unicorn
energy systems

ER ARRESTOR 02

EXTENDED RANGE ARRESTOR

ADVANCED LIGHTNING PROTECTION SOLUTION

SS-304
Premium Stainless Steel 304 for maximum durability.

LOW CORROSIVE
Highly resistant to corrosion, suitable for all environments.

HIGH COVERAGE AREA
Provides wider protection with advanced technology.

EXTENDED RANGE ARRESTOR
Early streamer emission technology for superior protection.

IDEAL FOR PROTECTION OF

RELIABLE DESIGN & PERFORMANCE
Advanced ESE Technology for ultimate protection

LIGHTNING PROTECTION
Protects structures from direct lightning strikes

HIGH DURABILITY & RELIABILITY
Built to perform in extreme weather conditions

EASY INSTALLATION & MAINTENANCE
Simple to install and designed for long life

unicorn energy systems

Technical Datasheet

ER Arrestor 02™

ALA - 002 UNI2502-W2-C8000

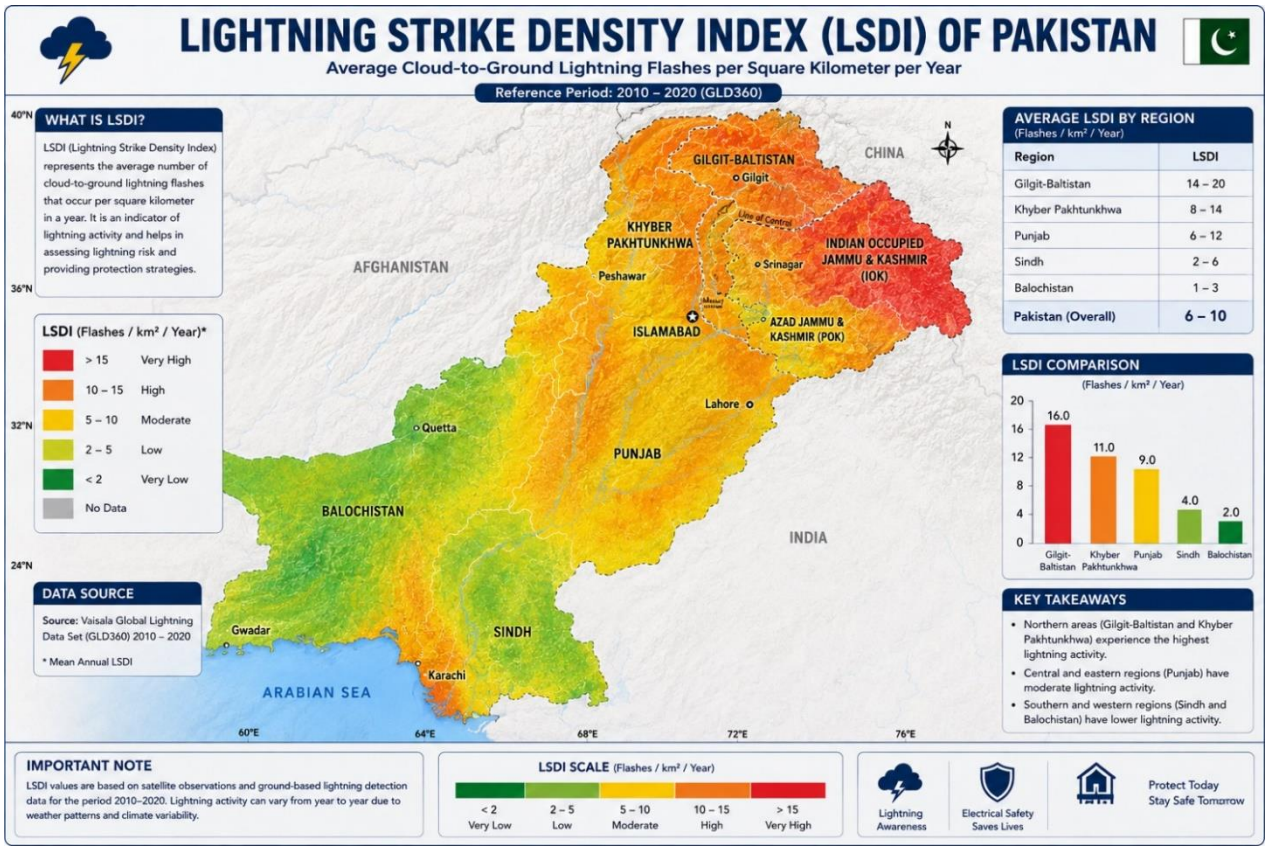
LIGHTNING AIR TERMINAL — ENGINEERED FOR RELIABLE LIGHITING STRIKE PROTECTION

Product of UNICORN ENERGY SYSTEMS

1. Why Lightning Protection Matters

Lightning is a significant and recurring cause of structural, electrical, and financial loss worldwide. International meteorological and industry data illustrate the scale of the risk:

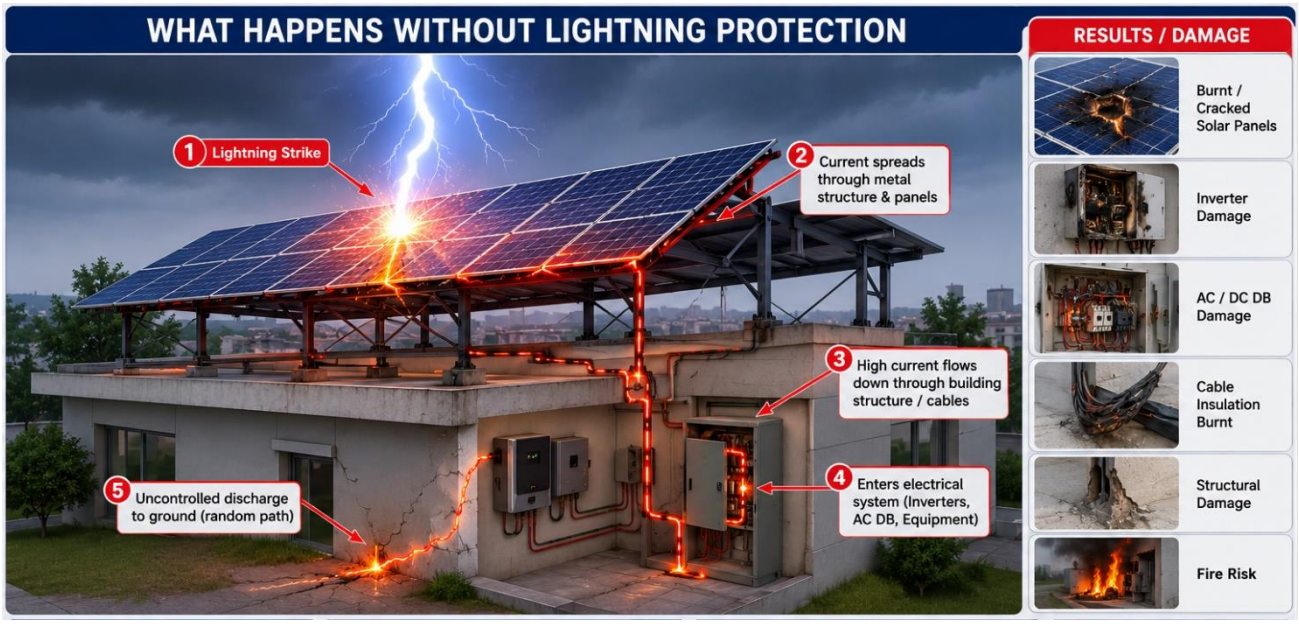
- Globally, an estimated 1.4 billion lightning flashes occur every year, of which around 25 million strike the ground (cloud-to-ground strikes) — each one a potential threat to nearby structures, towers, and equipment
- Lightning is linked to an estimated 24,000 deaths and many more injuries worldwide each year, underscoring the human safety dimension of strike protection, not just equipment protection
- In the United States alone, lightning was responsible for an estimated 15,000 structure fires in a recent year — a pattern repeated, in proportion, across other high-lightning-density regions of the world
- Industry estimates put global economic losses from lightning-related damage — structural damage, equipment failure, and downtime combined — at several billion US dollars annually across sectors including energy, telecom, industry, and agriculture
- With an estimated 7 million cell towers in operation worldwide, telecom infrastructure is a frequent direct-strike target; operators regularly report costly equipment repairs and extended service outages following strikes
- A large share of lightning damage does not come from a direct hit at all — indirect surges travelling through power lines, telecom cables, and data lines are a leading cause of equipment failure inside buildings that were never struck directly
- Data centers and control rooms are especially exposed to this indirect-surge risk, since a single lightning-induced voltage spike can damage servers and control electronics and trigger costly downtime



