PROTECTION AGAINST LIGHTNING
LIGHTNING RODS
& GROUNDING SYSTEMS

ENGLISH

catalogue 37

INGESCO
LIGHTNING SOLUTIONS

INDEX

WHO ARE WE?

The **INGESCO®** brand has been distinguished since 1973 for quality and leadership in **design, manufacture and installation** of **lightning protection systems** (lightning rods, meshes and surge protectors) and the **devices for lightning and storm prevention** and early warning.

Our manufacturing division relies on the reinforcement of the **LABELEC Electrotechnical Laboratory** in order to carry out the research and tests which permit our R&D department to advance the design of more efficient lightning rods and prevention devices.

In addition to the tests carried out in the **ENAC** accredited High Voltage Laboratories, **INGESCO®** tests its equipment under the most demanding conditions.

Natural field Laboratory (Niu de l' Àliga. La Tossa d'Alp)

To do this, we field-test our lightning conductors - at **the instrument equipped Experimental Tower** located at 2500 m in the **Catalan Pyrenees**, where lightning current parameters are recorded and subsequently studied.

LABELEC verifies the quality of all our products, subjecting them to rigorous electrical tests, even in the most extreme enviromental and corrosion conditions.

ilac-MRA ENAC ENSAYOS Nº 307/LE681

This ongoing effort for technological innovation and quality results in products like the **INGESCO® PDC, PDC.E** and ***Stream*** Lightning Rods. As regards prevention, we offer our real time **Lightning Location System, and storm warning systems - Previstorm.net.**

The quality of our lightning rods has been recognised by their corresponding product certificates, granted by the **Bureau Veritas International** certification organisation, which also guarantees the **ISO 9001:2008** quality certificate given to our production and marketing processes.

since 1973

Our group is backed by **39 years experience** gained in Spain with the execution of almost **40,000 lightning protection facilities** in Spain in all types of construction, and by a clear wager of the **research and development of new technological solutions** to the challenges faced by lightning protection.

INSPECTION ENTITY :

The QUIBAC Inspection Entity is a conformity assessment agency (Type C), accredited by ENAC (Accreditation nº41/EI069) for lightning rod facilities. QUIBAC, accredited as an Inspection Entity, performs an unbiased and objective evaluation of any protection system at all required stages: **Design and Engineering Management, Installation, Periodic Inspections.**

ilac-MRA ENAC INSPECCIÓN Nº 41/EI069

WHAT DO WE OFFER?

DESIGN, MANUFACTURING & INSTALLATION :

INGESCO® offers an integral lightning and surge protection and prevention service. Our offers encompass **the initial** protection and prevention systems **design** to the **manufacture, installation and start up** of the equipment. This allows us to provide concrete solutions to the specific needs of our clients.

Our Technical Office know in depth the national and international application norms and regulations (norms **UNE 21186, NFC 17102, EN 50164** and **EN 62305**) and the latest available technology, and can advise and design the protection project most adequate for your needs.

INGESCO® makes the following tools available to customers through its website (www.ingesco.com):

- **INGESCO SOFTWARE DESIGN.** An online program for calculating the protection level required according to the needs of the project. Also, the program can be used to aid in the elaboration of the study on blueprints through the use of tools such as: Installation guide, protection volume in CAD format... ***(www.ingesco.com/estudios)***
- **Product Catalog in PRESTO/FIEBDC format.** This catalog contains the necessary information to elaborate calculation logs and estimates through expenditure items, price schedule and technical information, amoung others. ***(www.ingesco.com/estudios)***

Investment products and **solutions to made to fit** are the currency which paves our way.

QUALITY SYSTEMS :

All the **INGESCO®** products are submitted to strict quality checks before entering the market. This effort has been recognised with, already in 2004, **ISO 9001:2008 certification,** a guarantee of quality in the processes of our products and services.

Product certified by BUREAU VERITAS Certification

ISO 9001 BUREAU VERITAS Certification

PERSONALISED ATTENTION :

INGESCO® offers immediate replies to your consultations.
We offer for your disposition our qualified technical and personnel infrastructure which will provide the best assessment of lightning and surge protection and prevention.

AREAS COVERED :

- **LIGHTNING PROTECTION**
  - Air terminals
  - Grounding systems
  - Meshed systems (Faraday's cage)
- **PREVENTION**
  - Lightning location system
  - Storm warning system (Previstorm.net)
- **INTERNAL PROTECTION**
  - Transient voltage protector devices

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CAPTURE SYSTEM

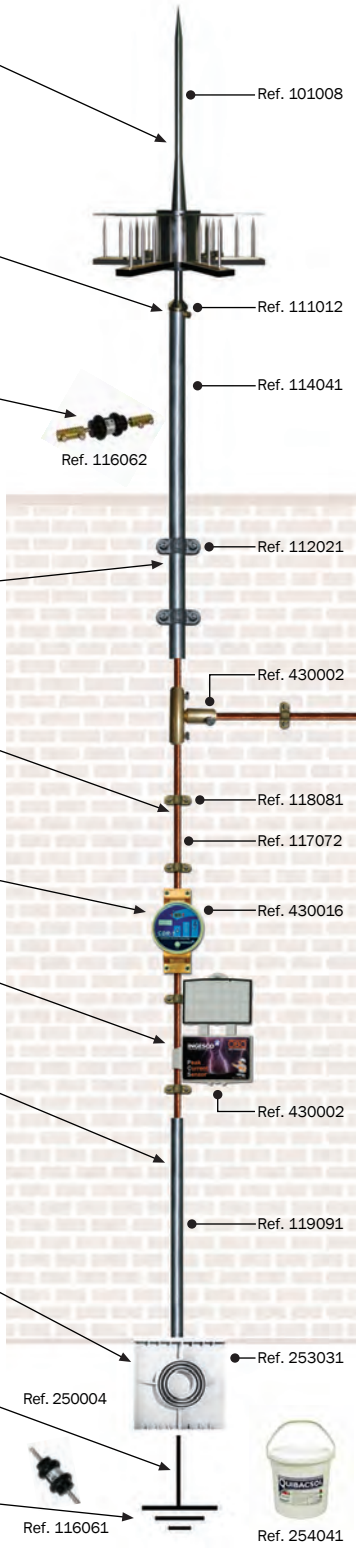
- Fix the central axis of the air terminal to the head-mast adaptor piece.
- Pass the down conductor cable through the interior of the mast and connect it to the base of the head-mast adaptor piece, fixing it by means of two allen screws.
- Connect the head-mast adaptor piece within the mast, fix it with its screw.
- Connect all metallic structures that are within the safe distance by means of spark gaps.

DOWN CONDUCTOR

- Anchor the mast to the structure by means of suitable support and if necessary, fix the mast to the cover using anchor braces.
- Fix the down conductor by means of fastener clips, tightening them well and, as a reference, use three fasteners per meter.
- Install the **CDR-1** lightning counter on the lower part of the conductor, two or three meters above the ground.
- Install the **PCS** card to the ground conducting cable.
- Protect the lower part of the down conductor by way of a minimum 2 meter protection tube.

GROUNDING SYSTEM

- Install the test joint inside the registry case in order to disconnect the grounding system and measure its resistance.
- Select the appropriate grounding system according to the type of terrain.
- Use an spark gap to connect the ESE grounding system with the general grounding system of the building.



INSTALLATION REQUIREMENTS:

- The tip of the lightning rods must be located, at a minimum, two meters above the zone it protects (including antennas, cooling towers, ceilings and deposits).
- Install two or more down conductors for each installation of lightning rods.
- The receiving antennas (TV, radio, telephone) must be connected by means of spark gaps to the down conductors of the lightning rod installations.
- The coaxial cables of the antennas must be protected with a device against surges.
- The metallic elements that rise above the roof should be connected to the closest down conductor.
- The trajectory of the down conductor must be as straight as possible and follow the shortest possible path, avoiding any abrupt layers or overhangings.
- In the layerings, the curvature of the radius are not to be inferior to 20 cm.
- The conducting cable must be placed outside of the building (whenever possible), avoiding the proximity of electrical or gas conductors.
- It is recommended the grounding have a registry case available in order to perform periodic inspections.
- The registry case (or, in its absence the conducting cable) must be provided with a system disconnecting switch that permits the disconnection of the grounding in order to measure its resistance.
- The resistance of the grounding taken must be the lowest possible (less than 10 ohms). The value is measured on the ground insulted from all other elements of conductive nature.
- It is advisable to connect the grounding of the lightning rods with the general grounding system of the building it is designed to protect.
- It is recommended to add Quibacsol mineral composite to enhance ground conductivity.

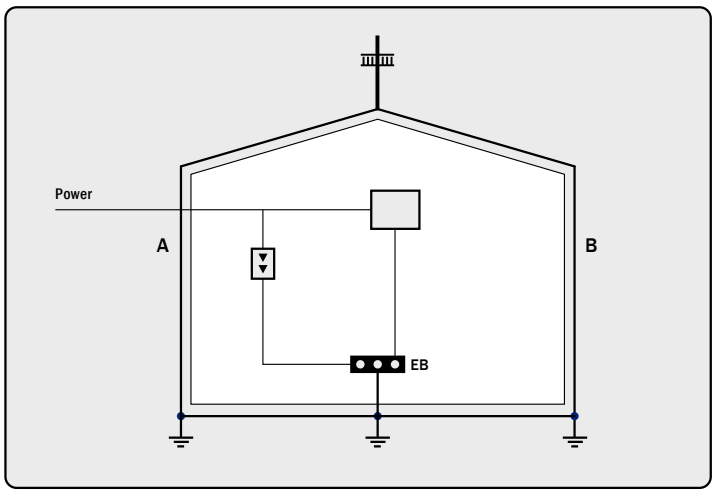
DOWN CONDUCTORS

The down conductors are designed to lead the lightning current from the capture devices to the ground.

Each lightning rod must be connected to at least two down conductors (A and B).

On buildings higher than 60m, four downconductors will be needed. These downconductors will be placed, wherever is possible, in the four corners of the building.

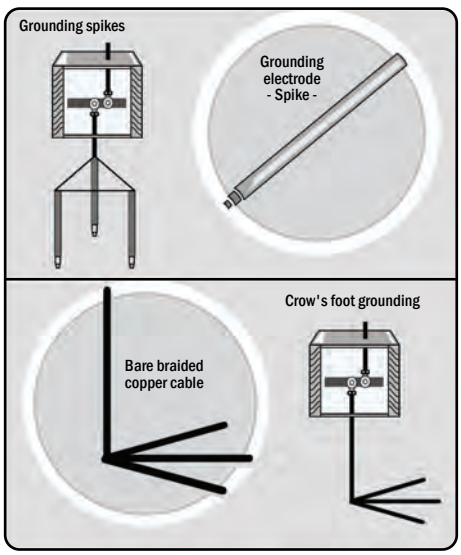
The two down conductors are to be located on two different facades, whenever this is possible.



