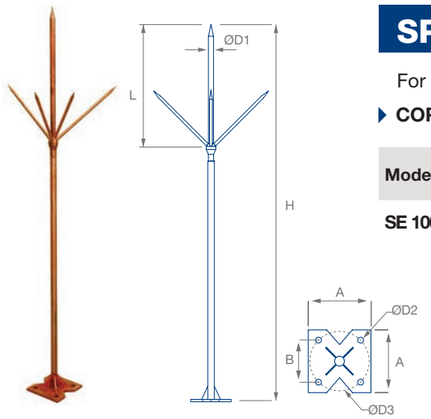


MULTIPLE RODS WITH MAST ADAPTOR

Multiple lightning rods with ROUND - FLAT conductor mast adaptor

Modelo	Ref.	Material	H (mm)	D1 (mm)	D2 (mm)	D3 (mm)	A (mm)	Weight (g)
Multiple CU 1’1/4”	110226	Cu	344	20	35,5	12	24	1200
Multiple CU 1’1/2”	110227	Cu	344	20	41	12	32	1350
Multiple IN 1’1/4”	110228	SST	344	20	35,5	12	24	1100
Multiple IN 1’1/2”	110229	SST	344	20	41	12	32	1300



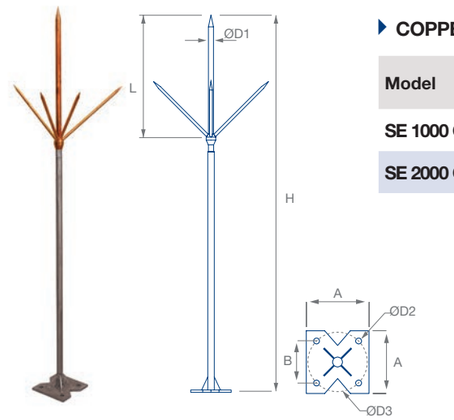


SPECIAL LIGHTNING RODS

For application in electrical substations and others.

COPPER lightning rods with COPPER-PLATED STEEL horizontal support

Model	Ref.	Mat.	H (mm)	L (mm)	D1 (mm)	D2 (mm)	D3 (mm)	A (mm)	B (mm)	Weight (g)
SE 1000 CU	110003	CCS	1600	480	20	18	160	170	113	5500



COPPER lightning rods with GALVANIZED STEEL horizontal support

Model	Ref.	Mat.	H (mm)	L (mm)	D1 (mm)	D2 (mm)	D3 (mm)	A (mm)	B (mm)	Weight (g)
SE 1000 CU/AZ	110096	Cu/GST	1600	480	20	18	160	170	113	5600
SE 2000 CU/AZ	110100	Cu/GST	2600	480	20	18	160	170	113	8600

CAPTURE SYSTEM ACCESSORIES

Adaptor parts

Masts

Fastening

CTE SUA 8

IEC 62305

IEC 62561

Accessories for installing the capture system. Adaptor parts, masts and anchoring systems.

Adjustment parts for lightning rods made by INGESCO (simple tips, multiple and ESE) of Ø16mm or 20mm. It facilitates the connection of the lightning rod to the conductive network.

Masts for fastening and support for termination rods to structures by anchors or baseplates.

Fastening systems for masts 1 ¼" , 1 ½" and 2" in diameter. Different solutions according to the construction needs.

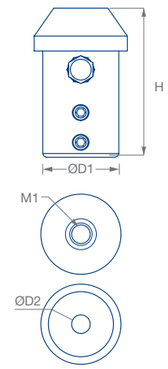
Made of resistant materials such as brass, copper, galvanized iron and stainless steel.

Please consult for custom manufacturing and other construction.

LIGHTNING ROD ADAPTER PIECES

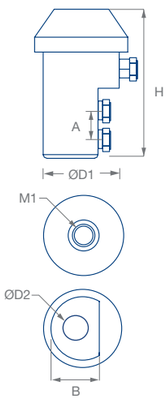
Adapter parts for lightning rod to ROUND conductor mast

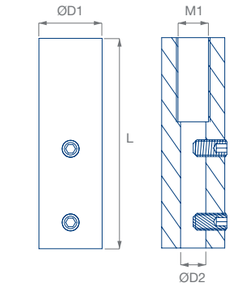
Model	Ref.	Mat.	H (mm)	D1 (mm)	D2 (mm)	M1 (mm)	Weight (g)
1" Ø16 RD	111033	Cu/Zn	80	26	12	M16	316
1"1/4" Ø16 RD IN	111062	SST	80	35,5	12	M16	623
1"1/4" Ø16 RD	111032	Cu/Zn	80	35,5	12	M16	664
1"1/2" Ø16 RD IN	111031	SST	80	41	12	M16	770
1"1/2" Ø16 RD	111022	Cu/Zn	80	41	12	M16	815
2" Ø16 RD	111025	Cu/Zn	80	53	12	M16	1341
1" Ø20 RD	111019	Cu/Zn	80	26	12	M20	286
1"1/4" Ø20 RD	111011	Cu/Zn	80	35,5	12	M20	628
1"1/4" Ø20 RD IN	111073	SST	80	35,5	12	M20	600
1"1/2" Ø20 RD IN	111052	SST	80	41	12	M20	736
1"1/2" Ø20 RD	111012	Cu/Zn	80	41	12	M20	777
2" Ø20 RD	111013	Cu/Zn	80	53	12	M20	1306



Adapter parts for lightning rod to ROUND and FLAT conductor mast

Model	Ref.	Mat.	H (mm)	D1 (mm)	D2 (mm)	M1 (mm)	A (mm)	B (mm)	Weight (g)
1"1/4" Ø16 RD-PL	111053	Cu/Zn	80	35,5	12	M16	19	24	645
1"1/2" Ø16 RD-PL	111054	Cu/Zn	80	41	12	M16	19	32	765
2" Ø16 RD-PL	111055	Cu/Zn	80	53	12	M16	19	45	1295
1"1/4" Ø20 RD-PL	111051	Cu/Zn	80	35,5	12	M20	19	24	630
1"1/4" Ø20 RD-PL	111069	SST	80	35,5	12	M20	19	25	530
1"1/2" Ø20 RD-PL	111070	SST	80	41	12	M20	19	30	715
1"1/2" Ø20 RD-PL	111056	Cu/Zn	80	41	12	M20	19	32	750
2" Ø20 RD-PL	111057	Cu/Zn	80	53	12	M20	19	45	1280





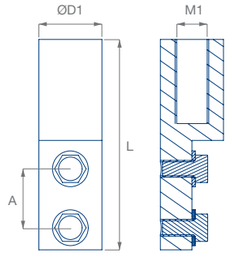
LIGHTNING ROD-CONDUCTOR CONNECTOR

Lightning rod - ROUND conductor connector

Model	Ref.	Mat.	L (mm)	D1 (mm)	D2 (mm)	M1 (mm)	Weight (g)
Ø16 round cond. 50-70 mm	111024	Cu/Zn	100	30	12	M16	480
Ø20 round cond. 50-70 mm	111038	Cu/Zn	100	30	12	M20	450

Lightning rod - FLAT conductor connector

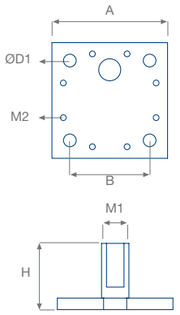
Model	Ref.	Mat.	L (mm)	D1 (mm)	A (mm)	M1 (mm)	Weight (g)
Ø16 flat cond. 30x2-4 mm	111039	Cu/Zn	100	30	28	M16	390
Ø20 flat cond. 30x2-4 mm	111040	Cu/Zn	100	30	28	M20	350



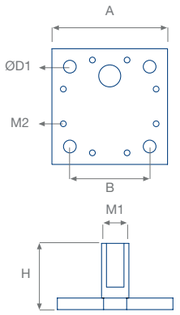
LIGHTNING ROD SUPPORTS

Horizontal supports Ø16mm or Ø20mm lightning rods with 50-70mm² cable connection

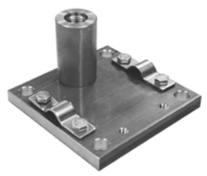
Model	Ref.	Mat.	H (mm)	M1 (mm)	D1 (mm)	M2 (mm)	A (mm)	B (mm)	Weight (g)
CU16	110268	Cu	60	M16	11	M6	100	80	1150
CU20	110269	Cu	60	M20	11	M6	100	80	1145

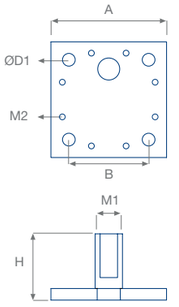


Model	Ref.	Mat.	H (mm)	M1 (mm)	D1 (mm)	M2 (mm)	A (mm)	B (mm)	Weight (g)
CU/ZN16	110266	Cu/Zn	60	M16	11	M6	100	80	1095
CU/ZN20	110267	Cu/Zn	60	M20	11	M6	100	80	1090



Model	Ref.	Mat.	H (mm)	M1 (mm)	D1 (mm)	M2 (mm)	A (mm)	B (mm)	Weight (g)
IN16	110271	SST	60	M16	11	M6	100	80	1040
IN20	110272	SST	60	M20	11	M6	100	80	1030

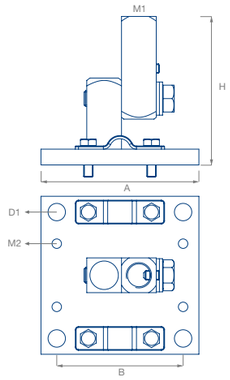




LIGHTNING ROD SUPPORTS

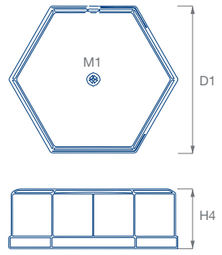
Tilting support for lightning rods Ø16mm or Ø20mm , up to 500 mm high

Model	Ref.	Mat.	H (mm)	M1 (mm)	D1 (mm)	M2 (mm)	A (mm)	B (mm)	Weight (g)
CU/ZN16	110283	Cu/Zn	94	M16	11	M6	100	80	1235
CU/ZN20	110212	Cu/Zn	94	M20	11	M6	100	80	1325



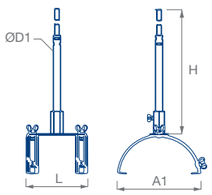
Concrete block support for air terminal

Mod.	Ref.	Mat.	H (mm)	M1 (mm)	D1 (mm)	Weight (g)
6.9kg base M16 for lightning rods up to 1m	110298	Concrete	81	M16	203	6900
16kg base M16 for lightning rods up to 3m	110297	Concrete	80	M16	364	16000



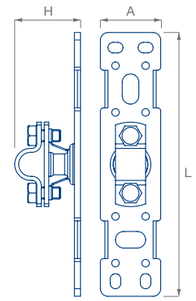
Support for lightning rod on tile roof

Model	Ref.	Mat.	H (mm)	A1 (mm)	D1 (mm)	L (mm)	Weight (g)
Roof ridge support	110202	Al / SST	1000	180-260	16	110	620



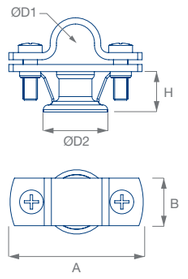
Vertical supports Ø16mm or Ø20mm lightning rods

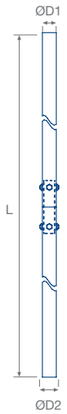
Model	Ref.	Mat.	No. pieces	L (mm)	A (mm)	H (mm)	Weight (g)
Stainless steel rods Ø16 - Ø20	112078	SST	1	175	40	42	212



Simple supports Ø16mm or Ø20mm lightning rods

Model	Ref.	Mat.	No. pieces	A (mm)	B (mm)	H (mm)	D1 (mm)	D2 (mm)	Weight (g)
Simple fastening rods Ø16	112110	Zn	1	56	20	20	16	27	60
Simple fastening rods Ø20	112111	Zn	1	56	20	20	20	27	82

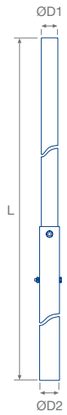




MASTS

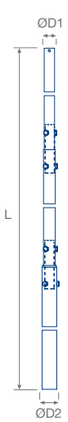
Stainless Steel masts

Model	Ref.	Mat.	L (mm)	No. parts	D1 (mm)	D2 (mm)	Weight (kg)
3m Ø1'1/2" IN	114045	SST	3000	1	48	48	9
6m Ø1'1/2" inner union IN	114042	SST	6000	2	48	48	22



Telescopic hot dip galvanized steel masts

Model	Ref.	Mat.	L (mm)	No. parts	D1 (mm)	D2 (mm)	Weight (kg)
1 m Ø1'1/4"	114079	HDG	1000	1	42,5	42,5	2,6
2 m Ø1'1/4"	114061	HDG	2000	1	42,5	42,5	5,2
3 m Ø1'1/4"	114052	HDG	3000	1	42,5	42,5	7,75
1 m Ø1'1/2"	114063	HDG	1000	1	48	48	3,3
2 m Ø1'1/2"	114056	HDG	2000	1	48	48	6,6
3 m Ø1'1/2"	114043	HDG	3000	1	48	48	10
3,8 m Ø 1'1/2"+ Ø 1'1/4	114091	HDG	3800	2	42,5	48	12,2
5,8 m Ø1'1/2"+ Ø1'1/4	114065	HDG	5800	2	42,5	48	18
7,6 m Ø2+Ø1'1/2"+ Ø1'1/4	114066	HDG	7600	3	42,5	60	30,2
8,6 m Ø2+Ø1'1/2"+ Ø1'1/4	114067	HDG	8600	3	42,5	60	33,8



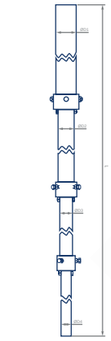
Hot dip galvanized steel masts with internal junction

Model	Ref	Mat.	L (m)	No. parts	D1 (mm)	D2 (mm)	Weight (kg)
4 m Ø 1'1/2" u. int.	114053	HDG	4	2	48	48	16,3
6 m Ø1'1/4" inner union	114048	HDG	6	2	42,5	42,5	16,8
6 m Ø1'1/2" inner union	114041	HDG	6	2	48	48	23
8 m Ø2+Ø1'1/2"+ Ø1'1/4 inner union	114068	HDG	8	3	42,5	60	33,8
9 m Ø2+Ø1'1/2"+ Ø1'1/4 inner union	114069	HDG	9	3	42,5	60	36,9

MASTS

6m telescopic aluminum mast with adaption piece

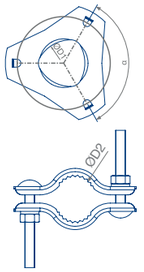
Model	Ref.	Mat.	L (mm)	No. parts	D1 (mm)	D2 (mm)	Weight (kg)
6m extendable mast with P.A.	114245	Al/SST	Up to 6000	4	40	80	22



WIND KIT

Wind kit for fastening masts

Model	Ref.	Mat.	D1 (mm)	D2 (mm)	α	Steel cable (m)	No. tighteners	No. cable ties	Weight (g)
Wind kit fastening masts	114197	HDG	40	45	120°	25	3	6	1700

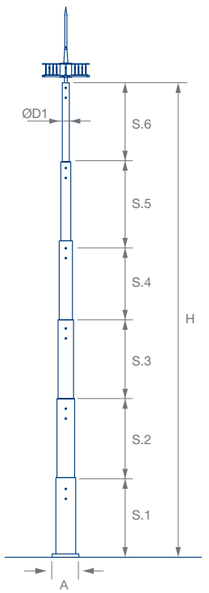


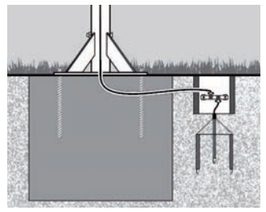
FREE-STANDING FOLDING MASTS

Free-standing hot dip galvanized steel masts

Self-supporting folding mast. Attachable sections, folding hinged baseplate. Easy transport and assembly. Dimensioned to withstand winds up to 144 Km / h.

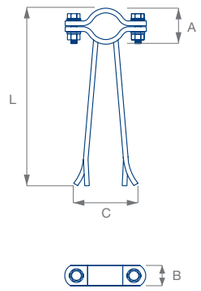
Model	Ref.	Mat.	Secc.	Øtubes (inches)	L parts (m)	H (m)	D1 (mm)	A (mm)	Weight (kg)
6 m	114201	HDG	S.1 S.2 S.3	3" 2'1/2" 1'1/2"	3 2,5 0,5	6	48	500	85
8 m	114200	HDG	S.1 S.2 S.3	3" 2'1/2" 1'1/2"	3 2,5 2,5	8	48	500	92
10 m	114075	HDG	S.1 S.2 S.3 S.4	4" 3" 2'1/2" 1'1/2"	3 2,5 2,5 2	10	48	500	125
12 m	114076	HDG	S.1 S.2 S.3 S.4 S.5	5" 4" 3" 2'1/2" 1'1/2"	3 2,5 2,5 2,5 1,5	12	48	500	160
14 m	114078	HDG	S.1 S.2 S.3 S.4 S.5 S.6	6" 5" 4" 3" 2'1/2" 1'1/2"	3 2,5 2,5 2,5 2,5 1	14	48	500	212



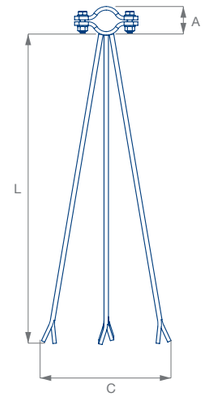


ANCHORS AND SUPPORTS FOR MASTS

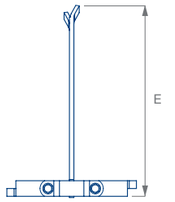
Anchors for vertically embedded wall mounting



Model	Ref.	Mat.	Nº pieces	L (mm)	A (mm)	B (mm)	C (mm)	Weight (kg)
work anchor 15 mast Ø1'1/4"	112087/1		1					1,8
	112087	HDG	2	240	46	35	110	3,6
	112087/3		3					5,4
work anchor 15 mast Ø1'1/2	112071/1		1					1,9
	112071	HDG	2	240	60	35	110	3,8
	112071/3		3					5,7
work anchor 15 mast Ø2"	112096/1		1					2
	112096	HDG	2	240	72	35	110	4
	112096/3		3					6



Model	Ref.	Mat.	Nº pieces	L (mm)	A (mm)	B (mm)	C (mm)	Weight (kg)
work anchor 30 mast Ø1'1/4"	112088/1		1					2,5
	112088	HDG	2	395	46	35	100	5
	112088/3		3					7,5
work anchor 30 mast Ø1'1/2"	112021/1		1					2,6
	112021	HDG	2	395	60	35	100	5,2
	112021/3		3					7,8
work anchor 30 mast Ø2"	112038/1		1					2,7
	112038	HDG	2	395	72	35	100	5,4
	112038/3		3					8,1



