WHAT ARE **POWER SURGES**?
How a surge protective device can protect your facility.

Surges, or transients, are brief **overvoltage spikes** or disturbances on a power waveform that can damage, degrade, or destroy electronic equipment within any home, commercial building, industrial, or manufacturing facility. Transients can reach amplitudes of **tens of thousands of volts**. Most equipment is designed to handle minor variations in their standard operating voltage. However, surges can be very **damaging** to nearly all equipment.

### Symptoms of Power Surges

<table>
<thead>
<tr>
<th>Circuit Board Failure</th>
<th>Lighting Failure</th>
<th>Motor Failure</th>
<th>Phantom Equipment Restart</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Circuit Board" /></td>
<td><img src="image2" alt="Lighting Failure" /></td>
<td><img src="image3" alt="Motor Failure" /></td>
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</tr>
</tbody>
</table>

### Causes of Power Surges
#### Internal Sources

- **Contactor, Relay & Breaker Operations**
- **Switching of Capacitor Banks & Loads**
  - *e.g. power factor correction*
- **Discharge of Inductive Devices**
  - *motors, transformers, etc.*
- **Fault or Arc Initiation**
- **Arcing Faults**
  - *ground*
- **Fault Clearing or Interruption**
- **Power System Recovery**
  - *from outage*
- **DC Battery Storage Systems**

**SWITCHING OF ELECTRICAL LOADS FROM:**

**MAGNETIC & INDUCTIVE COUPLING FROM:**

- **Elevators**
- **HVAC**
  - *with variable frequency drives*
- **Fluorescent Light Ballasts**
- **Copy Machines**
- **Computers**

### External Sources

- **Lightning**
- **Grid & Capacitor Bank Switching**
- **Damage to Power Lines or Transformers**

A typical building experiences **multiple power surges** every day. The average cost of downtime caused by power surge is **$130,000 per event**.

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