GROUNDING INSTALLATION

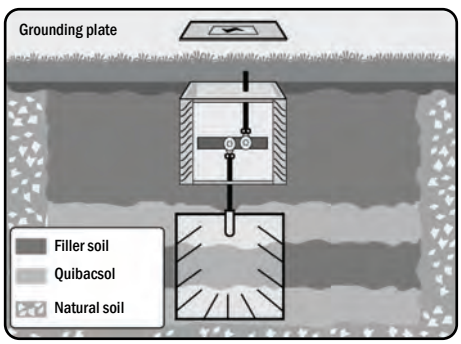
GROUNDING SPIKES:

- Introduce the spikes vertically in the terrain, arranged in line or in a triangle, spaced by a distance equal to the buried length as a minimum. The spikes are to be connected by way of sufficient sectioned cables which have identical or compatible characteristics as that which is used in the lightning down conductor.
- Bury the cable in a ditch at a minimum depth of 50 cm.
  Another possible configuration consists of burying the conducting cable of the same nature and section as that of the down conductor (excepting aluminium), having a crow's foot shape which must be buried at least 50 cm in depth.
- Install an inspection system in order to allow future maintenance.



GROUNDING PLATE:

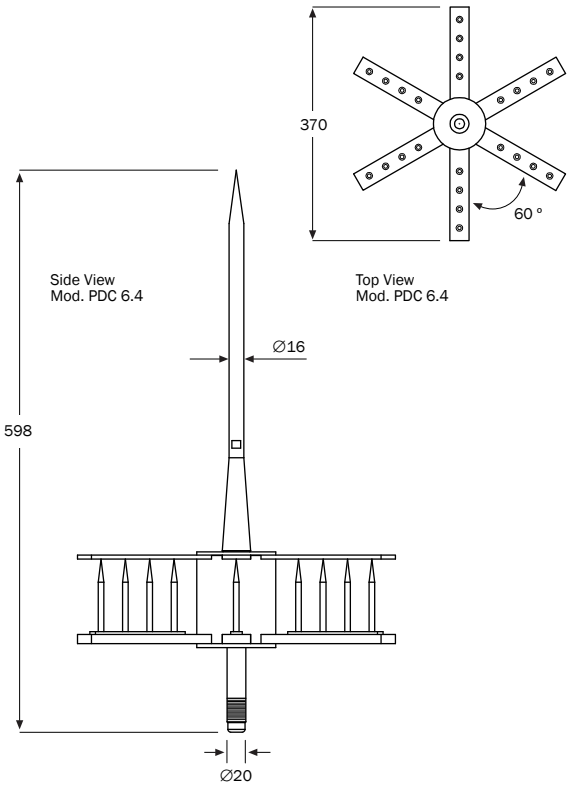
- Especially recommended for rocky terrain which does not permit excavation of great depth.
- Create a 1 m^3 minimum hole in the earth.
- Connect the plate to the down conductor.
- Install the copper plate vertically in relation to the ground and fold the stamped sides, alternating to the left and to the right in order to enhance conductivity.
- Fill in the hole, adding layers of Quibacsol composite to improve contact between the ground and the plate.
- Compact the land.
- Install an inspection system in order to allow future maintenance.



AIR TERMINALS

INGESCO® PDC LIGHTNING RODS

Photo Mod. PDC 6.4
(Ref. 101009)



Measurements in mm.

DESCRIPTION :

- Lightning rod with non-electronic *ESE* (Early Streamer Emission) system, standardized according norms UNE 21.186 and NFC 17.102.
- Adaptable to all types of buildings.
- Application standards:
  - UNE 21.186
  - NFC 17.102
  - EN 50.164/1
  - EN 62.305
- Product certification num. ES020609 issued by the certification entity Bureau Veritas International.
- Manufactured in AISI 316L stainless steel and PA66 polyamide.
- 100 % EFFICIENCY, maximum durability.
- Does not need an external power supply.
- Guarantee of electrical continuity and operation after lightning strike, in any atmospheric conditions.

MODELS / PROTECTION LEVELS :

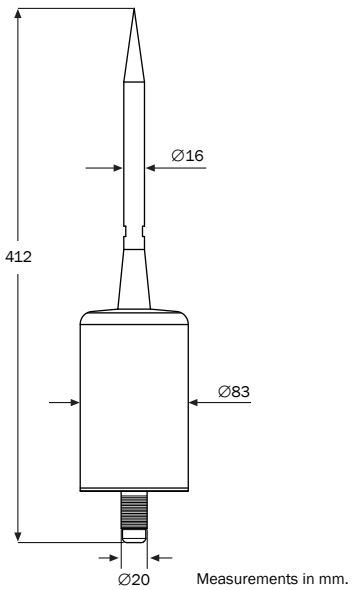
	PDC 3.1	PDC 3.3	PDC 4.3	PDC 5.3	PDC 6.3	PDC 6.4
INGESCO Lightning Rod						
Reference	101000	101001	101003	101005	101008	101009
Weight	2.350 gr.	3.200 gr.	3.400 gr.	3.600 gr.	3.800 gr.	4.150 gr.
Δt	**15 µs**	**25 µs**	**34 µs**	**43 µs**	**54 µs**	**60 µs**
LEVEL I	35 m	45 m	54 m	63 m	74 m	80 m
LEVEL 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 radii calculated according to: Norm UNE 21.186 & NFC 17.102.
(These radii of protection have been calculated according to an altitude difference of 20 m. between the end of the lightning rods and the considered horizontal plane).

AIR TERMINALS

INGESCO® PDC.E LIGHTNING RODS

Photo Mod. PDC.E 60
(Ref. 102007)



Measurements in mm.

DESCRIPTION :

- Lightning rod with electronic *ESE* (Early Streamer Emission) system, standardized according norms UNE 21.186 and NFC 17.102.
- Adaptable to all types of buildings.
- Application standards:
  - UNE 21.186
  - NFC 17.102
  - EN 50.164/1
  - EN 62.305
- Product certification num. ES020609 issued by the certification entity Bureau Veritas International.
- Made of AISI 316 stainless steel.
- 100 % EFFICIENCY, maximum durability.
- Does not need an external power supply.
- Guarantee of electrical continuity and operation after lightning strike, in any atmospheric conditions.

MODELS / PROTECTION LEVELS:

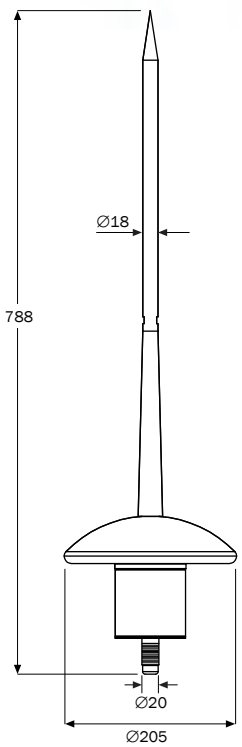
MODEL	PDC.E 15	PDC.E 30	PDC.E 45	PDC.E 60
Reference	102004	102005	102006	102007
W eight	3.775 gr.	3.770 gr.	3.765 gr.	3.760 gr.
Δt	**15 µs**	**30 µs**	**45 µs**	**60 µs**
LEVEL I	35 m	50 m	65 m	80 m
LEVEL II	43 m	59 m	74 m	89 m
LEVEL III	54 m	70 m	86 m	102 m
LEVEL IV	63 m	81 m	97 m	113 m

Protection radii calculated according to: Norm UNE 21.186 & NFC 17.102
(These radii of protection have been calculated according to an altitude difference of 20 m. between the end of the lightning rods and the considered horizontal plane).

AIR TERMINALS

INGESCO® PDC STREAM LIGHTNING RODS

Photo Mod. STREAM-60
(Ref. 102023)



Measurements in mm.

DESCRIPCIÓN :

- Lightning rod with electronic *ESE* (Early Streamer Emission) system, standardized according norms UNE 21.186 and NFC 17.102.
- Adaptable to all types of buildings.
- Application standards:
  - UNE 21.186
  - NFC 17.102
  - EN 50.164/1
  - EN 62.305
- Product certification num. ES020609 issued by the certification entity Bureau Veritas International.
- Made of AISI 316 stainless steel.
- 100 % EFFICIENCY, maximum durability.
- Does not need an external power supply.
- Guarantee of electrical continuity and operation after lightning strike, in any atmospheric conditions.

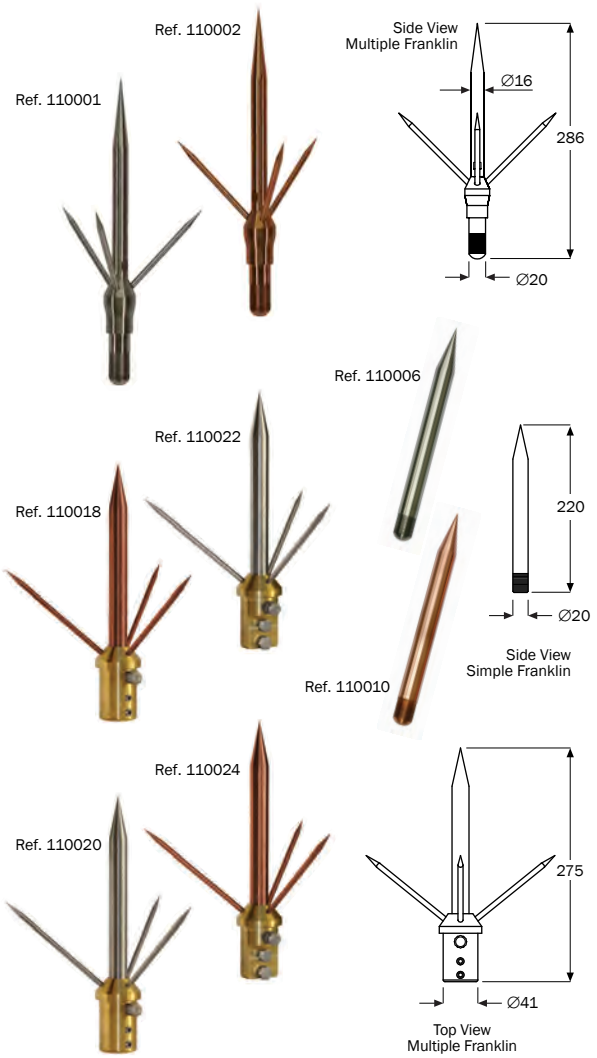
MODELS / PROTECTION LEVELS :

MODEL	STREAM-15	STREAM-30	STREAM-45	STREAM-60
Reference	102020	102021	102022	102023
Weight	5.550 gr.	5.540 gr.	5.530 gr.	5.520 gr.
Δt	**15 µs**	**30 µs**	**45 µs**	**60 µs**
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 radii calculated according to: Norm UNE 21.186 & NFC 17.102
(These radii of protection have been calculated according to an altitude difference of 20 m. between the end of the lightning rods and the considered horizontal plane).

