



CITEL

■■■ Reliability in Surge Protection ■■■

Surge Protection

for

Maritime Applications

AC & DC Power

Dataline

Coaxial

Telecom



CITEL, the global solutions provider



Since 1937, Citel has been an innovator in the field of Surge Protection. Today, Citel is a global leader in the development of reliable and adapted Surge Mitigation Solutions for critical applications.

- Over 1 Billion Lines Protected
- Local support in over 200 countries
- High Current R&D Laboratories at your disposal

Citel is unique as a manufacturer of Surge Protective Components (SPC's), Surge Protective Devices (SPD's) and coordinated protection systems.

THREAT

\$26B in losses due to Power Surges

Today's increased reliance on very sensitive electronics and processes make surge protection an important discussion topic in order to avoid catastrophic business losses. The Insurance Institute found that \$26 billion dollars was lost due to non-lightning power surges. In addition, there are about 25 million lightning strikes in the US each year that cause another \$650 million to \$1 billion in damage to equipment and facilities.

1. Direct Strike



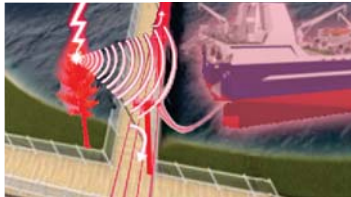
2. Hull Potential rise



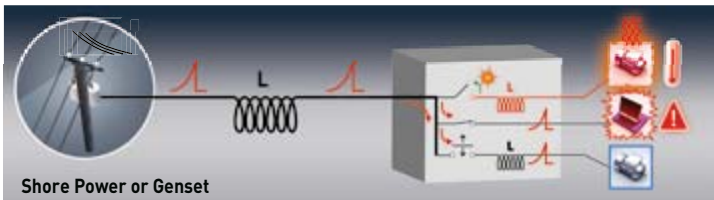
3. Strike on overhead lines



4. Coupling



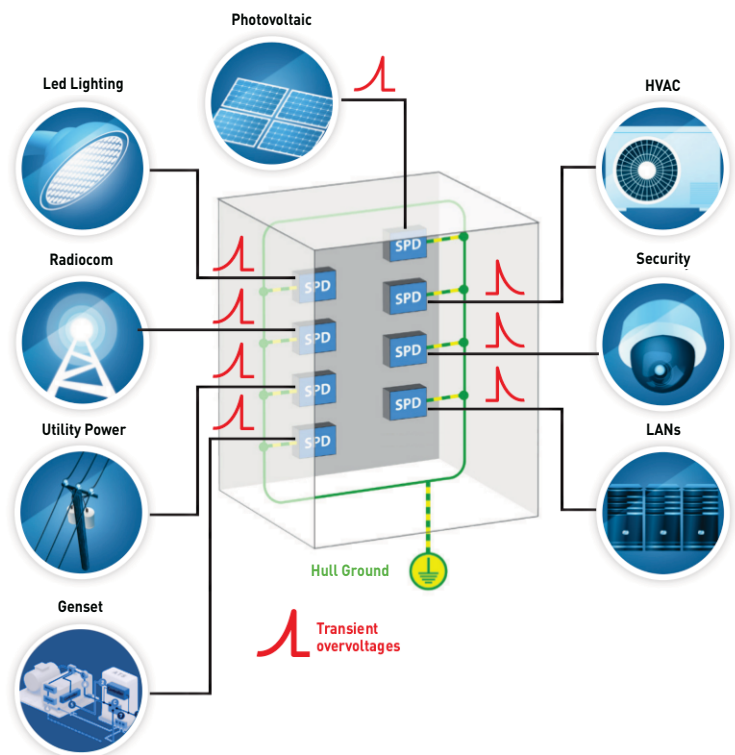
5. Switching



SOLUTION

Global Surge Mitigation Concept

Our philosophy is simple – determine your risk and evaluate every line (power or signal) for vulnerabilities. We call this the “box” concept. It works equally well for a single piece of equipment or an entire facility. Once you have determined your “boxes”, it is simple to develop a coordinated protection scheme to eliminate all threats from lightning and switching surges.



CITEL provides a wide range of surge protectors adapted to every network: **AC power, DC power, Telecom, Data and Coaxial**.

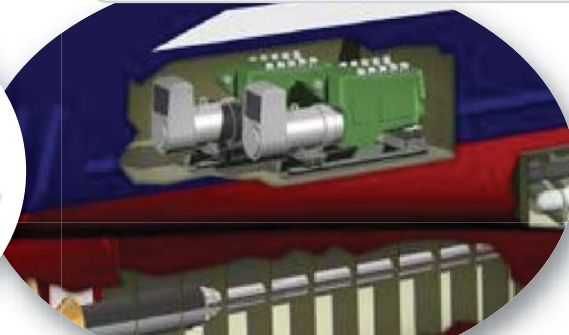
COMMON MARITIME APPLICATIONS

As the technology for power generation systems becomes more sophisticated, the risk of destruction caused by the lightning strikes and power line disturbances become more evident. Mission critical equipment must deploy a coordinated system of Surge Protective Devices (SPD) to assure continuous operation.

