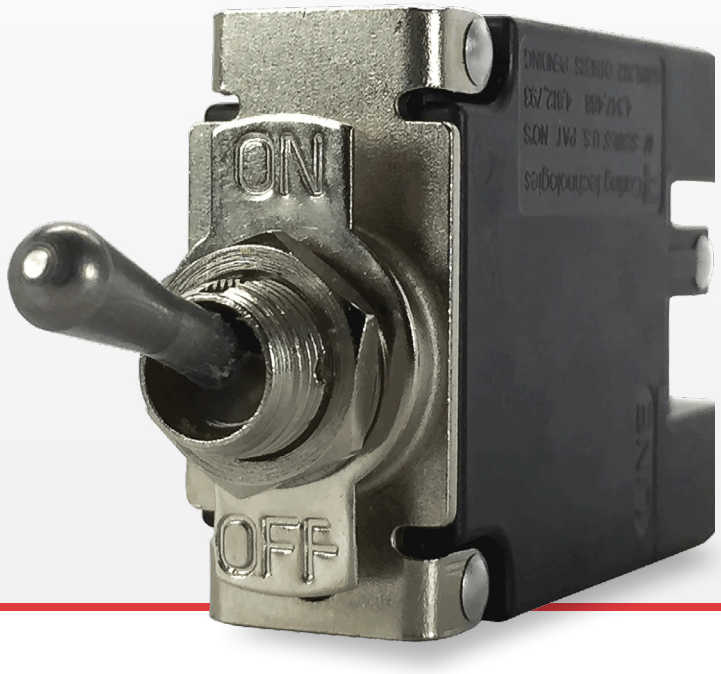
Littelfuse® | Carling Technologies®
A Littelfuse® Brand

MS-Series

Hydraulic-Magnetic Circuit Breaker

PRODUCT WEBPAGE

request sample, configure part, watch video





Sealed Metal Toggle

The MS-Series hydraulic-magnetic circuit breaker with sealed metal toggle actuator is compact in size, but ruggedly designed to meet IP68 requirements and MIL-PRF-39019F ingress protection when panel mounted. Additionally, it is MIL-PRF-55629 and MIL STD 202 compliant, making it ideal for COTS military applications, crucial communication equipment and other mission critical components. MS-Series breakers are available as a one to three pole configuration with ratings from 0.02 to 30 amps, up to 240VAC/65VDC and 3,000 amps max IC.

1-3	0.20-30	120/250	65
Poles	Amps	VAC	VDC

Typical Applications

- Vehicles
- Communication Equipment
- Generators
- Power Supplies

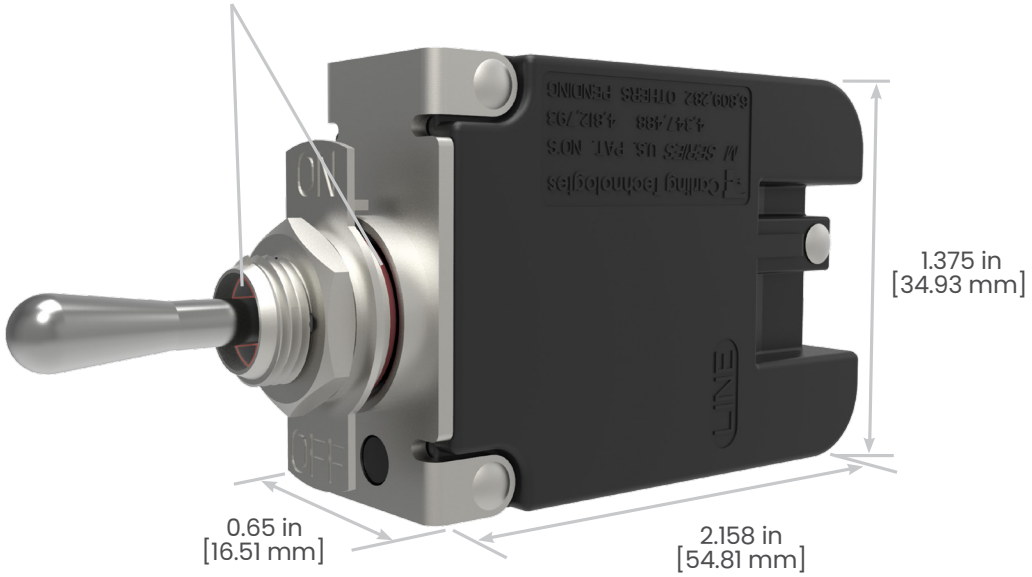
www.carlingtech.com 860.793.9281 sales@carlingtech.com

