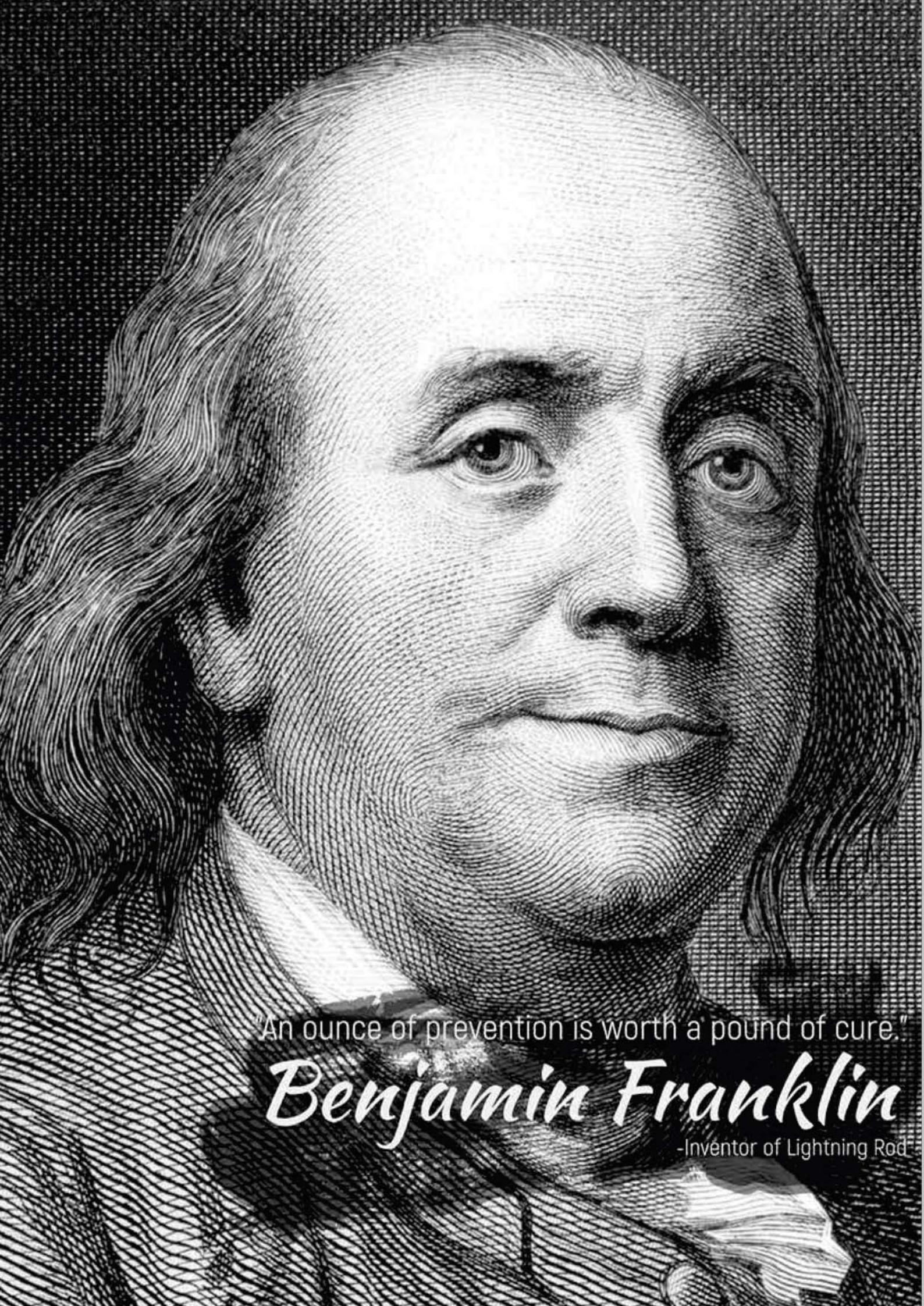
TOPBAS GRUP

ACTIVE LIGHTNING PROTECTION SYSTEMS

Early Streamer Emission Air Terminal


"An ounce of prevention is worth a pound of cure."
Benjamin Franklin
-Inventor of Lightning Rod

TOPBAS GRUP

Protection needs trust, trust needs experience, experience needs knowledge. Like thousands of people who trusted us, we are and will always be willing to protect people from the anger of mother nature. With years and experience of rigorously expetising in lightning protection field, our enthusiasm and ambition are always vivid. Because we protected from the Top.

Topbas Grup's products are manufactured according to ISO 9001, 14001, 29001, OHSAS 18001 & under CE quality requirements and are subjected to significant field and laboratory testing and computer modeling during product development. The products are supported by test reports, patent and trademark statements. Topbas Grup's has developed specialized designs to intigrate all aspects affecting system performance.

