Symptoms of Surge Voltages

Disruptive Symptoms:

Confused logic, lost files, data stream disruption and/or corruption, system lock-up.

Disruptive effects are
when surges are indu
Communication Lines
process plant.

But are generally blan
software or hardware

Dissipative Symptoms:

Little or no visible damage, but components will not function properly.

"Bad IC's" is usually
diagnosis.

Dissipative effects ar
cumulative result of
stress usually cause
internally generated,
energy, but constant
surges

Destructive Symptoms:

Very visible damage, burnt boards, traces and components. Some components literally blown off the board. Wire insulation melted and metallic parts deformed.

Surely a sign of power surge

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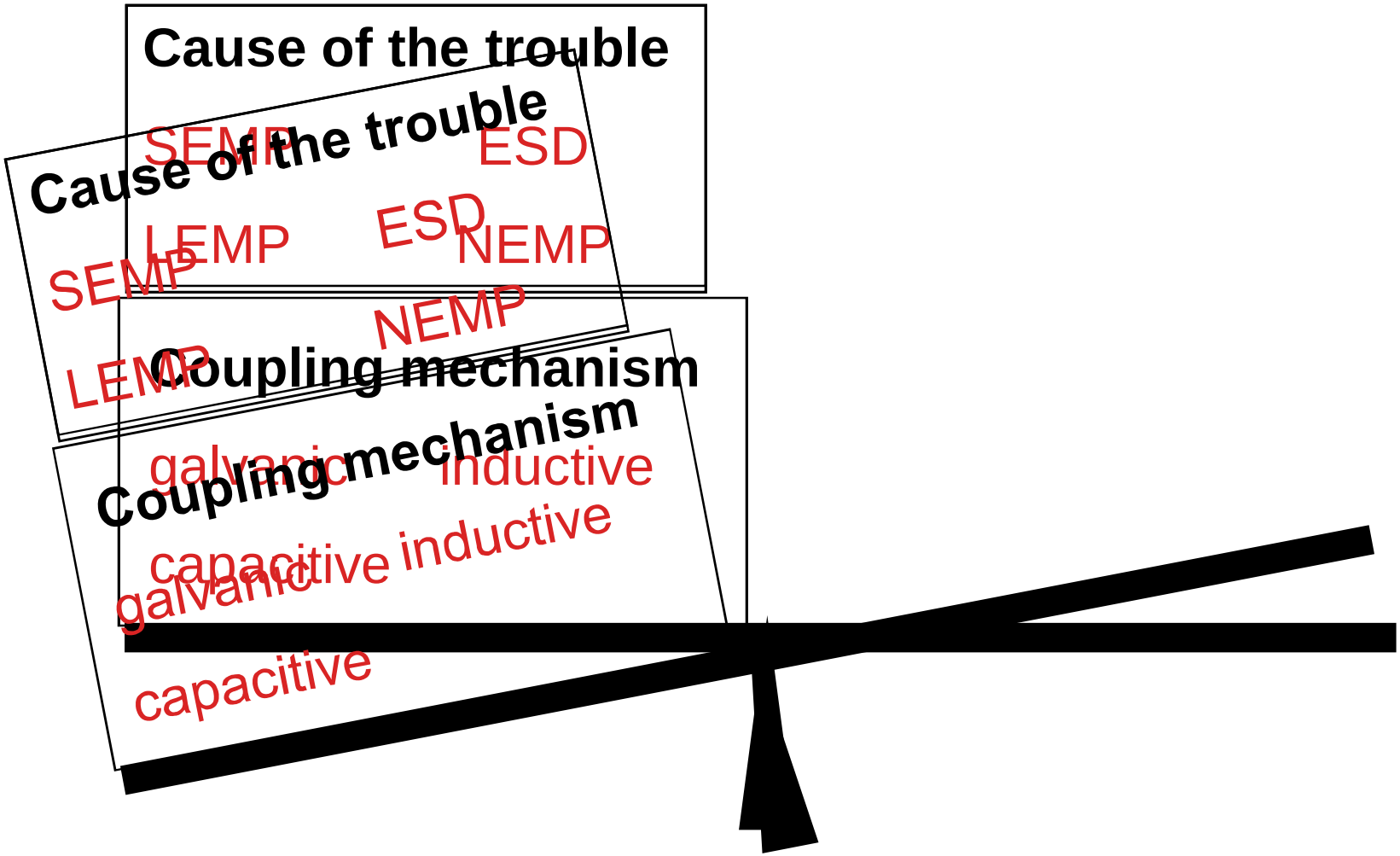
INSPIRING INNOVATIONS

Electromagnetic compatibility (EMC)



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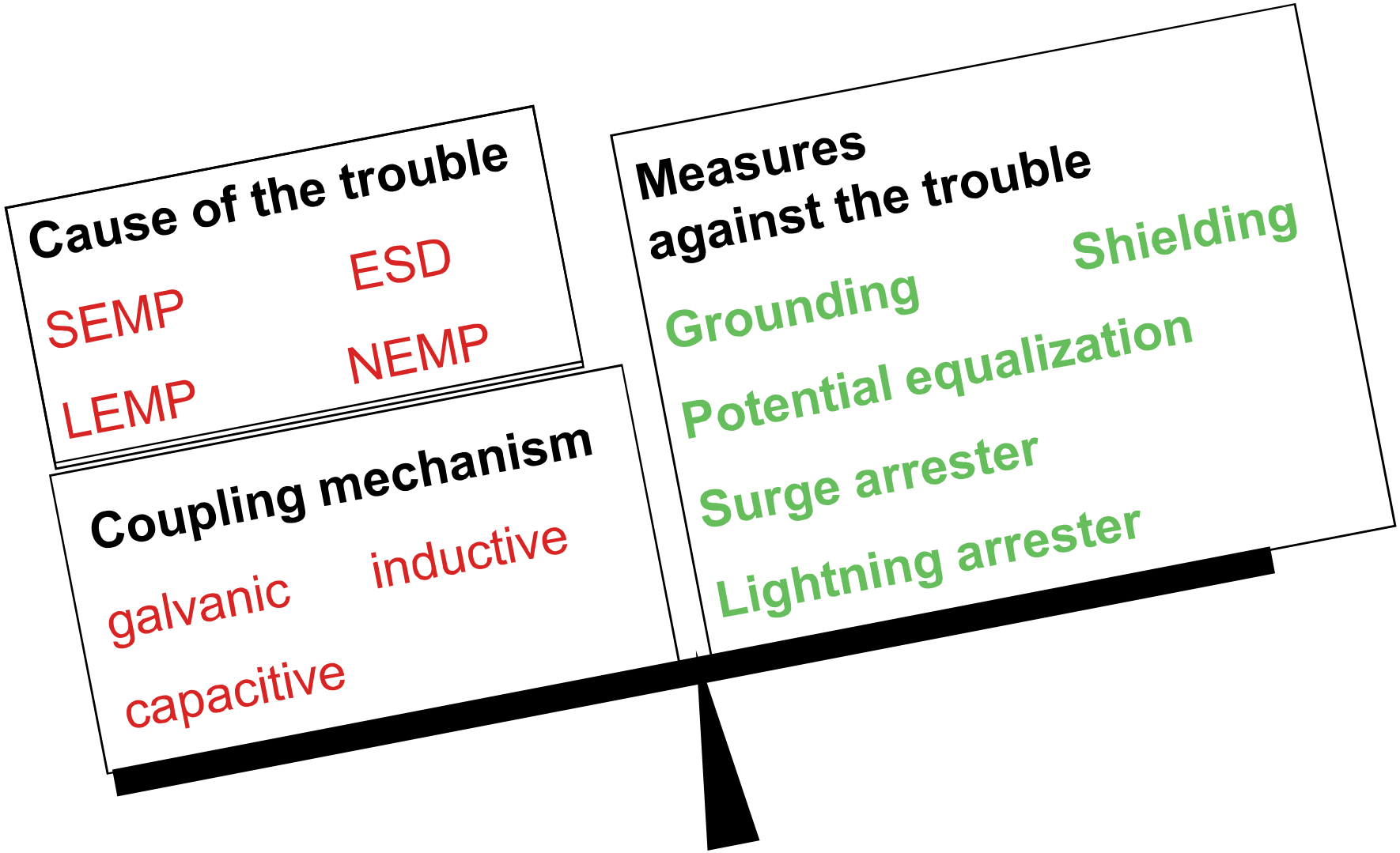
Electromagnetic compatibility (EMC)



