Lightning protection system
Early streamer emission air terminal

Power and productivity
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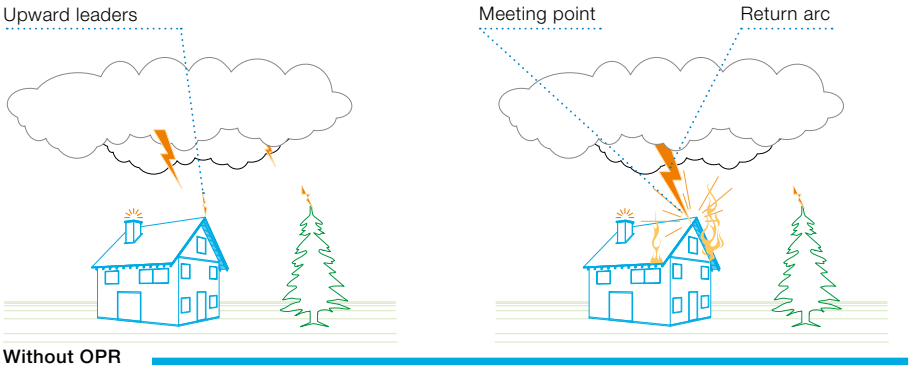
OPR Early streamer emission air terminal

The OPR efficiency (ΔT)

Lightning is one of the most spectacular meteorological phenomena. Generated by the interaction of clouds elements (water and ice), it can kill, injure and damage. The unique efficiency of the OPR Early streamer emission is based on the difference (ΔT), measured in a laboratory, in between the emission time of the OPR and the one from a simple rod. The OPR ESE air terminal is composed of a striking point connected to a down conductor to conduct the lightning to the ground.



Complete autonomy

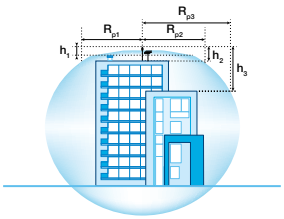
During a storm the ambient electric field may rise from 600 V to 10-20 kV/m. When the electric field reach this level representing a minimum risk for a lightning, the OPR begins to get activated and generates high voltage pulses, helping to create and propagating an upward leader. After a strike on the OPR, the lightning current is driven to ground by the down conductor to the earth termination system.

Radius of protection

The radius of protection (Rp) of the OPR is calculated according to the NF C 17-102 (edition 2011). It depends on the OPR efficiency (ΔT) expressed in micro-seconds. The maximum value for ΔT is 60 µs.

The risk assessment shall be calculated according to the NF C 17-102 Annex A / IEC 62305-2 and will define the protection level (LPL I, II, III or IV) which will be used in the determination of the OPR radius of protection.

	LPL I	LPL II	LPL III	LPL IV
Rolling sphere radius r(m)	20	30	45	60



Rp(h) : Protection radius at a given height (h)
$Rp(h) = \sqrt{2rh - h^2 + \Delta(2r + \Delta)}$ (for $h \geq 5$ m)

For h < 5 m, refer to the table below

h : Height of the OPR tip above the surface(s) to be protected

r(m) : Standardized striking distance

Δ(m) = 10^6 .ΔT (OPR efficiency)

OPR radius of protection

Protection level	I (r = 20 m)			II (r = 30 m)			III (r = 45 m)			IV (r = 60 m)		
OPR	OPR 30	OPR 45	OPR 60	OPR 30	OPR 45	OPR 60	OPR 30	OPR 45	OPR 60	OPR 30	OPR 45	OPR 60
h (m)	Radius of protection Rp (m)											
2	19	25	31	22	28	35	25	32	39	28	36	43
3	29	38	47	33	42	52	38	48	58	43	57	64
4	38	51	63	44	57	69	51	65	78	57	72	85
5	**48**	**63**	**79**	**55**	**71**	**86**	**63**	**81**	**97**	**71**	**89**	**107**
6	48	63	79	55	71	87	64	81	97	72	90	107
8	49	64	79	56	72	87	65	82	98	73	91	108
10	49	64	79	57	72	88	66	83	99	75	92	109
15	50	65	80	58	73	89	69	85	101	78	95	111
20	50	65	80	59	74	89	71	86	102	81	97	113
45	43	65	76	58	75	89	75	90	105	89	104	119
50	40	65	74	57	75	88	75	90	105	89	104	120
55	36	65	72	55	75	86	74	90	105	90	105	120
60	30	65	69	52	75	85	73	90	104	90	105	120

A complete expertise

OPR ordering details

ΔT µs	Description	Type	Order code	Weight kg
30	OPR 30	IMH3000	2CTB899800R7000	2.400
45	OPR 45	IMH4500	2CTB899800R7500	2.400
60	OPR 60	IMH6000	2CTB899800R7100	2.400

Mast to be ordered separately.
Maximum operating temperature: 120 °C.

