



PRODUCT CATALOGUE

LIGHTNING
AND SURGE
PROTECTION
SPECIALISTS



Cirprotec

Nimbus® & NLP - 2200

ESE Lightning rods

NEW



Designed and tested in full accordance
with the new NF C 17-102 v2011 standard

CPT cirprotec

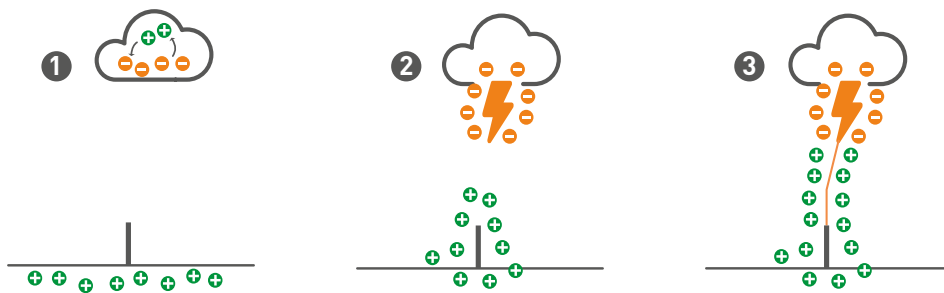
Lightning | The need for protection

THE PHENOMENON OF LIGHTNING

At any one time there are about **5,000 active thunderstorms around the world**. Lightning density depends on the terrain and climate, which means it varies from one place to another and from one time of year to another. In Spain, for example, some two million lightning bolts fall to earth, killing a dozen people and hundreds of animals each year.

The **average intensity of a lightning strike** is estimated to be around **20 kA - 30 kA**.

Isokeraunic maps present **historical strike density data** on the ground (Ng) and tabulate it from low to high risk of strike. In Spain, for example, the average isokeraunic level is relatively high, with 2 to 6 strikes/year per km².



HOW LIGHTNING FORMS

Lightning is a **powerful natural discharge** of static electricity, produced **during a thunderstorm** and generating an electromagnetic pulse. Under normal conditions, there is a balance between positive and negative charges in the atmosphere.

- 1** During the formation of a cumulonimbus, there is an increase of ionisation and a **potential difference is generated between the cloud and the ground**, which gives rise to small discharges.
- 2** As the electric field gains in strength, **the descending leader breaks up the dielectric field in the air**.
- 3** Eventually, it manages to break down the layers of the dielectric field in the air and **meets the ascending leader** from the surface.

THE DESTRUCTIVE EFFECTS OF LIGHTNING

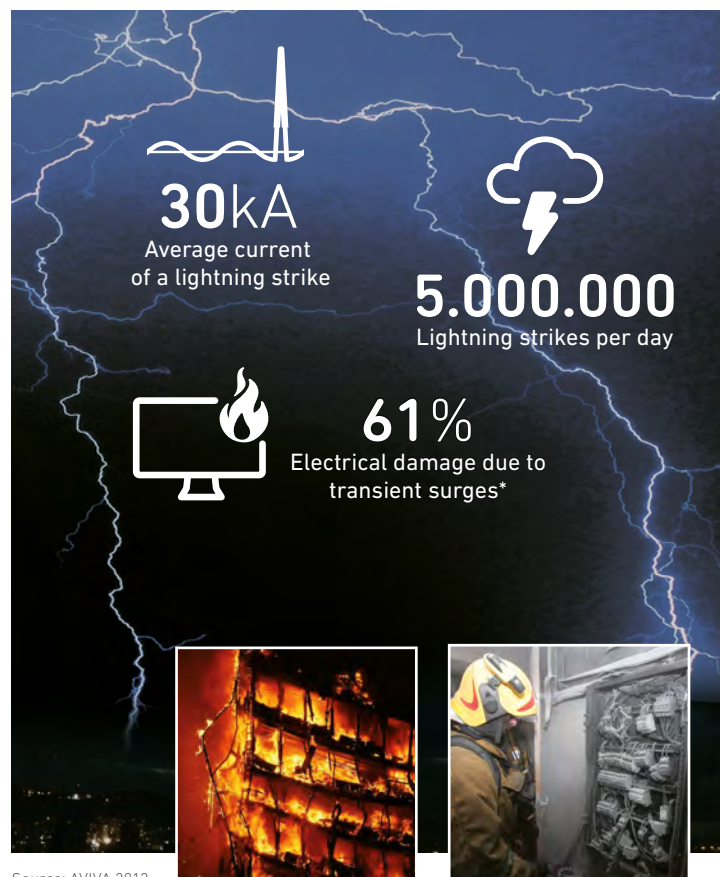
The effects of lightning pose a serious hazard to people, property, equipment and structures, and for this reason protection is essential.

