SOLUTIONS FOR POWER MANAGEMENT

FUSES AND OVERCURRENT PROTECTION DEVICES FOR POWER ELECTRONICS AND BATTERY-RELATED APPLICATIONS

Ferraz Shawmut | Eldre | Idealec | FTCAP
Mersen offers a broad and comprehensive line of protective devices for the protection of power electronics and DC applications. This brochure provides the reader a product line overview, classified into two distinct categories:

**CHAPTER 1: HIGH SPEED FUSES**

High speed fuses are used to protect sensitive loads against overcurrent conditions in power electronic equipment.

**STANDARD POWER CONVERTER PROTECTION**
- **FUNCTION**
  - Protection of power modules in converter / inverter / rectifier
- **PRODUCT FAMILIES**
  - Square Body Fuses .................. p.7
  - North American Style Round Body .... p.8
  - IEC Cylindrical Body .................. p.9
  - NH DIN and BS88 Fuses .............. p.10 & 11
  - Miniature Fuses ....................... p.12

**RAILWAY AND TRACTION CONVERTER PROTECTION**
- **FUNCTION**
  - For installation in heavy or light rail applications
  - For protection of main electrical feed and the power conversion
- **PRODUCT FAMILIES**
  - DC high performance Square & Round Body Power Fuses ............... p.13
  - Cylindrical Auxiliary DC Fuses ........ p.16

**APPLICATION-ENGINEEREED CONVERTER PROTECTION**
- **FUNCTION**
  - Protection of highly demanding and specific applications
- **PRODUCT FAMILIES**
  - Low Inductance Square Body ........ p.14
  - High Performance Square Body ...... p.15

**CHAPTER 2: OVERCURRENT PROTECTION DEVICES FOR BATTERY APPLICATIONS**

Overcurrent Protective Devices (OCPD) are specifically designed to safely clear both high and low DC fault currents for today’s demanding DC systems in EV/HEV and Electrical Energy Storage applications.

**DC FUSES FOR E-MOBILITY**
- **FUNCTION**
  - Fuses specifically designed for protection of DC battery related applications such as Electric Vehicles (EV) and Energy Storage (EES) facilities
- **PRODUCT FAMILIES**
  - M-fuse for Battery Module Protection ........ p.20
  - EVpack-fuse for Battery Disconnect Unit (BDU) and Maintenance Safety Disconnect (MSD) ........ p.21

**HYBRID OVERCURRENT PROTECTIVE DEVICES**
- **FUNCTION**
  - Hybrid DC protection and management for battery powered systems such as Electric Vehicles (EV) and Energy Storage (EES) facilities
- **PRODUCT FAMILIES**
  - Xp & Xs series ........................................... p.22
HIGH SPEED FUSES
THAT MEET EVERY MAJOR STANDARD

Standards may change from country to country, but the need for safe, reliable electrical protection for semiconductor applications is the same the world over. That's why Mersen offers the best protection solutions on the market today and the widest range of high speed fuses that meets every major International Standard.

HIGH SPEED FUSES ARE DIFFERENT FROM
REGULAR STANDARD FUSES

High speed fuses are used to protect semiconductor devices against overcurrent conditions. They are specifically designed to reduce the I²t, peak let-through current and arc voltages during a fault condition. There is hardly an electric powered product that exists today that does not rely on semiconductor technology to some degree. That means extending electrical protection to IGBTs, Silicon Carbide (SiC), GaN, thyristors, triacs, diodes, and a host of other solid-state components, and providing a wide range of voltage requirements, unique mounting configurations, and special protection characteristics. High speed fuses differ vastly from standard fuses in performance and purpose, as indicated in the table below:

<table>
<thead>
<tr>
<th>Overcurrent Protection</th>
<th>Standards</th>
<th>Safety Standards</th>
<th>Ratings</th>
<th>Type of Protection</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semiconductor and Special Purpose Fuses</td>
<td>Power Semiconductor</td>
<td>IEC or UL recognized component</td>
<td>Internationally harmonized (UL/IEC/CSA/CCC)</td>
<td>Non-Standard</td>
<td>Ultra-fast and low-energy</td>
</tr>
<tr>
<td>Standard Fuses</td>
<td>Cable/overload protection</td>
<td>IEC or UL listed component</td>
<td>Local-specific</td>
<td>Defined by Standards</td>
<td>Short circuit and overload</td>
</tr>
</tbody>
</table>

High speed fuses from Mersen are designed to:

- Limit the thermal energy (I²t) let-through
- Interrupt very high potential fault currents in extremely short times
- Limit the let-thru current in case of a fault
- Ride through normal transient overload conditions
- Withstand heavy duty cycling capabilities

HIGH SPEED FUSE SOLUTIONS

Mersen supports OEM designers and equipment-maintenance personnel with a comprehensive line of high speed fuses. Product lines, such as Protistor® PSC Square Body ceramic semiconductor fuses, have been developed to meet worldwide standards and also match every market with complete lines of North American style round semiconductor fuses, IEC Cylindrical, NH DIN German and British BS88 Standards fuses.

TYPICAL APPLICATIONS

- Protection of Power inverters, converters and rectifiers, AC and DC drives
- DC common bus
- Reduced voltage motor starters
- UPS systems
- Protection of Capacitor banks
- Switchboard and control panels
- DC grids
Mersen dedicated solutions are used in various markets around the globe. We work closely with our customers to better understand their application needs and to help improve their productivity.