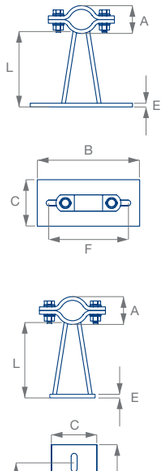
Model	Ref.	Mat.	Nº pieces	L (mm)	A (mm)	B (mm)	C (mm)	E (mm)	Weight (kg)
work anchor 60 mast Ø1'1/4"	112089/1		1						7,1
	112089	HDG	2	700	46	35	270	395	11,6
	112089/3		3						16,1
work anchor 60 mast Ø1'1/2"	112022/1		1						7,2
	112022	HDG	2	700	60	35	270	395	11,8
	112022/3		3						16,4
work anchor 60 mast Ø2"	112040/1		1						7,4
	112040	HDG	2	700	72	35	270	395	12,2
	112040/3		3						17,0

Model	Ref.	Mat.	Nº pieces	L (mm)	A (mm)	B (mm)	C (mm)	E (mm)	Weight (kg)
work anchor 100 mast Ø1'1/4"	112090/1		1						11,7
	112090	HDG	2	1095	46	35	365	460	23,4
	112090/3		3						35,1
work anchor 100 mast Ø1'1/2"	112023/1		1						11,8
	112023	HDG	2	1095	60	35	365	460	23,6
	112023/3		3						35,4
work anchor 100 mast Ø2"	112042/1		1						11,9
	112042	HDG	2	1095	72	35	365	460	23,8
	112042/3		3						35,7

ANCHORS AND SUPPORTS FOR MASTS

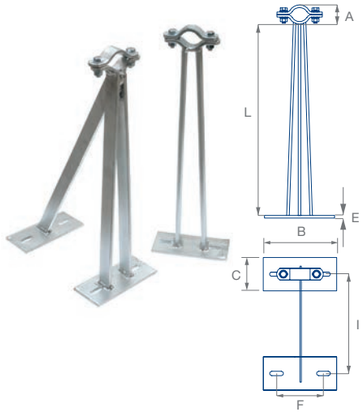
Anchor plate for vertical wall mounting

Model	Ref.	Mat.	No. pieces	L (mm)	A (mm)	B (mm)	C (mm)	E (mm)	F (mm)	Weight (kg)
plate anchor 15 mast Ø1'1/4"	112086/1		1							2,8
	112086	HDG	2	153	46	220	100	8	141	5,6
	112086/3		3							8,4
plate anchor 15 mast Ø1'1/2"	112024/1		1							2,9
	112024	HDG	2	153	60	220	100	8	141	5,8
	112024/3		3							8,7
plate anchor 15 mast Ø2"	112037/1		1							3
	112037	HDG	2	153	72	220	100	8	141	6
	112037/3		3							9
plate anchor 15 inv. mast Ø1'1/4"	112091/1		1							2,8
	112091	HDG	2	153	46	220	100	8	141	5,6
	112091/3		3							8,4
plate anchor 15 inv. mast Ø1'1/2"	112070/1		1							2,9
	112070	HDG	2	153	60	220	100	8	141	5,8
	112070/3		3							8,7
plate anchor 15 inv. mast Ø2"	112095/1		1							3
	112095	HDG	2	153	72	220	100	8	141	6
	112095/3		3							9



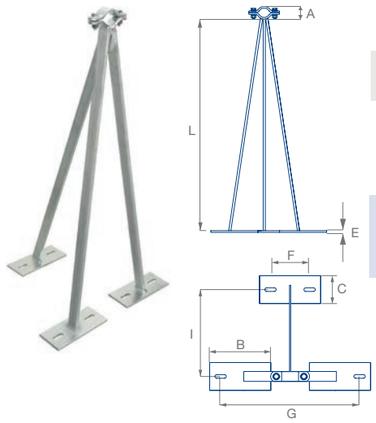
Model	Ref.	Mat.	No pieces	L (mm)	A (mm)	B (mm)	C (mm)	E (mm)	F (mm)	Weight (kg)
plate anchor 30 mast Ø1'1/4"	112092/1		1							3,5
	112092	HDG	2	302	46	220	100	8	141	7
	112092/3		3							10,5
plate anchor 30 mast Ø1'1/2"	112025/1		1							3,6
	112025	HDG	2	302	60	220	100	8	141	7,2
	112025/3		3							10,8
plate anchor 30 mast Ø2"	112039/1		1							3,7
	112039	HDG	2	302	72	220	100	8	141	7,4
	112039/3		3							11,1
plate anchor 30 inv. mast Ø1'1/4"	112099/1		1							3,5
	112099	HDG	2	302	46	220	100	8	141	7
	112099/3		3							10,5
plate anchor 30 inv. mast Ø1'1/2"	112100/1		1							3,6
	112100	HDG	2	302	60	220	100	8	141	7,2
	112100/3		3							10,8
plate anchor 30 inv. mast Ø2"	112101/1		1							3,7
	112101	HDG	2	302	72	220	100	8	141	7,4
	112101/3		3							11,1

ANCHORS AND SUPPORTS FOR MASTS



Anchor plate for vertical wall mounting

Model	Ref.	Mat.	No. pieces	L (mm)	A (mm)	B (mm)	C (mm)	E (mm)	F (mm)	I (mm)	Weight (kg)
plate anchor 60 mast Ø1'1/4"	112093/1		1								7,75
	112093	HDG	2	603	46	220	100	8	141	340	15,50
	112093/3		3								23,25
plate anchor 60 mast Ø1'1/2"	112027/1		1								7,85
	112027	HDG	2	603	60	220	100	8	141	340	15,70
	112027/3		3								23,55
plate anchor 60 mast Ø2"	112041/1		1								7,95
	112041	HDG	2	603	72	220	100	8	141	340	15,90
	112041/3		3								23,85



Model	Ref.	Mat.	No. pieces	L (mm)	A (mm)	B (mm)	C (mm)	E (mm)	F (mm)	G (mm)	I (mm)	Weight (kg)
plate anchor 100 mast Ø1'1/4"	112094/1		1									15,3
	112094	HDG	2	991	46	220	100	8	141	506	460	30,6
	112094/3		3									45,9
plate anchor 100 mast Ø1'1/2"	112030/1		1									15,4
	112030	HDG	2	991	60	220	100	8	141	506	460	30,8
	112030/3		3									46,2
plate anchor 100 mast Ø2"	112043/1		1									15,3
	112043	HDG	2	991	72	220	100	8	141	506	460	30,6
	112043/3		3									45,9

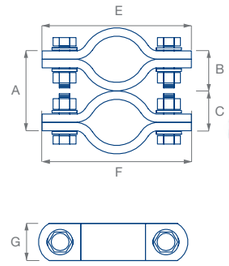
Accessory anchor plate for snap fastening

Model	Ref.	Mat.	No. pieces	B (mm)	C (mm)	E (mm)	F (mm)	Weight (kg)
fastening plate for plate anchor	112044/1		1					1,3
	112044	HDG	2	220	100	8	141	2,7
	112044/3		3					3,9

ANCHORS AND SUPPORTS FOR MASTS

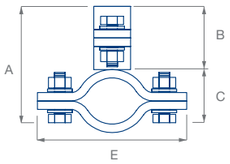
Anchoring double clamp for round profile attachment

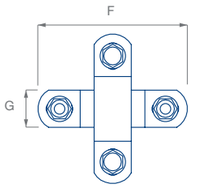
Model	Ref.	Mat.	No. pieces	A (mm)	B (mm)	C (mm)	E (mm)	F (mm)	G (mm)	Weight (kg)
double clamp 1'1/4"-1'1/4"	112102/1		1							1,3
	112102	HDG	2	92	46	46	147	147	35	2,6
	112102/3		3							3,9
double clamp 1'1/4"-1'1/2"	112036/1		1							1,4
	112036	HDG	2	106	46	60	147	142	35	2,8
	112036/3		3							4,2
double clamp 1'1/4"-2"	112104/1		1							1,5
	112104	HDG	2	118	46	72	147	160	35	3
	112104/3		3							4,5
double clamp 1'1/2"-1'1/2"	112026/1		1							1,5
	112026	HDG	2	120	60	60	142	142	35	3
	112026/3		3							4,5
double clamp 1'1/2"-2"	112035/1		1							1,6
	112035	HDG	2	132	60	72	142	160	35	3,2
	112035/3		3							4,8
double clamp 2"-2"	112034/1		1							1,7
	112034	HDG	2	144	72	72	160	160	35	3,4
	112034/3		3							5,1

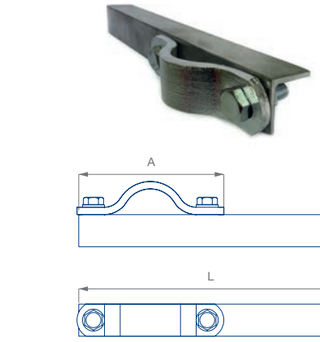


Anchoring double inverted clamp for round profile attachment

Model	Ref.	Mat.	No. pieces	A (mm)	B (mm)	C (mm)	E (mm)	F (mm)	G (mm)	Weight (kg)
double cross clamp 1'1/4"-1'1/4"	112105/1		1							1,3
	112105	HDG	2	92	46	46	147	147	35	2,6
	112105/3		3							3,9
double cross clamp 1'1/4"-1'1/2"	112106/1		1							1,4
	112106	HDG	2	106	46	60	147	142	35	2,8
	112106/3		3							4,2
double cross clamp 1'1/4"-2"	112107/1		1							1,5
	112107	HDG	2	118	46	72	147	160	35	3
	112107/3		3							4,5
double cross clamp 1'1/2"-1'1/2"	112032/1		1							1,5
	112032	HDG	2	120	60	60	142	142	35	3
	112032/3		3							4,5
double cross clamp 1'1/2"-2"	112108/1		1							1,6
	112108	HDG	2	132	60	72	142	160	35	3,2
	112108/3		3							4,8
double cross clamp 2"-2"	112109/1		1							1,7
	112109	HDG	2	144	72	72	160	160	35	3,4
	112109/3		3							5,1



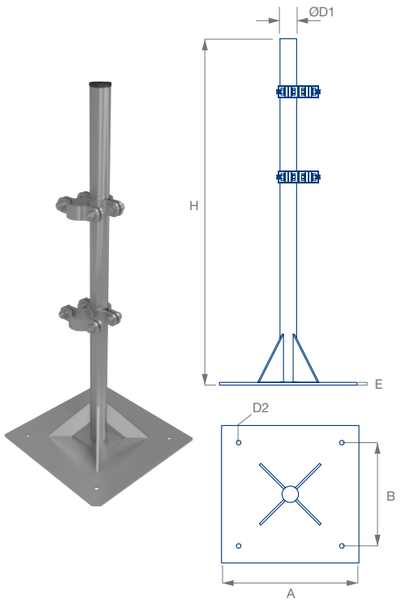




ANCHORS AND SUPPORTS FOR MASTS

Angle anchors for welding on metal structures

Model	Ref.	Mat.	No. pieces	A (mm)	B (mm)	C (mm)	L (mm)	Weight (kg)
attachment angle 30 Ø1”-1’1/4” - 1’1/2”-2”	112080/1	HDG	1	160	35	35	300	1,2
	112080		2					2,4
	112080/3		3					3,6
attachment angle 60 Ø1”-1’1/4” - 1’1/2”-2”	112103/1	HDG	1	160	35	35	600	2,4
	112103		2					4,8
	112103/3		3					6,2



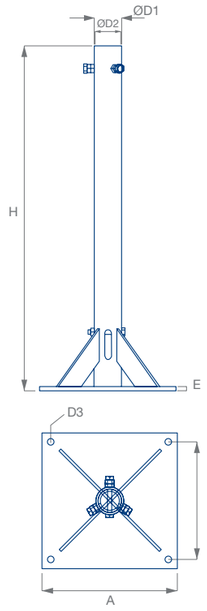
Horizontal surfaces baseplate support for fastening mast via brackets

Model	Ref.	Mat.	H (mm)	D1 (mm)	D2 (mm)	A (mm)	B (mm)	E (mm)	Weight (kg)
Ø1’1/2” double clamps Ø1’1/2”-Ø1’1/4”	113034	HDG	1015	48	14	400	300	8	17,5
Ø1’1/2” double clamps Ø1’1/2”-Ø1’1/2”	113031	HDG	1015	48	14	400	300	8	17,7
Ø1’1/2” double clamps Ø1’1/2”-Ø2”	113033	HDG	1015	48	14	400	300	8	17,9
Ø2” double clamps Ø2”-Ø1’1/4”	113043	HDG	1015	60	14	400	300	8	18,1
Ø2” double clamps Ø2”-Ø1’1/2”	113035	HDG	1015	60	14	400	300	8	18,3
Ø2” double clamps Ø2”-Ø2”	113032	HDG	1015	60	14	400	300	8	18,5

ANCHORS AND SUPPORTS FOR MASTS

Horizontal surfaces baseplate support for fastening mast up to 3m in length

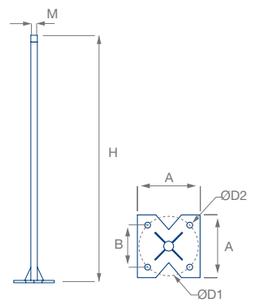
Model	Ref.	Mat.	H (mm)	D1 (mm)	D2 (mm)	D3 (mm)	A (mm)	B (mm)	E (mm)	Weight (kg)
Simple base plate support Ø1’1/2”	113037	HDG	758	60	53	14	300	260	8	12,5



SPECIAL SUPPORTS FOR SUBSTATION GANTRY

Base plate suport with M20 thread adaptor for application in electrical substations and others

Model	Ref.	Mat.	H (mm)	M	D1 (mm)	D2 (mm)	A (mm)	B (mm)	Weight (g)
Sup. base plate for tip	110241	GST	2000	M20	160	18	170	113	4800



CONDUCTORS

Among its many applications as a conductive element, it is used to build capture meshes, down conductor connections in lightning protection systems and for building grounding systems.

Made of different materials and dimensions for all types of installations.

UNE 21.186

NFC 17-102

IEC 62.305

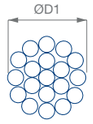
CTE SUA 8

R.E.B.T

IEC 62.561-2

NP 4426

VDE 0185-305

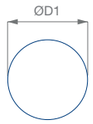


CONDUCTORS

Copper braided cable

Model	Ref.	Mat.	D1 (mm)	Weight (g/m)
35 mm² section	117071	Cu	7,5	315
50 mm² section	117072	Cu	8,5	500
70 mm² section	117073	Cu	9,5	600
95 mm² section	117074	Cu	11,5	830

* Coil approx. 50m. Other mesures consult.



Round steel conductor

Model	Ref.	Mat.	L (m)	D1 (mm)	Weight (g/m)
Spool Rd 8 galvanized steel (125m)	117081	HDG	125	8	312

Tinned copper flat conductor

Model	Ref.	Mat.	L (m)	A (mm)	B (mm)	Weight (g/m)
Spool 30x2 mm Cu tinned tape coil (50 m) **consult for other lengths*	117082	Tinned copper	50	30	2	537

FASTENING AND CONNECTING ACCESSORIES

Clamps

Connectors

IEC 62.305

IEC 62.561-4

UNE 21.186

NFC 17-102

Accessories for the installation of conductive meshes and down-conductors in external lightning protection systems.

Clamps for fastening round conductors 35 to 95 mm² sections, or flat conductors of 30x2 mm.

Connection elements for round conductors of 35-95 mm² sections or flat conductor 30x2-4 mm. Facilitates installation and connection to external lightning protection and grounding systems.

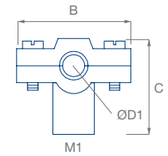
Made of different materials and dimensions for all types of facilities.

Consulting for other custom manufacturing and construction solutions.

CONDUCTOR FASTENING BRACKETS IEC62561-4

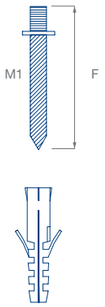
Cu / Zn (brass) alloy cable clamp

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	D1 (mm)	Weight (g)
M6 clamp for 35 mm² cable	118187	Cu/Zn	M6	17	44	36	7,1	104
M6 clamp for 50 mm² cable	118185	Cu/Zn	M6	17	44	36	9	101,5
M6 clamp for 70 mm² cable	118188	Cu/Zn	M6	17	44	36	10,4	97,6
M6 clamp for 95 mm² cable	118189	Cu/Zn	M6	17	44	36	11	93,9
M8 clamp for 35 mm² cable	118152	Cu/Zn	M8	17	44	36	7,1	101,2
M8 clamp for 50 mm² cable	118153	Cu/Zn	M8	17	44	36	9	99,6
M8 clamp for 70 mm² cable	118154	Cu/Zn	M8	17	44	36	10,4	94,8
M8 clamp for 95 mm² cable	118155	Cu/Zn	M8	17	44	36	11	91

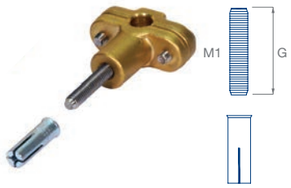


Cu / Zn (brass) alloy cable clamp with lag screw

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	F (mm)	D1 (mm)	Weight (g)
Lag screw M6 35 mm² cable	118150	Cu/Zn	M6	17	44	36	37,5	7,1	106,6
Lag screw M6 50 mm² cable	118099	Cu/Zn	M6	17	44	36	37,5	9	105
Lag screw M6 70 mm² cable	118000	Cu/Zn	M6	17	44	36	37,5	10,4	102
Lag screw M6 95 mm² cable	118100	Cu/Zn	M6	17	44	36	37,5	11	96
Lag screw M8 35 mm² cable	118151	Cu/Zn	M8	17	44	36	80	7,1	121,2
Lag screw M8 50 mm² cable	118083	Cu/Zn	M8	17	44	36	80	9	119
Lag screw M8 70 mm² cable	118093	Cu/Zn	M8	17	44	36	80	10,4	116
Lag screw M8 95 mm² cable	118092	Cu/Zn	M8	17	44	36	80	11	110

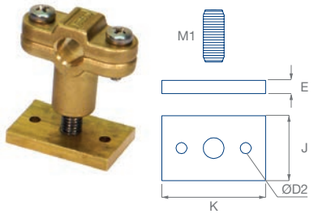


CONDUCTOR FASTENING BRACKETS IEC62561-4



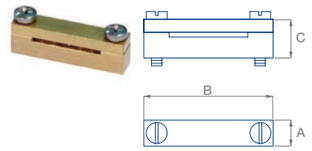
Cu / Zn (brass) alloy cable clamp with spike

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	G (mm)	D1 (mm)	Weight (g)
Spike M6 35 mm² cable	118148	Cu/Zn	M6	17	44	36	40	7,1	115,6
Spike M6 50 mm² cable	118082	Cu/Zn	M6	17	44	36	40	9	114
Spike M6 70 mm² cable	118091	Cu/Zn	M6	17	44	36	40	10,4	111
Spike M6 95 mm² cable	118090	Cu/Zn	M6	17	44	36	40	11	105
Spike M8 35 mm² cable	118149	Cu/Zn	M8	17	44	36	40	7,1	123,6
Spike M8 50 mm² cable	118081	Cu/Zn	M8	17	44	36	40	9	122
Spike M8 70 mm² cable	118089	Cu/Zn	M8	17	44	36	40	10,4	119
Spike M8 95 mm² cable	118088	Cu/Zn	M8	17	44	36	40	11	113



