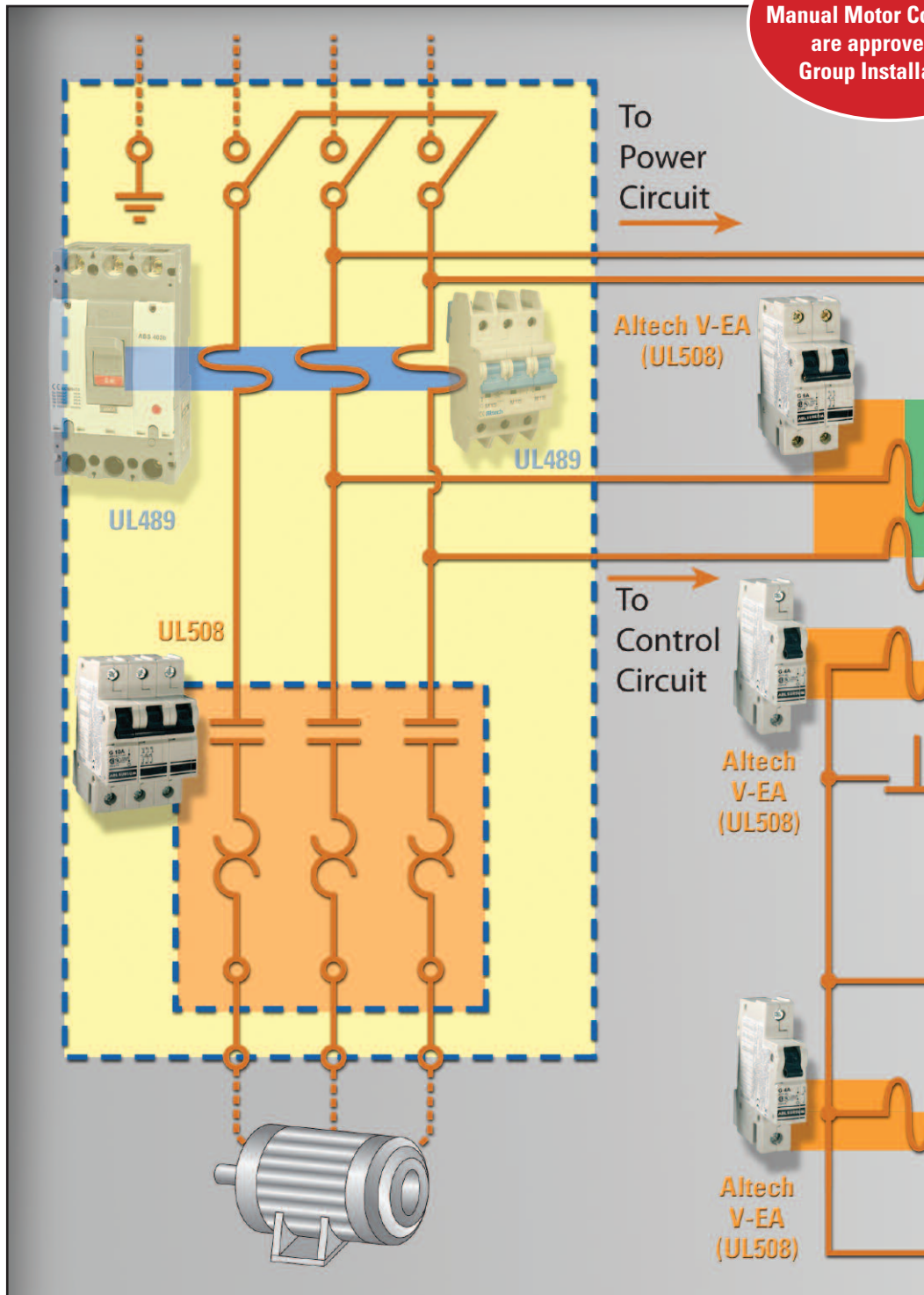


## Typical UL508 Application

Power Circuit of a UL508A Panel

Altech's V-EA UL508  
Manual Motor Controllers  
are approved for  
Group Installations



**Disclaimer:** This an application example. Installation should be done by a qualified electrician under the guidance of UL/NEC<sup>®</sup> specifications..

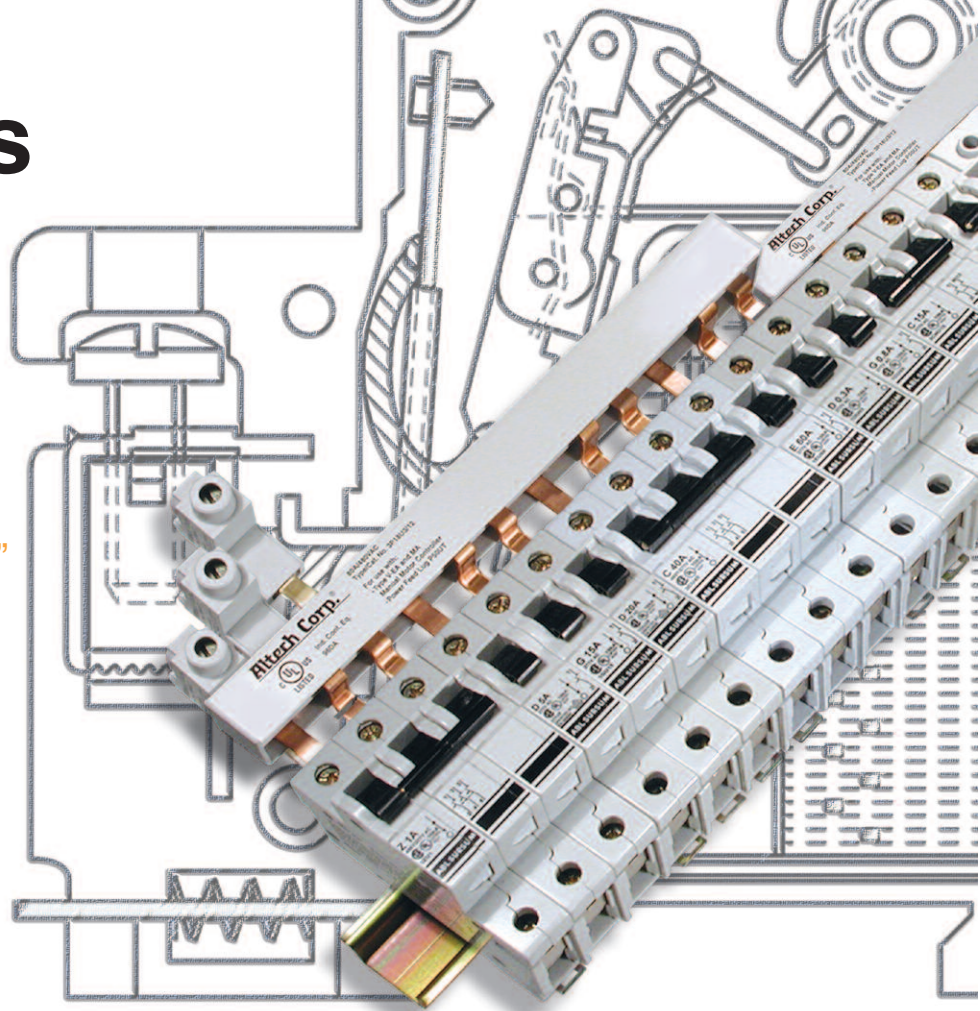
# V-EA Series

**UL** 508 listed  
E137938

**SP** C22.2 No.14 certified  
LR104391

**UL508 Listed**  
**Manual Motor Controller**  
**“Suitable as Motor Disconnect”**

- DIN Rail Mounted
- 17.5mm width per pole
- Thermal Magnetic
- 480Y/277V AC, 50/60Hz
- 10kA Short Circuit Withstand Capacity
- Applications Include:
  - AC Motor Starting, Across the Line
  - AC General Use
  - AC Resistance
  - AC Discharge Lamps (Ballast)
  - AC Incandescent Lamps (Tungsten)

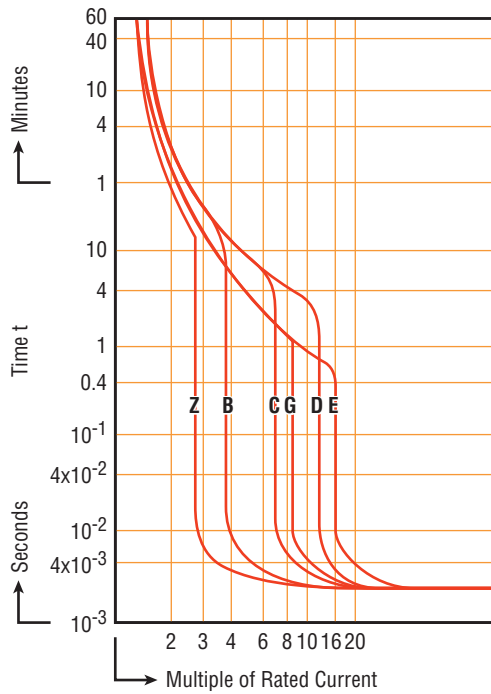


|                                                                |                                                                                                  |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>Voltage Rating</b>                                          | 480Y/277VAC<br>0.3-25A: 1 pole - 42VDC; 2 Pole - 80VDC<br>30-60A: 1 pole - 24VDC; 2 Pole - 60VDC |
| <b>Short Circuit Withstand Rating (UL/CSA - Ratings)</b>       | 0.3-60A (RC): 10kA with UL-listed RK5 back-up fuse or MCCB                                       |
| <b>Group Short Circuit Withstand Rating (UL/CSA - Ratings)</b> | 0.3-10A (RC): 10kA; 13-60A (RC): 5kA<br>no branch circuit protection required                    |
| <b>Interrupting Capacity (VDE - Ratings)</b>                   | 0.3-63A (RC): 10kA                                                                               |
| <b>Calibration Temperature</b>                                 | 40°C (104°F)                                                                                     |
| <b>Terminal Size Acceptability</b>                             | Top: 18-3 AWG; Bottom: 18-2 AWG                                                                  |
| <b>Terminal Torque</b>                                         | 20 lb.in.                                                                                        |
| <b>Terminal Protection Degree</b>                              | IP20                                                                                             |
| <b>Horse Power Ratings</b>                                     | see page 34                                                                                      |
| <b>Mechanical Endurance Ratings</b>                            | see page 35                                                                                      |

## SHORT CIRCUIT WITHSTAND RATINGS FOR V-EA MANUAL MOTOR CONTROLLER

| Trip Curve | Amp Range   | Backup Protection | UL-Listed RK5-Fuse up to 10kA | UL-Listed MCCB up to 10kA | No BCP Required up to: |
|------------|-------------|-------------------|-------------------------------|---------------------------|------------------------|
| all        | 0.3 - 10A   |                   | 4xRC*<br>min 15A, max 70A     | 4xRC*<br>min 15A, max 70A | 10kA                   |
| all        | 12 - 30/32A |                   | 4xRC*<br>max 125A             | 4xRC*<br>max 125A         | 5kA                    |
| all        | 40 - 50A    |                   | 4xRC*<br>max 200A             | 4xRC*<br>max 200A         | 5kA                    |
| all        | 60 / 63A    |                   | 4xRC*<br>max 250A             | 4xRC*<br>max 250A         | 5kA                    |

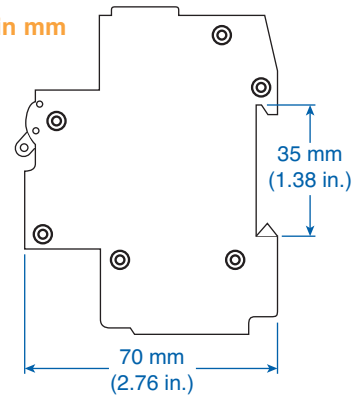
\*up to nearest rated current



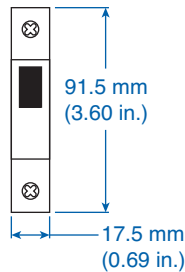
## Time versus Current Trip Curve

For the exact trip curve, please refer to pages 32-33.

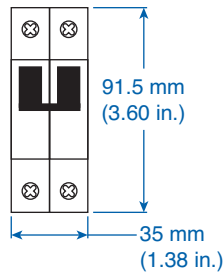
Dimensions in mm side view



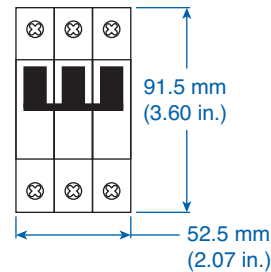
1 POLE



2 POLE



3 POLE



| Trip-Characteristics*          |                   |                        |                       | Applications                                            |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
|--------------------------------|-------------------|------------------------|-----------------------|---------------------------------------------------------|-------------------------------------|--------------|------------------------------|---------|---------------|----------------|--------------------|------------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------|------------------|
| Characteristic Trip Boundaries |                   |                        |                       | Lighting<br>Wiring<br>Protection<br>Control<br>Circuits | Business<br>Equipment<br>Appliances | Transformers | Power<br>Supplies<br>Heaters | Motors  |               |                |                    | General<br>Electronics | Solenoid | Semi-<br>conductors<br><br>Components/<br>devices with<br>low surge-<br>current and<br>short circuit<br>withstand<br>capabilities | Reactive<br>Load |
| Thermal Trip                   |                   | Magnetic Trip          |                       |                                                         |                                     |              |                              | General | Low<br>Inrush | High<br>Inrush | High<br>Efficiency |                        |          |                                                                                                                                   |                  |
| Must not<br>Trip>100ms         | Must Trip<br><1hr | Must not<br>Trip>100ms | Must Trip<br>at 100ms |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| B-Characteristics              |                   |                        |                       |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| 1.13xRC                        | 1.45xRC           | 3xRC                   | 5xRC                  |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| C-Characteristics              |                   |                        |                       |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| 1.13xRC                        | 1.45xRC           | 5xRC                   | 10xRC                 |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| D-Characteristics              |                   |                        |                       |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| 1.13xRC                        | 1.45xRC           | 10xRC                  | 16xRC                 |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| E-Characteristics              |                   |                        |                       |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| 1.05xRC                        | 1.35xRC           | 14xRC                  | 18xRC                 |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| G-Characteristics              |                   |                        |                       |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| 1.05xRC                        | 1.35xRC           | 8xRC                   | 10xRC                 |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| Z-Characteristics              |                   |                        |                       |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |
| 1.05xRC                        | 1.35xRC           | 2xRC                   | 3xRC                  |                                                         |                                     |              |                              |         |               |                |                    |                        |          |                                                                                                                                   |                  |

\*The value of each characteristic is shown vertically beneath its corresponding heading.