AIR TERMINALS

FRANKLIN LIGHTNING RODS



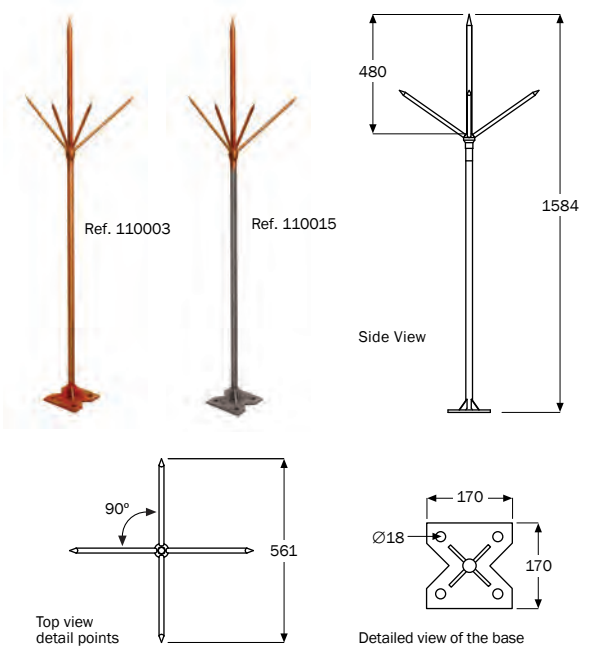
DESCRIPTION :

- External protection of structures against lightning.
- Complies with the requirements set forth in the standards:
  - EN 62.305
- Made of AISI 316L stainless steel or copper.
- Models with adaptor part included, in versions for 50 mm² cables (or 8 mm. diameter bar) and 30 x 2 mm. tape.
- Note: Consult for special measurements.

MODELS :

Standard Models	Reference	Weight
SIMPLE FRANKLIN - STAINLESS STEEL	110001	570 gr.
SIMPLE FRANKLIN - COPPER	110002	635 gr.
MULTIPLE FRANKLIN - STAINLESS STEEL	110006	465 gr.
MULTIPLE FRANKLIN - COPPER	110010	520 gr.
Models Adaptable to Masts - CABLE version	**Reference**	**Weight**
FR. MULTIPLE - STAINLESS STEEL / for 1'½" masts	110018	1,35 kg.
FR. MULTIPLE - STAINLESS STEEL / for 1'¼" masts	110019	1,20 kg.
FR. MULTIPLE - COPPER / for 1'½" masts	110020	1,40 kg.
FR. MULTIPLE - COPPER / for 1'¼" masts	110021	1,25 kg.
Models Aaptable to Masts - TAPE version	**Reference**	**Weight**
FR. MULTIPLE - STAINLESS STEEL / for 1'½" masts	110022	1,30 kg.
FR. MULTIPLE - STAINLESS STEEL / for 1'¼" masts	110023	1,10 kg.
FR. MULTIPLE - COPPER / for 1'½" masts	110024	1,35 kg.
FR. MULTIPLE - COPPER / for 1'¼" masts	110025	1,15 kg.

SPECIAL SET FRANKLIN + SUPPORT



DESCRIPTION :

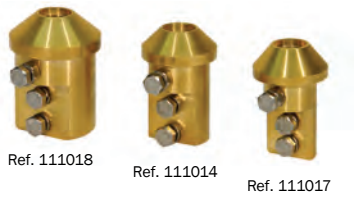
- Set made up of Franklin lightning rods with copper tips (special measurements) plus flat base support, for the external protection of structures against lightning.
- 1 metre high supports for multiple or simple Franklin.
- Copper plated or galvanised support.
- Complies with the requirements set forth in the standards:
  - EN 62.305

MODELS :

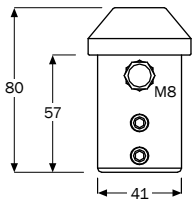
Copper Franklin set with copper plated support	Ref. 110003	5,50 kg.
Copper Franklin set with galvanised support	Ref. 110015	5,60 kg.

FIXATION ACCESSORIES

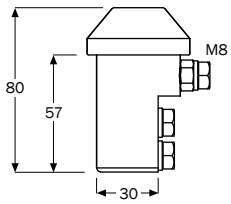
HEAD - MAST ADAPTOR PIECE



Front View Mod. 1'½" for Cable



Side View Mod. 1'½" for tape



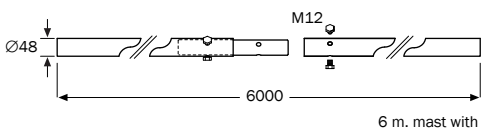
DESCRIPTION :

- Necessary to connect the air terminal receiver to the mast.
- Facilitates the connection of the head to the conducting network. Available in two models: for connection to cable or rod conductive networks and for connection to 30x2 mm. tape conductive networks.
- Complies with the requirements set forth in the standards:
  - EN 62.305
  - EN 50.164/1
- Made of Cu/Zn alloy (brass).
- Stainless steel hardware.

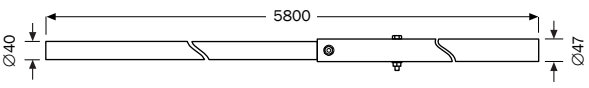
MODELS :

MODELS (according to mast's ∅)	Model for Cable		Model for Tape	
	Reference	Weight	Reference	Weight
1" inches	111019	288 gr.	-	-
1' ¼" inches	111011	640 gr.	111017	515 gr.
1' ½" inches	111012	760 gr.	111014	705 gr.
2" inches	111013	1.290 gr.	111018	1.275 gr.

MASTS



6 m. mast with internal union



Telescopic mast of 5,8 m.

DESCRIPTION :

- 3 and 6 meter masts.
- 5,8 to 8,6 m. telescopic masts in connectable sections.
- 5, 8 and 9 m. telescopic masts in connectable sections with internal joint.
- Models made of hot galvanized steel or stainless steel.
- Enquire about manufacturing of special dimensions.

MODELS :

STAINLESS STEEL	Reference	Weight
3 m. in 1'½"	114045	9,00 kg.
6 m. in 2 sections of 1'½"	114042	22,00 kg.
HOT GALVANIZED STEEL	**Reference**	**Weight**
3 m. in 1'¼"	114052	7,75 kg.
3 m. in 1'½"	114043	10,00 kg.
6 m. in 2 sections of 1'¼"	114048	16,80 kg.
6 m. in 2 sections of 1'½"	114041	23,00 kg.
TELESCOPE IN STEEL GALVANIZED	**Reference**	**Weight**
5,8 m. 2 sections ∅ 50 + 1'¼"	114065	18,00 kg.
7,6 m. 3 sections ∅ 50 + 1'¼"	114066	30,20 kg.
8,6 m. 3 sections ∅ 50 + 1'¼"	114067	33,23 kg.
8 m. 3 sec. 2" + 1'½" + 1'¼" stainless steel inside union	114068	33,80 kg.
9 m. 3 sec. 2" + 1'½" + 1'¼"' stainless steel inside union	114069	36,90 kg.

FIXATION ACCESSORIES

MAST ANCHOR SET

Ref. 112071


Ref. 112022

Ref. 112023

Ref. 112024

Ref. 112044

Ref. 112070

Ref. 112025

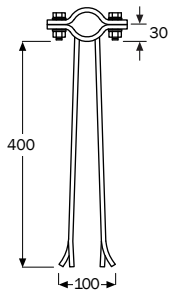

Ref. 112027

Ref. 112030

Ref. 112026

Ref. 112032


Ref. 112033



Work Anchor 30 cm.

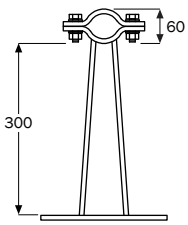


Plate Anchor 30 cm.

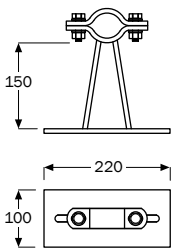
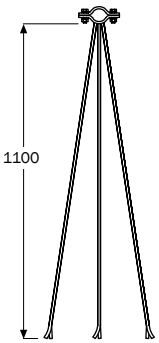
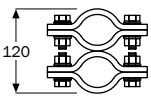


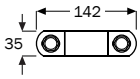
Plate Anchor 15 cm.

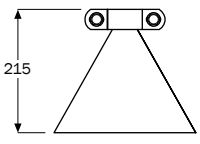


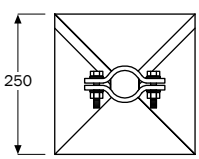
Work Anchor 100 cm.



Double Anchor 1'½"-1'½"







Hip Roof Anchor

DESCRIPCTION :

- Useful for vertical fastening of masts to various structures.
- Permits fastening 1'½" and 2" tubes. Consult for other measurements.
- Suppliable in Work, Plate or Double anchor versions.
- Set of two pieces made of hot galvanized steel.

MODELS :

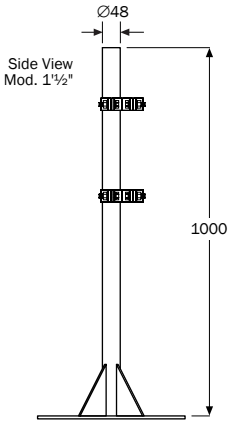
MASONRY AND PLATE ANCHORING	MODEL 1' ½"		MODEL 2"	
	Reference	Weight	Reference	Weight
WORK 15 cm.	112071	3,80 kg.	—	—
WORK 30 cm.	112021	5,20 kg.	112038	5,40 kg.
WORK 60 cm.	112022	13,20 kg.	112040	13,40 kg.
WORK 100 cm.	112023	23,60 kg.	112042	23,80 kg.
PLATE 15 cm.	112024	5,80 kg.	112037	6,00 kg.
PLATE 15 cm. Inverted	112070	5,80 kg.	—	—
PLATE 30 cm.	112025	7,20 kg.	112039	7,40 kg.
PLATE 60 cm.	112027	15,70 kg.	112041	15,90 kg.
PLATE 100 cm.	112030	30,80 kg.	112043	31,00 kg.