2. Hazards of Lighting Strike

For solar PV installations, telecom towers, and industrial structures specifically, an unprotected direct strike carries the following consequences:

- Lightning strikes can physically damage solar panels, causing shattered glass or punctures
- Electrical surges from lightning can overload panel components, leading to malfunction
- Even indirect lightning strikes can induce damaging voltage surges in solar equipment
- Lightning-induced fires pose a risk to both panels and surrounding property
- Electromagnetic interference from lightning can disrupt electronics in solar systems
- Grounding systems may be compromised by lightning strikes, reducing protection
- Lightning strikes can corrupt data in monitoring systems, hindering performance analysis
- Repairing lightning-damaged equipment incurs significant financial costs and downtime

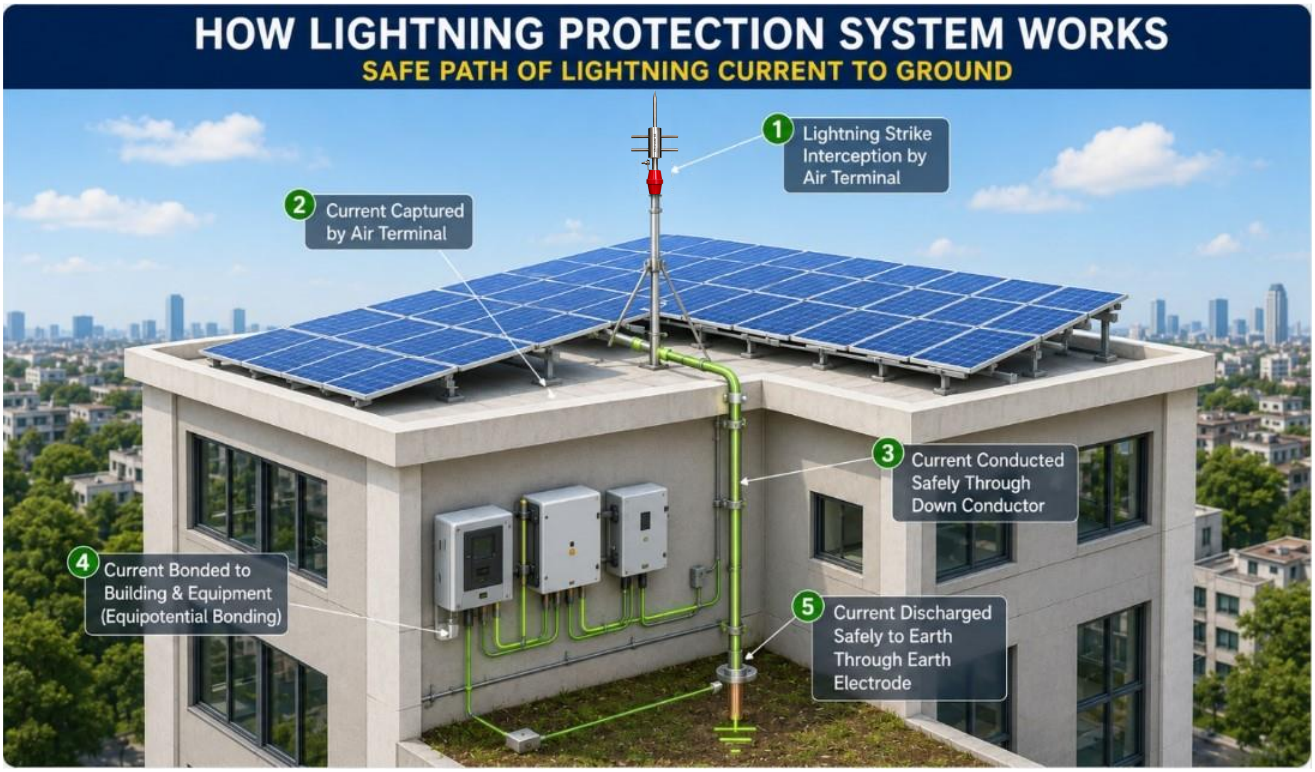


Typical direct-strike risk to an unprotected rooftop solar installation

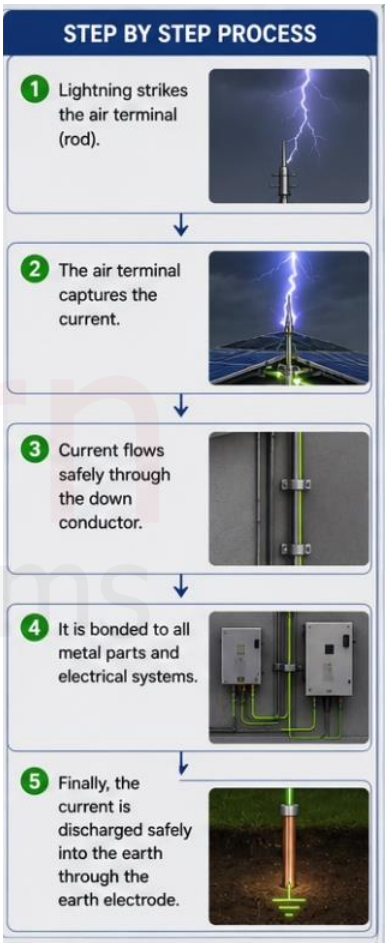
3. Benefits of a Lightning Protection System

- **Structural Safety** — Provides a controlled, low-resistance path for lightning current to reach ground, preventing structural fires, explosive damage to concrete, and destruction of roofing and building materials.
- **Equipment & Asset Protection** — Shields sensitive electrical and electronic equipment (inverters, control panels, communication systems, solar PV components) from both direct strikes and induced surge damage.
- **Life Safety** — Prevents dangerous side-flashing and step/touch voltage hazards that can injure or kill occupants and personnel near an unprotected structure during a strike.
- **Business Continuity** — Reduces downtime and financial losses caused by equipment failure, data loss, and system outages following lightning-related surges.
- **Fire Risk Reduction** — Minimizes ignition risk from resistive heating in undersized or unprotected conductors and wiring.

- **Insurance & Compliance Advantage** — Meeting IEC 62305, NFPA 780, or NEC 250 standards can lower insurance premiums and is often a regulatory requirement for industrial, commercial, and solar installations.



- Extended Equipment Lifespan — Protects investment in solar PV systems, inverters, and control electronics by preventing premature failure from repeated surge exposure — even from nearby, indirect strikes.
- Peace of Mind & Reliability — Ensures uninterrupted operation of critical infrastructure (hospitals, data centers, telecom towers, industrial plants, solar farms) where lightning-related failure carries high consequence.
- Cost-Effective Risk Mitigation — The cost of an LPS installation is significantly lower than the cumulative cost of repeated equipment replacement, structural repair, and downtime from unprotected strikes.
- Comprehensive Coverage — When combined with SPDs and proper earthing/bonding, an LPS protects the entire system — structural, electrical, and electronic — rather than just the point of strike.