### MARKETS AND APPLICATIONS

**Renewable Energies**

- Solar
- Wind
- Hydro
- Geothermal

**Power Electronics**

- Motor drives
- Inverters
- UPS systems
- Battery chargers

**DC Protection**

- Fuses
- Circuit breakers

**Transportation**

- Electric vehicles
- Hybrid vehicles

**Process Industries**

- Chemicals
- Petrochemicals
- Refineries
- Oil and gas

**Solar**

- PV systems
- Solar farms

### HIGH SPEED FUSES PRODUCT LINE

#### TYPICAL MARKETS AND APPLICATIONS**

<table>
<thead>
<tr>
<th>Market</th>
<th>Rectifiers</th>
<th>Inverters</th>
<th>Low and Medium Voltage Drives</th>
<th>UPS and Power Supplies</th>
<th>High Power Gen., Conversion, and Transmission</th>
<th>Semiconductors (IGBT, Diodes, Thyristors)</th>
<th>Battery - DC Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renewables</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Power Electronics</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>DC Protection</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

#### HIGH SPEED FUSES PRODUCT LINE - TECHNICAL OVERVIEW

**Product Line**

- Square Body
- North American Body
- Standard Cylindrical Body
- NH DIN and British Standard Square Body
- British Standard BSBB Square Body
- BSBB Cylindrical Body
- Miniature
- DC high performance Square & Round Body Power Fuses
- Low Inductance Square Body
- High Performance Square Body
- Cylindrical Auxiliary AC & DC
- DC Overcurrent Protection

**Operating Class/Range**

- 0.5kVAC/0.8kVDC
- 1kVAC/1.5kVDC
- 1.5kVAC/2.5kVDC
- 2kVAC/3.5kVDC
- 3kVAC/5kVDC
- 4kVAC/6kVDC
- 6.3kVAC/10kVDC
- 10kVAC/15kVDC
- 15kVAC/20kVDC
- 20kVAC/30kVDC

**Voltage Range (AC-DC)**

- 0.5 - 2.5kVAC/0.8 - 5kVDC
- 2.5 - 5kVAC/5.5 - 8kVDC
- 5.5 - 10kVAC/8.5 - 12kVDC
- 10 - 15kVAC/12 - 20kVDC
- 15 - 20kVAC/20 - 30kVDC
- 20 - 30kVAC/30 - 40kVDC
- 40 - 60kVAC/60 - 90kVDC
- 90 - 120kVAC/120 - 180kVDC

**Current Ratings**

- 1 - 600A
- 1 - 6000A
- 1 - 100kA
- 1 - 250kA

**Interrupting Rating**

- Up to 20kA
- Up to 250kA
- Up to 600kA

**Protection Fuses**

- Rectifiers, inverters, AC drives, UPS systems
- Motor drives, UPS systems
- Small inverters, UPS systems, AC drives, Battery chargers, high voltage, high current
- Inverters, AC drives, UPS systems
- Monitoring, control, very low power, converter, metering, devices
- Lightning protection, solar, wind, protection for inverters, DC systems, and drives
- High voltage, high current, high power, converter, metering, devices
- Auxiliary circuits, monitoring, control, very low power, converter, metering, devices

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**Footnotes:**

- *Varies by rating – Consult Mersen for more details*
- **Typical Application – Consult Mersen for further application examples**
APPLICATION ENGINEERING SUPPORT

Mersen application engineering teams are available to assist our customers with the correct selection of high speed fuses for their applications. Visit ep.mersen.com for more information.

Mersen High-Power Fuse Test Labs

Mersen offers our customers global test capabilities for testing products in North America (Newburyport, Massachusetts) and in Europe (Saint Bonnet de Mure, France). Our labs can conduct fuse performance testing in AC and DC applications under UL/CSA or IEC standards guidelines. We utilize state-of-the-art instruments and software to provide accurate run-testing services and in-depth analysis. For more information on our test capabilities, please contact Mersen.

The labs also play a critical role in custom-fuse development, enabling us to test prototypes quickly and efficiently to keep pace with your development schedule. These labs play a crucial and fundamental role in our quality control program for Mersen’s electrical protection products.

SOLUTIONS FOR POWER MANAGEMENT: TURN TO Mersen TO BE YOUR DESIGN PARTNER

Combine Mersen square body semiconductor fuses with Mersen’s cooling solutions and laminated bus bar offerings for an optimized system solution to support your power electronics designs. As a design partner with extensive application and product expertise, Mersen is able to maximize system performance, lower total costs, and reduce time to market. Our dedicated power electronics team is available to customize a solution for you. In addition, custom solutions are available for your semiconductor protection needs.

To reduce design time and to optimize performance specifications, Mersen engineering teams can provide state of the art simulations for fuses, heat sinks, and bus bars. Simulations can greatly improve prototype design considerations and reduce manufacturing lead times.
Mersen’s reputation for outstanding technical expertise, product quality, and engineered safety is the result of over a century of design and manufacturing knowledge, coupled with state-of-the-art equipment in various ISO-9001 and ISO-14001 registered facilities around the world.
**PROTISTOR® SQUARE BODY FUSES**

Mersen Protistor® square body fuses provide maximum flexibility in equipment design and ultimate protection for today’s power conversion equipment. These square body fuses are available in eight different body sizes, each size having more than seven worldwide acceptable mounting styles. The different mounting styles and body sizes along with a broad range of ampere ratings allow greatest flexibility in equipment design.

Mersen Protistor® square body fuses have been engineered to provide state-of-the-art protection for semiconductor devices. They have die-cut elements embedded in solidified sand, which helps control arcing characteristics for low I²t and high interrupting rating. All contact surfaces are silver plated and all hardware is non-magnetic. Many square body fuses are equipped with a trip-indicator. This trip indicator can operate a field-mountable micro-switch which is easily mounted directly onto the fuse.

**Highlights:**
- Extremely fast-acting
- Current limiting
- Very low I²t
- Worldwide acceptability
- Superior cycling ability

**Applications:**
- Rectifiers
- Inverters
- AC drives
- UPS systems

**Approvals:**
- UL recognized file E76491
- CSA certified
- IEC 60269-4 certified
- CCC approved

### PROTISTOR - SQUARE BODY FUSE RATINGS

<table>
<thead>
<tr>
<th>Size/Class/Range</th>
<th>Operating Class/Range</th>
<th>Ampere Rating (A)</th>
<th>Rated Voltage (V) IEC/UL</th>
<th>Maximum Interrupting Rating IR (kA)</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 31 32 33</td>
<td>aR</td>
<td>50-2500**</td>
<td>690/700VAC* 600VDC*</td>
<td>200kA* 100kA*</td>
<td>Flush-end, PressPack</td>
</tr>
<tr>
<td>2x31 2x32</td>
<td></td>
<td>2X up to 5000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 31 32 33</td>
<td>aR</td>
<td>50-1800**</td>
<td>1250/1300VAC 750VDC-900VDC*</td>
<td></td>
<td>Blade</td>
</tr>
<tr>
<td>2x32 2x32</td>
<td></td>
<td>2X up to 3600</td>
<td></td>
<td></td>
<td>Flush-end, PressPack</td>
</tr>
<tr>
<td>70 71 72 73</td>
<td>gR</td>
<td>50-1000</td>
<td>690VAC 600VDC*</td>
<td>150kA</td>
<td>Flush-end, Blade</td>
</tr>
<tr>
<td>70 71 72 73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* May vary by rating – Consult Mersen technical support
** May vary by mounting

Fuse holders available – Contact Mersen for more information.
AMP TRAP® NORTH AMERICAN STYLE ROUND BODY FUSES

The Amp-Trap Round Body high speed fuses were designed for the protection of semiconductor devices. This product line encompasses a wide variety of voltage ratings and performance, making it ideal for protecting a wide variety of power electronic applications.

