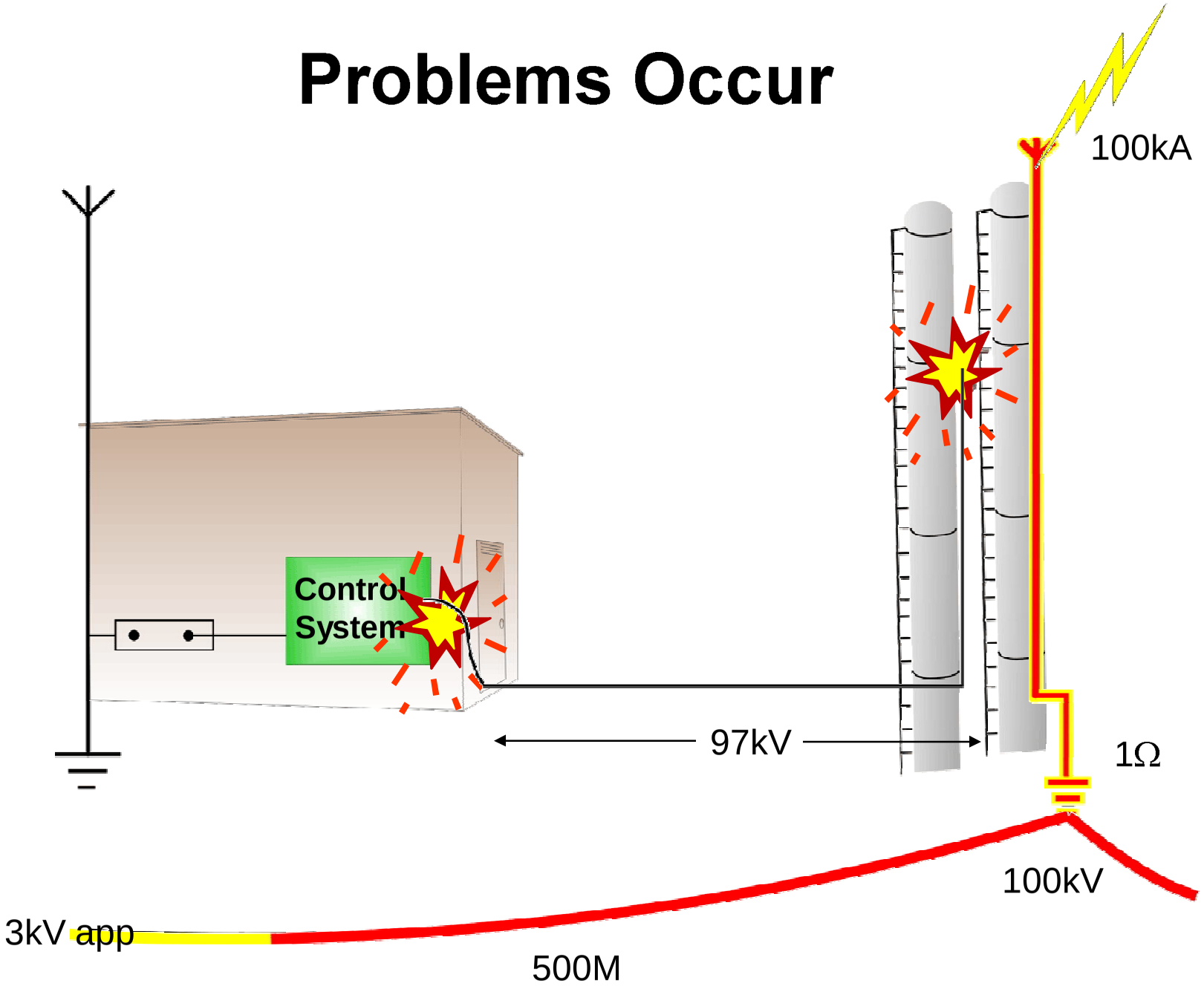
Problems Occur



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