4. Product Overview

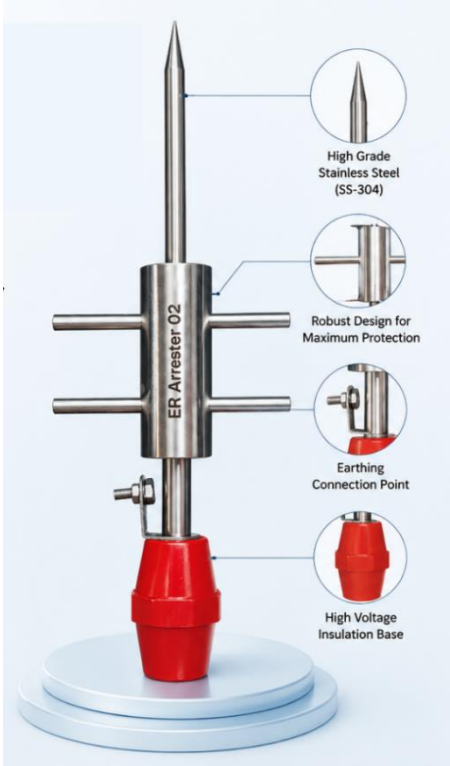
The ER Arrestor-02® is a stainless-steel lightning air termination rod manufactured by Unicorn Energy Systems for the protection of solar photovoltaic (PV) installations, telecommunication towers, and commercial or industrial structures against direct lightning strikes. The terminal is designed to safely intercept and conduct lightning current to an engineered earthing system, protecting connected equipment, structures, and personnel from strike-related damage.

Protection radius calculations are carried out in accordance with IEC 62305-3 (Protection Class LPS-IV), allowing installers to correctly size and position the terminal relative to the equipment being protected.

5. Key Features and Applications

- Constructed from rust-free stainless steel (SS-304, Taiwan-sourced) with a high melting point — recommended for demanding, high-efficiency lightning air terminals
- Engineered for straightforward installation on any site type — solar PV arrays, telecom towers, or building rooftops
- High-voltage, robust insulation base isolates the terminal from the mounting pole

- Supplied complete with all accessories required for installation
- Protection radius and related design parameters available per IEC 62305-3

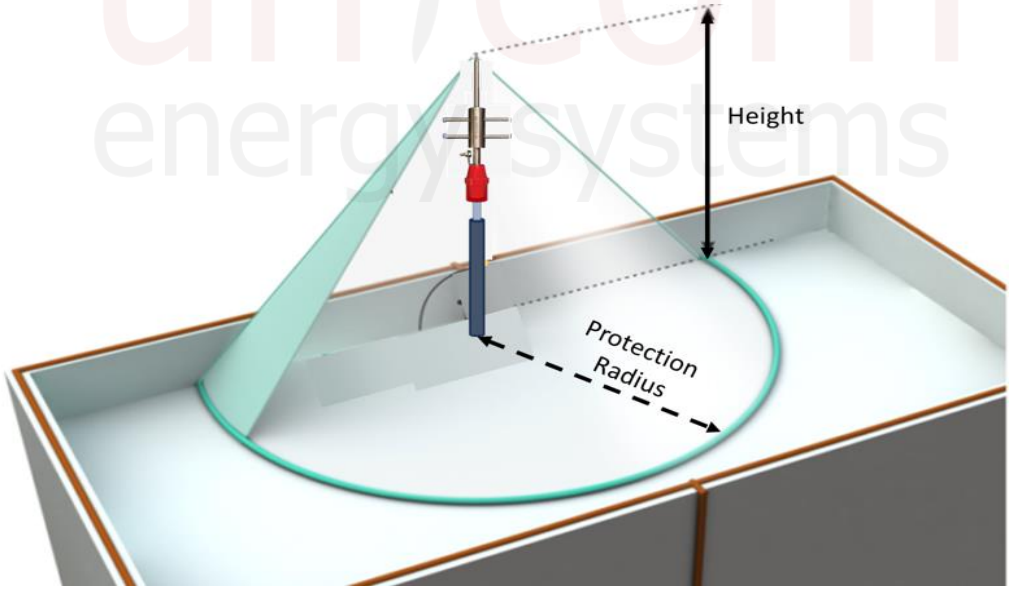


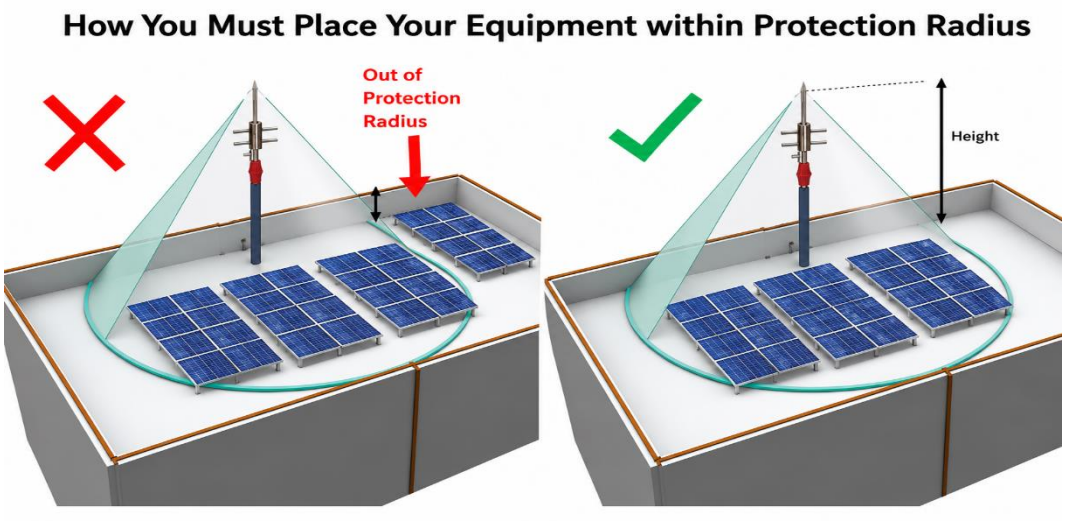
6. Protection Radius Coverage

Protection Radius: The maximum horizontal distance from the lightning protection terminal within which a structure or equipment is considered protected against direct lightning strikes. The protection radius depends on the terminal height, the protection method, and the selected Lightning Protection Level (LPL) as defined by applicable standards such as IEC 62305

The table below indicates the protection radius and equivalent circular protected area achieved by the ER Arrestor-02® at various mounting heights, calculated to IEC 62305-3 for a Class IV lightning protection system (LPS-IV).

HEIGHT (FT)	PROTECTION RADIUS (FT) (LEVEL 4)
10	40
15	51
20	58
25	63
30	66
35	73
40	75





7. Technical Specifications

Specifications	Details
Material	Stainless Steel SS-304
Current Rating	200KA
Impulse tested	110 kV (1.2/50 µs)
Insulation Resistance	More than 10 Tera Ohms
Insulation Rating	More than 80 kV
Design Standard	IEC 62305-3
Protection Class	LPS-I to LPS-IV
Terminal Height	375 mm (excluding optional pole)
Product Dimensions	See detail drawing at Page 6 of this document
Optional Mounting Pole	10 ft x 2 inch with 8inch x 8inch base plate (available separately)
Mounting Options	Ground-mount pole or structure-mount pole

8. Packaging & Shipping Details

Specifications	Details
Packaging Shape	Carton box
Net Weight (packed)	Approx. 1.7 kg
Product Weight	1.4 kg
Box Package Dimensions (L x W x D)	400mm x 180mm x 65mm
Recommended Storage Conditions	Low-humidity, dry storage
HS Code	8535.4000

9. Box Includes

Item	Quantity
High-voltage insulator	1 pc
Stainless steel zip tie, 12 inches	1 pc
16 mm long-neck cable thimble	1 pc
Stainless steel nut and bolt set	1 pc
ER Arrestor-02® terminal	1 pc


