# Altech Corp.®

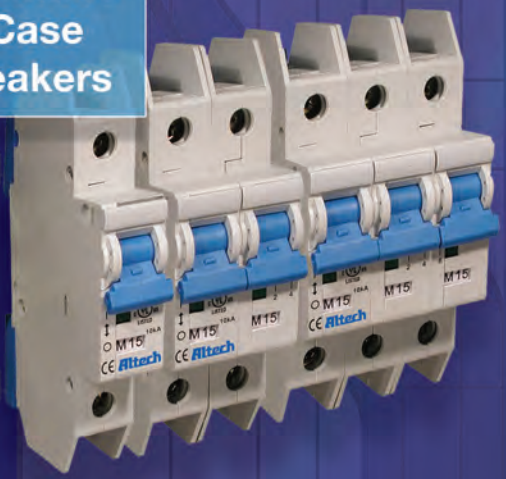
*Serving the Automation & Control Industry since 1984*

Certified System™
ISO 9001
QMI-SAI Global

Current Limiting

UL 508 Manual Motor Controllers

UL 489 Miniature Molded Case Circuit Breakers



UL 1077 Supplementary Protector

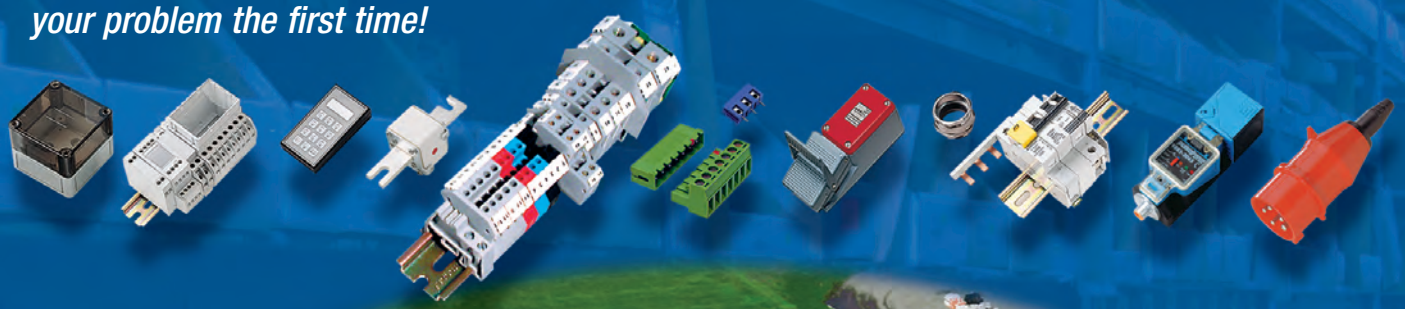
UL 489, UL 508 and UL 1077 Busbar Devices

## Circuit Protection Products

# Altech Corp.®

Since 1984, Altech Corporation has grown to become a leading supplier of automation and industrial control components. Headquartered in Flemington, NJ, Altech has an experienced staff of engineering, manufacturing and sales personnel to provide the highest quality products with superior service. This is the Altech Commitment!

With experienced Product Engineers and Customer Service personnel, Altech provides solutions to your most pressing application challenges. All with one thought in mind - ***to ensure that we solve your problem the first time!***



## Quality Commitment

*Altech's control components meet diverse national and international standards such as UL, NEC, CSA, IEC, VDE and more. Altech provides superior customer service and delivery through Total Quality Management and Continuous Process Improvement. Altech is ISO 9001 approved. We perform these services with honesty and integrity and are committed to achieve these goals.*

# Table of Contents

Altech Corp.®


**The Altech Selection of Breakers** ....4-5
**Application Examples UL508A** ....6-9

## UL489 Miniature Molded Case Circuit Breakers

### UL (AC), DL (DC) Series

- UL489 Miniature Molded Case Circuit Breaker ....10-11
- C Trip Characteristic AC ....12
- D Trip Characteristic AC ....13
- C Trip Characteristic DC ....14
- D Trip Characteristic DC ....15
- Accessories for UL/DL Series ....16
- Trip Curves and Technical Data ....17-19

### L (AC or DC) Series

- UL489 Miniature Molded Case Circuit Breaker ....20-21
- C Trip Characteristic AC ....22
- D Trip Characteristic AC ....23
- C and D Trip Characteristics DC ....24
- Trip Curves and Technical Data ....25
- Accessories for L Series ....26-27

## UL489 Busbar System

- Introduction and Ordering Information ....28-35

## UL508 Manual Motor Controllers "Suitable as Motor Disconnect"

### UM (V-EA) Series

- UL508 Manual Motor Controllers "Suitable as Motor Disconnect" ....36-37
- B Trip Characteristic ....38
- C Trip Characteristic ....39
- D Trip Characteristic ....40
- E Trip Characteristic ....41
- G Trip Characteristic ....42
- Z Trip Characteristic ....43
- Trip Curves and Technical Data ....44-47

### MA Series

- Three Phase Adjustable Trip Miniature Circuit Breakers/Manual Motor Controllers ....48-49
- Accessories V-EA/MA Series ....50-51

### MS Series

- Three Phase Adjustable Trip Economy Manual Motor Controllers ....52
- Accessories MS Series ....53

## UL1077 Supplementary Protectors

### UR Series

- UL1077 Supplementary Protectors ....54-55
- B Trip Characteristic ....56
- C Trip Characteristic ....57
- D Trip Characteristic ....58
- Accessories UR Series ....59
- Trip Curves and Technical Data ....60-61

### R Series

- UL1077 Supplementary Protectors ....62-63
- B Trip Characteristic ....64
- C Trip Characteristic ....65
- D Trip Characteristic ....66
- Trip Curves and Technical Data ....67
- Accessories UR Series ....68-69

## UL1077 / UL508 Busbar System

- Introduction and Ordering Information ....70-79

**TR Series** UL1077 Recognized Supplementary Protector /Circuit Breaker for Equipment ....80-85
**RP Series** RCCB Earth Leakage Circuit Breaker ....86-87
**Index** ....88-93
**Terms and Conditions** ....94

# The Altech Selection of Breakers

## The Advantages

In today's very competitive marketplace you need reliability, so you need to use circuit breakers that are high quality and technically correct for your application. Altech is a US leader in DIN rail mounted breakers with ratings up to 63A. Only Altech offers DIN rail mounted breakers that meet UL489, UL508 or UL1077 approvals with a short circuit interrupt capacity of up to 10kA. No other manufacturer offers this complete line. This assures you the right product for your application requirements.

### UL (AC), DL (DC), V-EA and UR Series Advantages

1 Hinged terminal cover design allows easy access to terminal screws with a broad range of screwdrivers!

2 Individual Part Number is shown on each circuit breaker and is legible when installed in the panel.

3 A clear-hinged cover protects designated marking area.

4 DIN Clip can be released when necessary.

5 Flexible replaceable terminal barriers reduce the possibility of breakage if accidentally dropped!




**Unique Standard Dual Connection Terminals**

A Box terminal for solid conductors or flexible conductors with or without cable lug.
B Screw terminal for forked cable lug.
C Screw terminal for ring tongue connection.

### L and R Series Advantages

1 Strong thermoplast housing.

2 Strong terminal barriers.

3 Spring action DIN Rail clips for both top and bottom.

4 Removable circuit identification tag.

5 Indicator window.

ON

OFF

6 Trip curve (D) and amperage (15A) window display.

D15

## UL 489

### UL (AC), DL (DC) Series UL489 Miniature Molded Case Circuit Breakers

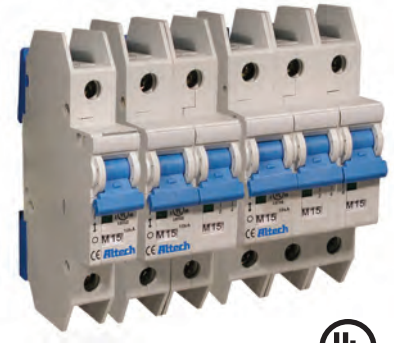
LISTED
C.B.
E329510

IEC 60947-2
Short Circuit Tested

**ACCESSORIES**

- Auxiliary Contact, Alarm Switch
- Shunt Trip
- Neutral Pole
- Undervoltage Trip (not UL)
- Touch Protection Caps
- Cooling Spacer
- Mounting Screw 34mm
- Lock-out Adapter

### L Series, AC or DC UL489 Miniature Molded Case Circuit Breakers



LISTED
C.B.
E305318

**ACCESSORIES**

- Auxiliary Contact
- Shunt Trip
- Neutral Pole
- Undervoltage Trip
- Front Mounting Kit with hardware
- Lock-out Adapter

## UL 508

### UM (V-EA) Series UL508 Manual Motor Controllers "Suitable as Motor Disconnect"

UL508 Listed
E137938

up to 25A
B,C,D curve

up to 25A
B,C,D curve

**ACCESSORIES**

- Auxiliary Contact, Alarm Switch
- Shunt Trip
- Undervoltage Trip (not UL)
- Neutral Pole
- Touch Protection Caps
- Cooling Spacer
- Mounting Screw 34mm
- Lock-out Adapter**

## UL 1077

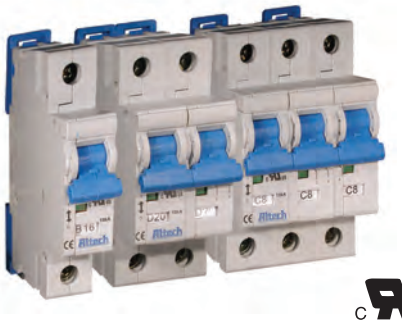
### UR Series UL1077 Recognized Supplementary Protector

C US
E137915

**ACCESSORIES**

- Auxiliary Contact, Alarm Switch
- Shunt Trip
- Undervoltage Trip (not UL)
- Neutral Pole
- Touch Protection Caps
- Cooling Spacer
- Mounting Screw 34mm
- Lock-out Adapter

### R Series UL1077 Recognized Supplementary Protector



C US
E301611

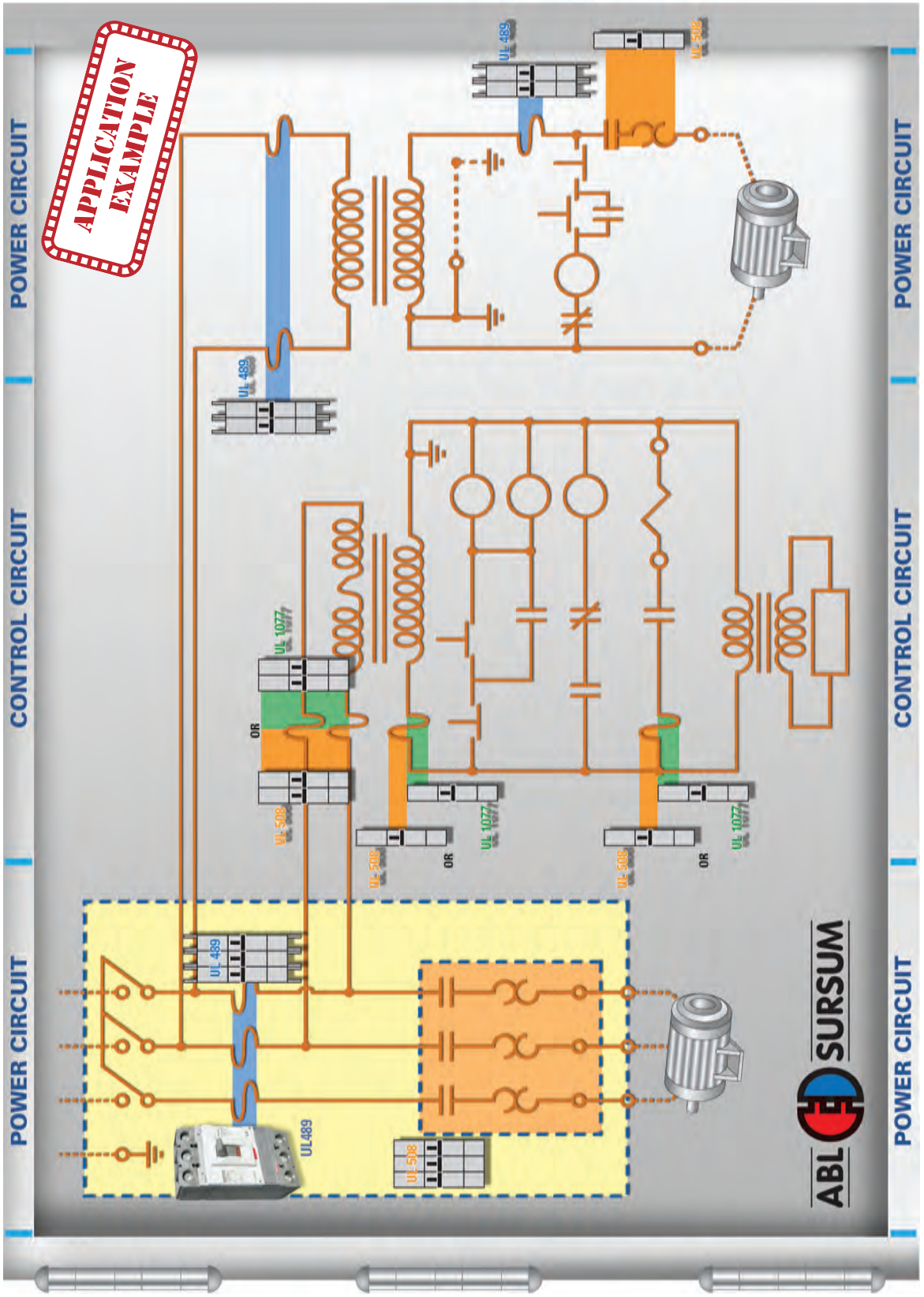
**ACCESSORIES**

- Auxiliary Contact
- Shunt Trip and Undervoltage Trip (not UL)
- Neutral Pole
- Lock-out Adapter