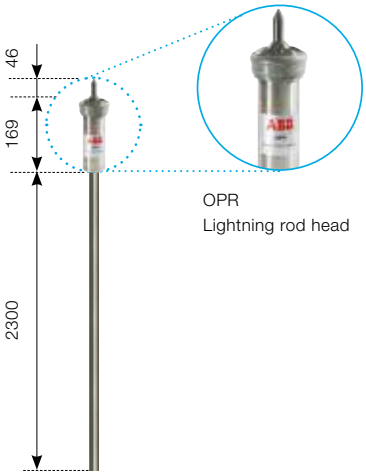
Masts

Height m	Description	Type	Order code	Weight (1 pce) kg
2.3	Stainless steel ESEAT mast Ø 30	MAT3002	2CTH070002R0000	3.000
3.0	Stainless steel ESEAT mast Ø 35	MAT3503	2CTH070011R0000	5.200

To be noted that the MAT3503 needs to be ordered with it screw and fixing kit KFP0035 made of a connecting clamp especially designed for Ø 35 mm mast.

Kit for MAT3503

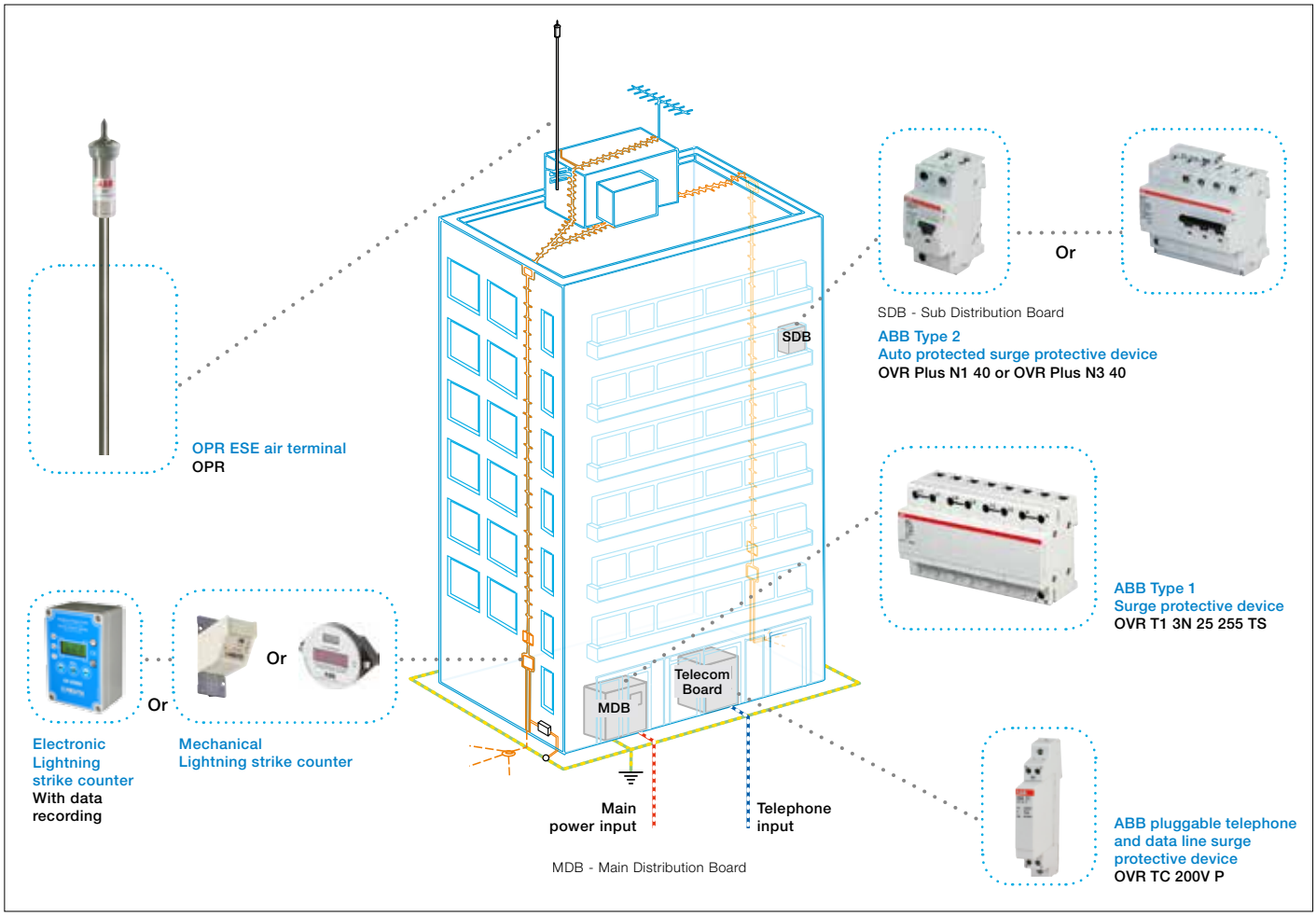
Description	Type	Order code	Weight (1 pce) kg
Screw and fixing	KFP0035	2CTH050027R0000	-



OPR with a stainless steel mast
Ø 30 - L = 2.3 m

Installing / testing

The installation and verification of lightning protection systems using one or more OPR units must be performed in accordance with the manufacturer's recommendations and to the NF C 17-102 standard.



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