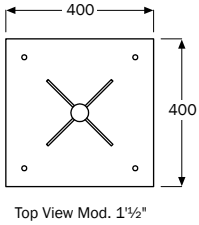
DOUBLE ANCHORING	Reference	Weight
DOUBLE ANCHOR CLAMP 1'½" - 1'½"	112026	3,00 kg.
DOUBLE ANCHOR CLAMP 1'½" - 1'¼"	112036	2,80 kg.
DOUBLE ANCHOR CLAMP 1'½" - 2"	112035	3,20 kg.
DOUBLE ANCHOR CLAMP 2" - 2"	112034	3,40 kg.
DOUBLE ANCHOR CROSS CLAMP 1'½" - 1'½"	112032	3,00 kg.

OTHER ANCHORINGS AND COMPLEMENTS	Reference	Weight
ANCHORING PLATE	112044	2,70 kg.
HIP ROOF ANCHOR	112033	2,75 kg.

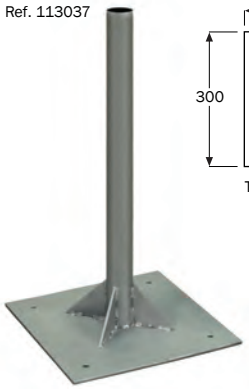
FIXATION ACCESSORIES

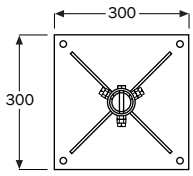
BASE PLATE SUPPORT



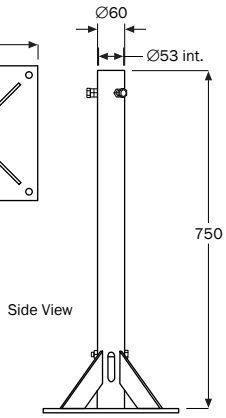


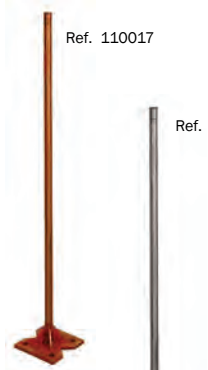
Top View Mod. 1'½"

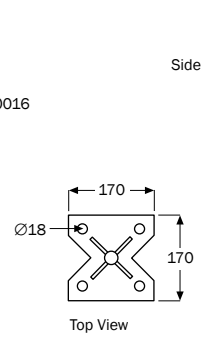




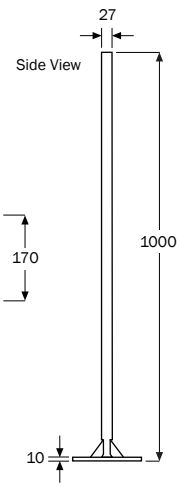
Top View







Top View



DESCRIPTION :

- Flat base support for horizontal surfaces for tube fastening, available for 1'¼", 1'½" and 2" tubes.
- Base plate support for fixing 3 m high 1½" masts on horizontal surfaces.
- Support for simple or multiple Franklin.
- Manufactured in hot dip galvanised steel or copper plated steel.

MODELS :

BASE PLATE SUPPORT	Reference	Weight
1'½" with Double Anchor Clamps 1'½" - 1'¼"	113034	17,50 kg
1'½" with Double Anchor Clamps 1'½" - 1'½"	113031	17,70 kg
1'½" with Double Anchor Clamps 1'½" - 2"	113033	17,90 kg
2" with Double Anchor Clamps 2" - 1'½"	113035	18,30 kg
2" with Double Anchor Clamps 2" - 2"	113032	18,50 kg
For 3 m. high 1'½" masts	113037	12,50 kg
Galvanised support for Franklin	110016	3,75 kg
Copper plated support for Franklin	110017	3,65 kg

DOWN CONDUCTORS

BRAIDED COPPER CABLE

Cable section detail

35 mm² (∅ 7 mm)	50 mm² (∅ 8 mm)	70 mm² (∅ 10 mm)	95 mm² (∅ 11 mm)
Ref. 117071	Ref. 117072	Ref. 117073	Ref. 117074

DESCRIPTION :

- Braided bare electrolytic copper cable.
- Complies with the requirements set forth in the standards:
  - NFC 17.102
  - UNE 21.186
  - EN 50.164/2
  - EN 62.305 (only cables 50 mm²)
- Mainly applied as a down conductor for lightning protection and grounding systems.

MODELS :

35 mm² of section	Ref. 117071	315 gr./m
50 mm² of section	Ref. 117072	500 gr./m
70 mm² of section	Ref. 117073	600 gr./m
95 mm² of section	Ref. 117074	830 gr./m

STEEL ROUND CONDUCTOR

Ref. 117081

DESCRIPTION :

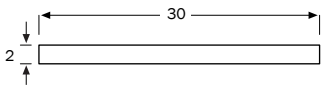
- Round conductor in accordance with EN 50.164–2.
- Meets the requirements of VDE 0185-305 (IEC 62.305).
- Manufactured in galvanised steel.
- Supplied in 125 m. coils.

MODELOS :

Rd 8 galvanised steel coil	Ref. 117081	312 gr./m

COPPER TAPE

Ref. 117082



Tape cross section detail

DESCRIPTION :

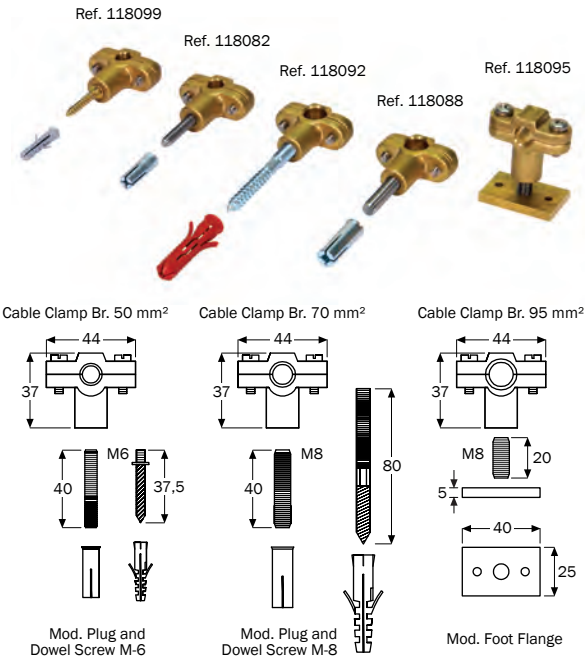
- 30 x 2 mm. bare electrolytic copper bar, supplied in 3 m. bars.
- Coil of 30 x 2 mm. tinned electrolytic copper tape, supplied in 46 m coils (25kg).
- Complies with the requirements set forth in the standards:
  - NFC 17.102
  - UNE 21.186
  - EN 50.164/2
  - EN 62.305
- Mainly applied as a down conductor for lightning protection and grounding systems.

MODELS :

30 x 2 mm Cu bar (3 m.)	Ref. 117076	530 gr./m
Coil of 30 x 2 mm tinned Cu bar (46 m.)	Ref. 117082	537 gr./m

CLAMPS

CABLE CLAMPING BACKETS



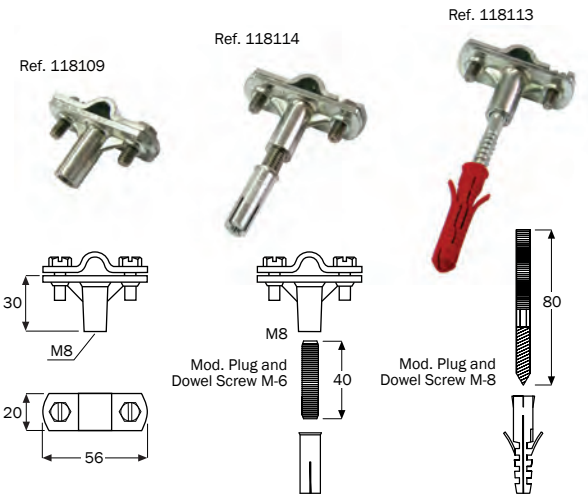
DESCRIPTION:

- Fastener clamps for 50-70-95 mm² cross section cables.
- Complies with the requirements set forth in the standards:
  • EN 62.305 • EN 50.164/4
- Made of Cu/Zn alloy (brass), stainless steel hardware.
- Pre assembled models with different anchoring types in M6 and M8 sizes (plug, dowel screw, foot flange).

MODELS:

CLAMPING BRACKET	Cable 50 mm²		Cable 70 mm²		Cable 95 mm²	
	Reference	Weight	Reference	Weight	Reference	Weight
Plug M-6	118082	114 gr.	118091	111 gr.	118090	105 gr.
Plug M-8	118081	122 gr.	118089	119 gr.	118088	113 gr.
Dowel Screw M6	118099	105 gr.	118000	102 gr.	118100	96 gr.
Dowel Screw M8	118083	119 gr.	118093	116 gr.	118092	110 gr.
Foot Flange	118084	145 gr.	118095	142 gr.	118094	136 gr.

FOLDING CLAMPING BRACKETS



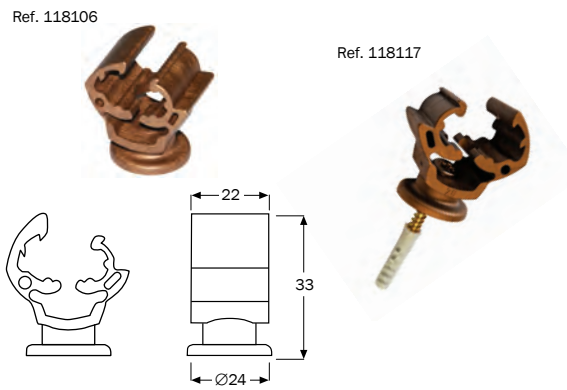
DESCRIPTION:

- Fastening clamps for 50 mm² and 70 mm² section cable.
- Various models depending on the type of wall fixing :
  • Dowel screw + metal plug • Lag screw + plastic plug
- Manufactured in Zinc, with stainless steel fasteners.

MODELS:

Folding clamping bracket double screw M8	Ref. 118109	77 gr.
Dowel screw folding clamping bracket M8	Ref. 118113	93 gr.
Plug folding clamping bracket M8	Ref. 118114	97 gr.

INSULATING CLAMPING BRACKETS



DESCRIPTION:

- Insulating clamps for 50 mm² section cable.
- Manufactured in Polyamide.
- Fixed to cable by clipping.
- Model with wall fixing by means of a lag screw.