Catastrophic consequences for people and animals

The flow of a current of a certain intensity for a short period of time is sufficient to cause electrocution and severe burns to the subject in question, sometimes leading to death.

Substantial financial losses:

- **Damage to buildings.** A direct lightning strike causes damage to structures (e.g. buildings, telecommunications antennas, manufacturing facilities and photovoltaic installations, etc.).
- **Fires.** The formation of sparks and heat dissipation due to the Joule effect can cause fires.
- **Destruction of equipment/service interruption.** An indirect lightning strike generates surges which damage equipment connected to the electrical network, telephone network, Ethernet, etc.



Source: AVIVA 2012

Lightning | Effective protection

REGULATORY FRAMEWORK

The destructive capacity of lightning makes it necessary to assess the need for protection, and possibly to install an effective protection system.

In the field of lightning protection, using either ESE lightning rods or faradisation systems, the following principle standards are used:

- **NF C 17-102:** "Protection of structures and open areas against lightning by a lightning rod with early streamer emission device" Internationally used French standard.
- **UNE 21186:** "Protection of structures, buildings and open areas by lightning rods with an early streamer emission device." Spanish standard.
- **UNE-EN 62305, IEC 62305:** "Lightning Protection". European and international standard.
- **Spanish Technical Building Code (CTE) Section SU8:** "Safety from the hazard caused by lightning" defines the need and measures to be taken for lightning protection, and is obligatory in Spain (Real Decreto 314/206).
- **EN/IEC 62561:2011.** "Lightning protection system components (LPSC)". European and international standard. It consists of 7 parts specifying the requirements of the various components involved in lightning protection. These include cables, clamps, counters, earth rods, earth enhancer compounds and earth inspection pits, among others.

RISK ANALYSIS

To determine the need for lightning protection and the level of protection required for a given facility, the various lightning rod standards specify a risk calculation. This calculation consists of knowing the levels of risk in the event of a lightning strike and its derivatives from parameters related to the facility (e.g. its dimensions, the annual level of lightning strikes, the materials of the structures, the type of wiring, and whether it is a cultural asset or open to the public).

This calculation will determine the need to establish various protection measures to effectively mitigate the risk (lightning rod, surge protection, or others).

PRODUCT CERTIFICATION

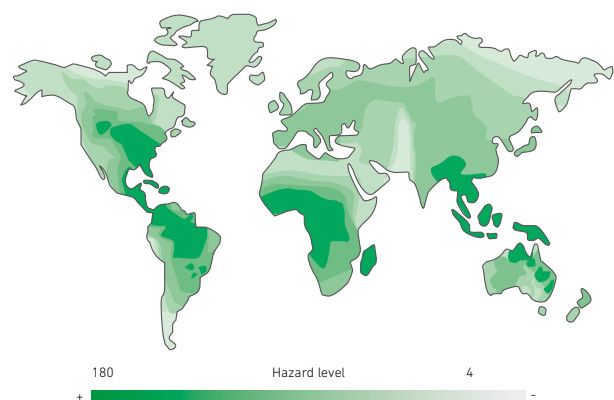
Due to its construction and accessibility, an **ESE lightning rod** is designed for **high durability**, and accessing and replacing it is usually complicated and expensive. So it is especially **important** for it to be **certified** and have undergone **tests** (mechanical, climate chambers, current impulses) **in accordance with the above standards**, which **guarantee its reliability and robustness**.