**Highlights:**
- Fast acting
- Current limiting
- Low I²t
- Indicator options available
- Various mounting types

**Applications:**
- AC drives, inverters
- Heavy traction and electrochemical rectifiers
- Heavy duty power supplies
- UPS

**Approvals:**
- CSA certified (consult Mersen)

**AMP-TRAP NORTH AMERICAN ROUND BODY FUSES RATINGS**

<table>
<thead>
<tr>
<th>Size/Series: Amp-Trap®</th>
<th>Operating Class/Range</th>
<th>Ampere Rating* Iₘ (A)</th>
<th>Rated Voltage Vₙ (V) [IEC]</th>
<th>Interrupting Rating - Tested</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>A150S</td>
<td></td>
<td>20 - 6000</td>
<td>150VAC/DC</td>
<td>100kA 50kA</td>
<td>Hockey Puck, Bolt-in Blades</td>
</tr>
<tr>
<td>A300S</td>
<td></td>
<td>1 - 6000</td>
<td>300VAC/DC</td>
<td>200kA 100kA</td>
<td>Ferrule, Hockey Puck, Bolt-in Blades</td>
</tr>
<tr>
<td>A500S</td>
<td></td>
<td>35 - 1200</td>
<td>500VAC/DC</td>
<td>200kA 87kA</td>
<td>Bolt-in Blades</td>
</tr>
<tr>
<td>A50P</td>
<td></td>
<td>10 - 1200</td>
<td>500VAC/450VDC</td>
<td>100kA 79kA</td>
<td>Ferrule, Bolt-in Blades</td>
</tr>
<tr>
<td>A60X</td>
<td>Partial Range</td>
<td>1 - 3000</td>
<td>600VAC</td>
<td>200kA n/a</td>
<td>Ferrule, Hockey Puck, Bolt-in Blades</td>
</tr>
<tr>
<td>A700S</td>
<td></td>
<td>35 - 800</td>
<td>700VAC/DC</td>
<td>200kA 100kA</td>
<td>Bolt-in Blades</td>
</tr>
<tr>
<td>A70P</td>
<td></td>
<td>10 - 2000</td>
<td>700VAC/650VDC</td>
<td>100kA 100kA</td>
<td>Ferrule, Hockey Puck, Bolt-in Blades</td>
</tr>
<tr>
<td>A70Q</td>
<td></td>
<td>35 - 600</td>
<td>700VAC/650VDC</td>
<td>200kA 100kA</td>
<td>Bolt-in Blades</td>
</tr>
<tr>
<td>A100P</td>
<td></td>
<td>15 - 2000</td>
<td>1000VAC/750VDC</td>
<td>100kA 100kA</td>
<td>Ferrule, Bolt-in Blades</td>
</tr>
<tr>
<td>A120X</td>
<td></td>
<td>½ - 30</td>
<td>1200VAC/1000VDC</td>
<td>100kA 100kA</td>
<td>Ferrule</td>
</tr>
<tr>
<td>A150X</td>
<td></td>
<td>1 - 1000</td>
<td>1500VAC/1500VDC</td>
<td>100kA 100kA</td>
<td>Ferrule, Bolt-in Blades</td>
</tr>
</tbody>
</table>

*For other ratings, consult Mersen technical support
Fuse holders available – Contact Mersen for more information
STANDARD POWER CONVERSION PROTECTION – STANDARD CYLINDRICAL BODY

STANDARD CYLINDRICAL BODY FUSES

Mersen’s Standard Cylindrical fuses provide an extremely high interrupting ratings offering power semiconductor applications the ultimate in electrical protection. The Protistor IEC semiconductor fuses offer is comprised of 2 different classes of protection:

- The gR range is a fast acting fuse with full-range protection. It protects high short-circuit currents and small overload currents.
- The aR range is a high performance, ultra-fast acting fuse for superior short-circuit protection only.

Highlights:
- Extremely fast acting
- Current limiting
- Extremely low I²t
- High breaking capacity
- Excellent cycling capability
- Modular fuse holder

Applications:
- Small inverters
- UPS systems
- Motor drives
- Capacitor discharge, high di/dt disconnection

Approvals:
- UL recognized file E76491
- CSA certified (consult Mersen)
- IEC 60269-4 certified
- CCC certified (consult Mersen)

PROTISTOR - IEC CYLINDRICAL FUSE-LINKS RATINGS

<table>
<thead>
<tr>
<th>Size/Series</th>
<th>Operating Class/Range</th>
<th>Ampere Rating Iₜ (A)</th>
<th>Rated Voltage (V) IEC/UL</th>
<th>Maximum Interrupting Rating IR AC</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>10X38 mm</td>
<td>gR</td>
<td>1-32, 1-63, 12-135</td>
<td>690/700VAC*</td>
<td>200kA</td>
<td>Ferrule</td>
</tr>
<tr>
<td>14X51 mm</td>
<td></td>
<td></td>
<td></td>
<td>Consult Mersen technical support*</td>
<td></td>
</tr>
<tr>
<td>22X58 mm</td>
<td></td>
<td></td>
<td></td>
<td>Consult Mersen technical support*</td>
<td></td>
</tr>
<tr>
<td>27X60 mm</td>
<td></td>
<td>8-110, 6-63, 25-135</td>
<td>800VAC</td>
<td>200kA</td>
<td></td>
</tr>
<tr>
<td>14X51 mm</td>
<td>aR</td>
<td>6-63, 25-135, 63-250</td>
<td>690/700VAC*</td>
<td>100kA</td>
<td>Ferrule</td>
</tr>
<tr>
<td>22X58 mm</td>
<td></td>
<td></td>
<td></td>
<td>Consult Mersen technical support*</td>
<td></td>
</tr>
<tr>
<td>27x60 mm</td>
<td></td>
<td>25-170</td>
<td>1000VAC</td>
<td>100kA</td>
<td></td>
</tr>
</tbody>
</table>