### Warning!

This information should only be used as a selection guide. The use of a Miniature Circuit Breaker/Manual Motor Controller in an application with a certain Trip-Characteristic always requires prototype testing! It is the responsibility of the circuit design engineer to select the appropriate Miniature Circuit Breaker/Manual Motor Controller for his specific application.

## B-Trip Characteristic



UL508 Listed  
E137938



### Application Examples:

Business equipment, wiring protection, lighting, appliances, control circuits, some motors and some electronic applications. Relatively long thermal trip delay but low magnetic trip point.



### One Pole

Standard Pack: 12

Weight:

0.3A - 32A

1.68kg (3.7 lb.)

40A - 63A

1.92kg (4.23 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 1.0A          | 1BU1              | UL SF     |
| 1.6A          | 1BU1.6            | UL SF     |
| 2.0A          | 1BU2              | UL SF     |
| 2.5A          | 1BU2.5            | UL SF     |
| 3.0A          | 1BU3              | UL SF     |
| 3.5A          | 1BU3.5            | UL SF     |
| 4.0A          | 1BU4              | UL SF     |
| 5.0A          | 1BU5              | UL SF     |
| 6.0A          | 1BU6              | UL SF     |
| 8.0A          | NA                |           |
| 10A           | 1BU10             | UL SF     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 1BU13             | UL SF     |
| 15A           | 1BU15             | UL SF     |
| 16A           | 1BU16             | UL SF     |
| 20A           | 1BU20             | UL SF     |
| 25A           | 1BU25             | UL SF     |
| 30A           | 1BU30             | UL SF     |
| 32A           | 1BU32             | UL SF     |
| 40A           | 1BU40             | UL SF     |
| 50A           | 1BU50             | UL SF     |
| 60A           | 1BU60             | UL SF     |
| 63A           | 1BU63             |           |



### One Pole plus neutral

Standard Pack: 6

Weight:

0.3A - 32A

1.56kg (3.44 lb.)

40A - 63A

1.74kg (3.84 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 1.0A          | 2BNU1             | UL SF     |
| 1.6A          | 2BNU1.6           | UL SF     |
| 2.0A          | 2BNU2             | UL SF     |
| 2.5A          | 2BNU2.5           | UL SF     |
| 3.0A          | 2BNU3             | UL SF     |
| 3.5A          | 2BNU3.5           | UL SF     |
| 4.0A          | 2BNU4             | UL SF     |
| 5.0A          | 2BNU5             | UL SF     |
| 6.0A          | 2BNU6             | UL SF     |
| 8.0A          | NA                |           |
| 10A           | 2BNU10            | UL SF     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 2BNU13            | UL SF     |
| 15A           | 2BNU15            | UL SF     |
| 16A           | 2BNU16            | UL SF     |
| 20A           | 2BNU20            | UL SF     |
| 25A           | 2BNU25            | UL SF     |
| 30A           | 2BNU30            | UL SF     |
| 32A           | 2BNU32            | UL SF     |
| 40A           | 2BNU40            | UL SF     |
| 50A           | 2BNU50            | UL SF     |
| 60A           | 2BNU60            | UL SF     |
| 63A           | 2BNU63            |           |



### Two Pole

Standard Pack: 6

Weight:

0.3A - 63A

1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 1.0A          | 2BU1              | UL SF     |
| 1.6A          | 2BU1.6            | UL SF     |
| 2.0A          | 2BU2              | UL SF     |
| 2.5A          | 2BU2.5            | UL SF     |
| 3.0A          | 2BU3              | UL SF     |
| 3.5A          | 2BU3.5            | UL SF     |
| 4.0A          | 2BU4              | UL SF     |
| 5.0A          | 2BU5              | UL SF     |
| 6.0A          | 2BU6              | UL SF     |
| 8.0A          | NA                |           |
| 10A           | 2BU10             | UL SF     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 2BU13             | UL SF     |
| 15A           | 2BU15             | UL SF     |
| 16A           | 2BU16             | UL SF     |
| 20A           | 2BU20             | UL SF     |
| 25A           | 2BU25             | UL SF     |
| 30A           | 2BU30             | UL SF     |
| 32A           | 2BU32             | UL SF     |
| 40A           | 2BU40             | UL SF     |
| 50A           | 2BU50             | UL SF     |
| 60A           | 2BU60             | UL SF     |
| 63A           | 2BU63             |           |



### Three Pole

Standard Pack: 4

Weight:

0.3A - 63A

1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 1.0A          | 3BU1              | UL SF     |
| 1.6A          | 3BU1.6            | UL SF     |
| 2.0A          | 3BU2              | UL SF     |
| 2.5A          | 3BU2.5            | UL SF     |
| 3.0A          | 3BU3              | UL SF     |
| 3.5A          | 3BU3.5            | UL SF     |
| 4.0A          | 3BU4              | UL SF     |
| 5.0A          | 3BU5              | UL SF     |
| 6.0A          | 3BU6              | UL SF     |
| 8.0A          | NA                |           |
| 10A           | 3BU10             | UL SF     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 3BU13             | UL SF     |
| 15A           | 3BU15             | UL SF     |
| 16A           | 3BU16             | UL SF     |
| 20A           | 3BU20             | UL SF     |
| 25A           | 3BU25             | UL SF     |
| 30A           | 3BU30             | UL SF     |
| 32A           | 3BU32             | UL SF     |
| 40A           | 3BU40             | UL SF     |
| 50A           | 3BU50             | UL SF     |
| 60A           | 3BU60             | UL SF     |
| 63A           | 3BU63             |           |



For ring tongue terminal version, replace "U" with "R" in part number. For example **1BR20** instead of **1BU20**.

# C-Trip Characteristic



UL508 Listed  
E137938



## Application Examples:

Low inrush motors, lighting, wiring protection, appliances, business equipment, and control circuit applications. Relatively long thermal trip delay and medium magnetic trip point.



### One Pole

Standard Pack: 12

Weight:

0.3A - 32A

1.68kg (3.7 lb.)

40A - 63A

1.92kg (4.23 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 1CU03             | UL SP     |
| 0.5A          | 1CU05             | UL SP     |
| 0.75A         | 1CU075            | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 1CU1              | UL SP     |
| 1.6A          | 1CU1.6            | UL SP     |
| 2.0A          | 1CU2              | UL SP     |
| 2.5A          | 1CU2.5            | UL SP     |
| 3.0A          | 1CU3              | UL SP     |
| 3.5A          | 1CU3.5            | UL SP     |
| 4.0A          | 1CU4              | UL SP     |
| 5.0A          | 1CU5              | UL SP     |
| 6.0A          | 1CU6              | UL SP     |
| 8.0A          | 1CU8              | UL SP     |
| 10A           | 1CU10             | UL SP     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 1CU13             | UL SP     |
| 15A           | 1CU15             | UL SP     |
| 16A           | 1CU16             | UL SP     |
| 20A           | 1CU20             | UL SP     |
| 25A           | 1CU25             | UL SP     |
| 30A           | 1CU30             | UL SP     |
| 32A           | 1CU32             | UL SP     |
| 40A           | 1CU40             | UL SP     |
| 50A           | 1CU50             | UL SP     |
| 60A           | 1CU60             | UL SP     |
| 63A           | 1CU63             | UL SP     |



### One Pole plus neutral

Standard Pack: 6

Weight:

0.3A - 32A

1.56kg (3.44 lb.)

40A - 63A

1.74kg (3.84 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 2CNU03            | UL SP     |
| 0.5A          | 2CNU05            | UL SP     |
| 0.75A         | 2CNU075           | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 2CNU1             | UL SP     |
| 1.6A          | 2CNU1.6           | UL SP     |
| 2.0A          | 2CNU2             | UL SP     |
| 2.5A          | 2CNU2.5           | UL SP     |
| 3.0A          | 2CNU3             | UL SP     |
| 3.5A          | 2CNU3.5           | UL SP     |
| 4.0A          | 2CNU4             | UL SP     |
| 5.0A          | 2CNU5             | UL SP     |
| 6.0A          | 2CNU6             | UL SP     |
| 8.0A          | 2CNU8             | UL SP     |
| 10A           | 2CNU10            | UL SP     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 2CNU13            | UL SP     |
| 15A           | 2CNU15            | UL SP     |
| 16A           | 2CNU16            | UL SP     |
| 20A           | 2CNU20            | UL SP     |
| 25A           | 2CNU25            | UL SP     |
| 30A           | 2CNU30            | UL SP     |
| 32A           | 2CNU32            | UL SP     |
| 40A           | 2CNU40            | UL SP     |
| 50A           | 2CNU50            | UL SP     |
| 60A           | 2CNU60            | UL SP     |
| 63A           | 2CNU63            | UL SP     |



### Two Pole

Standard Pack: 6

Weight:

0.3A - 63A

1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 2CU03             | UL SP     |
| 0.5A          | 2CU05             | UL SP     |
| 0.75A         | 2CU075            | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 2CU1              | UL SP     |
| 1.6A          | 2CU1.6            | UL SP     |
| 2.0A          | 2CU2              | UL SP     |
| 2.5A          | 2CU2.5            | UL SP     |
| 3.0A          | 2CU3              | UL SP     |
| 3.5A          | 2CU3.5            | UL SP     |
| 4.0A          | 2CU4              | UL SP     |
| 5.0A          | 2CU5              | UL SP     |
| 6.0A          | 2CU6              | UL SP     |
| 8.0A          | 2CU8              | UL SP     |
| 10A           | 2CU10             | UL SP     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 2CU13             | UL SP     |
| 15A           | 2CU15             | UL SP     |
| 16A           | 2CU16             | UL SP     |
| 20A           | 2CU20             | UL SP     |
| 25A           | 2CU25             | UL SP     |
| 30A           | 2CU30             | UL SP     |
| 32A           | 2CU32             | UL SP     |
| 40A           | 2CU40             | UL SP     |
| 50A           | 2CU50             | UL SP     |
| 60A           | 2CU60             | UL SP     |
| 63A           | 2CU63             | UL SP     |



### Three Pole

Standard Pack: 4

Weight:

0.3A - 63A

1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 3CU03             | UL SP     |
| 0.5A          | 3CU05             | UL SP     |
| 0.75A         | 3CU075            | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 3CU1              | UL SP     |
| 1.6A          | 3CU1.6            | UL SP     |
| 2.0A          | 3CU2              | UL SP     |
| 2.5A          | 3CU2.5            | UL SP     |
| 3.0A          | 3CU3              | UL SP     |
| 3.5A          | 3CU3.5            | UL SP     |
| 4.0A          | 3CU4              | UL SP     |
| 5.0A          | 3CU5              | UL SP     |
| 6.0A          | 3CU6              | UL SP     |
| 8.0A          | 3CU8              | UL SP     |
| 10A           | 3CU10             | UL SP     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 3CU13             | UL SP     |
| 15A           | 3CU15             | UL SP     |
| 16A           | 3CU16             | UL SP     |
| 20A           | 3CU20             | UL SP     |
| 25A           | 3CU25             | UL SP     |
| 30A           | 3CU30             | UL SP     |
| 32A           | 3CU32             | UL SP     |
| 40A           | 3CU40             | UL SP     |
| 50A           | 3CU50             | UL SP     |
| 60A           | 3CU60             | UL SP     |
| 63A           | 3CU63             | UL SP     |



For ring tongue terminal version, replace "U" with "R" in part number. For example **1BR20** instead of **1BU20**.

## D-Trip Characteristic



UL508 Listed  
E137938



### Application Examples:

High inrush motors, transformers, power supplies, heaters and reactive loads.  
Relatively long thermal trip delay and very high magnetic trip point.



### One Pole

Standard Pack: 12

Weight:

0.3A - 32A

1.68kg (3.7 lb.)