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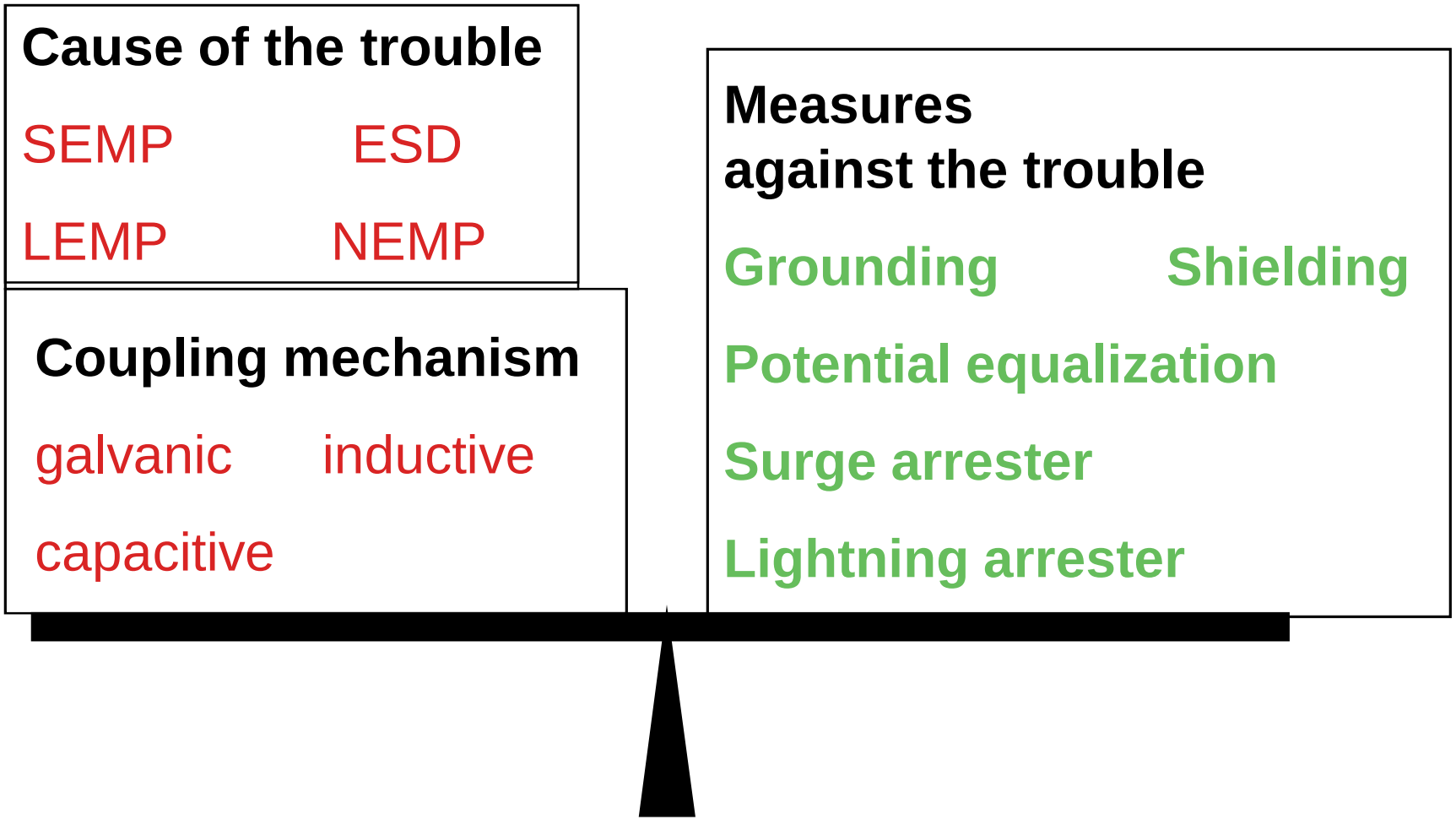
Electromagnetic compatibility (EMC)



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Surge Protection Strategies & Techniques

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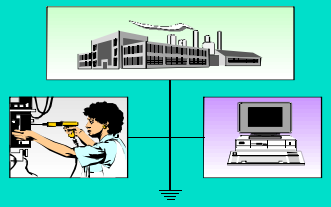
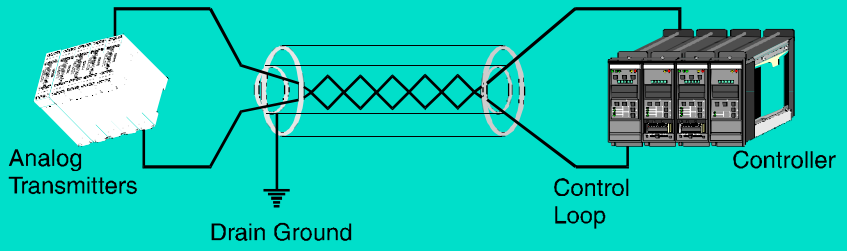
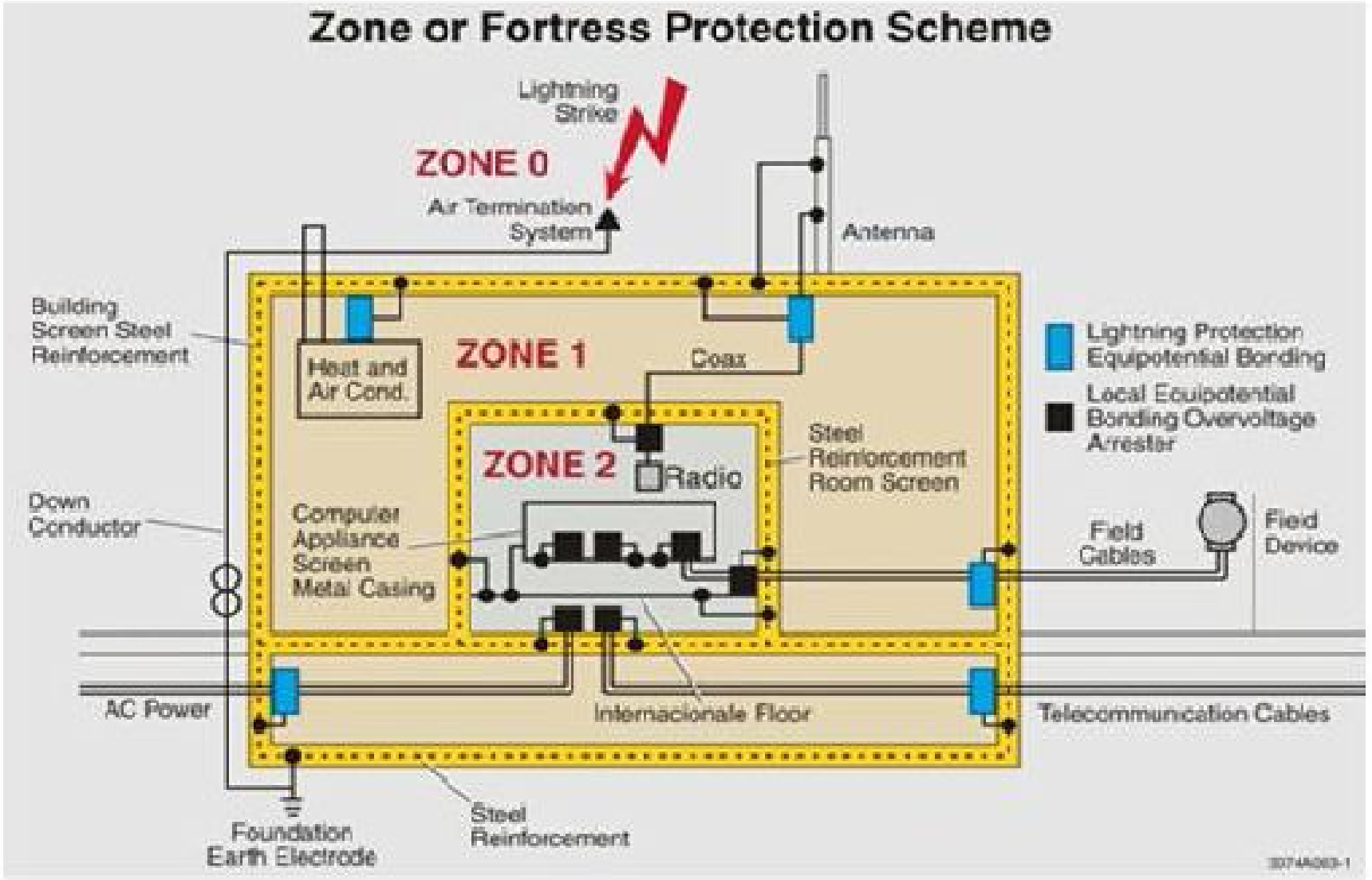
Surge Protection Strategies & Techniques