* May vary by rating – Consult Mersen technical support

AMP TRAP - CYLINDRICAL FUSE RATINGS

<table>
<thead>
<tr>
<th>Series</th>
<th>Size</th>
<th>Operating Class/Range</th>
<th>Ampere Rating Iₜ (A)</th>
<th>Rated Voltage (V) IEC/UL</th>
<th>Maximum Interrupting Rating IR AC</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>A150S</td>
<td>1-1/2” x 13/32” - 10X38 mm</td>
<td>partial</td>
<td>1-30</td>
<td>150VAC</td>
<td>100kA</td>
<td>50kA</td>
</tr>
<tr>
<td>A600</td>
<td>1-1/2” x 13/32” - 10X38 mm</td>
<td>partial</td>
<td>5-40</td>
<td>600VAC</td>
<td>200kA</td>
<td>100kA</td>
</tr>
<tr>
<td>A700S</td>
<td>2”x9/16” - 14X51 mm</td>
<td>partial</td>
<td>6-50</td>
<td>690VAC</td>
<td>200kA</td>
<td>100kA</td>
</tr>
<tr>
<td></td>
<td>21/4”x13/16” - 22x58 mm</td>
<td>partial</td>
<td>10-100</td>
<td>700VDC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fuse holders available – Contact Mersen for more information
Mersen’s DIN and BS88 Square Body Fuses offer an extremely high interrupting rating, providing the ultimate electrical protection for power semiconductor applications.

**Highlights:**
- Compact fast acting
- Current limiting
- High breaking capacity
- Low I²t

**Applications:**
- Inverters
- AC drives
- UPS systems

**Approvals:**
- UL recognized file E76491
- CSA certified
- IEC 60269-4 certified
- CCC approved

### PROTISTOR® - NH DIN AND BRITISH STANDARD BS88 SQUARE BODY FUSES RATINGS

<table>
<thead>
<tr>
<th>Size/Series</th>
<th>Operating Class/Range</th>
<th>Ampere Rating Iₐ (A)</th>
<th>Rated Voltage (V) IEC/UL AC</th>
<th>Maximum Interrupting Rating IR AC</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>gR</td>
<td>20-125</td>
<td>690VAC*</td>
<td>200kA*</td>
<td>BS88 blade w/wo trip indicator</td>
</tr>
<tr>
<td>000</td>
<td>aR</td>
<td>75-400</td>
<td></td>
<td></td>
<td>BS88 blade w/wo trip indicator</td>
</tr>
<tr>
<td>000, 00</td>
<td>aR</td>
<td>80-400</td>
<td></td>
<td></td>
<td>DIN80/110 blade w/wo trip indicator</td>
</tr>
<tr>
<td>000, 00, 1, 2, 3</td>
<td>aR</td>
<td>16-1000</td>
<td>690/700VAC*</td>
<td></td>
<td>plain blade</td>
</tr>
<tr>
<td>000, 00, 1, 2, 3</td>
<td>gS</td>
<td>16-630</td>
<td></td>
<td></td>
<td>plain blade</td>
</tr>
</tbody>
</table>

* May vary by rating – Consult Mersen technical support
For DC applications, consult Mersen technical support
Fuse holders available – Contact Mersen for more information
Mersen’s Protistor Fuse line offers an extremely high interrupting rating, affording power semiconductor applications the ultimate in circuit protection while meeting the British Standard BS88 in a round fuse format.

**Highlights:**
- Compact fast acting
- Current limiting
- High breaking capacity
- Low I²t

**Applications:**
- Inverters
- AC drives
- UPS systems

**Approvals:**
- IEC 60269-4 certified
- UL Recognized File: E76491

### PROTISTOR - BS88 CYLINDRICAL BODY FUSES RATINGS

<table>
<thead>
<tr>
<th>Size/Series</th>
<th>Operating Class/Range</th>
<th>Ampere Rating Iₐ (A)</th>
<th>Rated Voltage (VAC) IEC/UL</th>
<th>Maximum Interrupting Rating IR</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>10X28 mm</td>
<td>aR/gR</td>
<td>5-32</td>
<td>250VAC*</td>
<td>100kA*</td>
<td>BS88 blade</td>
</tr>
<tr>
<td>17X27 mm</td>
<td>aR/gR</td>
<td>7-180</td>
<td></td>
<td></td>
<td>BS88 blade w/wo trip indicator</td>
</tr>
<tr>
<td>36X27 mm 2X36X27 mm</td>
<td>aR/gR</td>
<td>50-1050</td>
<td></td>
<td></td>
<td>BS88 blade w/wo trip indicator</td>
</tr>
<tr>
<td>10X51 mm</td>
<td>aR</td>
<td>5-20</td>
<td>690VAC*</td>
<td>200kA*</td>
<td>BS88 blade</td>
</tr>
<tr>
<td>17X49 mm 2X17X49 mm</td>
<td>aR</td>
<td>16-160</td>
<td></td>
<td></td>
<td>BS88 blade w/wo trip indicator</td>
</tr>
<tr>
<td>17X49 mm</td>
<td>gR</td>
<td>12-90</td>
<td></td>
<td></td>
<td>BS88 blade w/wo trip indicator</td>
</tr>
<tr>
<td>36X55 mm 2X36X55 mm</td>
<td>aR</td>
<td>75-800</td>
<td></td>
<td></td>
<td>BS88 blade w/wo trip indicator</td>
</tr>
</tbody>
</table>

* May vary by rating – Consult Mersen technical support

For DC applications, consult Mersen technical support

Fuse holders available – Contact Mersen for more information
STANDARD POWER CONVERSION PROTECTION – MINIATURE BODY

PROTISTOR® - MINIATURE BODY FUSES

Mersen miniature fuse offers provide protection for electronic and low power equipment in AC networks. Mersen miniature fuse-links were developed to provide a very high breaking capacity for electronic converters. These fuse-links are ready to be installed directly on Printed Circuit Boards or with the use of clips for easy maintenance.