**2 series, 5 lines, 3 UL approvals, AC and DC models and the most trip curves in the industry.**

***Altech has the broadest offering in the industry.***

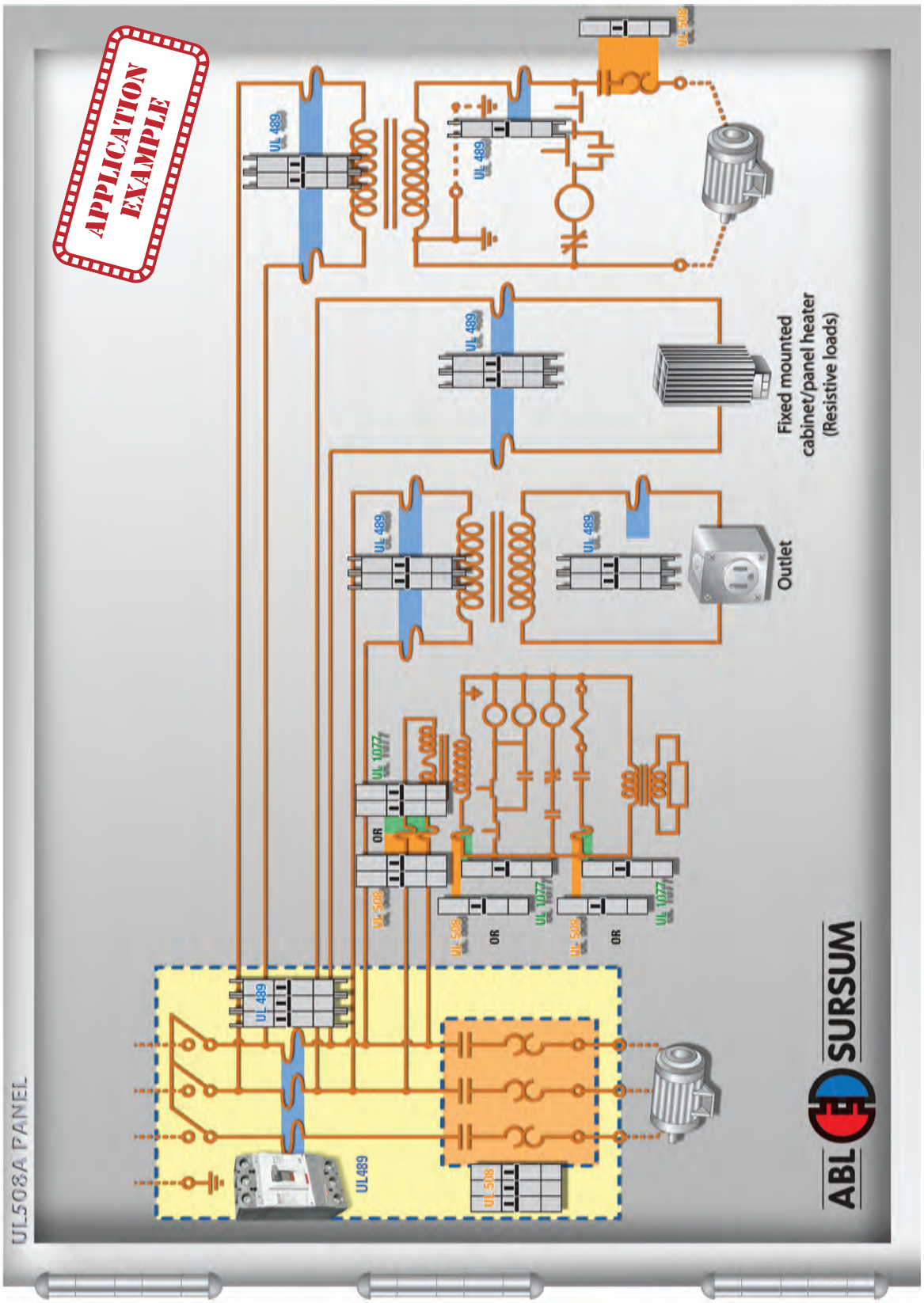
# Typical UL508A Panel




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

# Variation of UL508A Panel

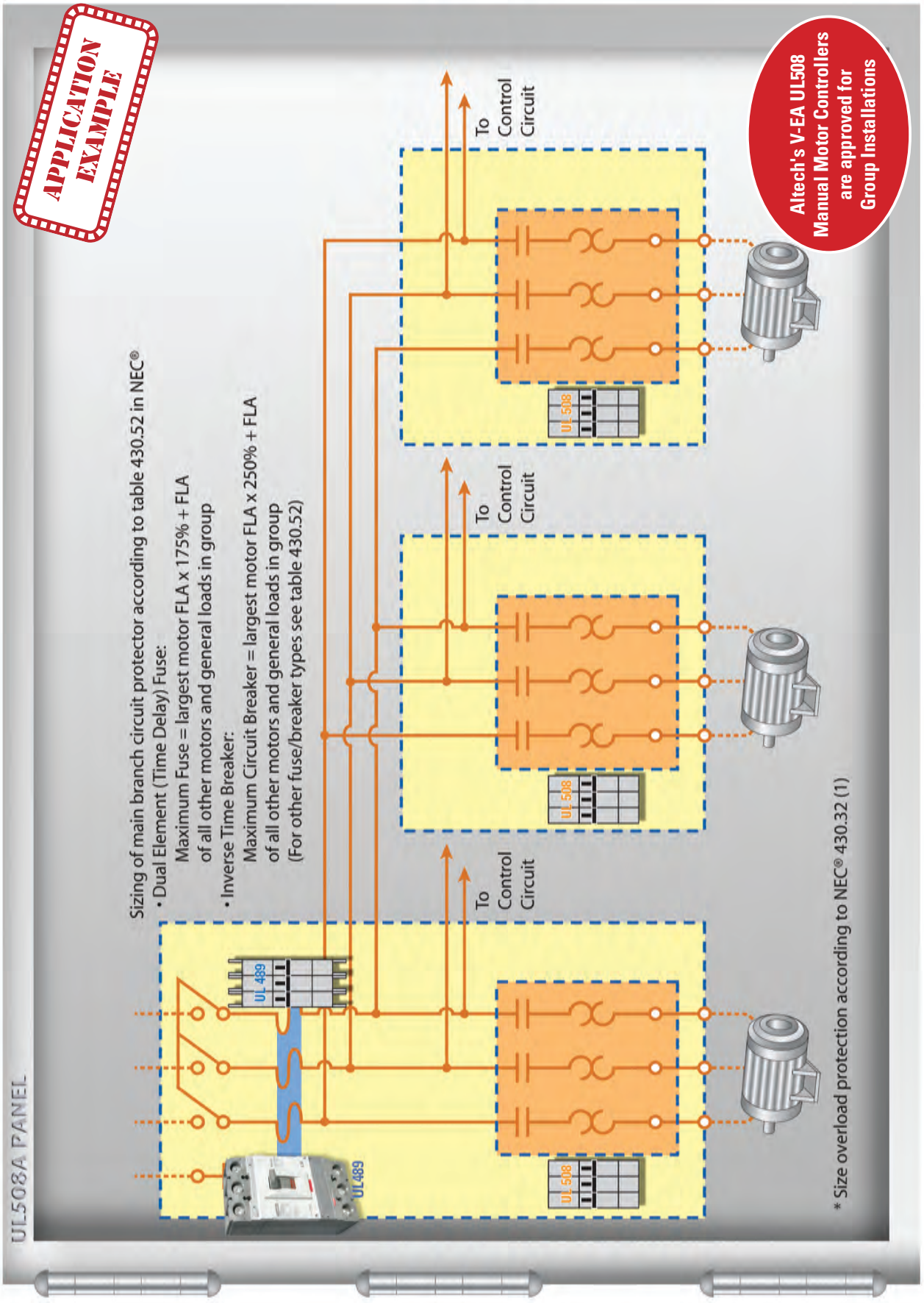
**(see NEC® article 430.53 for reference and more information).**




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

# Typical Motor Group Installation

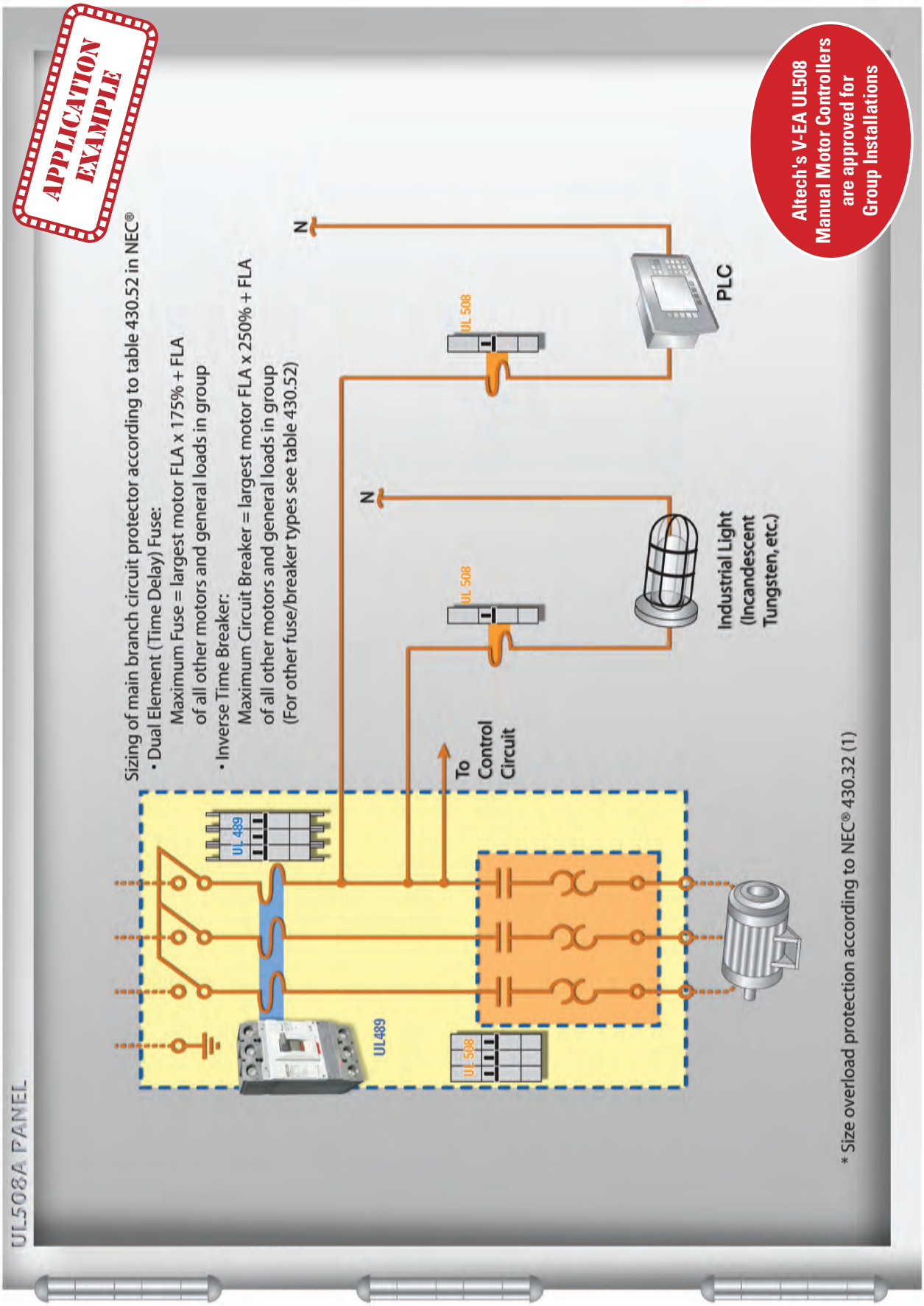
**(see NEC® article 430.53 for reference and more information).**




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

# Typical Motor Group Installation

**(see NEC® article 430.53 for reference and more information).**




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

# UL(AC), DL(DC) Series

## UL489 Miniature Molded Case Circuit Breakers

- Available in AC and DC models
- DIN Rail Mounted
- 17.5mm width
- Thermal Magnetic
- Current Limiting (UL tested)
- 240V, 480Y/277V AC, 50/60Hz
- 125V DC (1 pole); 250V DC (2 pole)
- 10kA Short Circuit Interrupting Capacity
- HACR Type 40°C
- Line/Load reversible

C UL US
LISTED
C.B.
E329510

IEC 60947-2
Short Circuit Tested

| | |
|---|---|
| **Current/ Voltage Rating** | |
| **UL-Series** | 0.3 - 63A/ 240V AC, 0.3-32A/ 480Y/277V AC* (48V DC / pole pending) |
| **DL-Series** | 0.3 - 63A/ 125/ 250V DC |
| **Calibration Temperature** | 40°C (104°F) |
| **Ambient Temperature** | -25°C to +55°C (-13°F to 131°F ) |
| **Storage Temperature** | -40°C to +70°C (-40°F to 158°F ) |
| **Terminal Size Acceptability** | Top: 18-3 AWG; Bottom: 18-2 AWG |
| **Terminal Torque (min/max)** | 2 Nm (17.7 lb.in.) / 2.5Nm (22.2 lb.in) |
| **Electrical Life** | 6,000 switching cycles ON/ OFF |
| **Mechanical Life** | 10,000 switching cycles ON/ OFF |
| **Vibration Resistance** | > 15g according to DIN EN 60069-2-59 during a load with $I_1 = 1.05 \times I_N$ |
| **Resistance to mechanical shocks** | 25g @ 11ms |
| **Degree of protection acc. IEC/EN 60529** | IP20 |
| **Mounting Orientation** | In any plane |

**One device, dual voltage ratings.*

### Short Circuit Interrupting Capacity
***According to UL 489***

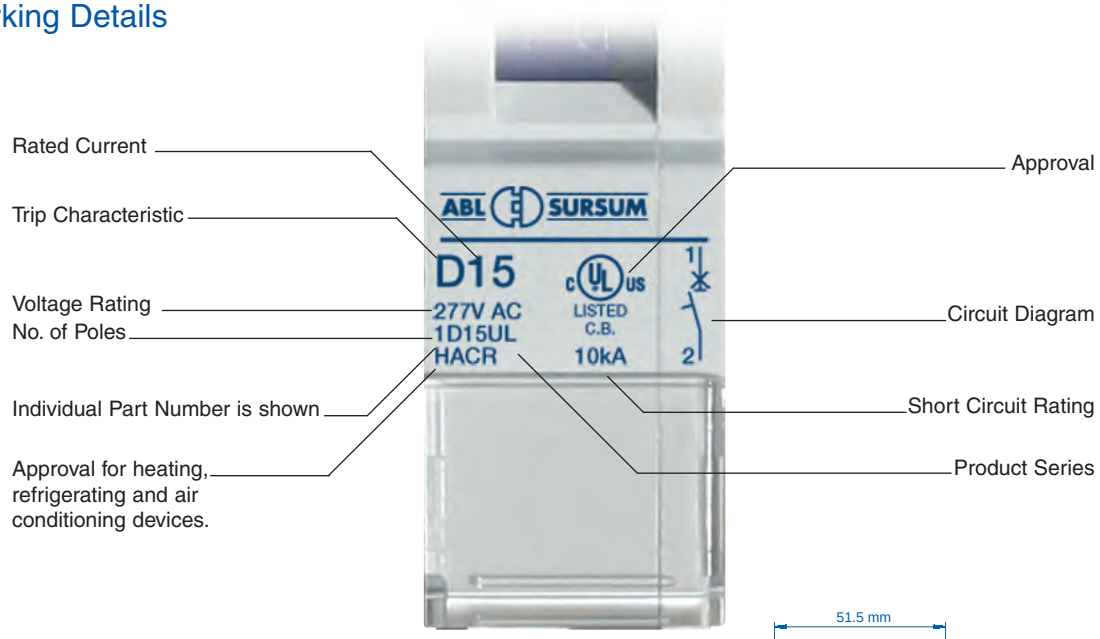
| No. Poles | Type | 0.3-32A | 40-63A |
|---|---|---|---|
| 1 | AC | 10kA @ 120, 240, 277V | 10kA @ 120, 240V |
| 2-3 | AC | 10kA @ 120, 240, 480Y/277V | 10kA @ 120 240V |

| No. Poles | Type | 0.3-32A | 40-63A |
|---|---|---|---|
| 1 | DC | 10kA @ 125V | 10kA @ 125V |
| 2 | DC | 10kA @ 250V | 10kA @ 250V |