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Design Features

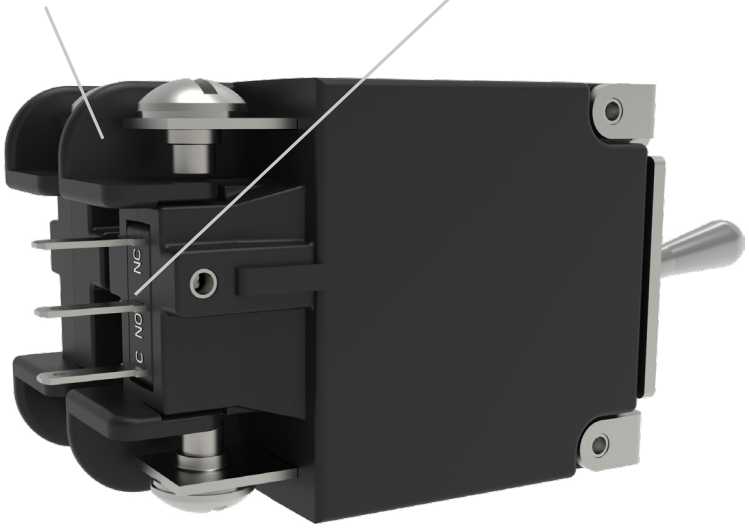
SEALS
IP68 Designed and tested to comply with MIL-PRF-39019F Ingress Protection

COMPACT SIZE
Max performance in compact size: 0.20-30 Amps; 65 VDC, 240 VAC 120/240 VAC



TERMINAL BARRIERS
Meet UL 1077 Spacing Requirements

OPTIONAL AUXILIARY SWITCH
Provides Breaker Status Indication



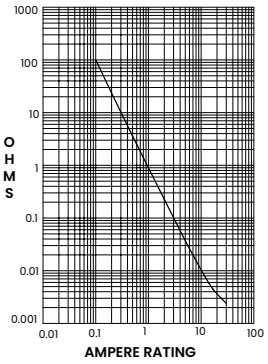
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Tech Specs

Electrical

Current Ratings	.02 - 30 Amps
Voltage Ratings	65VDC, 240VAC, 120/240VAC
Short Circuit Rating	See Table A
Auxiliary Switch Rating	5A @ 125VAC, 3A @ 32VDC, .1A @ 125VAC, 32VDC
Dielectric Strength	UL,CSA 1500V, 50/60 Hz for one minute between all electrically isolated terminals.
Insulation Resistance	Minimum of 100 Megohms @ 500VDC
Time Delay Impedance	See delay curve

RESISTANCE, IMPEDANCE VALUES
from Line to Load Terminals
(Values Based on Series Trip Circuit Breaker)



CURRENT (AMPS)	TOLERANCE (%)
0.20 - 30.0	25

Physical

Number of Poles	1-3 poles
Weight	Approximately 1.8 oz (50 G) per pole
Dimensions	See dimensional specs

Agency Certification

UL Standard 1077
cRUus Standard C22.2
TUV Certified

Mechanical

Current Ratings	10,000 ON-OFF operations @ 6 per minute; with rated Current & Voltage.
Trip Free	Trips on short circuit and overload, even when the actuator is forcibly held in the "On" position.
Trip Indication	The operating handle moves positively to the "Off" position when a short circuit or overload causes the circuit breaker to trip.