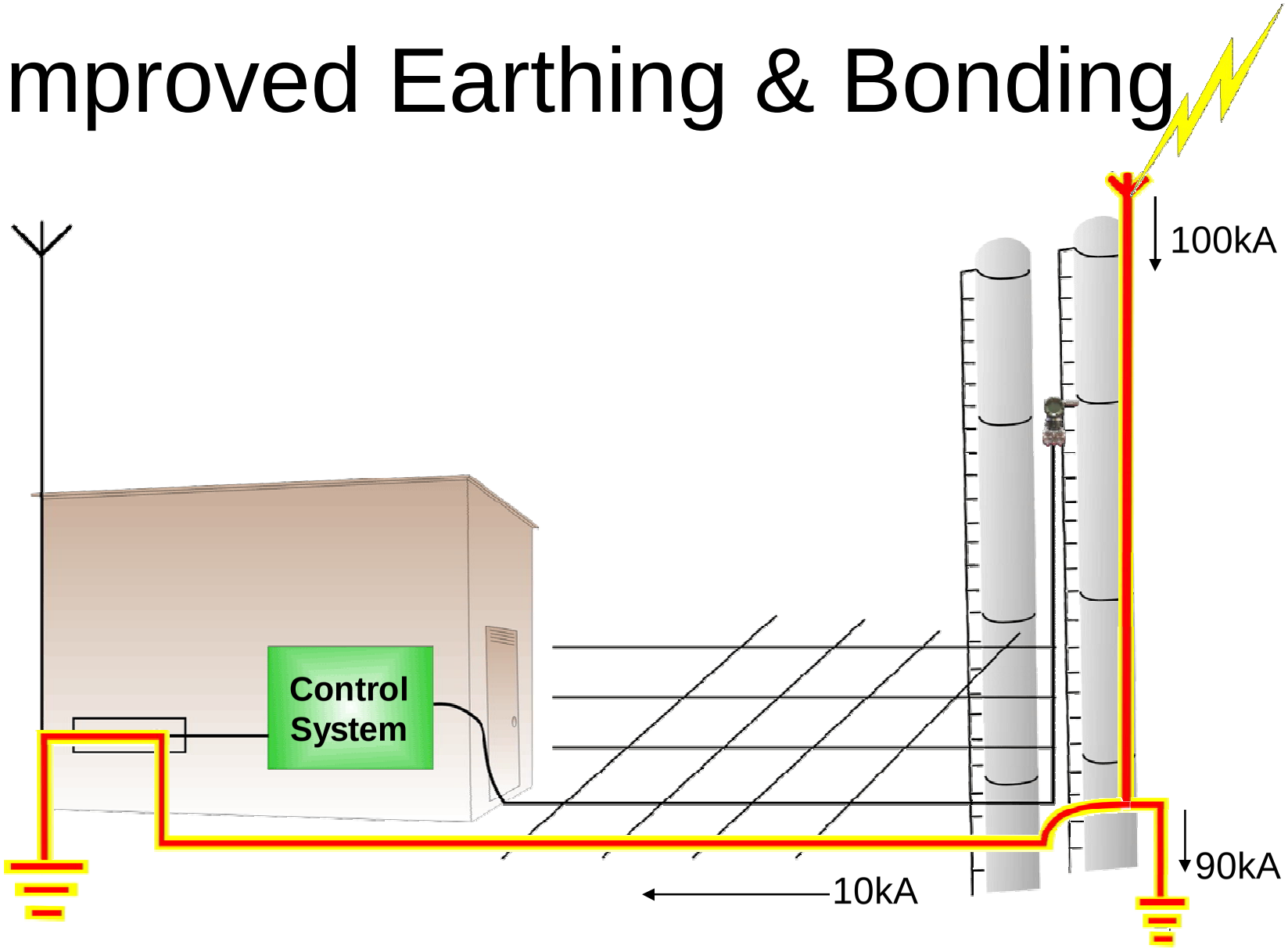
INSPIRING INNOVATIONS