Cu / Zn (brass) alloy cable clamp with leg

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	E (mm)	I (mm)	J (mm)	K (mm)	D1 (mm)	D2 (mm)	Weight (g)
W/leg 35 mm² cable	118130	Cu/Zn	M8	17	44	36	5	20	25	40	7,1	4	146,6
W/leg 50 mm² cable	118084	Cu/Zn	M8	17	44	36	5	20	25	40	9	4	145
W/leg 70 mm² cable	118095	Cu/Zn	M8	17	44	36	5	20	25	40	10,4	4	142
W/leg 95 mm² cable	118094	Cu/Zn	M8	17	44	36	5	20	25	40	11	4	136



Cu / Zn (brass) alloy tape clamp

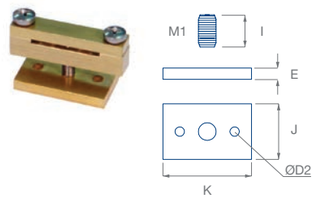
Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	Weight (g)
M6 for 30x2mm tape	118156	Cu/Zn	M6	10	50	15	60

Cu / Zn (brass) alloy tape clamp with lag screw

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	F (mm)	Weight (g)
Lag screw M6 for 30x2 mm tape	118103	Cu/Zn	M6	10	50	15	37,5	63

Cu / Zn (brass) alloy tape clamp with spike

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	G (mm)	Weight (g)
Spike M6 for 30x2 mm tape	118104	Cu/Zn	M6	10	50	15	40	72



Cu / Zn (brass) alloy tape clamp with leg

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	E (mm)	I (mm)	J (mm)	K (mm)	D2 (mm)	Weight (g)
W/leg for 30x2 mm tape	118105	Cu/Zn	M6	10	50	15	5	12	25	40	4	101

CONDUCTOR FASTENING BRACKETS

Zn folding clamp for round conductors

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	Weight (g)
Folding clamp M8 50-70mm² cable	118109	Zn	M8	20	56	30	77

Zn folding clamp w/lag screw for round conductors

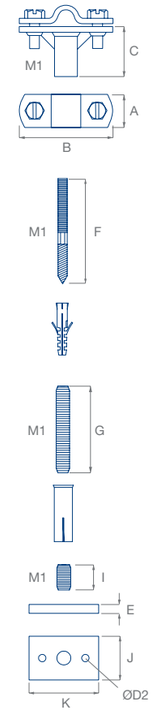
Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	F (mm)	Weight (g)
Folding clamp w/lag screw M8 50-70mm² cable	118113	Zn	M8	20	56	30	80	93

Zn folding clamp w/spike for round conductors

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	G (mm)	Weight (g)
Folding clamp w/spike M8 50-70 mm² cable	118114	Zn	M8	20	56	30	40	97

Zn folding clamp w/leg for round conductors

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	E (mm)	I (mm)	J (mm)	K (mm)	D2 (mm)	Weight (g)
Folding clamp w/leg 50-70 mm² cable	118136	Zn	M8	20	56	30	5	20	25	40	4	117



Zn folding clamp for flat conductors

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	Weight (g)
Folding clamp M8 30 mm tape	118118	Zn	M8	20	56	30	77

Zn folding clamp w/lag screw for flat conductors

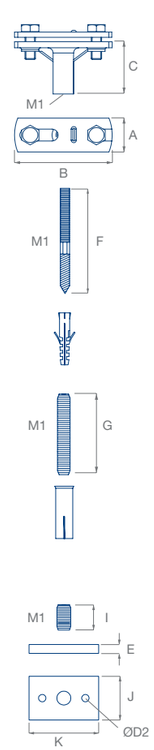
Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	F (mm)	Weight (g)
Folding clamp w/lag screw M8 30 mm tape	118119	Zn	M8	20	56	30	80	93

Zn folding clamp w/spike for flat conductors

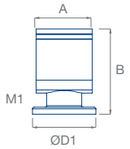
Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	G (mm)	Weight (g)
Folding clamp w/spike M8 30 mm tape	118120	Zn	M8	20	56	30	40	97

Zn folding clamp w/leg for flat conductors

Model	Ref.	Mat.	M1	A (mm)	B (mm)	C (mm)	E (mm)	I (mm)	J (mm)	K (mm)	D2 (mm)	Weight (g)
Folding clamp w/ leg M8 30 mm tape	118157	Zn	M8	20	56	30	5	20	25	40	4	117

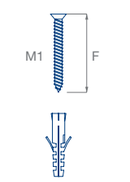


CONDUCTOR FASTENING BRACKETS



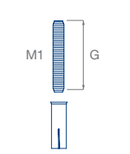
Insulate clamping bracket for round conductors

Model	Ref.	Mat.	M1	A (mm)	B (mm)	D1 (mm)	Weight (g)
PA M8 50 mm² cable	118106	PA	M8	22	30	24	7,2



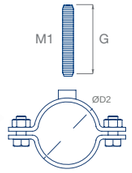
Insulate clamping bracket w/lag screw for round conductors

Model	Ref.	Mat.	M1	A (mm)	B (mm)	D1 (mm)	F (mm)	Weight (g)
PA w/lag screw M8 50 mm² cable	118117	PA	M8	22	30	24	80	10,4



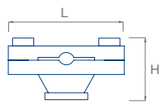
Insulate clamping bracket w/spike for round conductors

Model	Ref.	Mat.	M1	A (mm)	B (mm)	D1 (mm)	G (mm)	Weight (g)
PA w/spike M8 50 mm² cable	118158	PA	M8	22	30	24	40	27,2



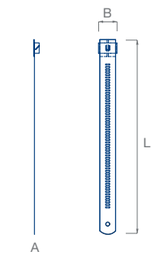
Insulate clamping bracket for fixing to tube

Model	Ref.	Mat.	A (mm)	B (mm)	D1 (mm)	D2 (mm)	G (mm)	Weight (g)
PA 50mm² tube	118177	PA	22	30	24	30	30	26,8



Insultating clamp for cable and flat conductor

Model	Ref.	Mat.	L (mm)	H (mm)	Weight (g/m)
Insulating clamp round/flat	118179	Nylon	82,25	23	22
Insulating clamp with M8 screw	118193	Nylon	82,25	23	40
Insulating clamp with leg	118212	Nylon	82,25	23	63



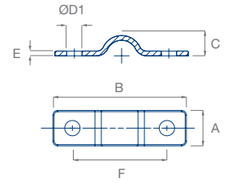
Strap clamp for round profiles

Model	Ref.	Mat.	A (mm)	B (mm)	L (mm)	Weight (g)
Strap clamp SST 127x4.6mm up to Ø25	118218	SST	0.25	4.6	127	25
Strap clamp SST 300x12mm up to Ø90	118176	SST	0.25	12	300	130
Strap clamp SST 998x8mm up to Ø304	118245	SST	0.25	7,9	998	260

CONDUCTOR FASTENING BRACKETS

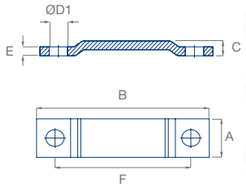
Light clamps for round conductors

Model			A (mm)	B (mm)	C (mm)	E (mm)	F (mm)	D1 (mm)	Weight (g)
Light clamp Cu Ø8-10 mm	118125	Cu	15	56,5	8,6	2	40	6,5	21
Light clamp CuSn Ø8-10 mm	118129	CuSn	15	56,5	8,6	2	40	6,5	21,1
Light clamp SST Ø8-10 mm	118146	SST	15	56,5	8,6	2	40	6,5	20



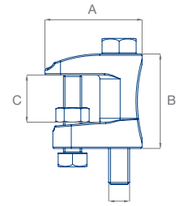
Light clamps for flat conductors

Model	Ref.	Mat.	A (mm)	B (mm)	C (mm)	E (mm)	F (mm)	D1 (mm)	Weight (g)
Light clamp Cu 30x2 mm	118122	Cu	15	61,5	5	3	49	6,5	27,5
Light clamp CuSn 30x2 mm	118128	CuSn	15	61,5	5	3	49	6,5	27,6
Light clamp SST 30x2 mm	118167	SST	15	61,5	5	3	49	6,5	26



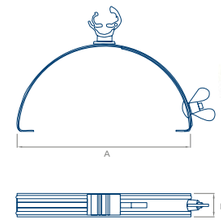
Profile clamping bracket

Model	Ref.	Mat.	A (mm)	B (mm)	C (mm)	M1	Weight (g)
Profile clamping bracket	118108	Zn	37	36	18	M8	80



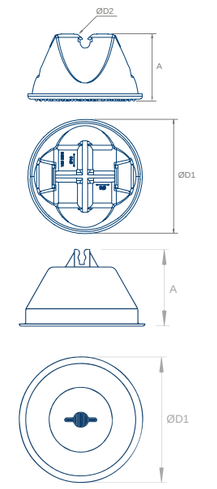
Roof file support bracket

Model	Ref.	Mat.	A (min-max) (mm)	B (mm)	Weight (g)
With clamp PA round conductor Ø8 mm	118242	SST/PA	185-260	25	109



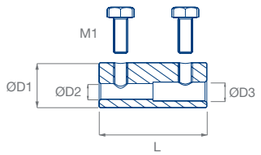
Concrete support for flat roofs

Model	Ref.	Mat.	Conductor (mm)	A (mm)	D1 (mm)	D2 (mm)	Weight (g)
Concrete support Ø8-10 mm round cond.	800237	PP/PE	8-10	78	133	8-10	1000
Support for self-filling with concrete Ø8 mm	800168	PE	8	85	140	-	55
Concrete support + 30mm flat bar adapter	800270	PP/PE	30x2-3,5	88	133	8	1007
Support for self-filling conductive plate	800274	PE	30x2-3,5	95	140	-	62



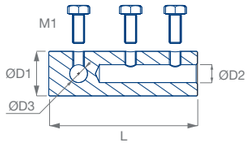
CONNECTORS

Linear sleeve connectors



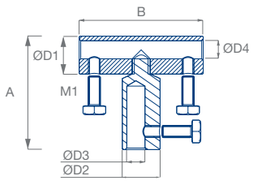
Model	Ref.	Mat.	D1 (mm)	D2 (mm)	D3 (mm)	L (mm)	M1	Weight (g)
Linear 35 x 35 mm²	115067	Cu/Zn	25	8,5	8,5	60	M8	230
Linear 35 x 50 mm²	115070	Cu/Zn	25	8,5	10,5	60	M8	220
Linear 35 x 70 mm²	115141	Cu/Zn	25	8,5	12,5	60	M8	210
Linear 35 x 95 mm²	115142	Cu/Zn	30	8,5	15,5	60	M8	310
Linear 50 x 50 mm²	115051	Cu/Zn	25	10,5	10,5	60	M8	220
Linear 50 x 70 mm²	115072	Cu/Zn	25	10,5	12,5	60	M8	200
Linear 50 x 95 mm²	115076	Cu/Zn	30	10,5	15,5	60	M8	300
Linear 70 x 70 mm²	115074	Cu/Zn	25	12,5	12,5	60	M8	200
Linear 70 x 95 mm²	115078	Cu/Zn	30	12,5	15,5	60	M8	290
Linear 95 x 95 mm²	115080	Cu/Zn	30	15,5	15,5	60	M8	270

"T" sleeve connectors (1 piece)



Model	Ref.	Mat.	D1 (mm)	D2 (mm)	D3 (mm)	L (mm)	M1	Weight (g)
"T" 1 piece 35 x 35 mm²	115143	Cu/Zn	25	8,5	8,5	100	M8	385
"T" 1 piece 35 x 50-70 mm²	115144	Cu/Zn	25	8,5	12,5	100	M8	380
"T" piece 35 x 95 mm²	115145	Cu/Zn	30	8,5	15,5	100	M8	365
"T" 1 piece 50 x 35 mm²	115146	Cu/Zn	25	10,5	8,5	100	M8	360
"T" 1 piece 50 x 50-70 mm²	115052	Cu/Zn	25	10,5	12,5	100	M8	355
"T" 1 piece 50 x 95 mm²	115147	Cu/Zn	30	10,5	15,5	100	M8	545
"T" 1 piece 70 x 35 mm²	115148	Cu/Zn	25	12,5	8,5	100	M8	325
"T" 1 piece 70 x 50-70 mm²	115081	Cu/Zn	25	12,5	12,5	100	M8	320
"T" 1 piece 70 x 95 mm²	115149	Cu/Zn	30	12,5	15,5	100	M8	515
"T" 1 piece 95 x 35 mm²	115150	Cu/Zn	30	15,5	8,5	100	M8	455
"T" 1 piece 95 x 50-70 mm²	115151	Cu/Zn	30	15,5	12,5	100	M8	450
"T" 1 piece 95 x 95 mm²	115082	Cu/Zn	30	15,5	15,5	100	M8	440

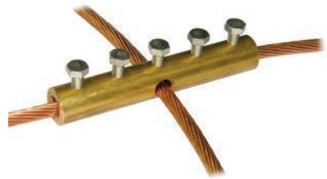
"T" sleeve connectors (2 pieces)

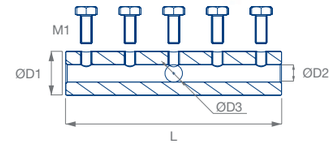


Model	Ref.	Mat.	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)	A (mm)	B (mm)	M1	Weight (g)
"T" 2 pieces 35 x 35 mm²	115152	Cu/Zn	25	25	8,5	8,5	75	82	M8	495
"T" 2 pieces 35 x 50-70 mm²	115153	Cu/Zn	25	25	8,5	12,5	75	82	M8	455
"T" 2 pieces 35 x 95 mm²	115154	Cu/Zn	25	30	8,5	15,5	75	82	M8	555
"T" 2 pieces 50 x 35 mm²	115155	Cu/Zn	25	25	10,5	8,5	75	82	M8	485
"T" 2 pieces 50 x 50-70 mm²	115056	Cu/Zn	25	25	10,5	12,5	75	82	M8	445
"T" 2 pieces 50 x 95 mm²	115156	Cu/Zn	25	30	10,5	15,5	75	82	M8	545
"T" 2 pieces 70 x 35 mm²	115157	Cu/Zn	25	25	12,5	8,5	75	82	M8	475
"T" 2 pieces 70 x 50-70 mm²	115083	Cu/Zn	25	25	12,5	12,5	75	82	M8	435
"T" 2 pieces 70 x 95 mm²	115158	Cu/Zn	25	30	12,5	15,5	75	82	M8	535
"T" 2 pieces 95 x 35 mm²	115159	Cu/Zn	30	25	15,5	8,5	80	82	M8	535
"T" 2 pieces 95 x 50-70 mm²	115160	Cu/Zn	30	25	15,5	12,5	80	82	M8	495
"T" 2 pieces 95 x 95 mm²	115084	Cu/Zn	30	30	15,5	15,5	80	82	M8	595

CONNECTORS

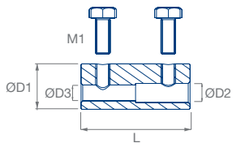
Cross sleeve connectors





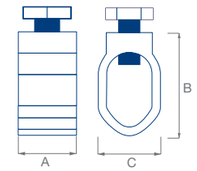
Model	Ref.	Mat.	D1 (mm)	D2 (mm)	D3 (mm)	L (mm)	M1 (mm)	Weight (g)
Cross 35 x 35 mm²	115161	Cu/Zn	25	8,5	8,5	148	M8	566
Cross 35 x 50-70 mm²	115162	Cu/Zn	25	8,5	12,5	148	M8	546
Cross 35 x 95 mm²	115163	Cu/Zn	30	8,5	15,5	148	M8	801
Cross 50 x 35 mm²	115164	Cu/Zn	25	10,5	8,5	148	M8	526
Cross 50 x 50-70 mm²	115053	Cu/Zn	25	10,5	12,5	148	M8	450
Cross 50 x 95 mm²	115165	Cu/Zn	30	10,5	15,5	148	M8	761
Cross 70 x 35 mm²	115166	Cu/Zn	25	12,5	8,5	148	M8	476
Cross 70 x 50-70 mm²	115085	Cu/Zn	25	12,5	12,5	148	M8	456
Cross 70 x 95 mm²	115167	Cu/Zn	30	12,5	15,5	148	M8	711
Cross 95 x 35 mm²	115168	Cu/Zn	30	15,5	8,5	148	M8	665
Cross 95 x 50-70 mm²	115169	Cu/Zn	30	15,5	12,5	148	M8	646
Cross 95 x 95 mm²	115086	Cu/Zn	30	15,5	15,5	148	M8	631

Round conductors - grounding rod connectors



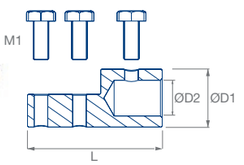
Model	Ref.	Mat.	D1 (mm)	D2 (mm)	D3 (mm)	L (mm)	M1	Weight (g)
Ø14 mm rod-35 mm² cable	115170	Cu/Zn	25	14,5	8,5	60	M8	200
Ø14 mm rod-50-70 mm² cable	115055	Cu/Zn	25	14,5	12,5	60	M8	180
Ø14 mm rod-95 mm² cable	115171	Cu/Zn	30	14,5	15,5	60	M8	220
Ø18 mm rod-35 mm² cable	115172	Cu/Zn	30	18,5	8,5	60	M8	290
Ø18 mm rod-50-70 mm² cable	115095	Cu/Zn	30	18,5	12,5	60	M8	270
Ø18 mm rod-95 mm² cable	115173	Cu/Zn	30	18,5	15,5	60	M8	250

Clamp for earth rod on round conductor



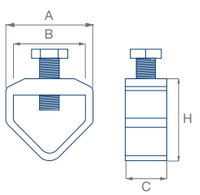
Model	Ref.	Mat.	A (mm)	B (mm)	C (mm)	M1	Weight (g)
Earth rod Ø14-20-cable 25-95mm²	115201	Cu/Zn	28	43	20	M10	110

Flat conductors - grounding rod connectors



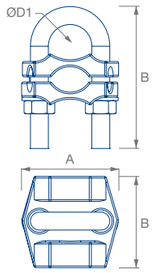
Model	Ref.	Mat.	D1 (mm)	D2 (mm)	L (mm)	M1	Weight (g)
Ø14 mm rod-30x2-4 mm tape	115174	Cu/Zn	30	14,5	70	M8	280
Ø18 mm rod-30x2-4 mm tape	115094	Cu/Zn	30	18,5	70	M8	250

Clamp for earth rod on flat conductor



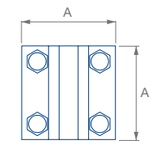
Model	Ref.	Mat.	A (mm)	B (mm)	C (mm)	H (mm)	M1	Weight (g)
Earth rod Ø14-20-tape 30x1-10mm	115198	Cu/Zn	42	34	17	40	M10	120

CONNECTORS



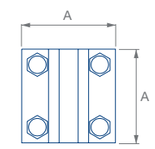
Round conductor junction clip - rod electrode

Model	Ref.	Mat.	A (mm)	B (mm)	D1 (mm)	H (mm)	Weight (g)
Rod Ø14-20 - cable 50-150mm²	115225	Cu/Zn	47,5	44,6	20,4	68.1	240



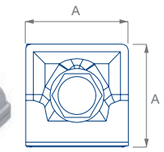
Cross connector

Model	Ref.	Mat.	A (mm)	Weight (g)
Cross connector Ø8-10 mm round cond. HDG	115098	HDG	60	110
Cross connector Ø8-10 mm round cond. Cu	115297	Cu	52	124