Environmental

Designed in accordance with requirements of specification MIL PRF-55629 & MIL-STD-202G as follows:

Shock	Withstands 100G's, 6ms, saw tooth while carrying rated current per Method 213, Condition I. Instantaneous curves tested at 80% of rated current.
Vibration	Withstands 0.060" excursion from 10-55 Hz, and 10G's 55-500 Hz, at rated current per Method 204C, Test Condition A. Instantaneous curves tested at 80% of rated current.
Salt Spray	Method 101, Condition A (90-95% RH @ 5% NaCl Solution, 96 hrs)
Moisture Resistance	Method 106G
Thermal Shock	Method 107D, Condition A (Five cycles @ -55°C to +25°C to +85°C to +25°C
Operating Temperature	-40°C to +85°C
Ingress Protection Level	MIL-PRF-55629C when mounted in panel.
Other	Materials used in this product are non-nutrient to fungus growth.

Time Delay Specs

To view all hydraulic-magnetic circuit breaker time delay values, please visit www.carlingtech.com/sites/default/files/documents/Carling-HM-CB-Time-Delays.pdf

Tables

Table A: Lists UL & cRUus Configuration & Performance Capabilities

Component Supplementary Protectors									
Circuit Configuration	Voltage			Current Rating	Poles Breaking	Short Circuit Capacity (Amps)[1]			
						UL / cRUus		TUV	
	Max Rating	Frequency	Phase	General Purpose Amps		U1	U3	Inc[2]	Icn
Series	65	DC	---	0.02 - 30	1	3000	300	3000	300
	240	50 / 60	1	0.02 - 30	1, 2	2000	300	3000	300
	120 / 240	50 / 60	1	0.02 - 30	2 or 3	2000	300	3000	300

Notes:

1 Short Circuit Current Rating (SC) Codes — The short-circuit current rating, followed by a letter and number designating the test conditions and any calibration following the short-circuit test as defined below:
U - Indicates that the short circuit test was performed without a series fuse
1 - Indicates that a re-calibration was not performed as part of the short circuit testing
3 - Indicates that the protector has proven to be suitable for further use after the short circuit test
Re-calibration, dielectric strength and voltage withstand tests were performed after the short circuit testing
2 - Inc rating obtained with a 50 Amp type gL fuse

*Manufacturer reserves the right to change product specification without prior notice.

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Ordering Scheme

Sample Part Number	M	S	1	-	B	-	14	-	615	-	C	-	1	C	B	-	A	-	0A	A
Selection	1	2	3		4		5		6		7		8	9	10		11		12	13

1. SERIES

M

2. ACTUATOR [1]

S Sealed Toggle

3. POLES

1 One **2** Two **3** Three

4. CIRCUIT

A Switch Only (no coil) [1,2]
B Series Trip (current)
M Series Trip (current) Aux switch .110 QC x 0.20 QC (silver contacts)
9 Series Trip (current) Aux switch .110 QC x 0.20 QC (gold contacts)

5. FREQUENCY & DELAY

03 DC, 50/60Hz, Switch Only [1]
10 DC, Instantaneous
12 DC, Short
14 DC, Medium
20 50/60Hz Instantaneous
22 50/60Hz Short
24 50/60Hz Medium
30 DC, 50/60Hz Instantaneous
32 DC, 50/60Hz Short
34 DC, 50/60Hz Medium
62 50/60Hz Short, High-inrush [4]
64 50/60Hz Medium, High-inrush [4]
72 DC, Short, High-inrush [4]
74 DC, Medium, High-inrush [4]
92 DC, 50/60Hz Short, High-inrush [4]
94 DC, 50/60Hz Medium, High-inrush [4]

