MS-Series
CIRCUIT BREAKER

Designed and tested to operate flawlessly in the harshest of environments, the MS-Series sealed toggle circuit breaker is ideally suited for COTS (commercial off the shelf) military applications. Our space saving envelope meets IP68 requirements and features a durable metal and sealed mounting bushing with MIL-PRF-39019F ingress protection when mounted in a panel.

This class-leading, affordable circuit breaker was designed in accordance with the requirements of MIL-PRF-55629 and MIL STD 202, making it the best choice for those applications where shock, vibration, moisture resistance, salt spray and thermal shock are of the utmost consideration. The MS-Series’ compact size and reliability make it ideal for crucial communication equipment and other mission critical components.

1-3 poles; 0.20-30 amps; 65VDC, 240VAC, 120/240VAC; UL, CUL recognized & TUV certified.

**Product Highlights:**
- Sealed Toggle Actuator
- MIL-PRF-39019F Ingress Protection
- MIL-PRF-55629 and MIL STD 202 Compliant
- Compact Design

**Typical Applications:**
- COTS Military
  - Communication Equipment
- Off Highway Equipment
  - Construction, Mining & Agriculture
- Generators & Power Supplies
- Harsh Environment Applications

**Resources:**
- Configure a Complete Part
- Download CAD & Sales Drawing
- Watch Product Video

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MS-Series

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
### Electrical Tables

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

<table>
<thead>
<tr>
<th>MS-SERIES TABLE A: COMPONENT SUPPLEMENTARY PROTECTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Circuit Configuration</strong></td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Max Rating</td>
</tr>
<tr>
<td>Series</td>
</tr>
<tr>
<td>65</td>
</tr>
<tr>
<td>240</td>
</tr>
<tr>
<td>120 / 240</td>
</tr>
</tbody>
</table>

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 G fuse

### Electrical

- **Current Ratings**: .02 - 30 Amps
- **Voltage Rating**: 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**: See delay curve

### Mechanical

- **Current Ratings**: 10,000 On-Off operations @ 6 per minute with rated current and 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.

### Agency Certifications

- UL Standard 1077
- CUL Standard C22.2
- TUV Certified

*Manufacturer reserves the right to change product specification without prior notice.*
### 1 SERIES
- M

### 2 ACTUATOR
- S Sealed Toggle

### 3 POLES
- One
- Two
- Three

### 4 CIRCUIT
- Switch Only (no coil)\(^1,2\)
- Series Trip (current)
- Series Trip (current) Aux switch .110 QC x .20 QC (silver contacts)
- Series Trip (current) Aux switch .110 QC x .20 QC (gold contacts)

### 5 FREQUENCY & DELAY
- 03 DC, 50/60Hz, Switch Only\(^1\)
- 10 DC, Instantaneous\(^3\)
- 12 DC, Short\(^4\)
- 14 DC, Medium\(^4\)
- 20 50/60Hz Instantaneous\(^3\)
- 22 50/60Hz Short\(^4\)
- 24 50/60Hz Medium\(^4\)
- 30 DC, 50/60Hz Instantaneous\(^3\)

### 6 CURRENT RATING (AMPERES)
<table>
<thead>
<tr>
<th>Code</th>
<th>Amperes</th>
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<tbody>
<tr>
<td>220</td>
<td>0.200</td>
</tr>
<tr>
<td>225</td>
<td>0.250</td>
</tr>
<tr>
<td>230</td>
<td>0.300</td>
</tr>
<tr>
<td>235</td>
<td>0.350</td>
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</tr>
<tr>
<td>275</td>
<td>0.750</td>
</tr>
<tr>
<td>280</td>
<td>0.800</td>
</tr>
<tr>
<td>285</td>
<td>0.850</td>
</tr>
<tr>
<td>290</td>
<td>0.900</td>
</tr>
</tbody>
</table>

### 7 TERMINAL
- Push-On 0.250 Tab (QC)\(^6\)
- Screw 8-32 (Upturned Lugs)\(^6\)
- Screw Terminal M4 (Upturned Lugs)\(^6\)
- Screw Terminal M4 (Bus Type)\(^6\)
- Solder Lug\(^6\)

### 8 ACTUATOR & MARKING COLOR
- Dull Metallic

### 9 FRONT PANEL HARDWARE
- No Legend Plate\(^10\)
- On-Off Vertical
- On-Off Horizontal
- I-O Vertical
- I-O Horizontal
- Dual Vertical
- Dual Horizontal

### 10 LEGEND PLATE
- No Legend Plate\(^10\)
- On-Off Vertical
- On-Off Horizontal
- I-O Vertical
- I-O Horizontal
- Dual Vertical
- Dual Horizontal

### 11 BUSHING COLOR
- 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
- Without approvals
- UL Recognized
- UL & CUL Recognized
- TUV Certified, UL Recognized, CUL Recognized
- TUV Certified

**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)
**Dimensional Specifications:** in. [mm]

Notes:
1. All dimensions are in inches [millimeters].
2. Tolerance ±0.020 [0.51] unless otherwise specified.

**Panel Mounting Detail**

Panel thickness 0.125" to 0.156"
### 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**

**Medium**

**Short D2**

**Medium D4**
Authorized Sales Representatives and Distributors

Click on a region of the map below to find your local representatives and distributors or visit www.carlingtech.com/findarep.

About Carling

Founded in 1920, Carling Technologies is a leading manufacturer of electrical and electronic switches and assemblies, circuit breakers, electronic controls, power distribution units, and multiplexed power distribution systems. With four ISO registered manufacturing facilities and technical sales offices worldwide, Carling Technologies Sales, Service and Engineering teams do much more than manufacture electrical components, they engineer powerful solutions! To learn more about Carling please visit www.carlingtech.com/company-profile.

To view all of Carling’s environmental, quality, health & safety certifications please visit www.carlingtech.com/environmental-certifications
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