Improved Earthing & Bonding



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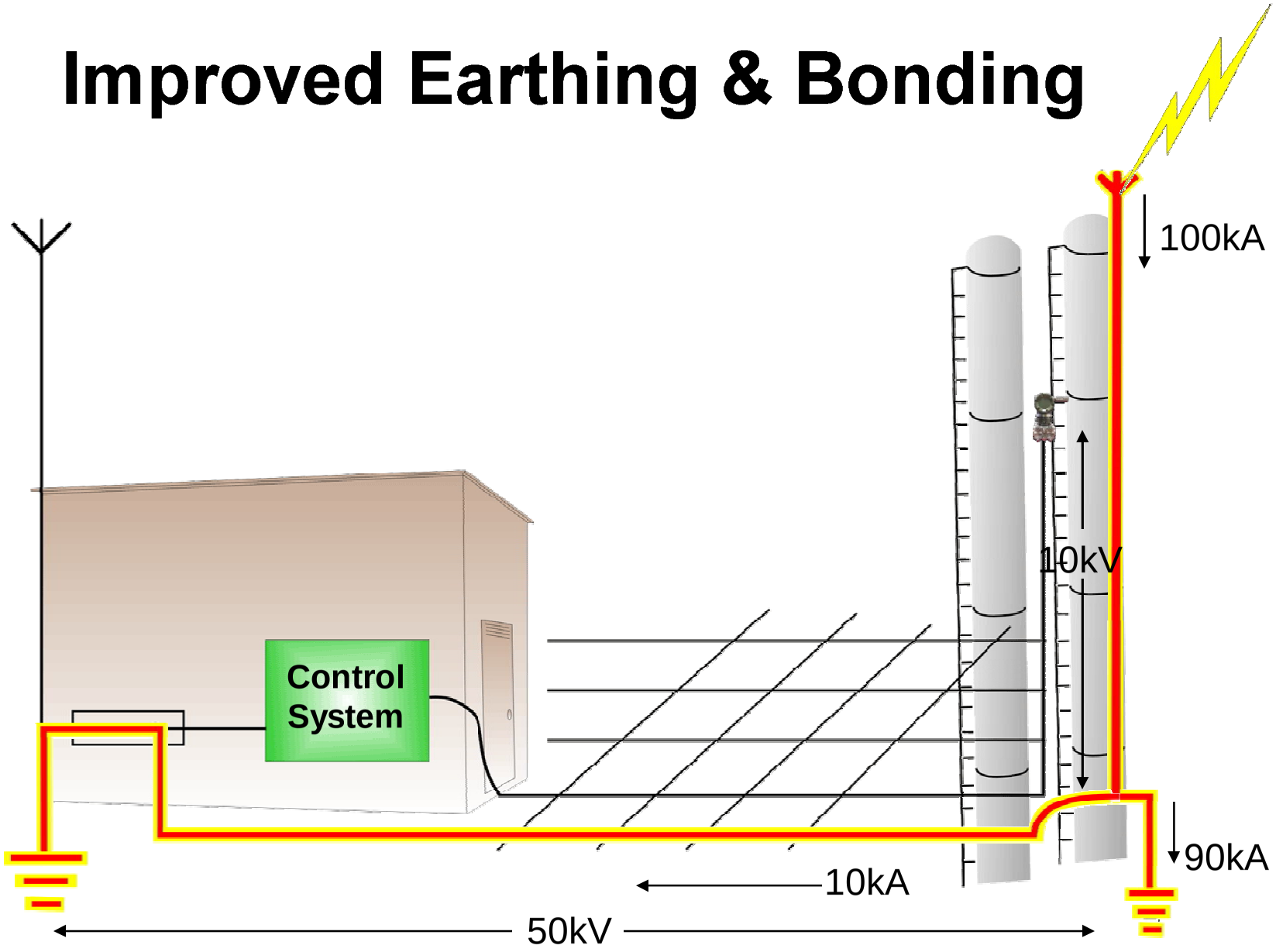
Improved Earthing & Bonding



Better than 97kV; but not good enough?

