Fault Tamer® Fuse Limiter

Low-spark operation reduces fire hazards, while current-limiting technology provides higher reliability.

Combines the technology of an expulsion fuse and current limiting into one package.

Fault Tamer Fuse Limiter

Each year, utilities are faced with a challenge to improve power reliability for their customers. This requires utilities to take a new look at their normal operations and identify common problems they may have considered unfixable in the past.

One such problem is when a miscoordination causes a fuse to operate on a lateral line. This happens when a fault occurs, such as one caused by a flashover from wildlife, at a distribution transformer, and both the distribution transformer and lateral fuses operate. The impact of this miscoordination is an unnecessary sustained outage for all customers fed from the lateral line rather than just those customers fed from the distribution transformer. In addition, the utility must send a truck out to identify the fault location, and the crew has to replace two fuses before restoring power, adding to utility maintenance and operation costs.

The reason these miscoordinations exist is because utilities historically have found it almost impossible to achieve complete fuse-link-to-fuse-link coordination close to substations, where fault currents can be high.

This is why S&C invented the Fault Tamer Fuse Limiter, which combines the function of a conventional fuse with the benefits of a current-limiting fuse. The Fault Tamer Fuse Limiter is an energy-limiting fault-interrupting device that provides tighter coordination with upstream lateral fuses. It fits into existing S&C mountings with no additional hardware or expensive modifications required, allowing it to be added to any overhead distribution transformer installation.

For example, a 20K fuse link will not coordinate with a 65K fuse link above 2,400 amperes. See Figure 1. The fast clearing characteristics of the Fault Tamer Fuse Limiter provide complete coordination with fuses even at high levels of available fault current. In fact, the Fault Tamer Fuse Limiter coordinates with fuses having ampere ratings as low as 40K. See Figure 2.

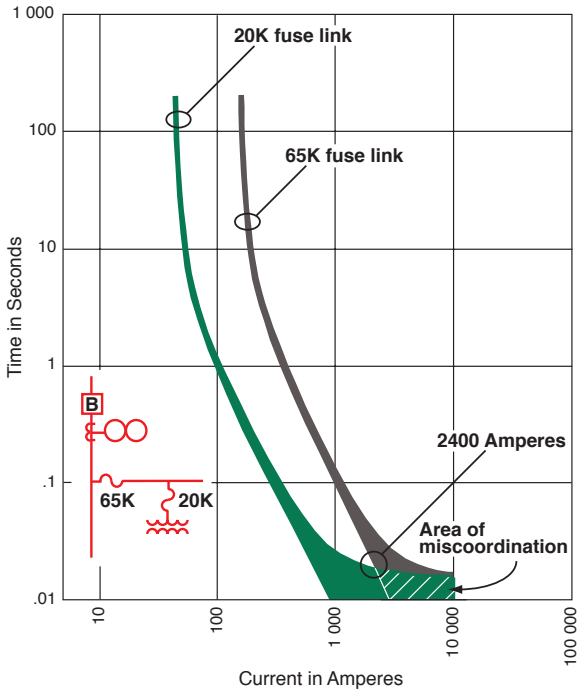


Figure 1. Limited coordination of a transformer fuse with a lateral fuse.