40A - 63A

1.92kg (4.23 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 1DU03             | UL SP     |
| 0.5A          | 1DU05             | UL SP     |
| 0.75A         | 1DU075            | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 1DU1              | UL SP     |
| 1.6A          | 1DU1.6            | UL SP     |
| 2.0A          | 1DU2              | UL SP     |
| 2.5A          | 1DU2.5            | UL SP     |
| 3.0A          | 1DU3              | UL SP     |
| 3.5A          | 1DU3.5            | UL SP     |
| 4.0A          | 1DU4              | UL SP     |
| 5.0A          | 1DU5              | UL SP     |
| 6.0A          | 1DU6              | UL SP     |
| 8.0A          | 1DU8              | UL SP     |
| 10A           | 1DU10             | UL SP     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 1DU13             | UL SP     |
| 15A           | 1DU15             | UL SP     |
| 16A           | 1DU16             | UL SP     |
| 20A           | 1DU20             | UL SP     |
| 25A           | 1DU25             | UL SP     |
| 30A           | 1DU30             | UL SP     |
| 32A           | 1DU32             | UL SP     |
| 40A           | 1DU40             | UL SP     |
| 50A           | 1DU50             | UL SP     |
| 60A           | 1DU60             | UL SP     |
| 63A           | 1DU63             | UL SP     |



### One Pole plus neutral

Standard Pack: 6

Weight:

0.3A - 32A

1.56kg (3.44 lb.)

40A - 63A

1.74kg (3.84 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 2DNU03            | UL SP     |
| 0.5A          | 2DNU05            | UL SP     |
| 0.75A         | 2DNU075           | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 2DNU1             | UL SP     |
| 1.6A          | 2DNU1.6           | UL SP     |
| 2.0A          | 2DNU2             | UL SP     |
| 2.5A          | 2DNU2.5           | UL SP     |
| 3.0A          | 2DNU3             | UL SP     |
| 3.5A          | 2DNU3.5           | UL SP     |
| 4.0A          | 2DNU4             | UL SP     |
| 5.0A          | 2DNU5             | UL SP     |
| 6.0A          | 2DNU6             | UL SP     |
| 8.0A          | 2DNU8             | UL SP     |
| 10A           | 2DNU10            | UL SP     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 2DNU13            | UL SP     |
| 15A           | 2DNU15            | UL SP     |
| 16A           | 2DNU16            | UL SP     |
| 20A           | 2DNU20            | UL SP     |
| 25A           | 2DNU25            | UL SP     |
| 30A           | 2DNU30            | UL SP     |
| 32A           | 2DNU32            | UL SP     |
| 40A           | 2DNU40            | UL SP     |
| 50A           | 2DNU50            | UL SP     |
| 60A           | 2DNU60            | UL SP     |
| 63A           | 2DNU63            | UL SP     |



### Two Pole

Standard Pack: 6

Weight:

0.3A - 63A

1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 2DU03             | UL SP     |
| 0.5A          | 2DU05             | UL SP     |
| 0.75A         | 2DU075            | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 2DU1              | UL SP     |
| 1.6A          | 2DU1.6            | UL SP     |
| 2.0A          | 2DU2              | UL SP     |
| 2.5A          | 2DU2.5            | UL SP     |
| 3.0A          | 2DU3              | UL SP     |
| 3.5A          | 2DU3.5            | UL SP     |
| 4.0A          | 2DU4              | UL SP     |
| 5.0A          | 2DU5              | UL SP     |
| 6.0A          | 2DU6              | UL SP     |
| 8.0A          | 2DU8              | UL SP     |
| 10A           | 2DU10             | UL SP     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 2DU13             | UL SP     |
| 15A           | 2DU15             | UL SP     |
| 16A           | 2DU16             | UL SP     |
| 20A           | 2DU20             | UL SP     |
| 25A           | 2DU25             | UL SP     |
| 30A           | 2DU30             | UL SP     |
| 32A           | 2DU32             | UL SP     |
| 40A           | 2DU40             | UL SP     |
| 50A           | 2DU50             | UL SP     |
| 60A           | 2DU60             | UL SP     |
| 63A           | 2DU63             | UL SP     |



### Three Pole

Standard Pack: 4

Weight:

0.3A - 63A

1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 3DU03             | UL SP     |
| 0.5A          | 3DU05             | UL SP     |
| 0.75A         | 3DU075            | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 3DU1              | UL SP     |
| 1.6A          | 3DU1.6            | UL SP     |
| 2.0A          | 3DU2              | UL SP     |
| 2.5A          | 3DU2.5            | UL SP     |
| 3.0A          | 3DU3              | UL SP     |
| 3.5A          | 3DU3.5            | UL SP     |
| 4.0A          | 3DU4              | UL SP     |
| 5.0A          | 3DU5              | UL SP     |
| 6.0A          | 3DU6              | UL SP     |
| 8.0A          | 3DU8              | UL SP     |
| 10A           | 3DU10             | UL SP     |
| 12A           | NA                |           |
| 12.5A         | NA                |           |
| 13A           | 3DU13             | UL SP     |
| 15A           | 3DU15             | UL SP     |
| 16A           | 3DU16             | UL SP     |
| 20A           | 3DU20             | UL SP     |
| 25A           | 3DU25             | UL SP     |
| 30A           | 3DU30             | UL SP     |
| 32A           | 3DU32             | UL SP     |
| 40A           | 3DU40             | UL SP     |
| 50A           | 3DU50             | UL SP     |
| 60A           | 3DU60             | UL SP     |
| 63A           | 3DU63             | UL SP     |



For ring tongue terminal version, replace "U" with "R" in part number. For example **1BR20** instead of **1BU20**.

# E-Trip Characteristic



UL508 Listed  
E137938

## Application Examples:

High efficiency motors, which have exceedingly high inrush currents. Relatively short thermal trip delays and very high magnetic trip points.



### One Pole

Standard Pack: 12

Weight:

0.3A - 32A

1.68kg (3.7 lb.)

40A - 63A

1.92kg (4.23 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 1EU03             | UL SP     |
| 0.5A          | 1EU05             | UL SP     |
| 0.75A         | 1EU075            | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 1EU1              | UL SP     |
| 1.6A          | 1EU1.6            | UL SP     |
| 2.0A          | 1EU2              | UL SP     |
| 2.5A          | 1EU2.5            | UL SP     |
| 3.0A          | 1EU3              | UL SP     |
| 3.5A          | 1EU3.5            | UL SP     |
| 4.0A          | 1EU4              | UL SP     |
| 5.0A          | 1EU5              | UL SP     |
| 6.0A          | 1EU6              | UL SP     |
| 8.0A          | 1EU8              | UL SP     |
| 10A           | 1EU10             | UL SP     |
| 12A           | 1EU12             | UL SP     |
| 12.5A         | 1EU125            | UL SP     |
| 13A           | 1EU13             | UL SP     |
| 15A           | 1EU15             | UL SP     |
| 16A           | 1EU16             | UL SP     |
| 20A           | 1EU20             | UL SP     |
| 25A           | 1EU25             | UL SP     |
| 30A           | 1EU30             | UL SP     |
| 32A           | 1EU32             | UL SP     |
| 40A           | 1EU40             | UL SP     |
| 50A           | 1EU50             | UL SP     |
| 60A           | 1EU60             | UL SP     |
| 63A           | 1EU63             | UL SP     |



### One Pole plus neutral

Standard Pack: 6

Weight:

0.3A - 32A

1.56kg (3.44 lb.)

40A - 63A

1.74kg (3.84 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 2ENU03            | UL SP     |
| 0.5A          | 2ENU05            | UL SP     |
| 0.75A         | 2ENU075           | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 2ENU1             | UL SP     |
| 1.6A          | 2ENU1.6           | UL SP     |
| 2.0A          | 2ENU2             | UL SP     |
| 2.5A          | 2ENU2.5           | UL SP     |
| 3.0A          | 2ENU3             | UL SP     |
| 3.5A          | 2ENU3.5           | UL SP     |
| 4.0A          | 2ENU4             | UL SP     |
| 5.0A          | 2ENU5             | UL SP     |
| 6.0A          | 2ENU6             | UL SP     |
| 8.0A          | 2ENU8             | UL SP     |
| 10A           | 2ENU10            | UL SP     |
| 12A           | 2ENU12            | UL SP     |
| 12.5A         | 2ENU125           | UL SP     |
| 13A           | 2ENU13            | UL SP     |
| 15A           | 2ENU15            | UL SP     |
| 16A           | 2ENU16            | UL SP     |
| 20A           | 2ENU20            | UL SP     |
| 25A           | 2ENU25            | UL SP     |
| 30A           | 2ENU30            | UL SP     |
| 32A           | 2ENU32            | UL SP     |
| 40A           | 2ENU40            | UL SP     |
| 50A           | 2ENU50            | UL SP     |
| 60A           | 2ENU60            | UL SP     |
| 63A           | 2ENU63            | UL SP     |



### Two Pole

Standard Pack: 6

Weight:

0.3A - 63A

1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 2EU03             | UL SP     |
| 0.5A          | 2EU05             | UL SP     |
| 0.75A         | 2EU075            | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 2EU1              | UL SP     |
| 1.6A          | 2EU1.6            | UL SP     |
| 2.0A          | 2EU2              | UL SP     |
| 2.5A          | 2EU2.5            | UL SP     |
| 3.0A          | 2EU3              | UL SP     |
| 3.5A          | 2EU3.5            | UL SP     |
| 4.0A          | 2EU4              | UL SP     |
| 5.0A          | 2EU5              | UL SP     |
| 6.0A          | 2EU6              | UL SP     |
| 8.0A          | 2EU8              | UL SP     |
| 10A           | 2EU10             | UL SP     |
| 12A           | 2EU12             | UL SP     |
| 12.5A         | 2EU125            | UL SP     |
| 13A           | 2EU13             | UL SP     |
| 15A           | 2EU15             | UL SP     |
| 16A           | 2EU16             | UL SP     |
| 20A           | 2EU20             | UL SP     |
| 25A           | 2EU25             | UL SP     |
| 30A           | 2EU30             | UL SP     |
| 32A           | 2EU32             | UL SP     |
| 40A           | 2EU40             | UL SP     |
| 50A           | 2EU50             | UL SP     |
| 60A           | 2EU60             | UL SP     |
| 63A           | 2EU63             | UL SP     |



### Three Pole

Standard Pack: 4

Weight:

0.3A - 63A

1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 3EU03             | UL SP     |
| 0.5A          | 3EU05             | UL SP     |
| 0.75A         | 3EU075            | UL SP     |
| 0.8A          | NA                |           |
| 1.0A          | 3EU1              | UL SP     |
| 1.6A          | 3EU1.6            | UL SP     |
| 2.0A          | 3EU2              | UL SP     |
| 2.5A          | 3EU2.5            | UL SP     |
| 3.0A          | 3EU3              | UL SP     |
| 3.5A          | 3EU3.5            | UL SP     |
| 4.0A          | 3EU4              | UL SP     |
| 5.0A          | 3EU5              | UL SP     |
| 6.0A          | 3EU6              | UL SP     |
| 8.0A          | 3EU8              | UL SP     |
| 10A           | 3EU10             | UL SP     |
| 12A           | 3EU12             | UL SP     |
| 12.5A         | 3EU125            | UL SP     |
| 13A           | 3EU13             | UL SP     |
| 15A           | 3EU15             | UL SP     |
| 16A           | 3EU16             | UL SP     |
| 20A           | 3EU20             | UL SP     |
| 25A           | 3EU25             | UL SP     |
| 30A           | 3EU30             | UL SP     |
| 32A           | 3EU32             | UL SP     |
| 40A           | 3EU40             | UL SP     |
| 50A           | 3EU50             | UL SP     |
| 60A           | 3EU60             | UL SP     |
| 63A           | 3EU63             | UL SP     |



For ring tongue terminal version, replace "U" with "R" in part number. For example **1BR20** instead of **1BU20**.

## G-Trip Characteristic



UL508 Listed  
E137938

### Application Examples:

General industrial, including motors, some transformers, solenoids, control circuits, lighting and wiring. Meets the US trip norms with relatively short thermal trip delay and high magnetic trip point.



### One Pole

Standard Pack: 12

Weight:

0.3A - 32A

1.68kg (3.7 lb.)

40A - 63A

1.92kg (4.23 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 1GU03             | UL SF     |
| 0.5A          | 1GU05             | UL SF     |
| 0.75A         | NA                |           |
| 0.8A          | 1GU08             | UL SF     |
| 1.0A          | 1GU1              | UL SF     |
| 1.6A          | 1GU1.6            | UL SF     |
| 2.0A          | 1GU2              | UL SF     |
| 2.5A          | 1GU2.5            | UL SF     |
| 3.0A          | 1GU3              | UL SF     |
| 3.5A          | 1GU3.5            | UL SF     |
| 4.0A          | 1GU4              | UL SF     |
| 5.0A          | 1GU5              | UL SF     |
| 6.0A          | 1GU6              | UL SF     |
| 8.0A          | 1GU8              | UL SF     |
| 10A           | 1GU10             | UL SF     |
| 12A           | 1GU12             | UL SF     |
| 12.5A         | 1GU125            | UL SF     |
| 13A           | 1GU13             | UL SF     |
| 15A           | 1GU15             | UL SF     |
| 16A           | 1GU16             | UL SF     |
| 20A           | 1GU20             | UL SF     |
| 25A           | 1GU25             | UL SF     |
| 30A           | 1GU30             | UL SF     |
| 32A           | 1GU32             | UL SF     |
| 40A           | 1GU40             | UL SF     |
| 50A           | 1GU50             | UL SF     |
| 60A           | 1GU60             | UL SF     |
| 63A           | 1GU63             |           |



### One Pole plus neutral

Standard Pack: 6

Weight:

0.3A - 32A

1.56kg (3.44 lb.)