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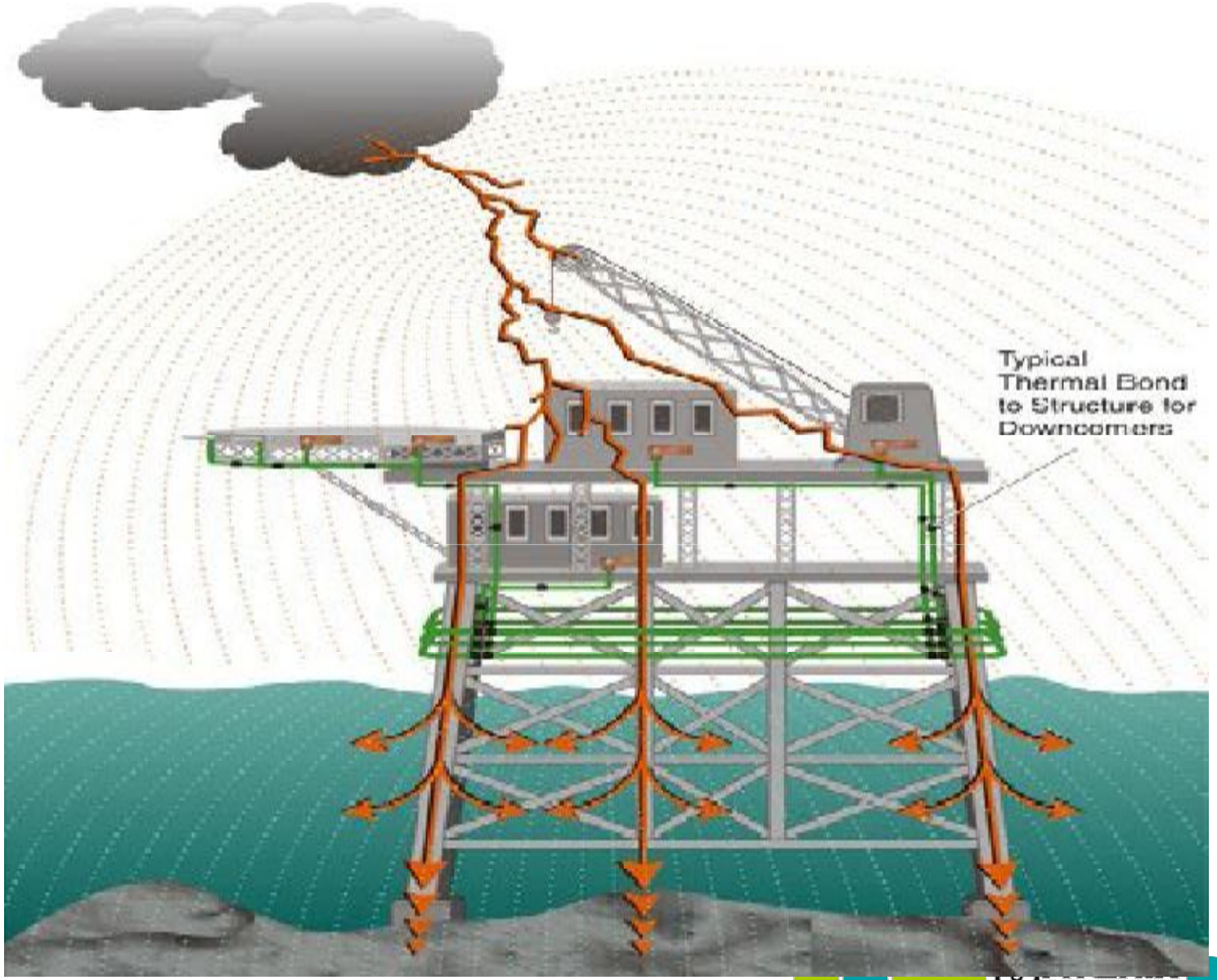
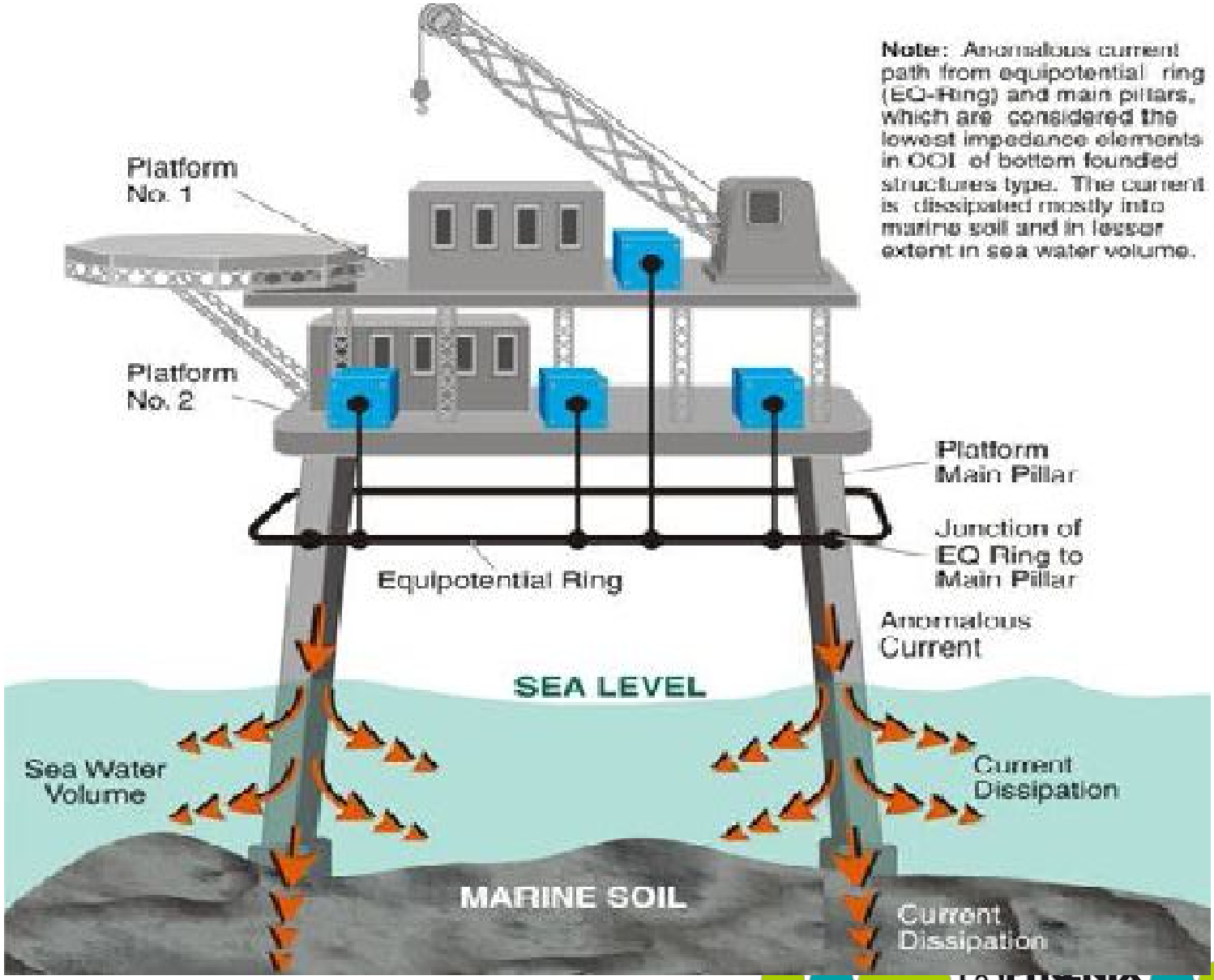
Lightning Effect on Oil Platform