High Voltage Insulator
X 1

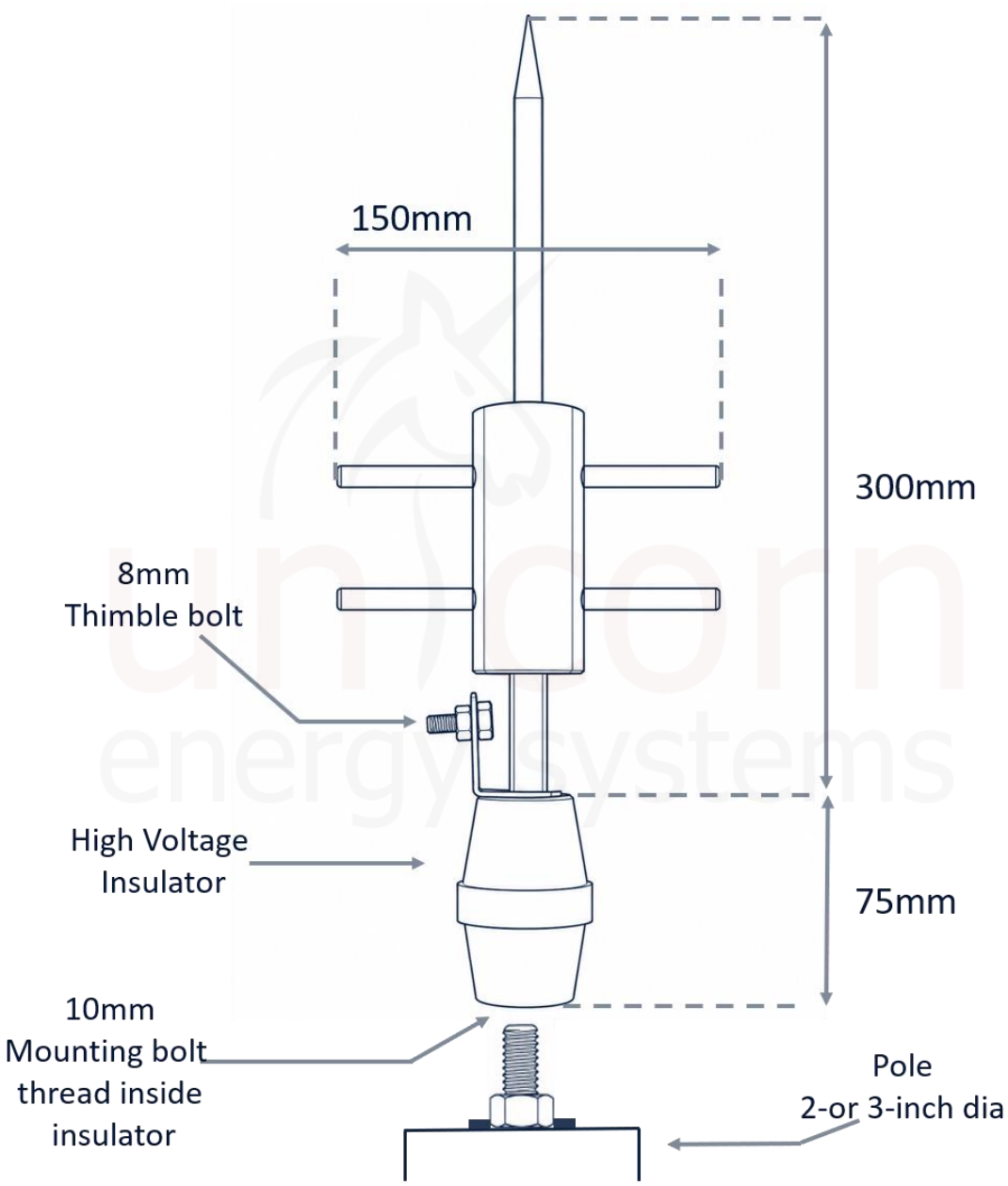

SS Zip tie 12 inch
X 1


16mm long neck thimble
X 1


SS Nut bolt
X 1


ER Arrestor 02
X 1

10. ER Arrestor - Product Dimensions



Scan for Product Videos

ER Arrestor Installation Video

Click here to see video

ER Arrestor Lab test Video

click here to see video

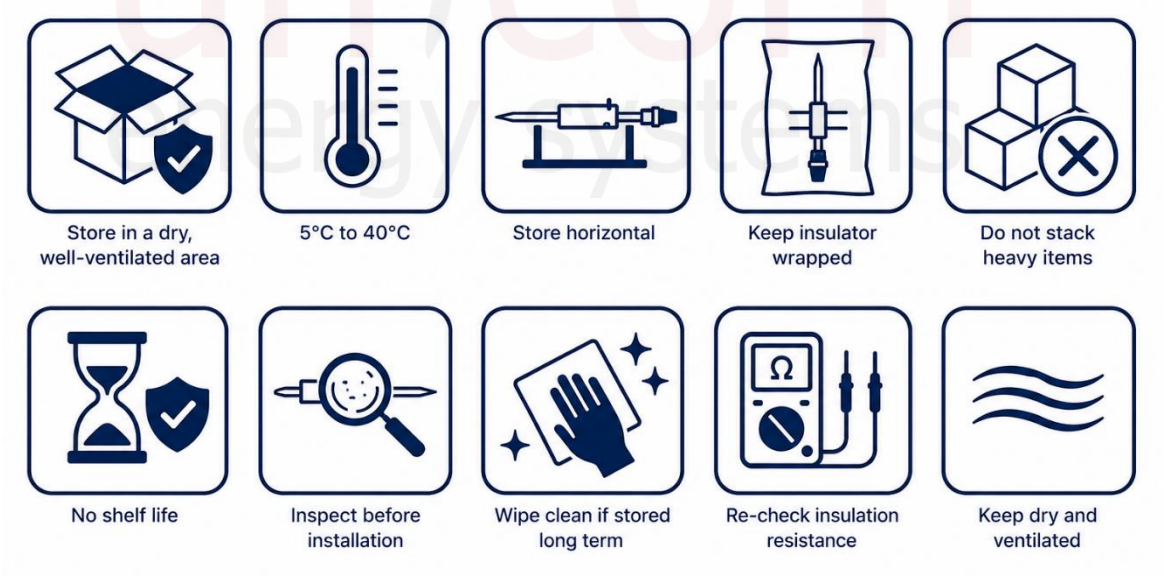
Damages of Lighting Strike

click here to see video

YouTube

11. Storage & Handling Guidelines

- Store in the original carton, in a dry, low-humidity, well-ventilated area, away from direct sunlight and away from corrosive chemicals or fumes
- Recommended storage temperature range: 5°C to 40°C
- Store the terminal in a horizontal position, supported along its length, to prevent the pointed tip from bending or being damaged
- Keep the high-voltage insulator in its protective wrapping until installation to prevent surface contamination or scratching, which can reduce flashover performance
- Do not stack heavy items on top of the packaged unit
- The stainless-steel terminal and insulator have no defined shelf life when stored per the above conditions; inspect for corrosion, contamination, or physical damage before installation regardless of storage duration
- If stored for an extended period, wipe the insulator surface clean and re-check insulation resistance before commissioning