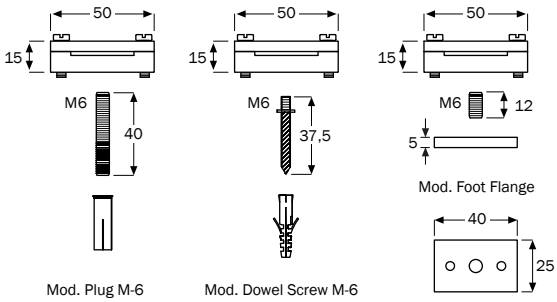
MODELS:

Insulator clamping bracket M8	Ref. 118106	7,2 gr.
Dowel screw insulator clamping brackets M6	Ref. 118117	10,4 gr.

CLAMPS

TAPE CLAMPING BRACKETS

Ref. 118104 Ref. 118103 Ref. 118105



DESCRIPTION :

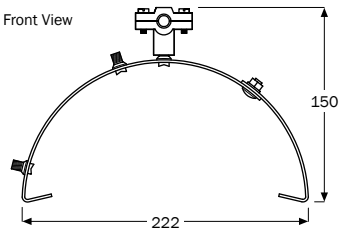
- Fastener clamps for 30x2 mm. cross section tape.
- Complies with the requirements set forth in the standards:
  • EN 62.305 • EN 50.164/4
- Made of Cu/Zn alloy (brass), stainless steel hardware.
- Available with different anchoring types in M6 (plug, dowel screw, foot flange).

MODELS :

Plug M-6	Ref. 118104	63 gr.
Dowel Screw M-6	Ref. 118103	72 gr.
Foot Flange	Ref. 118105	101 gr.

ROOF CONDUCTOR SUPPORT

Ref. 118086



DESCRIPTION:

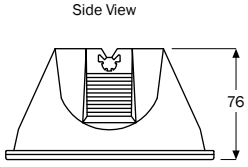
- Adjustable support for 160-260 mm wide lintel tiles.
- Complies with the requirements set forth in the standards:
  • EN 62.305 • EN 50.164/4
- Made of hot galvanized steel.
- With fastener clamp for 50-70-95 mm² cross section cables.

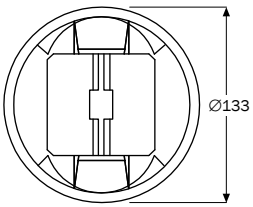
MODELS:

Cable CLAMP BRACKET 50 mm²	Ref. 118086	275 gr.
Cable CLAMP BRACKET 70 mm²	Ref. 118101	270 gr.
Cable CLAMP BRACKET 95 mm²	Ref. 118102	265 gr.

ROOF CONDUCTOR HOLDER FOR FLAT ROOFS

Ref. 800011





DESCRIPTION:

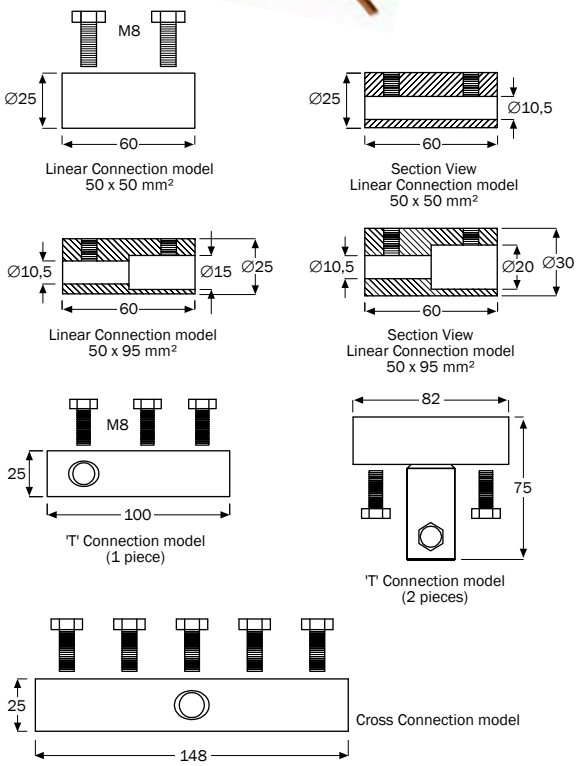
- Concrete support with black polyethylene sheath.
- Complies with the requirements set forth in the standards:
  • EN 62.305 • EN 50.164/4
- Allows fixing round conductors 35 to 95 mm² on flat roofs.

MODELS:

CONCRETE SUPPORT	Ref. 800011	1.140 gr.

CONNECTION DEVICES

CONNECTION DEVICES



DESCRIPCIÓN :

- Sleeves for the connection of 35-50-70-95 mm² cross section cables.
- Complies with the requirements set forth in the standards:
  - EN 62.305
  - EN 50.164/1
- Made of Cu/Zn alloy (brass).
- Stainless steel hardware.

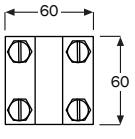
MODELS :

SLEEVES (by type of cables to connect)	Reference	W eight
LINEAR CONNECTION 35 x 35 mm²	115067	235 gr.
LINEAR CONNECTION 35 x 50 mm²	115070	226 gr.
LINEAR CONNECTION 50 x 50 mm²	115051	217 gr.
LINEAR CONNECTION 50 x 70 mm²	115072	212 gr.
LINEAR CONNECTION 50 x 95 mm²	115076	195 gr.
LINEAR CONNECTION 70 x 70 mm²	115074	204 gr.
LINEAR CONNECTION 70 x 95 mm²	115078	187 gr.
LINEAR CONNECTION 95 x 95 mm²	115080	168 gr.

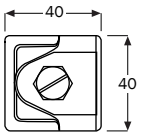
GROUND SLEEVES ELECTRODES		Reference
E. GROUND ROD CONNECTION - ∅ 14 mm.	115055	203 gr.
E. UNION CONNECTION - ∅ 18 mm.	115095	273 gr.

SPECIAL SLEEVES	Cable 50/70 mm²		Cable 95 mm²	
	Reference	W eight	Reference	W eight
'T' CONNECT. (1 Piece)	115052	355 gr.	115082	470 gr.
'T' CONNECT. (2 Pieces)	115056	500 gr.	115084	610 gr.
CROSS CONNECTION	115053	450 gr.	115086	665 gr.

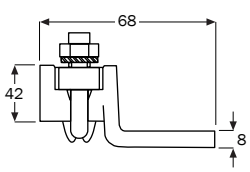
CONNECTORS



Top View Cross Connector



Adaptable Connector Top View



Side view Terminal Teeth

DESCRIPCIÓN :

- Connection fittings for 8-10 mm. round conductors and 50 mm² section cable. de sección.
- Flat terminal for 50-70-95-120 mm² section cable de sección.
- Models manufactured in brass and hot dip galvanised steel.
- Stainless steel (ref. 115100) and galvanised steel fasteners.

MODELS :

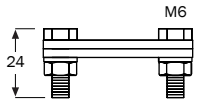
FLAT TERMINAL	Ref. 115097	186 gr.
RD 8-10 CROSS CONNECTOR	Ref. 115098	110 gr.
ADAPTABLE CONNECTOR	Ref. 115100	94 gr.

CONNECTION DEVICES

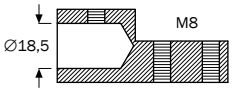
TAPE CONNECTORS

Ref. 115093

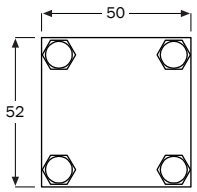
Ref. 115094



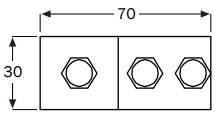
Front View Cross Coupler



Cross Section
Tape-Ground rod Coupler



Top View Cross Coupler



Top View
Tape-Ground rod Coupler

DESCRIPTION :

- Tape connectors specially designed for tapes 2 to 4 mm. thick and 30 mm. wide.
- Complies with the requirements set forth in the standards:
  - EN 62.305
  - EN 50.164/1
- Models made of copper or Cu/Zn alloy (brass), stainless steel hardware.

MODELS :

CROSS COUPLING FOR TAPE	Reference	Weight
In COPPER	115093	164 gr.

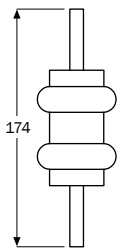
TAPE-GROUND ROD COUPLER	Reference	Weight
In Cu/Zn (Brass)	115094	284 gr.

VX-1 SPARK GAP

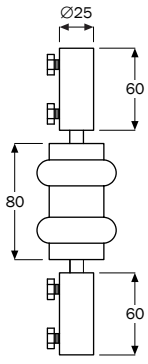
Ref. 116061

Ref. 116062

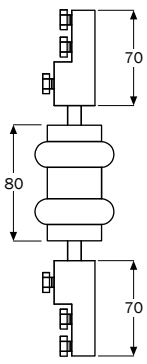
Ref. 116071



Mod. VX-1



Mod. VX-1 + Cable Sleeves



Mod. VX-1 + Tape Sleeves

DESCRIPTION :

- Indicated for the connection of TV and communications antennas and cathodic protection.
- Complies with the requirements set forth in the standards:
  - EN 50.164/3
- Maximum intensity 50 kA, wave type 10/350 µs.
- Response voltage 15kV =(1,2/50 µs)
- It can be supplied with terminal connectors (sleeves) for tape or for 50-70-95 mm² cross section cables. Stainless steel hardware.

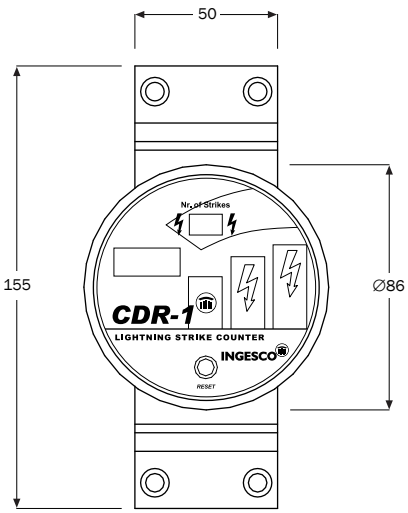
MODELS :

VX-1	Ref. 116061	360 gr.
VX-1 + Connection Sleeves for Cable 50 mm²	Ref. 116062	795 gr.
VX-1 + Connection Sleeves for Cable 70 mm²	Ref. 116063	785 gr.
VX-1 + Connection Sleeves for Cable 95 mm²	Ref. 116064	750 gr.
VX-1 + Connection Sleeves for Tape	Ref. 116071	970 gr.