40A - 63A

1.74kg (3.84 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 2GNU03            | UL SF     |
| 0.5A          | 2GNU05            | UL SF     |
| 0.75A         | NA                |           |
| 0.8A          | 2GNU08            | UL SF     |
| 1.0A          | 2GNU1             | UL SF     |
| 1.6A          | 2GNU1.6           | UL SF     |
| 2.0A          | 2GNU2             | UL SF     |
| 2.5A          | 2GNU2.5           | UL SF     |
| 3.0A          | 2GNU3             | UL SF     |
| 3.5A          | 2GNU3.5           | UL SF     |
| 4.0A          | 2GNU4             | UL SF     |
| 5.0A          | 2GNU5             | UL SF     |
| 6.0A          | 2GNU6             | UL SF     |
| 8.0A          | 2GNU8             | UL SF     |
| 10A           | 2GNU10            | UL SF     |
| 12A           | 2GNU12            | UL SF     |
| 12.5A         | 2GNU125           | UL SF     |
| 13A           | 2GNU13            | UL SF     |
| 15A           | 2GNU15            | UL SF     |
| 16A           | 2GNU16            | UL SF     |
| 20A           | 2GNU20            | UL SF     |
| 25A           | 2GNU25            | UL SF     |
| 30A           | 2GNU30            | UL SF     |
| 32A           | 2GNU32            | UL SF     |
| 40A           | 2GNU40            | UL SF     |
| 50A           | 2GNU50            | UL SF     |
| 60A           | 2GNU60            | UL SF     |
| 63A           | 2GNU63            |           |



### Two Pole

Standard Pack: 6

Weight:

0.3A - 63A

1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 2GU03             | UL SF     |
| 0.5A          | 2GU05             | UL SF     |
| 0.75A         | NA                |           |
| 0.8A          | 2GU08             | UL SF     |
| 1.0A          | 2GU1              | UL SF     |
| 1.6A          | 2GU1.6            | UL SF     |
| 2.0A          | 2GU2              | UL SF     |
| 2.5A          | 2GU2.5            | UL SF     |
| 3.0A          | 2GU3              | UL SF     |
| 3.5A          | 2GU3.5            | UL SF     |
| 4.0A          | 2GU4              | UL SF     |
| 5.0A          | 2GU5              | UL SF     |
| 6.0A          | 2GU6              | UL SF     |
| 8.0A          | 2GU8              | UL SF     |
| 10A           | 2GU10             | UL SF     |
| 12A           | 2GU12             | UL SF     |
| 12.5A         | 2GU125            | UL SF     |
| 13A           | 2GU13             | UL SF     |
| 15A           | 2GU15             | UL SF     |
| 16A           | 2GU16             | UL SF     |
| 20A           | 2GU20             | UL SF     |
| 25A           | 2GU25             | UL SF     |
| 30A           | 2GU30             | UL SF     |
| 32A           | 2GU32             | UL SF     |
| 40A           | 2GU40             | UL SF     |
| 50A           | 2GU50             | UL SF     |
| 60A           | 2GU60             | UL SF     |
| 63A           | 2GU63             |           |



### Three Pole

Standard Pack: 4

Weight:

0.3A - 63A

1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 3GU03             | UL SF     |
| 0.5A          | 3GU05             | UL SF     |
| 0.75A         | NA                |           |
| 0.8A          | 3GU08             | UL SF     |
| 1.0A          | 3GU1              | UL SF     |
| 1.6A          | 3GU1.6            | UL SF     |
| 2.0A          | 3GU2              | UL SF     |
| 2.5A          | 3GU2.5            | UL SF     |
| 3.0A          | 3GU3              | UL SF     |
| 3.5A          | 3GU3.5            | UL SF     |
| 4.0A          | 3GU4              | UL SF     |
| 5.0A          | 3GU5              | UL SF     |
| 6.0A          | 3GU6              | UL SF     |
| 8.0A          | 3GU8              | UL SF     |
| 10A           | 3GU10             | UL SF     |
| 12A           | 3GU12             | UL SF     |
| 12.5A         | 3GU125            | UL SF     |
| 13A           | 3GU13             | UL SF     |
| 15A           | 3GU15             | UL SF     |
| 16A           | 3GU16             | UL SF     |
| 20A           | 3GU20             | UL SF     |
| 25A           | 3GU25             | UL SF     |
| 30A           | 3GU30             | UL SF     |
| 32A           | 3GU32             | UL SF     |
| 40A           | 3GU40             | UL SF     |
| 50A           | 3GU50             | UL SF     |
| 60A           | 3GU60             | UL SF     |
| 63A           | 3GU63             |           |



For ring tongue terminal version, replace "U" with "R" in part number. For example **1BR20** instead of **1BU20**.

# Z-Trip Characteristic



UL508 Listed  
E137938

## Application Examples:

Semiconductors, components which fail-short (vs. fail-open), and components/devices with low surge-current and short circuit withstand capabilities. Relatively short thermal delay and very low magnetic trip point.



### One Pole

Standard Pack: 12

Weight:

0.3A - 32A  
1.68kg (3.7 lb.)  
40A - 63A  
1.92kg (4.23 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 1ZU03             | UL SF     |
| 0.5A          | 1ZU05             | UL SF     |
| 0.75A         | 1ZU075            | UL SF     |
| 0.8A          | NA                |           |
| 1.0A          | 1ZU1              | UL SF     |
| 1.6A          | 1ZU1.6            | UL SF     |
| 2.0A          | 1ZU2              | UL SF     |
| 2.5A          | 1ZU2.5            | UL SF     |
| 3.0A          | 1ZU3              | UL SF     |
| 3.5A          | 1ZU3.5            | UL SF     |
| 4.0A          | 1ZU4              | UL SF     |
| 5.0A          | 1ZU5              | UL SF     |
| 6.0A          | 1ZU6              | UL SF     |
| 8.0A          | 1ZU8              | UL SF     |
| 10A           | 1ZU10             | UL SF     |
| 12A           | 1ZU12             | UL SF     |
| 12.5A         | 1ZU125            | UL SF     |
| 13A           | 1ZU13             | UL SF     |
| 15A           | 1ZU15             | UL SF     |
| 16A           | 1ZU16             | UL SF     |
| 20A           | 1ZU20             | UL SF     |
| 25A           | 1ZU25             | UL SF     |
| 30A           | 1ZU30             | UL SF     |
| 32A           | 1ZU32             | UL SF     |
| 40A           | 1ZU40             | UL SF *   |
| 50A           | 1ZU50             | UL SF *   |



### One Pole plus neutral

Standard Pack: 6

Weight:

0.3A - 32A  
1.56kg (3.44 lb.)  
40A - 63A  
1.74kg (3.84 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 2ZNU03            | UL SF     |
| 0.5A          | 2ZNU05            | UL SF     |
| 0.75A         | 2ZNU075           | UL SF     |
| 0.8A          | NA                |           |
| 1.0A          | 2ZNU1             | UL SF     |
| 1.6A          | 2ZNU1.6           | UL SF     |
| 2.0A          | 2ZNU2             | UL SF     |
| 2.5A          | 2ZNU2.5           | UL SF     |
| 3.0A          | 2ZNU3             | UL SF     |
| 3.5A          | 2ZNU3.5           | UL SF     |
| 4.0A          | 2ZNU4             | UL SF     |
| 5.0A          | 2ZNU5             | UL SF     |
| 6.0A          | 2ZNU6             | UL SF     |
| 8.0A          | 2ZNU8             | UL SF     |
| 10A           | 2ZNU10            | UL SF     |
| 12A           | 2ZNU12            | UL SF     |
| 12.5A         | 2ZNU125           | UL SF     |
| 13A           | 2ZNU13            | UL SF     |
| 15A           | 2ZNU15            | UL SF     |
| 16A           | 2ZNU16            | UL SF     |
| 20A           | 2ZNU20            | UL SF     |
| 25A           | 2ZNU25            | UL SF     |
| 30A           | 2ZNU30            | UL SF     |
| 32A           | 2ZNU32            | UL SF     |
| 40A           | 2ZNU40            | UL SF *   |
| 50A           | 2ZNU50            | UL SF *   |



### Two Pole

Standard Pack: 6

Weight:

0.3A - 63A  
1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 2ZU03             | UL SF     |
| 0.5A          | 2ZU05             | UL SF     |
| 0.75A         | 2ZU075            | UL SF     |
| 0.8A          | NA                |           |
| 1.0A          | 2ZU1              | UL SF     |
| 1.6A          | 2ZU1.6            | UL SF     |
| 2.0A          | 2ZU2              | UL SF     |
| 2.5A          | 2ZU2.5            | UL SF     |
| 3.0A          | 2ZU3              | UL SF     |
| 3.5A          | 2ZU3.5            | UL SF     |
| 4.0A          | 2ZU4              | UL SF     |
| 5.0A          | 2ZU5              | UL SF     |
| 6.0A          | 2ZU6              | UL SF     |
| 8.0A          | 2ZU8              | UL SF     |
| 10A           | 2ZU10             | UL SF     |
| 12A           | 2ZU12             | UL SF     |
| 12.5A         | 2ZU125            | UL SF     |
| 13A           | 2ZU13             | UL SF     |
| 15A           | 2ZU15             | UL SF     |
| 16A           | 2ZU16             | UL SF     |
| 20A           | 2ZU20             | UL SF     |
| 25A           | 2ZU25             | UL SF     |
| 30A           | 2ZU30             | UL SF     |
| 32A           | 2ZU32             | UL SF     |
| 40A           | 2ZU40             | UL SF *   |
| 50A           | 2ZU50             | UL SF *   |



### Three Pole

Standard Pack: 4

Weight:

0.3A - 63A  
1.68kg (3.7 lb.)

| Rated Current | Type/<br>Cat. No. | Approvals |
|---------------|-------------------|-----------|
| 0.3A          | 3ZU03             | UL SF     |
| 0.5A          | 3ZU05             | UL SF     |
| 0.75A         | 3ZU075            | UL SF     |
| 0.8A          | NA                |           |
| 1.0A          | 3ZU1              | UL SF     |
| 1.6A          | 3ZU1.6            | UL SF     |
| 2.0A          | 3ZU2              | UL SF     |
| 2.5A          | 3ZU2.5            | UL SF     |
| 3.0A          | 3ZU3              | UL SF     |
| 3.5A          | 3ZU3.5            | UL SF     |
| 4.0A          | 3ZU4              | UL SF     |
| 5.0A          | 3ZU5              | UL SF     |
| 6.0A          | 3ZU6              | UL SF     |
| 8.0A          | 3ZU8              | UL SF     |
| 10A           | 3ZU10             | UL SF     |
| 12A           | 3ZU12             | UL SF     |
| 12.5A         | 3ZU125            | UL SF     |
| 13A           | 3ZU13             | UL SF     |
| 15A           | 3ZU15             | UL SF     |
| 16A           | 3ZU16             | UL SF     |
| 20A           | 3ZU20             | UL SF     |
| 25A           | 3ZU25             | UL SF     |
| 30A           | 3ZU30             | UL SF     |
| 32A           | 3ZU32             | UL SF     |
| 40A           | 3ZU40             | UL SF *   |
| 50A           | 3ZU50             | UL SF *   |

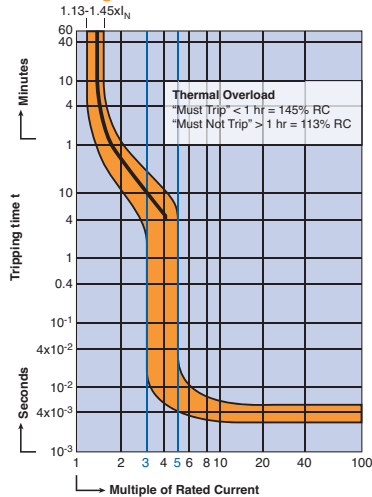


For ring tongue terminal version, replace "U" with "R" in part number. For example **1BR20** instead of **1BU20**.

# V-EA Trip Curves

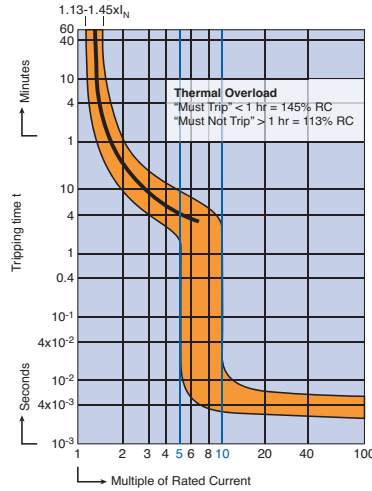
## B Trip Curve

### V-EA-B Trip 1.0A Through 10A Rated Current



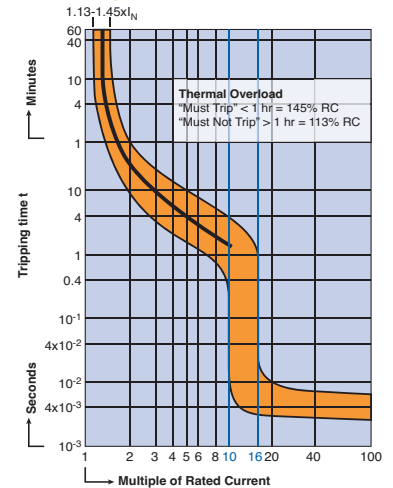
## C Trip Curve

### V-EA-C Trip 0.3A Through 10A Rated Current

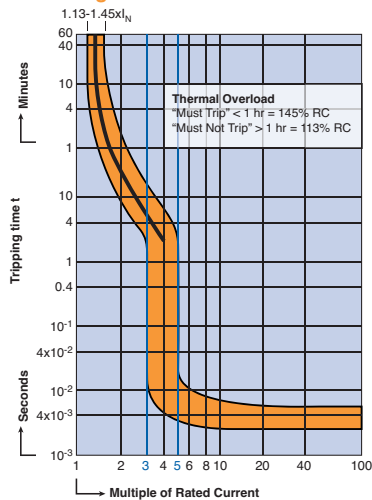


## D Trip Curve

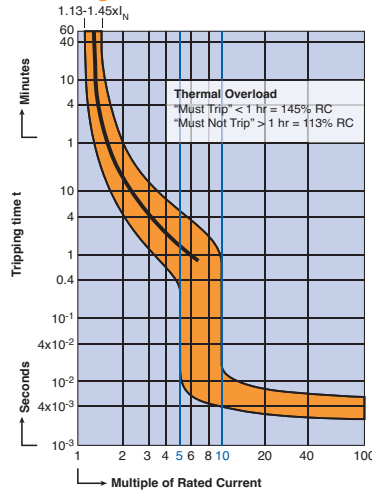
### V-EA-D Trip 0.3A Through 10A Rated Current



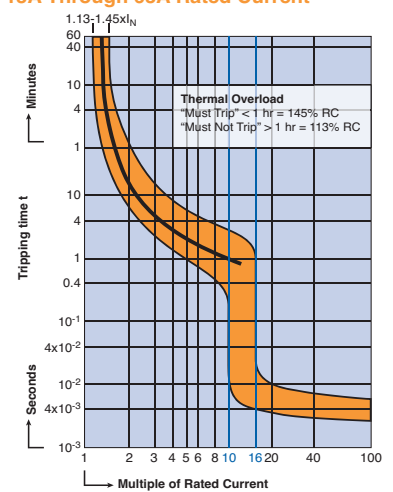
### V-EA-B Trip 13A Through 63A Rated Current



### V-EA-C Trip 13A Through 63A Rated Current



### V-EA-D Trip 13A Through 63A Rated Current



## "B" Magnetic Trip Parameters

Rated current 1.0A to 63A.