Product test certifications must be carried out by **recognized (accredited) laboratories or entities**, in order to ensure that the product complies with the applicable standards and meets the specified safety requirements. Lastly, it is important to have a **certification by an external entity** which **audits the production process**, thus guaranteeing its **industrial quality**.

As a matter of fact, when calculating the protection radius of an ESE lightning rod, the early emission is the only factor that depends on the lightning rod itself rather than on the characteristics of the facility. Which means that the reliable calculation of this value, certified by an accredited lab, is crucial for the correct protection of the facility.



ISOKERAUNIC MAP



Lightning strike density on the ground in Ng (strokes/year · km²)

Lightning protection system

The destructive capacity of the lightning makes it essential to evaluate the need for protection and, perhaps, to install a system to ensure effective protection. The current regulatory framework in each country defines the need for protection and sets out the steps to follow for designing a system which guarantees protection against lightning.

ASSESS THE NEED FOR PROTECTION

The need for protection of a facility is established starting from the evaluation of the **degree of safety** required and **associated risk** factors. Whenever the expected strike frequency (N_e) is greater than the permissible risk (N_a), protection must be installed. The **calculation of the need for protection** is quite complex and depends on the applicable regulatory framework.

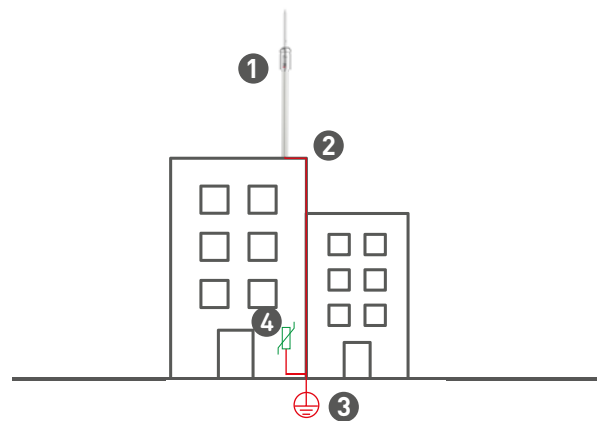
Required efficiency (E)	Level of protection	
$E \geq 0.98$	Level 1	Maximum safety
$0.95 \leq E \leq 0.98$	Level 2	High safety
$0.80 \leq E \leq 0.95$	Level 3	Medium safety
$0 \leq E \leq 0.80$	Level 4	Standard safety

Source: CT-DB-SUA8:2010

DESIGNING A PROTECTION SYSTEM (REQUIRED COMPONENTS)

The standards define an effective lightning protection system as a set of equipment and devices to capture (never to attract) lightning and conduct it safely to earth:

- 1 Capture system:** lightning air terminals.
- 2 Down conductor system:** components required to conduct lightning energy in a controlled and safe manner.
- 3 Earthing systems:** components required for dissipating lightning currents. A grounding system is essential for the proper operation of the protection system.
- 4 Surge protection:** devices for protecting electrical and electronic equipment connected to the facility's electrical network or low current networks (communication and information systems) against voltage surges.



CHOOSE THE CAPTURE TECHNOLOGY

Various types of lightning protection systems are available, which may be more or less appropriate depending on the construction features of the facility to be protected, the overall installation costs, etc.

Protection by Faradisation terminals (passive systems)

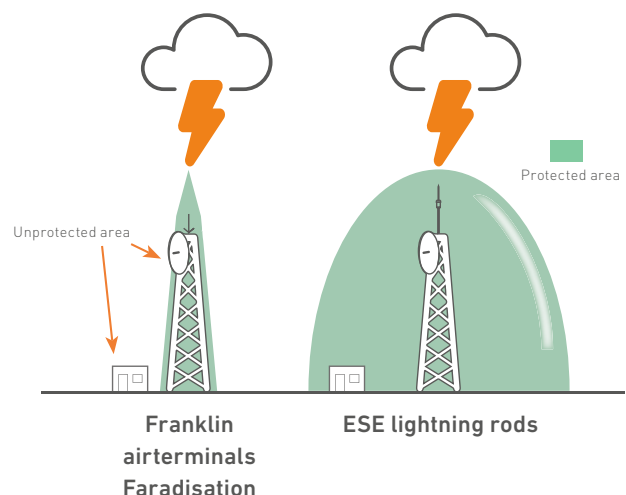
Standards: UNE EN 62305, IEC 62305 and CTE SU8.