- **Grounding**
- **Shielding**
- **Surge Arrestor Characteristics**





Lightning protection zones
IEC 62305,



Zone 0 Zone 1 Zone2

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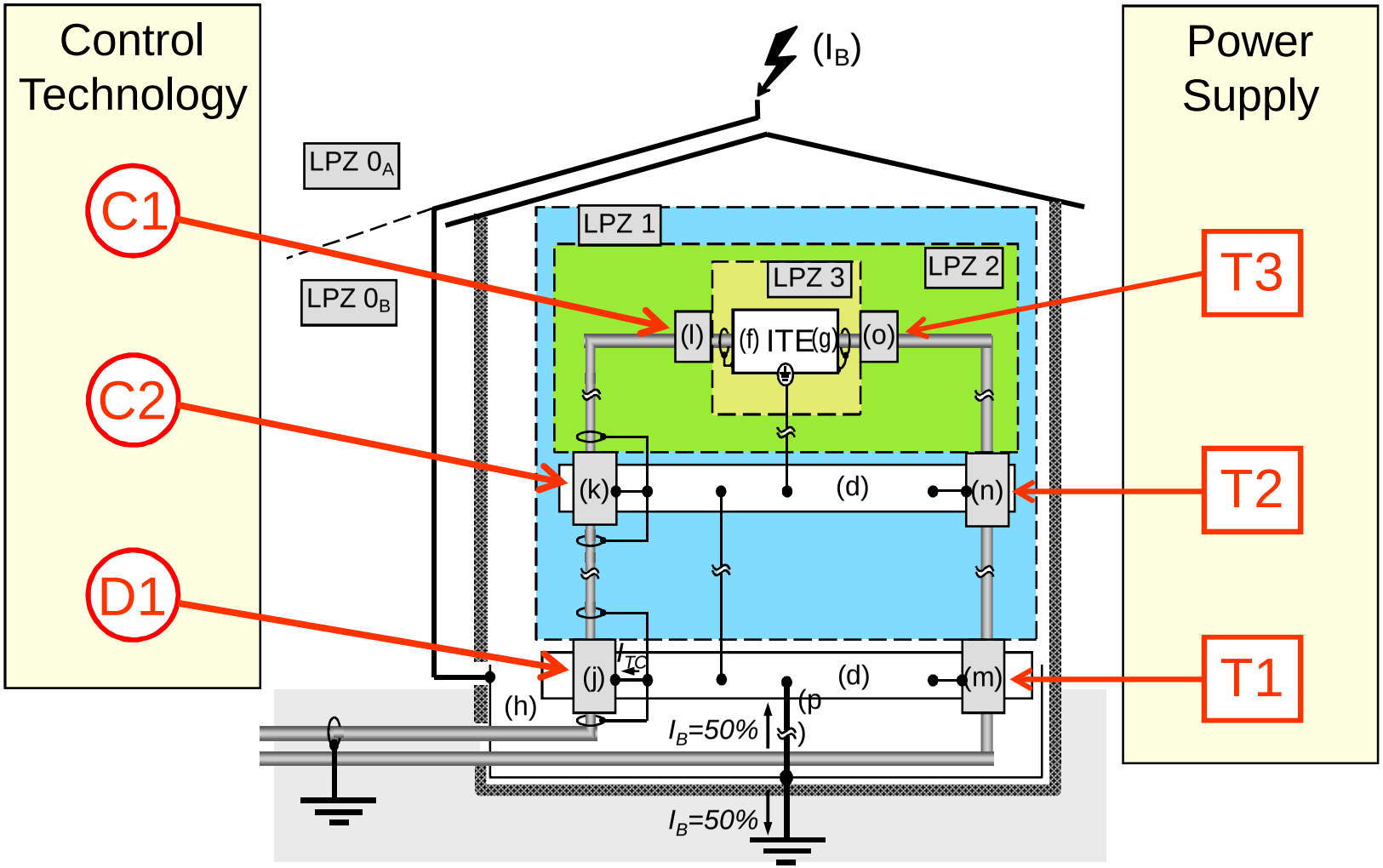
IEC 61643-22