1. Hold for a minimum of 100ms at surge of 3 times rated current.
2. Trip in under 100ms at 5 times rated current.

## "C" Magnetic Trip Parameters

Rated current 0.3A to 63A.

1. Hold for a minimum of 100ms at surge of 5 times rated current.
2. Trip in under 100ms at 10 times rated current.

## "D" Magnetic Trip Parameters

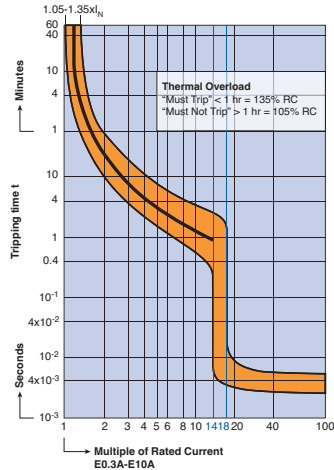
Rated current 0.3A to 63A.

1. Hold for a minimum of 100ms at surge of 10 times rated current.
2. Trip in under 100ms at 16 times rated current.

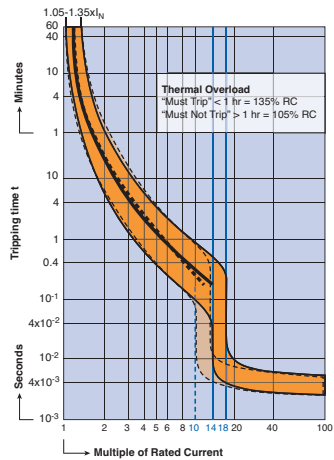
# V-EA Trip Curves

## E Trip Curve

V-EA-E Trip  
0.3A Through 10A Rated Current



V-EA-E Trip  
12A Through 60A Rated Current



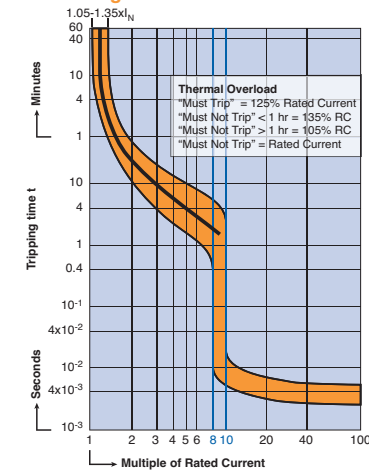
**"E" Magnetic Trip Parameters**  
Rated Current, 0.3A to 50A (—),  
60/63A (---).

### Magnetic Trip:

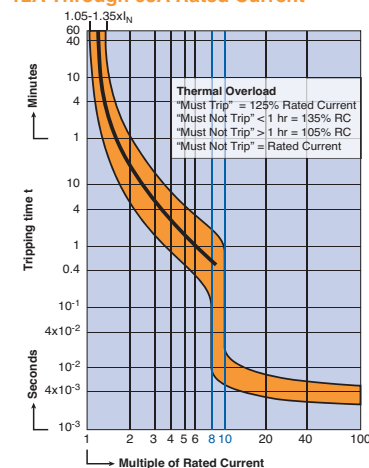
1. Hold for a minimum of 100ms at surge of 14 times (60A, 10 times) rated current.
2. Trip in under 100ms at 18 times (60A, 14 times) rated current.

## G Trip Curve

V-EA-G Trip  
0.3A Through 10A Rated Current



V-EA-G Trip  
12A Through 63A Rated Current



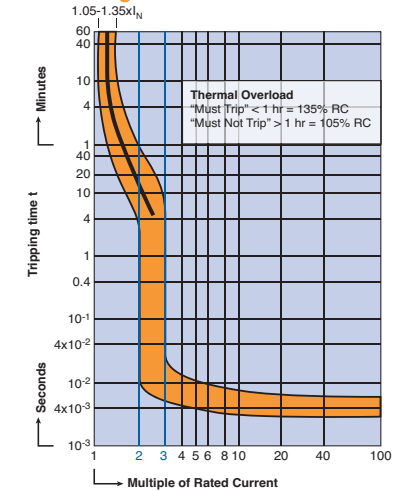
**"G" Magnetic Trip Parameters**  
Rated Current, 0.3A to 63A.

### Magnetic Trip:

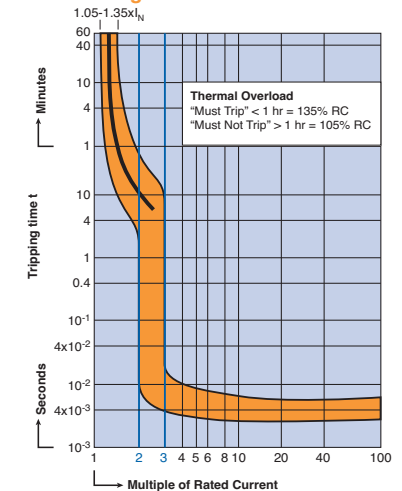
1. Hold for a minimum of 100ms at surge of 8 times rated current.
2. Trip in under 100ms at 10 times rated current.

## Z Trip Curve

V-EA-Z Trip  
0.3A Through 10A Rated Current



V-EA-Z Trip  
12.5A Through 32A Rated Current



**"Z" Trip Parameters**  
Rated Current, 0.3A to 32A.

### Magnetic Trip:

1. Hold for a minimum of 100ms at 2 times rated current.
2. Trip in under 100ms at 3 times rated current.

**Table HP 1: AMPERE RATINGS & HORSEPOWER RATING 1 PHASE**

|                          |                         |                         | FLA & LRC CONVERTED TO<br>TABLE HORSEPOWER (SEE NOTE #2)<br>USE FLA & LRC RATINGS WHERE<br>NO HP RATING IS GIVEN |                         |                         |                         |                         |                         |
|--------------------------|-------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                          |                         |                         | NOMINAL CIRCUIT VOLTAGE                                                                                          |                         |                         |                         |                         |                         |
| V-EA<br>RATED            | MOTOR<br>NAMEPLATE      | MOTOR<br>NAMEPLATE      | 110-120<br>VAC                                                                                                   | 200<br>VAC              | 208<br>VAC              | 220-240<br>VAC          | 265<br>VAC              | 277<br>VAC              |
| CURRENT<br>(SEE NOTE #1) | FLA<br>RATING           | STARTING/<br>LRC RATING |                                                                                                                  |                         |                         |                         |                         |                         |
| 0.30A<br>0.50A<br>0.75A  | 0.30A<br>0.50A<br>0.75A | 1.80A<br>3.00A<br>4.35A |                                                                                                                  |                         |                         |                         |                         |                         |
| 0.80A<br>1.0A<br>1.6A    | 0.80A<br>1.0A<br>1.6A   | 4.8A<br>6.0A<br>9.6A    |                                                                                                                  |                         |                         |                         |                         |                         |
| 2.0A<br>2.5A<br>3.0A     | 2.0A<br>2.5A<br>3.0A    | 12.0A<br>15.0A<br>18.0A |                                                                                                                  | 1/6hp<br>1/6hp          | 1/6hp<br>1/6hp          | 1/6hp<br>1/6hp<br>1/4hp | 1/6hp<br>1/6hp<br>1/4hp | 1/6hp<br>1/4hp<br>1/3hp |
| 3.5A<br>4.0A             | 3.5A<br>4.0A            | 21.0A<br>24.0A          |                                                                                                                  | 1/4hp<br>1/4hp          | 1/4hp<br>1/3hp          | 1/4hp<br>1/3hp          | 1/3hp<br>1/3hp          | 1/3hp<br>1/3hp          |
| 5.0A<br>6.0A<br>8.0A     | 5.0A<br>6.0A<br>8.0A    | 30.0A<br>36.0A<br>48.0A | 1/6hp<br>1/4hp<br>1/3hp                                                                                          | 1/3hp<br>1/2hp<br>3/4hp | 1/2hp<br>1/2hp<br>3/4hp | 1/2hp<br>1/2hp<br>1hp   | 1/2hp<br>3/4hp<br>1hp   | 1/2hp<br>3/4hp<br>1hp   |
| 10.0A                    | 10.0A                   | 60.0A                   | 1/2hp                                                                                                            | 1hp                     | 1hp                     | 1 1/2hp                 | 1 1/2hp                 | 2hp                     |
| 12.0A<br>12.5A           | 12.0A<br>12.5A          | 72.0A<br>75.0A          | 1/2hp<br>1/2hp                                                                                                   | 1 1/2hp<br>1 1/2hp      | 1 1/2hp<br>1 1/2hp      | 2hp<br>2hp              | 2hp<br>2hp              | 2hp<br>2hp              |
| 13.0A<br>15.0A<br>16.0A  | 13.0A<br>15.0A<br>16.0A | 78.0A<br>90.0A<br>96.0A | 1/2hp<br>3/4hp<br>1hp                                                                                            | 1 1/2hp<br>2hp<br>2hp   | 1 1/2hp<br>2hp<br>2hp   | 2hp<br>2hp<br>2hp       | 2hp<br>3hp<br>3hp       | 2hp<br>3hp<br>3hp       |
| 20.0A<br>25.0A           | 20.0A<br>25.0A          | 120.0A<br>150.0A        | 1 1/2hp<br>2hp                                                                                                   | 3hp<br>3hp              | 3hp<br>3hp              | 3hp<br>3hp              | 3hp<br>5hp              | 3hp<br>5hp              |
| 30.0A                    | 30.0A                   | 180.0A                  | 2hp                                                                                                              | 3hp                     | 3hp                     | 5hp                     | 5hp                     | 5hp                     |
| 32.0A                    | 32.0A                   | 192.0A                  | 2hp                                                                                                              | 3hp                     | 5hp                     | 5hp                     | 5hp                     | 5hp                     |
| 40.0A                    | 40.0A                   | 240.0A                  | 3hp                                                                                                              | 5hp                     | 7 1/2hp                 | 7 1/2hp                 | 7 1/2hp                 | 7 1/2hp                 |
| 50.0A<br>60.0A           | 50.0A<br>60.0A          | 300.0A<br>360.0A        | 3hp<br>5hp                                                                                                       | 7 1/2hp<br>10hp         | 10hp<br>10hp            | 10hp<br>10hp            | 10hp<br>10hp            | 10hp<br>15hp            |

NOTE #1: For AC motor circuit nameplate full load current, AC general-use loads, AC resistance loads, AC incandescent lamp (tungsten) loads, AC electric discharge lamp (ballast) loads.

NOTE #2: Conversions per UL508® Table 45.2 and NFPA-70: National Electrical Code® 2008 Tables 430-248 and 430-251(A).