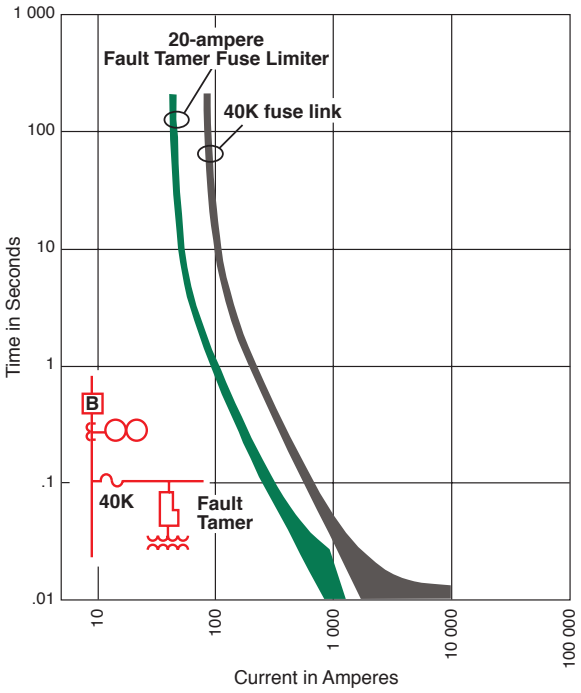


Figure 2. Complete coordination of a Fault Tamer Fuse Limiter with a lateral fuse.

The current-limiting ability of the Fault Tamer Fuse Limiter provides an additional benefit for wildfire and bushfire mitigation. As utilities grow increasingly concerned about wildfire risks, they are looking to reduce spark-intensive equipment that can start wildfires, which endanger their customers, finances, and reputation.

Because the Fault Tamer Fuse Limiter uses significantly less energy for its operation, it produces minimal debris during an operation compared to a fuse. The minimal debris creates less of a spark during fault-clearing, offering an alternative for utilities increasingly concerned about the operation of fuse cutouts during fault interruption on high fire-risk days.

The Fault Tamer Fuse Limiter is the only device that is low-spark and current-limiting, and it economically fits into the existing grid infrastructure. It is ideally suited for single-phase transformers, three-phase banks of single-phase transformers, and three-phase transformers.

★ The Fault Tamer meets spark protection classes defined in AS 1033.1-1990.

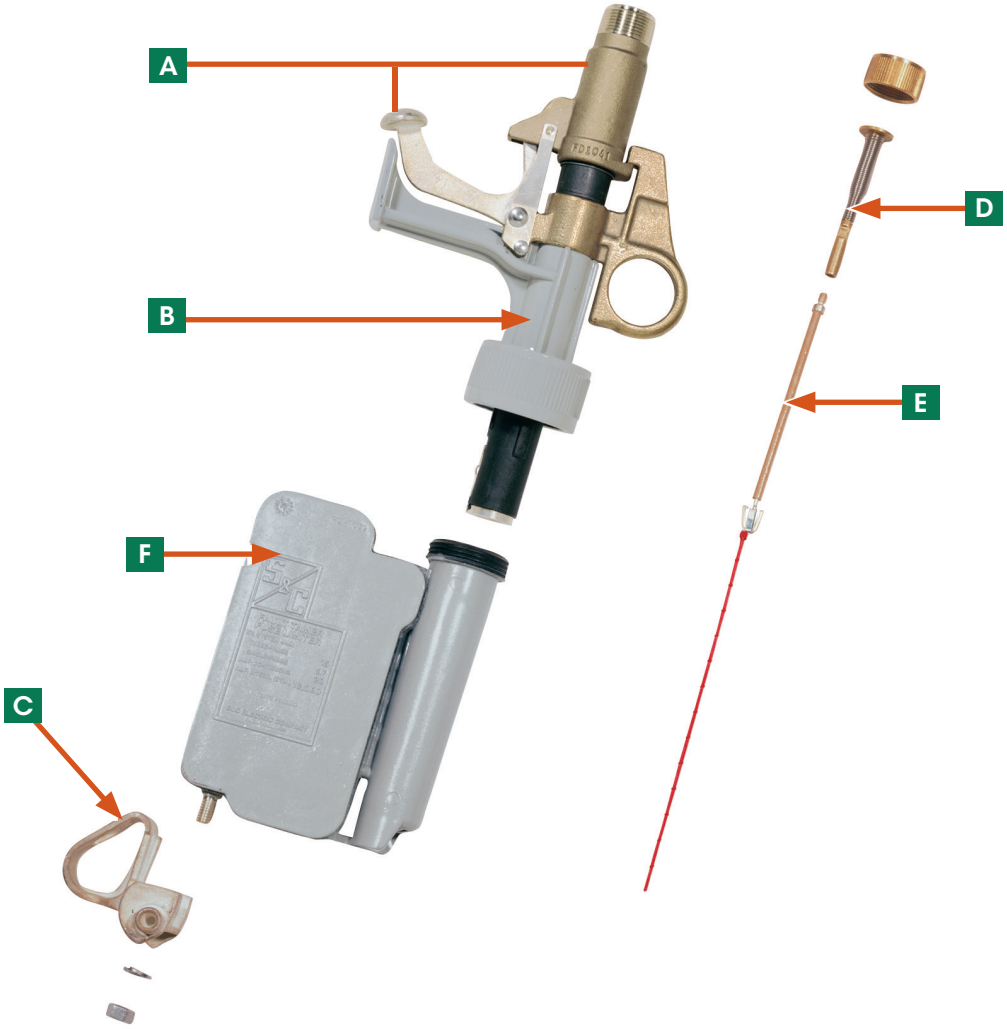
Class	Maximum number of sparks during test
A	0
B	1
C	Unrestricted