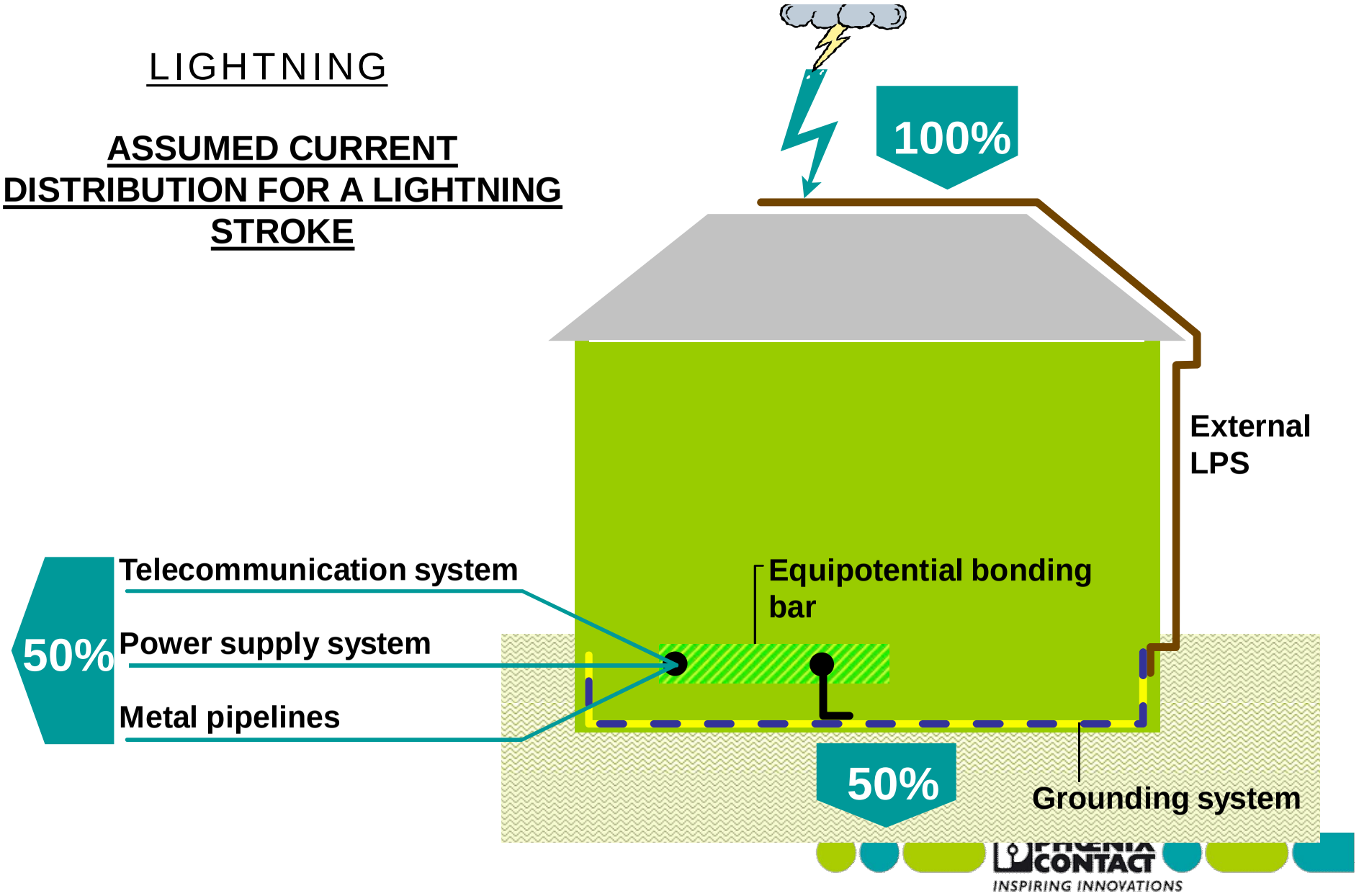
Current Dissipation



Lightning Current Distribution 50% /50%

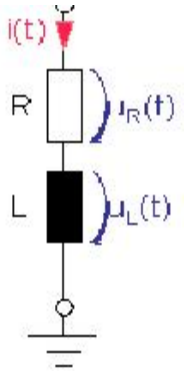
LIGHTNING

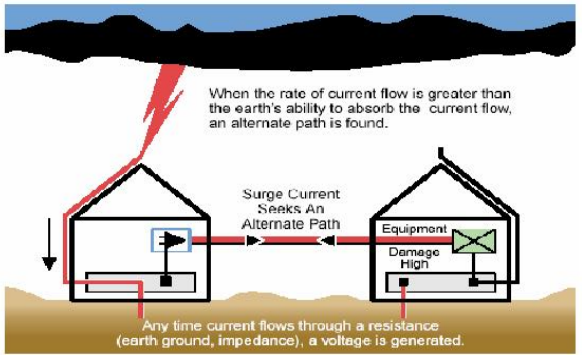
ASSUMED CURRENT DISTRIBUTION FOR A LIGHTNING STROKE



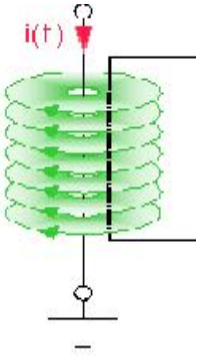
Coupling of Surge