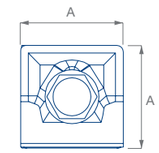
Cross connector Rd 8-10 x16mm

Model	Ref.	Mat.	A (mm)	Weight (g)
Cross connector Rd 8-10x16mm CU	115298	Cu	60	440
Cross connector Rd 8-10x16mm IN	115257	SST	60	390
Cross connector Rd 8-10x16mm HDG.	115299	HDG	60	388



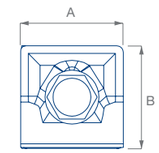
Adaptive round conductor connector

Model	Ref.	Mat.	A (mm)	Weight (g)
Adaptive round conductor connector AL	115300	Al	44	66
Adaptive round conductor connector CU	115301	Cu	40	119
Adaptive round conductor connector IN	115302	SST	40	107
Adaptive round conductor connector HDG.	115100	HDG	40	94



Connector Rd - Rd bimetallic

Model	Ref.	Mat.	A (mm)	Weight (g)
Connector Rd - Rd bimetallic	115303	Cu/SST	44	142

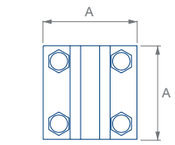


Connector Rd 8-10x16mm

Model	Ref.	Mat.	A (mm)	B (mm)	Weight (g)
Universal Connector Rd 8-10x16mm	115304	SST	40	50	163

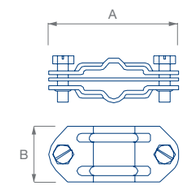
Cross connector for round and flat conductors

Modelo	Ref.	Mat.	A (mm)	Weight (g)
Cross connector RD-Plate HDG.	115305	HDG	60	285
Cross connector RD-Plate IN	115296	SST	60	285



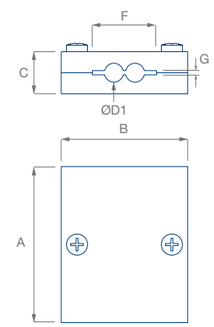
Rd connector- bimetallic plate

Model	Ref.	Mat.	A (mm)	B (mm)	Weight (g)
Rd connector- bimetallic plate	115105	Cu/SST	70	30	101



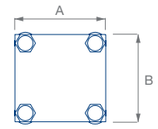
Universal switch connector

Model	Ref.	Mat.	A (mm)	B (mm)	C (mm)	F (mm)	G (mm)	D1 (mm)	Weight (g)
Universal connector	112115	Cu/Zn	74	60	20	30,5	2	9	650



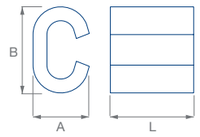
Cross-connector for tape

Model	Ref.	Mat.	A (mm)	B (mm)	Weight (g)
Cross connector tape	115093	Cu	52	50	164
Cross connector tape	115223	HDG	52	52	115
Cross connector tape	115307	SST	60	60	278



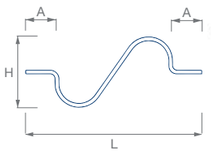
"C" pressure connection

Model	Ref.	Mat.	L (mm)	A (mm)	B (mm)	Weight (g)
"C" connector	115104	Cu	30	20,5	31	78



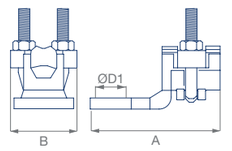
Expansion piece

Model	Ref.	Mat.	A (mm)	H (mm)	L (mm)	Weight (g)
Ø8 expansion joint	115306	Al	66	158	405	75



Flat terminal

Model	Ref.	Mat.	A (mm)	B (mm)	ØD1 (mm)	Weight (g)
Toothed flat terminal 25-120 mm² cable	115097	Cu/Zn	70	42	13	211



DOWN-CONDUCTOR PROTECTION

Mechanical protection of the lower section of down conductors of an external lightning protection system.

Fastening material includes: clamps and / or screws.

Made of galvanized steel and PVC.

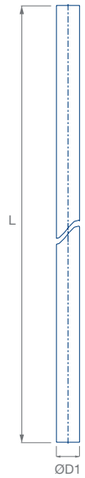
Tubes

Profiles

IEC 62.305

UNE 21.186

NFC 17-102



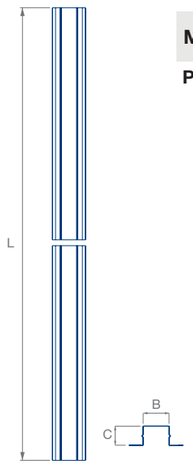
PROTECTION TUBE FOR CONDUCTORS

Protection tube for round conductors

Model	Ref.	Mat.	L (mm)	D1 (mm)	Weight (g)
Galv. Zinc-PVC shielded tube	119091	Zinc-PVC	3000	40	5000
Reticulated polyethylene 3mm tube.	119110	PE	2500	32	625
50m PE crosslinked coil 3mm	119113	PE	50m	32	12500
Galv. Steel tube 2m Ø30	119109	HDG.	2000	30	1900

Protection profile for flat conductor

Model	Ref.	Mat.	L (mm)	B (mm)	C (mm)	Weight (g)
Profile for flat conductor	119095	HDG	3000	40	32	2600



SPARK GAPS

IEC 62.561-3

IEC 62.305

UNE 21.186

NFC 17-102

Suitable for connecting antennas (TV, communication, etc ...) to external lightning protection systems to ensure bonding and prevent the formation of dangerous sparks between nearby metal masses.

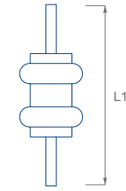
Bonding between grounding systems, operating separately under normal conditions, and ensuring their union if they suffer an overvoltage of a system.

Its use is recommended by current regulations to ensure equipotentiality of metallic structures on the roof of a building, or for interconnection between ground systems.

SPARK GAPS

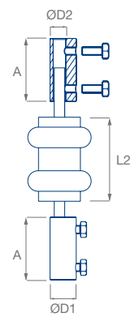
Spark gap protector

Model	Ref.	L1 (mm)	Weight (g)
VX-1 spark gap protector	116061	174	360



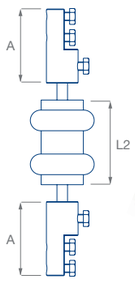
Spark gap with round conductor connection sleeves

Model	Ref.	L2 (mm)	A (mm)	D1 (mm)	D2 (mm)	Weight (g)
VX-1 spark gap protector 50 mm² cable	116062	80	60	25	10,5	795
VX-1 spark gap protector 70 mm² cable	116063	80	60	25	12,5	785
VX-1 spark gap protector 95 mm² cable	116064	80	60	30	15,5	750



Spark gap with flat conductor connection sleeves

Model	Ref.	L2 (mm)	A (mm)	Weight (g)
VX-1 Spark gap protector 30x2 mm tape	116071	80	70	970



GROUNDING SYSTEMS

2

GENERAL FEATURES

grounding system

The grounding system is established with the main objective of limiting the voltage with respect to ground, which can occur at a given moment in the metal frames, and prevent dangerous potential differences over allowing ground fault currents or discharge or atmospheric origin.

The grounding system of a lightning protection system is one of the most important parts of the system, as this the lightning currents and all its energy charge is dissipated.

The recommendations set by regulations such as **IEC 62305-3, NF C 17-102: 2011** and **UNE 21186: 2011**, indicate that grounding must have a low ohmic value (less than 10 Ω when the measurement is made at isolated low frequency any conductor element).

Fig. 13 – Grounding System cross section.

grounding standards

Depending on the protection system, they have indications marked by **IEC 62305-3: 2011** for Franklin rods or Faraday cage or by **UNE 21186: 2011** and **NF C 17-102: 2011** for the ESE lightning rod.

• Grounding for ESE Lightning Rods:

The dimensions of the ground will depend on the resistivity ρ= (Ω⋆m) of the terrain.

Grounding must be done for each down conductor and there are 2 types:

TYPE A GROUNDING: can be type **A1** or **A2**.

Fig. 14 – Registry system of grounding installation.

TYPE A1: It consists of a crow's foot configuration (see Fig. 15).

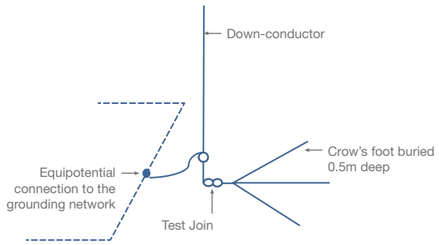


Fig. 15 – Example of grounding of type A1: 3 horizontal conductors (deep: 50cm, length: 7 to 8m).

TYPE A2: Formed by the union of many inline or triangle vertical stakes and separated by a distance of at least equal to its length (see Fig. 16).

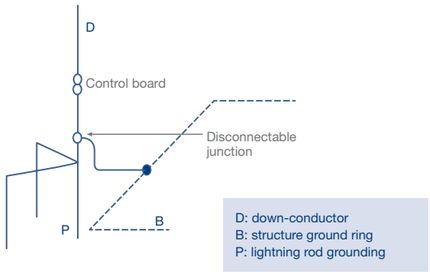


Fig. 16 – Example of grounding of type A2. The stakes will be linked by a conductor with the same characteristics and section of the down-conductor.

GROUND TYPE B: ring electrode, this arrangement is a conductive ring in contact with the ground 80% of its length. It may be external to the electrode structure or foundation. Each down conductor, besides being connected to the ring, is to be further connected to a horizontal electrode at either at least a 4 m vertical electrode or to a minimum length of 2 m (see Fig.17).

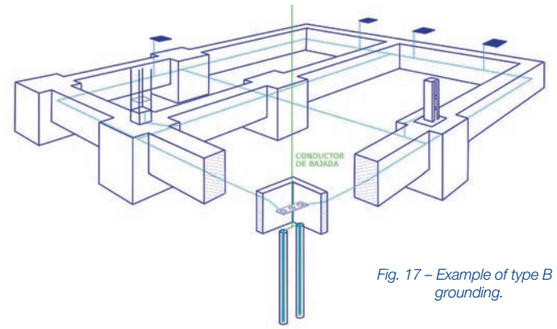


Fig. 17 – Example of type B grounding.

• Grounding for Franklin rod systems or Faraday cage:

According to layout, 2 grounding systems exist:

TYPE A: formed by horizontal or vertical electrodes installed outdoors and connected to each down conductor. In type, the number of electrodes should not be less than 2, and should be distributed evenly.

Minimum length of each earth electrode must be:

· L1 for horizontal electrodes.

· 0,5 L1 for vertical or inclined electrodes.

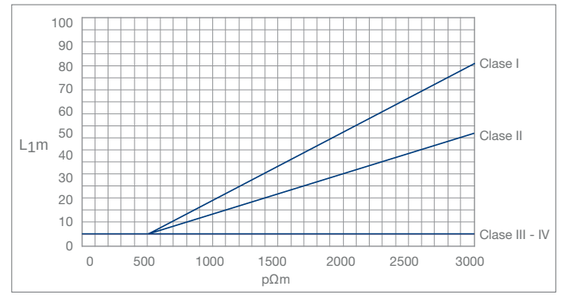


Fig. 18. – Minimum leght (L1) of each ground electrode according to the class of LPS. NOTE: III and IV classes are independents of the resistivity.

L1 being the minimum length of horizontal electrodes shown in Fig. 18.

In case we can not achieve these requirements, we will use the type B configuration.

TYPE B: It is formed by an outer conductor ring to the structure to be protected, in contact with the ground at least 80% of its length, installed at 0.5 m deep and 1 m separation from the structure.

It is recommended that the electrode number not be less than the number of down conductors with a minimum of two. A ring that would connect additional electrodes at points where the down-conductors are connected.

This Type B arrangement is recommended for rocky terrain, and is preferable to use with electronic systems or structures with a high danger of fire.

STEP VOLTAGES:

To minimize the risk of passing currents, and to protect people, you should:

- Perform equipotentialization by using a grounding mesh.
- Physical access restrictions to 3 m of the down conductor or warning signs.
- A layer of insulating material, for example 5 cm asphalt or 15 cm gravel.

GROUND ELECTRODES

Material for building grounding systems. Spike and place grounding electrodes, sacrificial anodes, graphite electrodes, ground resistivity enhancers and accessories.

Made of different materials and dimensions for all kinds of construction solutions.

Please consult for custom manufacturing and other construction solutions.

Spikes

Plates

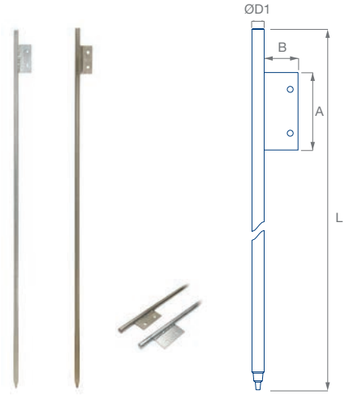
Quibacsol

IEC 62.305

IEC 62.561-2

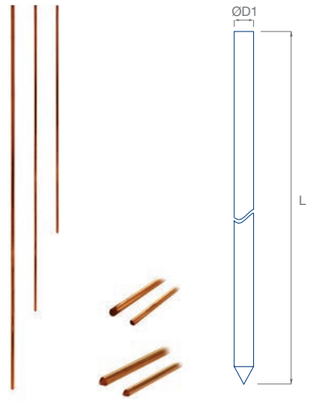
UNE 21.186

NFC 17-102



Electrode with tongued connection coupling

Model	Ref.	Mat.	L (mm)	A (mm)	B (mm)	D1 (mm)	Weight (g)
GST l:1500mm Ø18 mm	252020	GST	1500	112	50	18	3270
SST l:1500mm Ø18 mm	252030	SST	1500	112	50	18	3220
GST l:2000mm Ø18 mm	252053	GST	2000	112	50	18	4270
SST l:2000mm Ø18 mm	252054	SST	2000	112	50	18	4220



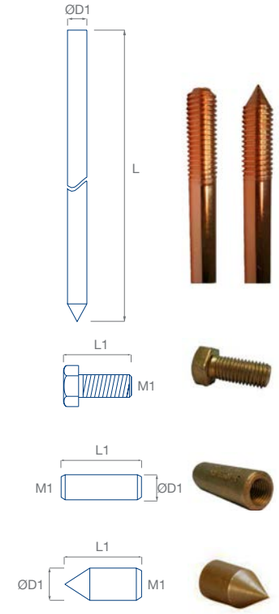
Copper-plated grounding rod

Model	Ref.	Mat.	L (mm)	D1 (mm)	Weight (g)
CCS l:2500 mm Ø18 mm	252027	CCS	2500	18	4500
CCS l:2000 mm Ø18 mm	252032	CCS	2000	18	4000
CCS l:1500 mm Ø18 mm	252033	CCS	1500	18	2400
CCS l:2000 mm Ø14 mm	252029	CCS	2000	14	2550
CCS l:1500 mm Ø14 mm	252024	CCS	1500	14	1860

GROUND ELECTRODES

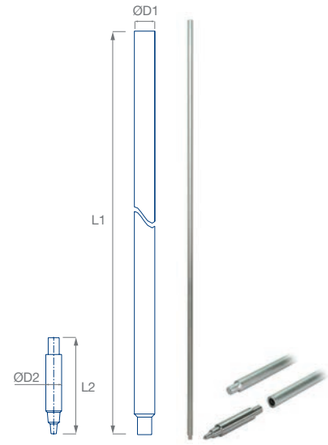
Threaded copper-plated steel earthing rod

Model	Ref.	Mat.	Nº Threads	L (mm)	D1 (mm)	M1	Weight (g)
Earthing rod Cu l:1.5m Ø16.6 1R	252104	CCS	1	1500	16,6	M18	2550
Earthing rod Cu l:1.5m Ø16.6 2R	252073	CCS	2	1500	16,6	M18	2540
Earthing rod Cu l:2m Ø16.6 1R	252103	CCS	1	2000	16,6	M18	3400
Earthing rod Cu l:2m Ø16.6 2R	252089	CCS	2	2000	16,6	M18	3390
Earthing rod Cu l:2.5m Ø16.6 1R	252105	CCS	1	2500	16,6	M18	4250
Earthing rod Cu l:3m Ø16.6 1R	252074	CCS	1	3000	16,6	M18	5100
M18 driving stud for 16.6 mm earth rod	252091	Brass	-	40	-	M18	125
M18 Connector for threaded earth rod 16mm	252092	Brass	-	70	25	M18	140
Driving point for 16mm brass earth rod	252083	Brass	-	65	22	M20	320



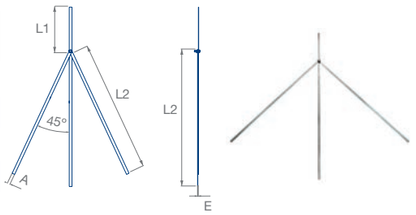
Spliceable grounding rods

Model	Ref.	Mat.	L1 (mm)	D1 (mm)	L2 (mm)	D2 (mm)	Weight (g)
l:1500mm Ø18 mm Galv. Steel spliceable rods	252025	HDG	1500	18	-	-	3190
Piercing tip	252026	ST	-	-	110	18	160

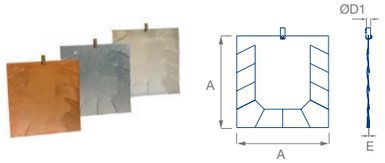


Grounding kit - 'Crow's feet'

Model	Ref.	Mat.	L1 (mm)	L2 (mm)	A (mm)	E (mm)	Weight (kg)
Crow's feet kit galv. steel l:1500 mm	252034	HDG	500	1500	30	3	4,5
Crow's feet kit galv. steel l:3000 mm	252035	HDG	500	3000	30	3	8,3
Crow's feet kit Cu Sn l:1500 mm	252051	Cu Sn	500	1500	30	2	4,3
Crow's feet kit Cu Sn l:3000mm	252052	Cu Sn	500	3000	30	2	8,1

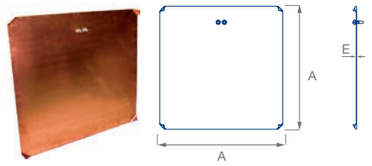


GROUND ELECTRODES



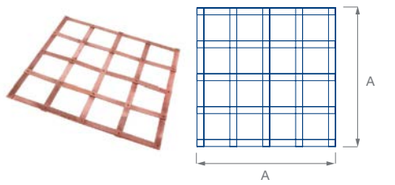
Grounding plate with connection sleeve

Model	Ref.	Mat.	A (mm)	E (mm)	D1 (mm)	Weight (kg)
Cu plate with Cu/Zn sleeve	251011	Cu	500	2	12,5	4,7
Galv. steel plate with SST sleeve	251015	GST	500	2	12,5	6,2
Stainless steel plate with SST sleeve	251012	SST	500	2	12,5	4,3



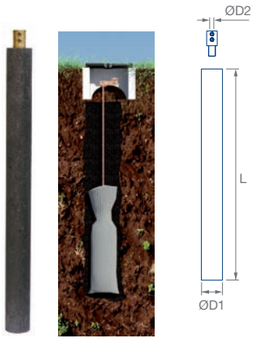
Copper grounding plate with “U” connection

Model	Ref.	Mat.	A (mm)	E (mm)	Weight (kg)
Plate Cu 500 conexión “U”	251021	Cu	500	2	4,7
Plate Cu 600 conexión “U”	251024	Cu	600	3	9,8



Copper tape earthing mesh

Modelo	Ref.	Mat.	A (mm)	E (mm)	Nº cond.	Weight (Kg)
Cu tape earthing mesh 630 x 630	251036	Cu	630	3	8	4,3
Cu tape earthing mesh 930 x 930	251038	Cu	930	3	10	7,5



GROUND ELECTRODES

Graphite electrode

Graphite electrodes suitable for highly corrosive soils.

