CLiP® Current Limiting Protector

Reduces Fault Energy by 99% on Overdutied Equipment

G&W Electric

Engineered to order. Built to last.

If your system suffered a major fault today, could your circuit breakers clear it? How quickly? At what cost?

As distribution systems expand to meet growing demand, available fault currents imposed on equipment are increasing 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.

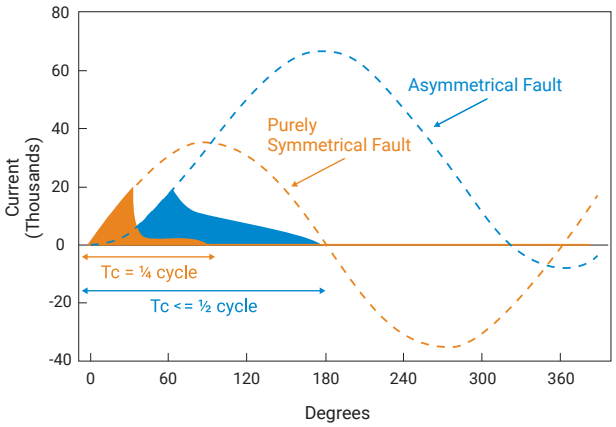
Protect your system with CLiP, an electronically sensed and triggered, commutating form of current limiter protection using a copper busbar path that carries the continuous current. CLiP limits blast and arc flash exposure, mitigates fire, reduces magnitude of peak let-through current and shields overdutied equipment from damage and catastrophic failure.

Let-Through Current vs. Prospective Fault Current

The let-through current plot (below) is applicable only for 40kA-rated CLiP units.

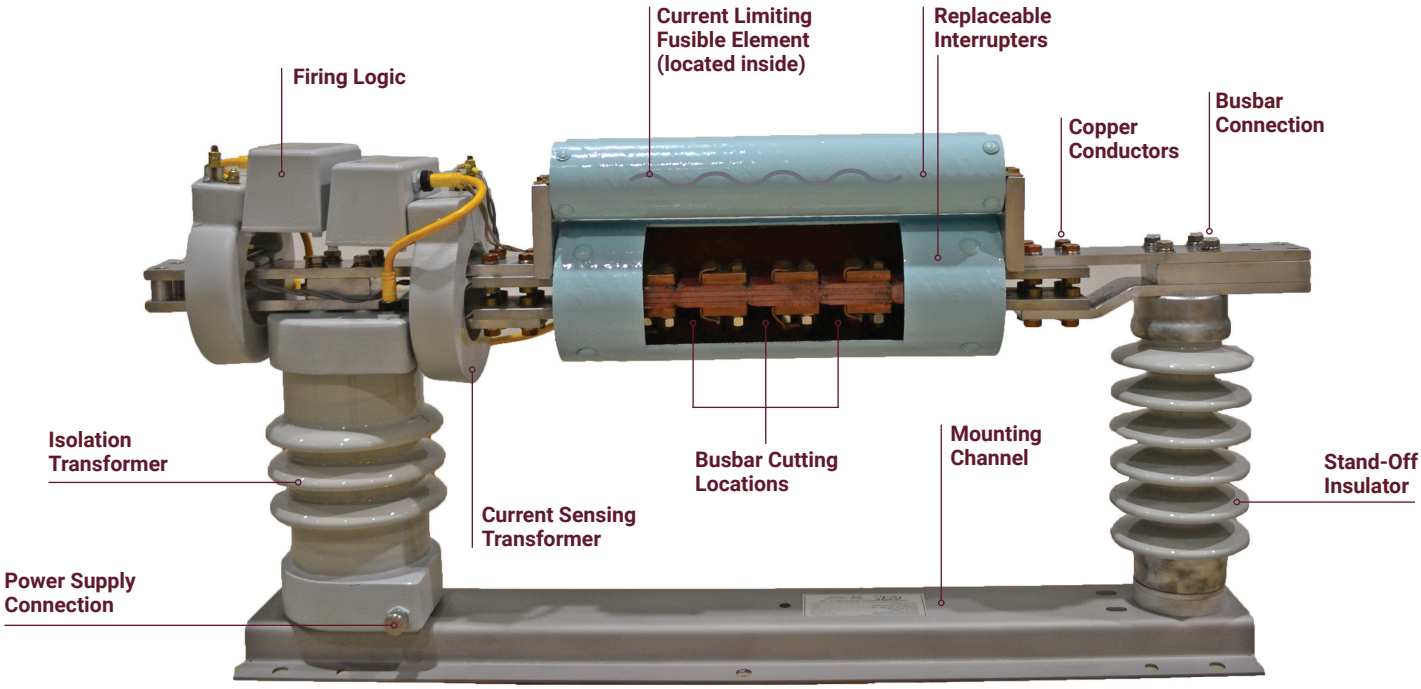
We can provide complex peak let-through plots tailored to your system. Contact us to discover how CLiP will perform in your specific application.

