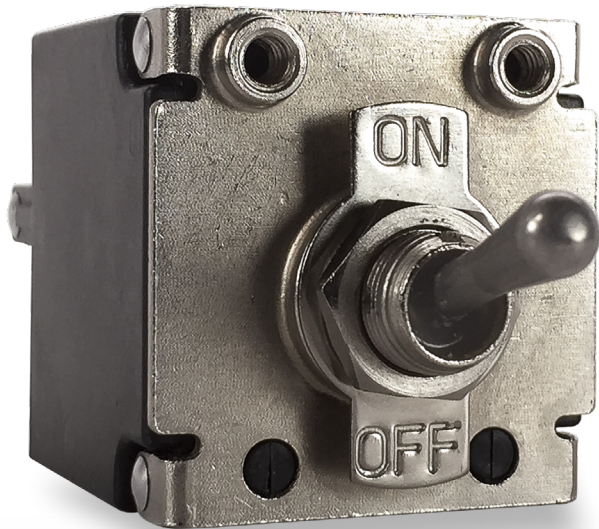


# MS-Series

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**

Poles

**0.20-30**

Amps

**120/250**

VAC

**65**

VDC

## Typical Applications

- Vehicles
- Communication Equipment
- Generators
- Power Supplies

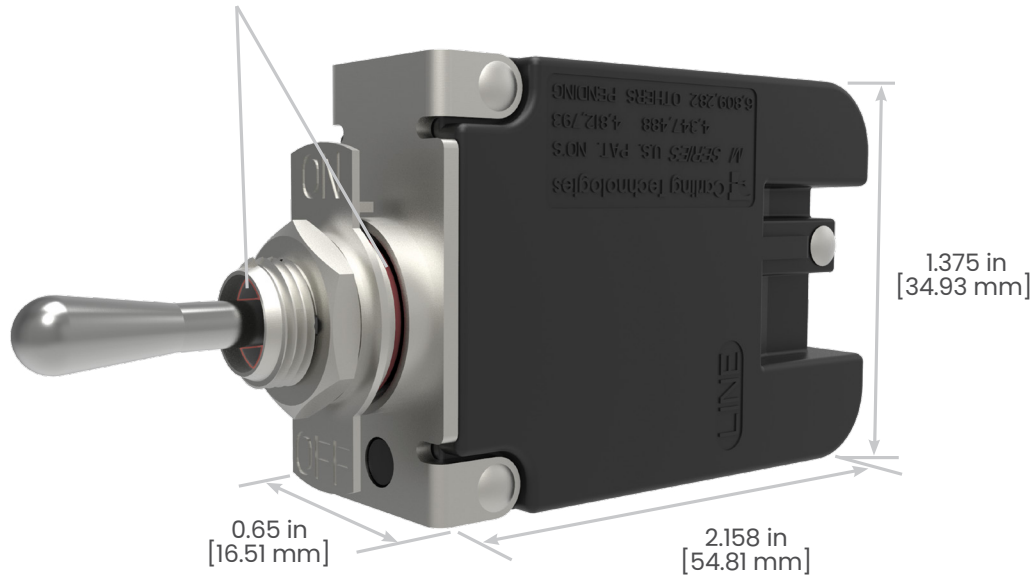
# Design Features

## 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

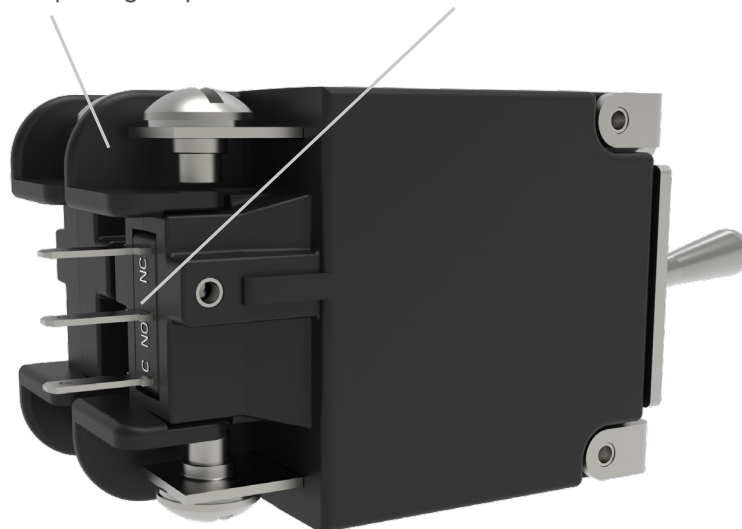


## TERMINAL BARRIERS

Meet UL 1077 Spacing Requirements

## OPTIONAL AUXILIARY SWITCH

Provides Breaker Status Indication

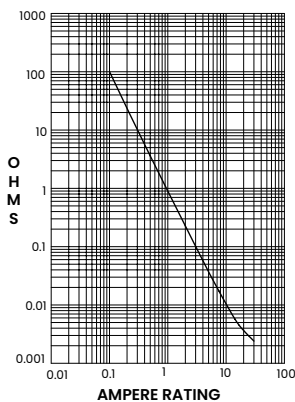


# Tech Specs

## Electrical

|                         |                                                                                    |
|-------------------------|------------------------------------------------------------------------------------|
| Current Ratings         | .02 – 30 Amps                                                                      |
| Voltage Ratings         | 65VDC, 240VAC, 120/240VAC                                                          |
| Short Circuit Rating    | See Table A                                                                        |
| Auxiliary Switch Rating | 5A @ 125VAC,<br>3A @ 32VDC,<br>.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<br>(AMPS) | TOLERANCE<br>(%) |
|-------------------|------------------|
| 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.                                                                                                        |

## Tables

**Table A:** Lists UL & cRUus Configuration & Performance Capabilities

| Component Supplementary Protectors |            |           |       |                      |                |                                            |     |                  |     |
|------------------------------------|------------|-----------|-------|----------------------|----------------|--------------------------------------------|-----|------------------|-----|