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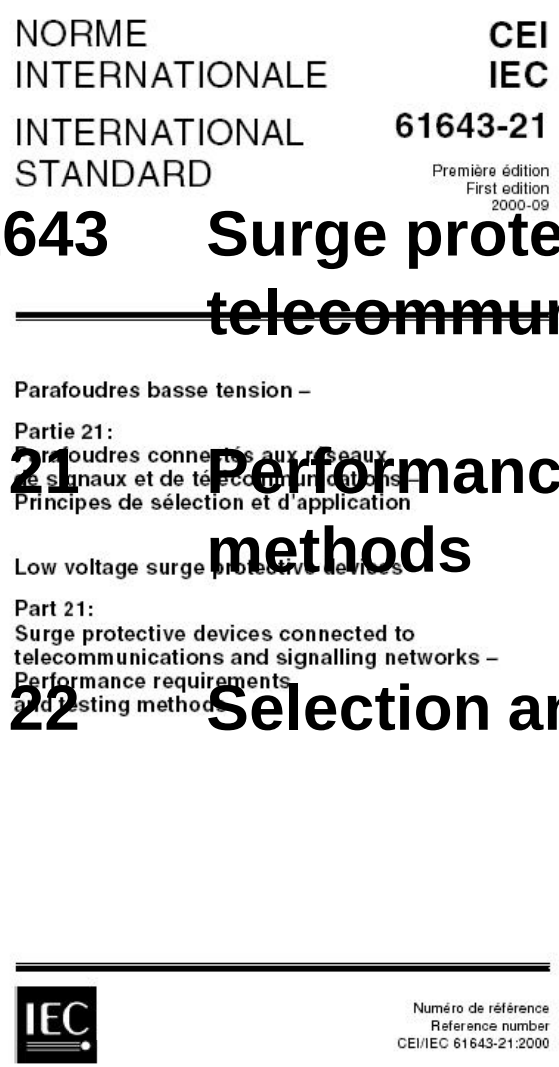
IEC 61643 part 21 and 22



NORME INTERNATIONALE
CEI IEC
INTERNATIONAL STANDARD
61643-21
Première édition
First edition
2000-09

Parafoudres basse tension –

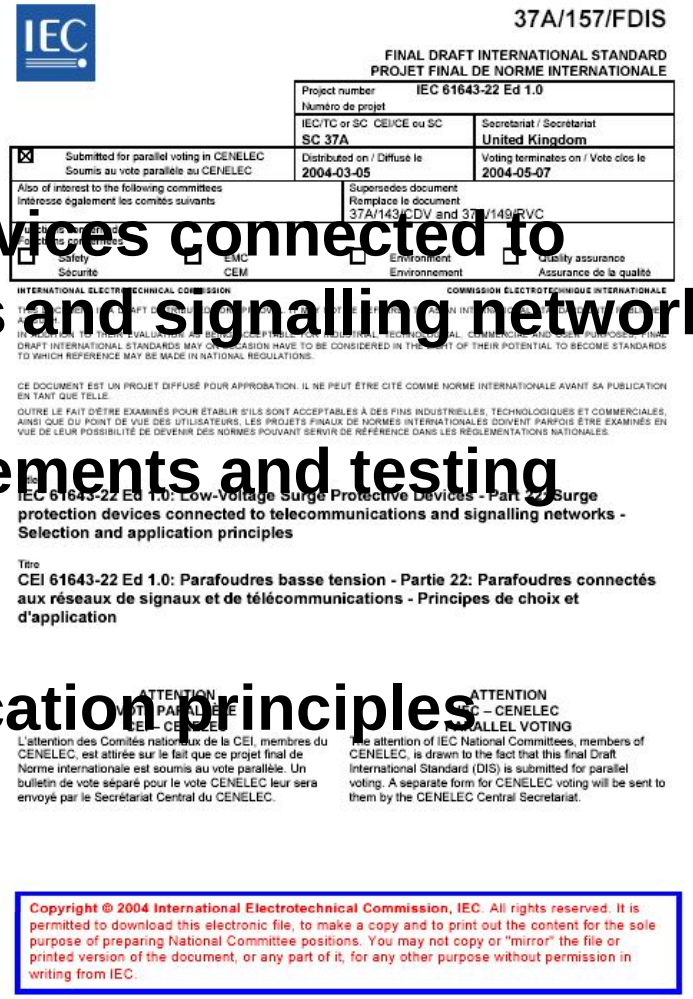
Partie 21:
Parafoudres connectés aux réseaux de signaux et de télécommunications – Principes de sélection et d'application

Low voltage surge protective devices

Part 21:
Surge protective devices connected to telecommunications and signalling networks – Performance requirements and testing methods

IEC

Numéro de référence
Reference number
CEI/IEC 61643-21:2000



IEC

37A/157/FDIS

FINAL DRAFT INTERNATIONAL STANDARD
PROJET FINAL DE NORME INTERNATIONALE

Project number / Numéro de projet	IEC 61643-22 Ed 1.0
IEC/TC or SC / CEI/CE ou SC	Secretariat / Secrétariat
SC 37A	United Kingdom
☒ Submitted for parallel voting in CENELEC / Soumis au vote parallèle au CENELEC	Distributed on / Diffusé le: 2004-03-05
	Voting terminates on / Vote clos le: 2004-05-07
Also of interest to the following committees / Intéresse également les comités suivants	Supersedes document / Remplace le document: 37A/143/CDV and 37A/149/RVC
☐ Safety / Sécurité ☐ EMC / CEM ☐ Environment / Environnement ☐ Quality assurance / Assurance de la qualité	

INTERNATIONAL ELECTROTECHNICAL COMMISSION — COMMISSION ELECTROTECHNIQUE INTERNATIONALE

DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

CE DOCUMENT EST UN PROJET DIFFUSÉ POUR APPROBATION. IL NE PEUT ÊTRE CITÉ COMME NORME INTERNATIONALE AVANT SA PUBLICATION EN TANT QUE TELLE.

OUTRE LE FAIT D'ÊTRE EXAMINÉS POUR ÉTABLIR S'ILS SONT ACCEPTABLES À DES FINS INDUSTRIELLES, TECHNOLOGIQUES ET COMMERCIALES, AINSI QUE DU POINT DE VUE DES UTILISATEURS, LES PROJETS FINAUX DE NORMES INTERNATIONALES DOIVENT PARFOIS ÊTRE EXAMINÉS EN VUE DE LEUR POSSIBILITÉ DE DEVENIR DES NORMES POUVANT SERVIR DE RÉFÉRENCE DANS LES RÉGLEMENTATIONS NATIONALES.

Titre
IEC 61643-22 Ed 1.0: Low-Voltage Surge Protective Devices - Part 22: Surge protection devices connected to telecommunications and signalling networks - Selection and application principles

Titre
CEI 61643-22 Ed 1.0: Parafoudres basse tension - Partie 22: Parafoudres connectés aux réseaux de signaux et de télécommunications - Principes de choix et d'application

ATTENTION
VOIR PARALLÈLE
CEI – CENELEC

L'attention des Comités nationaux de la CEI, membres du CENELEC, est attirée sur le fait que ce projet final de Norme internationale est soumis au vote parallèle. Un bulletin de vote séparé pour le vote CENELEC leur sera envoyé par le Secrétariat Central du CENELEC.

ATTENTION
IEC – CENELEC
PARALLEL VOTING

The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this final Draft International Standard (DIS) is submitted for parallel voting. A separate form for CENELEC voting will be sent to them by the CENELEC Central Secretariat.