**Table HP 2: AMPERE RATING & HORSEPOWER RATING 3 PHASE & 2 PHASE - 4 WIRE**

| FLA & LRC RATINGS CONVERTED TO TABLE HORSEPOWER (SEE NOTE #2)<br>USE FLA & LRC RATINGS WHERE NO HP IS LISTED |                                     |                                               |                           |                           |                   |                   |                   |                   |                              |                           |                           |                           |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------|---------------------------|---------------------------|-------------------|-------------------|-------------------|-------------------|------------------------------|---------------------------|---------------------------|---------------------------|
| V-EA<br>RATED<br>CURRENT<br>(SEE NOTE #1)                                                                    | MOTOR<br>NAMEPLATE<br>FLA<br>RATING | MOTOR<br>NAMEPLATE<br>STARTING/<br>LRC RATING | 110-120<br>VAC            |                           | 200<br>VAC        |                   | 208<br>VAC        |                   | 220-240 VAC<br>(SEE NOTE #3) |                           | 440-480<br>VAC            |                           |
|                                                                                                              |                                     |                                               | Motor Design              |                           | Motor Design      |                   | Motor Design      |                   | Motor Design                 |                           | Motor Design              |                           |
|                                                                                                              |                                     |                                               | B, C, D                   | E                         | B, C, D           | E                 | B, C, D           | E                 | B, C, D                      | E                         | B, C, D                   | E                         |
| 0.30A<br>0.50A<br>0.75A                                                                                      | 0.30A<br>0.50A<br>0.75A             | 3.0A<br>5.0A<br>7.5A                          |                           |                           |                   |                   |                   |                   |                              |                           |                           |                           |
| 0.80A<br>1.0A<br>1.6A                                                                                        | 0.80A<br>1.0A<br>1.6A               | 8.0A<br>10.0A<br>16.0A                        |                           |                           |                   |                   |                   |                   |                              |                           | 1/2hp                     | 1/2hp                     |
| 2.0A<br>2.5A<br>3.0A                                                                                         | 2.0A<br>2.5A<br>3.0A                | 20.0A<br>25.0A<br>30.0A                       |                           |                           | 1/2hp<br>1/2hp    | 1/2hp<br>1/2hp    | 1/2hp<br>1/2hp    | 1/2hp<br>1/2hp    | 1/2hp<br>1/2hp<br>1/2hp      | 1/2hp<br>1/2hp<br>1/2hp   | 3/4hp<br>1hp<br>1 1/2hp   | 3/4hp<br>1hp<br>1 1/2hp   |
| 3.5A<br>4.0A                                                                                                 | 3.5A<br>4.0A                        | 35.0A<br>40.0A                                |                           |                           | 1/2hp<br>3/4hp    | 1/2hp<br>3/4hp    | 3/4hp<br>3/4hp    | 3/4hp<br>3/4hp    | 3/4hp<br>3/4hp<br>3/4hp      | 3/4hp<br>3/4hp<br>3/4hp   | 2hp<br>2hp                | 2hp<br>2hp                |
| 5.0A<br>6.0A<br>8.0A                                                                                         | 5.0A<br>6.0A<br>8.0A                | 42.0A<br>50.4A<br>67.2A                       | 1/2hp<br>1/2hp<br>3/4hp   | 1/2hp<br>1/2hp<br>3/4hp   | 1hp<br>1hp<br>2hp | 1hp<br>1hp<br>2hp | 1hp<br>1hp<br>2hp | 1hp<br>1hp<br>2hp | 1hp<br>1 1/2hp<br>2hp        | 1hp<br>1 1/2hp<br>2hp     | 3hp<br>3hp<br>5hp         | 3hp<br>3hp<br>5hp         |
| 10.0A<br>12.0A<br>12.5A                                                                                      | 10.0A<br>12.0A<br>12.5A             | 84.0A<br>100.8A<br>105.0A                     | 1hp<br>1 1/2hp<br>1 1/2hp | 1hp<br>1 1/2hp<br>1 1/2hp | 2hp<br>3hp<br>3hp | 2hp<br>3hp<br>3hp | 2hp<br>3hp<br>3hp | 2hp<br>3hp<br>3hp | 3hp<br>3hp<br>3hp            | 3hp<br>3hp<br>3hp         | 5hp<br>7 1/2hp<br>7 1/2hp | 5hp<br>7 1/2hp<br>7 1/2hp |
| 13.0A<br>15.0A<br>16.0A                                                                                      | 13.0A<br>15.0A<br>16.0A             | 109.2A<br>126.0A<br>134.4A                    | 1 1/2hp<br>2hp<br>2hp     | 1 1/2hp<br>2hp<br>2hp     | 3hp<br>3hp<br>3hp | 3hp<br>3hp<br>3hp | 3hp<br>3hp<br>3hp | 3hp<br>3hp<br>3hp | 3hp<br>3hp<br>5hp            | 3hp<br>3hp<br>5hp         | 7 1/2hp<br>10hp<br>10hp   | 7 1/2hp<br>10hp<br>10hp   |
| 20.0A<br>25.0A                                                                                               | 20.0A<br>25.0A                      | 168.0A<br>210.0A                              | 3hp<br>3hp                | 3hp<br>3hp                | 5hp<br>5hp        | 5hp<br>5hp        | 5hp<br>7 1/2hp    | 5hp<br>7 1/2hp    | 5hp<br>7 1/2hp<br>7 1/2hp    | 5hp<br>7 1/2hp<br>7 1/2hp | 10hp<br>15hp              | 10hp<br>15hp              |
| 30.0A                                                                                                        | 30.0A                               | 252.0A                                        | 5hp                       | 5hp                       | 5hp               | 5hp               | 7 1/2hp           | 7 1/2hp           | 10hp                         | 10hp                      | 20hp                      | 20hp                      |
| 32.0A                                                                                                        | 32.0A                               | 268.8A                                        | 5hp                       | 5hp                       | 5hp               | 5hp               | 10hp              | 10hp              | 10hp                         | 10hp                      | 20hp                      | 20hp                      |
| 40.0A                                                                                                        | 40.0A                               | 226.0A                                        | 5hp                       | 5hp                       | 10hp              | 7 1/2hp           | 10hp              | 7 1/2hp           | 10hp                         | 10hp                      | 30hp                      | 20hp                      |
| 50.0A<br>60.0A                                                                                               | 50.0A<br>60.0A                      | 282.5A<br>339.0A                              | 7 1/2hp<br>10hp           | 7 1/2hp<br>10hp           | 15hp<br>15hp      | 10hp<br>10hp      | 15hp<br>20hp      | 10hp<br>10hp      | 15hp<br>20hp                 | 10hp<br>15hp              | 30hp<br>40hp              | 25hp<br>30hp              |

NOTE #1: For AC motor circuit nameplate full load current, AC general-use loads, AC resistance loads, AC incandescent lamp (tungsten) loads, AC electric discharge lamp (ballast) loads.

NOTE #2: Conversions per UL508® proposed Tables 45.2 and 45.4 and NFPA-70: National Electrical Code® 2008 Tables 430-249, 430-250 and 430-251(B).

## V-EA INTERNAL RESISTANCE

| Rated Current (Amp) | Trip Characteristic |          |          |          |          |          |
|---------------------|---------------------|----------|----------|----------|----------|----------|
|                     | B (Ohms)            | C (Ohms) | D (Ohms) | E (Ohms) | G (Ohms) | Z (Ohms) |
| 0.3                 | —                   | 16.8620  | 16.8620  | 14.52000 | 16.8620  | 31.5060  |
| 0.5                 | —                   | 6.8540   | 6.0009   | 5.92000  | 6.8540   | 10.2460  |
| 0.75/0.8            | —                   | 3.0540   | 3.0540   | 2.70000  | 3.0540   | 5.3920   |
| 1.0                 | —                   | 1.7000   | 1.7560   | 1.48000  | 1.7560   | 2.6910   |
| 1.6                 | —                   | 0.5870   | 0.5870   | 0.57400  | 0.5870   | 0.9440   |
| 2.0                 | —                   | 0.4190   | 0.4190   | 0.40500  | 0.4190   | 0.8900   |
| 2.5                 | —                   | 0.2950   | 0.2950   | 0.26900  | 0.2950   | 0.4290   |
| 3.0                 | —                   | 0.2020   | 0.2020   | 0.18600  | 0.2020   | 0.3460   |
| 3.5                 | —                   | 0.1390   | 0.1390   | 0.13900  | 0.1390   | 0.1790   |
| 4.0                 | —                   | 0.1090   | 0.1090   | 0.10600  | 0.1090   | 0.1620   |
| 5.0                 | —                   | 0.0654   | 0.0654   | 0.05900  | 0.0654   | 0.1050   |
| 6.0                 | 0.0528              | 0.0528   | 0.0491   | 0.04600  | 0.0491   | 0.0823   |
| 8.0                 | —                   | 0.0278   | 0.0240   | 0.03040  | 0.0333   | 0.0371   |
| 10                  | 0.0216              | 0.0216   | 0.0187   | 0.02020  | 0.0211   | 0.0278   |
| 12/12.5             | —                   | —        | —        | 0.00724  | 0.0084   | 0.0151   |
| 13                  | 0.0113              | 0.0084   | 0.0085   | 0.00724  | 0.0084   | 0.0151   |
| 15/16               | 0.0085              | 0.0085   | 0.0076   | 0.00731  | 0.0076   | 0.0114   |
| 20                  | 0.0067              | 0.0067   | 0.0064   | 0.00582  | 0.0064   | 0.0075   |
| 25                  | 0.0050              | 0.0050   | 0.0041   | 0.00411  | 0.0046   | 0.0050   |
| 30/32               | 0.0032              | 0.0032   | 0.0027   | 0.00272  | 0.0030   | 0.0032   |
| 40                  | 0.0025              | 0.0025   | 0.0022   | 0.00212  | 0.0022   | 0.0022   |
| 50                  | 0.0019              | 0.0019   | 0.0018   | 0.00184  | 0.0019   | 0.00195  |
| 60/63               | 0.0018              | 0.0018   | 0.0017   | 0.00172  | 0.00179  | —        |

Resistances listed are “hot” values, as opposed to cold start values. Operating voltage drop across the V-EA and power loss per pole can be approximated with basic formulas:

$$V_{\text{DROP}} = I_{\text{OPERATING}} \times R_{\text{TABLE}}$$

$$P_{\text{LOSS P/P}} = I_{\text{OPERATING}}^2 \times R_{\text{TABLE}}$$

Voltage drops should be reviewed when V-EAs with high internal resistance are used (e.g., load voltage minimums). Power loss should be reviewed when V-EAs with high rated currents are used (e.g., enclosure heating).

The listed V-EA internal resistance values should not be used in calculations of available short-circuit current downstream of the V-EA. The dynamic impedance of the V-EA under short-circuit conditions can vary significantly from internal resistance values in normal operation.

## LINE CURRENT FREQUENCY EFFECTS ON TRIP CURVES

| Frequency Effects on Magnetic Trip Curves |                                   |                            |                            |                            |                        |
|-------------------------------------------|-----------------------------------|----------------------------|----------------------------|----------------------------|------------------------|
| Trip Curve                                | Trip Zone At 16 2/3 - 60Hz (x RC) | Trip Zone At 100 Hz (x RC) | Trip Zone At 200 Hz (x RC) | Trip Zone At 400 Hz (x RC) | Trip Zone At DC (x RC) |
| Z                                         | 2 - 3                             | 2.2 - 3.3                  | 2.4 - 3.6                  | 2.8 - 4.2                  | 3.0 - 4.5              |
| B                                         | 3 - 5                             | 3.3 - 5.5                  | 3.6 - 6.0                  | 4.2 - 7.0                  | 4.5 - 7.5              |
| C                                         | 5 - 10                            | 5.5 - 11.0                 | 6.0 - 12                   | 7.0 - 14.0                 | 7.5 - 15.0             |
| G                                         | 8 - 10                            | 8.8 - 11.0                 | 9.6 - 12.0                 | 11.2 - 14.0                | 12.0 - 15.0            |
| D                                         | 10 - 16                           | 11.0 - 17.6                | 12.0 - 19.2                | 14.0 - 22.4                | 15.0 - 24.0            |
| E                                         | 14 - 18                           | 15.4 - 19.8                | 16.8 - 21.6                | 19.6 - 25.2                | 21.0 - 27.0            |

The thermal trip is not affected by the frequency of the line current. The magnetic trip is within the trip zone of the characteristic curve for frequencies from 16 2/3 to 60Hz. At lower and higher frequencies, the magnetic trip will be delayed longer than indicated by the characteristic curve, roughly as follows:

**At 100Hz:** Mag. Trip Current = 1.1 x curve current

**At 200Hz:** Mag. Trip Current = 1.2 x curve current

**At 400Hz:** Mag. Trip Current = 1.4 x curve current

**At DC:** Mag. Trip Current = 1.5 x curve current

For example, at 16 2/3 - 60 Hz the magnetic trip zone for the “G” characteristic is 8 to 10 times the rated current of the specific V-EA (i.e., hold for at least 100ms at 8 x RC, trip in less than 100ms at 10 x RC). With a 400Hz current, a magnetic trip at 10 x RC would be greatly delayed (thermal would likely trip first), as the magnetic trip zone is now 11.2 to 14 x RC. If a quicker magnetic trip is required with 400Hz, the “B” or “C” characteristic should be considered.

## MECHANICAL ENDURANCE RATINGS (ON/OFF OPERATIONS)

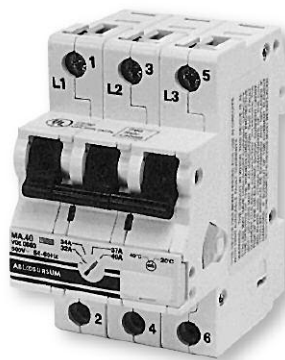
| Application                             | 2 x (1.15 x RC)                      | 2 x RC | RC   | No Load | Total |
|-----------------------------------------|--------------------------------------|--------|------|---------|-------|
| AC General Use                          | —                                    | 6000   | —    | 4000    | 10000 |
| AC Motor Starting Across the Line       | 1000                                 | —      | 5000 | 4000    | 10000 |
| AC Incandescent Lamps (Tungsten)        | —                                    | —      | 6000 | 4000    | 10000 |
| AC Electrical Discharge Lamps (Ballast) | —                                    | 6000   | —    | 4000    | 10000 |
| AC Resistance                           | —                                    | 6000   | —    | 4000    | 10000 |
| Manufacturers self certification        | 20000 ON/OFF operations with no load |        |      |         |       |

# MA- Series

## Three Phase Adjustable Trip Miniature Circuit Breakers/ Manual Motor Controllers

The MA was designed to handle the high inrush loads of 3 phase transformers, power supplies, motors, etc. The MA protects wiring and equipment from damage caused by the three major classes of over-current, yet greatly reduces the number of nuisance trips in high starting and inrush current circuits.