CLiP SYMMETRICAL AND ASYMMETRICAL TYPICAL FAULT CURRENT INTERRUPTS



Tc = Time it takes for CLiP to clear the fault

CLiP COMPONENTS



TECHNICAL RATINGS

VOLTAGE (kV)	CURRENT (A)	kA RMS, SYM. INTERRUPT/kA INST. MAX TRIGGER					BIL (kV)
		38/14	40/14	60/21	80/42	120/14	
2.8 5.5 8.3 15.5	1,500		X	X	X	X	110
	3,500						
	5,000						
27	1,200		X	X	X	X	200
	2,500						
	4,000						
38	1,200	X		X			200
	2,500						
	4,000						

DIMENSIONS

Maximum Voltage & Current	Overall Length Over Bus in (mm)	Maximum Height in (mm)	Height to Top of Bus in (mm)	Width of Energized Parts in (mm)	Weight per Phase lb (kg)
2.8 & 5.5kV 1,500A 3,000A* 5,000A	46 (1,168) 48 (1,219) 48 (1,219)	23 (584) 25 (635) 26 (660)	17 (432) 19 (482) 19 (482)	9.4 (239) 9.4 (239) 24 (609)	150 (68) 200 (91) 330 (150)
8.3 & 15.5kV 1,200A* 3,000A* 5,000A	52 (1,321) 54 (1,372) 54 (1,372)	23 (584) 25 (635) 26 (660)	17 (432) 19 (482) 19 (482)	9.4 (239) 9.4 (239) 14 (356)	160 (73) 220 (100) 380 (173)
27 & 38kV 1,200A 2,500A 4,000A	59 (1,499) 61 (1,549) 61 (1,549)	28 (711) 30 (762) 30 (762)	22 (559) 24 (609) 24 (609)	9.4 (239) 9.4 (239) 13.5 (343)	195 (89) 280 (127) 560 (254)

**Other ratings are available. Consult factory.*
Note: Dimensions are approximate. Do not use for construction. Custom configurations requiring less space are available.

FEATURES AND BENEFITS

FEATURES	BENEFITS
Single-phase and three-phase protection	• Use the high-speed remote indication relay contacts (located in the control box) to trip a breaker and interrupt unfaulted phases. No need to replace interrupters in unfaulted phases
Threshold current sensing (Does not use transient susceptible rate of rise current sensing)	• Hardened transient filtering responds to actual current values, not transients or harmonics • Can directly protect capacitor banks and harmonic filters • Consistent peak let-through values, regardless of fault asymmetry level
Field-selectable trigger levels (pick-up)	• Adjust trigger levels in the field to ensure continuing protection as the site characteristics change
Remote enable/disable	• If protection is temporarily not required, it can be remotely disabled. It then acts simply as a busbar. The operation modes are PLC and SCADA adaptable
Remote trip indication	• Three-phase remote indication of operation (within three cycles) provides two Form C contacts for remote monitoring and trip of user's series breaker to prevent single-phasing
Outdoor duty	• Can be installed outdoors without an enclosure or mounted on a pole
No fuse aging associated with transients or inrushes	• No need to replace aging fuses, providing substantial long-term cost savings
Copper busbar	• Lower system losses, resulting in improved reliability. Lower peak let-through, resulting in better current limiting performance