COMPACT PACKAGE

LIMITS CURRENT

SPARK PROTECTION CLASS A★

Construction



A **Dropout mechanism** — Provides line crews a visible dropout indication of operation

B **Fuse tube** — Houses the fuse cartridge

C **Trunnion** — Allows for ease of installation and removal

D **Spring-and-cable-loaded assembly** — Stainless steel spring provides high-speed elongation of an arc when the fuse cartridge operates (The copper cable inside the spring carries load (and fault) current.)

E **Fuse cartridge** — Operates and clears faults up to 970 amperes

F **Backup limiter** — Operates and clears high-magnitude faults above 970 amperes

Handling

The Fault Tamer Fuse Limiter has been designed to retrofit into any 15-kV or 27-kV Type XS Fuse Cutout mounting. A Fault Tamer Fuse Limiter that has operated can be easily identified from the ground because it drops open. Both the fuse tube and the backup limiter can be quickly removed from the mounting with a telescoping hot stick.

Re-fusing

Re-fusing is quick and easy. Backup limiters are offered in only one ampere rating size: 20 amperes. Fuse cartridges have ratings of 3, 5, 7, 10, 15, and 20 amperes, and all are specifically designed to coordinate with the 20-ampere backup limiter. The backup limiter and fuse cartridge cannot be mismatched, which is possible when fuse cutouts and backup current-limiting fuses are used. Warehouse and line truck stocking problems are kept to a minimum.

Designed for Loadbuster®—The S&C Loadbreak Tool

The Fault Tamer Fuse Limiter is also designed to work perfectly with Loadbuster—The S&C Loadbreak Tool. The Loadbuster tool switching helps keep service interruptions to a minimum. Live switching can be done at the point that minimizes the length of planned outages and at the point where the fewest customers will be involved.