6. CURRENT RATING (AMPERES)

CODE	AMPERES	CODE	AMPERES	CODE	AMPERES	CODE	AMPERES
220	0.200	**295**	0.950	**460**	6.00	**614**	14.00
225	0.250	**410**	1.00	**465**	6.50	**615**	15.00
230	0.300	**512**	1.25	**470**	7.00	**616**	16.00
235	0.350	**415**	1.50	**475**	7.50	**617**	17.00
240	0.400	**517**	1.75	**480**	8.00	**717**	17.50
245	0.450	**420**	2.00	**485**	8.50	**618**	18.00
250	0.500	**522**	2.25	**490**	9.00	**619**	19.00
255	0.550	**425**	2.50	**495**	9.50	**620**	20.00
260	0.600	**527**	2.75	**610**	10.00	**622**	22.00
265	0.650	**430**	3.00	**710**	10.50	**624**	24.00
270	0.700	**435**	3.50	**611**	11.00	**625**	25.00
275	0.750	**440**	4.00	**711**	11.50	**630**	30.00
280	0.800	**445**	4.50	**612**	12.00		
285	0.850	**450**	5.00	**712**	12.50		
290	0.900	**455**	5.50	**613**	13.00		

Notes:
1 Series code "A" only available with delay code "03"
2 Only available when tied to a protected pole
3 Requires a 2 or 3 pole device
4 Only available without agency approvals (Approval Code A)

Configure Complete Part Number > | Browse Standard Parts >

7. TERMINAL

1 Push-On 0.250 Tab (QC)
2 Screw 8-32 (Upturned Lugs)
3 Screw 8-32 (Bus Type)
C Screw Terminal M4 (Upturned Lugs)
E Screw Terminal M4 (Bus Type)
L Solder Lug

8. ACTUATOR & MARKING COLOR

1 Dull Metallic

9. FRONT PANEL HARDWARE

A No Outer Panel Hardware
B Hex Nut, Nickel Plated
C Hex Nut, Nickel Plated with Locking Ring
F Panel Dress Nut, Nickel Plated
G Panel Dress Nut, Nickel Plated with Locking Ring

10. LEGEND PLATE

A No Legend Plate
B On-Off Vertical
C On-Off Horizontal
D I-O Vertical
E I-O Horizontal
F Dual Vertical
G Dual Horizontal