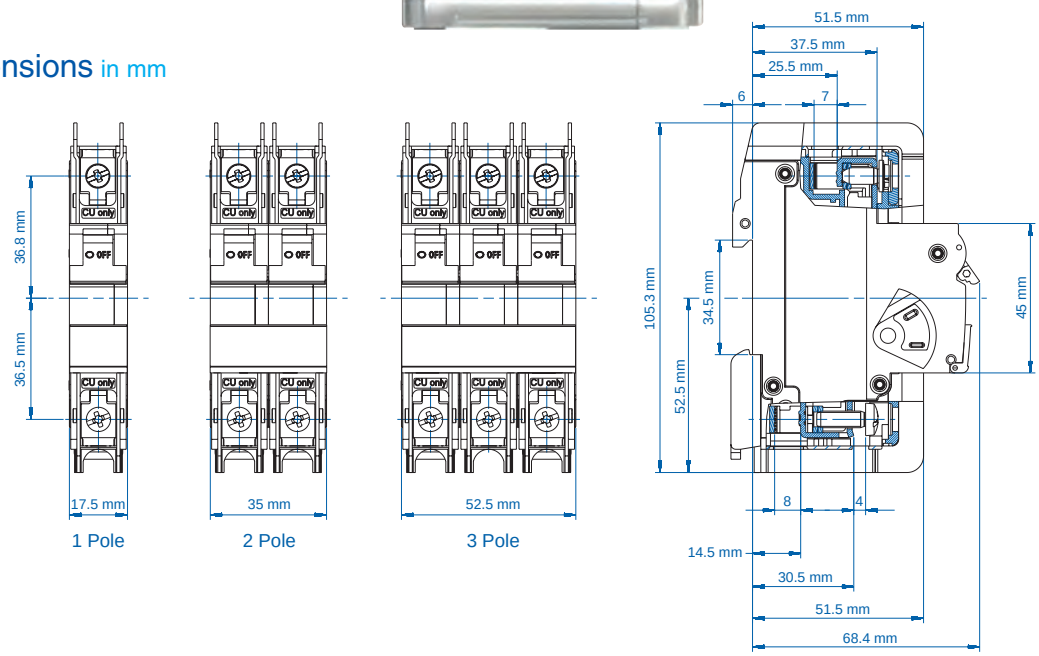
### Short Circuit Interrupting Capacity
***According to IEC 60947-2, DIN EN 60947-2***

| No. Poles | Type | 0.3-32 | 40-63A |
|---|---|---|---|
| 1 | AC | 15kA@240V | 15kA@240V |
| 2-3 | AC | 15kA@415V | 10kA@415V |

## Marking Details




## Dimensions in mm




| Trip-Characteristics* | | | | Applications | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Characteristic Trip Boundaries | | | | Lighting Wiring Protection Control Circuits | Business Equipment Appliances | Transformers | Power Supplies Heaters | Motors | | Reactive Load | Telecommu-nications/ Computer Equipment | Power Supplies |
| Thermal Trip | | Magnetic Trip | | | | | | Low Inrush | High Inrush | | | |
| Must not Trip>100ms | Must Trip <1hr | Must not Trip>100ms | Must Trip at 100ms | | | | | | | | | |
| C-Characteristics AC | | | | | | | | | | | | |
| 1.05xRC | 1.35xRC | 5xRC | 10xRC | | | | | | | | | |
| C-Characteristics DC | | | | | | | | | | | | |
| 1.05xRC | 1.35xRC | 7xRC | 14xRC | | | | | | | | | |
| D-Characteristics AC | | | | | | | | | | | | |
| 1.05xRC | 1.35xRC | 10xRC | 16xRC | | | | | | | | | |
| D-Characteristics DC | | | | | | | | | | | | |
| 1.05xRC | 1.35xRC | 14xRC | 22.4xRC | | | | | | | | | |

**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 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 for his specific application.

# UL - Series
## C-Trip Characteristic

**Application Examples:**

Low inrush motors, resistive loads, wiring protection, receptacles, lighting, and control circuit applications. Relatively short thermal trip delay and medium magnetic trip point.

C UL US LISTED C.B.
E329510

### One Pole

**Standard Pack:** 12

**Weight:**
0.3-32A:
1.74kg (3.83lb.)

40-63A:
1.98kg (4.37lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3A | **1C03UL** | 277V AC |
| 0.5A | **1C05UL** | 277V AC |
| 1.0A | **1C1UL** | 277V AC |
| 1.6A | **1C1.6UL** | 277V AC |
| 2.0A | **1C2UL** | 277V AC |
| 3.0A | **1C3UL** | 277V AC |
| 4.0A | **1C4UL** | 277V AC |
| 5.0A | **1C5UL** | 277V AC |
| 6.0A | **1C6UL** | 277V AC |
| 8.0A | **1C8UL** | 277V AC |
| 10A | **1C10UL** | 277V AC |
| 12A | **1C12UL** | 277V AC |
| 13A | **1C13UL** | 277V AC |
| 15A | **1C15UL** | 277V AC |
| 16A | **1C16UL** | 277V AC |
| 20A | **1C20UL** | 277V AC |
| 25A | **1C25UL** | 277V AC |
| 30A | **1C30UL** | 277V AC |
| 32A | **1C32UL** | 277V AC |
| 40A | **1C40UL** | 240V AC |
| 50A | **1C50UL** | 240V AC |
| 60A | **1C60UL** | 240V AC |
| 63A | **1C63UL** | 240V AC |

### Three Pole

**Standard Pack:** 4

**Weight:**
0.3-32A:
1.74kg (3.83lb.)

40-63A:
1.98kg (4.37lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3A | **3C03UL** | 480Y/277V AC |
| 0.5A | **3C05UL** | 480Y/277V AC |
| 1.0A | **3C1UL** | 480Y/277V AC |
| 1.6A | **3C1.6UL** | 480Y/277V AC |
| 2.0A | **3C2UL** | 480Y/277V AC |
| 3.0A | **3C3UL** | 480Y/277V AC |
| 4.0A | **3C4UL** | 480Y/277V AC |
| 5.0A | **3C5UL** | 480Y/277V AC |
| 6.0A | **3C6UL** | 480Y/277V AC |
| 8.0A | **3C8UL** | 480Y/277V AC |
| 10A | **3C10UL** | 480Y/277V AC |
| 12A | **3C12UL** | 480Y/277V AC |
| 13A | **3C13UL** | 480Y/277V AC |
| 15A | **3C15UL** | 480Y/277V AC |
| 16A | **3C16UL** | 480Y/277V AC |
| 20A | **3C20UL** | 480Y/277V AC |
| 25A | **3C25UL** | 480Y/277V AC |
| 30A | **3C30UL** | 480Y/277V AC |
| 32A | **3C32UL** | 480Y/277V AC |
| 40A | **3C40UL** | 240V AC |
| 50A | **3C50UL** | 240V AC |
| 60A | **3C60UL** | 240V AC |
| 63A | **3C63UL** | 240V AC |

### Two Pole

**Standard Pack:** 6

**Weight:**
0.3-32A:
1.74kg (3.83lb.)

40-63A:
1.98kg (4.37lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3A | **2C03UL** | 480Y/277V AC |
| 0.5A | **2C05UL** | 480Y/277V AC |
| 1.0A | **2C1UL** | 480Y/277V AC |
| 1.6A | **2C1.6UL** | 480Y/277V AC |
| 2.0A | **2C2UL** | 480Y/277V AC |
| 3.0A | **2C3UL** | 480Y/277V AC |
| 4.0A | **2C4UL** | 480Y/277V AC |
| 5.0A | **2C5UL** | 480Y/277V AC |
| 6.0A | **2C6UL** | 480Y/277V AC |
| 8.0A | **2C8UL** | 480Y/277V AC |
| 10A | **2C10UL** | 480Y/277V AC |
| 12A | **2C12UL** | 480Y/277V AC |
| 13A | **2C13UL** | 480Y/277V AC |
| 15A | **2C15UL** | 480Y/277V AC |
| 16A | **2C16UL** | 480Y/277V AC |
| 20A | **2C20UL** | 480Y/277V AC |
| 25A | **2C25UL** | 480Y/277V AC |
| 30A | **2C30UL** | 480Y/277V AC |
| 32A | **2C32UL** | 480Y/277V AC |
| 40A | **2C40UL** | 240V AC |
| 50A | **2C50UL** | 240V AC |
| 60A | **2C60UL** | 240V AC |
| 63A | **2C63UL** | 240V AC |

### Add-on Neutral Pole

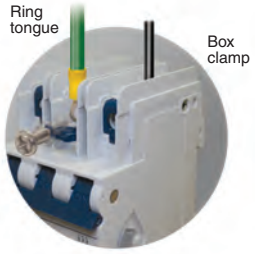
| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3-32A | **N32UL** | 480/277V AC |
| 40-63A | **N63UL** | 240V AC |

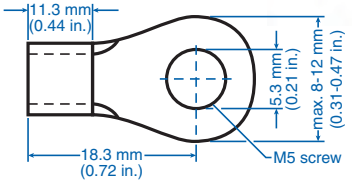
**Standard Pack:** 6

**Weight:**
0.99kg (2.18 lb.)

### Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# UL - Series
## D-Trip Characteristic

LISTED C.B.
E329510

**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

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3A | **1D03UL** | 277V AC |
| 0.5A | **1D05UL** | 277V AC |
| 1.0A | **1D1UL** | 277V AC |
| 1.6A | **1D1.6UL** | 277V AC |
| 2.0A | **1D2UL** | 277V AC |
| 3.0A | **1D3UL** | 277V AC |
| 4.0A | **1D4UL** | 277V AC |
| 5.0A | **1D5UL** | 277V AC |
| 6.0A | **1D6UL** | 277V AC |
| 8.0A | **1D8UL** | 277V AC |
| 10A | **1D10UL** | 277V AC |
| 12A | **1D12UL** | 277V AC |
| 13A | **1D13UL** | 277V AC |
| 15A | **1D15UL** | 277V AC |
| 16A | **1D16UL** | 277V AC |
| 20A | **1D20UL** | 277V AC |
| 25A | **1D25UL** | 277V AC |
| 30A | **1D30UL** | 277V AC |
| 32A | **1D32UL** | 277V AC |
| 40A | **1D40UL** | 240V AC |
| 50A | **1D50UL** | 240V AC |
| 60A | **1D60UL** | 240V AC |
| 63A | **1D63UL** | 240V AC |

**Standard Pack:** 12

**Weight:**
0.3-32A:
1.74kg (3.83lb.)

40-63A:
1.98kg (4.37lb.)

### Three Pole

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3A | **3D03UL** | 480Y/277V AC |
| 0.5A | **3D05UL** | 480Y/277V AC |
| 1.0A | **3D1UL** | 480Y/277V AC |
| 1.6A | **3D1.6UL** | 480Y/277V AC |
| 2.0A | **3D2UL** | 480Y/277V AC |
| 3.0A | **3D3UL** | 480Y/277V AC |
| 4.0A | **3D4UL** | 480Y/277V AC |
| 5.0A | **3D5UL** | 480Y/277V AC |
| 6.0A | **3D6UL** | 480Y/277V AC |
| 8.0A | **3D8UL** | 480Y/277V AC |
| 10A | **3D10UL** | 480Y/277V AC |
| 12A | **3D12UL** | 480Y/277V AC |
| 13A | **3D13UL** | 480Y/277V AC |
| 15A | **3D15UL** | 480Y/277V AC |
| 16A | **3D16UL** | 480Y/277V AC |
| 20A | **3D20UL** | 480Y/277V AC |
| 25A | **3D25UL** | 480Y/277V AC |
| 30A | **3D30UL** | 480Y/277V AC |
| 32A | **3D32UL** | 480Y/277V AC |
| 40A | **3D40UL** | 240V AC |
| 50A | **3D50UL** | 240V AC |
| 60A | **3D60UL** | 240V AC |
| 63A | **3D63UL** | 240V AC |

**Standard Pack:** 4

**Weight:**
0.3-32A:
1.74kg (3.83lb.)

40-63A:
1.98kg (4.37lb.)

### Two Pole

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3A | **2D03UL** | 480Y/277V AC |
| 0.5A | **2D05UL** | 480Y/277V AC |
| 1.0A | **2D1UL** | 480Y/277V AC |
| 1.6A | **2D1.6UL** | 480Y/277V AC |
| 2.0A | **2D2UL** | 480Y/277V AC |
| 3.0A | **2D3UL** | 480Y/277V AC |
| 4.0A | **2D4UL** | 480Y/277V AC |
| 5.0A | **2D5UL** | 480Y/277V AC |
| 6.0A | **2D6UL** | 480Y/277V AC |
| 8.0A | **2D8UL** | 480Y/277V AC |
| 10A | **2D10UL** | 480Y/277V AC |
| 12A | **2D12UL** | 480Y/277V AC |
| 13A | **2D13UL** | 480Y/277V AC |
| 15A | **2D15UL** | 480Y/277V AC |
| 16A | **2D16UL** | 480Y/277V AC |
| 20A | **2D20UL** | 480Y/277V AC |
| 25A | **2D25UL** | 480Y/277V AC |
| 30A | **2D30UL** | 480Y/277V AC |
| 32A | **2D32UL** | 480Y/277V AC |
| 40A | **2D40UL** | 240V AC |
| 50A | **2D50UL** | 240V AC |
| 60A | **2D60UL** | 240V AC |
| 63A | **2D63UL** | 240V AC |

**Standard Pack:** 6

**Weight:**
0.3-32A:
1.74kg (3.83lb.)

40-63A:
1.98kg (4.37lb.)

### Add-on Neutral Pole

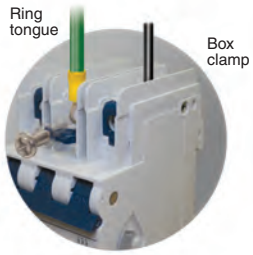
| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3-32A | **N32UL** | 480/277V AC |
| 40-63A | **N63UL** | 240V AC |

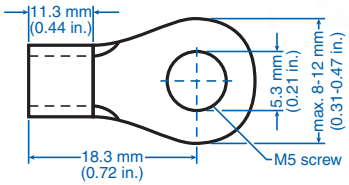
**Standard Pack:** 6

**Weight:**
0.99kg (2.18 lb.)

### Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# UL - Series
# C-Trip (DC) Characteristic

**Application Examples:**

Telecommunication equipment,
computer equipment, uninterruptable power supplies.

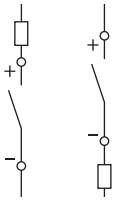
C UL US LISTED C.B.
E329510

## One Pole

**Standard Pack:** 12

**Weight:**
0.3-32A:
1.86kg (4.1lb.)

40-63A:
2.10kg (4.6lb.)



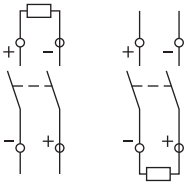
| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3A | **1C03DL** | 125V DC |
| 0.5A | **1C05DL** | 125V DC |
| 1.0A | **1C1DL** | 125V DC |
| 1.6A | **1C1.6DL** | 125V DC |
| 2.0A | **1C2DL** | 125V DC |
| 3.0A | **1C3DL** | 125V DC |
| 4.0A | **1C4DL** | 125V DC |
| 5.0A | **1C5DL** | 125V DC |
| 6.0A | **1C6DL** | 125V DC |
| 8.0A | **1C8DL** | 125V DC |
| 10A | **1C10DL** | 125V DC |
| 12A | **1C12DL** | 125V DC |
| 13A | **1C13DL** | 125V DC |
| 15A | **1C15DL** | 125V DC |
| 16A | **1C16DL** | 125V DC |
| 20A | **1C20DL** | 125V DC |
| 25A | **1C25DL** | 125V DC |
| 30A | **1C30DL** | 125V DC |
| 32A | **1C32DL** | 125V DC |
| 40A | **1C40DL** | 125V DC |
| 50A | **1C50DL** | 125V DC |
| 60A | **1C60DL** | 125V DC |
| 63A | **1C63DL** | 125V DC |

## Two Pole

**Standard Pack:** 6

**Weight:**
0.3-32A:
1.86kg (4.1lb.)

40-63A:
2.10kg (4.6lb.)