12. Installation Methods

1. Site Selection
Select the highest suitable location to provide maximum protection coverage.

2. Base Plate Installation
Fix the 8" × 8" base plate securely using four anchor bolts.

3. Pole Installation
Install and securely weld the 2" dia GI/SS pole vertically to the base plate.

4. Top Thread Preparation
Weld a 10 mm threaded bolt at the center of the pole top.

5. Install Insulator
Place the insulator onto the threaded bolt.

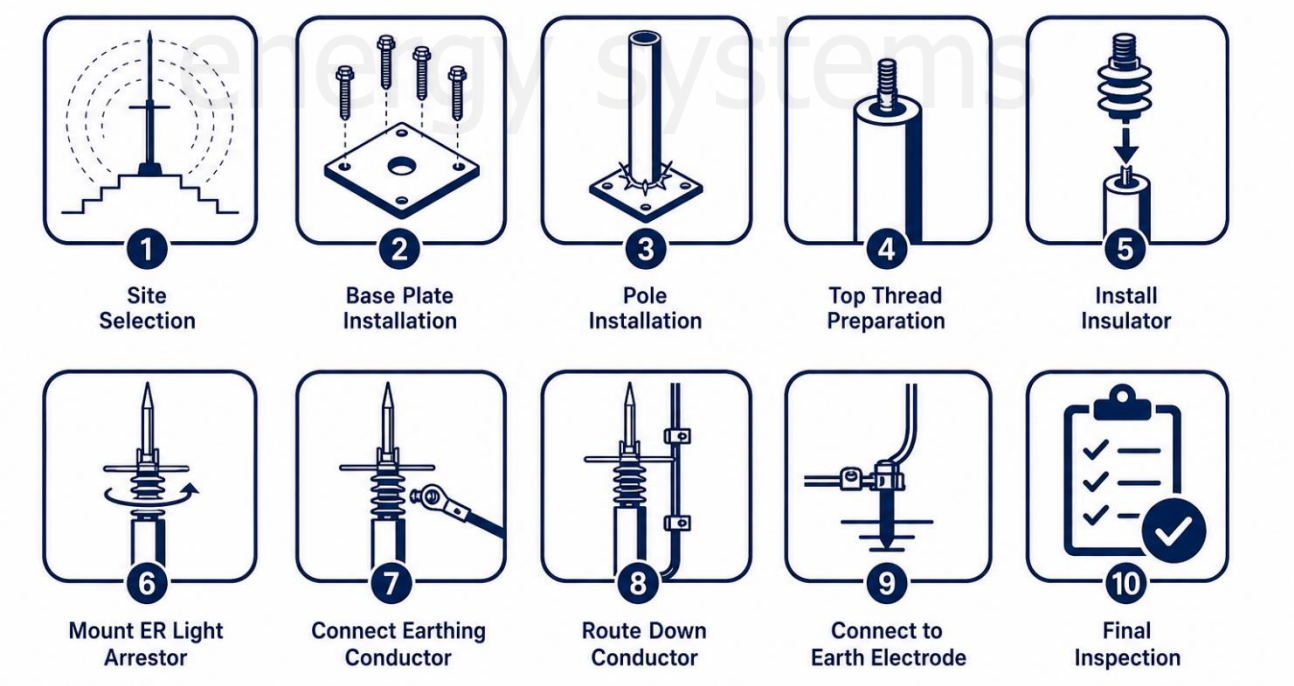
6. Mount ER Light Arrestor
Place the ER Light Arrestor with insulator on bolt welded on pole and rotate clockwise until fully tightened.

7. Connect Earthing Conductor
Attach the earthing conductor using a copper thimble and tighten it securely to the terminal bolt.

8. Route Down Conductor
Run the down conductor vertically along the pole using suitable clamps.

9. Connect to Earth Electrode
Connect the down conductor to the earth electrode or main earth bar.

10. Final Inspection
Verify all mechanical connections are tight and check earth continuity before commissioning.



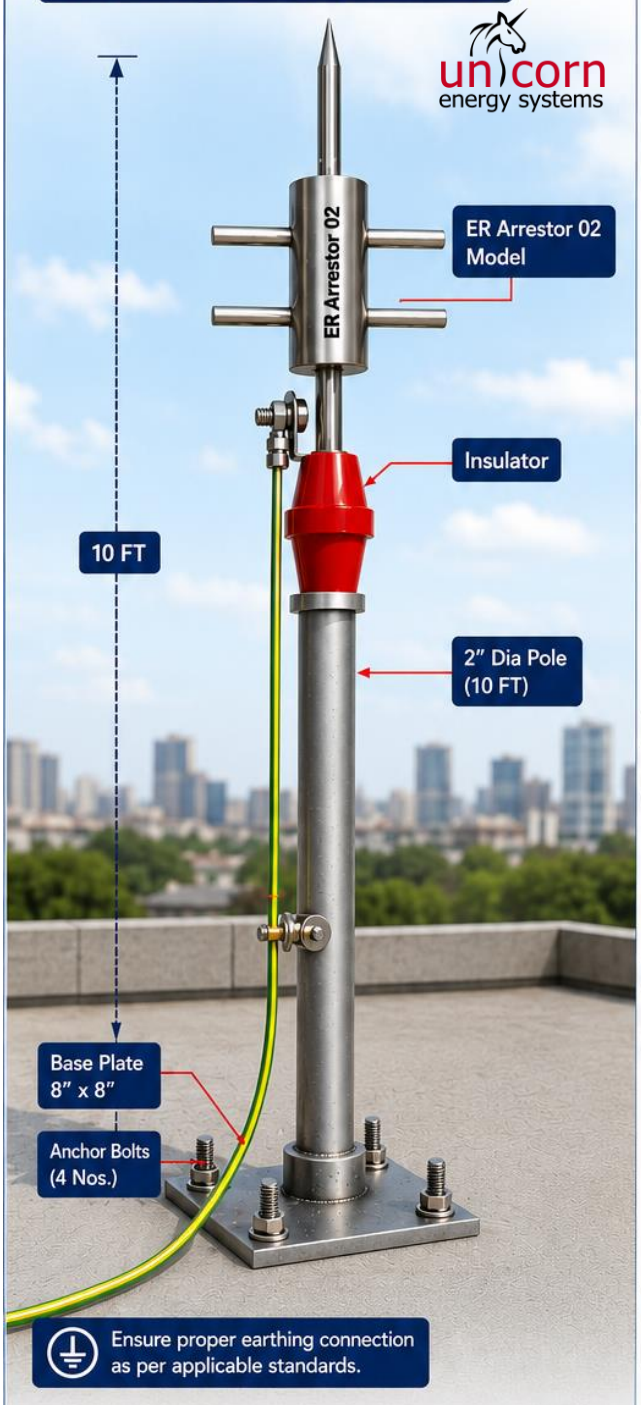
⚠ CAUTION

Do not route lighting arrestor down conductor inside or near conduit pipes carrying power lines or any other earth wire

NOTE:
In public passage area always install sign of "DO NOT TOUCH DOWN CONDUCTOR IN CLOUDY SEASON"
To avoid any hazard in cloudy season when lighting strike is possible

ER ARRESTOR 02
MODEL

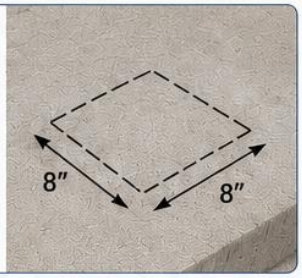
ROOF INSTALLATION DIAGRAM



COMPONENTS USED

1 ROOF PREPARATION

- Select a suitable location on the roof.
- Ensure the surface is flat and structurally strong.



2 BASE PLATE FIXING

- Place the base plate (8" x 8") on the roof.
- Mark the 4 hole positions.
- Drill holes and fix anchor bolts securely.

3 POLE INSTALLATION

- Weld the 2" diameter pole (10 ft) to the base plate sleeve.
- Ensure the pole is vertical and the weld is strong.

4 TOP BOLT PREPARATION

- At the top of the pole, weld a 10mm threaded bolt in the center.

5 ER ARRESTOR MOUNTING

- Place ER Arrestor with insulator on top of 10mm thread bolt and tight properly.
- Rotate clockwise to tighten.

6 EARTHING CONNECTION

- Connect the earthing conductor to the bolt on the ER Arrestor 02 using thimble.
- Run the conductor down the pole and connect it to the main earthing system.