11. BUSHING COLOR

A Nickel Plated / Multipole Version

12. VOLTAGE CODE

0A 65 VDC
0D 240 VAC
0C 120/240 VAC [3]
0N 65 VDC / 120/240 VAC [3]
17 65 VDC / 240 VAC

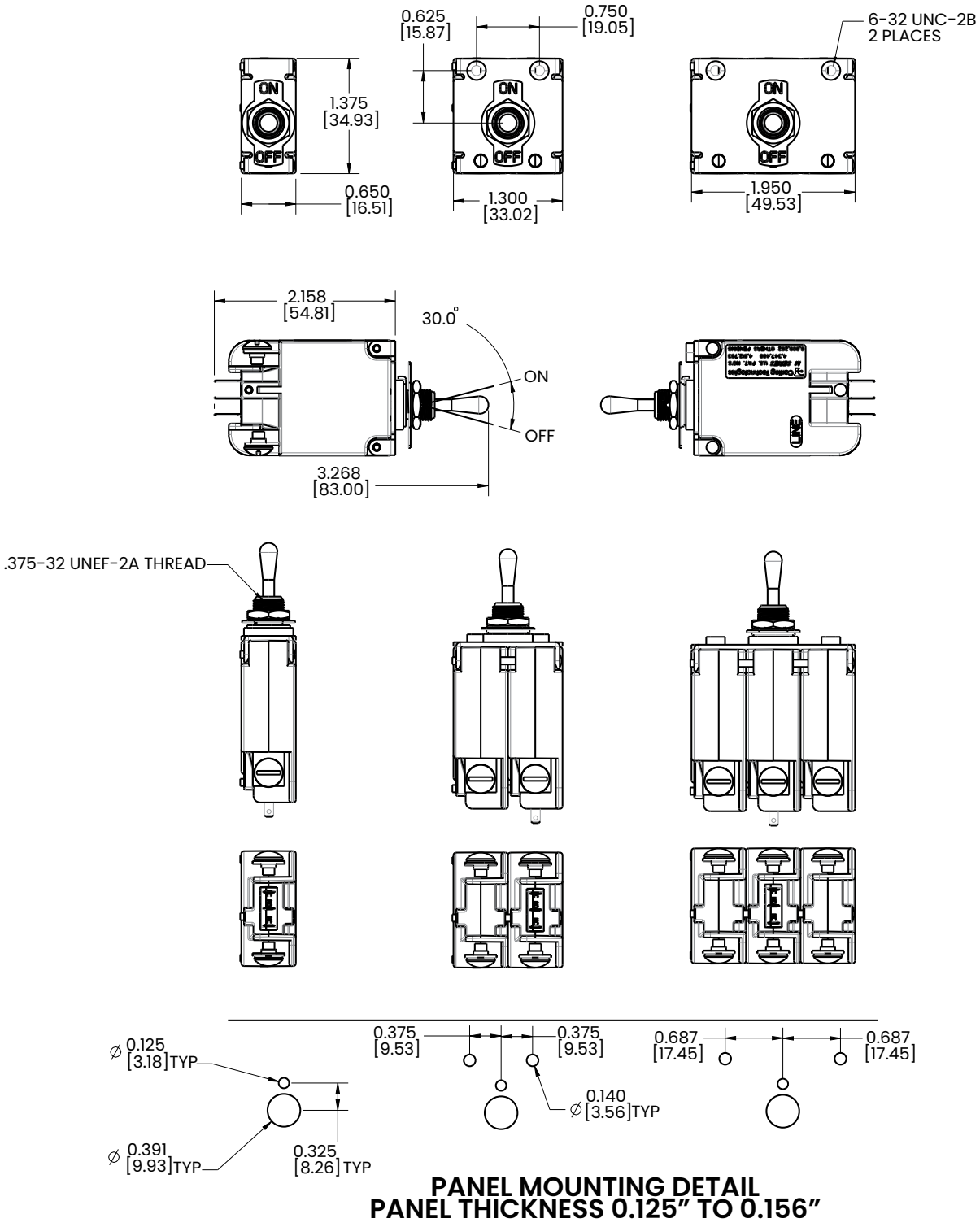
13. AGENCY APPROVAL

A Without approvals
B UL Recognized
C UL & cRUus Recognized
E TUV Certified, UL Recognized, cRUus Recognized
U TUV Certified

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Dimensional Specs

inches [millimeters]



PANEL MOUNTING DETAIL
PANEL THICKNESS 0.125" TO 0.156"

Notes:
1 Tolerance ±.020 [.51] unless otherwise specified.

CLA-8126 Rev: A

*Manufacturer reserves the right to change product specification without prior notice.

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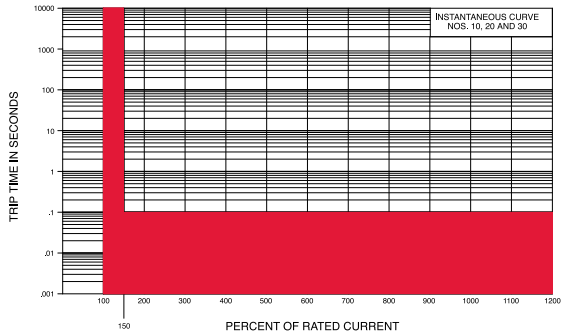
Time Delay