| Circuit Configuration              | Voltage    |           |       | Current Rating       |                | Short Circuit Capacity (Amps) <sup>1</sup> |     |                  |     |
|                                    | Max Rating | Frequency | Phase | General Purpose Amps | Poles Breaking | UL / cRUus                                 |     | TUV              |     |
|                                    |            |           |       |                      |                | U1                                         | U3  | Inc <sup>2</sup> | Inc |
| 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:

<sup>1</sup> 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

# 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 <sup>1</sup>

S Sealed Toggle

## 3. POLES

1 One 2 Two 3 Three

## 4. CIRCUIT

A Switch Only (no coil) <sup>1,2</sup>  
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 <sup>1</sup> | 32 DC, 50/60Hz Short                            |
| 10 DC, Instantaneous                     | 34 DC, 50/60Hz Medium                           |
| 12 DC, Short                             | 62 50/60Hz Short, High-inrush <sup>4</sup>      |
| 14 DC, Medium                            | 64 50/60Hz Medium, High-inrush <sup>4</sup>     |
| 20 50/60Hz Instantaneous                 | 72 DC, Short, High-inrush <sup>4</sup>          |
| 22 50/60Hz Short                         | 74 DC, Medium, High-inrush <sup>4</sup>         |
| 24 50/60Hz Medium                        | 92 DC, 50/60Hz Short, High-inrush <sup>4</sup>  |
| 30 DC, 50/60Hz Instantaneous             | 94 DC, 50/60Hz Medium, High-inrush <sup>4</sup> |

## 6. CURRENT RATING (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:

- Series code "A" only available with delay code "03"
- Only available when tied to a protected pole
- Requires a 2 or 3 pole device
- 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

