



S&C ELECTRIC COMPANY
Excellence Through Innovation

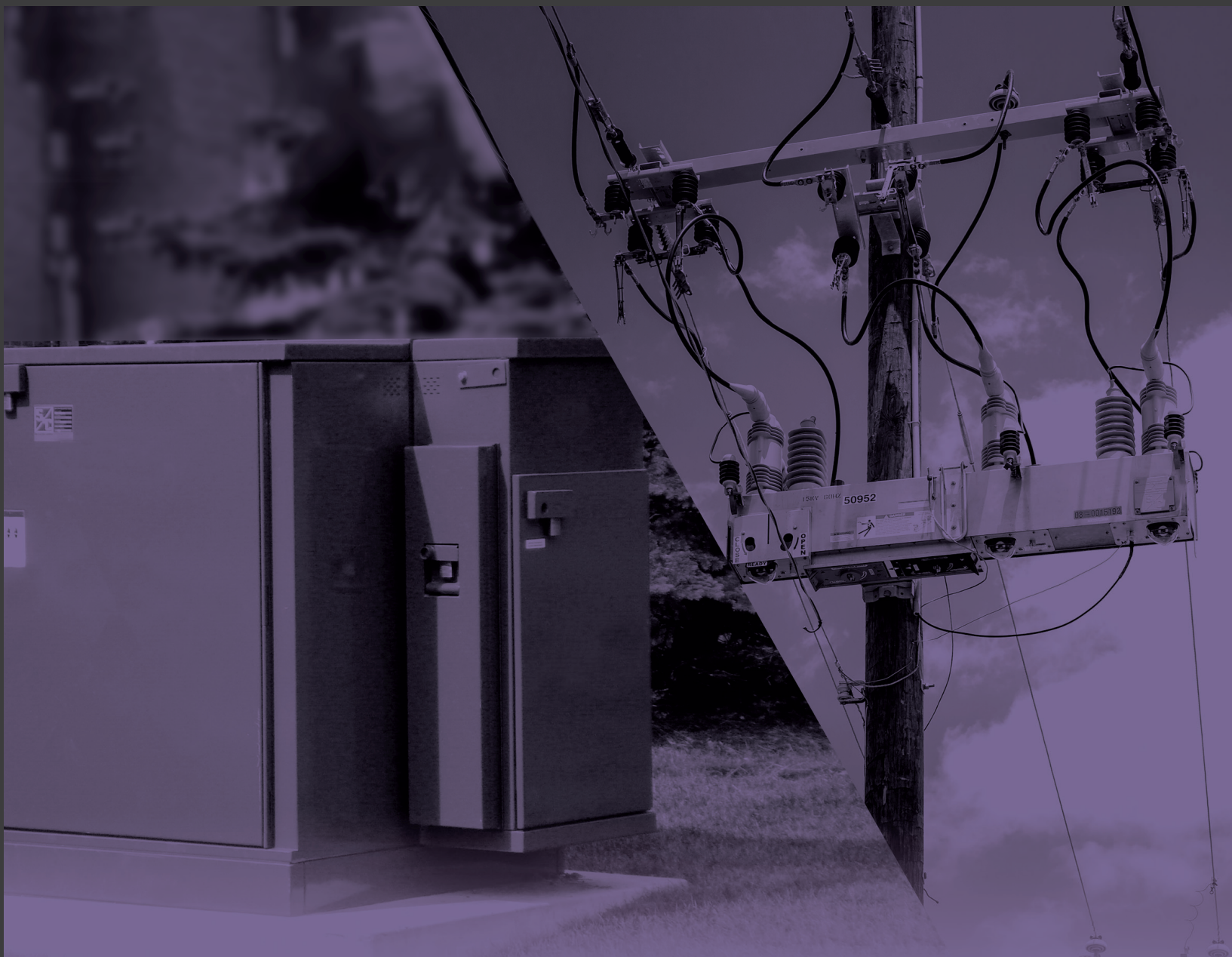
LEARN MORE AT SANDC.COM



766-2153

December 17, 2018

© S&C Electric Company 2018, all rights reserved



PULSECLOSING[®] TECHNOLOGY

THE ONLY HYBRID CIRCUIT SOLUTION

Excellence Through Innovation



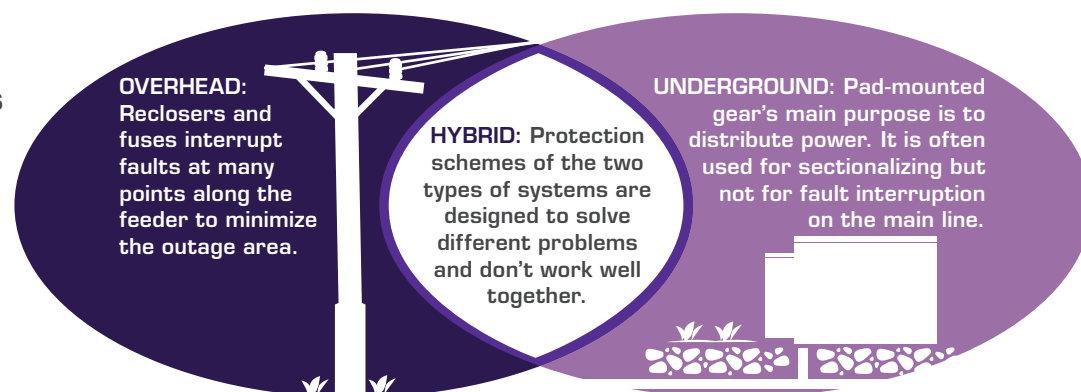
1 Hybrid circuits are the most difficult to manage for reliability and protection.

Hybrid circuits are growing in numbers due to utility undergrounding practices and have difficult protection challenges.

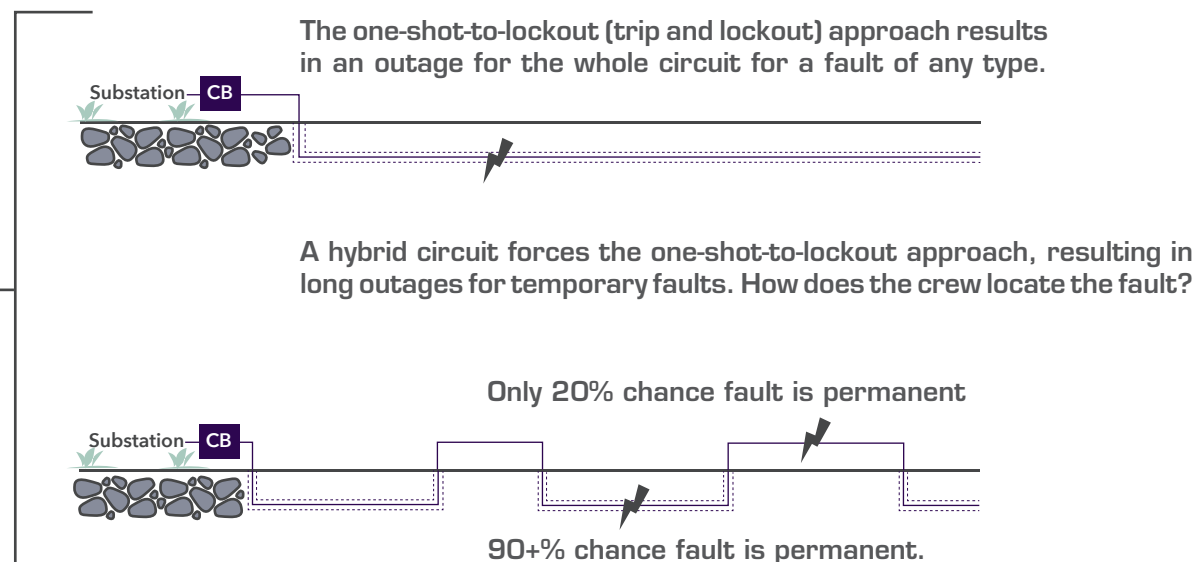
This stems from the problem characteristics of underground feeder sections:

- HIGH FAULT CURRENT CAUSES MORE DAMAGE.** Cables are often close to a substation and have low impedance, so more energy is involved.
- FAULT LOCATION IS INHERENTLY DIFFICULT AND TIME CONSUMING.** This results from being underground. Strategies may include thumping cables, trial and error switching, or interpreting fault indicators.
- ONE SHOT TO LOCKOUT IS A COMPROMISE TO AVOID FAULT DAMAGE.** This means there are limited protection options, especially on hybrid circuits with overhead sections. It's a trade-off that results in more outages from temporary faults.
- REPAIR & REPLACEMENT IS MORE COMPLICATED THAN OVERHEAD LINES.** This may involve complicated excavations and disruptions of traffic, resulting in longer outage times.

A further complication is protection philosophies for underground and overhead sections are contradictory and use different devices.