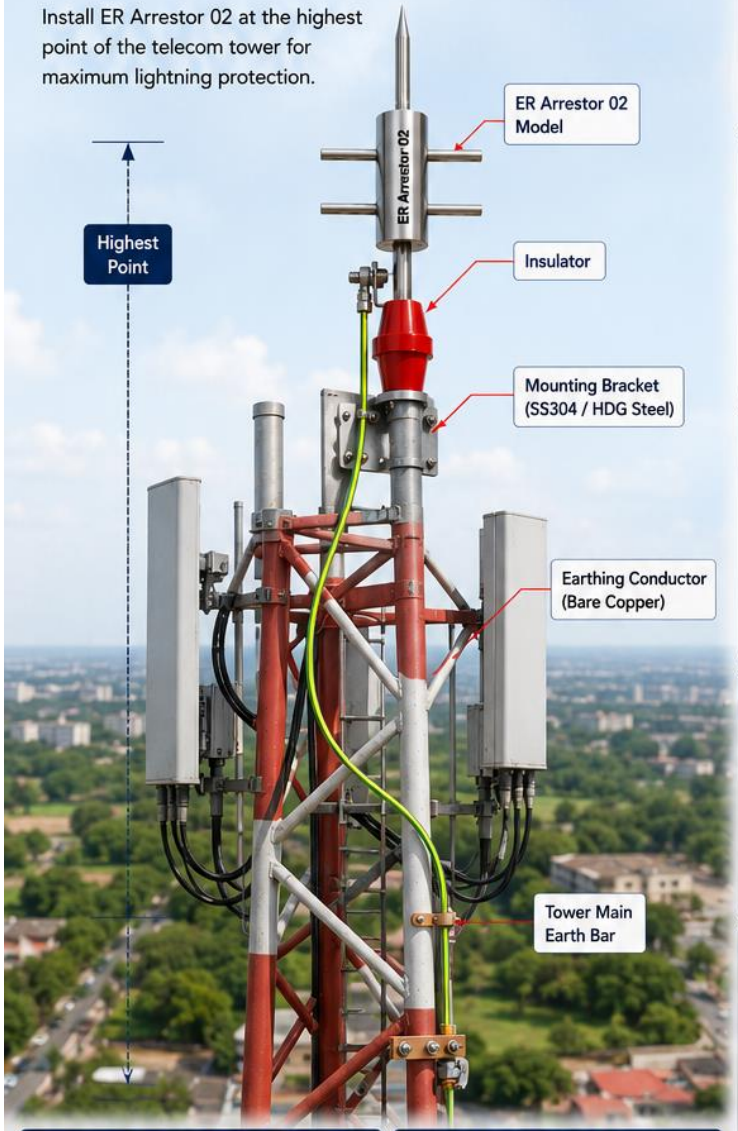
SPECIFICATIONS	
Pole Height	10 FT
Pole Diameter	2 Inch
Base Plate Size	8" x 8"
Top Bolt	10mm Thread
Material	SS / GI
Installation	Roof Mounted

ER ARRESTOR 02
MODEL

unicorn energy systems

TELECOM TOWER INSTALLATION GUIDE

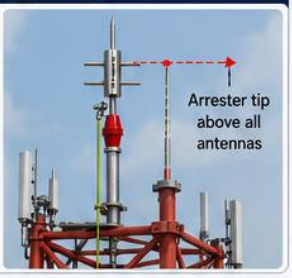
Install ER Arrestor 02 at the highest point of the telecom tower for maximum lightning protection.



INSTALLATION STEPS

1 LOCATION SELECTION

- Install ER Arrestor 02 at the highest point of the tower.
- Ensure the tip of the arrestor is above all antennas and structures.



2 MOUNTING BRACKET INSTALLATION

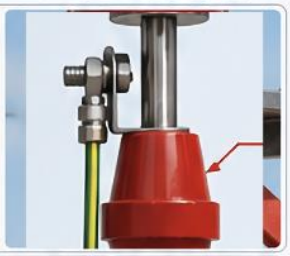
- Install a strong SS304 or HDG steel bracket on the top member.
- Fix the bracket using U-bolts or bolt clamps securely.

3 ER ARRESTOR INSTALLATION

- Place the insulator on the mounting bracket.
- Screw the ER Arrestor 02 clockwise on the 10mm threaded stud and tighten properly.

4 EARTHING CONNECTION

- Connect the earthing conductor to the earthing terminal on the arrestor using thimble.
- Use bare copper or tinned copper conductor (25–50 mm²).



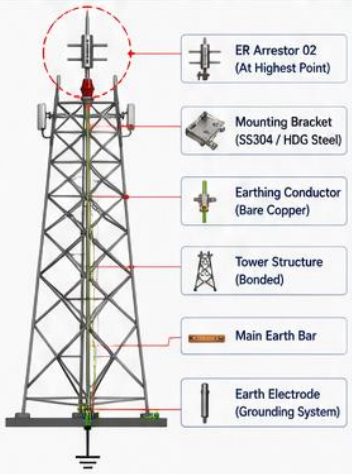
5 RUN CONDUCTOR TO MAIN EARTH BAR

- Run the conductor down the tower using clamps.
- Keep the path as short and straight as possible. Avoid sharp bends.

6 FINAL CHECK

- Check all bolts and connections for proper tightness.
- Measure earth continuity and earth resistance.
- Ensure the arrestor is vertical and secure.

TOWER INSTALLATION OVERVIEW



COMPONENTS USED

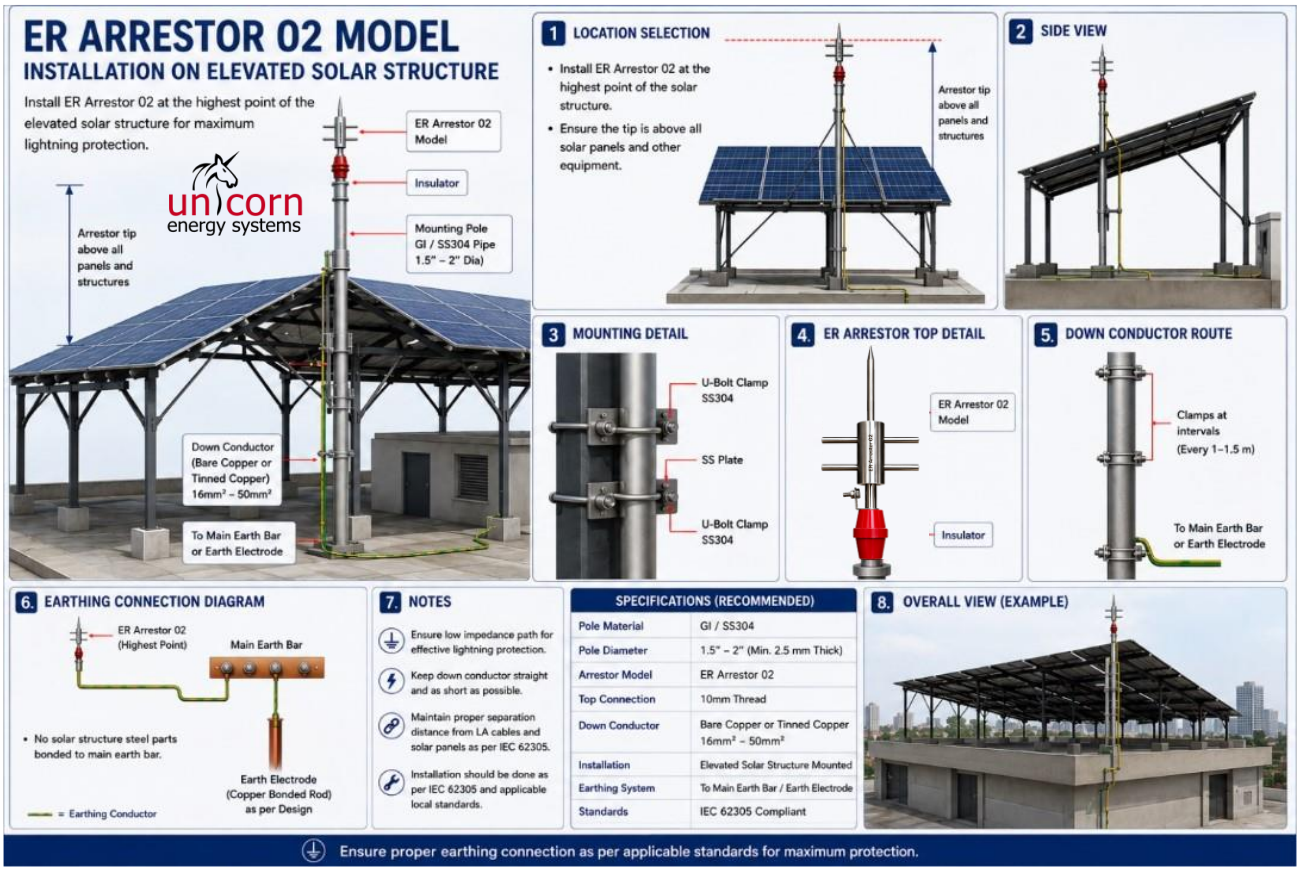
NOTES

- Ensure the entire tower, equipment and cable trays are properly bonded to the main earthing system.
- Use low impedance path for earthing for effective lightning protection.
- Installation should be done as per IEC 62305 and applicable local standards.