Genset, Power Distribution, Shore Power



Genset

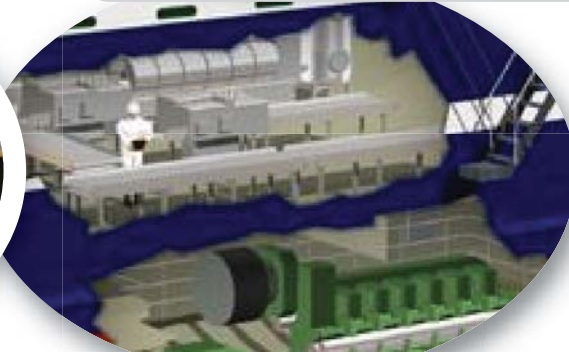


- Main and Backup Generators
- Distribution Panels and Switchboards
- Automatic Transfer Switch (ATS)
- Main Threats:
 - Direct Lighting on ship
 - Close by strike
 - Utility Connection (shore power)
 - Internal switching from Machinery

Onboard Machinery and Processing Equipment



Conveyer



- Conveyers, Packaging, Freezers, Refrigeration Systems, etc.
- Cranes, Netting Systems, Pumping Equipment, Anchoring Systems, etc.
- Main Threats:
 - Direct Lighting on ship
 - Close by strike
 - Utility Connection (shore power)
 - Internal switching from Machinery
 - Internal switching from Genset

Lighting Systems



Light Fixture



- Lighting Panel
- Lighting Fixture
- Main Threats:
 - Direct Lighting on ship
 - Close by strike
 - Utility Connection (shore power)
 - Internal switching from Machinery
 - Internal switching from Genset
 - Static discharge

Navigation, Communication and Safety Equipment



Communication Systems



- Guidance and Navigation Equipment
- Cameras
- Fire Alarm Systems
- Controls
- Communication Equipment
- Main Threats:
 - Direct Lightning on ship
 - Close by strike
 - Utility Connection (shore power)
 - Internal switching from Machinery
 - Internal switching from Genset
 - Static discharge



COORDINATED PROTECTION STRATEGY



Location/Description/Model

AC Power - Main Distribution Panel	1	MDS Series
AC Power - Sub-Distribution Panel	2	DS70US Series
AC Power - Shore Power Panel	3	M50 Series
AC Power -Equipment Control Panel Incoming Power	4	DS70US Series
AC Power - HVAC Incoming Power	5	MDS Series
Signal/Twisted Pair Wires - HVAC Controls	6	DLA Series
AC Power - Lighting Panel	7	DS70US Series
AC Power - Light Fixture	8	MLPXU Series
Ethernet / POE - Indoor Camera	9	MJ8 Series
Ethernet / POE - Outdoor Camera	10	CGCMJ8 Series
Coaxial - Antenna/Radio/GPS	11	P8AX Series
AC Power - Shore Power	12	MDS Series



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RECOMMENDED PRODUCTS (TECHNICAL CHARACTERISTICS)

AC & DC Power SPDs



Product Family	MDS750	M50	DS70US	MLPXU
Protection Type	AC Power	AC Power	AC Power	AC Power
Location	Incoming AC Panel	Incoming AC Panel	Incoming AC Panel	Lighting Fixture
Maximum Surge Rating - I _{max}	220kA (8/20μs) per phase	50kA (8/20μs) per phase	75kA (8/20μs) per module	20kA (8/20μs) per phase
Nominal Surge Rating - I _n (UL 1449)	20kA (8/20μs)	20kA (8/20μs)	20kA (8/20μs)	10kA (8/20μs)
Features	LED Indication, audible alarm, remote contacts, surge counter	LED Indication, audible alarm	Din Rail mount, Remote contacts, Replaceable modules	Compact, Series or Parallel install LED Indicators
Approvals	UL 1449 4th Ed. Type 1 Listed	UL 1449 4th Ed. Type 1/2 Listed	UL 1449 4th Ed. Type 1 Listed	UL 1449 4th Ed. Type 4CA

Data & Signal SPDs



Product Family	DLA	MJ8	CGCMJ8
Protection Type	Twisted Pair Wires	Indoor Ethernet/POE	Outdoor Pole or Wall Mount Ethernet/POE
Max Surge rating	20kA	16kA	16kA
Voltage	Up to 170Vdc	Up to 60Vdc	Up to 60Vdc
Main Features	Din Rail mounting, Shielded Protection RS485, RS232, 4-20mA, ADSL	Din Rail mounting, RJ45 Shielded Connectors, Gigabit Ethernet Speed, POE++	RJ45 Shielded Connectors, Gigabit Ethernet Speed, POE++ Up to IP67 rating, Pole mount kit
Approvals	UL497B Listed		

Coaxial SPDs



Product Family	P8AX	PRC
Protection Type	Gas Discharge Tube - DC Pass	Quarter Wave Filter - DC Block
Max Surge rating	20kA	100kA
Frequency Range	DC to 7GHz	450MHz to 5.8GHz
RF Power	Up to 780W	Up to 1500W
Connectors	N, F, BNC, TNC, 7/16, SMA	N, F, BNC, TNC, 7/16
Approvals	UL497E Listed	



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