

Fusing Equipment

Electrical Apparatus

240-71

ELF-LR™ Current-Limiting Fuse

GENERAL

The Cooper Power Systems ELF-LR™ Current-Limiting Fuse is a full range current-limiting fuse that is suitable for use in areas where a high-fire hazard exists. ELF-LR liquid fuse replacements are noiseless and expel no hot gases or burning particles while performing fault current interruptions.

The ELF-LR fuse has been granted permanent exemption by the California Dept. of Forestry and Fire Protection from the pole clearance requirements when mounted in the field according to manufacturer's specifications. The ELF-LR fuse meets the exemption requirements listed specifically in the California Code of Regulations, Title 14, Section 1255 (10).

ELF-LR fuses are designed to protect pole-type transformers, single-phase and three-phase laterals and underground taps.

The full range current-limiting rating ensures reliable operation of all overloads and fault currents. The element construction consists of two separate sections (low-current section and high-current section) which are self-contained in one housing. The low-current section provides consistent, reliable clearing of all currents high enough to melt the element. The high-current section is a punched-hole ribbon design that controls peak arc voltage levels and limits both current and energy (I^2t) let-through levels during high-current fault clearing operation.

PRODUCTION TESTS

Tests are conducted on 100% of production in accordance with Cooper Power Systems requirements.

- Physical Inspection
- I^2t Testing
- Resistance Testing
- Helium Mass Spectrometer Leak Testing



Figure 1.
ELF-LR Current-Limiting Fuse.

TABLE 1
Electrical Ratings and Characteristics

Fuse Ratings		Mount Rating Voltage (kV)	Continuous Current Ratings (A)*			Minimum Melt I^2t (A ² -s)	Maximum Clear I^2t (A ² -s)	Maximum Current Interrupting (A rms symmetrical)
Voltage (kV)	Current (A)		25°C	40°C	55°C			
8.3/13.2	6	7.2	8	7	6	520	4000	50,000
8.3/13.2	8	7.2	12	11	11	1150	5000	50,000
8.3/13.2	12	7.2	18	17	16	1150	5000	50,000
8.3/13.2	18	7.2	25	24	23	1350	8000	50,000
8.3/13.2	20	7.2	27	26	25	2000	10000	50,000
17.2/23	6	15	8	7	6	520	4000	43,000
17.2/23	8	15	12	11	11	1150	5000	43,000
17.2/23	12	15	18	17	16	1150	5000	43,000
17.2/23	18	15	25	24	23	1350	8000	43,000
17.2/23	20	15	27	26	25	2000	10000	43,000

* For temperatures other than listed, a deration factor of 0.26% per °C can be applied.

INSTALLATION

The ELF-LR fuse is designed to be mounted in a 15 kV liquid fuse-specific, bushing-style mounting, such as the S & C G-3942. Please review fuse mounting manufacturer's instructions for details, as well as instruction sheet S240-71-1, included with every shipment of fuses.

OPERATION

The ELF-LR fuse contains a blue cap to cover an orange indicating band on the upper part of the fuse. When the fuse operates, a striker pin is fired, dislodging the blue cap and exposing the indicator band.

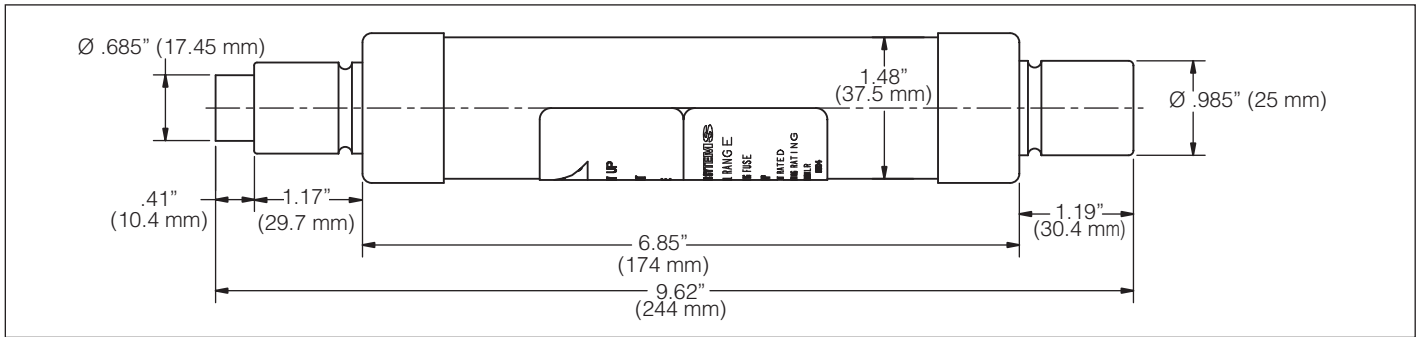


Figure 2.
8.3/13.2 kV ELF-LR Fuse.