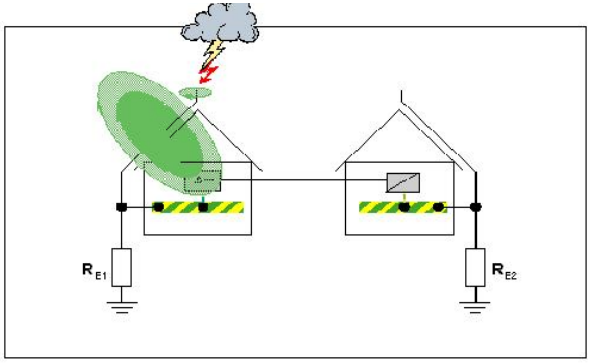
GALVANIC



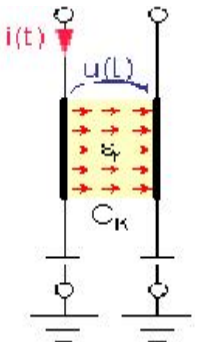


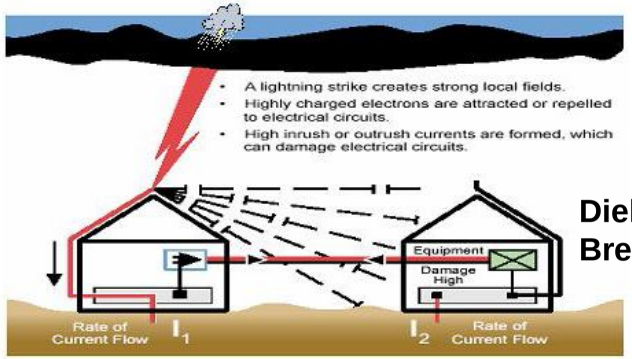
INDUCTIVE





CAPACITIVE





Dielectric Breakdown

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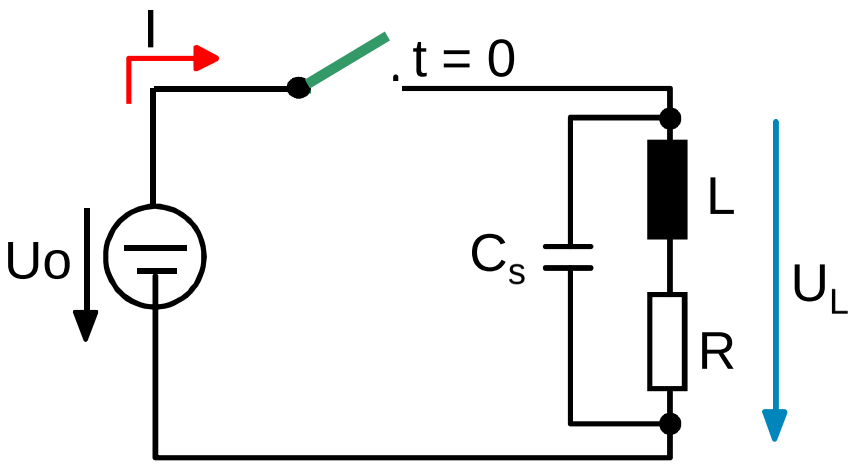
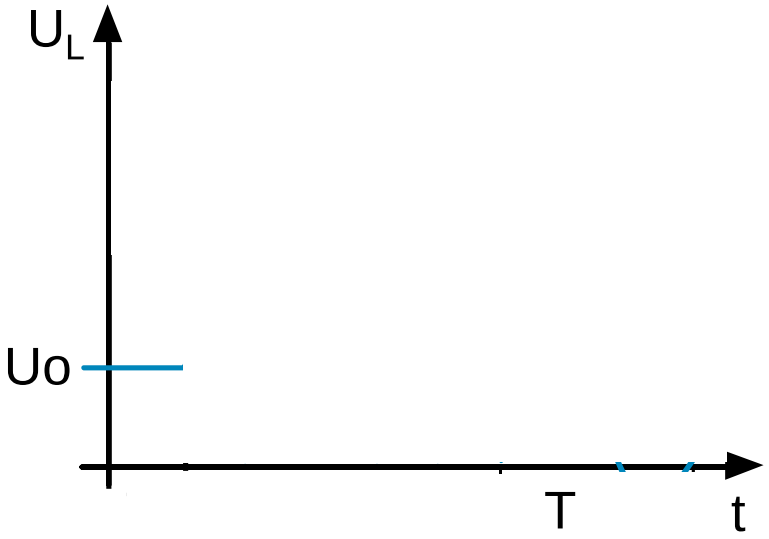
INSPIRING INNOVATIONS