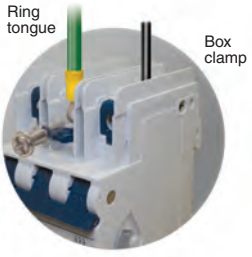


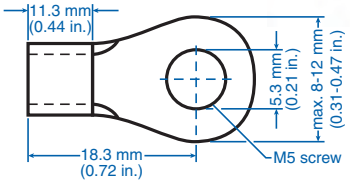
| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3A | **2C03DL** | 250V DC |
| 0.5A | **2C05DL** | 250V DC |
| 1.0A | **2C1DL** | 250V DC |
| 1.6A | **2C1.6DL** | 250V DC |
| 2.0A | **2C2DL** | 250V DC |
| 3.0A | **2C3DL** | 250V DC |
| 4.0A | **2C4DL** | 250V DC |
| 5.0A | **2C5DL** | 250V DC |
| 6.0A | **2C6DL** | 250V DC |
| 8.0A | **2C8DL** | 250V DC |
| 10A | **2C10DL** | 250V DC |
| 12A | **2C12DL** | 250V DC |
| 13A | **2C13DL** | 250V DC |
| 15A | **2C15DL** | 250V DC |
| 16A | **2C16DL** | 250V DC |
| 20A | **2C20DL** | 250V DC |
| 25A | **2C25DL** | 250V DC |
| 30A | **2C30DL** | 250V DC |
| 32A | **2C32DL** | 250V DC |
| 40A | **2C40DL** | 250V DC |
| 50A | **2C50DL** | 250V DC |
| 60A | **2C60DL** | 250V DC |
| 63A | **2C63DL** | 250V DC |

Warning!
Correct polarity must be observed when connecting the DC circuit breakers.

### Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# UL - Series
# D-Trip (DC) Characteristic

**Application Examples:**

Telecommunication equipment,
computer equipment, uninterruptable power supplies.

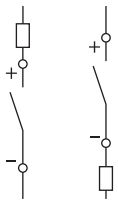
LISTED C.B.
E329510

## One Pole

**Standard Pack:** 12

**Weight:**
0.3-32A:
1.86kg (4.1lb.)

40-63A:
2.10kg (4.6lb.)



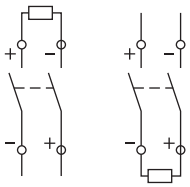
| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3A | **1D03DL** | 125V DC |
| 0.5A | **1D05DL** | 125V DC |
| 1.0A | **1D1DL** | 125V DC |
| 1.6A | **1D1.6DL** | 125V DC |
| 2.0A | **1D2DL** | 125V DC |
| 3.0A | **1D3DL** | 125V DC |
| 4.0A | **1D4DL** | 125V DC |
| 5.0A | **1D5DL** | 125V DC |
| 6.0A | **1D6DL** | 125V DC |
| 8.0A | **1D8DL** | 125V DC |
| 10A | **1D10DL** | 125V DC |
| 12A | **1D12DL** | 125V DC |
| 13A | **1D13DL** | 125V DC |
| 15A | **1D15DL** | 125V DC |
| 16A | **1D16DL** | 125V DC |
| 20A | **1D20DL** | 125V DC |
| 25A | **1D25DL** | 125V DC |
| 30A | **1D30DL** | 125V DC |
| 32A | **1D32DL** | 125V DC |
| 40A | **1D40DL** | 125V DC |
| 50A | **1D50DL** | 125V DC |
| 60A | **1D60DL** | 125V DC |
| 63A | **1D63DL** | 125V DC |

## Two Pole

**Standard Pack:** 6

**Weight:**
0.3-32A:
1.86kg (4.1lb.)

40-63A:
2.10kg (4.6lb.)

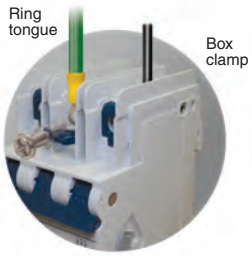


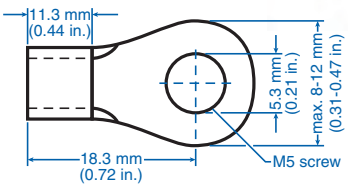
| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3A | **2D03DL** | 250V DC |
| 0.5A | **2D05DL** | 250V DC |
| 1.0A | **2D1DL** | 250V DC |
| 1.6A | **2D1.6DL** | 250V DC |
| 2.0A | **2D2DL** | 250V DC |
| 3.0A | **2D3DL** | 250V DC |
| 4.0A | **2D4DL** | 250V DC |
| 5.0A | **2D5DL** | 250V DC |
| 6.0A | **2D6DL** | 250V DC |
| 8.0A | **2D8DL** | 250V DC |
| 10A | **2D10DL** | 250V DC |
| 12A | **2D12DL** | 250V DC |
| 13A | **2D13DL** | 250V DC |
| 15A | **2D15DL** | 250V DC |
| 16A | **2D16DL** | 250V DC |
| 20A | **2D20DL** | 250V DC |
| 25A | **2D25DL** | 250V DC |
| 30A | **2D30DL** | 250V DC |
| 32A | **2D32DL** | 250V DC |
| 40A | **2D40DL** | 250V DC |
| 50A | **2D50DL** | 250V DC |
| 60A | **2D60DL** | 250V DC |
| 63A | **2D63DL** | 250V DC |

Warning!
Correct polarity must be observed when connecting the DC circuit breakers.

### Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# UL/DL Series Accessories

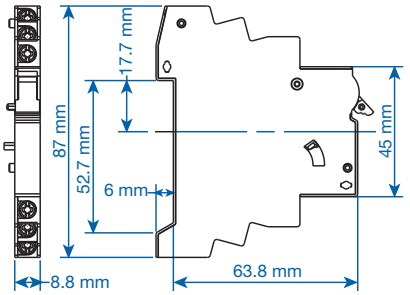
*For mounting instructions please refer to page 43.*

C UL US
LISTED
C.B. ACC.
3NY7
E335632

## Auxiliary Contact, Alarm Switch

| Type/ Cat No. | Description | Contacts Type | Std Pk |
|---|---|---|---|
| H10UL | 1 Auxiliary Contact | 1NO | 6 |
| H11UL | 2 Auxiliary Contacts | 1NO + 1NC | 6 |
| H12UL | 3 Auxiliary Contacts | 1NO + 2NC | 6 |
| H21UL | 3 Auxiliary Contacts | 2NO + 1NC | 6 |
| HLS11L* | 1 Auxiliary/1 Signal Contact | 1CO + 1CO (Signal) | 6 |

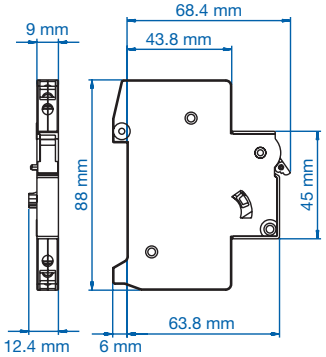
| | |
|---|---|
| **Rated Operating Currents** | 10A@240V AC<br>3A@110V DC<br>1A@220V DC |
| **Minimum Contact Load** | 1mA @ 24V DC |
| **Torque** | max. 0.8Nm (7 lb.in) |
| **Wire Range**: | |
| **Single Wire** | 1.0mm² - 2.5mm² (18-14 AWG) |
| **Stranded Wire** | 1.0mm² - 1.5mm² (18-16 AWG) |
| **Stranded Wire with Ferrule** | 1.0mm² - 1.5mm² (18-16 AWG) |




Dimensions HxxUL.

## Shunt Trip

| Type/ Cat No. | Rated Voltage $U_N$ | Max. Operating Current @ $U_N$ | Std Pk |
|---|---|---|---|
| FA12UL | 12V AC/DC | 1.3A | 5 |
| FA24UL | 24V AC/DC | 0.6A | 5 |
| FA48UL | 48 - 72V AC/DC | 0.2A | 5 |
| FA110UL | 110 - 240V AC/DC, 277V AC | 0.25A @ 110V<br>0.5A @ 240V<br>0.58A @ 277V | 5 |



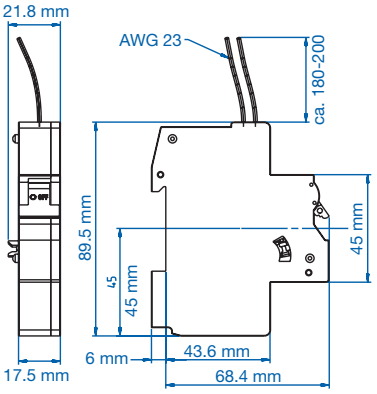

Dimensions HLS11L.

## Undervoltage Trip*

| Type/ Cat No. | Line Voltage $V_E$ | Std Pk |
|---|---|---|
| UA120UL | 120V AC, 60Hz | 5 |

Reset-Hold Voltage = 0.85 x $V_E$
Drop-Out Voltage = 0.35 ~ 0.7 x $V_E$

$V_E$ = Rated Voltage




Dimensions UA120UL

## Neutral Pole

| Type/ Cat No. | Rated Current $I_N$ | Rated Voltage $U_N$ | Std Pk |
|---|---|---|---|
| N32UL | 0.3 - 32A | 480Y/277V AC | 6 |
| N63UL | 40 - 63A | 240V AC | 6 |

## Touch Protection Caps

*to cover the terminal screw holes on the switching devices, neutral Poles and shunt trips for increased touch protection.*

| Type/ Cat No. | Std Pk |
|---|---|
| BS.UL | 100 |

## Cooling Spacer

| Type/ Cat No. | Std Pk |
|---|---|
| 15.960 | 1 |

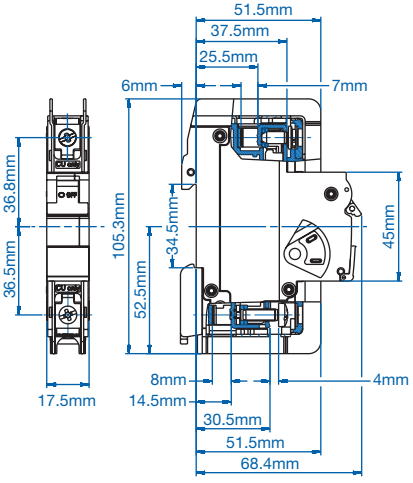
## Mounting Screw 34mm

*to connect the auxiliary contact and shunt trip or neutral Pole to the circuit breaker.*

| Type/ Cat No. | Std Pk |
|---|---|
| E983419 | 10 |

## Lock-out Adapter**

| Type/ Cat No. | Std Pk |
|---|---|
| EASS | 10 |



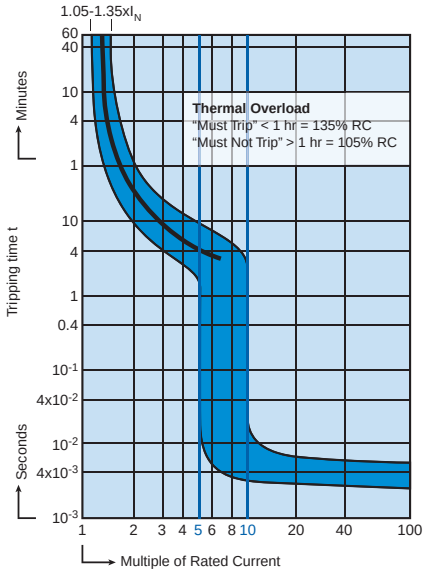

Dimensions NxxUL, FAxxUL

* UL not approved.

** UL and DL series 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.

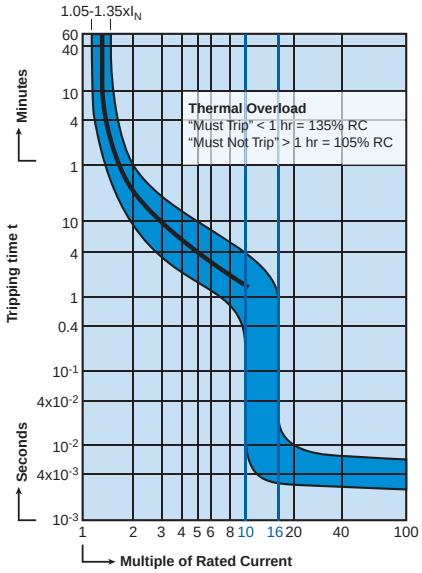
# UL Series (AC) Trip Curves

## C (AC) Trip Curve

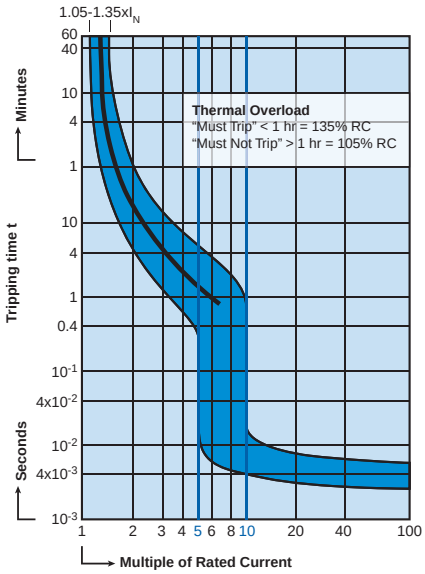



0.3A Through 10A Rated Current

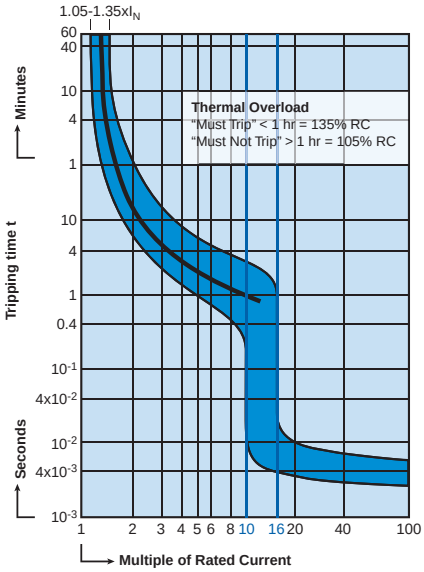
## D (AC) Trip Curve




0.3A Through 10A Rated Current




12A Through 63A Rated Current




12A Through 63A Rated Current

**"C" Magnetic Trip Parameters**
Rated current 0.3A to 63A.

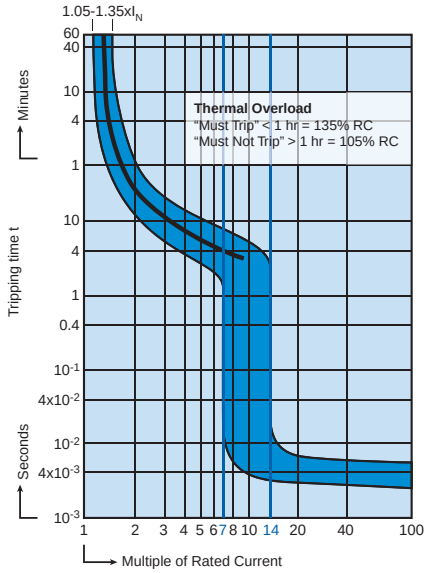
1. Hold for a minimum of 100ms at surge of 5 times rated current.
2. Trip in under 100ms at 10 times rated current.