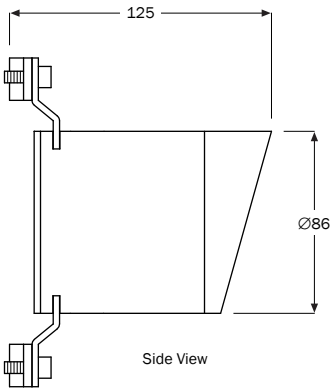
LIGHTNING STRIKE COUNTERS

CDR-1 LIGHTNING STRIKE COUNTER

Ref. 430016



Front View



Side View

DESCRIPTION :

- Logs the lightning strikes which occur within the external lightning protection system.
- Complies with the requirements set forth in the standards:
  - UNE 21.186
  - NFC 17.102
  - EN 62.305
  - EN 50.164-1
  - EN 50164-6
- Range of Intensity:
  1 kA (8/20 µs) - 100 kA (10/350 µs), according to EN 50.164/6
- Valid for: Cable 50-95 mm², Rod ∅ 8-12 mm, Tape 30x2 mm.
- An external power supply is not required for its operation.
- Designed for installation in parallel.
- Resettable model.

MODELS :

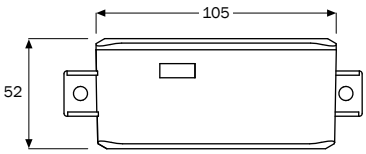
CDR-1	Ref. 430016	830 gr.

LIGHTNING STRIKE COUNTERS

CDR-11

Ref. 430019

Top view



Front view

DESCRIPTION :

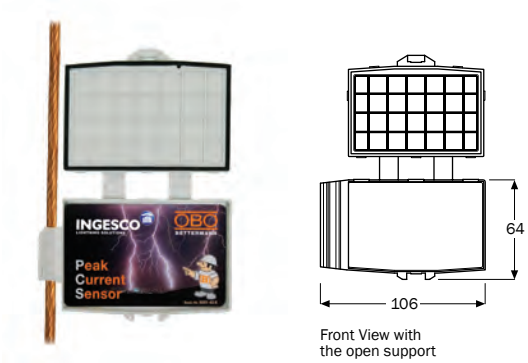
- Records the number of lightning strikes on a lightning protection system.
- Meets the requirements of the applicable standards:
  - NFC 17.102
  - UNE 21.186
  - EN 50.164–6
  - UNE-EN 62.305
- Current range: 1 kA (8/20 µs) - 100 kA (10/350 µs), in accordance with EN 50.164–6
- Valid for: 50-95 mm² cable, 8-12 mm diameter bar.
- An external power supply is not required for its operation.
- Includes fasteners for fixing.
- Mounting system by wall fixing.

MODELS :

CDR-11	Ref. 430019	290 gr.

PCS CARD

Ref. 430002



Front View with
the open support

DESCRIPTION :

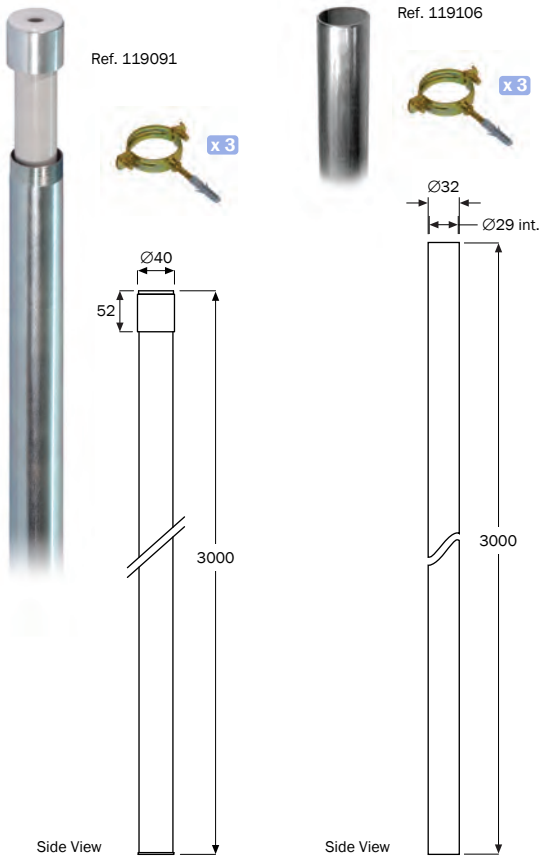
- It detects and stores current spikes which circulate through the conductor.
- A support fixture is included for a 8 to 10 mm. diameter round cable.

MODELS :

PCS CARD	Ref. 430002	24 gr.

DOWN CONDUCTOR PROTECTION

PROTECTION TUBE



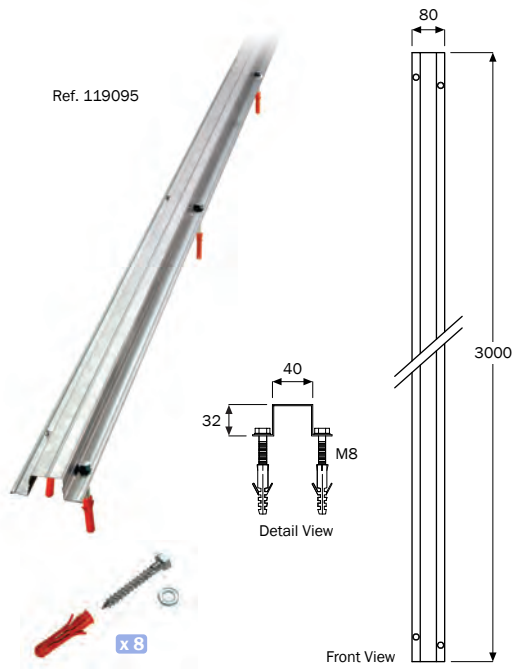
DESCRIPTION :

- Mechanical protector for down conductors of external lightning protection systems, placed at ground level.
- Suitable for the protection of external down conductors, as recommended by the UNE 21.186 and NFC 17.102 standards.
- Length 3 m.
- Manufactured in galvanised steel. Ref 119091 contains 32 mm. diameter internal PVC tube.
- Includes 3 clamps, plugs and dowel screws.

MODELS :

Galvanized steel tube / PVC	Ref. 119091	5,00 kg.
Galvanized steel tube	Ref. 119106	2,80 kg.

GUARD FOR TAPE PROTECTION



DESCRIPTION :

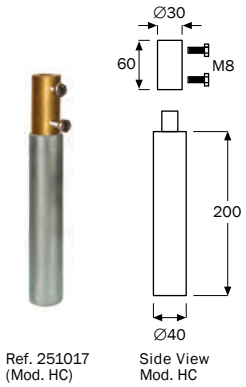
- Mechanical protector for tape down conductors of external lightning protection systems, placed at ground level.
- Suitable for the protection of external down conductors, as recommended by the UNE 21.186 and NFC 17.102 standards.
- Length 3 m.
- Model made of 1 mm. hot galvanized steel plate sheet.
- Masonry wall anchoring hardware included.

MODELOS :

TAPE GUARD	Ref. 119095	2,60 kg.

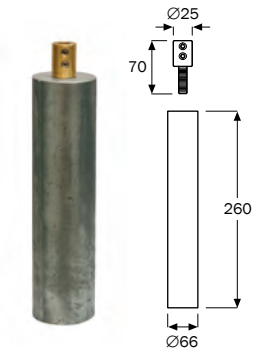
GROUND ELECTRODE

SACRIFICIAL ANODE



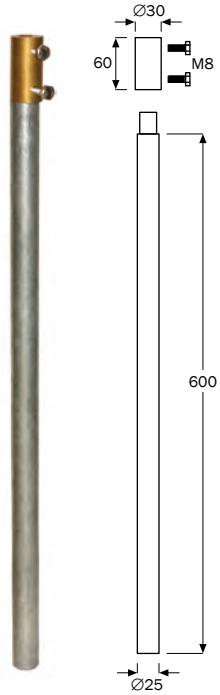
Ref. 251017 (Mod. HC)

Side View Mod. HC



Ref. 251019 (Mod. LC)

Side View Mod. LC



Ref. 251018 (Mod. MC)

Side View Mod. MC

DESCRIPTION :

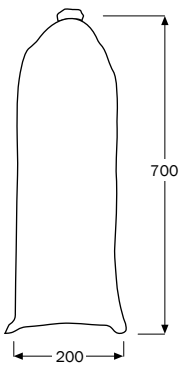
- Ideal for protection against corrosion.
- Models manufactured in zinc or magnesium (model LC).
- Ground resistivity:
  - HC model (High Conductivity) — $\rho < 50\ \Omega\,m$
  - MC Model (Medium Conductivity) — $50 < \rho < 200\ \Omega\,m$
  - LC model (Low Conductivity) — $200 < \rho < 500\ \Omega\,m$
- Includes connection coupling for 50 mm² cross section cable.

MODELS :

SACRIFICIAL ANODE	Reference	Weight
200 mm long HC model	251017	2.420 gr.
600 mm long MC model	251018	2.790 gr.
260 mm long LC model	251019	930 gr.

GRAPHITE ELECTRODE

Ref. 252039



Side View

DESCRIPTION :

- Graphite electrode with connection coupling (50 mm²) cable) for grounding systems. Supplied in wrapping containing a solid graphite bar covered with graphite powder.
- Recommended for ground with high resistivity and/or rocky terrain.
- Long useful life due to minimal degradation by corrosion.
- Graphite electrode:

  Longitude: 500 mm Diameter: 50 mm
  Electrical resistivity: 950 μΩ /cm

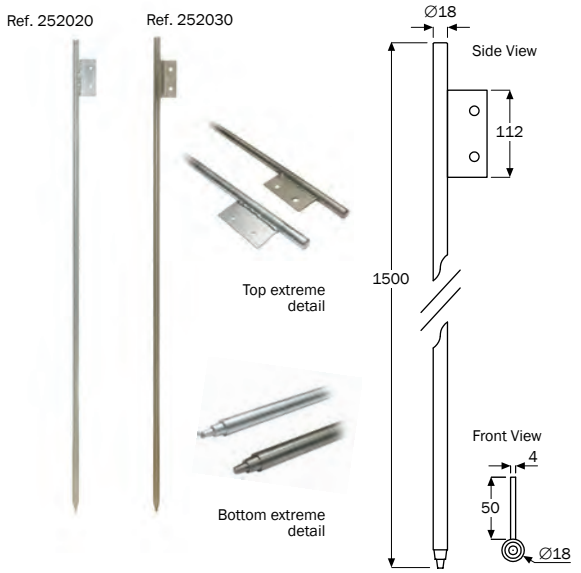
- Meets the requirements of the applicable standards:
  - UNE 21.186
  - UNE-EN 50.164-2
  - NFC 17.102
  - UNE-EN 62305

