Motor Protection Solutions

Protecting Your Investments
Motor Protection Solutions

The Allen-Bradley® line of motor protection devices encompasses a range of simple, single purpose protection to the newer overload technologies featuring diagnostics and Logix integration.

Importance of Motor Protection

Electric motors are the backbone of today’s modern industry providing the mechanical energy needed for most manufacturing processes. Push too hard, too often, and there is the potential for unforeseen downtime while the affected motor shuts down and awaits reset.

75% of motor failures can be prevented by appropriate protection measures


MachineAlert™ Monitoring Relays

- Key Features:
  - Programmable latching or inhibit at set level
  - Adjustable time delay settings
  - Three-phase devices are powered by the measuring circuit
  - Adjustable measurement set points

Bimetallic Overload Relays

- Key Features:
  - Ambient temperature compensation for consistency
  - Rated for DC and variable frequency drives applications up to 400 Hz
  - Optional remote reset solenoid and external reset accessories

857 Motor/Feeder Protection Relay

- Key Features:
  - Suitable for any system voltage to 450,000V
  - Configurable interlocking schemes offering basic logic functions
  - All settings, events, and indications are in a non-volatile memory

Feature Comparison

<table>
<thead>
<tr>
<th>Protection Features</th>
<th>MachineAlert</th>
<th>Bimetallic</th>
<th>E1 Plus, E3 Model</th>
<th>E300</th>
<th>857</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overload</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Phase loss</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ground fault</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Current imbalance</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Jam</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Over/under voltage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Voltage imbalance</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Over/under power</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Diagnostics Features

<table>
<thead>
<tr>
<th>% Full load amperes</th>
<th>MachineAlert</th>
<th>Bimetallic</th>
<th>E1 Plus, E3 Model</th>
<th>E300</th>
<th>857</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Thermal capacity utilization</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Voltage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Power</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Energy</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tbody>
</table>

Integration Features

<table>
<thead>
<tr>
<th>DeviceLogix™</th>
<th>MachineAlert</th>
<th>Bimetallic</th>
<th>E1 Plus, E3 Model</th>
<th>E300</th>
<th>857</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic controller</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

E1 Plus™ Electronic Overload Relay

- Key Features:
  - Current measurement-based protection
  - Low energy consumption
  - Side-mount expansion modules provide adjustable levels of protection and communication

E300™ Electronic Overload Relay

- Key Features:
  - Provides critical motor protection functions
  - Communication and diagnostics provides detailed logs and control from relay to motor
  - Can simplify control architecture

Causes of Motor Failures

- Rotor Bar, 5%
- Unknown, 10%
- External, 16%
- Stator Winding, 16%
- Shaft Coupling, 2%
- Bearing, 51%
E1 Plus™ Electronic Overload Relay

The solid-state design of the E1 Plus overload relay, offered in two models, provides ambient temperature compensation, thermal and phase loss protection and a wide 5:1 adjustment range. The ED model provides fixed protection while the EE model provides selectable and expandable protection.

Customizable

The optional side mount modules* for the E1 Plus overload relays allow you to customize the device to your application’s specific needs.

* Side mount modules only available for EE model

Selecte able Trip Class & Reset Mode

- Selectable manual/ auto-manual reset modes
- Up to 4 trip class options

5:1 Current Range
- Wide FLA range

Model Specifications

<table>
<thead>
<tr>
<th>Bulletin 193, ED Model</th>
<th>Bulletin 193/592, EE Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Range</td>
<td>0.1…45 A</td>
</tr>
<tr>
<td>Trip Class</td>
<td>10 Fixed</td>
</tr>
<tr>
<td>Side Mount Modules</td>
<td>Communication, Protection</td>
</tr>
</tbody>
</table>

Mounting Options

- IEC Motor Starter
- NEMA Motor Starter
- DIN Rail Mount with Pass-thru

Diagnostics

The E1 Plus communication side-mount modules provide a cost-effective transformation of real-time data into your control architecture.