Systems which capture by means of rods and meshes work by distributing and dissipating the lightning discharge current through a network of conductors.

Lightning rod protection with early streamer emission (ESE)

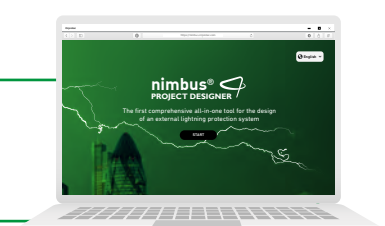
Standards: NF C 17-102, UNE 21186, CTE SU8, NP 4426, etc.

Suitable for any installation type and open areas, where it optimises the material and installation cost while ensuring proper safety.



Design quickly and easily with nimbus® project designer

Free online tool which allows to design **external lightning protection systems** (need for protection, optimised location of ESE lightning rods) and generates a complete report to attach to the **project quote**.



nimbus.cirprotec.com

Lightning rods | ESE Technology

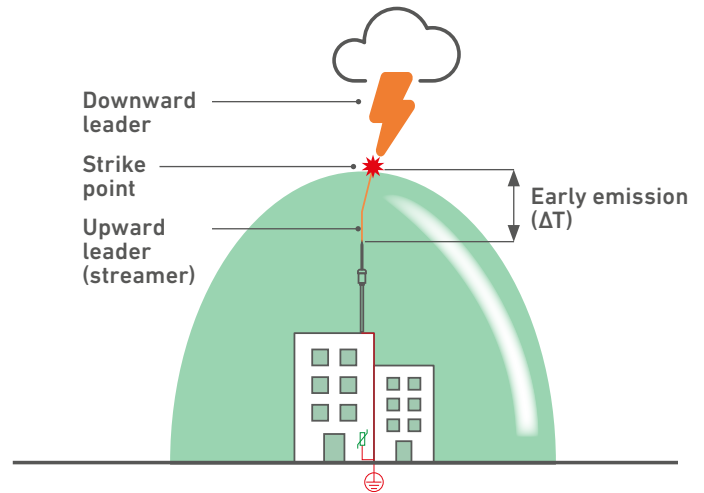
THE MOST EFFICIENT SYSTEM

ESE (Early Streamer Emission) technology uses the atmospheric gradient to generate ionization which creates an **upward propagating leader** faster than any Franklin passive rod. The time difference ΔT is the "benefit" of ESE technology and is known as "early emission" (microseconds μs).

By reducing the start time, the streamer can be connected to the descending leader at a **virtually located strike point well above the tip of the ESE lightning rod**. This **substantially increases the protected volume** (or radius) and facilitates the protection of large areas, simplifying and reducing material and installation costs.

Determining the protection radius is key for selecting the model most suitable lightning rod for each facility based on the level of early emission (ΔT).

The main standards governing these devices are NF C 17-102:2011 and UNE 21186:2011. They establish the relationship between the early streamer emission time parameter of the lightning rod (ΔT) and its radius of protection/coverage.