Highlights:
- Extremely current limiting
- High breaking capacity
- Worldwide acceptability

Applications:
- Monitoring controllers
- Very low power converter
- Metering devices

Approvals:
- UL recognized E76491
- UL recognized E90660
- IEC 127-2 Standard Sheet 1

PROTISTOR - MINIATURE BODY FUSES RATINGS

<table>
<thead>
<tr>
<th>Size/Series</th>
<th>Operating Class/Range</th>
<th>Ampere Rating $I_a$ (A)</th>
<th>Rated Voltage (VAC)</th>
<th>IEC/UL</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>5X20 mm</td>
<td>Fast acting/FA</td>
<td>14-20A</td>
<td>125VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,04-13A</td>
<td>250VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,04-4A</td>
<td>400VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,63A</td>
<td>500VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6X32 mm</td>
<td></td>
<td>25-30A</td>
<td>125VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,04-20A</td>
<td>250VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,04-20A</td>
<td>400VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2,63A</td>
<td>440VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,04-16A</td>
<td>500VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6X46 mm</td>
<td>Fast acting/FA</td>
<td>0,1-1,3A</td>
<td>690VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,1-16A</td>
<td>1000VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5X20 mm</td>
<td>Time Lag/SA</td>
<td>14-16A</td>
<td>125VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,04-13A</td>
<td>250VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,04-3,2A</td>
<td>400VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6X32 mm</td>
<td></td>
<td>25-30A</td>
<td>125VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,04-20A</td>
<td>250VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,04-10A</td>
<td>400VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,1-10A</td>
<td>500VAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,6A</td>
<td>600VAC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fuse holders available – Contact Mersen for more information
PROTISTOR® - DC HIGH PERFORMANCE SQUARE & ROUND POWER FUSES

Mersen DC high performance power fuses were developed to provide superior protection for railway power circuits. These fuse-links are typically operated at more elevated temperatures than other fuse types. They have lower I²t to minimize damage to components in case of short circuits, and have lower watts loss and longer life.

**Highlights:**
- Extremely fast acting
- Current limiting
- Very low I²t
- Worldwide acceptability
- Superior cycling ability

**Applications:**
- Light rail (metro/tram): 600/750VDC
- Suburban lines: 1,5kVDC
- Suburban lines: 3kVDC
- Railway 15 / 25 KVAC

**Approvals:**
- UL recognized file E76491
- CSA certified
- IEC 60269-4 certified
- CCC approved (consult Mersen)

### PROTISTOR - DC HIGH PERFORMANCE SQUARE & ROUND BODY POWER FUSE RATINGS

<table>
<thead>
<tr>
<th>Size/Series</th>
<th>Operating Class/Range</th>
<th>Ampere Rating* (A)</th>
<th>Rated Voltage (VDC)</th>
<th>Maximum Interrupting Rating IR (A)</th>
<th>Mounting</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>gR</td>
<td>50-160</td>
<td>900VDC*</td>
<td>Consult Mersen technical support</td>
<td>Flush-end or blade</td>
<td>Square</td>
</tr>
<tr>
<td>121</td>
<td></td>
<td>200-250</td>
<td></td>
<td></td>
<td>Flush-end</td>
<td></td>
</tr>
<tr>
<td>122</td>
<td></td>
<td>250-500</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>123</td>
<td></td>
<td>500-800</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>2X122</td>
<td></td>
<td>500-1000</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>2X123</td>
<td></td>
<td>1000-1600</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>aR</td>
<td>20-125</td>
<td>1200VDC*</td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td></td>
<td>160-420</td>
<td>1500VDC*</td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>2X72</td>
<td></td>
<td>500-840</td>
<td>1200VDC*</td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>aR</td>
<td>20-215</td>
<td>2000VDC*</td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>122</td>
<td></td>
<td>160-400</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>2X122</td>
<td></td>
<td>500-800</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>gR</td>
<td>6-125</td>
<td>2400VDC*</td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>302</td>
<td></td>
<td>100-280</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>2X302</td>
<td></td>
<td>200-560</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>aR</td>
<td>20-180</td>
<td>2400VDC*</td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>302</td>
<td></td>
<td>160-400</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>2X302</td>
<td></td>
<td>400-800</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>gR</td>
<td>6-125</td>
<td>4000VDC*</td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>602</td>
<td></td>
<td>100-180</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>2X602</td>
<td></td>
<td>200-560</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>aR</td>
<td>10-150</td>
<td>4200VDC*</td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>602</td>
<td></td>
<td>200-375</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>2X602</td>
<td></td>
<td>400-750</td>
<td></td>
<td></td>
<td>L-bracket</td>
<td></td>
</tr>
<tr>
<td>Diam. 90mm</td>
<td>gR</td>
<td>400-600</td>
<td>1900VDC* 1500VDC**</td>
<td>60kA</td>
<td>Flush-end</td>
<td>Round</td>
</tr>
<tr>
<td>Diam. 146mm</td>
<td>gR</td>
<td>850-1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Consult Mersen technical support

** Nominal line voltage [railway]

Fuse holders available – Contact Mersen for more information
Mersen is a unique player in protection against capacitor discharge and high di/dt faults. Our extensive knowledge base was acquired from our direct partnerships with key customers that resulted in the development of Square Body. This experience has given us the ability to create a dynamic product that has the capability to disconnect within tens of microseconds to prevent collateral damage from a fault condition.