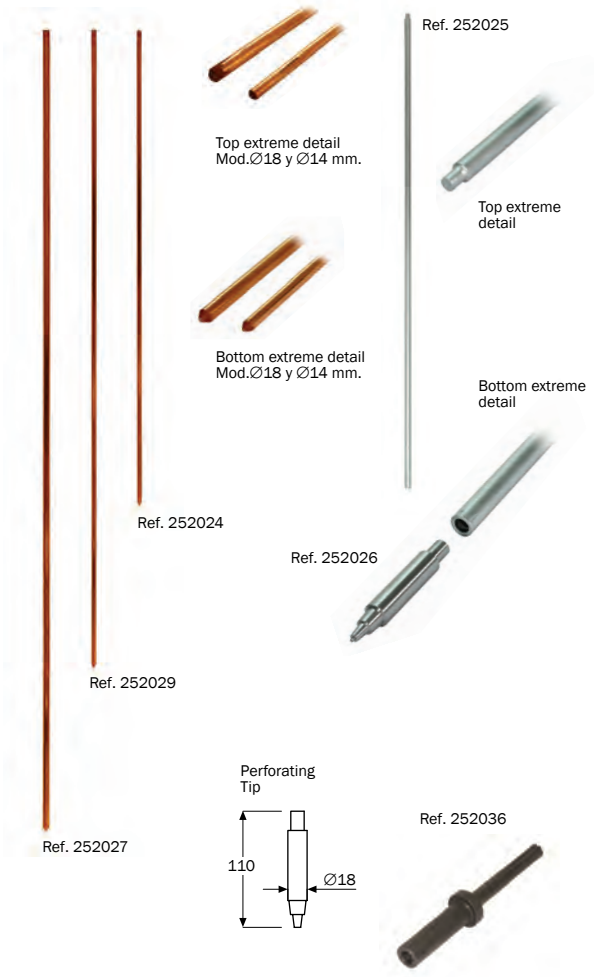
MODELS :

GRAPHITE ELECTRODE	Ref. 252039	8,00 kg.

GROUND ELECTRODE

ELECTRODE - GROUNDING ROD





DESCRIPTION :

- Very useful in any type of grounding (houses, antennas, machinery and instrumentation, etc.)
- Complies with the requirements set forth in the standards:
  - EN 62.305
  - EN 50.164/2
- Models made of hot galvanized steel, stainless steel or copper-plated steel.

MODELS :

GROUNDING RODS WITH COUPLING TAB	Reference	Weight
1,5 m. in GALVANIZED STEEL ∅ 18 mm.	252020	3,27 kg.
1,5 m. in STAINLESS STEEL ∅ 18 mm.	252030	3,22 kg.

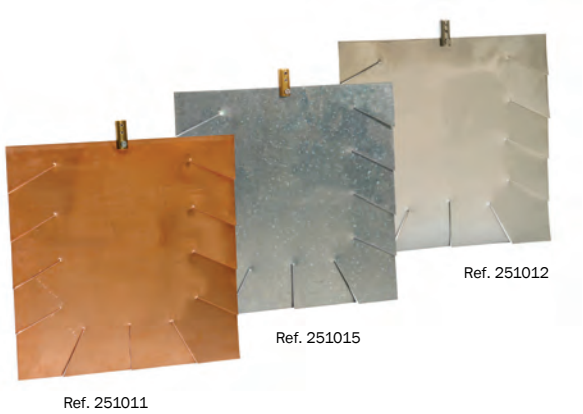
COPPER-PLATED STEEL GROUNDING RODS	Reference	Weight
2,5 m. long - ∅ 18 mm.	252027	5,25 kg.
2 m. long - ∅ 18 mm.	252032	3,28 kg.
2 m. long - ∅ 14 mm.	252029	2,55 kg.
1,5 m. long - ∅ 18 mm.	252033	2,40 kg.
1,5 m. long - ∅ 14 mm.	252024	1,86 kg.

SPLICEABLE GROUNDING RODS	Reference	Weight
1,5 m. in GALVANIZED STEEL ∅ 18 mm.	252025	3,19 kg.
END DRILL IRON	252026	160 gr.
HILTI TYPE STUCK TOOL with TE-Y connection (*)	252036	640 gr.

(*) *Necessary jointly with an electric hammer drill for the placement of the spliceable grounding rods.*

GROUND ELECTRODE

ELECTRODE - GROUNDING PLATE



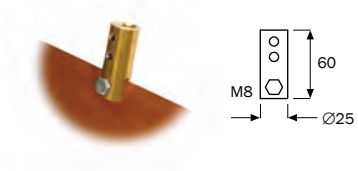
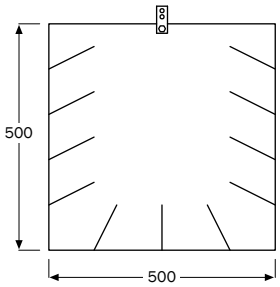


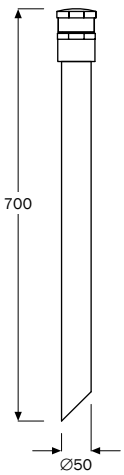
Plate connection sleeve detail

Ref. 119094

Humidification Tube

Front View





Side Lateral

DESCRIPTION :

- Ideal for the installation of grounding systems with high resistance terrain.
- Models available made of Copper, Hot galvanized steel or Stainless steel*.

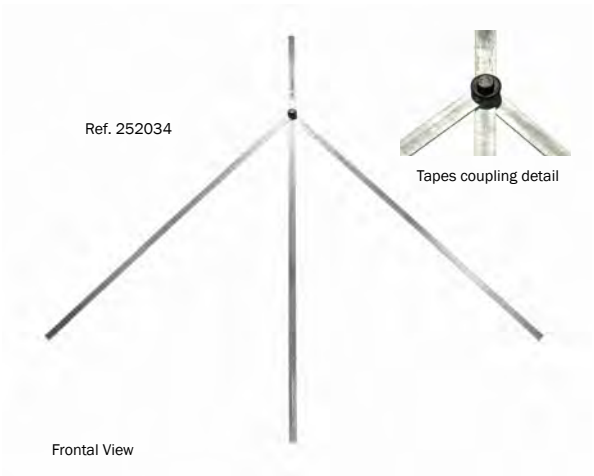
  **(The stainless steel model is recommended by INGESCO® for use only in very humid, marine or highly corrosive environments).*
- Stainless steel hardware.
- Complies with the requirements set forth in the standards (except Stainless steel model):
  - UNE 21.186
  - NFC 17.102
  - EN 50.164/2
  - EN 62.305
- Large contact surface.
- It is recommended to add the Quibacsol mineral compound in the installation, and also a humidifying tube accessory for maintenance.

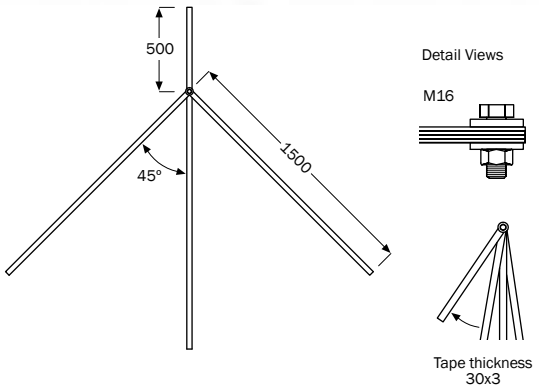
MODELS :

GROUNDING PLATE - COPPER	Ref. 251011	4,70 kg.
GROUNDING PLATE - GALVANIZED STEEL	Ref. 251015	6,20 kg.
GROUNDING PLATE - STAINLESS STEEL	Ref. 251012	4,30 kg.
HUMIDIFICATION TUBE	Ref. 119094	570 gr.

GROUND ELECTRODE

GROUND TERMINATION KIT - "CROW'S FOOT"





DESCRIPTION :

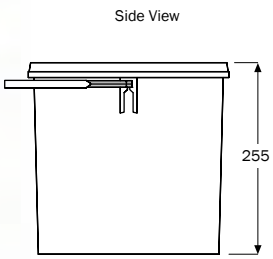
- Very useful in any type of grounding, specially recommended for lightning protection systems.
- Complies with the requirements set forth in the standards:
  - UNE 21.186
  - NFC 17.102
  - EN 50.164/2
  - EN 62.305
- Models made of hot galvanized steel.

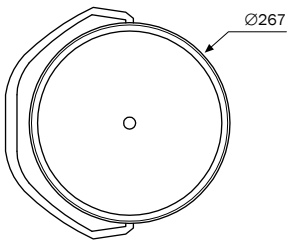
MODELS :

KIT "CROW'S FOOT" 1,5 m.	Ref. 252034	4,50 kg.
KIT "CROW'S FOOT" 3 m.	Ref. 252035	8,30 kg.

QUIBACSOL MINERAL COMPOUND

Ref. 254041





Top View

DESCRIPTION :

- Mineral composite to improve conductivity to ground.
- With its use, low resistances are obtained in all types of groundings (houses, antennas, machinery and instrumentation, lightning rods, etc.)
- Packaging made of recycled plastic, practical and easy to store.

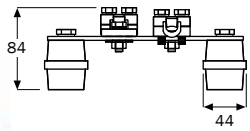
MODELS :

QUIBACSOL - 10 kg. PACKAGE	Ref. 254041	10,40 kg.

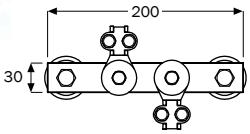
TEST JOINTS

WALL MOUNTED TEST JOINT

Ref. 250001

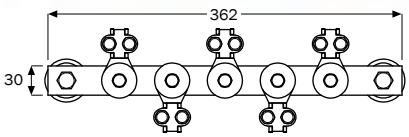


Front View Mod. 2 Terminals



Top View Mod. 2 Terminals

Ref. 250009



Top View Mod. 5 Terminals

DESCRIPTION :

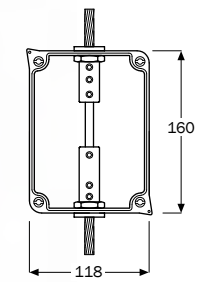
- Grounding connection bar consisting of copper bar, insulators and terminal connectors.
- Complies with the requirements set forth in the standards:
  • UNE 21.186 • NFC 17.102 • EN 50.164/1 • EN 62.305
- Made of Cu (bar) and brass (terminals). Stainless steel hardware.

MODELS :

WALL MOUNTED TEST JOINT	Reference	Weight
2 TERMINALS (Length: 200 mm.)	250001	940 gr.
3 TERMINALS (Length: 254 mm.)	250007	1.215 gr.
4 TERMINALS (Length: 308 mm.)	250008	1.490 gr.
5 TERMINALS (Length: 362 mm.)	250009	1.750 gr.