SPECIFICATIONS

Pole Height	10 FT
Pole Diameter	2 Inch
Base Plate Size	8" x 8"
Top Bolt	10mm Thread
Material	SS / GI
Installation	Telecom Tower Mounted
Application	Telecom Towers, Masts, Buildings, Industrial Structures
Standards	IEC 62305 Compliant

Ensure proper earthing connection as per applicable standards for maximum protection.

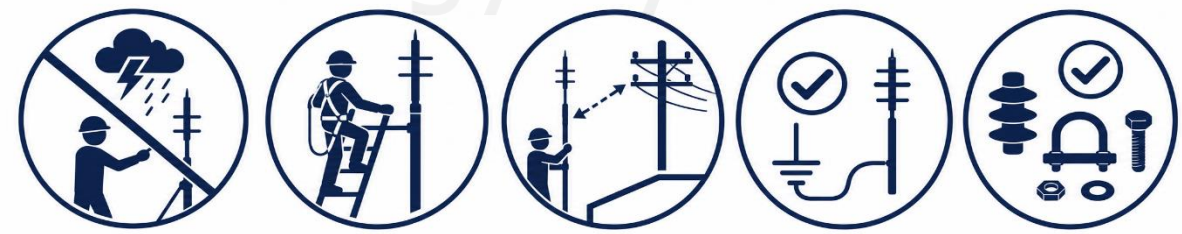


13. Safety Precautions

The following precautions should be observed by installers and maintenance personnel when handling, installing, or inspecting the ER Arrestor-02®:

13.1 Installation Safety

- Never install, remove, or work on the terminal, pole, or associated wiring during a thunderstorm or when lightning activity is present in the area
- Installation at height requires trained personnel using appropriate fall-protection equipment (harness, lanyard, secured ladder or scaffold) in line with local occupational safety regulations
- Maintain safe clearance from overhead power lines, telecom cabling, and other live services while positioning the pole and terminal
- Confirm that a compliant, low-impedance earth-termination system is installed, bonded, and tested before the air terminal is brought into service
- Use only the manufacturer-supplied insulator, clamps, and fasteners; do not substitute non-rated hardware, as this can compromise the insulation rating and mechanical strength of the assembly



13.2 Handling Precautions

- The terminal has a sharp pointed tip — use cut-resistant gloves when unpacking, carrying, or positioning the rod to avoid puncture injury
- Do not drill, cut, weld, or otherwise modify the terminal shaft or insulator, as this may void the tested insulation and impulse performance
- Inspect the insulator for cracks, chips, or surface contamination before installation; do not install a visibly damaged insulator

13.3 Ongoing Inspection & Maintenance

- Carry out a visual inspection of the terminal, insulator, pole, and earth bonding connections at least once a year, and ideally before the monsoon/storm season
- Check for corrosion, loose fasteners, or physical damage to the terminal tip and cross-arms after any reported strike event
- Re-verify earth resistance values periodically as part of the site's routine electrical maintenance program

14. Independent Test Certification

ER Arrestor Model 02 is High Voltage Laboratory Tested

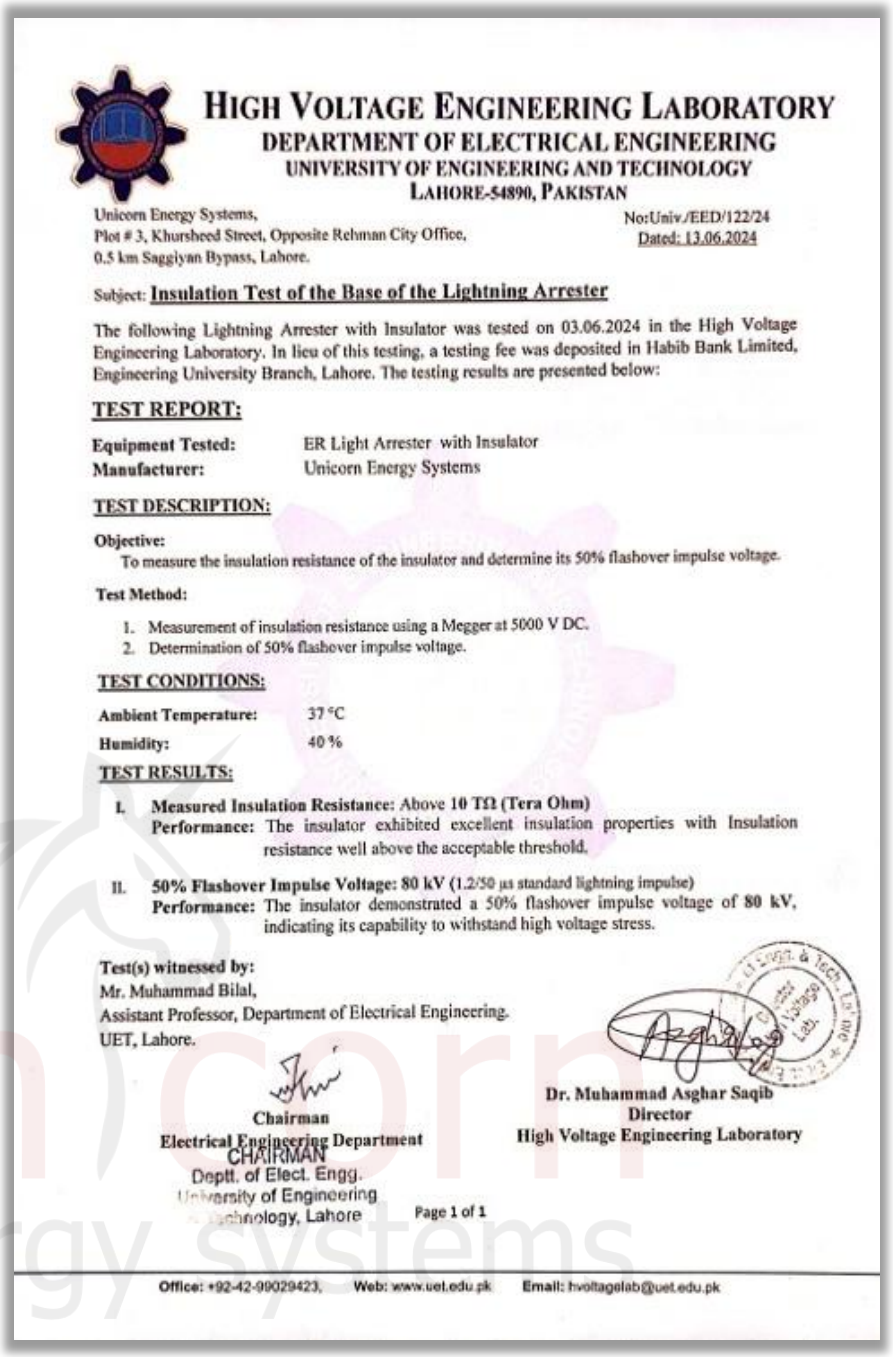
The ER Arrestor 02 with Insulator has been laboratory tested at the High Voltage Engineering Laboratory, UET Lahore. Test results confirmed:

Insulation Resistance: >10 TΩ

50% Flashover Impulse Voltage (U50): **80 kV (1.2/50 µs)**

Impulse Conduction Test: Successfully passed 10 impulses at **110 kV (1.2/50 µs)**

These results demonstrate excellent electrical insulation performance and reliable operation under high-voltage lightning impulse conditions



HIGH VOLTAGE ENGINEERING LABORATORY
DEPARTMENT OF ELECTRICAL ENGINEERING
UNIVERSITY OF ENGINEERING AND TECHNOLOGY
LAHORE-54890, PAKISTAN

Unicorn Energy Systems,
Plot # 3, Khursheed Street, Opposite Rehman City Office,
0.5 km Saggiyan Bypass, Lahore.