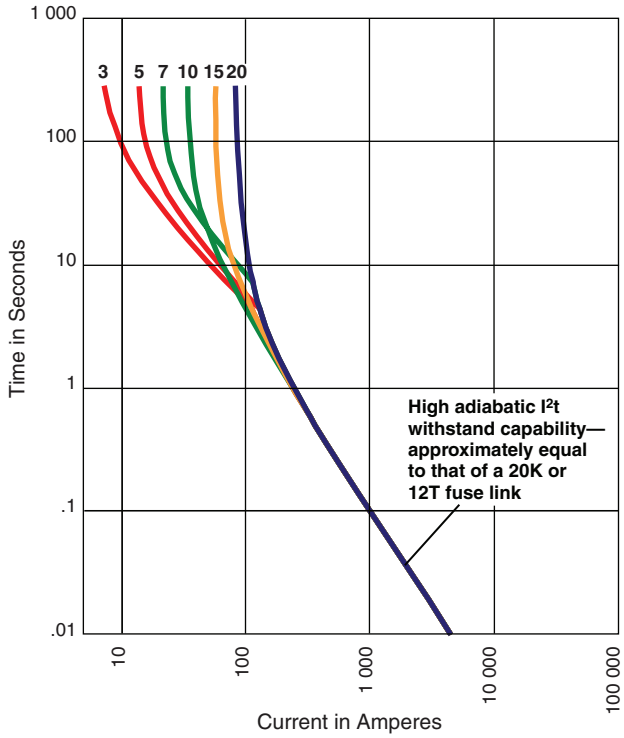


Figure 3. Fault Tamer Fuse Limiter cartridges provide excellent transformer protection and less than 1% probability of operation due to lightning surges.

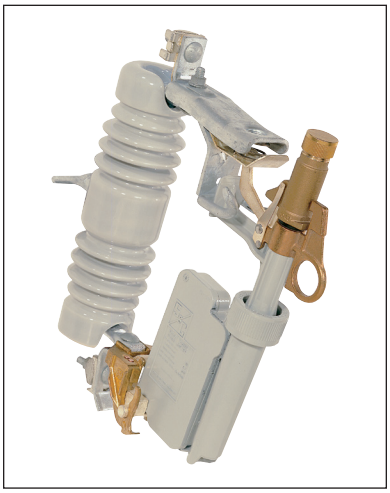


Figure 4. Catalog number 98021-D rated for 15-kV, 110-kV BIL systems. Also available with composite-polymer silicone insulator.

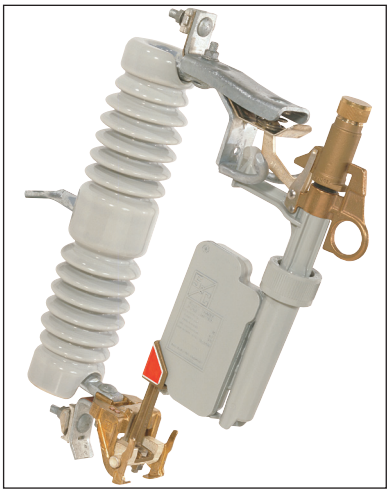


Figure 5. Catalog number 98072-D rated for 15-kV, 125-kV BIL systems. Includes extension adapter to allow 15-kV Fault Tamer Fuse Limiter components to be installed in 25-kV mounting.

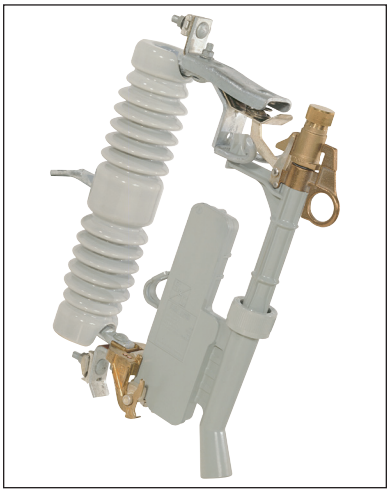


Figure 6. Catalog number 98022-D rated for 25-kV, 125-kV BIL systems.

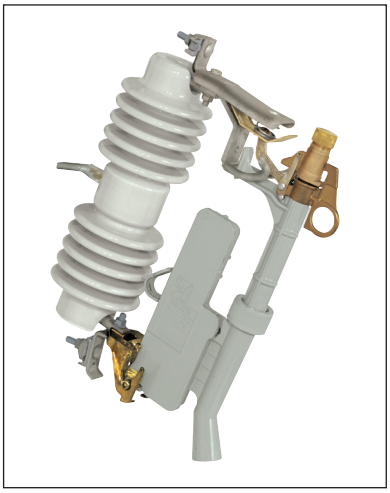


Figure 7. Catalog number 98052-D rated for 25-kV, 150-kV BIL systems. Similar in appearance to catalog number 98044-D rated for 25-kV, 150-kV BIL mounting on solidly grounded neutral (multi-grounded neutral) 34.5-kV systems. Both models are available with composite-polymer silicone insulator.