**"D" Magnetic Trip Parameters**
Rated current 0.3A to 63A.

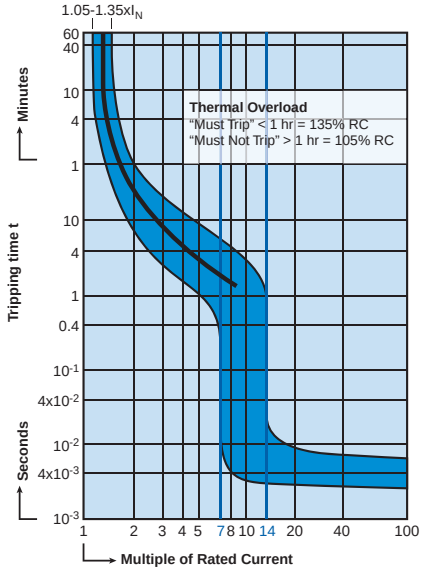
1. Hold for a minimum of 100ms at surge of 10 times rated current.
2. Trip in under 100ms at 16 times rated current.

# UL Series (DC) Trip Curves

## C (DC) Trip Curve




0.3A Through 10A Rated Current

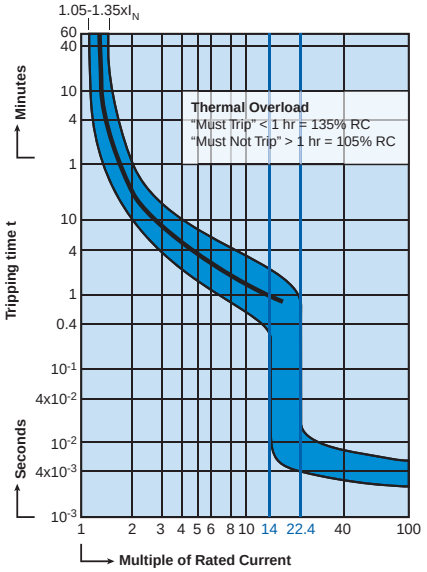



12A Through 63A Rated Current

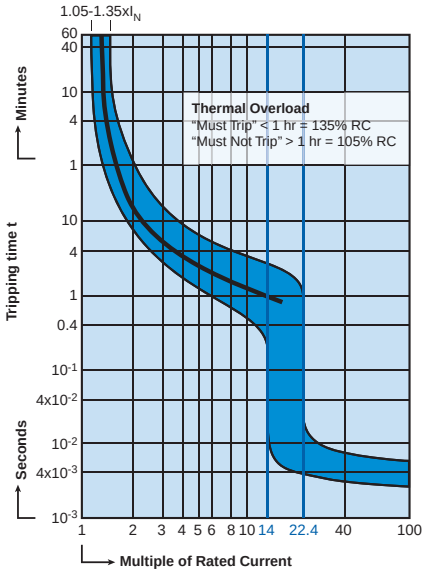
**"C" Magnetic Trip Parameters**
Rated current 0.3A to 63A.

1. Hold for a minimum of 100ms at surge of 7 times rated current.
2. Trip in under 100ms at 14 times rated current.

## D (DC) Trip Curve




0.3A Through 10A Rated Current




12A Through 63A Rated Current

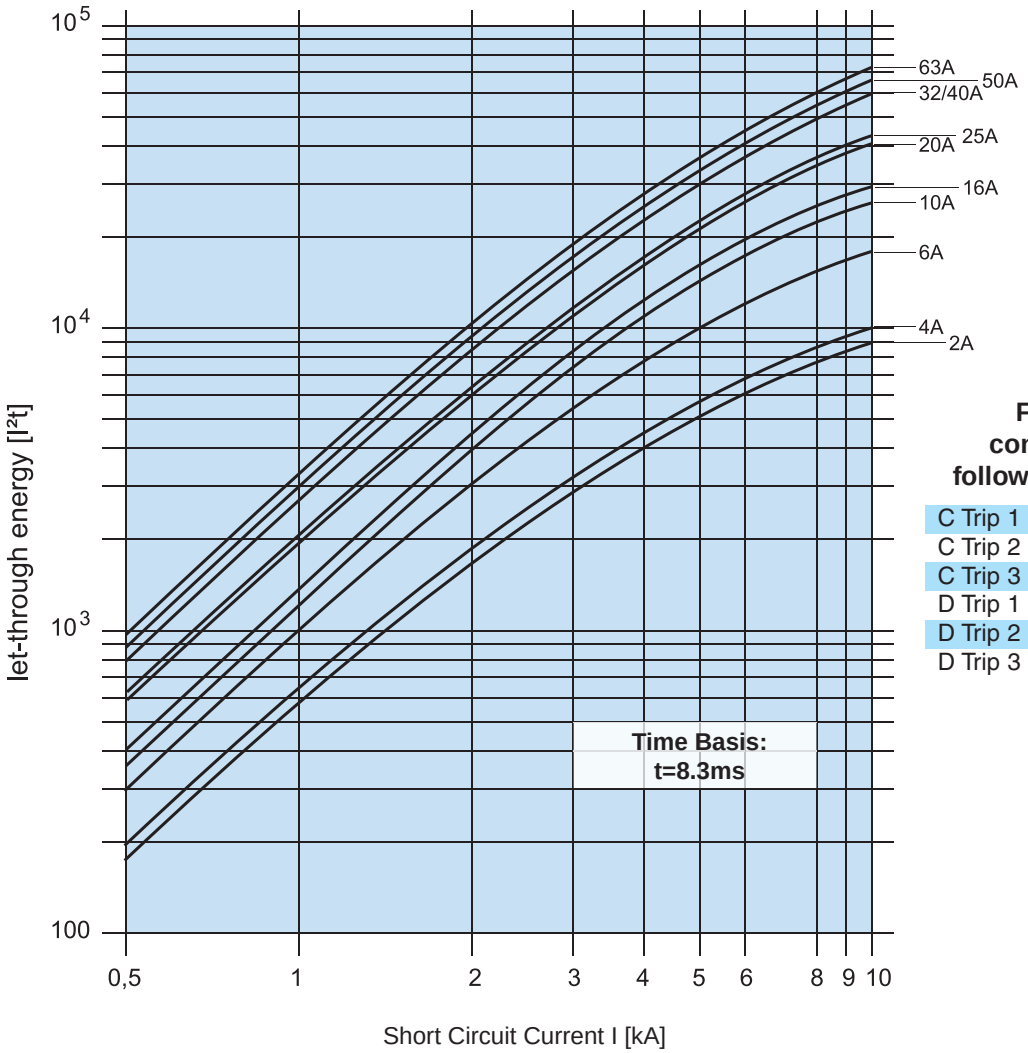
**"D" Magnetic Trip Parameters**
Rated current 0.3A to 63A.

1. Hold for a minimum of 100ms at surge of 14 times rated current.
2. Trip in under 100ms at 22.4 times rated current.

## UL/ DL Series Internal Resistance

| Rated Current (A) | Trip Characteristic C (Ohm) | D (Ohm) |
|---|---|---|
| 0.3 | 16.8620 | 16.8620 |
| 0.5 | 6.8540 | 6.0009 |
| 1.0 | 1.7000 | 1.7560 |
| 1.6 | 0.5870 | 0.5870 |
| 2.0 | 0.4190 | 0.4190 |
| 3.0 | 0.2020 | 0.2020 |
| 4.0 | 0.1090 | 0.1090 |
| 5.0 | 0.0654 | 0.0654 |
| 6.0 | 0.0528 | 0.0491 |
| 8.0 | 0.0278 | 0.0240 |
| 10 | 0.0216 | 0.0187 |
| 12 | 0.0084 | 0.0085 |
| 13 | 0.0084 | 0.0085 |
| 15/ 16 | 0.0085 | 0.0076 |
| 20 | 0.0067 | 0.0064 |
| 25 | 0.0050 | 0.0041 |
| 30/ 32 | 0.0032 | 0.0027 |
| 40 | 0.0025 | 0.0022 |
| 50 | 0.0019 | 0.0018 |
| 60/ 63 | 0.0018 | 0.0017 |

## UL Series Let-through Energy I²t Diagram, D Trip 1 pole



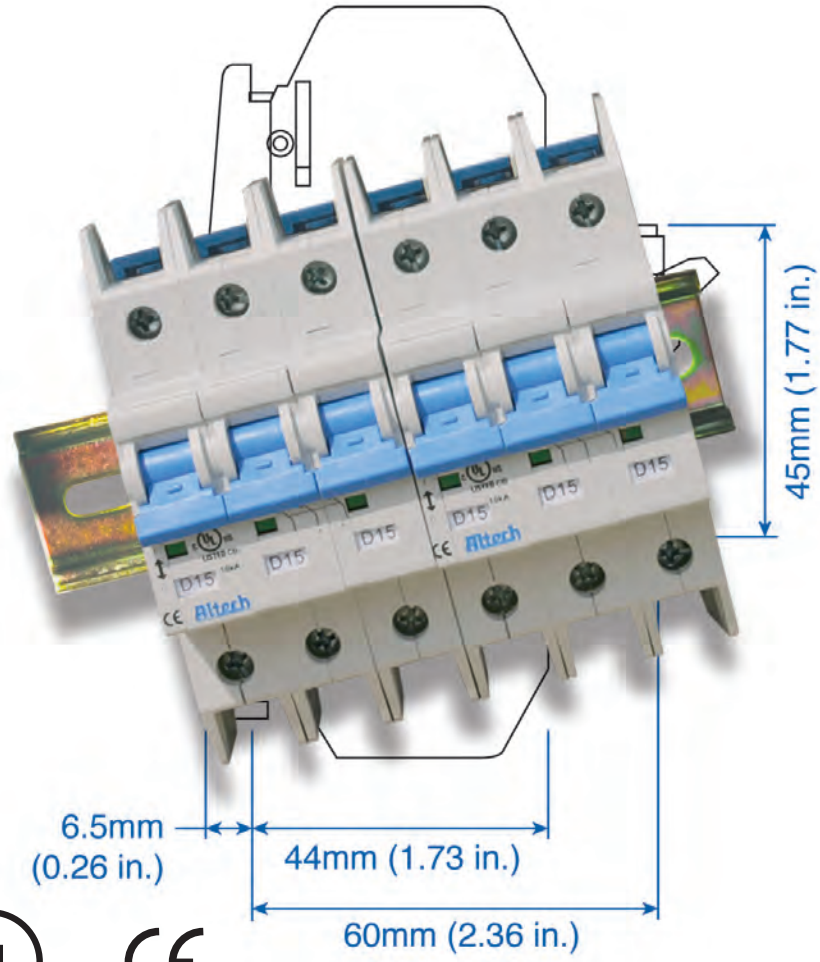

**For other Trip/Pole configurations use the following correction factors:**

| |
|---|
| C Trip 1 pole + 0.84 x curve value |
| C Trip 2 pole + 0.71 x curve value |
| C Trip 3 pole + 0.92 x curve value |
| D Trip 1 pole + 1.00 x curve value |
| D Trip 2 pole + 0.87 x curve value |
| D Trip 3 pole + 1.08 x curve value |

# L-Series
## AC or DC
### Miniature Molded Case Circuit Breakers

### UL489 Listed Circuit Breakers

- Available in AC and DC models
- DIN Rail Mounted
- 17.5mm width
- Thermal Magnetic
- 240V, 480Y/277V AC, 50/60Hz
- 125VDC (1 pole); 250VDC (2 pole)
- 10kA Short Circuit Interrupting Capacity
- Positive Trip indicator (Green - off/tripped, Red - on)
- HACR Type 40°C
- Line/Load reversible

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| | |
|---|---|
| **AC Version Current/ Voltage Rating** | **0.2-63A/240VAC, 0.2-32A/480Y/277VAC*** |
| **DC Version Current/ Voltage Rating** | **0.2-63A/125/250VDC** |
| **Calibration Temperature** | 40°C (104°F) |
| **Operating Temperature** | -25° to 60°C (-13° to 140°F) |
| **Storage Temperature** | -25° to 75°C (-13° to 167°F) |
| **Terminal Size Acceptability and Torque** | 14-3 AWG: 17.5 lb-in. (2.0 Nm)<br>18-16 AWG: 25 lb-in. (2.8 Nm) |
| **Terminal Protection Degree** | IP20 at front |
| **Electrical Life** | 6,000 cycles on/off |
| **Mechanical Life** | 10,000 cycles on/off |
| **Wire Connection** | copper wire only 60/75°C |
| **Vibration Resistance** | 3g (18-50Hz) |
| **Mounting Orientation** | In any plane |

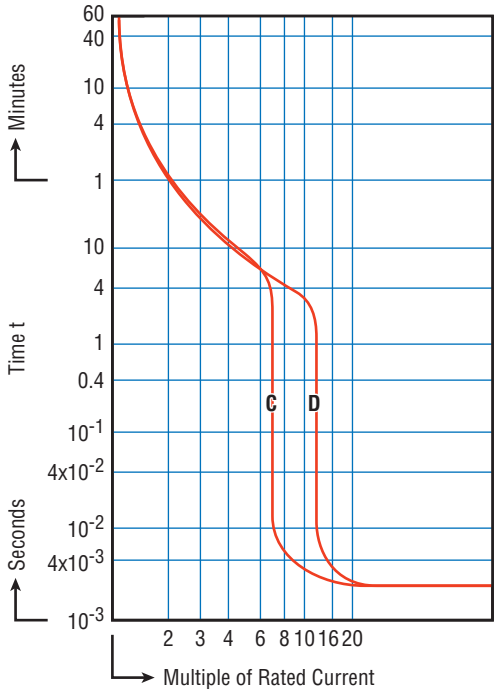
**One device dual voltage ratings.*

### AC - SHORT CIRCUIT INTERRUPTING RATING

| No. Poles | Type | 0.2-32A | 33-63A |
|---|---|---|---|
| 1 | AC | 10kA@120, 240, 277V | 10kA@120, 240V |
| 2-4 | AC | 10kA@120, 240V, 480Y/277V | 10kA@120, 240V |

### DC - SHORT CIRCUIT INTERRUPTING RATING

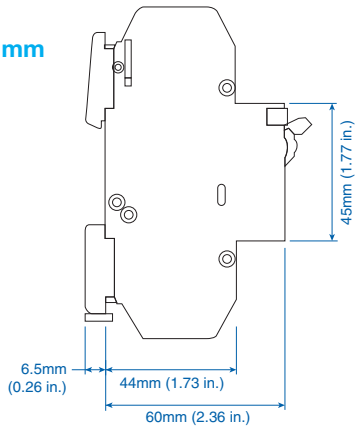
| No. Poles | Type | 0.2-32A | 33-63A |
|---|---|---|---|
| 1 | DC | 10kA@125V | 10kA@125V |
| 2 | DC | 10kA@250V | 10kA@250V |