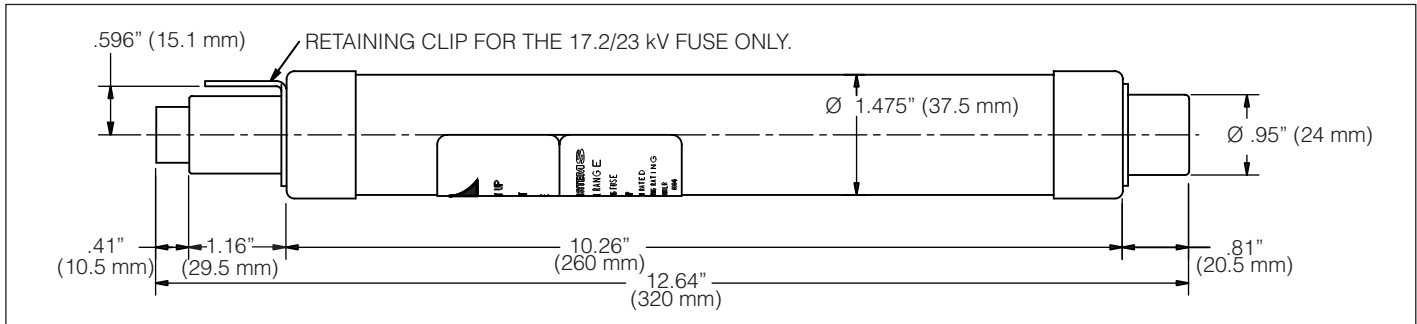


Figure 3.
17.2/23 kV ELF-LR Fuse.

TABLE 2
ELF-LR Current-Limiting Fuse Catalog
Numbers

Fuse Ratings		Mount Rating Voltage (kV)	ELF-LR Fuse Catalog No.
Voltage (kV)	Current (A)		
8.3/13.2	6	7.2	FAK81W6LR
8.3/13.2	8	7.2	FAK81W8LR
8.3/13.2	12	7.2	FAK81W12LR
8.3/13.2	18	7.2	FAK81W18LR
8.3/13.2	20	7.2	FAK81W20LR
17.2/23	6	15	FAK71W6LR
17.2/23	8	15	FAK71W8LR
17.2/23	12	15	FAK71W12LR
17.2/23	18	15	FAK71W18LR
17.2/23	20	15	FAK71W20LR

ORDERING INFORMATION

To order a Cooper Power Systems ELF-LR Current-Limiting Fuse, determine the requirements of the application, and specify the required fuse from Table 2.

ADDITIONAL INFORMATION

Refer to the following reference literature for application recommendations:

R240-91-47 ELF-LR Fuse Time-Current Characteristic Curves

CP-0305 ELF-LR Certified Test Report

Contact your Cooper Power Systems representative for further information.

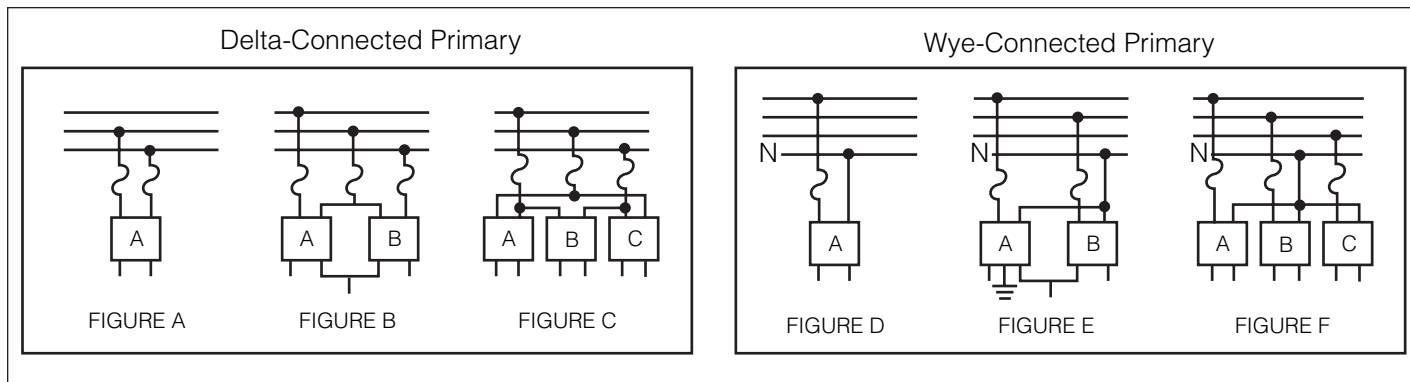


Figure 4.
Schematic of primary voltage system connections.