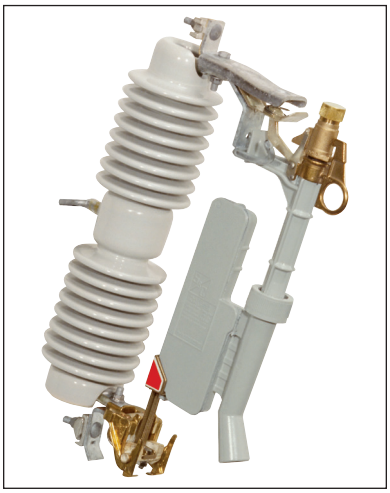


Figure 8. Catalog number 98053-D rated for 25-kV, 150-kV BIL systems. Includes an extension adapter for use in a 25-kV mounting with a porcelain insulator having a 26-inch (660-mm) leakage distance to ground or a composite-polymer silicone insulator having a 30-inch (762-mm) leakage distance to ground.

A Note on System Voltage Rating

A Fault Tamer Fuse Limiter should be selected so its system maximum three-phase voltage rating is equal to or greater than the system line-to-line voltage. To ensure proper coordination of a Fault Tamer Fuse Limiter with system surge arresters, the system voltage also should not be too low relative to the fuse limiter's system voltage class rating. To satisfy both of these requirements, the following specific system-voltage and minimum-surge-arrester recommendations should be observed:

Table 1. System Voltage and Minimum Surge Arrester Recommendations

S&C Fault Tamer System Voltage Class Rating, kV, ANSI (IEC)	Applicable 60-Hz System Voltage, kV	Applicable 50-Hz System Voltage, kV	Minimum Surge Arrester Rating, kV
15 (12)	10 through 15	10 through 15	9
25 (24)	22 through 29	20 through 26	18

Table 2. Fault Tamer Fuse Limiter①—For new installations.

Rating								Leakage Distance to Ground Minimum, Inches (mm)	Catalog Number	
Voltage, kV						Amperes, RMS				
System Class, ANSI (IEC)	System Maximum				BIL	Max	Interr., Sym.		Porcelain Insulator	Polymer Insulator
	60 Hz		50 Hz							
	Three-Phase②	Phase-to-Neutral	Three-Phase②	Phase-to-Neutral						
15 (12) (see Figure 4)	15	8.7	15	8.7	110	20	12 000	8½ (216)	98021	98021-P
15 (12) (see Figure 5)	15	8.7	15	8.7	125	20	12 000	11 (279)	98072●	—
25 (24) (see Figure 6)	29	16.8	26	15.1	125	20	12 000	11 (279)	98022	—
25 (24) (see Figure 7)	29	16.8	26	15.1	150	20	12 000	17 (432)	98052	98052-P
25 (24) (see Figure 8)	29	16.8	26	15.1	150	20	12 000	26 (660)	98053■▲	98053-P■
22/38 (20.8/36)	—	22	—	20.8	150	20	12 000	17 (432)	98044▲	98044-P◆

① TCC No. 450-8. Includes mounting, backup limiter, and fuse tube (less mounting bracket, connectors, and Fault Tamer Fuse Limiter fuse cartridge).

② Also applies to phase-to-phase applications. Applications involving single-phase transformers connected phase to phase, as well as three-phase applications require the use of a Fault Tamer Fuse Limiter in each lead.

● Includes an extension adapter for use in mounting with a porcelain insulator having 11-inch (279 mm) leakage distance to ground.

■ Includes an extension adapter for use in mounting with porcelain insulator having 26-inch (660-mm) leakage distance to ground, or a composite-polymer silicone insulator having a 30-inch (762-mm) leakage distance to ground.

▲ Meets 170-kV BIL rating requirement of IEC Publication 282-2.

◆ Applicable only for protection of single-phase transformers in solidly grounded-neutral (multi-grounded-neutral) 34.5-kV systems. Uses a 29-kV, 150-kV BIL mounting.

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