Model	Ref.	Mat.	D1 (mm)	D2 (mm)	L (mm)	Weight (kg)
Graphite electrode	252039	Graphite	50	12,5	600	12,5

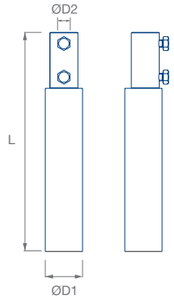
Graphite electrode composed by:
Graphite rod, connection device, bag, 10kg Quibacsol mineral compound.
Components are supplied separated. Mounting shall be performed during the installation.

SACRIFICIAL ANODES

Sacrificial anodes

Anodes for cathodic protection of ground electrodes or metal masses.

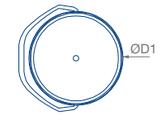
Modelo	Ref.	Mat.	D1 (mm)	D2 (mm)	L (mm)	Weight (g)
Modelo HC de 200 mm de longitud	251017	Zinc	40	12,5	260	2420
Modelo MC 600 mm in length	251018	Zinc	25	12,5	660	2790
Modelo LC 260 mm in length	251019	Mg	66	12,5	330	920

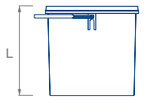


QUIBACSOL MINERAL COMPOUND

QUIBACSOL mineral compound

Model	Ref.	L (mm)	D1 (mm)	Weight (kg)
QUIBACSOL 10 kg	254041	255	267	10,4





Humidification tube

Model	Ref.	Mat.	L (mm)	D1 (mm)	Weight (g)
Humidification tube	119094	PVC	700	50	570

EQUIPOTENCIAL BONDING BARS / TEST JOINT BOXES

Grounding and potential compensation connecting bars, control and recording systems.

Made of copper alloy Cu / Zn (brass), bronze with stainless steel screw set.

Refer to custom manufacturing and other constructive solutions.

Equipotential bonding bars

Registry systems

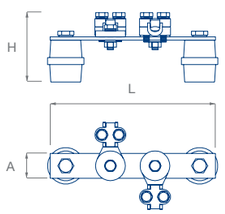
IEC 62.305

IEC 62.561-1

UNE 21.186

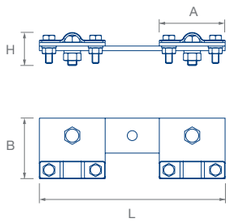
NFC 17-102

EQUIPOTENTIAL BONDING BARS



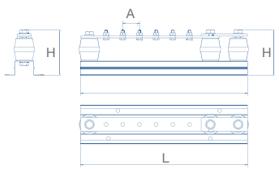
Equipotential bonding bars with insulators

Model	Ref.	Mat.	L (mm)	A (mm)	H (mm)	Weight (g)
2 pole equipotential bar	250001	Cu	200	30	84	940
3 pole equipotential bar	250007	Cu	254	30	84	1215
4 pole equipotential bar	250008	Cu	308	30	84	1490
5 pole equipotential bar	250009	Cu	362	30	84	1750



Equipotential bar for registry case (round-flat conductor)

Model	Ref.	Mat.	L (mm)	A (mm)	B (mm)	H (mm)	Weight (g)
2 pole case equipotential bar	250026	Cu	159,5	56,5	50	28,2	405
3 pole case equipotential bar	250027	Cu	159,5	56,5	50	28,2	525
4 pole case equipotential bar	250028	Cu	211	56,5	50	28,2	696
5 pole case equipotential bar	250029	Cu	262,5	56,5	50	28,2	870



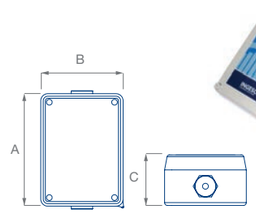
Equipotential bar

Model	Ref.	L (mm)	A (mm)	H (mm)	Tape	Nº Links	Weight (Kg)
Equip.Cu Bar 6 Connec. M10	250106	435	45	105	50x5	1	1,80
Equip.Cu Bar 8 Connec. M10	250107	525	45	105	50x5	1	2,07
Equip.Cu Bar 10 Connec. M10	250109	685	45	105	50x5	2	2,68
Equip.Cu Bar 13 Connec. M10	250102	1115	45	105	50x6	4	6,54
Equip.Cu Bar 15 Connec. M10	250110	955	45	105	50x5	2	3,70
Equip.Cu Bar 20 Connec. M10	250111	1180	45	105	50x5	2	4,37
Equip.Cu Bar 28 Connec. M10	250103	1835	45	105	50x6	4	9,97

TEST JOINT CASE

Test joint box

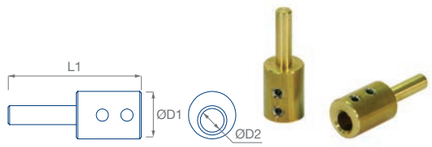
Model	Ref.	Mat.	A (mm)	B (mm)	C (mm)	Weight (g)
Test joint box for 50mm² cable	250006	PVC	165	115	71	1100
Test joint for flat conductor	250099	PVC	165	115	71	1100



ADAPTERS FOR TEST JOIN CASE

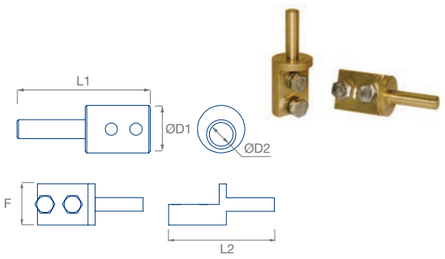
Adapters for round conductor

Model	Ref.	Mat.	L1 (mm)	D1 (mm)	D2 (mm)	Weight (g)
Adapter Kit cable 70 mm²	250010	Cu/Zn	70	25	12,5	260
Adapter Kit cable 95 mm²	250011	Cu/Zn	70	30	15,5	226



Adapters for flat conductor

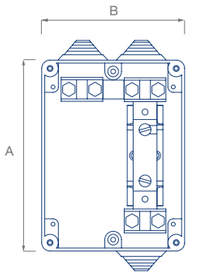
Model	Ref.	Mat.	L2 (mm)	F (mm)	Weight (g)
Adapter Kit 30x2 mm flat conductor	250012	Cu/Zn	77	30	392



TEST JOIN CASE

Test joint box

Model	Ref.	Mat.	A (mm)	B (mm)	C (mm)	Weight (g)
Test joint box	250049	PVC	160	110	65,5	342



EARTH INSPECTION PITS

Polypropylene and concrete earth inspection pits. Polypropylene, PVC, aluminum and cast iron covers.

Down-conductor signs for lightning protection and grounding in PVC or aluminum.

Made of different materials and dimensions for all kinds of constructive solutions.

Consult for other construction solutions.

Earth pits

IEC 62.305

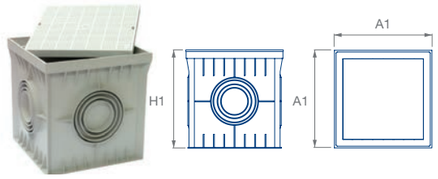
UNE-EN 124

UNE 21.186

NFC 17-102

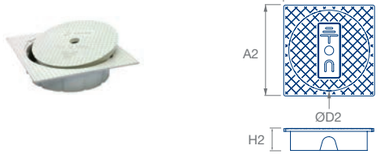
EARTH PITS AND COVERS

Polypropylene earth pit



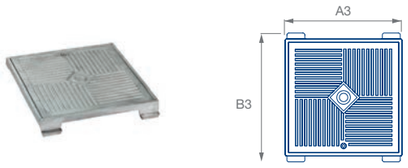
Model	Ref.	Mat.	A1 (mm)	H1 (mm)	Weight (g)
Square PP earth pit with cover	253058	PP	300	300	3000
Square PP earth pit with PVC cover	253057	PP/PVC	300	300	2600

Circular Polypropylene earth pit



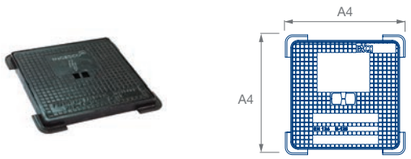
Model	Ref.	Mat.	A2 (mm)	D2 (mm)	H2 (mm)	Weight (g)
Circular PP earth pit	253032	PP	250	222	63	775

Cover and aluminum frame



Model	Ref.	Mat.	A3 (mm)	B3 (mm)	Weight (g)
Aluminum cover and frame	253037	Al	305	330	2220

Cast iron cover and frame

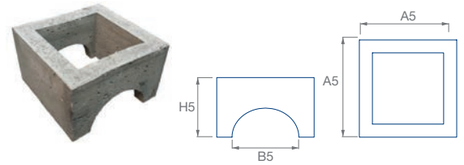


Model	Ref.	Mat.	A4 (mm)	Weight (g)
Cast iron cover and frame	253033	Fe	337	4950

EARTH PITS AND COVERS

Concrete earth pit

Model	Ref.	Mat.	A5 (mm)	B5 (mm)	H5 (mm)	Weight (kg)
Square concrete earth pit	253059	Concrete	335	230	205	22



Down-conductor signage

Model	Ref.	Mat.	Dimensions	Weight (g)
PVC grounding sign	256001	PVC	DINA4	864
Aluminum grounding sign	256002	Al	DINA4	888
PVC lightning rod sign	256003	PVC	DINA4	864

ALUMINOTHERMIC WELDING

Aluminothermic welding is a method in which, due to the reaction caused by the copper oxide reduction by aluminum, a durable two metal element (copper-copper or copper-steel) bond two metal elements (copper-copper or copper-steel) is obtained.

The reaction takes place in a graphite mold in which the elements to be welded have previously been introduced and at the required load. This results in a durable, compact and homogeneous bonding between the elements.

The conductivity of the welding connection is equal to or greater than two joined conductors.

The connection is resistant to overloads or surges.

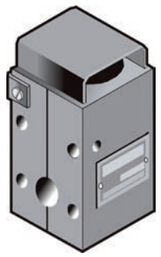
Molds

Load cartridge

Ignition devices

Accessories

GRAPHITE MOLDS



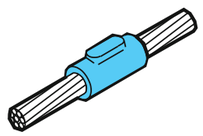
The molds were machined from a block of refractory materials (graphite). Its average duration, in normal use is 70 to 100 welds. A lid protects projections at the time of ignition.

A mold for each type of welding and joining element. Check references of the molds and the list of connections types.

Because of the multitude of connections that can be made, the different materials, conductors and structures that can occur in a system, this catalog only reflects the most common connections (copper-copper and copper-steel). Consult for any other connection.

TYPES OF CONNECTIONS BY ALUMINOTHERMIC WELDING

Cable-cable (CC) welding



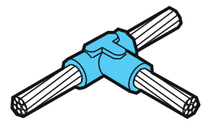
Linear cable-cable (LCC)

Model	Trunk cable (mm^2)	Secondary cable (mm^2)	Type of mold	Mold ref.	Type of cartridge	Cartridge ref.
Linear connection cable-cable 35-35	35	35	LCC35/35	500005	C4	500001
Linear connection cable-cable 50-35	50	35	LCC50/35	500006	C4	500001
Linear connection cable-cable 50-50	50	50	LCC50/50	500007	C4	500001
Linear connection cable-cable 70-35	70	35	LCC70/35	500008	C4	500001
Linear connection cable-cable 70-50	70	50	LCC70/50	500009	C5	500002
Linear connection cable-cable 70-70	70	70	LCC70/70	500010	C5	500002

Cable-cable (CC) welding

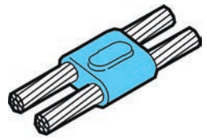
"T" horizontal cable-cable (TH-CC)

Model	Trunk cable (mm^2)	Secondary cable (mm^2)	Type of mold	Mold ref.	Type of cartridge	Cartridge ref.
"T" horiz. connection cable-cable 35-35	35	35	TH-CC35/35	500011	C4	500001
"T" horiz. connection cable-cable 35-50	35	50	TH-CC35/50	500012	C5	500002
"T" horiz. connection cable-cable 35-70	35	70	TH-CC35/70	500013	C5	500002
"T" horiz. connection cable-cable 50-35	50	35	TH-CC50/35	500014	C5	500002
"T" horiz. connection cable-cable 50-50	50	50	TH-CC50/50	500015	C6	500003
"T" horiz. connection cable-cable 50-70	50	70	TH-CC50/70	500016	C6	500003
"T" horiz. connection cable-cable 70-35	70	35	TH-CC70/35	500017	C5	500002
"T" horiz. connection cable-cable 70-50	70	50	TH-CC70/50	500018	C6	500003
"T" horiz. connection cable-cable 70-70	70	70	TH-CC70/70	500019	C6	500003



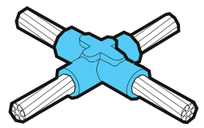
Parallel cable-cable (LP-CC)

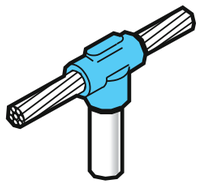
Model	Trunk cable (mm^2)	Secondary cable (mm^2)	Type of mold	Mold ref.	Type of cartridge	Cartridge ref.
Parallel connection cable-cable 35-35	35	35	LP-CC35/35	500020	C6	500003
Parallel connection cable-cable 35-50	35	50	LP-CC35/50	500021	C6	500003
Parallel connection cable-cable 35-70	35	70	LP-CC35/70	500022	C6	500003
Parallel connection cable-cable 50-35	50	35	LP-CC50/35	500023	C6	500003
Parallel connection cable-cable 50-50	50	50	LP-CC50/50	500024	C6	500003
Parallel connection cable-cable 50-70	50	70	LP-CC50/70	500025	C6	500003
Parallel connection cable-cable 70-35	70	35	LP-CC70/35	500026	C6	500003
Parallel connection cable-cable 70-50	70	50	LP-CC70/50	500027	C6	500003
Parallel connection cable-cable 70-70	70	70	LP-CC70/70	500028	C7	500004



Cross cable-cable (X-CC)

Model	Trunk cable (mm^2)	Secondary cable (mm^2)	Type of mold	Mold ref.	Type of cartridge	Cartridge ref.
Cross connection cable-cable 35-35	35	35	X-CC35/35	500029	C6	500003
Cross connection cable-cable 35-50	35	50	X-CC35/50	500030	C6	500003
Cross connection cable-cable 35-70	35	70	X-CC35/70	500031	C6	500003
Cross connection cable-cable 50-35	50	35	X-CC50/35	500032	C6	500003
Cross connection cable-cable 50-50	50	50	X-CC50/50	500033	C6	500003
Cross connection cable-cable 50-70	50	70	X-CC50/70	500034	C6	500003
Cross connection cable-cable 70-35	70	35	X-CC70/35	500035	C6	500003
Cross connection cable-cable 70-50	70	50	X-CC70/50	500036	C6	500003
Cross connection cable-cable 70-70	70	70	X-CC70/70	500037	C7	500004





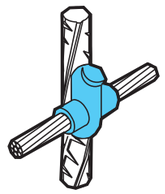
Earthing rod-cable (PC) welding

"T" spike-cable (TPC)

Model	Øspike (mm)	Secondary cable (mm²)	Type of mold	Mold ref.	Type of cartridge	Cartridge ref.
"T" connection rod-cable 14-35	14	35	TPC14/35	500038	C6	500003
"T" connection rod-cable 14-50	14	50	TPC14/50	500039	C6	500003
"T" connection rod-cable 14-70	14	70	TPC14/70	500040	C7	500004
"T" connection rod-cable 18-35	18	35	TPC18/35	500041	C6	500003
"T" connection rod-cable 18-50	18	50	TPC18/50	500042	C7	500004
"T" connection rod-cable 18-70	18	70	TPC18/70	500043	C7	500004

Linear rod-cable (LPC)

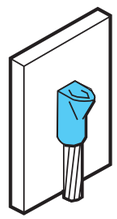
Model	Øspike (mm)	Secondary cable (mm²)	Type of mold	Mold ref.	Type of cartridge	Cartridge ref.
Linear connection rod-cable 14-35	14	35	LPC14/35	500044	C5	500002
Linear connection rod-cable 14-50	14	50	LPC14/50	500045	C6	500003
Linear connection rod-cable 14-70	14	70	LPC14/70	500046	C6	500003
Linear connection rod-cable 18-35	18	35	LPC18/35	500047	C6	500003
Linear connection rod-cable 18-50	18	50	LPC18/50	500048	C6	500003
Linear connection rod-cable 18-70	18	70	LPC18/70	500049	C6	500003



Round-cable (RC) welding

Cross round-cable (X-RC)

Model	Ørod (mm)	Secondary cable (mm²)	Type of mold	Mold ref.	Type of cartridge	Cartridge ref.
Cross connection round-cable 10/35	10	35	X-RC10/35	500050	C6	500003
Cross connection round-cable 10/50	10	50	X-RC10/50	500051	C7	500004
Cross connection round -cable 10/70	10	70	X-RC10/70	500052	C7	500004
Cross connection round-cable 16/35	16	35	X-RC 16/35	500053	C6	500003
Cross connection round-cable 16/50	16	50	X-RC 16/50	500054	C7	500004
Cross connection round-cable 16/70	16	70	X-RC 16/70	500055	C7	500004



Cable-plate (CCH) welding

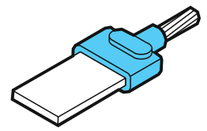
Vertical cable-plate (V-CCH)

Model	Trunk cable (mm²)	Type of mold	Mold ref.	Type of cartridge	Cartridge ref.
Vertical connection plate-cable 35	35	V-CCH35	500056	C5	500002
Vertical connection plate-cable 50	50	V-CCH50	500057	C6	500003
Vertical connection plate-cable 70	70	V-CCH70	500058	C7	500003

Cable-tape (CPL) welding

Linear cable-tape (L-CPL)

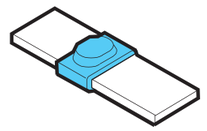
Model	Trunk cable (mm²)	Tape dimensions (mm)	Type of mold	Mold ref.	Type of cartridge	Cartridge ref.
Linear connection cable-tape 35/25x3	35	25x3	L-CPL35/25X3	500059	C4	500001
Linear connection cable-tape 50/25x3	50	25x3	L-CPL50/25X3	500060	C5	500002
Linear connection cable-tape 70/25x3	70	25x3	L-CPL70/25X3	500061	C6	500003



Tape-tape (PL) welding

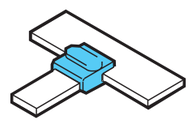
Linear tape-tape (L-PL)

Model	Tape dimensions (mm)		Mold ref.	Type of cartridge	Cartridge ref.
Linear tape-tape 25x3	25x3	L-PL25x3	500062	C5	500002



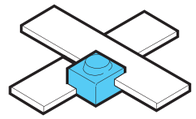
"T" horizontal tape-tape (TH-PL)

Model	Tape dimensions (mm)		Mold ref.	Type of cartridge	Cartridge ref.
"T" connection horizontal tape-tape 25x3	25x3	TH-PL25x3	500063	C5	500002



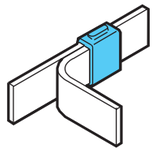
Cross tape-tape (X-PL)

Model	Tape dimensions (mm)		Mold ref.	Type of cartridge	Cartridge ref.
Cross connection tape-tape 25x3	25x3	X-PL25x3	500064	C5	500002



Parallel tape-tape (P-PL)

Model	Tape dimensions (mm)		Mold ref.	Type of cartridge	Cartridge ref.
Parallel connection tape-tape 25x3	25x3	P-PL25x3	500065	C6	500003



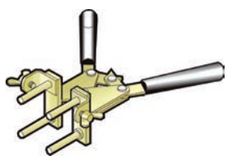
LOADS

Load cartridges

Solder powder for connection. It comes in a plastic container containing thermite charge (cap color) on one side and on the opposite side (black cap), dust ignition. A metal disc used to seal the nozzle before depositing the load is also supplied.