TABLE 3
Recommendations for Distribution Transformers in Single-Phase Applications

Fuse Voltage	8.3/13.2 kV		8.3/13.2 kV		8.3/13.2 kV		8.3/13.2 kV	
System Voltage	2400 Δ		2400/4160 Y		4800 Δ		4800/8320 Y	
Single-Phase Transformer Size (kVA)	Figure A		Figure D		Figure A		Figure D	
	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating
10	4.17	6	4.17	6	2.08	6 ^a	2.08	6 ^a
15	6.25	12 ^a	6.25	12 ^a	3.13	6	3.13	6
25	10.42	18	10.42	18	5.21	8	5.21	8
37.5	15.63	20	15.63	20	7.81	12 ^a	7.81	12 ^a
50	20.83	—	20.83	—	10.42	18	10.42	18
75	31.25	—	31.25	—	15.63	20	15.63	20
100	41.67	—	41.67	—	20.83	—	20.83	—
167	69.58	—	69.58	—	34.79	—	34.79	—
250	104.17	—	104.17	—	52.08	—	52.08	—
333	138.75	—	138.75	—	69.38	—	69.38	—
Fuse Voltage	8.3/13.2 kV		8.3/13.2 kV		8.3/13.2 kV		8.3/13.2 kV	
System Voltage	7200 Δ		7200/12470 Y		7620/13200 Y		12000 Δ	
Single-Phase Transformer Size (kVA)	Figure A		Figure D		Figure D		Figure A	
	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating
10	1.39	6 ^a	1.39	6 ^a	1.31	6 ^a	0.83	06 ^a
15	2.08	6 ^a	2.08	6 ^a	1.97	6 ^a	1.25	06 ^a
25	3.47	6	3.47	6	3.28	6	2.08	06 ^a
37.5	5.21	8	5.21	8	4.92	8	3.13	6
50	6.94	12 ^a	6.94	12 ^a	6.56	12 ^a	4.17	6
75	10.42	18	10.42	18	9.84	18 ^a	6.25	12 ^a
100	13.89	20	13.89	20	13.12	18	8.33	12
167	23.19	—	23.19	—	21.92	—	13.92	20
250	34.72	—	34.72	—	32.81	—	20.83	—
333	46.25	—	46.25	—	43.70	—	27.75	—
500	69.44	—	69.44	—	65.62	—	41.67	—
Fuse Voltage	17.2/23 kV		17.2/23 kV					
System Voltage	13200 Δ		14400 Δ					
Single-Phase Transformer Size (kVA)	Figure A		Figure A					
	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating				
10	0.76	6 ^a	0.69	6 ^a				
15	1.14	6 ^a	1.04	6 ^a				
25	1.89	6 ^a	1.74	6 ^a				
37.5	2.84	6 ^a	2.60	6 ^a				
50	3.79	6	3.47	6				
75	5.68	8	5.21	8				
100	7.58	12 ^a	6.94	12 ^a				
167	12.65	18	11.60	18				
250	18.94	—	17.36	—				
333	25.23	—	23.13	—				
500	37.88	—	34.72	—				

Notes:
 Recommended fuse ratings are based on the use of Cooper Power Systems ELF-LR fuse time-current characteristics in R240-91-47.
 Recommendations provide overload protection (fusing ratio) between 200-300% rated load.
 Fusing Ratio = Fuse Min. Melt Current at 300 sec./Transformer Full Load Current x 100
 a - Fuse allows more than 300% load for 300 seconds.

TABLE 4
Recommendations for Distribution Transformers in Three-Phase Applications