An IEC device with excellent ratings under a UL listing at 480Y/277V (including group ratings) and at 500V under international standards, the Altech/ABL Sursum MA provides short and long term cost effective circuit protection for USA and/or export applications. The short term advantages include: (1) adjustable thermal trip allows finalization of initial designs before procurement of the load equipment is complete; (2) snap-on mounting for readily available, internationally standardized DIN Rail saves panel layout design time as well as installation and change labor; (3) large cage-clamp terminals with screws suitable to power screwdrivers, simplifies and speeds wiring; (4) convenient switched disconnect during factory testing and/or initial start-up saves time and aggravation. The key long term advantage is customer satisfaction and proven over-current protection of wiring and equipment (and the lack of rework/repair costs).



UL508 listed  
E137938



CAN/CSA-C22.2 No.14 certified



### Type Designation

MA      RT  
(a)   (b)   (c)   (d)

(a) = MA - Manual Motor Controller

(b) = Rated Current

(c) = U - US Housing

(d) = Blank - Standard Terminal

RT - Ring-tongue Terminal

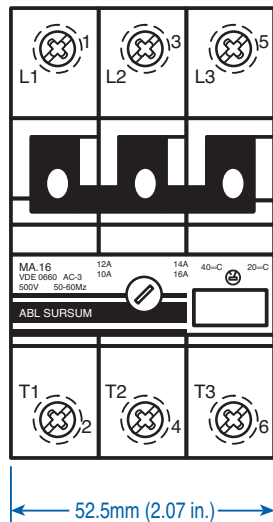
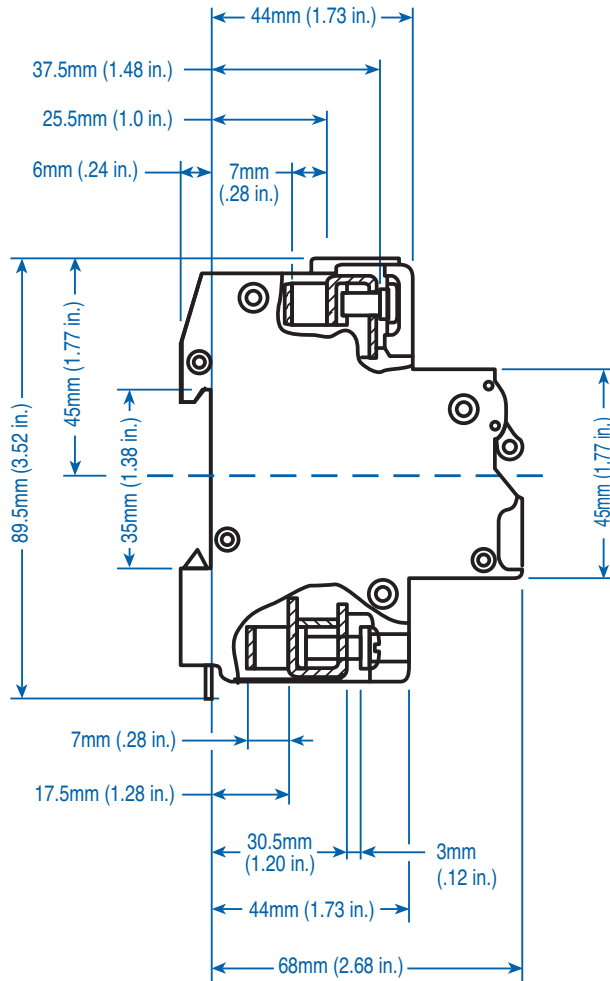
|                                                                 |                                                 |
|-----------------------------------------------------------------|-------------------------------------------------|
| <b>Voltage Rating</b>                                           | 480Y/277VAC                                     |
| <b>AIC (Interrupt Capacity)</b>                                 | 0.16A-2.5A: 42kA; 4.0A-16A: 14kA; 20A-40A: 10kA |
| <b>Standard Short Circuit Withstand Rating (UL/CSA Ratings)</b> | 0.16A-2.5A: 42kA; 4.0A-16A: 14kA                |
| <b>Group Short Circuit Ratings (UL/CSA Ratings)</b>             | see above                                       |
| <b>Typical Life</b>                                             | 6000 on/off operations with 2xRC                |
| <b>Calibration Temperature</b>                                  | 25°C, +0°, -5° (77°F, +0° -9°)                  |
| <b>Standard Pack and Weight</b>                                 | 1/450g (1.0 lb.)                                |
| <b>Terminal Size Acceptability</b>                              | Top/Bottom: 18-3 AWG                            |

| Type and Rated Current | Cat. No. | FLA Dial Adjustment Markings | GROUP SHORT CIRCUIT RATING AT 480VAC <sup>a</sup> (and BCP size) | 3Ø HORSEPOWER RATINGS AT NOMINAL LINE VOLTAGE (See Note for HEA Definition) |               |               |                   |                   |
|------------------------|----------|------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------|---------------|-------------------|-------------------|
|                        |          |                              |                                                                  | 110-120V HP (HEA)                                                           | 200V HP (HEA) | 208V HP (HEA) | 220-240V HP (HEA) | 460-480V HP (HEA) |
| MA0.16U                | 15.901U  | 0.1/ 0.12/0.14/0.16          | 42kARMS symmetrical (max. 1200A MCCB or RK5)                     |                                                                             |               |               |                   |                   |
| MA0.25U                | 15.902U  | 0.16/0.19/0.22/0.25          |                                                                  |                                                                             |               |               |                   |                   |
| MA0.40U                | 15.903U  | 0.25/0.30/0.35/0.40          |                                                                  |                                                                             |               |               |                   |                   |
| MA0.63U                | 15.904U  | 0.40/0.48/0.56/0.63          |                                                                  |                                                                             |               |               |                   |                   |
| MA1.0U                 | 15.905U  | 0.63/0.75/0.87/1.0           |                                                                  |                                                                             |               |               |                   |                   |
| MA1.6U                 | 15.906U  | 1.0/1.2/1.4/1.6              | 14kARMS symmetrical (max. 350A MCCB or RK5)                      |                                                                             |               |               |                   |                   |
| MA2.5U                 | 15.907U  | 1.6/1.9/2.2/2.5              |                                                                  |                                                                             |               |               |                   |                   |
| MA4.0U                 | 15.908U  | 2.5/3.0/3.5/4.0              |                                                                  | 1/2 (4.0)                                                                   | 3/4 (3.2)     | 3/4 (3.1)     | 1 (3.6)           | 2 (3.42)          |
| MA6.3U                 | 15.909U  | 4.0/4.8/5.6/6.3              |                                                                  | 3/4 (5.6)                                                                   | 1 1/2 (6.0)   | 1 1/2 (5.7)   | 1 1/2 (5.2)       | 3 (4.8)           |
| MA10U                  | 15.910U  | 6.3/7.5/8.7/10               |                                                                  | 1 (7.2)                                                                     | 2 (7.8)       | 2 (7.5)       | 3 (9.6)           | 5 (7.6)           |
| MA16U                  | 15.911U  | 10/12/14/16                  | 10kARMS symmetrical (max. 350A MCCB or RK5)                      | 2 (13.6)                                                                    | 3 (11.0)      | 3 (10.6)      | 5 (15.2)          | 10 (14.0)         |
| MA20U                  | 15.912U  | 16/17/18.5/20                |                                                                  | 3 (19.2)                                                                    | 5 (17.5)      | 5 (16.7)      | 5 (15.2)          | 10 (14.0)         |
| MA25U                  | 15.913U  | 20/21.5/23/25                |                                                                  | 3 (19.2)                                                                    | 5 (17.5)      | 7 1/2 (24.2)  | 7 1/2 (22.0)      | 15 (21.0)         |
| MA32U                  | 15.914U  | 25/27/30/32                  |                                                                  | 5 (30.4)                                                                    | 7 1/2 (25.0)  | 7 1/2 (24.2)  | 10 (28.0)         | 20 (27.0)         |
| MA40U                  | 15.915U  | 32/34/37/40                  |                                                                  | 5 (30.4)                                                                    | 10 (32.0)     | 10 (31.0)     | 10 (28.0)         | 25 (34.0)         |

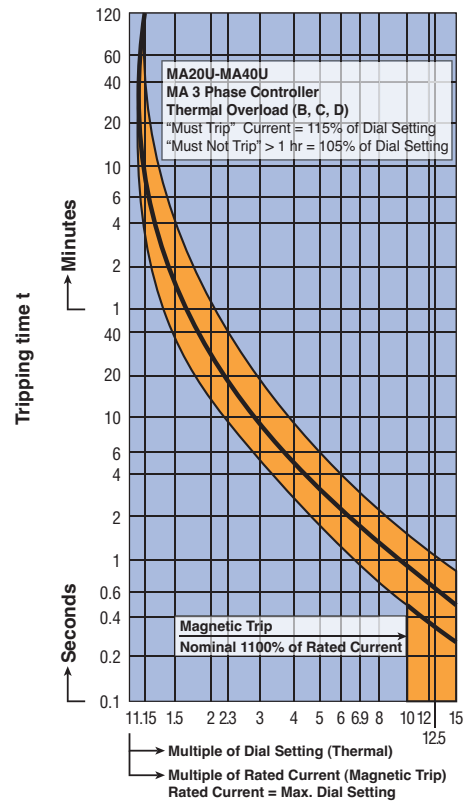
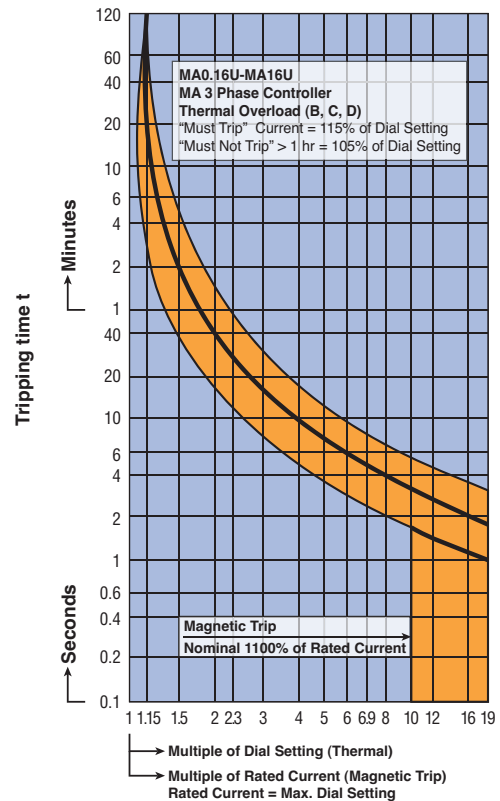
Note: **HEA - Horsepower Equivalent Amperes**, the nominal amperage assigned to standard motor horsepower ratings in design guide tables such as NFPA-70 Tables 430-248, 430-249, 430-250; UL1077 Table 16.2; CSA - C22.2 No. 235-M89 Tables 44 and 45; CSA-C22.2 No. 14-M91 Table 19, etc. Multiply HEA values (in parenthesis) by 1.1 if power factor is 90%, and by 1.2 if power factor is 80%.

<sup>a</sup> The standard-circuit short-circuit rating is 14kA for all types. Group ratings can be used in a standard circuit (e.g., MA1.0U at 42kA), but a higher standard rating cannot be used in a group circuit (e.g., MA40U at 14kA only in standard circuit.)

## DIMENSIONS



MA/USA Manual Motor Controller



## V-EA and MA Circuit Breaker Accessories



UL508 listed  
E137938



Accessories can be factory or field mounted on V-EA and MA manual motor controllers for enhanced control and monitoring capabilities. Field mounting kits include all necessary parts and instructions. Accessories can be gang mounted on a single controller (the Auxiliary Switch in the outside position). The mounting arrangement links the internal latch-pins for the tripping mechanisms, ensuring simultaneous trips. Handles are linked to simplify manual resetting.

### FA - Shunt Trip

| Type/<br>Cat. No. | Trip/Coil<br>Voltage<br>AC or DC | Max. Coil<br>Current | Approvals |
|-------------------|----------------------------------|----------------------|-----------|
| FA12U             | 12V                              | 1.3A                 | UL Ⓢ      |
| FA24U             | 24V                              | 0.6A                 | UL Ⓢ      |
| FA48U             | 48-72V                           | 0.2A                 | UL Ⓢ      |
| FA110U            | 110V/220V                        | 0.25A/0.5A           | UL Ⓢ      |

Std.Pk.: 1

Unit Weight: 120 grams (0.27 lb.)

Width: 17.5mm (.689in.)

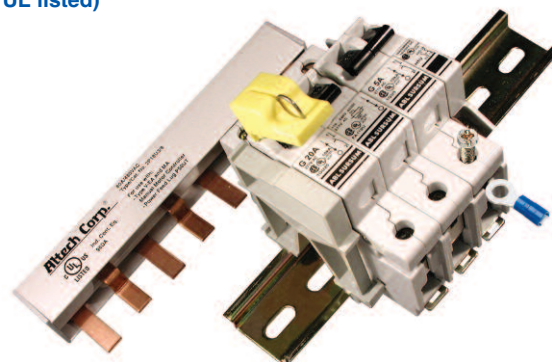
### UA - Undervoltage Trip (not UL listed)

| Type/<br>Cat. No. | Line Voltage<br>60Hz* |
|-------------------|-----------------------|
| UA120             | 120VAC                |
| UA240             | 240VAC                |
| UA277             | 277VAC                |
| UA415             | 415VAC                |
| UA480             | 480VAC                |

Std.Pk.: 1

Unit Weight: 70 grams (0.16 lb.)