We smile with our clients!






RESEARCH AND DEVELOPMENT

As one of the leading companies in the field of lightning protection, TOPBAS has invested heavily in field and laboratory testing as part of its ongoing commitment to research and development. Throughout the product development of the TOPBAS ESEAT, the proto-type models were subjected to intense testing under high voltage conditions. Following further refinements, the TOPBAS ESE air terminals were subjected to final testing by an independently accredited test laboratory which completed testing in full compliance with the French National standard NF C 17-102 : 2011. The final testing of Topbas ESE terminals showed effective performance as defined in the standard.

TOPBAS ESE
AIR TERMINALS

Topbas ESE air terminals are externally mounted, proactive, structural lightning protection devices and are designed to activate in the moments directly preceding an imminent direct strike. The installation of a Topbas ESE air terminal combines the best advantages of two systems: the direct path ground of a conventional lightning protection system, and ESE technology employed in the Topbas ESE internal design. These combined advantages ensure that the Topbas ESE provides a secure zone of protection.

During thunderstorm conditions when the lightning down leader is approaching ground level, an upward leader may be created by any level, an upward leader may be created by any surface in the case of a passive lightning rod, the upward leader propagates only after a long period of charge organization. In the case of Topbas ESE air terminal, the Initiation time of an upward leader is greatly reduced. The Topbas ESE air terminal, generates controlled magnitude and frequency pulses at the tip of the terminal during high fields prior to a lightning discharge. This enables the creation of an upward leader from the terminal that propogates toward the downward leader coming from the Undercloud.

This development of an upward streamer earlier in time and pace ensures that the Topbas ESE terminal will be the target of the developing lightning strikes. The selection of the Topbas ESE model, placement, and mounting height above the protected area is to be done as per the project requirements.

RISK **ASSESSMENT**

The procedure for calculating the risk factor is described in Lightning Protection standards. The result determines the need for installing a Lightning Protection system and its degree of security. The risk assessment compares the expected lightning incidence with the assumed probability of lightning strike on the structure. The rate between these two factors indicates if the lightning protection system is needed and the security grade. This value depends on several tabulated factors, such as the type of structure and its content, although sometimes other considerations could be taken into account, improving the protection level over the risk calculations.

The need for the level of protection often depends on subjective criteria since the protection level depends on the "acceptable number of strikes on the structure", which can always be limited to adopting level I, the safest and most effective.

Protection level is thus related to the accepted probability of a lightning strike to a structure. A lower protection level will be able to intercept lightning with a high associated current, but a flash with a low current could avoid the lightning protection system and strike the structure. Protection level assumes lower protection radius for the air terminals, hence the system would also intercept lower current lightning.

Standards consider that **lightning protection** is needed in the following cases:

- Any installation or machinery that is used for working
- Large concentrations of people
- Need of continuity in production or public services
- Areas with high lightning density
- Very high or isolated buildings
- Buildings containing explosive or inflammable materials
- Building containing irreplaceable heritage

AREA OF **PROTECTION**

The protecion radius(Rp) of Topbas ESE terminal is calculated using the following formula as defined in NF C 17-102 (September 2011), namely:

$R_p(h) = \sqrt{2rh - h^2 + \triangle(2r + \triangle)}$

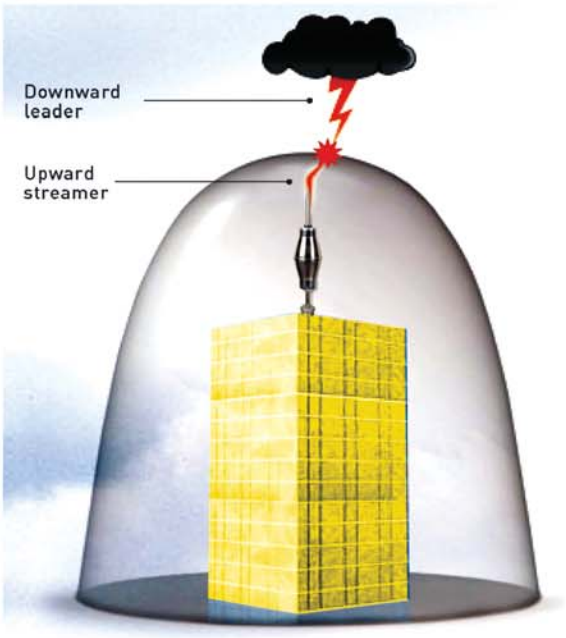
and

Rp=h x Rp5/5 for $2 \geq h < 5$ m

Rp5=value of Rp from EQn.(1) when h = 5 m

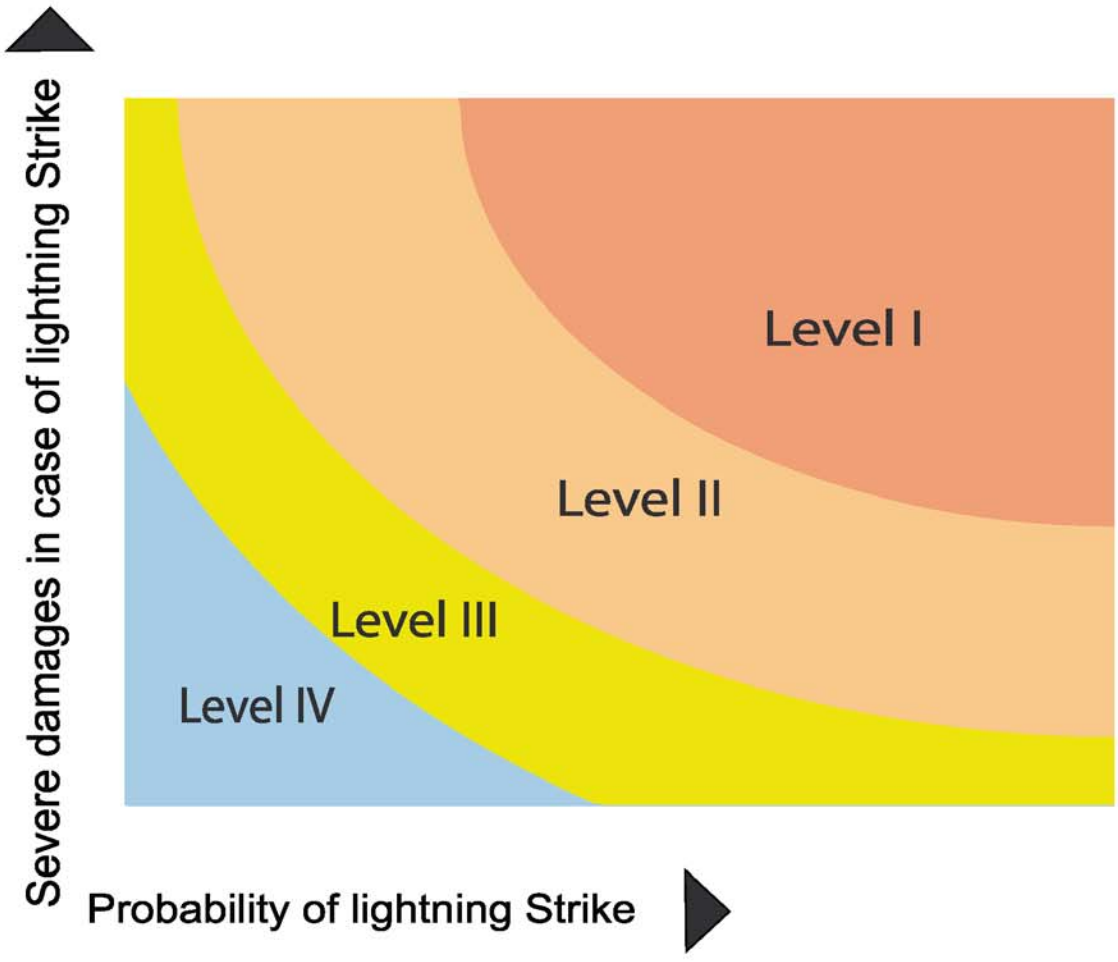
r = 20m for protecion level I (Very High Protecion)
= 30m for protecion level II (High Protecion)
= 45m for protecion level III (Medium Protecion)
= 60m for protecion level IV (Standard Protecion)

and $\triangle$ =Triggering time advantage



Early streamer emission (ESE) lightning rods

LIGHTNING PROTECTION LEVEL



SIRIUS ESE AIR TERMINAL

TECHNICAL FEATURES

- Non-Electronic ESE
- Designed & tested as per NF C 17-102 (2011) standard
- ΔT = 60 µSec (Triggering Time Advance Delta T)
- CPRI (Govt of India) tested for 70 KA (8/20 µSec)
- 100 KA (10/350 µSec) lightning current tested in METU (Turkey, Europe) lab
- No use of batery or external power source
- 304L (Inox) Stainless Steel design— suitable for any environmental condiions
- Suitable for use with a variety of down conductors— tape/strip, round conductor, isolated / insulated cables / HVSC cable etc
- 20 years warranty

Protection radius as per NF C 17-102 (2011)				
Mast Height h(m)	**Level I (Very High)**	**Level II (High)**	**Level III (Medium)**	**Level IV (Standard)**
2	31	35	39	43
3	47	52	58	63
4	63	69	78	85
5	79	86	97	107
6	79	87	97	107
8	79	88	98	108
10	79	88	99	109
15	80	89	101	111
20	80	89	102	113
45	80	89	105	119
50	80	89	105	120
80	80	89	105	120
100	80	89	105	120