M, MS-SERIES TIME DELAY VALUES										
	PERCENT OF RATED CURRENT									
	Delay	100%	135%	150%	200%	400%	600%	800%	1000%	1200%
TRIP	10, 20, 30	No Trip	May Trip	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max	.100 Max
TIME	12, 22, 32, 62, 72, 92	No Trip	.300 - 7.00	.200 - 5.00	.100 - 2.00	.030 - .500	.008 - .300	.006 - .150	.005 - .100	.005 - .100
SECONDS	14, 24, 34, 64, 74, 94	No Trip	3.00 - 70.0	2.00 - 40.0	1.00 - 15.0	.100 - 4.00	.008 - 2.00	.006 - .800	.005 - .350	.005 - .160

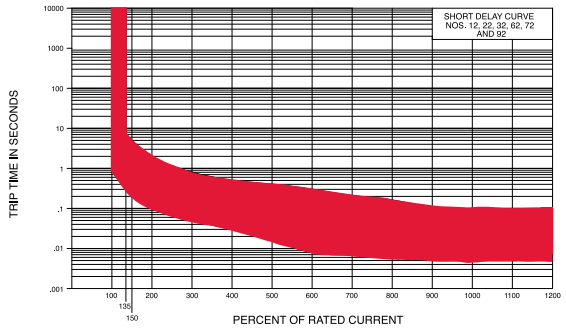
Notes:
1 Delay Curves 12,14, 22, 24, 32, 34, 62, 64, 72, 74, 92, 94: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.
2 Delay Curves 10, 20, 30: Breakers to hold 100% and must trip at 150% of rated current and greater within the time limit shown in this curve.
3 All Curves: Curve data shown represents breaker response at ambient temperature of 77°F (25°C) with no preloading. Breakers are mounted in standard wall-mount position.
4 The minimum inrush pulse tolerance handling capability is 12 times the rated current on standard delays and 18 times the rated current on high inrush delays. These values are based on a 60 Hz 1/2 cycle, 8.33 ms pulse. High inrush delays should be specified for applications with high initial surge currents of short duration, such as switching power supplies, highly capacitive loads and transformer loads.

Dual Rated AC/DC

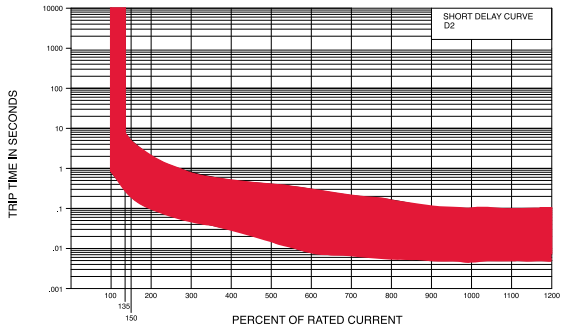
Instantaneous



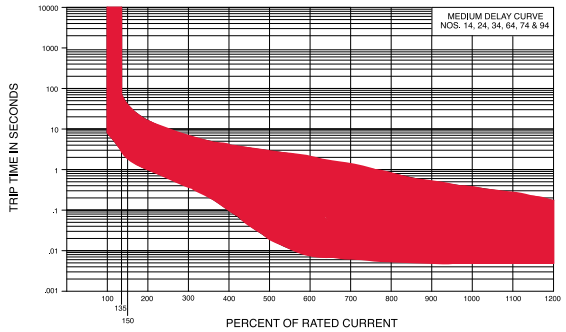
Short



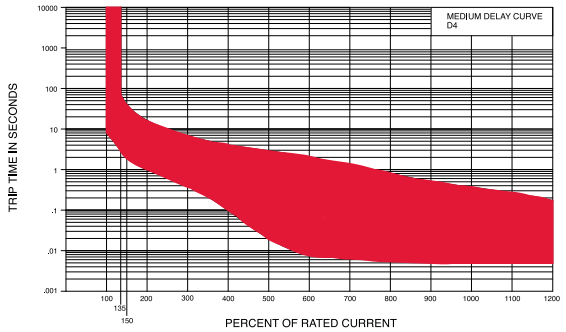
Short D2



Medium



Medium D4



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