Fuse Voltage	8.3/13.2 kV				8.3/13.2 kV		8.3/13.2 kV				8.3/13.2 kV	
System Voltage	2400 Δ				2400/4160 Y		4800 Δ				4800/8320 Y	
Single-Phase (kVA)	Figure B*		Figure C		Figure E* and F		Figure B*		Figure C		Figure E* and F	
	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating
10	4.17	6	7.22	12 ^a	4.17	6	2.08	6 ^a	3.61	6	2.08	6 ^a
15	6.25	12 ^a	10.83	18	6.25	12 ^a	3.13	6	5.41	8	3.13	6
25	10.42	18	18.04	-	10.42	18	5.21	8	9.02	12	5.21	8
37.5	15.63	20	27.06	-	15.63	20	7.81	12	13.53	18	7.84	12
50	20.83	-	36.09	-	20.83	-	10.42	18	18.04	-	10.42	18
75	31.25	-	54.13	-	31.25	-	15.63	20	27.06	-	15.63	20
100	41.67	-	72.17	-	41.67	-	20.83	-	36.08	-	20.83	-
167	69.58	-	120.28	-	69.58	-	34.79	-	60.14	-	34.79	-
250	104.17	-	180.42	-	104.17	-	52.08	-	90.21	-	52.08	-
333	138.75	-	240.56	-	138.75	-	69.38	-	120.28	-	69.38	-
Fuse Voltage	8.3/13.2 kV				8.3/13.2 kV		8.3/13.2 kV		17.2/23 kV			
System Voltage	7200 Δ				7200/12470 Y		12000 Δ		7620/13200 Y			
Single-Phase (kVA)	Figure B*		Figure C		Figure E* and F		Figure C		Figure E* and F		Figure B*	
	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating
10	1.39	6 ^a	2.41	6 ^a	1.39	6 ^a	1.44	06 ^a	1.31	6 ^a	0.83	06 ^a
15	2.08	6 ^a	3.61	6	2.08	6 ^a	2.17	06 ^a	1.97	6 ^a	1.25	06 ^a
25	3.47	6	6.01	8	3.47	6	3.61	6	3.28	6	2.08	06 ^a
37.5	5.21	8	9.02	12	5.21	8	5.41	8	4.92	8	3.13	6
50	6.94	12 ^a	12.03	18	6.94	12 ^a	6.56	12 ^a	4.17	6	7.22	12 ^a
75	10.42	18	18.04	-	10.42	18	10.83	18	9.84	18 ^a	6.25	12 ^a
100	13.89	20	24.06	-	13.89	20	14.43	20	13.12	18	8.33	12
167	23.19	-	40.10	-	23.19	-	24.06	-	21.92	-	13.92	20
250	34.72	-	60.14	-	34.72	-	36.08	-	32.81	-	20.83	-
333	46.25	-	80.19	-	46.25	-	48.11	-	43.70	-	27.75	-
500	69.44	-	120.28	-	69.44	-	72.17	-	65.62	-	41.67	-
Fuse Voltage	17.2/23 kV				17.2/23 kV		17.2/23 kV		17.2/23 kV			
System Voltage	13200 Δ				14400 Δ		14400 Δ		14400 Δ			
Single-Phase (kVA)	Figure B*		Figure C		Figure B*		Figure C		Figure B*		Figure C	
	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating	Rated Amps	Fuse Rating
10	0.76	6 ^a	1.39	6 ^a	0.69	6 ^a	1.20	6 ^a	0.69	6 ^a	0.69	6 ^a
15	1.14	6 ^a	1.97	6 ^a	1.04	6 ^a	1.80	6 ^a	1.04	6 ^a	1.04	6 ^a
25	1.89	6 ^a	3.28	6	1.74	6 ^a	3.01	6	1.74	6 ^a	1.74	6 ^a
37.5	2.84	6 ^a	4.92	8	2.60	6 ^a	4.51	8	2.60	6 ^a	2.60	6 ^a
50	3.79	6	6.56	12 ^a	3.47	6	6.01	8	3.47	6	3.47	6
75	5.68	8	9.84	18 ^a	5.21	8	9.02	12	5.21	8	5.21	8
100	7.58	12	13.12	-	6.94	12 ^a	12.03	18	6.94	12 ^a	6.94	12 ^a
167	12.65	18	21.87	-	11.60	18	20.05	-	11.60	18	11.60	18
250	18.94	-	32.80	-	17.36	-	30.07	-	17.36	-	17.36	-
333	25.23	-	43.74	-	23.13	-	40.09	-	23.13	-	23.13	-
500	37.88	-	65.61	-	34.72	-	60.14	-	34.72	-	34.72	-

Notes:
 * The recommended fuse sizes for this connection are based on equal size transformers in the bank. If a larger transformer is used in the bank for supplying single-phase loads, the fuse selections should be based on the larger transformer kVA.
 Recommended fuse ratings are based on the use of Cooper Power Systems ELF-LR fuse time-current characteristics in R240-91-47.
 Recommendations provide overload protection (fusing ratio) between 200-300% rated load.
 Fusing Ratio = Fuse Min. Melt Current at 300 sec./Transformer Full Load Current x 100
 a - Fuse allows more than 300% load for 300 seconds.

ISO 9001:2000-Certified Quality Management System