IONIA ESE AIR TERMINAL

TECHNICAL FEATURES

- Technology - Electronic ESE
- Designed & tested as per NF C 17-102 (2011) standard
- ΔT = 78 µSec (Triggering Time Advance Delta T)
- 100 KA (10/350 µSec) lightning current tested in METU (Turkey, Europe) lab
- In-built Electronic Triggering Device
- 304L (Inox) Stainless Steel design— suitable for any environmental condiions
- Suitable for use with a variety of down conductors— tape/strip, round conductor, isolated / insulated cables / HVSC cable etc
- 20 years warranty
- Remote monitoring facility also available

Protection radius as per NF C 17-102 (2011)				
Mast Height h(m)	**Level I (Very High)**	**Level II (High)**	**Level III (Medium)**	**Level IV (Standard)**
2	38	42	46	50
3	58	63	69	75
4	77	84	93	101
5	96	105	116	126
6	97	105	116	127
10	97	106	118	128
15	98	107	120	131
20	99	109	121	133
45	104	115	130	144
60	107	119	135	150
80	111	124	142	158
100	114	129	148	165

Remote Monitoring Facility

UMBRAECO-15 ESE AIR TERMINAL

TECHNICAL FEATURES

- Non-Electronic ESE
- Designed & tested as per NF C 17-102 (2011) standard
- ΔT = 15 µSec (Triggering Time Advance Delta T)
- 100 KA (10/350 µSec) lightning current tested in METU (Turkey, Europe) lab
- No use of batery or external power source
- 304L (Inox) Stainless Steel design— suitable for any environmental condiions
- Suitable for use with a variety of down conductors— tape/strip, round conductor, isolated / insulated cables / HVSC cable etc
- 20 years warranty

Protection radius as per NF C 17-102 (2011)

Mast Height h(m)	Level I (Very High)	Level II (High)	Level III (Medium)	Level IV (Standard)
2	13	15	18	20
3	19	22	27	31
4	25	30	36	41
5	32	37	45	51
6	32	38	46	52
8	33	39	47	54
10	34	40	49	56
20	35	44	55	63
30	35	44	58	69
40	35	44	60	72

LYRA-12 ESE AIR TERMINAL

TECHNICAL FEATURES

- Non-Electronic ESE
- Designed & tested as per NF C 17-102 (2011) standard
- ΔT = 10 µSec (Triggering Time Advance Delta T)
- 100 KA (10/350 µSec) lightning current tested in METU (Turkey, Europe) lab
- No use of batery or external power source
- 304L (Inox) Stainless Steel design— suitable for any environmental condiions
- Suitable for use with a variety of down conductors— tape/strip, round conductor, isolated / insulated cables / HVSC cable etc
- 20 years warranty

Protection radius as per NF C 17-102 (2011)				
Mast Height h(m)	**Level I (Very High)**	**Level II (High)**	**Level III (Medium)**	**Level IV (Standard)**
2	10	12	15	17
3	15	19	23	26
4	21	25	30	34
5	26	31	38	43
6	27	32	39	44
7	27	33	39	44
8	27	33	39	44

LIGHTNING EVENT COUNTER

StrikerX lightning event counter is designed to count and record the lightning strikes captured by lightning protection systems such as ESE lightning rods, simple capturing rods and the cage method. The lightning counter is necessary to determine whether the lightning rod received any lightning strikes.

The counter is connected to the down conductor of the lightning arrester and therefore it detects the electromagnetic field caused by lightning discharge current, and it counts each strike and shows it by way of the number display,

With the help of the lightning counter the customer can follow the number of lightning strikes arrested by your system. It does not require any additional power supply for its operation.

TECHNICAL FEATURES

- IP 65 rated enclosure suitable for external applicaion.
- Ease of installaion, StrikerX can be retro-fited to any lightning protecion system.
- Non-intrusive and fast acing proximity circuit detects lightning transient currents.
- Non resetable electro-mechanical counter.
- Can be mounted at any locaion along the down conductor.

Model	StrikerX
Description	Lightning event Counter
Display Model	Electromechanical display (non resettable)
Current sensiivity (8/20 µs)	>250A
Lightning Current (10/350 µs)	100 KA
Current Sample Mode	Inducive Probe (Built-in)
Operating temperature (°C)	-20~+85
Indicator	6 digits
Enclosure material	Plastic
Degree of protecion	IP 65 (IEC 529)
Dimension of counter (cm)	16 (L) x 9 (W) x 6 (H)

Lightning Event Counter Test Device

- Internal batery
- Patented product
- Tests up to 500+

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