Model	Reference	Lid color	u./package
C4 45 load	500001	white	20
C5 65 load	500002	yellow	10
C6 90 load	500003	orange	10
C7 115 load	500004	red	10

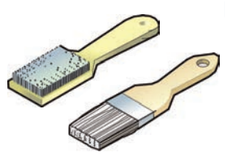
ACCESSORIES



Support tweezers

Designed to handle safely molds, allowing opening and closing when the mold is hot. Their size can vary depending on the mold dimensions.

Model	Reference
Tweezer T-80	500066



Wire brush and brush

Use the wire brush for cleaning the cables or elements to be welded.
Use the brush to clean the inside of the mold after each weld.

Model	Reference
Wire brush	500067
Brush	500068

Sealing paste

Model	Reference
Sealing paste 0.9kg	500091

Mold scraper

Its shape is especially designed for cleaning the mold loading chute.

Model	Reference
Scraper R-4 (for C4 anc C5 loads)	500069
Scraper R-9 (for C6 anc C7 loads)	500070

Ignition gun

It is used for igniting ignition powder.
Supports normal replacement lighter flints.

Model	Reference
Ignition gun	500071

Remote ignition system

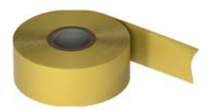
System used for igniting ignition powder remotely.
For this ignition system, it requires that the molds are manufactured with a special cover. If it is a conventional mold, an auxiliary cap should be placed to hold the system. The device works with commercial batteries, and features a bright LED that indicates if the batteries are exhausted or requires replacement fuse. Safer and cleaner process.

Model	Reference
Remote ignition device	500072
Long distance ignition consumable	500073
Quick clamping auxiliary cover	500074

ACCESSORIES

Protection tapes

Model	Ref.
Anti-corrosion plastic tape Width 100mm (L=10m)	800035
Anti-corrosion plastic tape Width 50mm (L=10m)	800148



Spray

Model	Ref.
Cold Galvanizing Spray 400ml	250032

CONTROL SYSTEMS

CONTROLS SYSTEMS: LIGHTNING COUNTERS

overview

Lightning counters are control systems designed to detect the electric current that is directed to ground through the down conductor when a lightning strike hits the system.

The installation of the lighting meter on down conductors of external lightning protection systems (LPS) is indicated by the regulations for the control and immediate verification of the status of the protection system after any lightning strike recorded on the structure.

standards

- **UNE 21186:2011:** Protección contra el rayo. Pararrayos con dispositivo de cebado.
- **NF C 17-102:2011:** Protection contre la foudre. Systèmes de protection contre la foudre à dispositif d'amorçage.
- **NP 4426:2013:** Proteção contra descargas atmosféricas - Sistemas com dispositivo de ionização não radioativo.
- **IEC 62.561/6:2011:** Lightning protection system components (LPSC) Part 6. Requeriments for lightning strike counters.
- **IEC 62.561/1:2012:** Lightning protection system components (LPSC) Part 1. Requeriments for connection components.

INGESCO counters range

	 CDR-11	 CDR UNIVERSAL	 CDR-HS
Waveform	8-20µs 10-350µs	8-20µs 10-350µs	8-20µs 10-350µs
Minimum current registration	1 kA	1 kA	0,1 kA
Maximum current	100 kA	100 kA	100 kA
Rise time	from 8 to 10µs	from 8 to 10µs	from 8 to 10µs
Mount	Serial	Parallel, without electrical contact	Serial
Accessories	Adapter plate	-	Adapter plate
Application	SPECR	ELPS (round or flat conductor)	ELPS, mesh reticular, metallic structures
Bootable to zero	NO	YES	NO

• LPS via ESE lightning rods & conventional rods.

Place a **CDR UNIVERSAL** or **CDR-11** lightning counter on one of the ground down-conductors

The system requires no external power or batteries. Its electromechanical 3 digit dial counter registers whenever a lightning discharge flows through the down conductor (minimum intensity 1kA).

They can be placed on flat or round conductors, including the **CDR UNIVERSAL** has the advantage that it is not necessary to cut the down-conductor as it is placed in parallel and does not require ohmic contact to record discharges.

• LPS with mesh systems or arrestor down-conductors in contact with metal structures.

This type of construction systems are characterized by current drifts that hinder detection of low and medium intensity lightning. The **CDR-HS** is a high sensitivity counter to detect impacts from 100 A, well below the minimum range in the regulations (1 kA). This makes the control system suitable for this type of protective systems, allowing us to track and verify the proper operation of the system.

LIGHTNING COUNTERS

Control and recording equipment of lightning on external lightning protection systems (special active rod or passive rod systems) as well as structures (high rise towers, wind turbines, etc ...).

CDR UNIVERSAL

CDR-11

CDR-HS

IEC 62.561/6:2018

UNE 21.186

NFC 17-102:2011

CDR-11

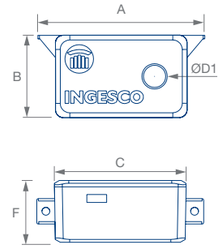
Lightning counter for external lightning protection installations.

Valid for round conductors (50-70 mm^2 or Ø8-10 mm sections).

Adapter kit available for plate or flat braid down-conductors.

CDR-11

Model		A (mm)	B (mm)	C (mm)	F (mm)	D1 (mm)	Weight (g)
CDR-11	430019	105	52	83	40	14	290
Parameters							
Functioning temp range:	from -20º to 65ºC						
Current range:	from 1kA (8/20µs) to 100kA (10/350µs)						
Counter range:	from 0 to 999 strakes						
Degree of protection:	IP65						
Resettable:	NO						



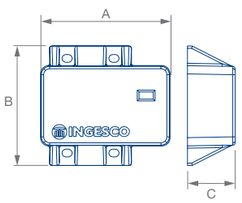
CDR UNIVERSAL

Lightning counter for external lightning protection installations (ESE lightning rod, Franklin, conductor mesh ...).

Valid for round conductors (50-70 mm^2 or Ø8-10 mm sections), or flat conductors (30x2 - 4mm).

Detection without ohmic contact. Resettable model.

CDR Universal



Model		A (mm)	B (mm)	C (mm)	Weight (g)
CDR UNIVERSAL	432028	109	101	42	490
Parameters					
Functioning temp range:	from -20º to 65ºC				
Current range:	from 1kA (8/20µs) to 100kA (10/350µs)				
Counter range:	from 0 to 999 strakes				
Degree of protection:	IP65				
Resettable:	YES				

CDR-HS

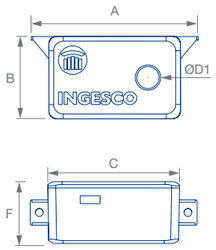
High sensitivity lightning counter for external lightning protection installations with multiple down-conductors (passive systems conductor mesh ...) and / or protection down-conductors in contact metal structures.

Valid for round conductors (50-70mm2 or Ø8-10mm sections).

Adapter kit available for plate or flat braid down-conductors.

CDR-HS

Model	Ref.	A (mm)	B (mm)	C (mm)	F (mm)	D1 (mm)	Weight (g)
CDR-HS	432027	105	52	83	40	14	300
Parameters							
Functioning temp range:	from -20º to 65ºC						
Current range:	from 100A (8/20µs) to 100kA (10/350µs)						
Counter range:	from 0 to 999 strakes						
Degree of protection:	IP65						
Resettable:	NO						



LIGHTNING STRIKE COUNTERS FOR ELEVATED STRUCTURES

The Hight sensitivity of this product allows it to record and report different types of lightning impact in elevated structures that are not detectable by other lightning counters existing in the market.

The use of the **DL EOLOS K15FO** counter in wind turbines helps to considerably reduce the maintenance costs because it informs you exactly which blade has received the lightning impact.

DL EOLOS

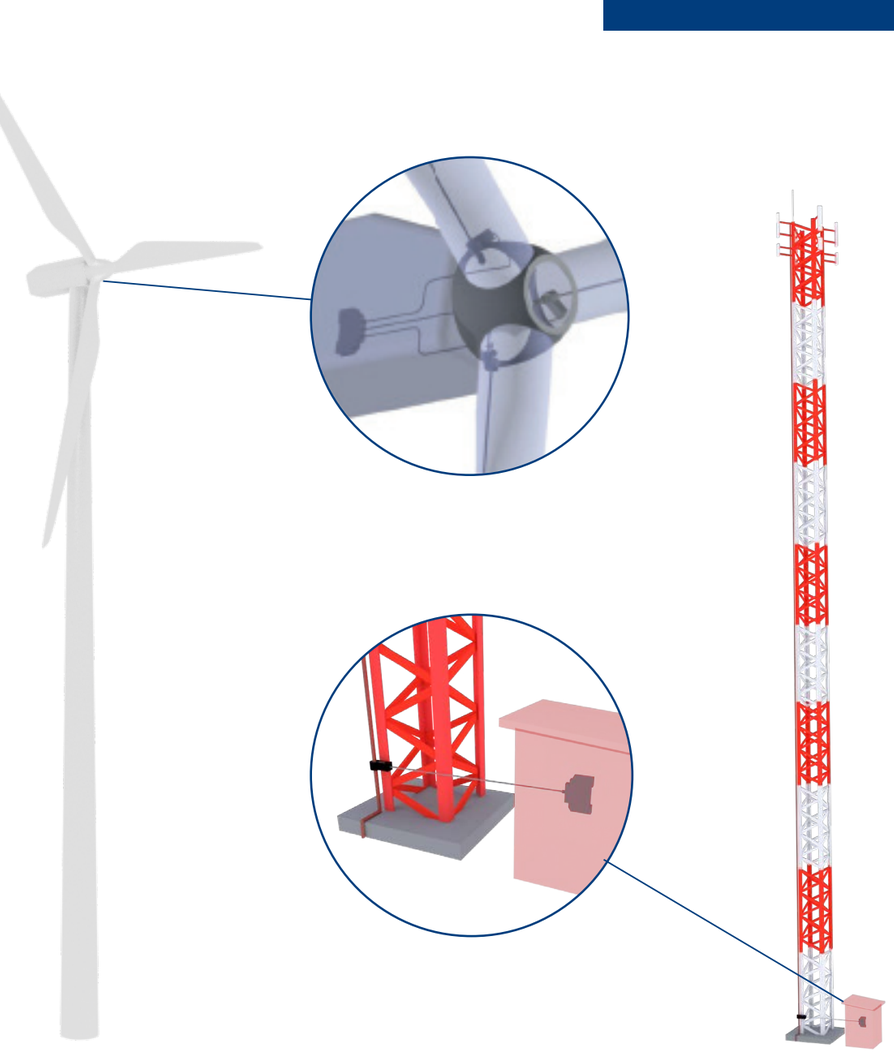
IEC 62.305

IEC 62.561/6:2018

IEC 61.400-24

UNE 21.186

NFC 17-102:2011



DL EOLOS K15FO

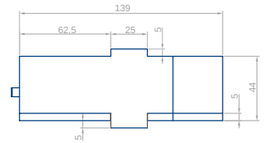
Bandwidth lightning discharge counter with fiber optic output for wind turbines.

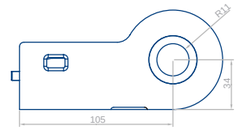
The event notification signals generated by the **DL EOLOS K15FO** counter can be received by the fiber optical **DL EOLOS FO-RCVR-3CH** receiver.

DL EOLOS K15FO

Model	Ref.
DL EOLOS K15FO	430022

Parameters	
Temperature range:	-20º to 60ºC
Current range:	±180A a ±200kA
Counting range:	Up to 999 events (rolls down to 000)
Protection grade:	IP65





DL EOLOS FO-RCVR-DIN

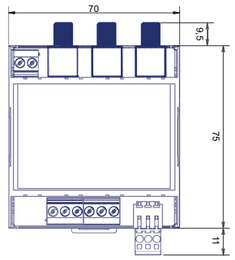
Communications receiver for real-time notification of lightning impacts detection in lightning protection systems.

This device operates in conjunction with the **DL EOLOS K15FO** and **DL EOLOS K15FO/820** high-bandwidth lightning counters.

DL EOLOS FO-RCVR-DIN

Model	Ref	Number of outputs
DL EOLOS FO-RCVR-DIN	432036	3
DL EOLOS FO-RCVR-DIN-1CH	432038	1

Parameters	
Power supply:	18~28VDC, 0.7W.
Fibre optics:	SMA connector. Compatible with POF, OM1, OM3 and OM4 optical fibres.
Ingress protection:	IP20
Enclosure material:	ABS plastic
Communications:	Modbus RTU over serial RS485 line.
Installation:	DIN rail mount.



SURGE ARRESTORS

4

INTERNAL PROTECTION - TRANSIENT SURGES

overview

The voltage surges are elevations in voltage that can occur in electrical distribution, data communications and telephony lines resulting in a premature aging of components and / or damage to the equipment connected to the network.

Overvoltages caused by direct lightning (Fig. 19), indirect (Fig. 20), disconnection of inductive loads (coils, motors, etc ...), network switches and / or defects in them (Fig occur. 21).

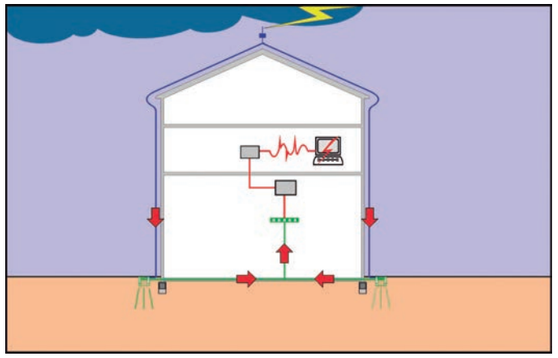


Fig. 19 – Direct discharge.

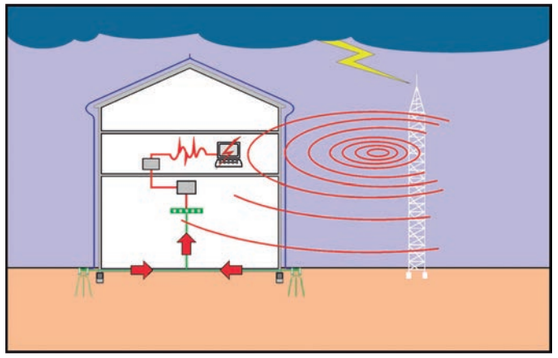


Fig. 20 – Nearby indirect discharge.

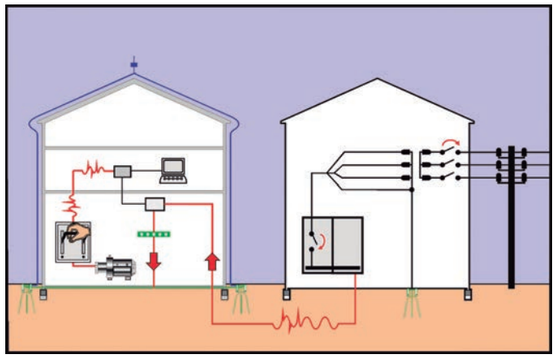


Fig. 21 – Switching networks.

Overvoltage surges are large spikes have with a slope and are short-lived, yet the strong effects on sensitive electronic equipment are devastating.

The level of the voltage that can appear on the network is a function of lightning density level (lightning / year • Km^2), the type of attack, aerial or underground, and the proximity of the MV / LV transformer.

For proper protection of the equipment against power surges, a system must perform grounding of low ohmic value and connect equipotentialy with an external protection system. Moreover, you should install protection against surges on supply lines (power, telephone, data, etc.).

Installation of external lightning protection (according to **IEC 62305-3**) and surge arresters (according to I**EC 62305-4**) significantly reduces the risk of damage caused by lightning in structures, equipment and people (calculation risks according to **IEC 62305-2**).

protection zones (LPZ)

• **External areas**:

LPZ 0_A: area exposed to direct lightning strike (current and total magnetic field)).
LPZ 0_B: area exposed to indirect impact (partial flow and total magnetic field).

• **Internal areas**:

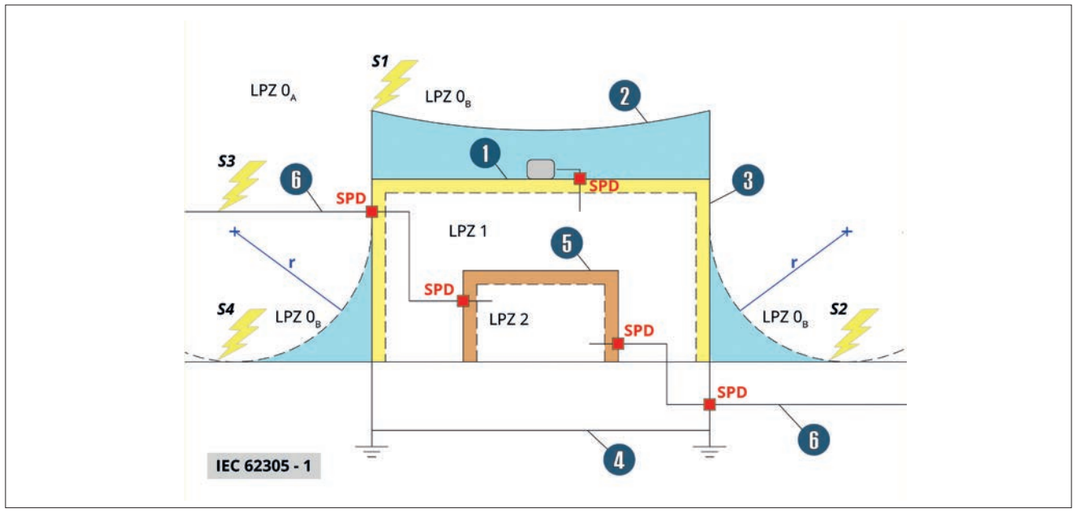
LPZ 1: area exposed to overvoltage (induced current CIDA and attenuated magnetic field).
LPZ 2…n: area exposed to overvoltage (current induced).
SPD: Surge Protectors.

• **Sources of damage:**

S1: Direct discharge on the structure
S2: Indirect discharge near the structure
S3: The discharge on service lines connected to the structure
S4: Indirect discharge near service lines connected to the structure.

r: rolling sphere radius

1: Structure
2: Lightning rods
3: Down-conductors
4: Grounding systems
5: Room (shield of LPZ 2)
6: Services connected to the structure



INTERNAL PROTECTION - TRANSIENT SURGES

surge categories

The categories indicate what the value of voltage shock wave to withstand for the equipment and determine the maximum value of residual voltage Up which should have surge protectors in each area.