**Highlights:**
- Extremely fast acting
- Extremely current limiting
- Very low I²t
- Worldwide acceptability
- Superior cycling ability

**Applications:**
- Voltage commutated inverters (UPS and drives)
- High voltage drives or softstarters

**Approvals:**
- Consult Mersen Technical Support

### PROTISTOR® - LOW INDUCTANCE SQUARE BODY FUSE RATINGS

<table>
<thead>
<tr>
<th>Size/Series</th>
<th>Operating Class/Range</th>
<th>Ampere Rating Iₐ (A)</th>
<th>Rated Voltage (V) IEC/UL</th>
<th>Maximum Interrupting Rating (V) IEC/UL</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2X15X2? single body</td>
<td>aR</td>
<td>up to 325A</td>
<td>5000VAC*</td>
<td>5000VDC*</td>
<td>L-brackets terminals</td>
</tr>
<tr>
<td>2X15X2? multiples bodies</td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>2X15X2? single body</td>
<td></td>
<td>up to 250A</td>
<td>7200VAC*</td>
<td>7200VDC*</td>
<td></td>
</tr>
<tr>
<td>2X15X2? multiples bodies</td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>2X15X2? single body</td>
<td></td>
<td>up to 170A</td>
<td>10000VAC*</td>
<td>10000VDC**</td>
<td></td>
</tr>
<tr>
<td>2X15X2? multiples bodies</td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>2X15X2? single body</td>
<td></td>
<td>up to 135A</td>
<td>12500VAC*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>2X15X2? multiples bodies</td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

* Consult Mersen technical support
** DC (VSI) Voltage Source Inverter

Fuse holders available – contact Mersen for more information
APPLICATION ENGINEERED PROTECTION - HIGH PERFORMANCE SQUARE BODY

PROTISTOR® - HIGH PERFORMANCE SQUARE BODY POWER FUSES

Mersen provides state-of-the-art protection for large, high-power applications of power generation, transmission, and conversion of electrical energy. Mersen High Performance Square Body fuses are fully customizable to fit our customer’s requirements. Our expertise in fast acting technology has led to the development of an optimized protection solution with the lowest I²t and the highest breaking current capacity while keeping the best cycling capability. The High Performance Square Body fuses have pure silver fuse elements embedded in solidified sand. All contact surfaces are plated and all hardware is non-magnetic. All fuses come standard with a blown fuse indicator. This indicator can operate a microswitch which is easily mounted directly onto the fuse in service.

Highlights:
- Extremely fast acting
- Current limiting
- Very low I²t
- Worldwide acceptability
- Superior cycling ability

Applications:
- LV & MV high power drives
- Large rectifiers
- Substation
- High power UPS systems

Approvals:
- UL recognized file E76491
- CSA certified
- IEC 60269-4 certified
- CCC approved (consult Mersen)

PROTISTOR - HIGH PERFORMANCE SQUARE BODY FUSES RATINGS

<table>
<thead>
<tr>
<th>Size/Series</th>
<th>Operating Class/Range</th>
<th>Ampere Rating Iₙ (A)</th>
<th>Rated Voltage Vₙ (V)</th>
<th>Maximum Interrupting Rating IR</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td></td>
<td>1250-6200</td>
<td>750VAC*</td>
<td>230kA tested* 350kA estimated*</td>
<td>Flush-end, PressPack</td>
</tr>
<tr>
<td>2X44</td>
<td></td>
<td>2400-10000</td>
<td>700VAC*</td>
<td></td>
<td>Plates, PressPack</td>
</tr>
<tr>
<td>73</td>
<td></td>
<td>800-2400</td>
<td>1250VAC*</td>
<td></td>
<td>Flush-end, Plates, Blades</td>
</tr>
<tr>
<td>2X73</td>
<td></td>
<td>1800-4200</td>
<td>1150VAC*</td>
<td></td>
<td>Plates, Omega bar</td>
</tr>
<tr>
<td>83, 84</td>
<td>aR</td>
<td>630-4200</td>
<td>1500VAC*</td>
<td></td>
<td>Flush-end, Plates, Blades, PressPack</td>
</tr>
<tr>
<td>2X83, 2X84</td>
<td></td>
<td>900-8400</td>
<td>1450VAC*</td>
<td></td>
<td>Plates, PressPack</td>
</tr>
<tr>
<td>93, 94</td>
<td></td>
<td>525-3600</td>
<td>1800VAC*</td>
<td></td>
<td>Flush-end, Plates, Blades, PressPack</td>
</tr>
<tr>
<td>2X93, 2X94</td>
<td></td>
<td>1050-7200</td>
<td>1800VAC*</td>
<td></td>
<td>Plates, PressPack</td>
</tr>
<tr>
<td>123,124</td>
<td></td>
<td>630-2900</td>
<td>2500VAC*</td>
<td></td>
<td>Flush-end, Plates</td>
</tr>
<tr>
<td>2X123, 2X124</td>
<td></td>
<td>800-4100</td>
<td>2500VAC*</td>
<td></td>
<td>Plates, PressPack</td>
</tr>
<tr>
<td>173,174</td>
<td></td>
<td>400-1500</td>
<td>3800VAC*</td>
<td>150kA tested* 300kA estimated*</td>
<td>Plates, PressPack</td>
</tr>
<tr>
<td>2X173, 2X174</td>
<td></td>
<td>800-3100</td>
<td>3600VAC*</td>
<td></td>
<td>Plates</td>
</tr>
</tbody>
</table>

*may vary by rating – Consult Mersen technical support
Fuse holders available – Contact Mersen for more information
Mersen DC high performance power fuses were developed to provide superior protection for railway power and auxiliary circuits. They have lower $I^2t$ to minimize damage to components in case of short circuits, and have lower watts loss and longer life.

**Highlights:**
- Extremely fast acting
- Current limiting
- Very Low $I^2t$
- Worldwide acceptability
- Superior cycling ability

**Applications:**
- Protection of rectifiers, inverters, AC drives, Traction Auxiliary Circuits
- UPS Systems, reduced voltage motor starters, and other equipment in globally accepted applications

**Approvals:**
- UL Recognized file E76491
- Consult Mersen Technical Support

### PROTISTOR® - CYLINDRICAL AUXILIARY DC FUSE RATINGS

<table>
<thead>
<tr>
<th>Size/Series</th>
<th>Operating Class/Range</th>
<th>Ampere Rating $I_n$ (A)</th>
<th>Rated Voltage (VDC)</th>
<th>Maximum Interrupting Rating IR DC</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>14X51 mm gL</td>
<td>2-50</td>
<td>440VDC</td>
<td>100kA</td>
<td>Ferrule</td>
<td></td>
</tr>
<tr>
<td>22X58 mm gR</td>
<td>50-100</td>
<td>660VDC</td>
<td>50kA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27X60 mm gR</td>
<td>125-160</td>
<td>1000VDC</td>
<td>100kA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27X60 mm gR</td>
<td>1500VDC</td>
<td>up to 100kA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20X127 mm gR</td>
<td>0.8-110</td>
<td>1500VDC</td>
<td>60kA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20X190 mm gR</td>
<td>0.8-25</td>
<td>2000VDC</td>
<td>30kA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36X127 mm gR</td>
<td>20-100</td>
<td>4000VDC</td>
<td>30kA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36X190 mm gR</td>
<td>40-100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36X250 mm gR</td>
<td>0.8-20</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Fuse holders available – Contact Mersen for more information
SEMICONDUCTOR FUSE MAPPING DEFINITIONS