No:Univ./EED/122/24
Dated: 13.06.2024

Subject: **Insulation Test of the Base of the Lightning Arrester**

The following Lightning Arrester with Insulator was tested on 03.06.2024 in the High Voltage Engineering Laboratory. In lieu of this testing, a testing fee was deposited in Habib Bank Limited, Engineering University Branch, Lahore. The testing results are presented below:

TEST REPORT:

Equipment Tested: ER Light Arrester with Insulator
Manufacturer: Unicorn Energy Systems

TEST DESCRIPTION:

Objective:
To measure the insulation resistance of the insulator and determine its 50% flashover impulse voltage.

Test Method:

1. Measurement of insulation resistance using a Megger at 5000 V DC.
2. Determination of 50% flashover impulse voltage.

TEST CONDITIONS:

Ambient Temperature: 37 °C
Humidity: 40 %

TEST RESULTS:

I. **Measured Insulation Resistance:** Above **10 TΩ (Tera Ohm)**
Performance: The insulator exhibited excellent insulation properties with Insulation resistance well above the acceptable threshold.

II. **50% Flashover Impulse Voltage: 80 kV** (1.2/50 µs standard lightning impulse)
Performance: The insulator demonstrated a 50% flashover impulse voltage of **80 kV**, indicating its capability to withstand high voltage stress.

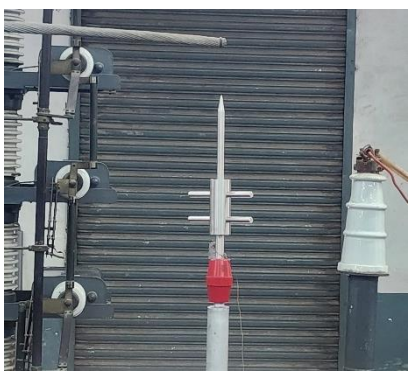
Test(s) witnessed by:
Mr. Muhammad Bilal,
Assistant Professor, Department of Electrical Engineering.
UET, Lahore.

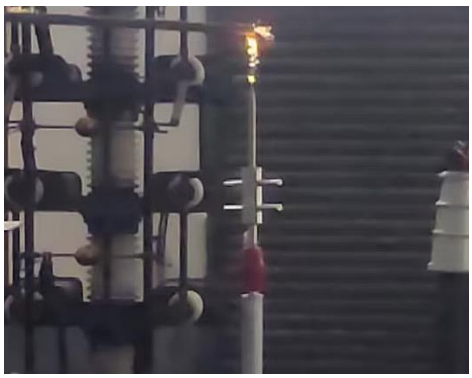
Chairman
Electrical Engineering Department
CHAIRMAN
Deptt. of Elect. Engg.
University of Engineering
Technology, Lahore

Dr. Muhammad Asghar Saqib
Director
High Voltage Engineering Laboratory

Page 1 of 1

Office: +92-42-99029423, Web: www.uet.edu.pk Email: hvoltagelab@uet.edu.pk





See detail test video on YouTube

15. Standards & Compliance

ER Arrestor-02® is designed and manufactured with reference to internationally recognized lightning protection standards, including **IEC 62305** (Protection Against Lightning) and **EN 50164** (Lightning Protection Components).

16. Safety & Handling

- **Handling —** handle with care during installation to avoid damage to the terminal tip and insulator base; use appropriate lifting and mounting equipment for elevated installation.
- **Storage —** store in the original carton, in a dry, low-humidity, well-ventilated area, away from direct sunlight and corrosive chemicals or fumes, at a recommended storage temperature of 5°C to 40°C; store the terminal horizontally, supported along its length, to prevent the pointed tip from bending or being damaged.
- **Disposal —** primarily constructed from stainless steel (SS-304); dispose of or recycle in accordance with local regulations at end of service life.
- **Full safety data —** refer to the product Material Safety Data Sheet (MSDS) for complete handling and material safety information.

17. Shelf Life

ER Arrestor-02® has no defined shelf life under proper storage conditions. As a stainless-steel (SS-304) air-termination device, it is not subject to material degradation from storage; however, it should be kept in its original packaging, protected from physical damage and prolonged moisture exposure, prior to installation.

19. Warranty

Unicorn Energy Systems warrants that **ER Arrestor-02®** is free from manufacturing defects and meets the technical specifications stated in this datasheet at the time of dispatch. This warranty covers material and manufacturing quality only.

The protection radius and performance of the installed lightning protection system depend on multiple site-specific factors — including installation height, structure geometry, surrounding terrain, and compliance with recommended installation guidelines — which are outside the manufacturer's control and cannot be guaranteed by the product alone. Accordingly, this warranty does not extend to protection performance, strike interception outcomes, or claims arising after final site inspection and client acceptance of the installed system.

Any claim under this warranty must be raised prior to installation, accompanied by proof of purchase and storage in accordance with this datasheet.

OUR TRUSTED CLIENTS

About Unicorn Energy Systems

Unicorn Energy Systems is a Lahore-based engineering company and Pakistan's first dedicated **manufacturer** of electrical earthing chemicals. Founded on the principle of delivering **internationally-benchmarked** earthing and lightning protection solutions to the local market, the company designs, manufactures, and supplies a complete range of **products** — including ground enhancement materials, conductivity enhancement compounds, ESE and conventional lightning arrestors, earthing electrodes, and solar PV solutions. Beyond manufacturing, Unicorn Energy Systems also provides **specialized engineering services**, including solar installation **inspection and audits**, **thermal imaging** of solar and electrical installations, **lightning arrestor protection radius design**, and **earthing material design consultancy** tailored to specific project requirements.

Every product and service is developed with reference to recognized international standards such as **IEC 62305**, **IEC 62561-7**, and **NEC 250**, and is independently verified through testing at accredited laboratories including the High Voltage Engineering Laboratory at the **University of Engineering & Technology (UET), Lahore**.

Unicorn Energy Systems serves **residential**, **commercial**, and **industrial** clients across Lahore, Islamabad, Rawalpindi, Karachi, Multan, Gujranwala, Raiwind, and Kasur, and has been trusted by leading national organizations including Pakistan Railways, PTCL, the Pakistan Air Force, Frontier Works Organization (FWO), Sui Northern Gas Pipelines Limited (SNGPL), and Mughal Steel. Backed by in-house engineering expertise and a commitment to quality, safety, and reliability, Unicorn Energy Systems continues to advance the standard of electrical earthing and lightning protection practice in Pakistan."

Contact & Support

Website: www.unicornenergysystems.com

Phone: +92 335 4946 498

WhatsApp: +92 335 4946 498

Email: unicornenergysystems@gmail.com

Address: Saggiyan Industrial Area, Lahore, Pakistan

Disclaimer: Specifications, features, and images in this datasheet are subject to change without prior notice. This document is intended for general product reference; always consult project-specific engineering guidelines and the product MSDS before installation.

unicorn
energy systems

ELECTRICAL EARTH SOLUTIONS

RELIABLE • DURABLE • EFFECTIVE

HIGH RELIABILITY
Consistent performance in all soil conditions

CORROSION RESISTANT
Protects electrodes and extends system life

EFFECTIVE PROTECTION
Ensures safe and efficient earthing system

LONG LASTING PERFORMANCE
Stable & maintenance free for 25+ years

COST EFFECTIVE
Improves earthing without extra electrodes

IDEAL FOR

BUILDINGS | SOLAR SYSTEMS | INDUSTRIAL PLANTS | TRANSFORMER STATIONS | TELECOM TOWERS | IT & ELECTRONIC EQUIPMENT

www.unicornenergysystems.com