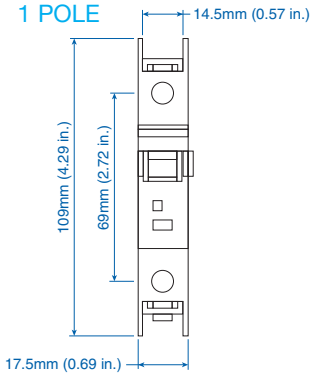

# Time versus Current Trip Curve

*For the exact trip curve, please refer to page 25.*

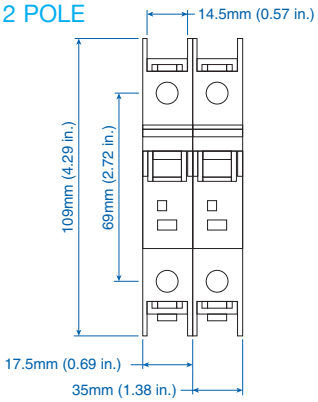
**Dimensions in mm**
**side view**



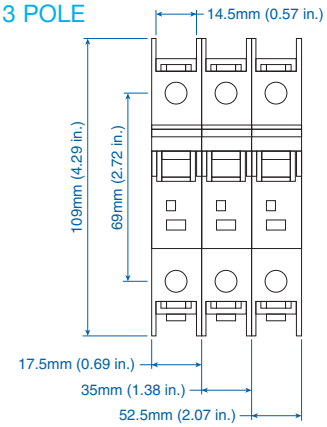

1 POLE




2 POLE




3 POLE




| Trip-Characteristics* | | | | Type | Applications | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Characteristic Trip Boundaries | | | | | Lighting Wiring Protection Control Circuits | Business Equipment Appliances | Transformers | Power Supplies Heaters | Motors | | Reactive Load |
| Thermal Trip | | Magnetic Trip | | | | | | | Low Inrush | High Inrush | |
| Must not Trip>100ms | Must Trip <1hr | Must not Trip>100ms | Must Trip at 100ms | | | | | | | | |
| C-Characteristics | | | | | | | | | | | |
| 1.05xRC | 1.3xRC | 5xRC | 10xRC | AC | | | | | | | |
| 1.05xRC | 1.3xRC | 5xRC | 10xRC | DC | | | | | | | |
| D-Characteristics | | | | | | | | | | | |
| 1.05xRC | 1.3xRC | 10xRC | 16xRC | AC | | | | | | | |
| 1.05xRC | 1.3xRC | 10xRC | 16xRC | DC | | | | | | | |

**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 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 for his specific application.

# AC C-Trip Characteristics

**Application Examples:**
Low inrush motors, resistive loads, wiring protection, receptacles, lighting, and control circuit applications. Relatively short thermal trip delay and medium magnetic trip point.

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One Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.2A | 1CU02L |
| 0.5A | 1CU05L |
| 1.0A | 1CU1L |
| 1.6A | 1CU1.6L |
| 2.0A | 1CU2L |
| 3.0A | 1CU3L |
| 4.0A | 1CU4L |
| 5.0A | 1CU5L |
| 6.0A | 1CU6L |
| 8.0A | 1CU8L |
| 10A | 1CU10L |
| 12A | 1CU12L |
| 13A | 1CU13L |
| 15A | 1CU15L |
| 16A | 1CU16L |
| 20A | 1CU20L |
| 25A | 1CU25L |
| 30A | 1CU30L |
| 32A | 1CU32L |
| 40A | 1CU40L |
| 50A | 1CU50L |
| 60A | 1CU60L |
| 63A | 1CU63L |

**Standard Pack:** 12

**Weight:** 1.7kg (3.74 lb.)

Two Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.2A | 2CU02L |
| 0.5A | 2CU05L |
| 1.0A | 2CU1L |
| 1.6A | 2CU1.6L |
| 2.0A | 2CU2L |
| 3.0A | 2CU3L |
| 4.0A | 2CU4L |
| 5.0A | 2CU5L |
| 6.0A | 2CU6L |
| 8.0A | 2CU8L |
| 10A | 2CU10L |
| 12A | 2CU12L |
| 13A | 2CU13L |
| 15A | 2CU15L |
| 16A | 2CU16L |
| 20A | 2CU20L |
| 25A | 2CU25L |
| 30A | 2CU30L |
| 32A | 2CU32L |
| 40A | 2CU40L |
| 50A | 2CU50L |
| 60A | 2CU60L |
| 63A | 2CU63L |

**Standard Pack:** 6

**Weight:** 1.7kg (3.74 lb.)

Three Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.2A | 3CU02L |
| 0.5A | 3CU05L |
| 1.0A | 3CU1L |
| 1.6A | 3CU1.6L |
| 2.0A | 3CU2L |
| 3.0A | 3CU3L |
| 4.0A | 3CU4L |
| 5.0A | 3CU5L |
| 6.0A | 3CU6L |
| 8.0A | 3CU8L |
| 10A | 3CU10L |
| 12A | 3CU12L |
| 13A | 3CU13L |
| 15A | 3CU15L |
| 16A | 3CU16L |
| 20A | 3CU20L |
| 25A | 3CU25L |
| 30A | 3CU30L |
| 32A | 3CU32L |
| 40A | 3CU40L |
| 50A | 3CU50L |
| 60A | 3CU60L |
| 63A | 3CU63L |

**Standard Pack:** 4

**Weight:** 1.7kg (3.74 lb.)

Four Pole
Please contact Altech.

For ring tongue terminal version, replace "U" with "**R**" in part number. For example **1CR20L** instead of *1CU20L*.

# AC D-Trip Characteristics

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

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One Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.2A | 1DU02L |
| 0.5A | 1DU05L |
| 1.0A | 1DU1L |
| 1.6A | 1DU1.6L |
| 2.0A | 1DU2L |
| 3.0A | 1DU3L |
| 4.0A | 1DU4L |
| 5.0A | 1DU5L |
| 6.0A | 1DU6L |
| 8.0A | 1DU8L |
| 10A | 1DU10L |
| 12A | 1DU12L |
| 13A | 1DU13L |
| 15A | 1DU15L |
| 16A | 1DU16L |
| 20A | 1DU20L |
| 25A | 1DU25L |
| 30A | 1DU30L |
| 32A | 1DU32L |
| 40A | 1DU40L |
| 50A | 1DU50L |
| 60A | 1DU60L |
| 63A | 1DU63L |

**Standard Pack:** 12

**Weight:** 1.7kg (3.74 lb.)

Two Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.2A | 2DU02L |
| 0.5A | 2DU05L |
| 1.0A | 2DU1L |
| 1.6A | 2DU1.6L |
| 2.0A | 2DU2L |
| 3.0A | 2DU3L |
| 4.0A | 2DU4L |
| 5.0A | 2DU5L |
| 6.0A | 2DU6L |
| 8.0A | 2DU8L |
| 10A | 2DU10L |
| 12A | 2DU12L |
| 13A | 2DU13L |
| 15A | 2DU15L |
| 16A | 2DU16L |
| 20A | 2DU20L |
| 25A | 2DU25L |
| 30A | 2DU30L |
| 32A | 2DU32L |
| 40A | 2DU40L |
| 50A | 2DU50L |
| 60A | 2DU60L |
| 63A | 2DU63L |

**Standard Pack:** 6

**Weight:** 1.7kg (3.74 lb.)

Three Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.2A | 3DU02L |
| 0.5A | 3DU05L |
| 1.0A | 3DU1L |
| 1.6A | 3DU1.6L |
| 2.0A | 3DU2L |
| 3.0A | 3DU3L |
| 4.0A | 3DU4L |
| 5.0A | 3DU5L |
| 6.0A | 3DU6L |
| 8.0A | 3DU8L |
| 10A | 3DU10L |
| 12A | 3DU12L |
| 13A | 3DU13L |
| 15A | 3DU15L |
| 16A | 3DU16L |
| 20A | 3DU20L |
| 25A | 3DU25L |
| 30A | 3DU30L |
| 32A | 3DU32L |
| 40A | 3DU40L |
| 50A | 3DU50L |
| 60A | 3DU60L |
| 63A | 3DU63L |

**Standard Pack:** 4

**Weight:** 1.7kg (3.74 lb.)

Four Pole
Please contact Altech.

For ring tongue terminal version, replace "U" with "**R**" in part number. For example **1CR20L** instead of *1CU20L*.

# DC C- & D-Trip Characteristics

**Application Examples:**
Telecommunication equipment, computer equipment, uninterruptable power supplies.

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CE

## C-Trip

One Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.2A | DC1CU02L |
| 0.5A | DC1CU05L |
| 1.0A | DC1CU1L |
| 1.6A | DC1CU1.6L |
| 2.0A | DC1CU2L |
| 3.0A | DC1CU3L |
| 4.0A | DC1CU4L |
| 5.0A | DC1CU5L |
| 6.0A | DC1CU6L |
| 8.0A | DC1CU8L |
| 10A | DC1CU10L |
| 12A | DC1CU12L |
| 13A | DC1CU13L |
| 15A | DC1CU15L |
| 16A | DC1CU16L |
| 20A | DC1CU20L |
| 25A | DC1CU25L |
| 30A | DC1CU30L |
| 32A | DC1CU32L |
| 40A | DC1CU40L |
| 50A | DC1CU50L |
| 60A | DC1CU60L |
| 63A | DC1CU63L |

**Standard Pack:** 12

**Weight:** 1.7kg (3.74 lb.)

Two Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.2A | DC2CU02L |
| 0.5A | DC2CU05L |
| 1.0A | DC2CU1L |
| 1.6A | DC2CU1.6L |
| 2.0A | DC2CU2L |
| 3.0A | DC2CU3L |
| 4.0A | DC2CU4L |
| 5.0A | DC2CU5L |
| 6.0A | DC2CU6L |
| 8.0A | DC2CU8L |
| 10A | DC2CU10L |
| 12A | DC2CU12L |
| 13A | DC2CU13L |
| 15A | DC2CU15L |
| 16A | DC2CU16L |
| 20A | DC2CU20L |
| 25A | DC2CU25L |
| 30A | DC2CU30L |
| 32A | DC2CU32L |
| 40A | DC2CU40L |
| 50A | DC2CU50L |
| 60A | DC2CU60L |
| 63A | DC2CU63L |

**Standard Pack:** 6

**Weight:** 1.7kg (3.74 lb.)

## D-Trip

One Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.2A | DC1DU02L |
| 0.5A | DC1DU05L |
| 1.0A | DC1DU1L |
| 1.6A | DC1DU1.6L |
| 2.0A | DC1DU2L |
| 3.0A | DC1DU3L |
| 4.0A | DC1DU4L |
| 5.0A | DC1DU5L |
| 6.0A | DC1DU6L |
| 8.0A | DC1DU8L |
| 10A | DC1DU10L |
| 12A | DC1DU12L |
| 13A | DC1DU13L |
| 15A | DC1DU15L |
| 16A | DC1DU16L |
| 20A | DC1DU20L |
| 25A | DC1DU25L |
| 30A | DC1DU30L |
| 32A | DC1DU32L |
| 40A | DC1DU40L |
| 50A | DC1DU50L |
| 60A | DC1DU60L |
| 63A | DC1DU63L |

**Standard Pack:** 12

**Weight:** 1.7kg (3.74 lb.)

Two Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.2A | DC2DU02L |
| 0.5A | DC2DU05L |
| 1.0A | DC2DU1L |
| 1.6A | DC2DU1.6L |
| 2.0A | DC2DU2L |
| 3.0A | DC2DU3L |
| 4.0A | DC2DU4L |
| 5.0A | DC2DU5L |
| 6.0A | DC2DU6L |
| 8.0A | DC2DU8L |
| 10A | DC2DU10L |
| 12A | DC2DU12L |
| 13A | DC2DU13L |
| 15A | DC2DU15L |
| 16A | DC2DU16L |
| 20A | DC2DU20L |
| 25A | DC2DU25L |
| 30A | DC2DU30L |
| 32A | DC2DU32L |
| 40A | DC2DU40L |
| 50A | DC2DU50L |
| 60A | DC2DU60L |
| 63A | DC2DU63L |

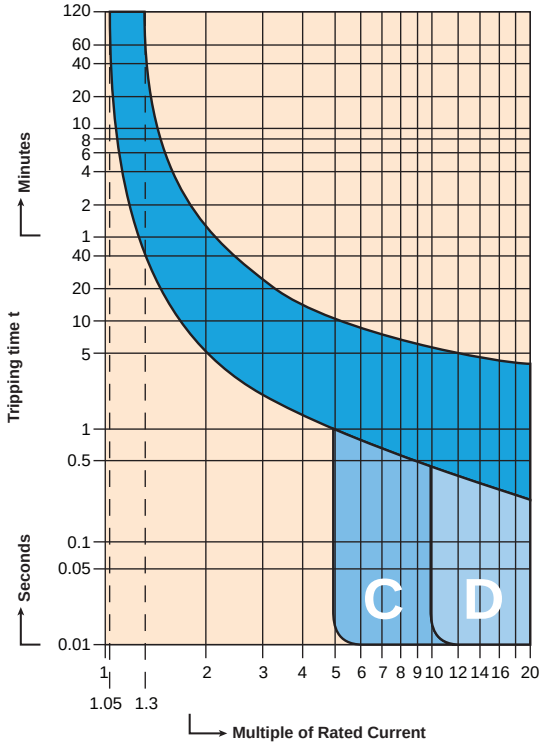
**Standard Pack:** 6

**Weight:** 1.7kg (3.74 lb.)

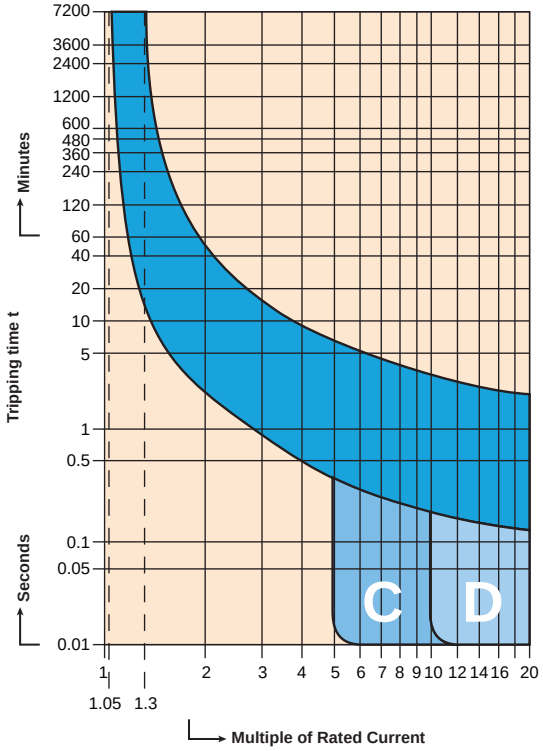
For ring tongue terminal version, replace "U" with "**R**" in part number. For example **1CR20L** instead of *1CU20L*.