FORM FDIS (IEC)/FORMULAIRE FDIS (CEI)
2002-08-08

IEC 61643 Surge protection devices connected to telecommunications and signalling networks

- **Part 21 Performance requirements and testing methods**
- **Part 22 Selection and application principles**

PHOENIX CONTACT
INSPIRING INNOVATIONS

IEC 61643-22 (09.2002)

Table 7.3.1.2: Range and requirements of surge voltage devices SPD in lightning protection zones

Lightning protection zone		LPZ 0/1	LPZ 1/2	LPZ 2/3
Range of surge values	**10/350**	0.5 –**2.5kA**	---	---
	1,2/50 **8/20**	---	0.5 – 10 kV 0.25 – **5 kA**	0.5 - 1 kV 0.25– **0.5 kA**
	10/700 5/300	4 kV 100 A	0.5 – 4 kV 25 – 100 A	---
Requirements to SPD´s (Category from IEC 61643-21 table 3)	**SPD (j)** *	**D1** B2	C2 B2/B3	No galvanic connection to the outside of the building
	SPD (k)	---	**C2**	C1
	SPD (l)	---	---	**C1**

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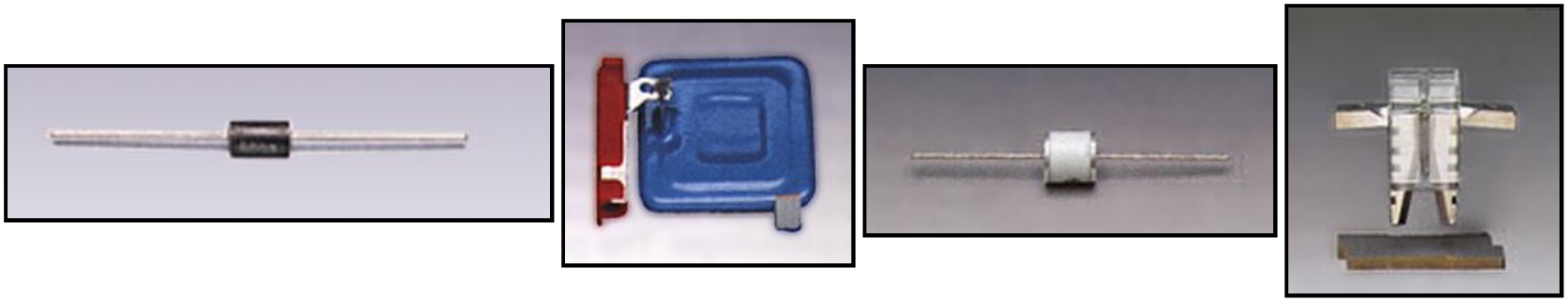
Construction elements

Characteristic

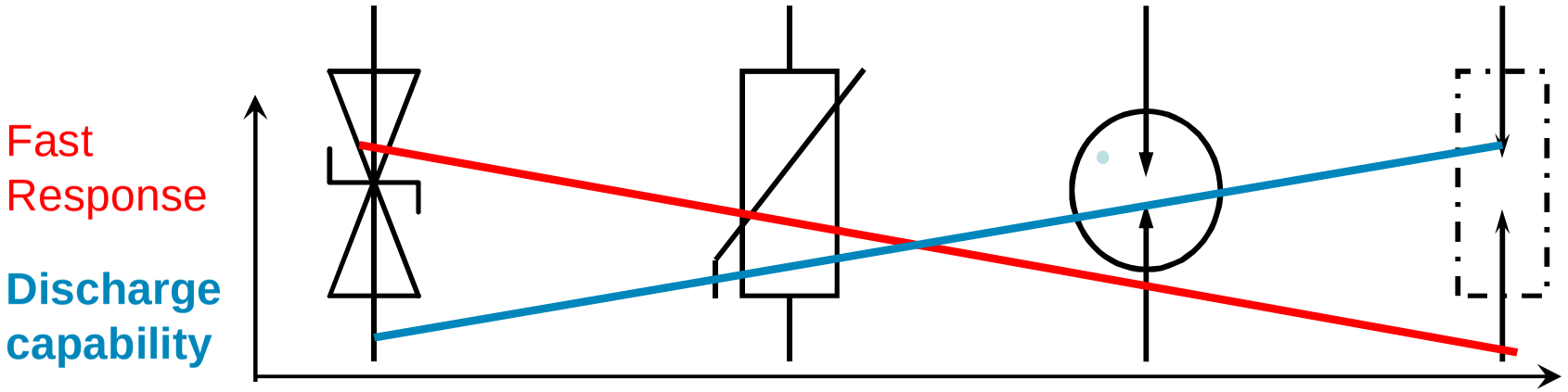


Silicon Avalanche Diode (SAD)

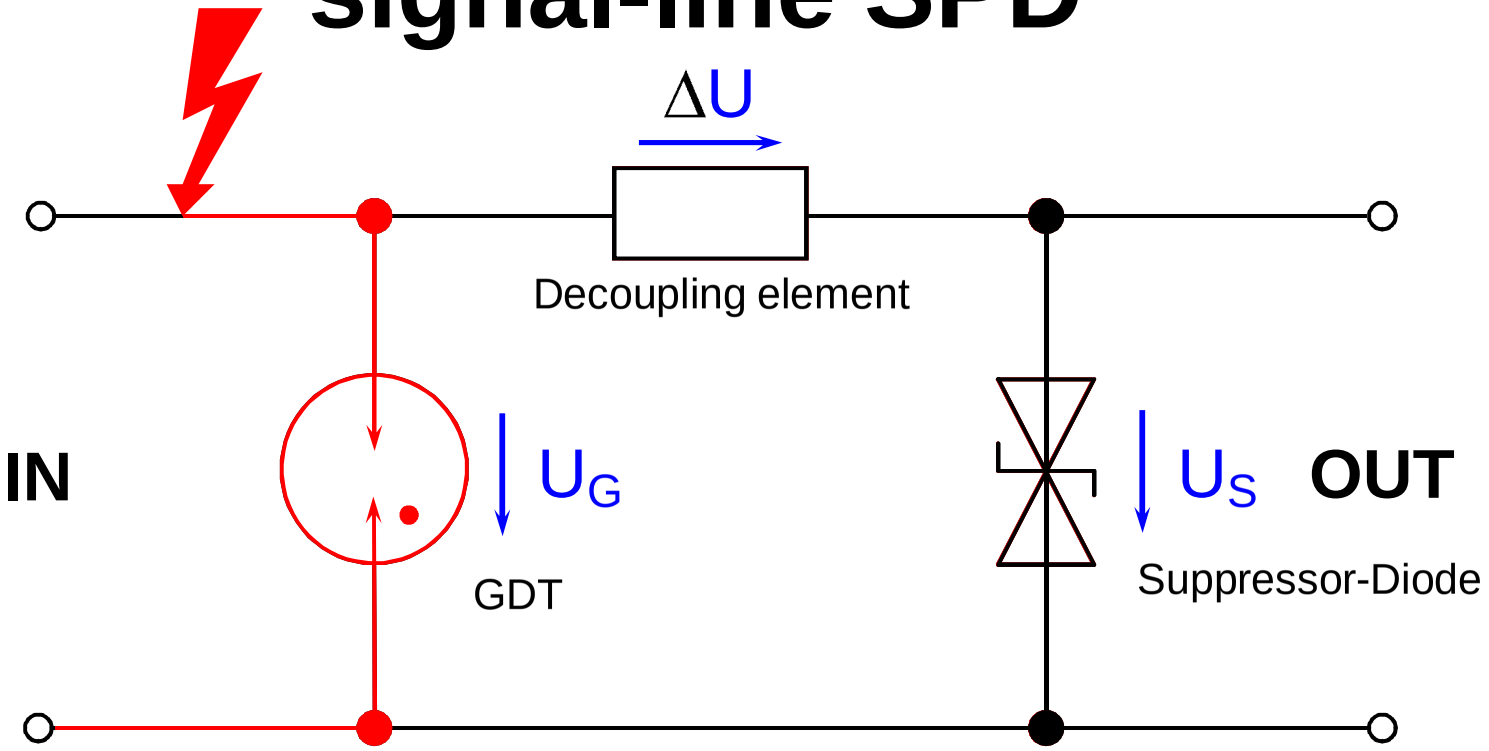
Metal Oxide Varistor (MOV)