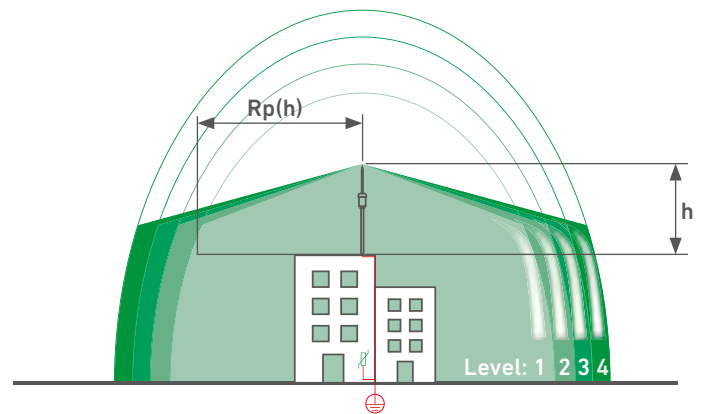
GREATER PROTECTION VOLUME

- Radius of protection up to 120 m
- Savings of over 30% compared to a passive system
- Easy to install and maintain

WHAT ESE MODEL (ΔT) SHOULD BE INSTALLED?

The selection and installation of an ESE type lightning rod is carried out **using risk assessment guidelines**. An effective and safe design requires defining the **level of protection or degree of safety** required, calculating the volume of the facility to be protected and, depending on this, selecting the **appropriate lightning rod** based on its early emission time ΔT .

The table below determines the **radius of protection (R_p)** as a function of the height of the lightning rod above the surface to be protected (h), the value of early emission (ΔT) of each model and the level of protection. This level is determined from the **risk assessment**.



Protection radius [m] according to NF C 17-102:2011

Level of protection		LEVEL 1				LEVEL 2				LEVEL 3				LEVEL 4			
h[m]	Model	nimbus®/nimbus® R/nimbus® PRO				nimbus®/nimbus® R/nimbus® PRO				nimbus®/nimbus® R/nimbus® PRO				nimbus®/nimbus® R/nimbus® PRO			
	$\Delta T[\mu s]$	15	30	45	60	15	30	45	60	15	30	45	60	15	30	45	60
2		13	19	25	31	15	22	28	35	18	25	32	39	20	28	36	43
5		32	48	63	79	37	55	71	86	45	63	81	97	51	71	89	107
10		34	49	64	79	40	57	72	88	49	66	83	99	56	75	92	109
20		35	50	65	80	44	59	74	89	55	71	86	102	63	81	97	113
30		34	49	64	79	45	60	75	90	58	73	89	104	69	85	101	116
40		29	46	62	77	44	59	74	89	60	75	90	105	72	88	103	118
50		18	40	58	74	40	57	72	88	60	75	90	105	74	89	105	120
60		-	30	51	69	34	52	69	85	58	73	89	104	75	90	105	120

nimbus® | Highlights

ESE TECHNOLOGY

The state-of-the-art electronic device (ESE technology) allows the nimbus® lightning rod range to offer the best performance in terms of early emission levels.

IN ACCORDANCE WITH STANDARDS

The lightning rods of the nimbus® series have undergone the tests and quality controls specified in the requirements of standards NF C 17-102:2011 and UNE 21186:2011.

QUALITY ASSURANCE

nimbus® lightning rods are Bureau Veritas certified. This guarantees the type tests, as well as the production process (audited) and ensures quality.



AISI 316 STAINLESS STEEL

Highest quality anti-corrosion stainless steel AISI 316 is used in the manufacture of nimbus® lightning rods.

MAINTENANCE TEST

Inspection and maintenance of LPSs is called for by the regulations. Cirprotec partners offer this service to its customers. The LR-tester (accessory) allows to perform the maintenance test of any nimbus® lightning rod on site.



LR-TESTER

+ 45,000 LIGHTNING RODS

The quality and reliability of the nimbus® series is backed by +25 years of experience of CPT. Over 45.000 lightning rods have been installed worldwide in cooperation with a consolidated global network of highly experienced sales and installation partners, as well as recurring customers.

BEYOND THE STANDARD

The nimbus® series offers a level of robustness well above those required in the standard, thus exceeding the characteristics of similar solutions. Tests carried out at independent laboratories have demonstrated its ability to withstand discharges of up to 200 kA.

LIGHTNING DISCHARGE COUNTER

CDR-401 is the standard open-core lightning strike counter, which can easily be placed around a down tape or down cable.