# L-Series Trip Curves

### C and D Trip
### Less than 10A




### C and D Trip
### 10A and higher




## Temperature and Power Loss Specifications

| Rated current In (A) | Effective rated current allowing for ambient temperature I cor (A) | | | | | | | | | Internal impedance Z (m Ω) char. B, C, D, K | Power Loss B, C, D, K P (W) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | -20 | -10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | | |
| 0.2 | 0.24 | 0.24 | 0.23 | 0.22 | 0.21 | 0.2 | 0.19 | 0.18 | 0.17 | 45100.0 | 1.80 |
| 0.5 | 0.61 | 0.59 | 0.57 | 0.55 | 0.53 | 0.5 | 0.47 | 0.44 | 0.42 | 8000.0 | 2.00 |
| 1 | 1.21 | 1.18 | 1.14 | 1.1 | 1.05 | 1.0 | 0.93 | 0.88 | 0.83 | 2000.0 | 2.00 |
| 2 | 2.42 | 2.36 | 2.28 | 2.2 | 2.1 | 2.0 | 1.86 | 1.76 | 1.67 | 490.0 | 1.96 |
| 3 | 3.63 | 3.54 | 3.42 | 3.3 | 3.15 | 3.0 | 2.79 | 2.64 | 2.5 | 230.0 | 2.07 |
| 4 | 4.84 | 4.72 | 4.56 | 4.4 | 4.2 | 4.0 | 3.72 | 3.52 | 3.33 | 150.0 | 2.40 |
| 5 | 6.1 | 5.9 | 5.7 | 5.5 | 5.3 | 5.0 | 4.7 | 4.4 | 4.2 | 95.0 | 2.38 |
| 6 | 7.3 | 7.1 | 6.8 | 6.6 | 6.3 | 6.0 | 5.6 | 5.3 | 5.0 | 69.0 | 2.48 |
| 7 | 8.5 | 8.2 | 8.0 | 7.7 | 7.4 | 7.0 | 6.5 | 6.2 | 5.8 | 52.0 | 2.55 |
| 8 | 9.7 | 9.4 | 9.1 | 8.8 | 8.4 | 8.0 | 7.4 | 7.0 | 6.7 | 35.0 | 2.24 |
| 10 | 12.1 | 11.8 | 11.4 | 11.0 | 10.5 | 10.0 | 9.3 | 8.8 | 8.3 | 23.5 | 2.35 |
| 12 | 14.5 | 14.2 | 13.7 | 13.2 | 12.6 | 12.0 | 11.2 | 10.6 | 10.0 | 18.7 | 2.69 |
| 13 | 15.7 | 15.3 | 14.8 | 14.3 | 13.7 | 13.0 | 12.1 | 11.5 | 10.8 | 14.3 | 2.42 |
| 14 | 16.9 | 16.5 | 16.0 | 15.4 | 14.7 | 14.0 | 13.0 | 12.3 | 11.7 | 12.4 | 2.43 |
| 15 | 18.2 | 17.7 | 17.1 | 16.5 | 15.8 | 15.0 | 14.0 | 13.2 | 12.5 | 10.1 | 2.27 |
| 16 | 19.4 | 18.9 | 18.2 | 17.6 | 16.8 | 16.0 | 14.9 | 14.1 | 13.3 | 7.5 | 1.92 |
| 20 | 24.2 | 23.6 | 22.8 | 22.0 | 21.0 | 20.0 | 18.6 | 17.6 | 16.7 | 6.3 | 2.52 |
| 25 | 30.3 | 29.5 | 28.5 | 27.5 | 26.3 | 25.0 | 23.3 | 22.0 | 20.8 | 4.6 | 2.88 |
| 30 | 36.3 | 35.4 | 34.2 | 33.0 | 31.5 | 30.0 | 27.9 | 26.5 | 25.0 | 3.6 | 3.24 |
| 32 | 38.7 | 37.8 | 36.5 | 35.2 | 33.6 | 32.0 | 29.8 | 28.2 | 26.7 | 3.6 | 3.69 |
| 35 | 42.3 | 41.3 | 39.9 | 38.5 | 36.8 | 35.0 | 32.6 | 30.8 | 29.2 | 3.6 | 4.41 |
| 40 | 48.4 | 47.2 | 45.6 | 44.0 | 42.0 | 40.0 | 37.2 | 35.2 | 33.3 | 3.0 | 4.80 |
| 50 | 60.5 | 59.0 | 57.0 | 55.0 | 52.5 | 50.0 | 46.5 | 44.1 | 41.7 | 2.4 | 6.00 |
| 60 | 72.6 | 70.9 | 68.4 | 66.0 | 63.0 | 60.0 | 55.9 | 52.9 | 50.1 | 1.8 | 6.48 |

# Accessories

## L-Series Circuit Breakers

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Accessories can be factory or field mounted on L-Series miniature molded case circuit breakers 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.

### Neutral Pole (63A/240VAC; 32A/480Y/277VAC)

| Description | Type/ Cat. No. | Cable Max | Cable Min | Torque Max | Torque Min |
|---|---|---|---|---|---|
| Neutral | ALTN2L | 25mm² 3 AWG | 2.5mm² 12 AWG | 2Nm 17.5 lb-in | 1.5Nm 12 lb-in |

**Standard Pack:** 10

**Weight:** 1.2kg (2.64 lb.)

### Shunt Trip and Undervoltage Trip

| Description | Shunt Trip Type/Cat. No. | Operational Voltage | Rated Coil Current | Undervoltage Trip* Type/Cat. No. |
|---|---|---|---|---|
| **AC Coil:** | | | | |
| 12V AC | FA12ACL | 8.4 - 13.2V | 6A | UV12ACL |
| 24V AC | FA24ACL | 16.8 - 26.4V | 2.8A | UV24ACL |
| 48V AC | FA48ACL | 33.6 - 52.8V | 0.8A | UV48ACL |
| 60V AC | FA60ACL | 42 - 66V | ~0.7A | UV60ACL |
| 110V AC | FA110ACL | 77 - 121V | 0.5A | UV110ACL |
| 120V AC | FA120ACL | 84 - 132V | ~0.5A | UV120ACL |
| 230V AC | FA230ACL | 161 - 253V | 0.6A | UV230ACL |
| 277V AC | FA277ACL | 194 - 305V | ~0.5A | UV277ACL |
| 400V AC | FA400ACL | 280 - 440V | 0.5A | UV400ACL |
| **DC Coil:** | | | | |
| 12V DC | FA12DCL | 8.4 - 13.2V | ~6A | UV12DCL |
| 24V DC | FA24DCL | 16.8 - 26.4V | 3A | UV24DCL |
| 48V DC | FA48DCL | 33.6 - 52.8V | 2A | UV48DCL |
| 110V DC | FA110DCL | 77 - 121V | 0.6A | UV110DCL |

* Reset-Hold Voltage = 0.85 x $V_E$; Drop-Out Voltage = 0.2 x $V_E$

**Standard Pack:** 10

**Weight:** 1.1kg (2.43 lb.)

| | |
|---|---|
| **Terminal Size - min/max** | 2.5 mm² (12 AWG) / 25mm² (3 AWG) |
| **Terminal Torque - min/max** | 1.5 Nm (12 lb. in.) / 2 Nm (17.5 lb. in.) |

# Accessories

## L-Series Circuit Breakers

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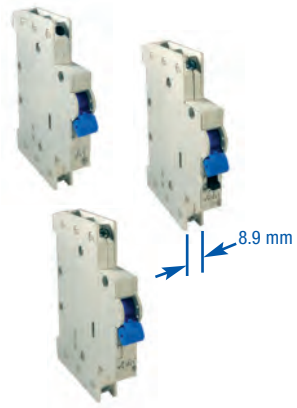


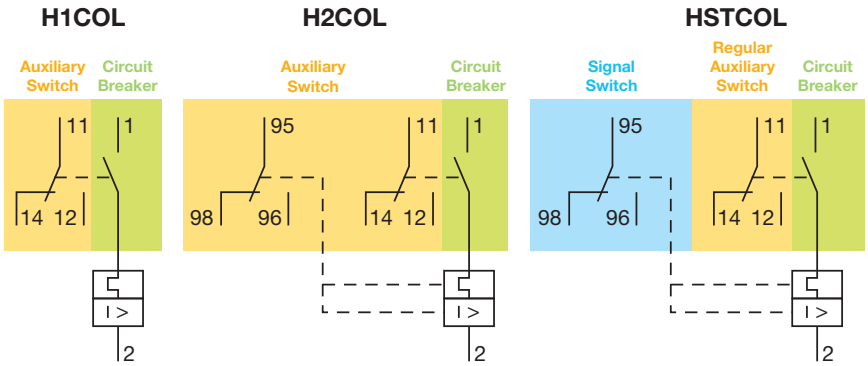

### Auxiliary Contact (6A/120V AC; 3A/240V AC; 6A/24V DC; 0.5A/125V DC)

| Description | Type/ Cat. No. | Cable Max | Cable Min | Torque Max | Torque Min |
|---|---|---|---|---|---|
| 1 x CO | H1COL | 2.5mm² 12 AWG | 0.5mm² 20 AWG | 0.5Nm 4 lb-in | 0.33Nm 3 lb-in |
| 2 x CO | H2COL | | | | |
| 1 x CO, 1 Signal & Test Button | HSTCOL | | | | |

**Standard Pack:** 15

**Weight:** 0.5kg (1.32 lb.)

### Wiring Diagram



### Lock-out Adapter

Luggage Lock

| Description | Type/ Cat. No. |
|---|---|
| Yellow | EASS2L |

**Standard Pack:** 10

**Weight:** 50g (1.76 oz.)

### Front Mounting Kit with hardware

| Description | Type/ Cat. No. | Weight |
|---|---|---|
| 1 Pole | FMA1PL | 40g (1.41 oz.) |
| 2 Pole | FMA2PL | 45g (1.59 oz.) |
| 3 Pole | FMA3PL | 50g (1.76 oz.) |

**Standard Pack:** 1

# Altech UL489 Busbar System

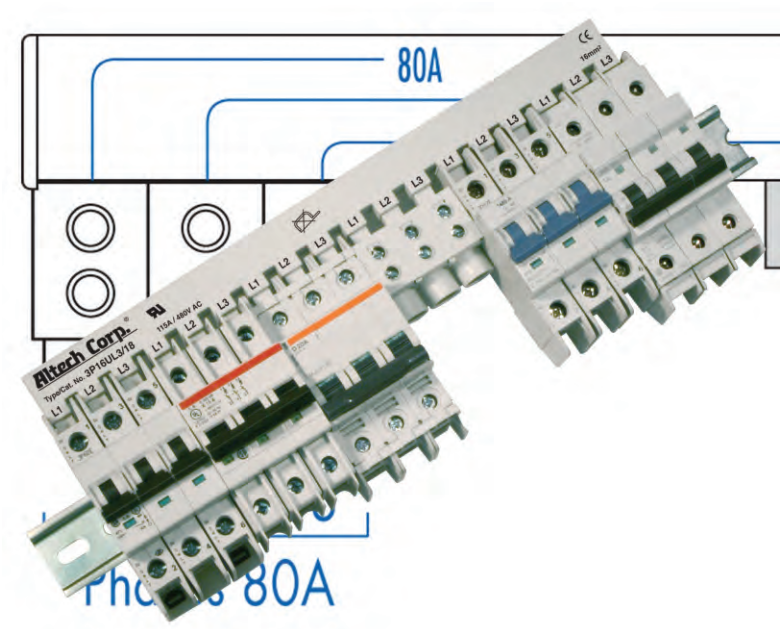
UL489 recognized
E305318

## UL489 Listed Busbars

The Altech Busbar System is an innovative way to jumper up to 57 poles of Miniature Molded Case Circuit Breakers.

The advantages of this busbar system are:

- 30% Installation time savings
- Panel space savings
- Reduced maintenance
- High electrical ratings




**Universal UL489 Busbar fits most UL489 Miniature Circuit Breakers in the market!**

*Please contact Altech for details and further information.*

### UL489 Busbar System

- Every pin configuration is possible by combination of existing 6, 12 and 18 pin busbars.
- Power Feeding:
  Power Feed Lug (115A), Direct Power Feed (115A)
- UL listed for Altech's L-Series and ABL's UL-Series of Miniature Circuit Breakers
- UL listed for use with most popular UL489 Miniature Circuit Breakers in the market.

| Technical Specifications | Busbars UL489 |
|---|---|
| **Material of Busbar** | Copper |
| **Material of Insulation (Housing)** | Polyamide |
| **Electrical Ratings** | 115A/600V AC/DC |
| **Short Circuit Withstand Rating** | 10kA |
| **Applying Standards** | UL489, VDE0660 Part 100, IEC60749, DIN EN60947-1 |

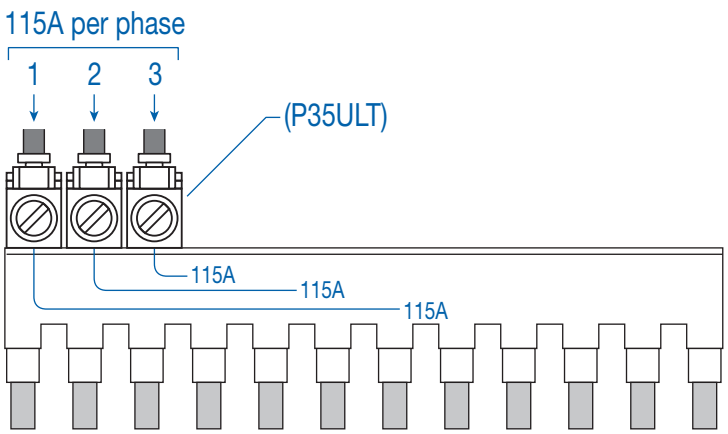
# Altech UL489 Busbar System

## Power Feed Methods

### End Feed Method

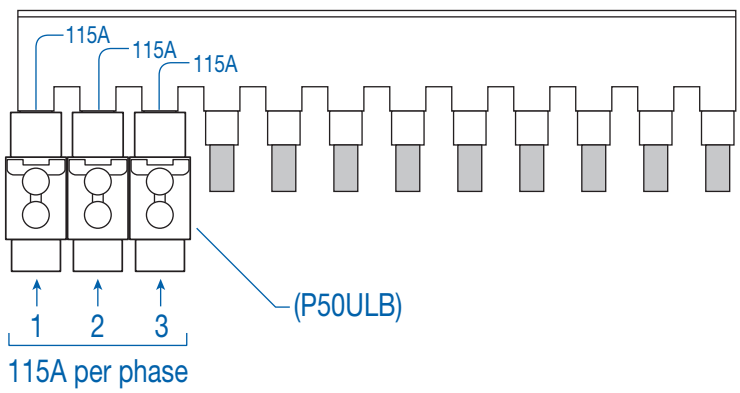
#### P35ULT

With the **P35ULT** Power Feed Lug as a Start/End Feeding Device a maximum input current of **115A per Phase** can be achieved.



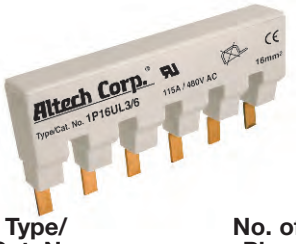

#### P50ULB

With the **P50ULB** Modular Direct Power Feed as a Start/End Feeding Device a maximum input current of **115A per Phase** can be achieved.