Gas Discharge Tube (GDT)

Spark Gap



Principle circuit of a MCR / signal-line SPD



Technical data Gas Discharge Tube
Discharge current: ...5...10...20kA 8/20µs
Protection level: 450...800V

Technical data suppressor-diode:
Discharge current: ...50...700A 8/20µs
Protection level: 10... <100V
acc. from the nominal voltage

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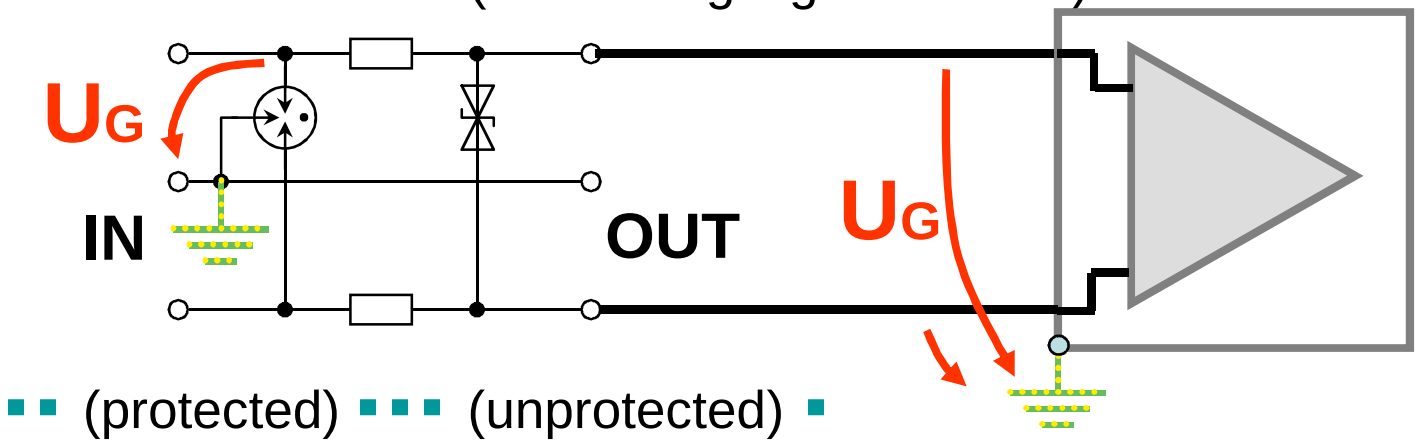
Circuit Versions of Arrestors

Circuit version 1x2 (for floating signal circuits)

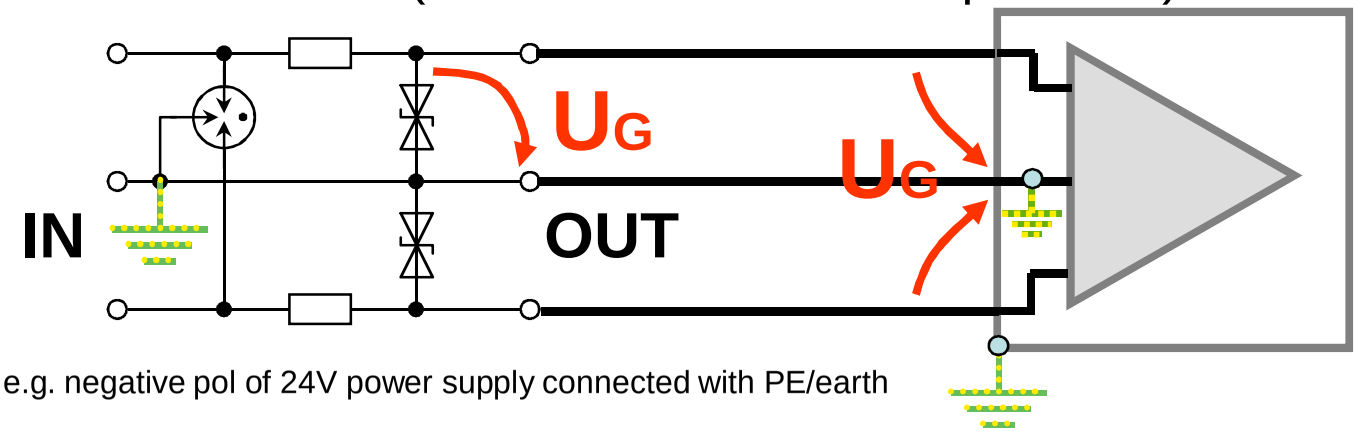


(protected) (unprotected)

Input:
floating input circuit

Protection level:
Depend from the GDT

Circuit version 2x1 (for common reference potential)



e.g. negative pol of 24V power supply connected with PE/earth

Input:
based on earth potential

Protection level:
Depend from the Dioden

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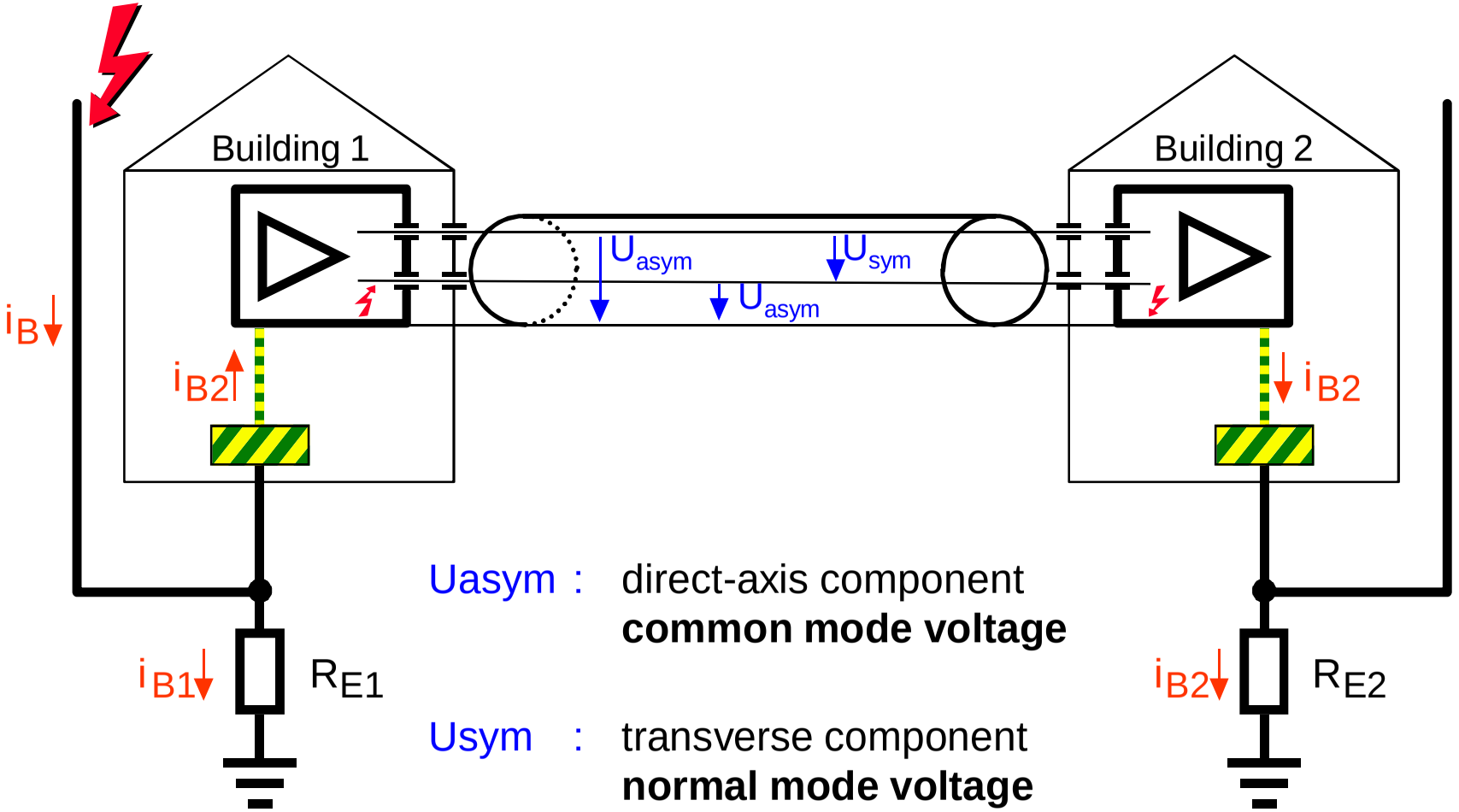
Symmetrical and asymmetrical voltages