CDR-401

nimbus® R | Highlights

COMPLIANCE WITH STANDARDS CODES

Lightning rod regulations NFC 17-102:2011 and UNE 21186:2011; as well as series UNE 61000-6 for radiated emissions.

VERIFIABLE QUALITY PEACE OF MIND

nimbus® is the first lightning rod to provide a high-quality confirmation method based on the verification of its authenticity. Verification must be done on the official Cirprotec website using a laser-marked QR on the body of the lightning rod.

LED COMMUNICATION ALERT

When performing a test, a high intensity LED on the lightning rod provides visual verification that the communication between the lightning rod and the remote control is taking place correctly.

RELIABILITY UNDER EXTREME CONDITIONS

The components of the nimbus® R series ensure quality protection, as in the entire nimbus® range. The components related to communication and testing are also of the highest quality. nimbus® runs on a battery which can operate at temperatures down to -30 °C.

Ergonomically designed to withstand hurricane force winds.

This all guarantees the long-term operability and profitability of the projects.

OFF-THE-GRID

It requires no external power as it includes a PV module and a high capacity battery which allows the communication to be powered as well as to make exhaustive tests of the internal operating electronics of the lightning rod (emission and charge).

REMOTE TESTING

Remote test using the universal R-Tester control (accessory), with wide range of RF communication in open areas (up to 1000m).

PART NUMBERS

ORDERING CODE	PART NUMBER	EARLY STREAMER EMISSION TIME [µs]	HEIGHT [CM]	REMOTELY TESTABLE	NF C 17-102:2011 UNE 21186:2011
77901401	nimbus® 15 R	15	45.85	✓	✓
77901403	nimbus® 30 R	30	50.85	✓	✓
77901404	nimbus® 45 R	45	55.85	✓	✓
77901406	nimbus® 60 R	60	60.85	✓	✓
77901410	R-Tester (accessory)	-	-	-	-



Capture System (air terminal)

nimbus® lightning rod **with early emission system (ESE)**. **More than 45,000** protected facilities around the world.

Adapting piece

For fixing nimbus® in the mast.

Lightning strike counter

It allows **lightning strikes on the facility to be detected**, for the purpose of maintenance, thus ensuring its integrity.

Down conductor system

Set of **clamps and accessories** for the design of the lightning system. Solutions for cable and flat tape.

Earthing system

Elements that ensure a good **dissipation of the energy** from the lightning strike.

Lightning rods - accessories

EXTERNAL PROTECTION PRODUCTS

Lightning discharge counters

CDR-401

CDR-401 is Cirprotec's lightning discharge counter. It complies with the latest applicable Lightning Protection related Standards (UNE-EN 50164-6, UNE-EN 62561-6 and UTE C 17106).

FEATURES AND BENEFITS

- Open core technology: CDR-401 is a "Clip-on" counter that can be installed around the conductor. Ideal also for retrofitting.
- Universal: Installation around flat tapes and cable conductors.
- CDR-401 is totally protected against the effect of dust and against the effect of immersion (IP67).