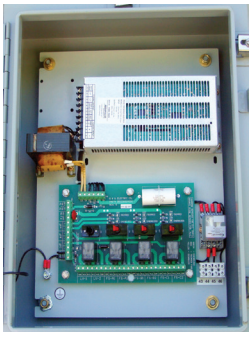
CONVENTIONAL DEVICES VS. CLiP

		DESIGN CONSIDERATIONS
Conventional Fault-Interrupting Devices	Current-Limiting Fuse	• Reduced current-limiting capabilities at low-level fault currents • Motor starts, lightning surges and heavy transients may damage traditional fuse elements or change their response, requiring replacement • No status feedback available
	Expulsion Fuse	• Emits blasts when clearing faults and ineffective in limiting let-through energy • Lower-level fault currents may partially melt the fuse, resulting in failure or limited performance if not known or replaced • No status feedback available
	Circuit Breaker	• Much slower clearing times allow for far greater energy let-through and requires maintenance • Requires an external device (relay) to send the operational signal, which delays the circuit interruption
Conventional Current-Limiting Devices	Current-Limiting Reactor	• Large size often does not fit in retrofit applications • Adds to system losses (internal resistance in mohm range) during normal operation • Blocks VARS transfer out of generators • No status feedback available
	Three-Phase Earthing Switch	• Large size often does not fit in retrofit applications • Eliminates the arc by inducing a bolted fault on the system, which adds stresses to the entire electrical system • Equipment lifespan may be reduced

OPTIONS

- The field test unit provides verification and proper operation of CLiP installation
- Redundant sending and firing logic units provide a second unit per phase, with independent sending and triggering capability
- CLiP simulation verifies the customer's system conditions prior to activating the interrupters
- An enable/disable relay provides the customer with a means of remotely disabling CLiP when its protective capabilities are not required
- Power-coated IP32 or NEMA 3R enclosures are available
- D.C. to A.C. inverter converts virtually any D.C. voltage to A.C. as required by CLiP controls

Field test unit and redundant sensing and firing logic



Control box with inverter

APPLICATIONS

Typical applications for CLiP include:

- Refineries
- Military installations
- Generating stations
- Shipboard
- Distribution networks
- Wind and solar
- Chemical plants
- Paper mills
- Capacitor banks
- Universities
- Distributed generation
- Hospitals
- Cement plants
- Steel mills
- Mining and smelting
- Oil platforms and FPSOs

CLiP used in a large offshore deepwater oil platform

CLiP installed in a generating station at a large southeastern university

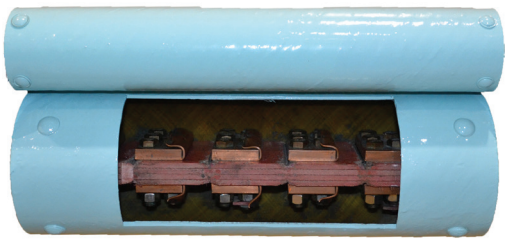
CLiP protecting the substation of a midwestern windfarm

HOW CLiP OPERATES

Upon occurrence of a short circuit current:

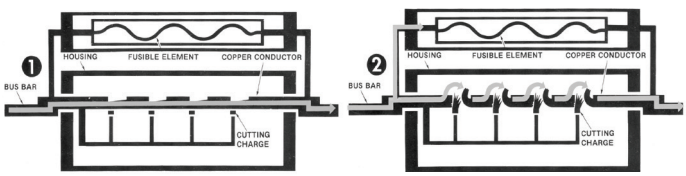
- A sensing unit actuates a linear cutting device
- This segments the copper conductor in a number of fractional lengths and bends them upward, forming multiple gaps
- Arcs form at these gaps and resultant arc voltage causes transfer of the short circuit current to a small, parallel current limiting fuse
- The fuse melts and clears the circuit
- Current extinction occurs in the first half loop and limitation prior to the first peak
- Reliable interruption is assured without venting of ionized gases

Note the multiple breaks in the main current path to provide faster commutation of fault current to the current limiting fuse element, while providing improved dielectric withstand.



Close up of the severed main conductor and melted current limiting element of a 3000A (double bus) CLiP after interruption

Operation Sequence



Contact us today

708.388.5010 or info@gwelec.com

G&W Electric

Engineered to order. Built to last.

Since 1905, G&W Electric has been a leading provider of innovative power grid solutions, including the latest in load and fault interrupting switches, reclosers, system protection equipment, power grid automation and transmission and distribution cable terminations, joints and other cable accessories. G&W is headquartered in Bolingbrook, Illinois, U.S.A., with manufacturing facilities and sales support in more than 100 countries, including China, Mexico, Canada, UAE, India, Singapore and Brazil. We help our customers meet their challenges and gain a competitive edge through a suite of advanced products and technical services.

gwelec.com

GW10-2019 05/2019