



## Characteristics and application

GROMOSTAR - a lightning rod with early streamer emission PDA (fr. paratonnerre à dispositif d'amorçage) is the main element of a lightning protection system that protects a building against damage and fire resulting from lightning discharges, whose task is to draw the discharge directly from a storm cloud. The main feature characterizing this product is the method of operation consisting in earlier generation of ionization compared to other elements of the protected building, which results in sending the lightning current directly to the lightning rod and then a discharge conduit brings it down to the ground.

GROMOSTAR 35T is equipped with a verifiable system that allows you to check the technical condition, including electrical parameters of the lightning conductor without the need to disassemble it. The verifiable system located inside the metal base of the lightning rod is activated by using an external device - the lightning rod tester. The verifiable system, being electrically isolated and neutral to the system initiating the leader's development, does not interfere with the lightning rod's operation.

GROMOSTAR 35T is used in the protection of people and property against the effects of direct lightning strike in the following facilities: civic buildings, industrial, residential and open areas.

## Properties

- greater effectiveness in relation to the classic Franklin head confirmed by laboratory tests,
- proven, durable design that can withstand multiple lightning strikes,
- simple installation and maintenance - minimal impact on the roofing,
- lower installation and subsequent operation costs compared to traditional lightning protection systems,
- the applied technical solution protected by patent in numerous countries worldwide,
- production process subject to the requirements of ISO9001 and Qualifoudre INERIS,
- product tested in accordance with NF C17-102 (09/2011) and PN-EN 50164-1:2010 in high voltage laboratories: Institute of Plasma and Laser Physics and Laser Microfusion in Warsaw, SIAME at the University of Pau (France) and Building Materials Laboratory at The Building Research Institute in Warsaw,
- certificate of the the Institute of Power Engineering in Warsaw confirming product conformity with PN-EN 62561-1 standard.

## Principle of operation

In stormy conditions, when the leader of the lightning discharges from the cloud towards the ground, there is a sharp increase in the electric field around the front edge of the leader.

Blades of metal and semiconductor components become a source of upwards leaders developing towards the front edge of a descending lightning bolt. The GROMOSTAR lightning rod produces an upwards leader (ionization process) sooner than the other elements in its protected zone. Electrical charges accumulate on the outer cover of the lightning rod and the electric potential of the cover increases in relation to the ground potential.

The flashover on the internal magneto causes an electric current of several A to flow in the initiating system, giving rise to an upwards leader on the blade. The upwards leader, which is supported by the initiating system and the inflow of electric charge from the ground and from metal structures electrically connected to the mast, moves towards the descending leader of the lightning discharge. As the upwards and downwards leaders approach each other, there is a strong current increase in the initiating system leading to flashover in the external spark gap.

The short circuit created between the cover and the base directs the atmospheric discharge current to the ground, bypassing the system initiating the development of the leader.

After intercepting a lightning strike, the initiating system can be checked by using a TP-T type lightning tester or a lightning strike recorder with PLW-03AT tester function.

## Testing:

The evaluation of lightning protection efficiency in the verifiable version of GROMOSTAR T is based on the verification of electrical parameters of the system initiating the leader's development. During the test, which lasts approximately 10 seconds, the tester powers the electromechanical system, which moves the measuring electrodes to provide an electrical connection between the leader development initiator and the tester and then measures the electrical parameters of the initiator.

The electrical control and measurement connection between the tester and the lightning rod is two-wire.

## Technical data

Compliance with standards: NF C17-102 (09/2011), PN EN 62561-1

<b>Advance time <math>\Delta T</math> [<math>\mu s</math>]:</b>	35
<b>Dimensions [mm]:</b>	mounting: M16x30, length: 479, diameter $\varnothing 50,8$
<b>Weight [kg]:</b>	2,1
<b>Material:</b>	stainless steel 304 (Ni)
<b>Packaging:</b>	cardboard 550x140 x 80 mm
<b>Including:</b>	8 m cable to tester

## Principles of assembly

The tester cable should be routed through the inside of the lightning rod mast casing. The M3 ring end of the cable should be attached to the output of the GROMOSTAR T lightning rod tester unit. The other end of the cable should be plugged into the TP-T tester side interface socket or PDA socket of the lightning rod recorder with PLW-03AT tester function.

The GROMOSTAR T lightning rod should be screwed into the M16 sleeve of the lightning mast; tight the nut with a size 32 wrench, and then lock with the M5 Allen counter screw at the top of the mast. The lightning conductor on the lightning mast can be attached to a rigid building structure (chimney, wall, steel structure) using mast holders or placed in a tripod with a concrete base adapted for this purpose (flat roof surface). The lightning conductor placed on the mast must stand at least 2m above all elements installed on the building, e.g. antennas, air conditioners, superstructures. Design and installation of lightning protection using GROMOSTAR lightning rods should be carried out in accordance with the requirements of NF C17-102 (09/2011). The installation should be entrusted to a professional. The manufacturer is not liable for damages resulting from incorrect installation. The GROMOSTAR lightning protection system protects the building against the effects of a direct lightning strike. To ensure full protection of the building, including electrical installations and signal transmission, against the effects of lightning, surge protection should be used.

## Protection zone radius

According to the NF C17-102 (09/2011) standard, the radius of the GROMOSTAR lightning protection zone R is related to the  $\Delta T$  value, protection levels I, II, III, IV and the height H of the lightning rod.

$\Delta T$ - advance time value (determined on the basis of PDA lightning rod effectiveness tests carried out in a high voltage laboratory)

H- lightning rod elevation over protected elements (required  $H \geq 2m$ )

R- radius of the protected zone

$\Delta T$ [ $\mu s$ ]	Type	Level of protection (effectiveness)	Protection radius R (m) for height H (m)						
			H=2	H=3	H=4	H=5	H=7	H=10	H=20
35	GROMOSTAR 35T	I (98%)	23	30	36	49	50	51	52
		II (95%)	35	35	44	57	58	58	62
		III (90%)	27	40	52	63	67	58	73
		IV (80%)	30	47	64	73	75	77	82

For facilities requiring protection at 1++ (99.9%) and for facilities posing a threat to the environment (specific hazard factor  $hf=20$  according to EN 62305-2) or that may cause environmental contamination ( $hf = 50$  according to EN 62305-2), the values of the protection radius should be reduced by 40%.

**Guarantee period:** 10 years