Uasym : direct-axis component
common mode voltage

Usym : transverse component
normal mode voltage

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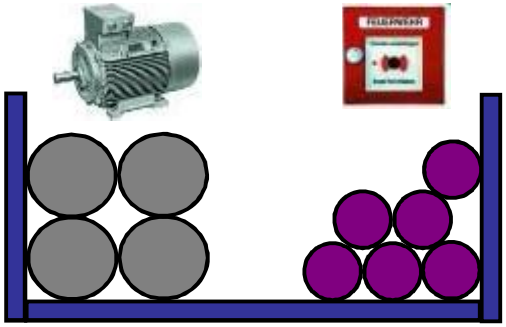
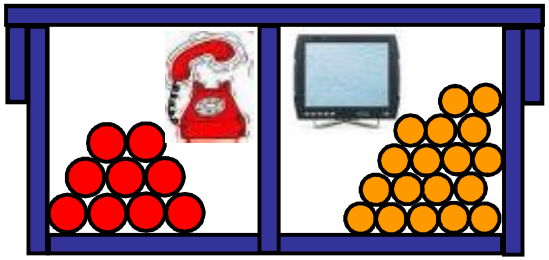
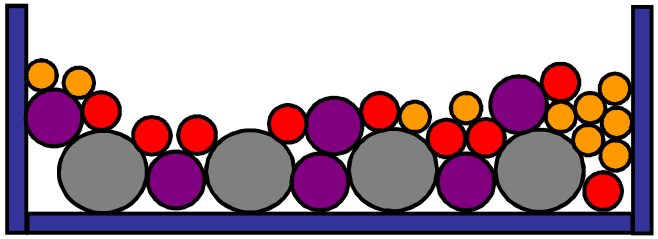
Wiring as base for a good or bad installation

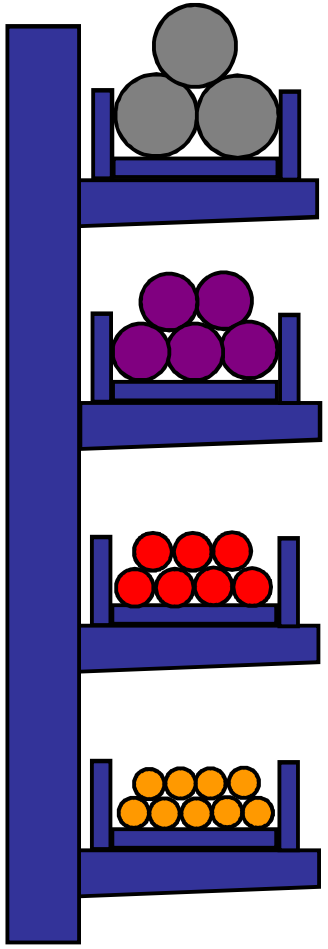




correct



reality



perfect

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Applications

Point of Installation

Mandatory Protection

- **Main Panel and UPS**
- **I/O Line Protection for cables coming from Zone 1 including Fieldbus**
- **Protect critical equipment locally**

  - PLC Power Supply , Exposed Signal I/O's, Critical sensor (Transmitters) , RTU's, IT devices UPS, weighing stations, Surveillance System etc

Recommended Protection

Protect even the communication lines

- LAN cable, DATA Cable
- Critical Equipment within the covered area
- Fire Alarm System

Optional Protection

Signal Lines for Critical equipment inside the covered area

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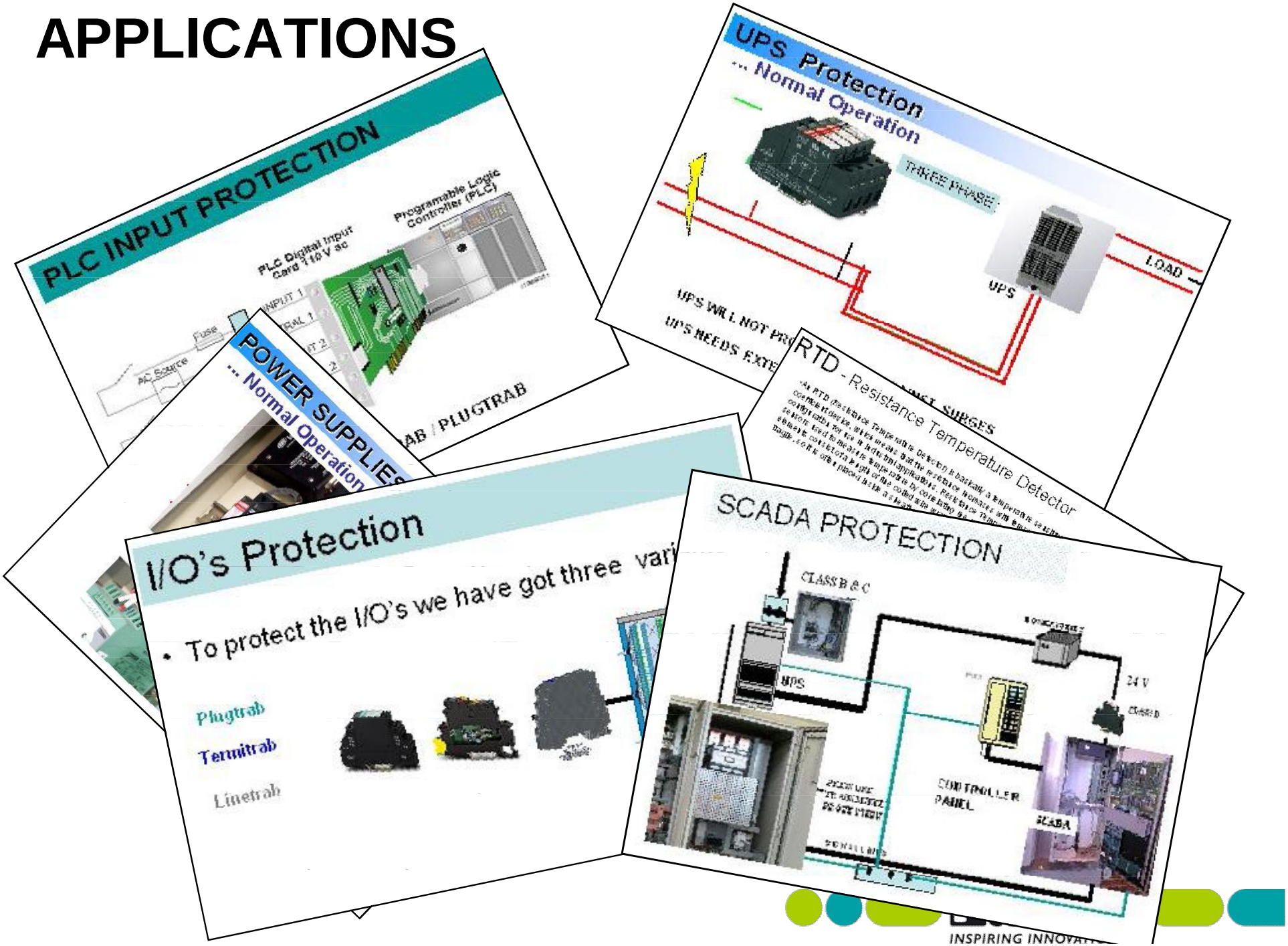
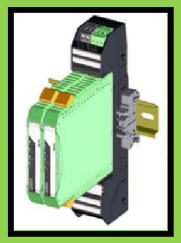
APPLICATIONS