The purpose of installing surge protectors is to avoid the devastating effects of surges on electrical and / or electronic equipment, cutting these peaks to permissible values as per IEC 60664-1, depending on the category that has the equipment want to be protected (Fig. 22).

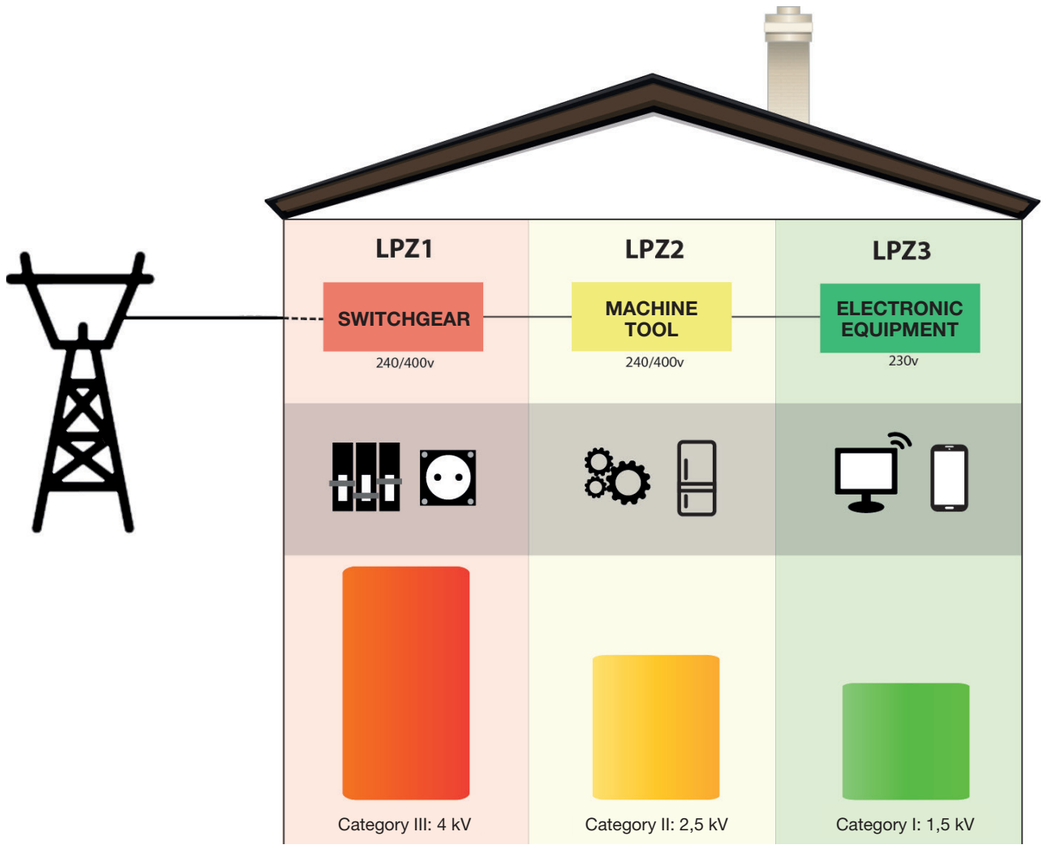


Fig. 22 – Surge categories

selection of surge protectors

Surge protectors are connected between an active conductor (phase) and ground, upstream of the equipment they protect.

Normal impedance is high, but when the voltage exceeds the threshold voltage, the protector becomes a low-impedance ground to dissipate the surge, protecting the equipment.

To select which protector to install, we must consider:

· Nominal line voltage.

· Number of phases to be protected.

· Type of network (TT, TN, TNC, TNC-S, TN-S).

· Category of equipment to be protected.

· Level of exposure to surges (I_{max}).

standards

Surge protection devices must conform to the following standards:

· UNE EN 61643-11:2013 Low voltage surge protection devices.

· IEC 62305 series – Lightning protection:

- IEC 62305-1: Protection against lightning - General principles.
- IEC 62305-2: Protection against lightning –Risk management.
- IEC 62305-3: Protection against lightning – Physical damage to structure and life hazard.
- IEC 62305-4: Protection against lightning – Electrical and electronic systems within structures.

· UNE 21186:2011 /NF C 17-102:2011 Protection against lightning: Lightning rods with early stream emitters.

· UNE EN 60664-1 Isolation coordination for low voltage equipment systems (networks).

POWER LINE SURGE PROTECTORS

CE

General protection against lightning and surges of low-voltage on electrotechnical facilities

Effective protection of main lines, branch lines, switchboards and equipment.

Three-phase and single-phase protectors, type 1+2 and type 2.

Easily replaceable, pluggable and blocking system modules

Base and modules configured for secure mounting.

Easy maintenance through local fault locator.

For protection of other lines (voice, data) or other such facilities (electrical installations with different voltage, etc ..) please consult.

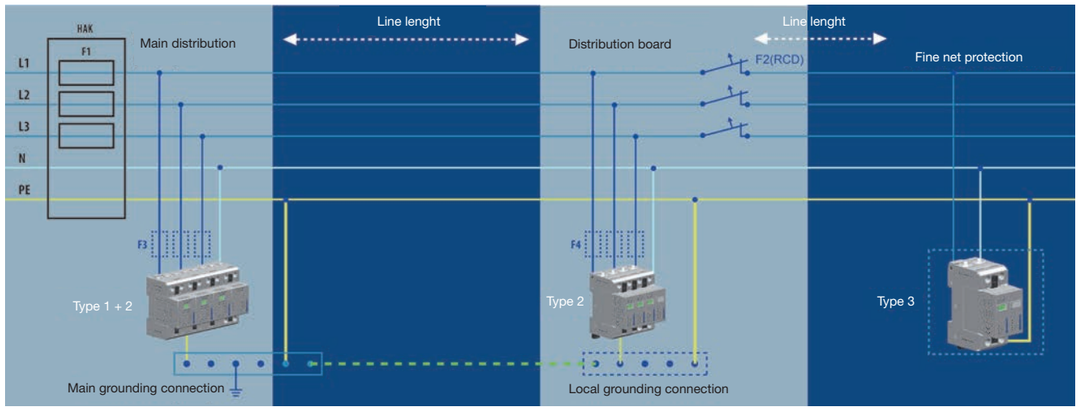
IEC 62305-1, 2, 3 & 4

IEC 61643-11

EN-60664-1

UNE 21.186:2011

NFC 17-102:2011



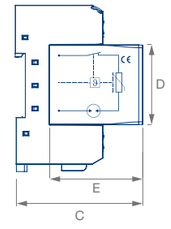
SLS-B+C100/1+1

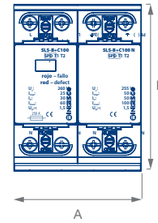
Combined lightning discharger for low voltage networks of type T1 and T2.
220V monophase lines.

▸ **SLS-B+C100/1+1**

Description	Ref.	Nº Phases	Protection grade	Working temp. range	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (g)
SLS-B+C100/1+1	370213	F+N	IP20	from -40º to 80ºC	72	90	72	45	48	670
SLS-B+C100/0	370215	-	IP20	from -40º to 80ºC	-	-	-	45	48	300

Parameters		L-N	NPE
Rated voltage	U_n	230 V AC	-
Maximum working voltage	U_c	260 V AC	255 V AC
Peak value of lightning current (10/350µs)	I_{imp}	25 kA	50 kA
Nominal discharge current (8/20µs)	I_n	30 kA	50 kA
Maximum discharge current (8/20µs)	I_{max}	60 kA	100 kA
Protection level	U_p	<1,50 kV	
Maximum fuse protection		250A gL/gG	-
Response time	t_A	100 ns	
Min-max section rigid conductor connection		2,5-50 mm²	
Min-max section multi-strand conductor connection		2,5-35 mm²	
Local fault indicator		yes	no
Installation		DIN rail	





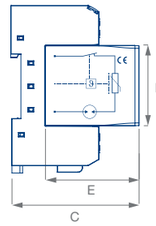
SLS-B+C100/3+1

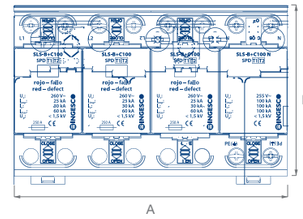
Combined lightning to low voltage discharger for networks of type T1 and T2 .
380V three-phase lines.

▸ **SLS-B+C100/3+1**

Description	Ref.	Nº Phases	Protection grade	Working temp. range	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (g)
SLS-B+C100/3+1	370214	3F+N	IP20	from -40º to 80ºC	144	90	72	45	48	1300
SLS-B+C100/0	370215	-	IP20	from -40º to 80ºC	-	-	-	45	48	300

Parameters		L-N	NPE
Rated voltage	U_n	230 V AC	-
Maximum working voltage	U_c	260 V AC	255 V AC
Peak value of lightning current (10/350µs)	I_{imp}	25 kA	100 kA
Nominal discharge current (8/20µs)	I_n	30 kA	100 kA
Maximum discharge current (8/20µs)	I_{max}	60 kA	100 kA
Protection level	U_p	<1,50 kV	
Maximum fuse protection		250A gL/gG	-
Response time	t_A	100 ns	
Min-max section rigid conductor connection		2,5-50 mm²	
Min-max section multi-strand conductor connection		2,5-35 mm²	
Local fault indicator		yes	no
Installation		DIN rail	





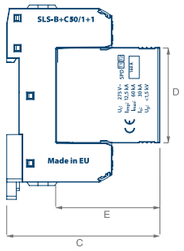
SLS-B+C50/1+1

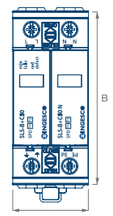
Combined low-voltage surge protector for type T1 and T2.
230V single phase lines.

▸ **SLS-B+C50/1+1**

Description	Ref.	Nº Phases	Protection grade	Working temp. range	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (g)
SLS-B+C50/1+1	370241	F+N	IP20	from -40º to 80ºC	36	82	72	45	48	240
SLS-B+C50/0	370247	-	IP20	from -40º to 80ºC	-	-	-	45	48	95

Parameters		L-N	NPE
Rated voltage	U_n	230 V AC	-
Maximum working voltage	U_c	275 V AC	255 V AC
Peak value of lightning current (10/350µs)	I_{imp}	12,5 kA	25 kA
Nominal discharge current (8/20µs)	I_n	30 kA	30 kA
Maximum discharge current (8/20µs)	I_{max}	60 kA	60 kA
Protection level	U_p	<1,2 kV	<1,5 kV
Maximum fuse protection		160A gL/gG	-
Response time	t_A	25 ns	100 ns
Min-max section rigid conductor connection		1-35 mm²	
Min-max section multi-strand conductor connection		1-25 mm²	
Local fault indicator		yes	no
Installation		DIN rail 35mm	





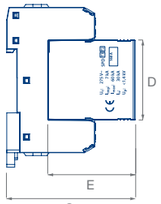
SLS-B+C50/3+1

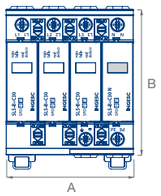
Combined low-voltage surge protector for type T1 and T2
Three-phase lines 230/400V.

▸ **SLS-B+C50/3+1**

Description	Ref.	Nº Phases	Protection grade	Working temp. range	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (g)
SLS-B+C50/3+1	370242	3F+N	IP20	de -40º a 80ºC	72	82	72	45	48	460
SLS-B+C50/0	370247	-	IP20	de -40º a 80ºC	-	-	-	45	48	95

Parameters		L-N	NPE
Rated voltage	U_n	230 V AC	-
Maximum working voltage	U_c	275 V AC	255 V AC
Peak value of lightning current (10/350µs)	I_{imp}	12,5 kA	50 kA
Nominal discharge current (8/20µs)	I_n	30 kA	50 kA
Maximum discharge current (8/20µs)	I_{max}	60 kA	100 kA
Protection level	U_p	<1,2 kV	<1,5 kV
Maximum fuse protection		160A gL/gG	-
Response time	t_A	25 ns	100 ns
Min-max section rigid conductor connection		1-35 mm²	
Min-max section multi-strand conductor connection		1-25 mm²	
Local fault indicator		yes	no
Installation		DIN rail 35mm	





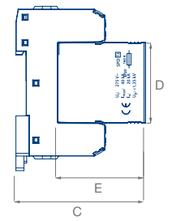
SLS-C20/1+1

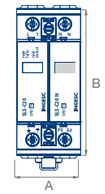
Low-voltage surge protector for type T2, class C. 220V single phase lines.

▸ **SLS-C20/1+1**

Description	Ref.	Nº Phases	Protection grade	Working temp. range	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (g)
SLS-C20/1+1	370219	F+N	IP20	from -40º to 80ºC	36	82	72	45	48	230
SLS-C20/0	370221	-	IP20	from -40º to 80ºC	-	-	-	45	48	95

Parameters		L-N	NPE
Rated voltage	U_n	230 V AC	-
Maximum working voltage	U_c	275 V AC	255 V AC
Peak value of lightning current (10/350µs)	I_{imp}	-	12 kA
Nominal discharge current (8/20µs)	I_n	20 kA	20 kA
Maximum discharge current (8/20µs)	I_{max}	40 kA	40 kA
Protection level	U_p	<1'5 kV	
Maximum fuse protection		160 A gL/gG	-
Response time	t_A	25 ns	
Min-max section rigid conductor connection		1-35 mm²	
Min-max section multi-strand conductor connection		1-25 mm²	
Local fault indicator		yes	no
Installation		DIN rail	





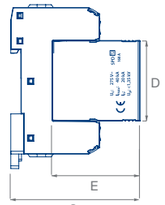
SLS-C20/3+1

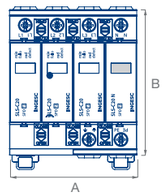
Low-voltage surge protector for type T2, class C. 380V three-phase lines.

▸ **SLS-C20/3+1**

Description	Ref.	Nº Phases	Protection grade	Working temp. range	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (g)
SLS-C20/3+1	370220	3F+N	IP20	from -40º to 80ºC	72	82	72	45	48	450
SLS-C20/0	370221	-	IP20	from -40º to 80ºC	-	-	-	45	48	95

Parameters		L-N	NPE
Rated voltage	U_n	230 V AC	-
Maximum working voltage	U_c	275 V AC	255 V AC
Peak value of lightning current (10/350µs)	I_{imp}	-	12 kA
Nominal discharge current (8/20µs)	I_n	20 kA	20 kA
Maximum discharge current (8/20µs)	I_{max}	40 kA	40 kA
Protection level	U_p	<1,35 kV	<1,50 kV
Maximum fuse protection		160A gL/gG	-
Response time	t_A	25 ns	100 ns
Min-max section rigid conductor connection		1-35 mm²	
Min-max section multi-strand conductor connection		1-25 mm²	
Local fault indicator		yes	no
Installation		DIN rail	





SURGE ARRESTERS FOR PHOTOVOLTAIC PLANTS

Protection against lightning and transient overvoltage in photovoltaic panels

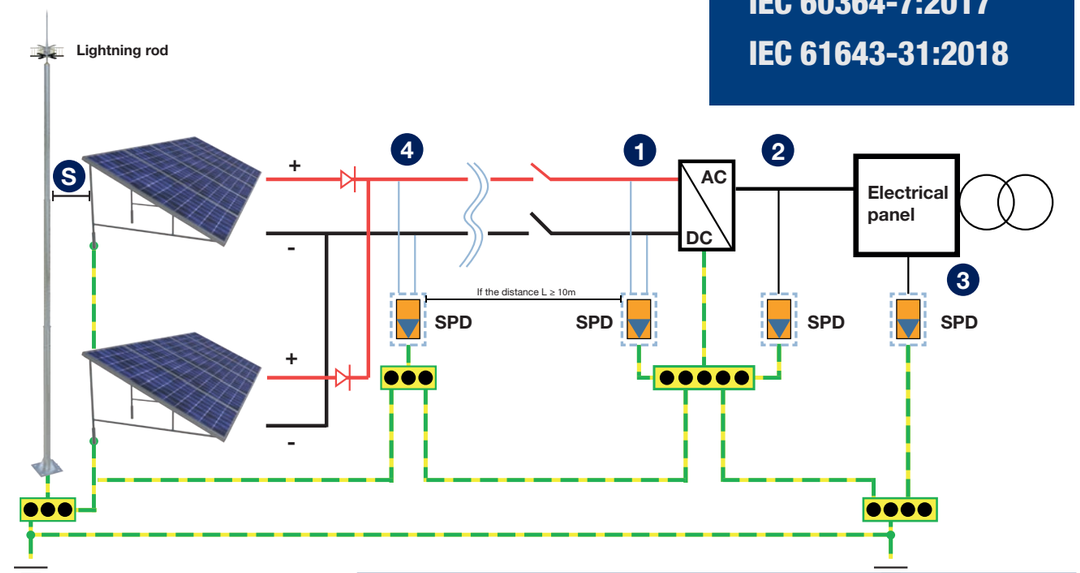
SPD type 2 with Y connection

Pluggable arresters , easily replaceable modules with locking system

Easy maintenance through a local fault indicator.

For another type of protection of photovoltaic installations, consult.

IEC 62305-1, 2, 3 & 4
IEC 61643-11
EN-60664-1
UNE 21.186:2011
NFC 17-102:2011
RBT ITC-23
EN 50539-11:2013
IEC 61643-32:2017
IEC 60364-7:2017
IEC 61643-31:2018



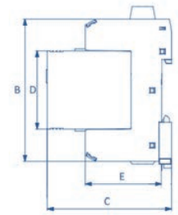
Situation		Types of surge protection devices (SPD) IEC61643-32:2017		
		Location 3	Location 2	Locations 1 and 4
	Without external LPS	SPD class I (IEC61643-11) or SPD class II (IEC61643-11)	SPD classs II (IEC61643-11)	SPD class II (IEC61643-31)
	With external LPS with separation distance S	SPD class I (IEC61643-11)	SPD class II (IEC61643-11)	SPD class II (IEC61643-31)
	With external LPS without separation distance S	SPD class I (IEC61643-11)	SPD class I (IEC61643-11)	SPD class I (IEC61643-31)

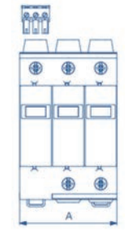
SLS-PV700/3Y

Three-phases type T2 surge arrester 700 V photovoltaic panels.

▸ **SLS-PV700/3Y**

Description	Ref.	Protection grade	Working temp. range	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (g)
SLS-PV700/3Y	370239	IP20	-40º a 80ºC	54	82	72	45	44	340





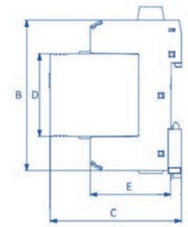
Parameters		
Maximun operating voltage		**750V DC**
Nominal discharge current (8/20 µs)	I_n	20 kA
Maximum discharge current (8/20 µs)	I_{max}	40 kA
Voltage protection level	U_p	3,6 kV
Response time	t_A	25 ns
Cross-section of connected conductors solid		1/35 mm²
Cross-section of connected conductors stranded		1/25mm²
Fault indication		yes
Mounting		DIN rail

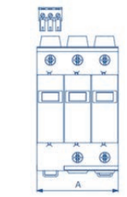
SLS-PV1000/3Y

Three-phases type T2 surge arrester for 1000 V photovoltaic panels.