Reasons of Surge Voltages

- lightning electromagnetic pulse (LEMP)
- switching electromagnetic pulse (SEMP)
- electrostatic discharge (ESD)
- nuclear electromagnetic pulse (NEMP)

Switching action





U_o = 24 VDC
I = 46 mA
R = 520 Y
L = 350 mH
C_s = 10 pF

$$U_{max} = \frac{U_0}{R} \cdot \sqrt{\frac{L}{C_S}}; \quad T = 2\pi \cdot \sqrt{L \cdot C_S}$$

$$U_{max} = 8.6\ \text{kV}$$

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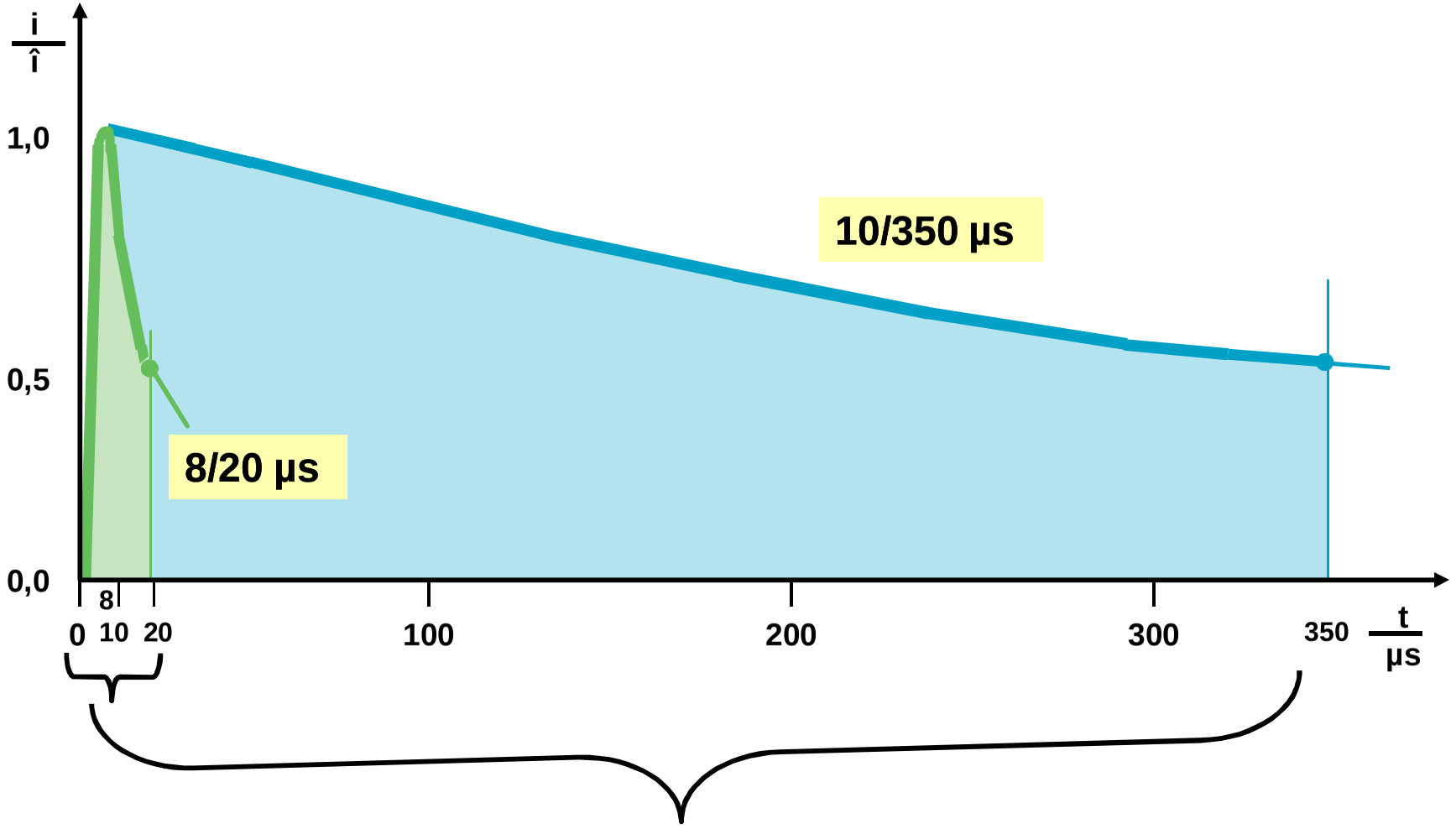
Lightning vs Surge Current - In Relation