SEMICONDUCTOR FUSE TECHNOLOGY

Semiconductor fuses are used to protect against catastrophic semiconductor failure. Because of their ability to operate quickly during high fault current, semiconductor fuses help to significantly limit short circuit current to downstream components. Each different technology type of semiconductor fuse is defined by the fuse size, shape, and the type of termination:

- Cylindrical fuses can have bladed or non-bladed electrical contacts. Ferrule style fuses have caps crimped or affixed to the body. The body construction material is either made of ceramic or GMG (Glass Melamine Glass).
- Square body fuses have terminals that are screwed to the body. The body material is made of ceramic.

REGIONAL STANDARDS

Semiconductor fuses are covered by regulatory standards. The mechanical connections represented by the standards shown in this brochure follow these regional practices. Here are general descriptions of these regional practices:

- US - North American: Ferrule type, round body, or square body fuses with closed slot blades or end contacts with UNC tapped holes.
- FR - IEC Europe: Ferrule type and square body fuses with open slot blades or end contacts with metric tapped holes.
- DIN - German: Round body and square body fuses with brackets and wedge shaped contacts according to DIN43620 and DIN 43653 standards.
- BS - British: Round body and square body fuses with brackets according to BS88-4 standards.
- SP - Special Purpose: Fuses with mounting arrangements determined by application needs.
MANAGING OPERATION & FAULT CLEARING OF DEMANDING DC APPLICATIONS

With the continuous growth of demands for DC battery-related applications such as Electric Vehicles and Energy Storage facilities, comes the need for better operation management and fault clearing of such loads. Mersen offers a wide range of DC overcurrent protection (OCP) solutions based upon incumbent proven technology (DC fuse) enhanced by two new disruptive hybrid devices. These three product families are designed to safely clear both high and low DC fault currents for today’s demanding DC systems in EV/HEV and Electrical Energy Storage applications.

OVERCURRENT PROTECTION DEVICES FOR BATTERY AND DC APPLICATIONS

Mersen DC-rated OCPD devices have been specifically developed to:

- Clear both high and low DC fault current
- Limit or eliminate the impact of severe duty cycles in DC switching applications
- Decrease power losses during normal operation to improve system efficiency
- Offer a reliable and robust alternative to DC relays, DC contactors, DC switches

Mersen OCPD devices come in two variants: DC-Fuse and Hybrid Technology:

<table>
<thead>
<tr>
<th>Product range</th>
<th>MONOLITHIC TECHNOLOGY</th>
<th>HYBRID TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core technology</td>
<td>DC-Fuse</td>
<td>Pyro + clearing elements</td>
</tr>
<tr>
<td>Value proposition</td>
<td>Ultra fast-acting fuses (for large fault currents)</td>
<td>Fast-acting operation &lt; 1ms Innovative and cost effective solutions Close-to-zero conduction loss Operates for small or large fault current Fully configurable Very compact size High cycling performances High inrush current capabilities</td>
</tr>
<tr>
<td>Visuals</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DC OVERCURRENT PROTECTION DEVICES FOR BATTERY APPLICATIONS

EXAMPLE OF PRODUCT FIT IN EV/HEV APPLICATIONS:

Main battery pack
1 to 16 batteries assembled in series/parallel
(1 fuse per module > up to 16 fuses)

Maintenance Safety Disconnect MSD
(1 fuse + OCPD)

Junction Box / Battery Disconnect Unit BDU
(4 to 8 fuses)

Inverter + Motor
450 > 1,000 V
Up to 800 A

EXAMPLE OF PRODUCT FIT IN ELECTRICAL ENERGY STORAGE APPLICATIONS:

Module Fuse
Battery Module

Maintenance Safety Disconnect + Combiner Box

Protistor®
AC Fuse (aR)
SPD

DC<->AC bidirectional inverter cabinet

M-fuse®

χp series®

χs-EV series®

EP.MERSEN.COM
M-FUSE MF 100VDC BATTERY MODULE FUSES

M-fuse line-up belongs to the new DC Overcurrent protection (O.C.P.) range developed by Mersen to address specific needs in EV/HEV and Battery Electrical Storage Systems. M-fuse provides the ultimate protection of the battery modules, offering reliable clearing of DC fault currents.

It has been specifically engineered and tested to provide DC-applications best-in-class protection performance: Up to 100VDC, Current rating (In) = 50 to 200A, Interrupting Rating (IR) = 20kA, L/R ≤ 1.5ms, Minimum Breaking Capacity (MBC) < 1kA.

Features and Benefits:
- Designed for DC applications
- Low watt losses
- High cycling performance
- Full coverage of battery module voltage and current
- Ultra compact size
- Current Ratings (In): 50 to 200A
- Interrupting Rating: 20kA @ 100VDC, L/R < 1.5ms

Applications:
- Battery modules protection
- EV/HEV
- Electrical Energy Storage
- Supercapacitor module protection

Standards:
- UL recognized, CE, RoHS
- Power Cycling & Vibrations: JASO D622
- IATF - ISO/TS 16949 Quality management undergoing certification

Typical usage of M-fuse in Mersen DC Protection Family

PROTISTOR® - HIGH PERFORMANCE SQUARE BODY FUSES RATINGS AND APPLICATION DATA

<table>
<thead>
<tr>
<th>Series</th>
<th>Ampere Rating In (A)</th>
<th>Rated Voltage Vn (V) (IEC)</th>
<th>Maximum Interrupting Rating AC</th>
<th>Maximum Interrupting Rating DC</th>
<th>Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-fuse MF 100VDC</td>
<td>50 – 200</td>
<td>100VDC</td>
<td>-</td>
<td>20kA</td>
<td>Bolt-In</td>
</tr>
<tr>
<td></td>
<td>50 – 180</td>
<td>100VDC</td>
<td>-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EVpack-fuse line-up belongs to the new DC Overcurrent protection (O.C.P.) range developed by Mersen to address specific needs in EV/HEV and Battery Electrical Storage Systems. EVpack-fuse provides the ultimate protection of the battery pack offering reliable clearing of DC fault currents. It has been specifically engineered and tested to provide DC applications best-in-class protection performance: Up to 1,000VDC, Current rating (In)= 5 to 600A, Interrupting Rating (IR) = 20kA, L/R ≤1ms, Minimum Breaking Capacity (MBC) < 3kA for a perfect matching with DC contactor.