TEST JOINT IN BOX

Ref. 250006



Front View

Refs. 250010
250011

Ref. 250012

Photo of Test Joint
+ Fittings

DESCRIPTION :

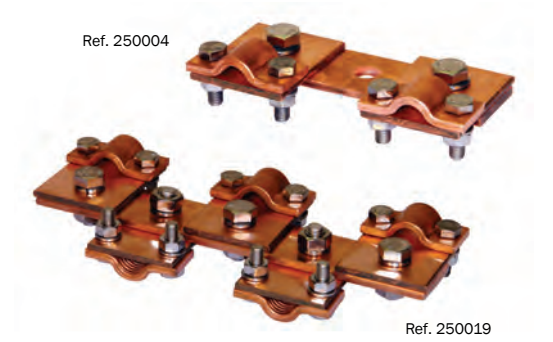
- Wall mounted grounding test joint, consisting of Cu/Zn alloy (brass) manual disconnection system and 160x118x75 mm. PVC box, water resistant (IP 65). Stainless steel hardware.
- Specially made for 50 mm² cross section Cu cable down conductors. Fittings also available for connection of 70 and 95 mm² cross section cables and for copper tape 30x2 mm. down conductors.
- Complies with the requirements set forth in the standards:
  • UNE 21.186 • NFC 17.102
  • EN 50.164–1 • EN 62.305

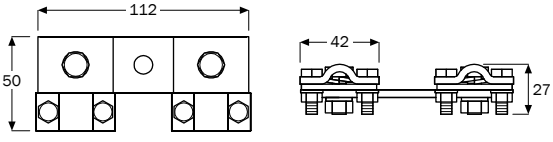
MODELS :

TEST JOINT IN BOX	Ref. 250006	610 gr.
FITTINGS FOR 70 mm² CABLE	Ref. 250010	260 gr.
FITTINGS FOR 95 mm² CABLE	Ref. 250011	226 gr.
FITTINGS FOR TAPE CONDUCTOR	Ref. 250012	392 gr.

TEST JOINT

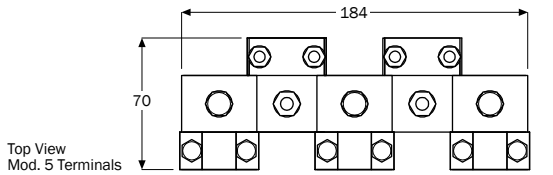
TEST JOINT IN ACCESS BOX - CABLE MODEL





Top View Mod. 2 Terminals

Front View Mod. 2 Terminals



Top View
Mod. 5 Terminals

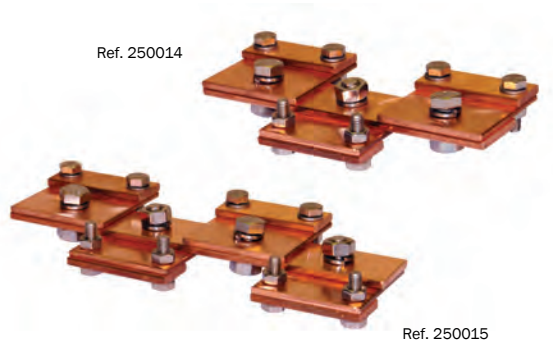
DESCRIPTION :

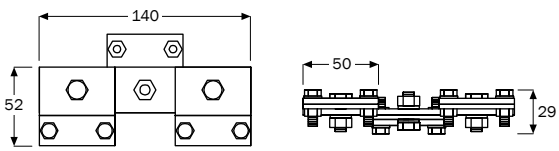
- Grounding connection bar consisting of copper bar and connection terminals for 35 to 95 mm² cross section cables.
- Complies with the requirements set forth in the standards:
  - UNE 21.186
  - NFC 17.102
  - EN 50.164/1
  - EN 62.305
- Made of Cu (Copper). Stainless steel hardware.

MODELS :

TEST JOINT IN ACCESS BOX - Cable Model	Reference	Weight
2 TERMINALS (Length: 110 mm.)	250004	335 gr.
3 TERMINALS (Length: 110 mm.)	250017	455 gr.
4 TERMINALS (Length: 146 mm.)	250018	605 gr.
5 TERMINALS (Length: 182 mm.)	250019	755 gr.

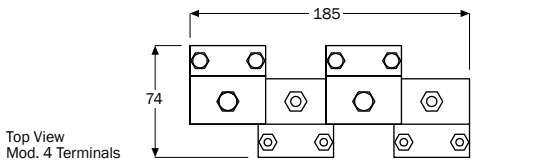
TEST JOINT IN ACCESS BOX - TAPE MODEL





Top View Mod. 3 Terminals

Front View Mod. 3 Terminals



Top View
Mod. 4 Terminals

DESCRIPTION :

- Grounding connection bar consisting of copper bar and connection terminals for 30x2 mm. copper tape.
- Complies with the requirements set forth in the standards:
  - UNE 21.186
  - NFC 17.102
  - EN 50.164/1
  - EN 62.305
- Made of Cu (Copper). Stainless steel hardware.

MODELS :

TEST JOINT IN ACCESS BOX - Tape Model	Reference	Weight
2 TERMINALS (Length: 140 mm.)	250013	410 gr.
3 TERMINALS (Length: 140 mm.)	250014	540 gr.
4 TERMINALS (Length: 185 mm.)	250015	720 gr.
5 TERMINALS (Length: 230 mm.)	250016	900 gr.

REGISTRY CASE

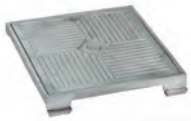
REGISTRY CASE AND COVERS

Ref. 253058

Ref. 253032

Ref. 253057

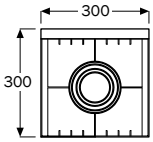
Ref. 253033



Ref. 253037

Ref. 253034

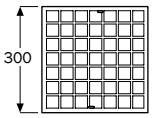
Ref. 256001 / 256002



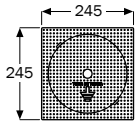
Front View
PP Square model

Front View
PP Circular model

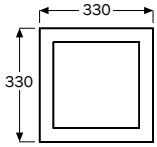
Front View
Concrete model



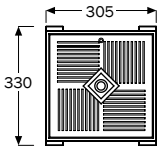
Top View
PP Square model



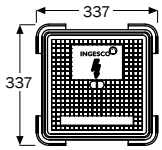
Top View
PP Circular model



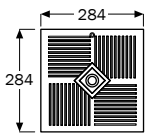
Top View
Concrete model



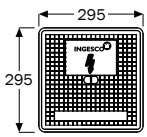
Aluminum
Frame + Cover



Cast iron
Frame + Cover



Aluminum cover



Cast iron cover

DESCRIPTION :

- Signage for ground connections.
- High strength antiskid inspection chambers and covers.
- Models made of polypropylene or concrete.

MODELS :

POLYPROPYLENE INSPECTION CHAMBERS	Reference	Weight
Square chamber (30x30X30 cm.)	253058	3,00 kg.
PP square chamber and PVC cover (UNE-EN 124)	253057	2,60 kg.
Circular PP (∅ 20 cm.)	253032	775 kg.

REGISTRY CASE AND COVERS	Reference	Weight
Cast iron frame and cover	253033	4,95 gr.
Aluminium frame and cover	253037	2,22 gr.

CONCRETE REGISTRY CASE	Reference	Weight
Square (33x33x23 cm.)	253034	24,00 kg.

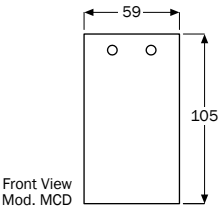
DOWN CONDUCTOR SIGNALING	Reference	Weight
Grounding systems signaling PVC	256001	86,4 gr.
Grounding systems signaling aluminium	256002	88,8 gr.

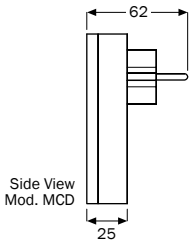
SURGE PROTECTION DEVICES

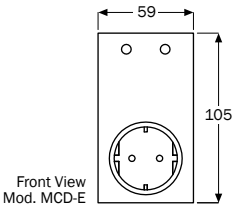
ABSORBER · TRANSIENT SURGE PROTECTION

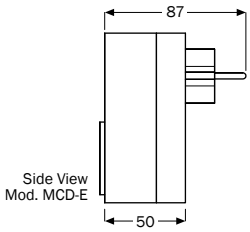
Ref. 370070

Ref. 370166









DESCRIPTION :

- Protection against transitory surges of general electrical facilities connected to single-phase low voltage 230V mains power. Protector Type III (Fine protection).
- Suitable for protection of equipment intended to be connected to an electrical installation.
- Model MCD-E, includes a front jack for connecting equipment to the electrical grid.
- Technical specifications of the Absorber protectors:

Nominal Voltage:	U_N= 230V AC (50Hz).
Maximum working Voltage:	U_C= 275V AC (50Hz)
Nominal discharge Intensity:	I_n (8/20 µs)= 5kA
Maximum discharge Intensity:	I_{max} (8/20 µs)= 8kA
Response time:	t_A < 25 ns
Protection level:	$U_P \leq$ 1kV
Nominal load current:	I_L= 16 A (MCD-E model)

MODELS :

ABSORBER MCD	Ref. 370070	200 gr.
ABSORBER MCD-E	Ref. 370166	238 gr.

REFERENCES INDEX

www.ingesco.com

SYMBOLS USED

Five year warranty against manufacturing defects.

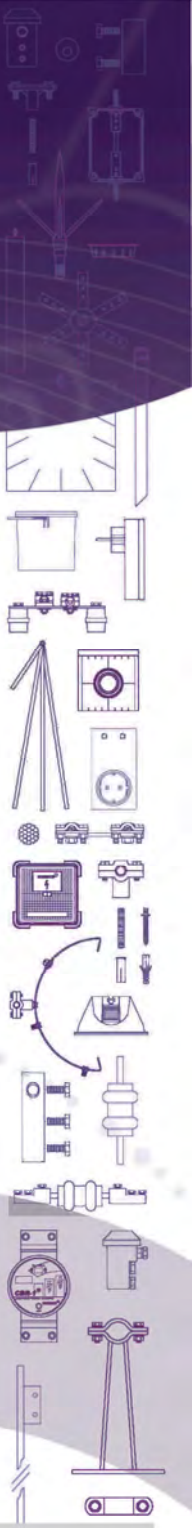
It complies with the maximum protection radii estalished in the current standarts

Tested at the High Voltage Electro-technical Laboratory **LABELEC®**.

Non electronica air terminal, it does not contain any consumable element, total electrical continuity guaranteed.

ESE lightning air terminal, no external power suply required. Will not expel any type of residual emission info the environment.

lightning rods & grounding systems



DISTRIBUTOR :

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