Width: 17.5mm (.689in.)



For further Busbar information please see pages 56-73 or our comprehensive Altech Universal Power Distribution catalog.

### H - Auxiliary Switch

| Type/<br>Cat. No. | Contact<br>Rating                                                 | Wire<br>Size              | Approvals | For Use With: |
|-------------------|-------------------------------------------------------------------|---------------------------|-----------|---------------|
| H11U              | 10A / 220V AC<br>3A / 110V DC or pulsed<br>1A / 220V DC or pulsed | 4mm <sup>2</sup> (12 AWG) | UL Ⓢ      | V-EA, MA      |

Std. Pk.: 1

Unit Weight: 45 grams (0.12 lb.)

Width: 9mm (.354in.)



### Lock-out \*\* Cat. No. EASS

Prevent inadvertent resetting of the V-EA or MA during maintenance.  
Fits 1/4" pad lock.



### Cooling Spacer Cat. No. 15.960

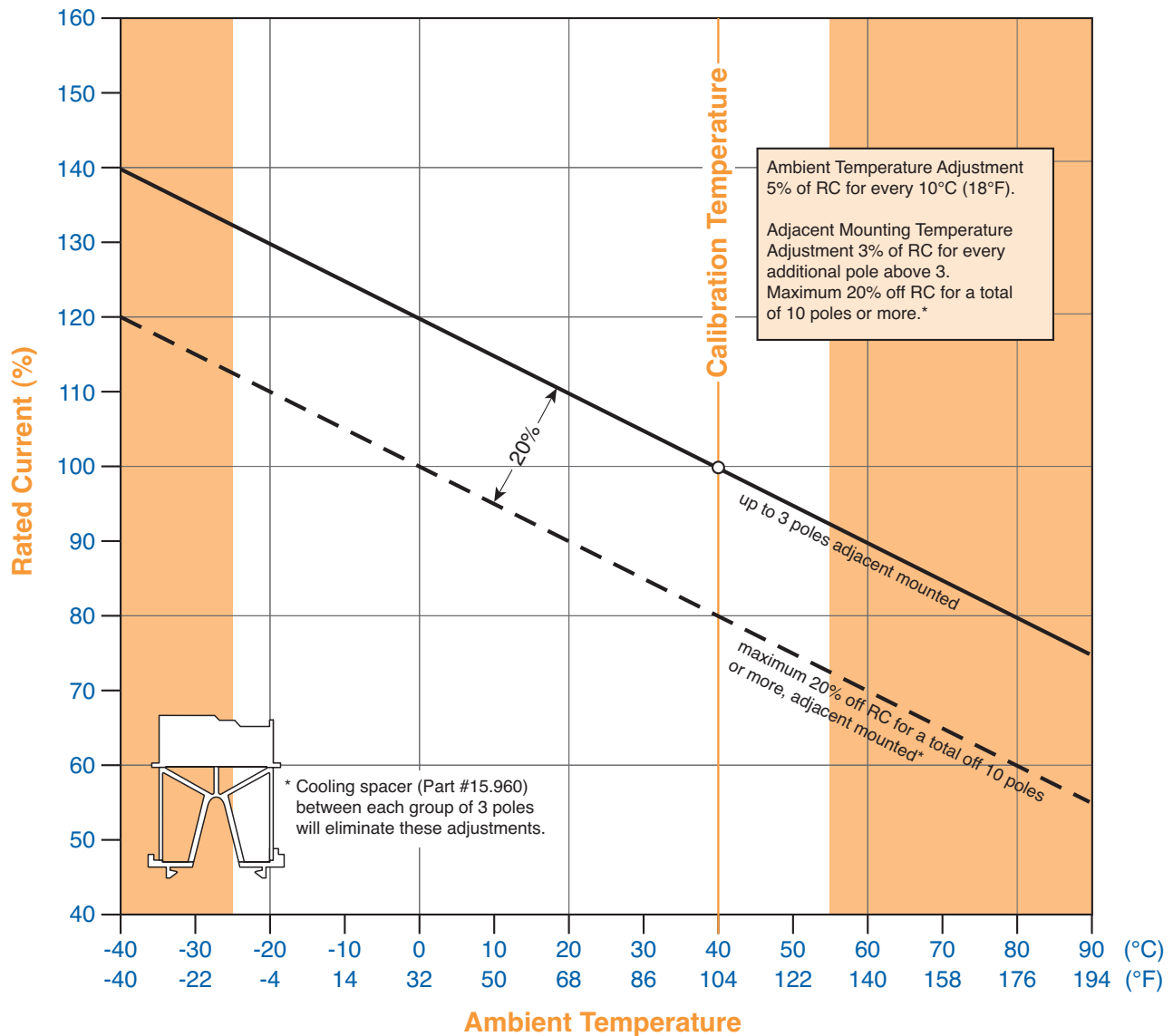
\* Please consult Altech for your 50Hz application needs.

\*\* V-EA and MA can also be locked in the on and off position by simply using a common lead or meter seal, which gets fed through the hole in the handle and a corresponding hole in the housing.

## TEMPERATURE CORRECTION CURVE

### Ambient Temperature and Adjacent Mounting/Loading Adjustment

(V-EA/MA Ambient Temperature - 25°C to 55°C, Storage Temperature -40°C to 70°C)



# MS-Series Three Phase Adjustable Trip Economy Manual Motor Controllers

with overload and short circuit protection,  
phase failure sensitivity according to  
IEC 947-4-1, DIN VDE 0660 Part 102



E137938



## Type Designation

MS 016

(a) (b)

(a) = MS - Manual Motor  
Controller

(b) = Rated Current

| Type/<br>Cat. No. | Rated<br>Current | Overload<br>release<br>adjustment/FLA<br>(A) | Instantaneous<br>setting<br>(A) | 3Ø Horsepower Rating                                                                                                                                                                            |         |         |       |         |
|-------------------|------------------|----------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-------|---------|
|                   |                  |                                              |                                 | 115V                                                                                                                                                                                            | 200V    | 230V    | 480V  | 600V    |
| MS016             | 0.16             | 0.1 - 0.16                                   | 1.92                            | Ampere rated for motor circuits having a full-load-amperage (FLA) not exceeding the MS's general purpose rated current and a locked rotor current not exceeding 6 times the MS's rated current. |         |         |       |         |
| MS025             | 0.25             | 0.16 - 0.25                                  | 3                               |                                                                                                                                                                                                 |         |         |       |         |
| MS04              | 0.4              | 0.25 - 0.4                                   | 4.8                             |                                                                                                                                                                                                 |         |         |       |         |
| MS063             | 0.63             | 0.4 - 0.63                                   | 7.6                             |                                                                                                                                                                                                 |         |         |       |         |
| MS1               | 1.0              | 0.63 - 1                                     | 12                              |                                                                                                                                                                                                 |         |         | 1/2hp | 1/2hp   |
| MS1.6             | 1.6              | 1 - 16                                       | 19.2                            |                                                                                                                                                                                                 |         |         | 3/4hp | 1hp     |
| MS2.5             | 2.5              | 1.6 - 2.5                                    | 30                              |                                                                                                                                                                                                 | 1/2hp   | 1/2hp   | 1hp   | 1 1/2hp |
| MS4               | 4.0              | 2.5 - 4                                      | 48                              | 1/2hp                                                                                                                                                                                           | 3/4hp   | 1hp     | 2hp   | 3hp     |
| MS6.3             | 6.3              | 4 - 6.3                                      | 75.6                            | 3/4hp                                                                                                                                                                                           | 1 1/2hp | 1 1/2hp | 3hp   | 5hp     |
| MS10              | 10.0             | 6.3 - 10                                     | 120                             | 1hp                                                                                                                                                                                             | 2hp     | 3hp     | 5hp   | 7 1/2hp |
| MS16              | 16.0             | 10 - 16                                      | 192                             | 2hp                                                                                                                                                                                             | 3hp     | 5hp     | 10hp  | 10hp    |
| MS20              | 20.0             | 16 - 20                                      | 240                             | 3hp                                                                                                                                                                                             | 5hp     | 7 1/2hp | 15hp  | —       |
| MS25              | 25.0             | 20 - 25                                      | 300                             | 3hp                                                                                                                                                                                             | 5hp     | 7 1/2hp | 15hp  | —       |

Maximum Voltage 600V AC (MS20 and MS25, 480V AC)

Interrupting Capacity (UL/CSA Rating) 5kA

Group Short Circuit (UL/CSA - Ratings) 5kA

Interrupting Capacity (VDE - Ratings) 0.16-6.3A: Self protected  
10-25A: 6kA

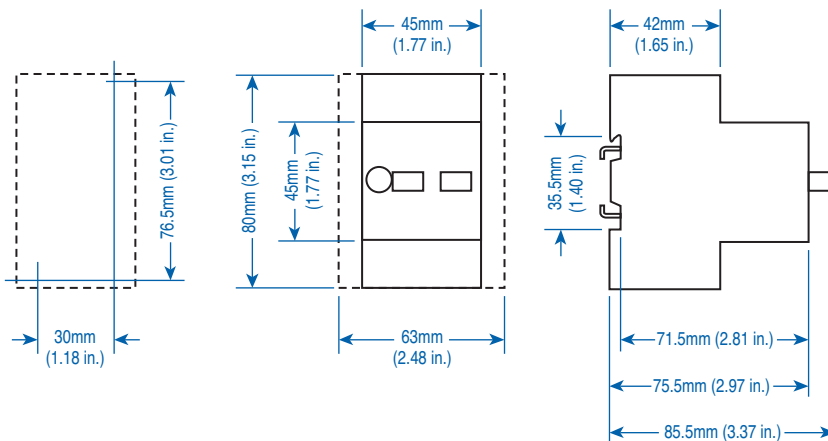
Mechanical Endurance 10000 on/off operations

Standard Pack and Weight 1/250g (0.55lb)

Terminal Size Acceptability 14-10 AWG

Terminal Torque 1.8Nm (16lb. in.)

## Dimensions



With its high breaking capacity and current limitation the MS Manual Motor Controllers provide optimum protection for electrical motors as well as for other consumer units up to 25 amps. They are equipped with phase failure sensitivity, isolating and main switch functions. 13 ranges cover nominal rated currents from 0.1 up to 25 amps. The MS's are temperature compensated; the trip current of the magnetic part is  $12 \times I_n$ . The Manual Motor Controllers are built in accordance with IEC 947.

## Accessories

### MS Three Phase

### Adjustable Trip Economy

### Manual Motor Controllers



#### Auxiliary contact blocks for side mounting (3.5A/230VAC; 2A/400V AC)

| Width<br>mm | Contacts  | Type/<br>Cat. No. | Weight<br>g/pc. | Std.<br>Pk. |
|-------------|-----------|-------------------|-----------------|-------------|
| 9           | 2NO       | HMS20             | 40              | 10          |
| 9           | 1NO + 1NC | HMS11             | 40              | 10          |
| 9           | 1NO       | HMS10             | 35              | 10          |
| 9           | 2NC       | HMS02             | 40              | 10          |
| 9           | 1NC       | HMS01             | 35              | 10          |



**Insulated Enclosure IP55**  
with integrated PE(N) terminal;  
top and bottom each have 2 metric  
knock-outs

| Type/<br>Cat. No. | Weight<br>g/pc. | Std.<br>Pk. |
|-------------------|-----------------|-------------|
| MS.G55            | 240             | 1           |



**Emergency-Stop**  
twist or key to release,  
red on yellow background

| Release<br>Type | Type/<br>Cat. No. | Weight<br>g/pc. | Std.<br>Pk. |
|-----------------|-------------------|-----------------|-------------|
| Twist           | MS.PV             | 60              | 5           |
| Key             | MS.PS2            | 65              | 5           |



**Flush Mounting Enclosure IP55**  
with integrated PE(N) terminal

| Type/<br>Cat. No. | Weight<br>g/pc. | Std.<br>Pk. |
|-------------------|-----------------|-------------|
| MS.F55            | 170             | 1           |



**Indicator Light**  
with neon bulb, nominal rated voltage:  
220 - 240V or 380 - 440V

| Color  | Type/<br>Cat. No. | Weight<br>g/pc. | Std.<br>Pk. |
|--------|-------------------|-----------------|-------------|
|        | 220-240V 380-440V |                 |             |
| trans  | MS.SLW2 MS.SLW3   | 10              | 5           |
| green  | MS.SLG2 MS.SLG3   | 10              | 5           |
| red    | MS.SLR2 MS.SLR3   | 10              | 5           |
| yellow | MS.SLJ2 MS.SLJ3   | 10              | 5           |

#### Busbar



| Busbar<br>63A                                     | for<br>2 MS | Type/Cat. No.<br>for<br>3 MS | for<br>4 MS | for<br>5 MS |
|---------------------------------------------------|-------------|------------------------------|-------------|-------------|
| no<br>spacing                                     | G45-14-2    | G45-14-3                     | G45-14-4    | G45-14-5    |
| with auxiliary<br>switch<br>(1/2 pole)<br>spacing | G54-14-2    | G54-14-3                     | G54-14-4    | G54-14-5    |



#### Power Feed Block

| Type/<br>Cat. No. | Rating<br>(A) | Std.<br>Pk. |
|-------------------|---------------|-------------|
| GE2-14            | 63A           | 1           |