**Features and Benefits:**
- Designed for DC applications
- Low watt losses
- High cycling performance
- Full coverage of battery module voltage and current
- Ultra compact size

**Applications:**
- EV/HEV
- Electrical Energy Storage
- Battery pack protection
- Battery Disconnect Unit (BDU)
- Battery Junction Box for auxiliaries
- Battery charger
- Supercapacitor pack protection

**EVpack-FUSE BATTERY PACK FUSES**

<table>
<thead>
<tr>
<th>Size</th>
<th>Series</th>
<th>Ampere Rating In (A)</th>
<th>Rated Voltage Vn (V)</th>
<th>Interrupting Rating DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEV55C Ferrule Fuse</td>
<td>EVpack-fuse</td>
<td>5 - 50</td>
<td>550VDC</td>
<td>20kA</td>
</tr>
<tr>
<td>MEV55C - S Surface Mount Fuse</td>
<td>EYMEV55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEV55C - P PC Board Mount</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEV70V - S Surface Mount Fuse</td>
<td>EVpack-fuse</td>
<td>35 - 175</td>
<td>700VDC</td>
<td></td>
</tr>
<tr>
<td>MEV70A Round Body Fuse</td>
<td>EYMEV70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEV100C Ferrule Fuse</td>
<td>EVpack-fuse</td>
<td>8 - 30</td>
<td>1000VDC</td>
<td></td>
</tr>
<tr>
<td>MEV100C - S Surface Mount</td>
<td>EYMEV100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEV100A Round Body Fuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEV100J Round Body Fuse</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Fuse holders available – contact Mersen for more info.

**Standards:**
- UL recognized, CE, RoHS
- Power Cycling & Vibrations: JASO D622
- IATF - ISO/TS 16949 Quality management undergoing certification
HYBRID Xp SERIES DC OVERCURRENT PROTECTIVE DEVICES

Xp SERIES: HYBRID DC FAULT CLEARING DEVICE

Xp features a high cycling performance DC protection device that can clear both high and low-fault current at 1,000 VDC in less than 1 ms, providing maximum flexibility in equipment design and ultimate protection. They have been engineered to provide protection for DC applications: Battery Energy Storage, EV/HEV, Smart-grid, PV installations, etc. The Xp system is composed of a fast acting pyro element, controlled by a gate current, plus a parallel clearing element. This protection meets custom requirements of very fast operating time and very high overload current.

Features and Benefits:
- DC application focused design
- Extremely low watt losses (-20W / 400A)
- Excellent cycling performance
- Ultra-fast acting (300 μs)
- Small footprint
- Large inrush current: 15 In for 100 ms
- Self-triggered and/or external triggering
- Tunable Time-Current curve and Minimum Breaking Capacity (MBC) value

Applications:
- EV/HEV
- Battery Energy Storage
- PV installations (1,500VDC in development)
- Supercapacitors bank
- DC General Purposes
- Remote Power Switch Contact

Standards:
- IATF - ISO/TS 16949 Quality management undergoing certification

Xs-EV SERIES: HYBRID DC POWER RELAY

Xs-EV features a DC power relay that can repetitively clear up to 2kA at 1,000 VDC. Xs-EV has been engineered to provide high DC switching performances versus conventional mechanical DC power relay, switch and contactor. This power relay is a hybrid technology with the capability of switching both high voltage and high current designed specially for electrical vehicle applications.

Features and Benefits:
- Designed for DC applications
- Bidirectional
- Arc-less
- Reduced footprint & mass
- Low conduction losses
- Repeatable current make/break capability for resistive & inductive loads at full rated voltage and current
- Enhanced cycling performances
- Built-in turn ON fault detection

Applications:
- EV/HEV
- Battery Energy Storage
- DC Grid, Smart-Grid, Off-Grid
- Battery Disconnect Units BDU
- Battery Junction Box
- Power switch, power contactor
EXTENDED SOLUTIONS FOR POWER MANAGEMENT

HIGH-PERFORMANCE COOLING SOLUTIONS FOR POWER ELECTRONICS
Mersen integrates its extensive cooling expertise and patented heat sink technology into power electronics applications to make them more efficient, reliable, and profitable. Our unique knowledge of air, phase change, and liquid cooled heat sinks enables Mersen to help customers find the right customized thermal protection solution for their unique applications.

AIR COOLING SOLUTIONS
Mersen’s air cooled Fabfin® heat sink stands out from ordinary extruded heat sinks because of its higher fins, giving it excellent performances. Using a swaging process means a variety of its higher fins and increased height-to-space ratio types of fins can be used.

HEAT PIPES FOR INSTANTANEOUS COOLING ACTION
The high heat losses from press-pack or IGBT power devices can easily be conveyed outward via heat pipe cooling units. A heat pipe is a device that uses “phase change” to efficiently conduct large amounts of heat between two solid surfaces.

LIQUID COOLING SOLUTIONS
Power electronics components (SiC, IGBTs, thyristors) need a cooling solution that is both effective and reliable, especially when installed in a confined space. To ensure maximum reliability, Mersen has mastered vacuum brazing technology for liquid cooled solutions to achieve guaranteed water tightness with no seams, robustness, corrosion free, and excellent thermal performance.

LAMINATED BUS BAR SOLUTIONS
Laminated bus bar is an engineered component consisting of layers of fabricated copper separated by thin dielectric materials, laminated into a unified structure.

Why choose laminated bus bar?
Bus bars reduce system costs, improve reliability, increase capacitance, and eliminate wiring errors. They also lower inductance and lower impedance. Plus, the physical structure of bus bars offers unique features in mechanical design. For example, complete power distribution subsystems can also act as structural members of a total system. Multilayer bus bars offer a structural integrity that wiring methods just can’t match.
MERSEN IS A GLOBAL EXPERT IN ELECTRICAL POWER AND ADVANCED MATERIALS

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