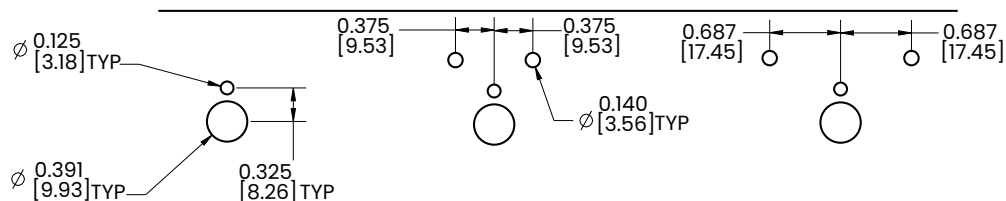
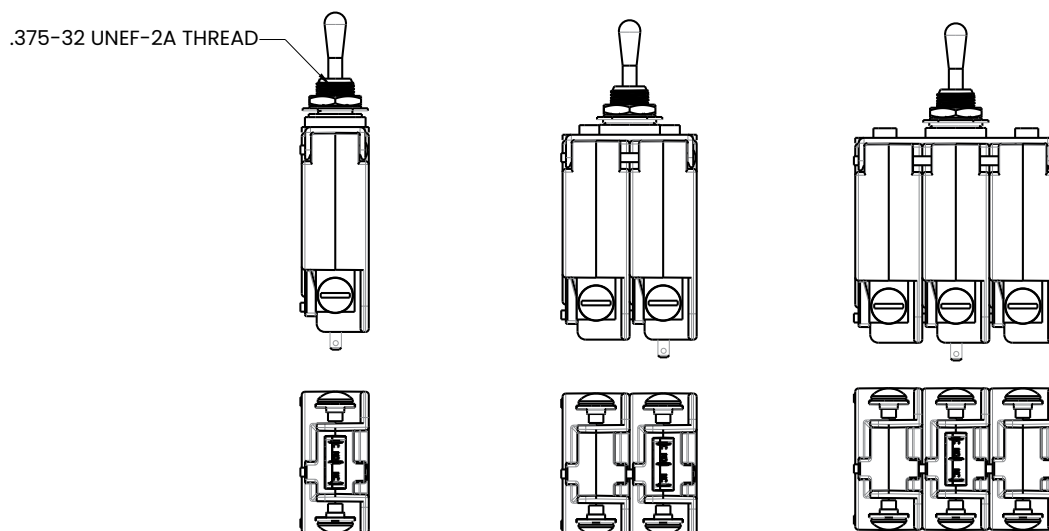
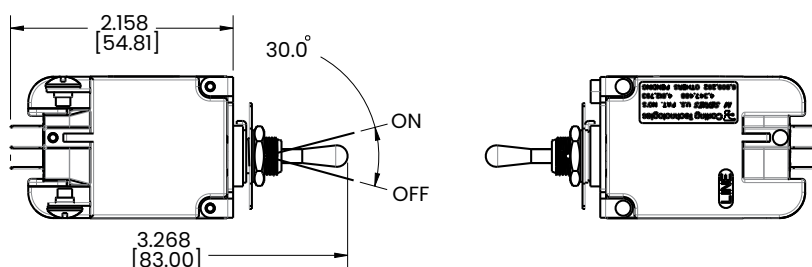
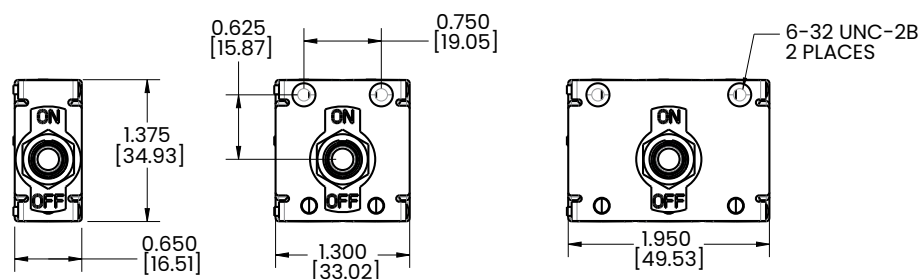
0A 65 VDC  
0D 240 VAC  
0C 120/240 VAC <sup>3</sup>  
0N 65 VDC / 120/240 VAC <sup>3</sup>  
17 65 VDC / 240 VAC

## 13. AGENCY APPROVAL

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

# Dimensional Specs

inches [millimeters]



**PANEL MOUNTING DETAIL**  
**PANEL THICKNESS 0.125" TO 0.156"**

Notes:

