G&W Electric

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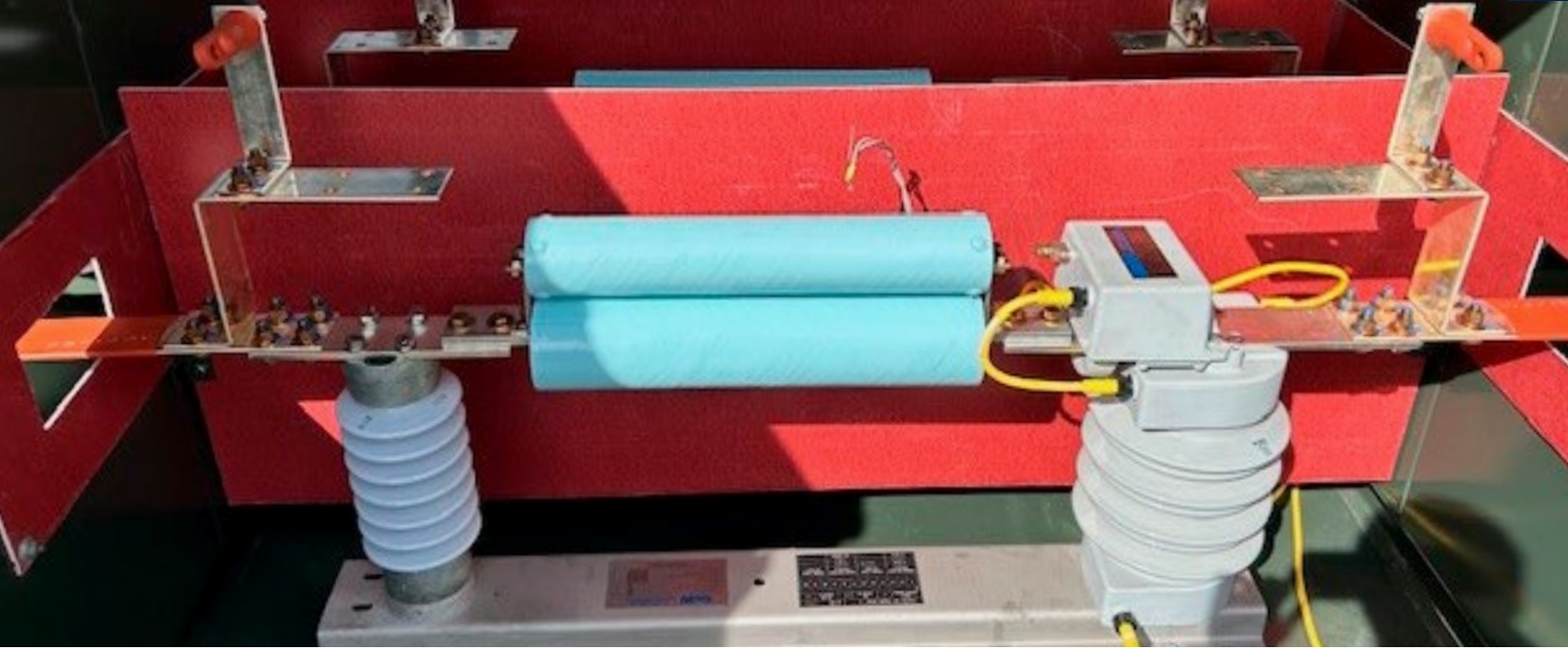
CASE STUDY

How CLiP® Current Limiting Protector Helped the City of Lodi Meet Growing Energy Demands



Background: The City of Lodi

The City of Lodi is located in San Joaquin County, California, with a population of over 66,000. Lodi Electric Utility was founded in 1910 to serve the community with reliable, affordable, clean and safe power.

The opportunity: Expanding power generation capacity

The City of Lodi was working with the State of California to site a new 48MW power plant, connected via Lodi's existing grid. California's tight supply margins, in addition to local reliability needs, made this project an imperative.

The proposed optimal site for the new power plant was located near another generation plant, which immediately raised concerns about a fault current affecting the system's padmount switchgear, and cables.

> *"CLiP current limiting protector provided an innovative, cost-effective solution that allowed us to move forward without costly redesigns or system inefficiencies—and on schedule."*
>
> **The City of Lodi**

The challenge: Plant location and fault current overload

As distribution systems expand to meet growing demand, available fault currents imposed on equipment increase through stiffened transmission systems, greater substation capacity and on-site and distributed generation. These currents may exceed their thermal, mechanical and interrupting capability, leading to catastrophic failure.

A system power study conducted by the city showed that the addition of the plant would contribute substantial additional fault current to the distribution system. The incremental addition would produce enough fault current to cause the distribution system to become underrated, per IEEE Standard 386s ratings for separable insulated connectors.

To maintain grid safety and reliability, the fault contributions for the new plant needed to be limited. And, while reactors could also reduce the fault current, reactors would reduce the total generation output. Another solution needed to be found—if not, the energization of the plant would be delayed and a substantial, costly redesign of the entire project may have been needed.

The Solution: G&W Electric CLiP® Current Limiting Protector

Here are the solutions that were evaluated:

1. Current limiting fuses

- Limited in the continuous current rating
- Unavailable in the necessary ratings to protect the system.
- Unable to sufficiently reduce fault current

2. Current limiting reactors

- Often lose generation capacity due to power losses
- Reactors can also cause power quality issues

3. CLiP current limiting protector

- Rated to the right current and voltage levels
- Can clear the faults in less than a half cycle
- Trigger level of 2kA was well suited to this application
- Control box capability to communicate with local SCADA system via relay contacts
- Cost-effective compared to other solutions

Key factors in the decision to utilize CLiP current limiting protector:

- Speed was a major deciding factor
- Does not reduce power generation capacity
- Custom settings met the City's specifications
- Seamless integration with SCADA

How CLiP Current Limiting Protector Works

Upon occurrence of a short circuit current:

I. A sensing unit actuates a contained pyrotechnic operation based on a predetermined trigger setting.

II. The copper conductor is segmented in several fractional lengths and bends them upward, forming multiple gaps.

III. Arcs form at these gaps and the resultant arc voltage causes transfer of the short circuit current to a parallel current limiting fuse.

IV. The fuse melts and clears the circuit fault.

V. Current extinction occurs in the first half cycle and limitation prior to the first peak.

VI. Reliable interruption is assured without venting of ionized gases.

VII. All of these steps happen from one quarter to one half cycle. Nothing else is so fast to protect the assets.

The Results: Money saved, energized on time

Ultimately, CLiP® current limiting protector solved Lodi's fault current issues, allowing the City to energize on time and provide the generating capacity that local citizens, and the power grid at-large, particularly data centers, desperately needed. This was also accomplished without any substantial and costly redesign of the system and without affecting power quality or system efficiency.

With no issues of nuisance tripping to date, the decision to use CLiP current limiting protector saved Lodi substantial dollars while also preserving grid efficiency and reliability.

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