Advanced Technology of Protection from Lightning

WAT Franklin®

E.S.E. LIGHTNING CONDUCTORS

Ab-TROM s.r.o.

Lightning Protection | Surge Protection | Grounding Solutions

Advanced Technology of Protection from Lighting

Working principle of the gripper

When a lightning is approaching to the earth, a corona discharge is going to be created on the lightning conductor. In case of a classic lightning rod, this upward corona discharge starts its propagation in direction of an upward main branch after a long period of its transient phase. An initialization advancing time of the WAT Franklin+ gripper allow to shorten time necessary for formation and continuous propagation of the upward discharge which is connected with higher efficiency of lightning trapping in reference to the classic lightning rod.

Thanks to its initialization advancing time, the WAT Franklin+ gripper radiates a high-voltage signal of the exact determined and controlled frequency and amplitude. Its efficiency is secured by the rapid formation and propagation of the upward main branch under space charge reducing around its tip.

The WAT Franklin+ gripper is self-sustaining. Its energy is obtained from a surrounding electrical field which is presenting during a storm (10 to 20 kv/m). The initialization advancing time shall be trigged as soon as the surrounding electrical field exceeds its peak effective value which corresponds with minimal thunder-stroke risks.

Functions of the WAT Franklin+ tip are following:

1. It emits the corona discharge consisting of high-voltage impulses
2. It entraps the lightning and leads it to the earth

The energy necessary for charging of electric equipments situated inside the gripper is being "sucked" by means of a metal jacket of the gripper cylinder. The metal cylinder contains electronic equipment of the system which generates corona discharges by means of a pair of auxiliary control electrodes. A rod at the lower gripper end is provided with thread M20 intended for connection of the gripper with basic rods.

By means of the WAT Franklin+ gripper testing at independent high-voltage laboratories it has been proved that the active lightning conductor efficiency is in accordance with standard STN 341391, NF C 17-102 and UNE 21 186. Issued certificates confirm these facts.

Protected zones

Rp: It is a radius of protection coverage on horizontal level situated in vertical distance h from the gripper tip [m]

h: It is a gripper tip height above a protected structure (protected structures) [m]

Basis Parameters of the WAT Franklin+ Grippers

ΔT [μs]	Type	Cylinder diameter / Total gripper length [mm]
10	WAT Franklin+ 421H	Ø70 / 330
20	WAT Franklin+ 421H	Ø70 / 330
30	WAT Franklin+ 422H	Ø70 / 330
45	WAT Franklin+ 423H	Ø70 / 330
60	WAT Franklin+ 425H	Ø70 / 330

Mathematics and physics description of the WAT Franklin+ gripper

During a storm in the open air under fulfillment of given space conditions, the WAT Franklin+ gripper shall radiate an upward signal as the first. The time obtained in this way compared with the classic lightning rod under the same conditions is called an initialization advancing time gain ΔT. A gain or loss of the initialization advancing time is determined directly from laboratory test results.

Protected zones (see the table) with following item meanings:

Rp: It is a radius of protection coverage on horizontal level situated in vertical distance h from the gripper tip [m]

H: It is a gripper tip height above a protected structure (protected structures) [m]

D: It is an impact distance with following values:
20 m for rate of protection LPS I
30 m for rate of protection LPS II
45 m for rate of protection LPS III
60 m for rate of protection LPS IV

ΔL = 1 E6 . ΔT (initialization advancing time) [m]

Rp = √ h (2D + h) + ΔL (2D + ΔL) (pro h > = 5 m)

Rp = h x Rp(5)/5

For h « 5 m it shall be necessary to use the table of radii of protection from the STN 34 1391 standard and from the Z3 (05/2008) revision.

Primary Advantages of the Active Lightning Protection

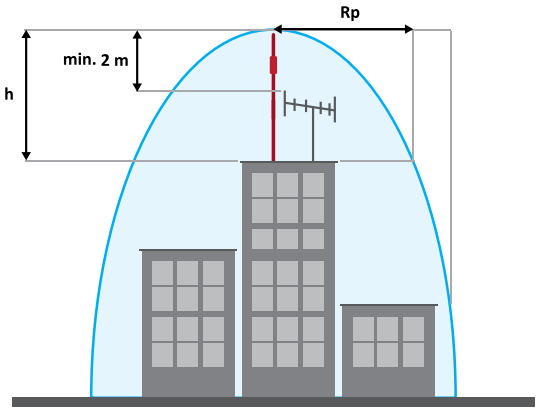
They consist in prevention of by-discharges (so called "little brothers") during a thunder-stroke, minimal roof covering and building structure disturbance, trouble free composition of conductors and down leads into the advanced building architecture, high protection degree of both electrical and electronic equipment of buildings, minimal repair, maintenance and inspection costs, less complicated groundwork in citizen build-up areas.

Typical Applications

WAT Franklin+ ESE Terminal are the preferred protection method for mega-structures such as distribution warehouses, industrial plants, amusement parks, shopping malls, sports arenas, golf courses, churches, educational institutions, houses and other large area structures. ESE Terminal are tested to certify gain in triggering time as per STN 341391, NFC 17-102 and UNE 21 186.

Features & Benefits

- Patented Technology
- STN 341391, NF C 17 - 102 and UNE 21 186 tested and certified
- Lightweight and low wind loading
- Reliable performance in all weather conditions
- Suitable for corrosive environments
- Available in five models for numerous applications
- Economical and easy to install
- No internal electronics or power supply



Radius of Protection of the WAT Franklin+ Grippers

Protection Level LPL = I (D = 20 m)					
WAT Franklin+	W10	W20	W30	W45	W60
ΔT [μs]	10	20	30	45	60
h [m]	Rp [m]				
2	10	14	19	25	31
3	15	22	28	37	47
4	20	29	38	50	62
5	26	37	47	63	78
20 max	30	40	50	65	80

Protection Level LPL = II (D = 30 m)					
WAT Franklin+	W10	W20	W30	W45	W60
ΔT [μs]	10	20	30	45	60
h [m]	Rp [m]				
2	12	17	21	28	34
3	18	26	32	42	51
4	25	34	43	56	69
5	31	43	54	70	86
20	38	49	59	74	89
30 max	40	50	60	75	90

Protection Level LPL = III (D = 45 m)					
WAT Franklin+	W10	W20	W30	W45	W60
ΔT [μs]	10	20	30	45	60
h [m]	Rp [m]				
2	15	20	25	32	38
3	22	30	38	48	58
4	30	41	50	64	77
5	37	51	63	80	97
20	49	60	70	86	102
45 max	55	65	75	90	105

Protection Level LPL = IV (D = 60 m)					
WAT Franklin+	W10	W20	W30	W45	W60
ΔT [μs]	10	20	30	45	60
h [m]	Rp [m]				
2	17	23	28	35	42
3	26	34	42	53	64
4	34	46	57	71	85
5	43	58	71	89	106
20	57	69	80	97	113
60 max	70	80	90	105	120

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Authorised Dealer:

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