cirprotec.com/cdr

Standards

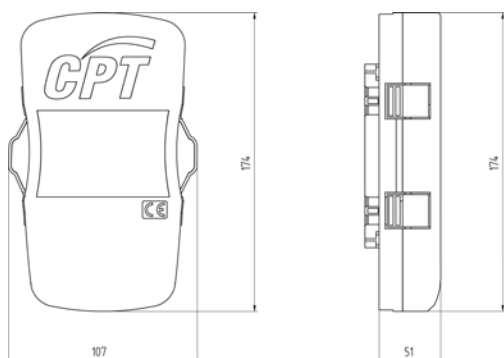
- EN 50164-6
- EN 62561-6
- UTE C 17106

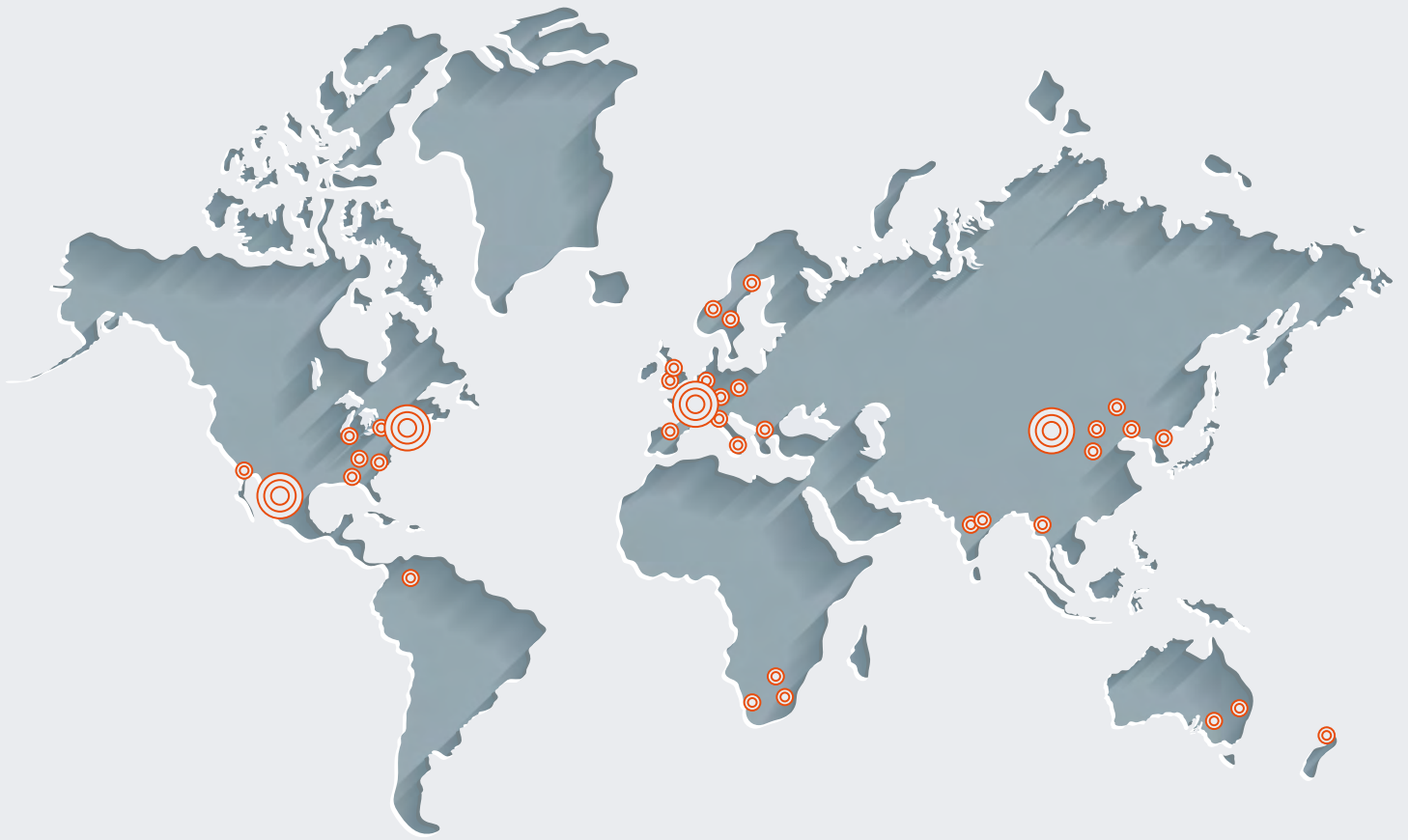


PART NUMBERS

ORDERING CODE	PART NUMBER	THRESHOLD CURRENT (8/20) [KA]	MAXIMUM COUNTING AND WITHSTAND DISCHARGE CURRENT (10/350) [KA]	MAX. FLAT TAPE WIDTH [MM]	MAX. DIAMETER OF CABLE [MM]
77920130	CDR-401	1	150	30	10

DIMENSIONS





GLOBAL EXPERT
IN ELECTRICAL POWER
AND ADVANCED MATERIALS

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