1 Tolerance  $\pm 0.020$  [51] unless otherwise specified.

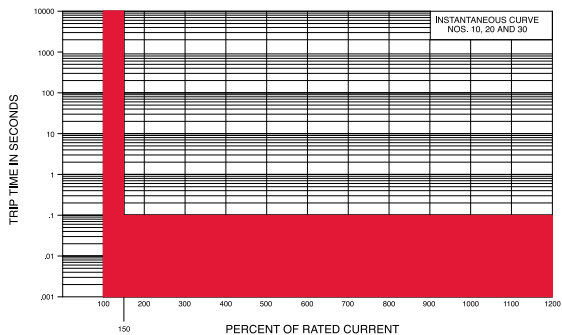
# Time Delay

| M, MS-SERIES TIME DELAY VALUES |                          |         |             |             |             |             |             |             |             |             |
|--------------------------------|--------------------------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| TRIP<br>TIME<br>SECONDS        | PERCENT OF RATED CURRENT |         |             |             |             |             |             |             |             |             |
|                                | Delay                    | 100%    | 135%        | 150%        | 200%        | 400%        | 600%        | 800%        | 1000%       | 1200%       |
|                                | 10, 20, 30               | No Trip | May Trip    | .100 Max    | .100 Max    | .100 Max    | .100 Max    | .100 Max    | .100 Max    | .100 Max    |
|                                | 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 |
|                                | 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 |

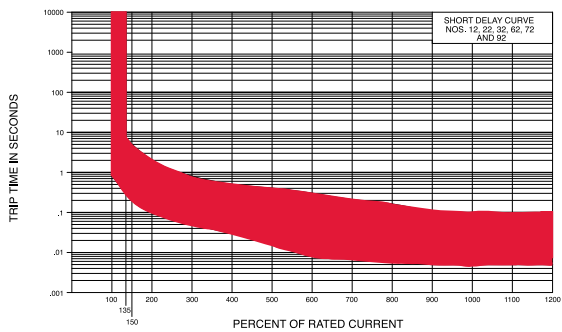
- Notes:
- 1 Delay Curves 12,14, 22, 24, 32, 34, 62, 64, 72, 74, 92, 94: Breakers to hold 100% and must trip at 135% of rated current and greater within the time limit shown in this curve.
  - 2 Delay Curves 10, 20, 30: Breakers to hold 100% and must trip at 150% of rated current and greater within the 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

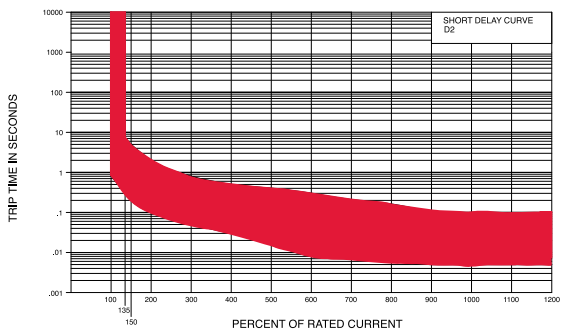
### Instantaneous



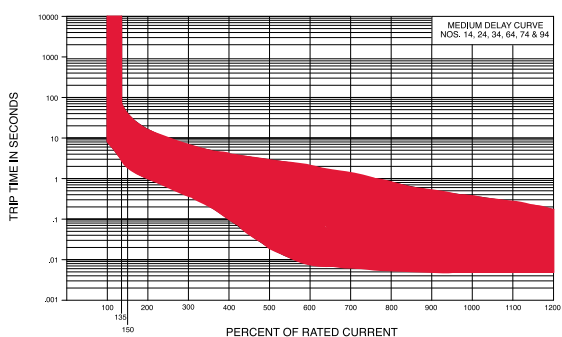
### Short



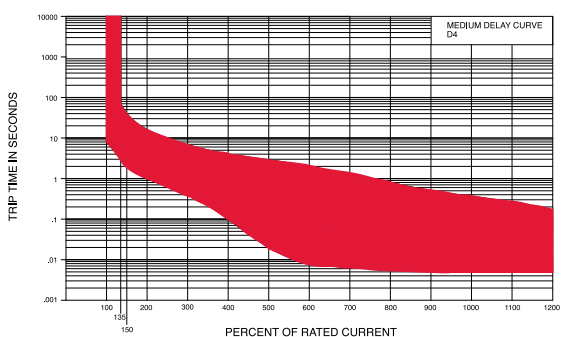
### Short D2



### Medium



### Medium D4



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