10/350 LIGHTNING WAVE CONTAINS MUCH HIGHER ENERGY

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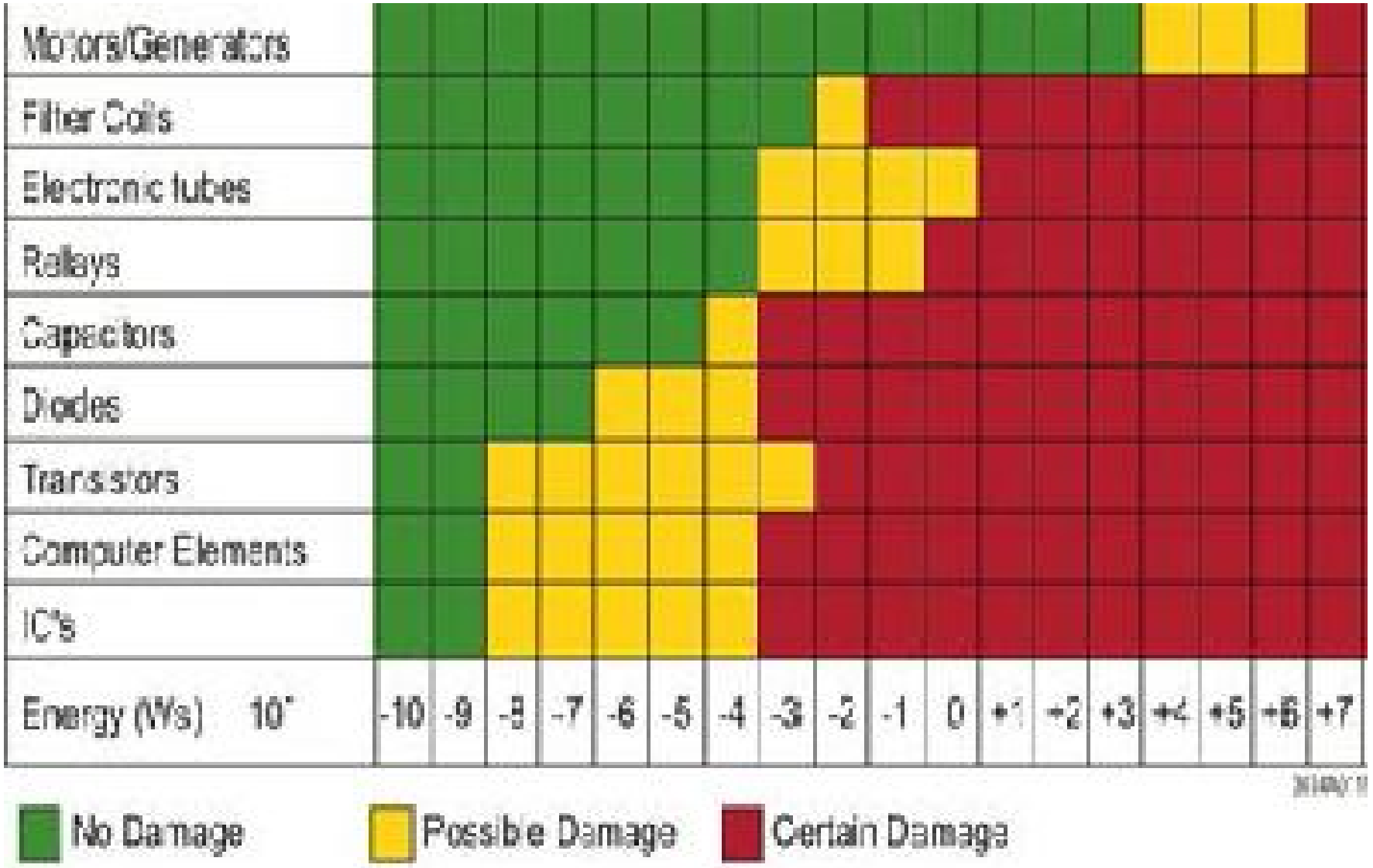
Effect of Surge



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