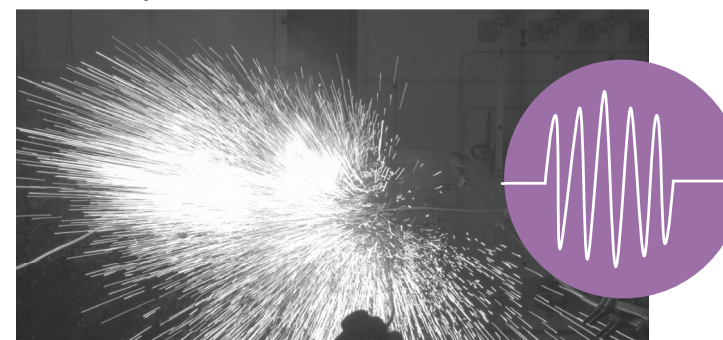


Examples of troublesome circuits to protect

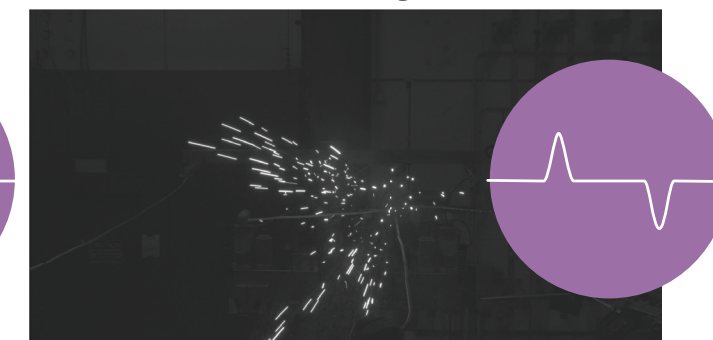


2 PulseClosing® Technology overcomes reclosing limitations.

CONVENTIONAL RECLOSING uses the full energy of the power system, so it is not used in hybrid circuits.



The hybrid circuit problem can be solved by using **LOW-ENERGY FAULT TESTING** that does not cause damage.



PulseClosing Technology is a feature of S&C's IntelliRupter® PulseCloser® fault interrupter, which can be deployed on distribution systems up to 38 kV.

95% LESS ENERGY IS USED THAN RECLOSING, preventing damage to your system when testing for faults.



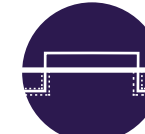
AVOID OUTAGES DUE TO TEMPORARY FAULTS because a test sequence can be used instead of a one-shot-to-lockout approach.



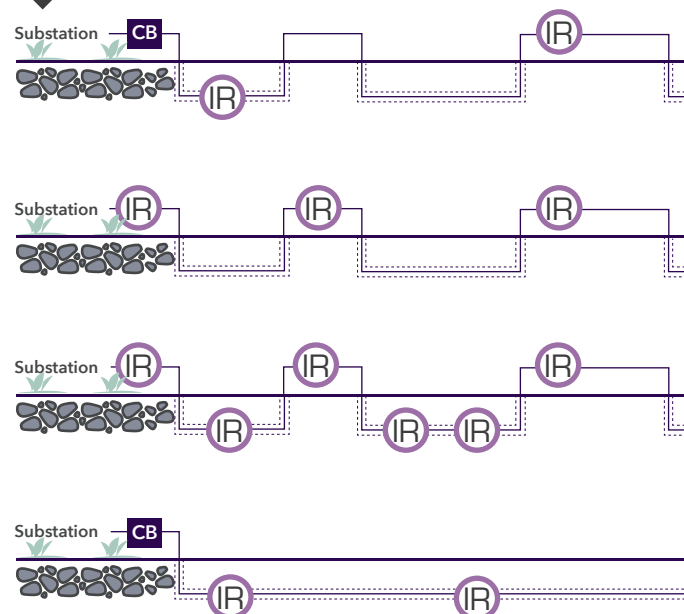
SEGMENT UNDERGROUND SECTIONS using fault interrupters to minimize the outage area.



UNIVERSAL PROTECTION STRATEGY finally provides a technology that enables flexible protection and segmentation for hybrid circuits.



3 Universal protection is provided for overhead, underground, or hybrid circuits.



Units can be deployed on overhead and underground circuits with similar protection. You no longer need to compromise protection and reliability. All temporary faults are cleared and service is automatically restored.

For existing circuits where adding pad-mounted gear would be difficult, units can be deployed on overhead sections with full test sequences. Also, usage in the substation optimizes protection on the first cable section and reduces stress on substation transformers.

PulseClosing Technology allows for an unlimited number of units in series, meaning better segmentation on overhead and underground circuits than ever before.

This technology can also be used on all-underground circuits and can be added without affecting existing equipment (which is there to distribute power). A key point is that service is automatically restored for any temporary or self-clearing cable faults, and the control center is notified of the incident for planning cable inspections.