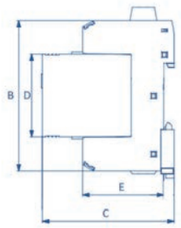
▸ **SLS-PV1000/3Y**

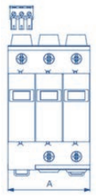
Description	Ref.	Protection grade	Working temp. range	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (g)
SLS-PV1000/3Y	370222	IP20	-40º to 80ºC	54	82	72	45	44	340





Parameters		
Maximun operating voltage		**1020V DC**
Nominal discharge current (8/20 µs)	I_n	15kA
Maximum discharge current (8/20 µs)	I_{max}	40 kA
Voltage protection level	U_p	4,0 kV
Response time	t_A	25 ns
Cross-section of connected conductors solid		1/35 mm²
Cross-section of connected conductors stranded		1/25 mm²
Fault indication		yes
Mounting		DIN rail





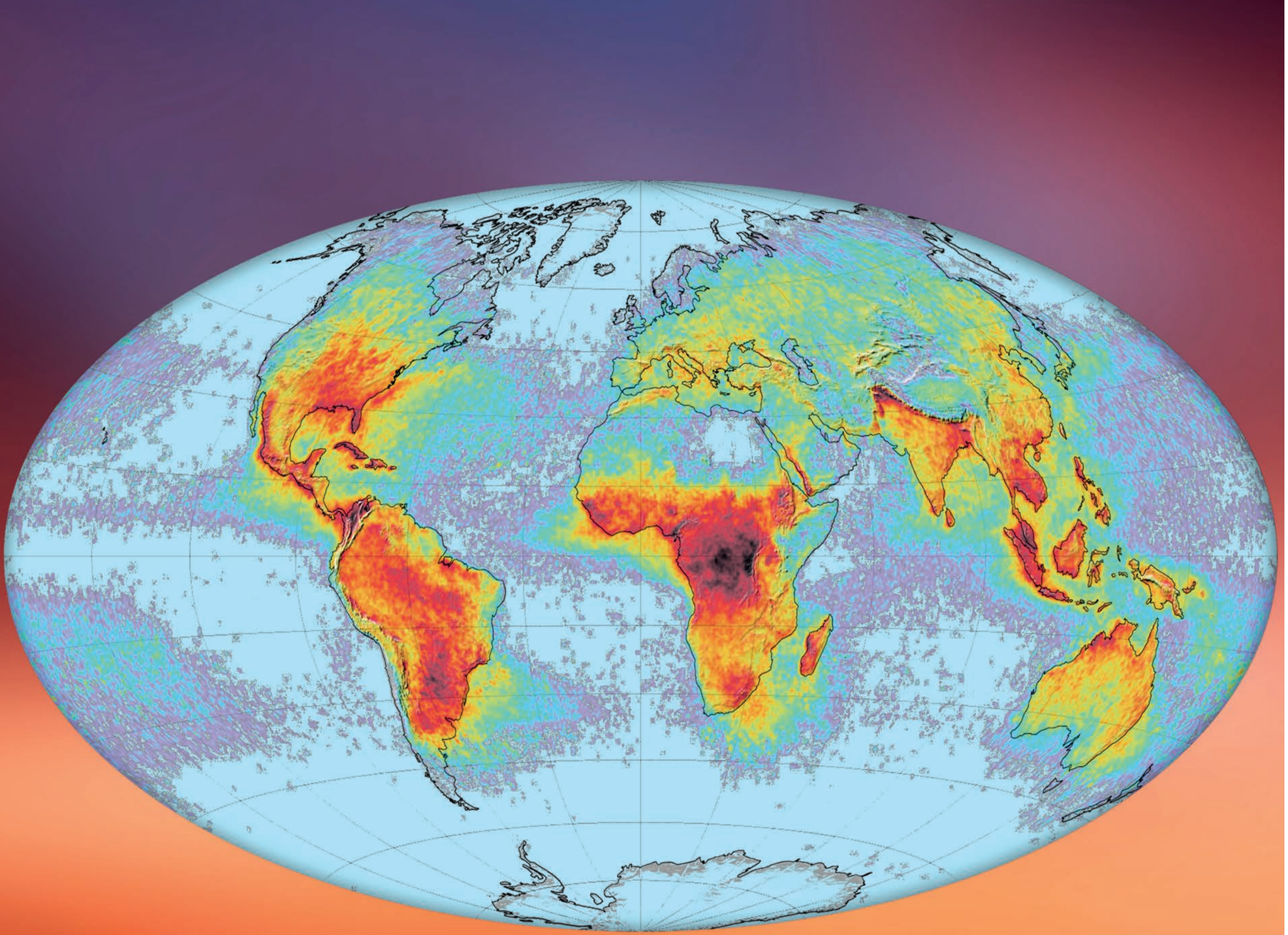
SLS-PV1500/3Y

Three-phases type T2 surge arrester for 1500 V photovoltaic panels.

SLS-PV1500/3Y

Description	Ref.	Protection grade	Working temp. range	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Weight (g)
SLS-PV1500/3Y	370299	IP20	de -40º a 80ºC	54	82	72	45	44	340

Parameters		
Maximun operating voltage		1500V DC
Nominal discharge current (8/20 µs)	I_n	15kA
Maximum discharge current (8/20 µs)	I_{max}	40 kA
Voltage protection level	U_p	6,4 kV
Response time	t_A	25 ns
Cross-section of connected conductors solid		1-35 mm^2
Cross-section of connected conductors stranded		1-25 mm^2
Fault indication		si
Mounting		carril DIN



STORM DETECTORS

5

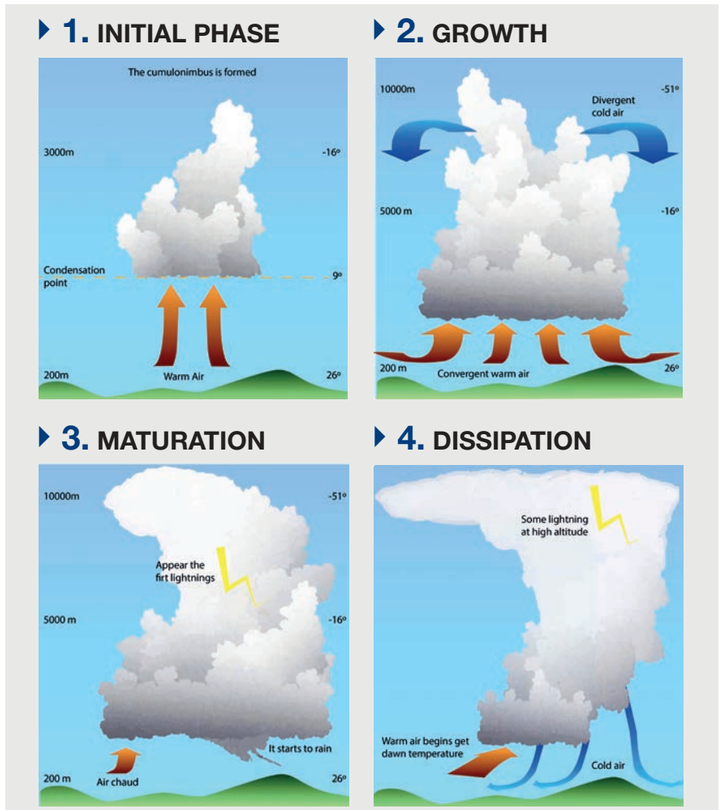
STORM DETECTORS: STORM WARNING SYSTEMS

general information

Every year the direct or indirect effects of lightning strikes cause damages or loses. Both in the public and in the private sector, lightning causes personal and economic damages or the loss of service.

The methods of lightning protection contemplated in the regulations aim to limit damage, but do not cover other potentially dangerous situations caused by storms and lightning that can be dynamically prevented or reduced by activating temporary measures whose origin is a preventive alert provided by a detector system.

To cover these needs, and in order to minimise risks to humans and goods involved, The European Standard UNE-EN IEC 62793:2019 and the international IEC 62793:2020 have been developed and published. These standards define the different types of lightning hazard warning systems and how to implement alarm systems.

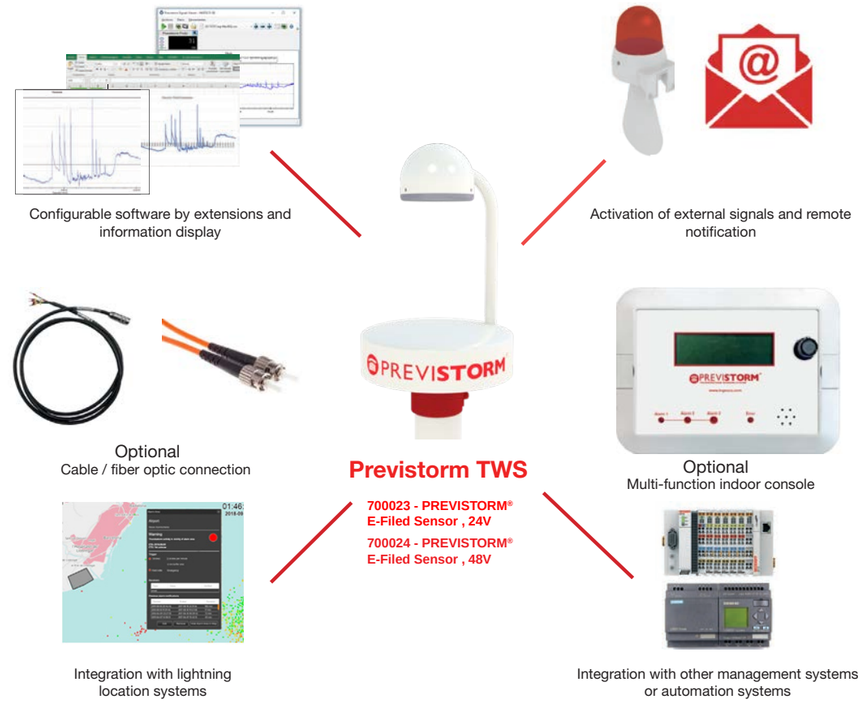


thunderstorm warning systems (IEC 62793:2020)

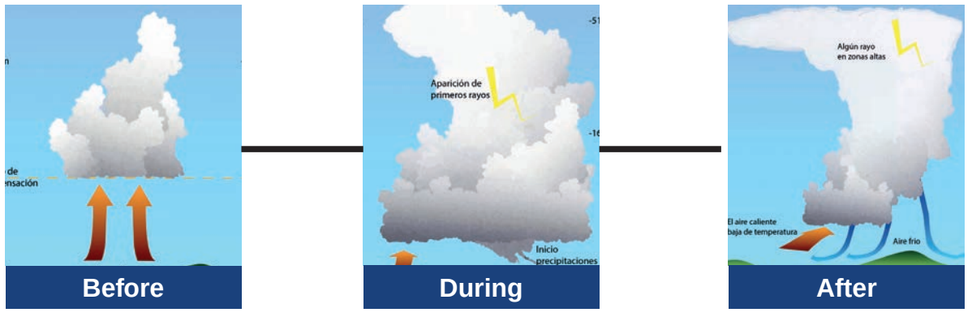
- Local Detector: Detects the electrical storms that occur in the area surrounding the sensor, like the electrostatic field meters based on the principle of electric field mill. Provides information before the first strike (IC/CG) and during all phases of the storm (Phase 1 to 4).
- Electromagnetic sensor: Detects IC lightning (between clouds) and CG lightning (cloud-to-ground) (Phase 2 to 4).
- Ray location system: Network of sensors that enables the user to track already active storms. Provides information on the possible location of the lighting strikes (Phase 2 to Phase 4).

PREVISTORM THUNDERSTORM WARNING SYSTEM: An alert system based on the monitoring of the electric field.

The preventive protection against lightning of PREVITSTORM® Thunderstorm Warning System uses the operating principle of the “electric field mill” for the measurement and continuous analysis of the evolution of the atmospheric electric field. This system enables the monitoring of the storm cloud electrification processes, the generation of early warning notifications and the detection of lightning strikes; thus providing a time advantage for the activation of security and protection measures for people and property.



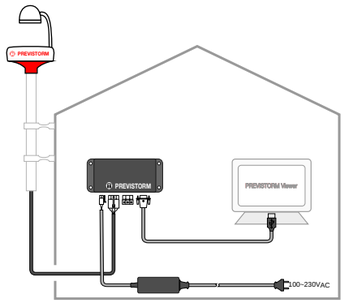
REVISTORM® Thunderstorm Warning System provides accurate and reliable information throughout the life cycle of the storm



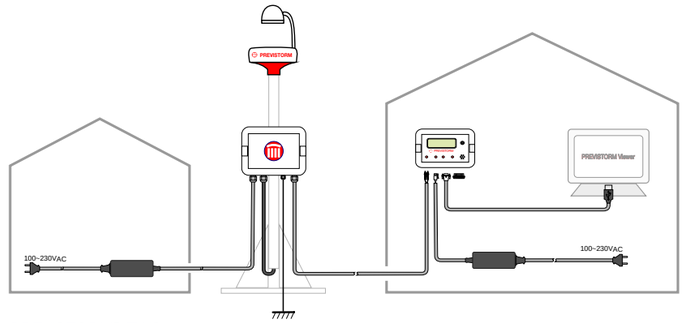
STORM DETECTORS: THUNDERSTORM WARNING SYSTEMS

PREVISTORM TWS configurable system

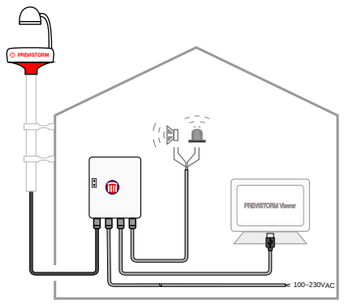
It is a storm warning system of extraordinary efficiency. PREVISTORM TWS is totally configurable, enabling the user to respond to all kinds of requirements and needs. Its high degree of customization makes the PREVISTORM TWS one-of-a-kind.



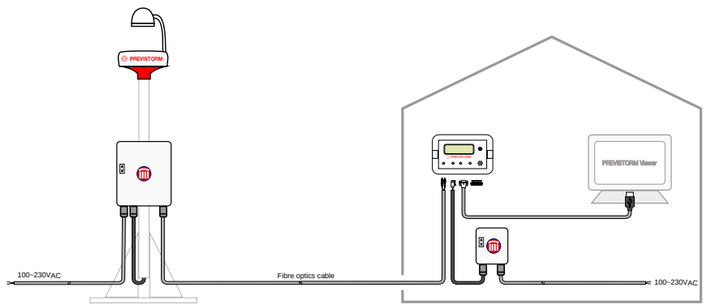
PREVISTORM® TWS for basic application



PREVISTORM® TWS system with fiber optic insulation.



PREVISTORM® TWS for quick installation. Includes control for two alarm devices.



PREVISTORM® TWS with fiber optic insulated sensor and prepared for quick installation.

multiple applications

There are certain industrial and social activities sensitive to the effects of lightning. For example: companies where dangerous activities and/or work are carried out in open field, telecommunications systems, energy generation, transportation and infrastructure, research centres, fire prevention plants, datacenters, among many others. Activities such as sports, outdoor events, etc. require warninginformation about lightning hazard.

Power generation and renewables

Industry

leisure

Research

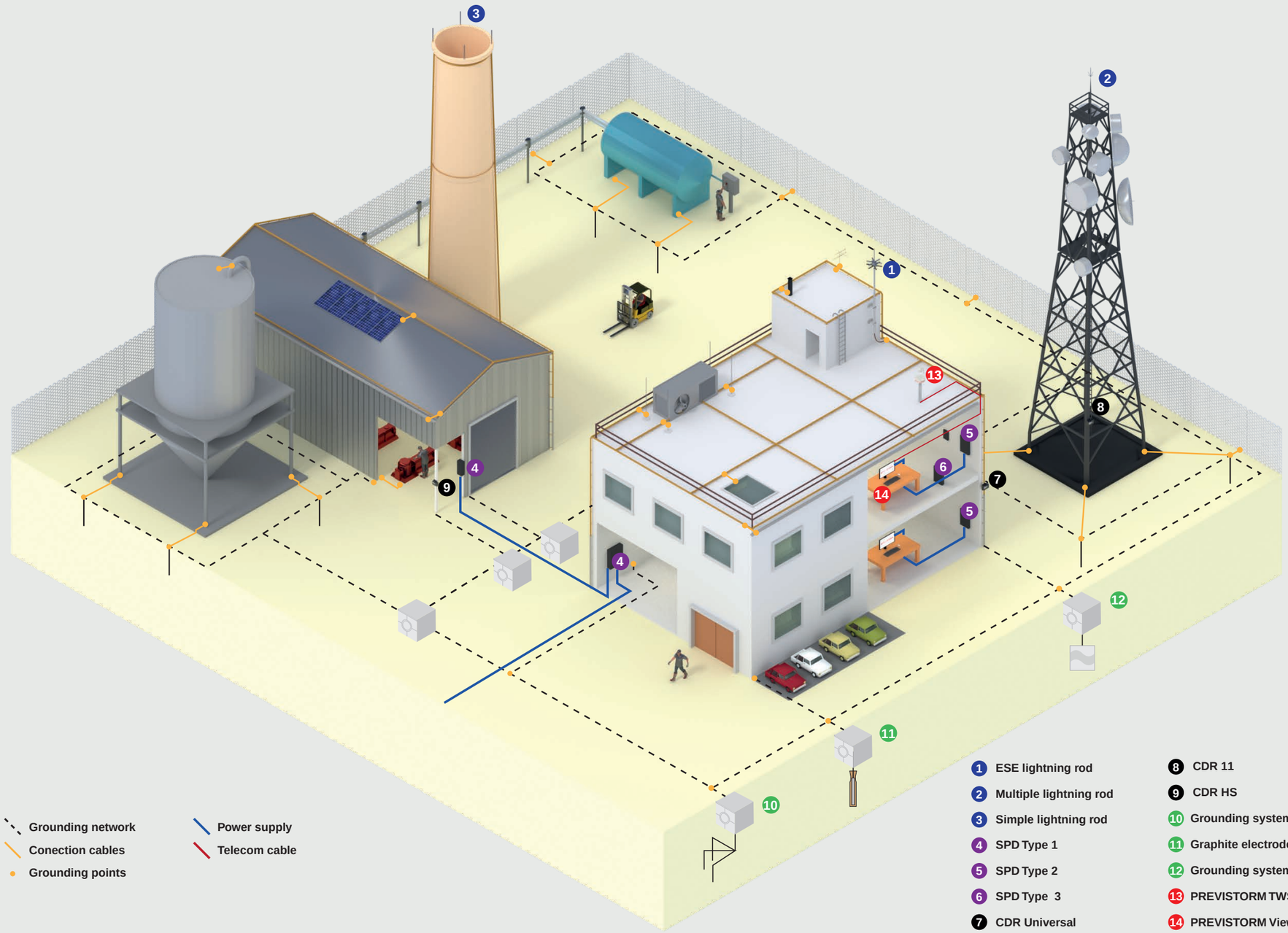
Communications

Sports

Airports and infrastructure

Fire prevention services

Hydrographic Confederations



COMPREHENSIVE PROTECTION SCHEME

GROUNDING · OVERVOLTAGES · EXTERNAL PROTECTION · PREVENTION · CONTROL SYSTEMS

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