Foundation Field bus...



Power

Segment Protector

Field Barrier

Junction Boxes

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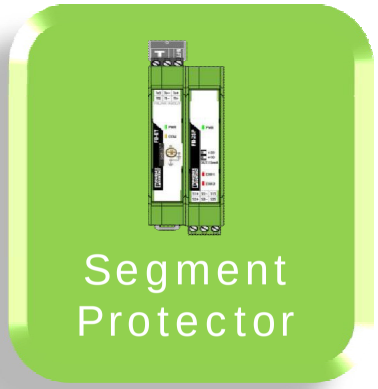
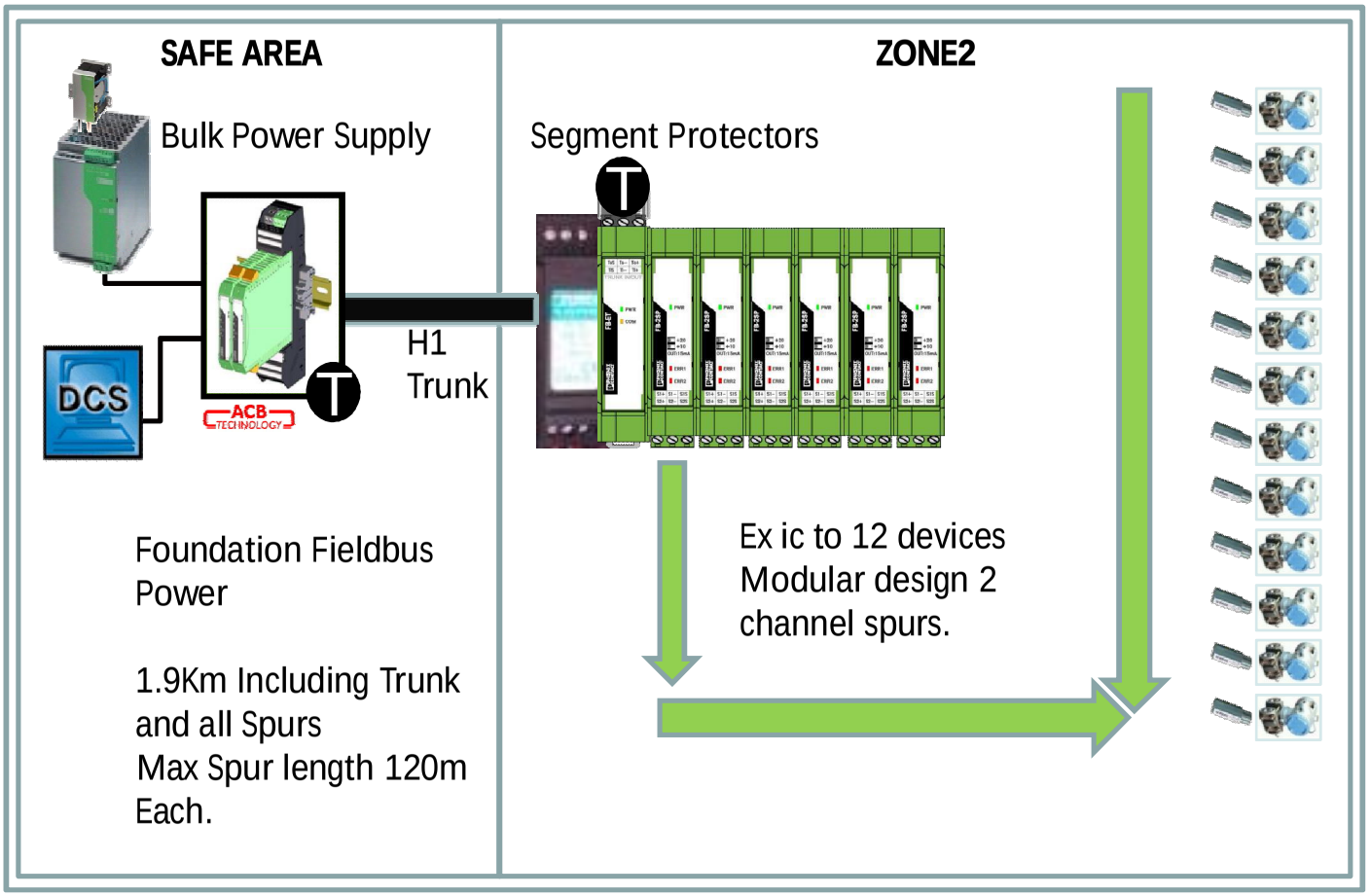
INSPIRING INNOVATIONS

Foundation Field bus





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Foundation Field bus Surge

Surge Protection for field bus systems. WHY?

- The cost of replacing the damaged equipment, and detecting subsequent failures due to partial damage is High.
- The cost of possible loss of production.
- The possible effect on safety for example undetected damage to intrinsically safe equipment and preventing high voltages entering Zone 0 locations.
- The possible effect on indirectly related systems such as control system computers.
- In general if there is a significant risk of lightning induced damage, the cost of the protection devices and their installation can be readily justified.

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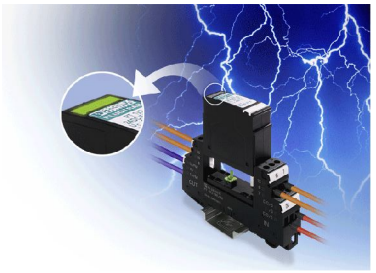
Normative requirements IEC 62305-3

Protection level	Visual inspection (Interval)	Complete inspection (Interval)	Critical systems complete inspection (Interval)
I and II	Yearly	Every 2 years	Yearly
III and IV	Every 2 years	Every 4 years	Yearly

Lightning protection systems utilized in applications involving structures with a risk of explosion should be visually inspected every 6 months. Electrical testing of the installation should be performed once a year.

PARAMETERS TO BE MENTIONED



Diagnostic Features

Surge Discharging Capacity

Testing Performance as Per IEC Std

IEC 61643-1 and -22

Easy Maintenance - Pluggability

Advantage of Surge Protection

CONCLUSION

Less Downtime & Less Stress

Better Life & Equipment Performance

Lower Operation & Maintenance Costs

Thank you

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DEHN + SÖHNE

A reliable partner for your safety

Total Lightning & Surge Protection Solution

DEHN INDIA Pvt. Ltd.