- DeviceNet
- EtherNet/IP
- PROFIBUS

Advantages

- Includes integrated I/O
  - Provides convenient local termination of motor-related inputs (2) and outputs (1), simplifying the control architecture
- Provides operational and diagnostic data
  - Average motor current
  - Percentage of thermal capacity usage
  - Device status
  - Trip and warning identification
  - Trip history (5 previous trips)
- Expands protective functions
  - Overload warning
  - Jam protection
  - Underload warning

Model Specifications

<table>
<thead>
<tr>
<th>Current Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 mm push button cutout</td>
</tr>
</tbody>
</table>
E300™ Electronic Overload Relay

The E300 Electronic Overload Relay provides a flexible design and advanced intelligence. Real-time diagnostics are transformed into actionable information – maximizing your up-time and protecting your assets.

On-Device Settings
- Network address configuration
- Restore factory default settings
- Enable security settings

Modular Design
The new modular design of the E300 overload relay allows customers to tailor the device for their application’s exact needs.

Dual Port EtherNet/IP
- Supports device level ring

Removable Terminal Blocks

Customizable
Multiple accessory options allow for the E300 overload relay to be customized to fit your application needs. Customers can expand out to 4 of the available Digital I/O modules, plus 4 Analog I/O modules along with a power supply and operator interface.

Expansion Digital I/O
- 4 inputs/2 outputs
- 24V DC
- 120V AC
- 240V AC

Expansion Analog I/O
- 3 universal inputs/1 output
- 4 – 20 mA
- 0 – 10V
- RTD
- NTC

Expansion Power Supply
- 120/240V AC
- 24V DC

Expansion Port
- Expansion I/O
- Operator station

Communication Module

Control Module

Sensing Module

Mounting Options

The E300 overload relay provides real-time motor diagnostic information to proactively indicate when a motor is having a problem allowing you to efficiently troubleshoot. This information includes:
- Current
- Ground fault current
- Voltage
- Power
- Energy
- % Thermal capacity utilization
- Time to trip
- Time to reset
- Trip history
- Trip snapshot

The communication options of the E300 overload relay allow users to view this diagnostic information using the following methods:
- Logix add-on profile
- Web browser
- FactoryTalk® View
- Faceplates

IEC Motor Starter
DIN Rail Mount Motor Starter
NEMA Motor Starter
**MachineAlert™ Monitoring Relays**

The MachineAlert family of dedicated function motor protection relays offers supplementary protective functions that are easily added to your motor control circuits.

**Ideal Applications**
- Protects against single phasing during start-up and run-time in motor applications
- Detects incorrect phase sequence to keep the motor from starting
- Detects no-load conditions indicating absence of water in water lubricated pumps
- Protects motors from over temperature conditions

**Bimetallic Overload Relays**

The bimetallic thermal overload relays compensate for ambient temperature while providing overload protection and phase-loss sensitivity. They are a cost-effective ways to protect your electrical equipment investment.

**Ideal Applications**
- Ideal for light industry and low critical process
  - Conveyors
  - Fans
  - Pumps
  - VFD-controlled motors
  - DC motors
857 Motor/Feeder Protection Relay

The 857 medium/high-voltage motor and feeder protection relay contains the essential protection functions needed to protect feeders, and motors in distribution networks of utilities, heavy industries, power plants and offshore applications.

Functions
This device also includes many programmable functions for various protection and communication situations:
• Ultra-fast arc protection (optional)
• Power quality assessment
• Trip circuit supervision
• Circuit breaker protection
• Complete protection and control

Product Selection Attributes

Diagnostics

Performance

Usability

Bimetallic
• Selectable reset mode
• Built-in test/reset button
• Manual trip

E1 Plus*
• Multiple trip class options
• Selectable reset modes
• Wide current range
• Additional modules for communications and protection

E300
• Wide current range
• Advanced performance and diagnostics
• Embedded communications
• Modularity
• Multiple expansion options

857
• Highly configurable
• Motor and feeder protection in one unit
• Multiple communication interfaces and protocols
• Extensive diagnostic capabilities
• Suitable for all system voltages to 450,000V

* E1 Plus, EE model used in comparison charts.
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On-Line Product Directory
Our portfolio of motor protection devices are designed to protect your manufacturing investments.
http://www.rockwellautomation.com/go/pd/motor-protectors

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