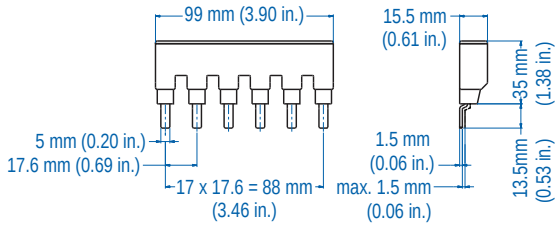



* *For complete specifications and description of Feeding Devices see page 33.*

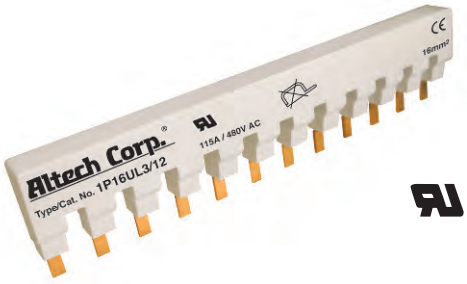
# 1 PHASE BUSBAR 16mm² for 115A



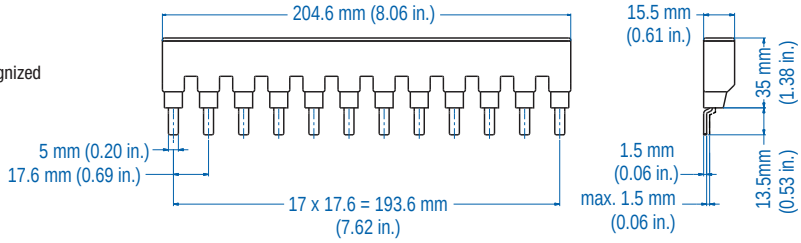

UL489 recognized
E305318



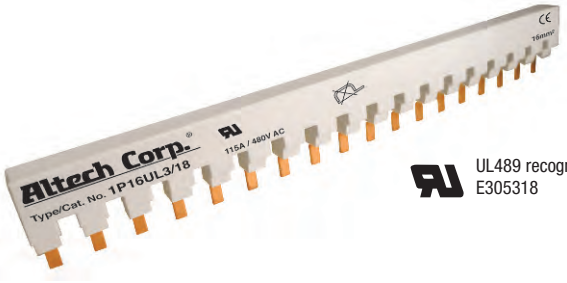

| Type/ Cat. No. | No. of Pins | Length [mm] |
|---|---|---|
| 1P16UL3/6 | 6 | 99 |



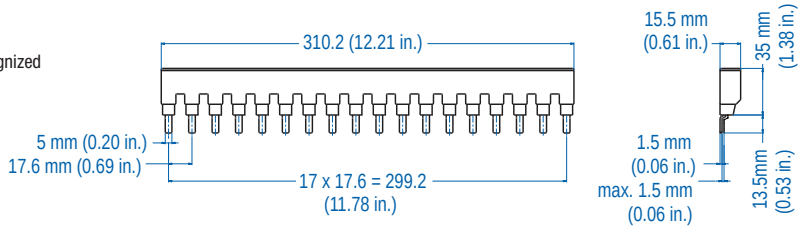

UL489 recognized
E305318




| Type/ Cat. No. | No. of Pins | Length [mm] |
|---|---|---|
| 1P16UL3/12 | 12 | 204.6 |



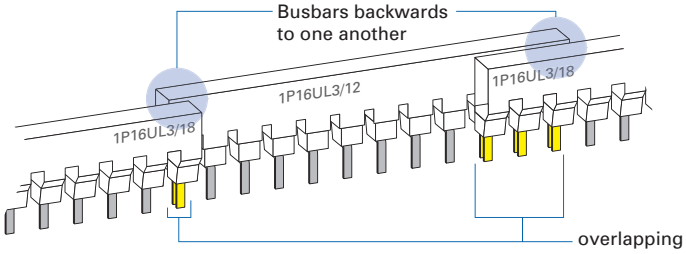

UL489 recognized
E305318




| Type/ Cat. No. | No. of Pins | Length [mm] |
|---|---|---|
| 1P16UL3/18 | 18 | 310.2 |

## Example for different No. of Pins

*eg. 44 pins use 1x 1P16UL3/12 + 2x 1P16UL3/18*



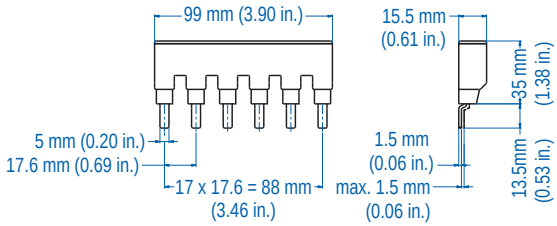

- No. of overlapping pins of 2 busbars must be a multiplier of the No. of phases
- Overlapping busbars are backwards to each other

# ACCESSORIES

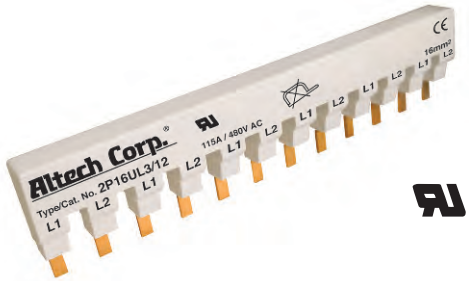
| Type/Cat. No: | P35ULT | P50ULB | BRUL *(3 per strip)* |
|---|---|---|---|
| **Description:** | Power Feed Lug | Modular Direct Power Feed | Insulation Cap |

# 2 PHASE BUSBAR 16mm² for 115A

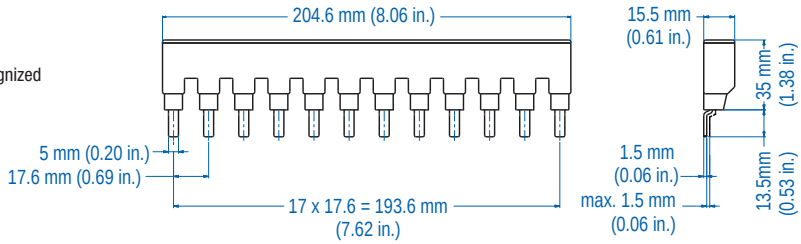
UL489 recognized
E305318



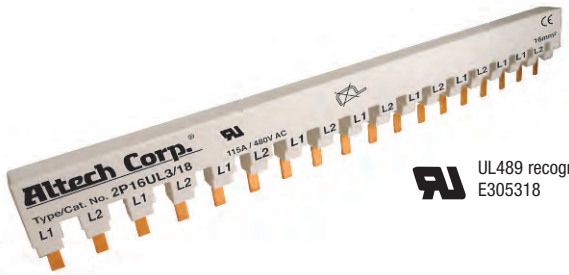

| Type/ Cat. No. | No. of Pins | Length [mm] |
|---|---|---|
| 2P16UL3/6 | 6 | 99 |



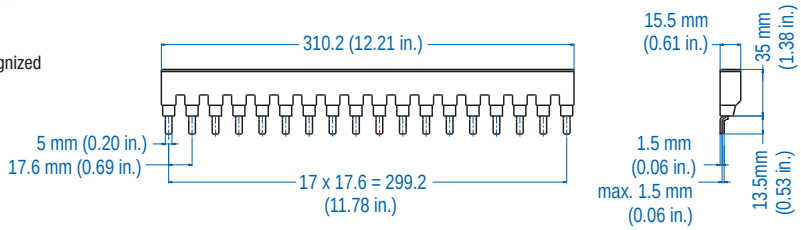

UL489 recognized
E305318




| Type/ Cat. No. | No. of Pins | Length [mm] |
|---|---|---|
| 2P16UL3/12 | 12 | 204.6 |



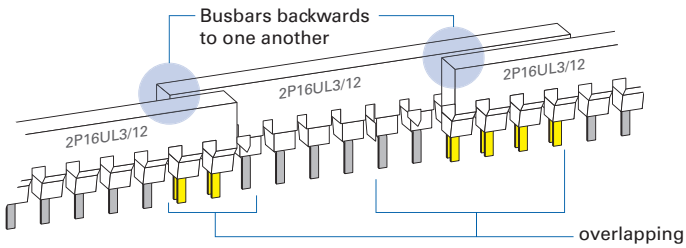

UL489 recognized
E305318




| Type/ Cat. No. | No. of Pins | Length [mm] |
|---|---|---|
| 2P16UL3/18 | 18 | 310.2 |

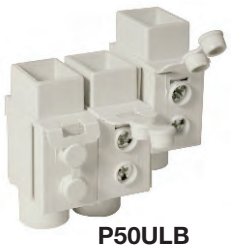
### Example for different No. of Pins

*eg. 30 pins use 3x 2P16UL3/12*




- No. of overlapping pins of 2 busbars must be multiplier of the No. of phases
- Overlapping busbars are backwards to each other

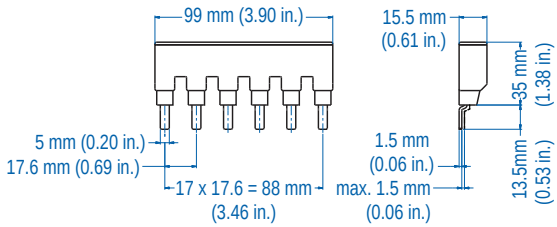
# ACCESSORIES



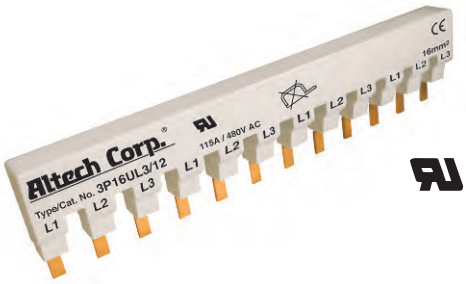
| Type/Cat. No: | P35ULT | P50ULB | BRUL *(3 per strip)* |
|---|---|---|---|
| **Description:** | Power Feed Lug | Modular Direct Power Feed | Insulation Cap |

# 3 PHASE BUSBAR 16mm² for 115A

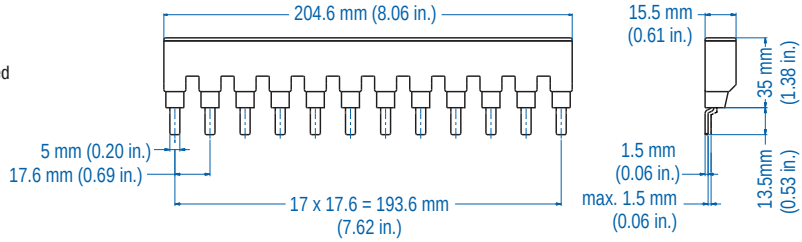
UL489 listed
E305318



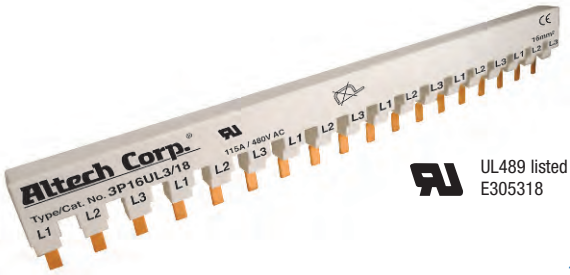

| Type/ Cat. No. | No. of Pins | Length [mm] |
|---|---|---|
| 3P16UL3/6 | 6 | 99 |



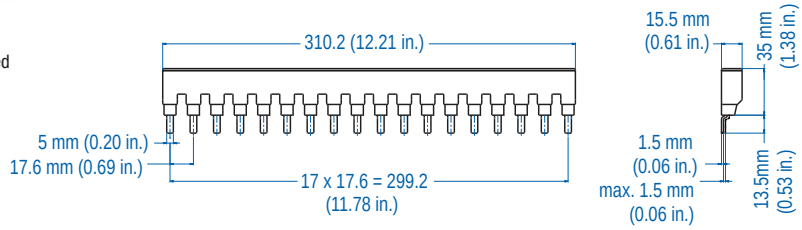

UL489 listed
E305318




| Type/ Cat. No. | No. of Pins | Length [mm] |
|---|---|---|
| 3P16UL3/12 | 12 | 204.6 |



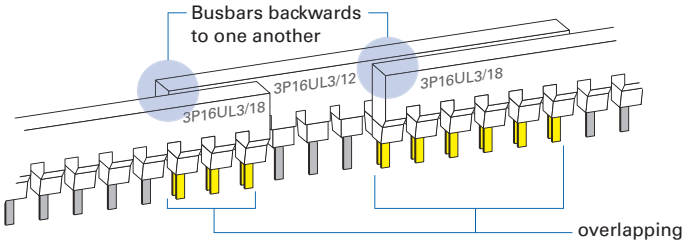

UL489 listed
E305318




| Type/ Cat. No. | No. of Pins | Length [mm] |
|---|---|---|
| 3P16UL3/18 | 18 | 310.2 |

### Example for different No. of Pins

*eg. 39 pins use 1x 3P16UL3/12 + 2x 3P16UL3/18*




- No. of overlapping pins of 2 busbars must be multiplier of the No. of phases
- Overlapping busbars are backwards to each other

# ACCESSORIES

| Type/Cat. No: | P35ULT | P50ULB | BRUL *(3 per strip)* |
|---|---|---|---|
| **Description:** | Power Feed Lug | Modular Direct Power Feed | Insulation Cap |

# Power Feed Devices

Easy connection of power supply wires to the busbar/MCB. Power Feed Devices ensure permanent connection.

## Power Feed Lug

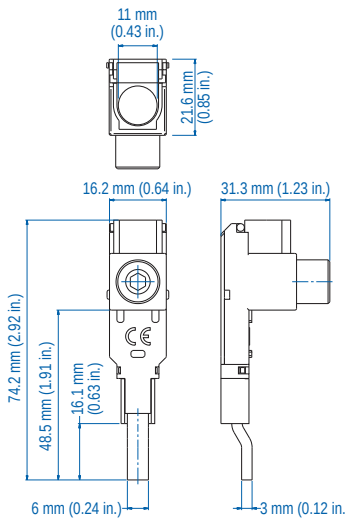
UL489 listed
E305318

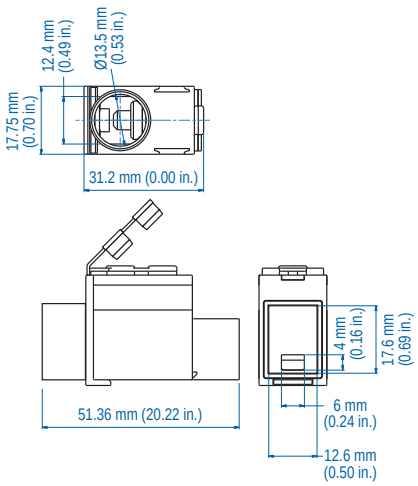
## Modular Direct Power Feed

UL489 listed
E305318

| Type/Cat. No. | P35ULT | P50ULB |
|---|---|---|
| Electrical Ratings | 115A/600V AC/DC | 115A/600V AC/DC |
| Wire Range | 14-2 AWG Cu | 14-1 AWG Cu |
| Wire Temperature Rating | 75°C | 75°C |
| Required Torque | 4Nm (35.4 lb. in.) | Cable Side 3.5Nm/31 lb. in. (14-6AWG)<br>4Nm/35.4 lb. in. (4-1AWG)<br>Busbar Side 2.5Nm/22 lb. in. |
| Material of Lug | Brass | Brass |
| Insulation Material | Polyamide | Polyamide |
| For use with | UL489 1, 2, 3 phase Busbar | UL489 1, 2, 3 phase Busbar |

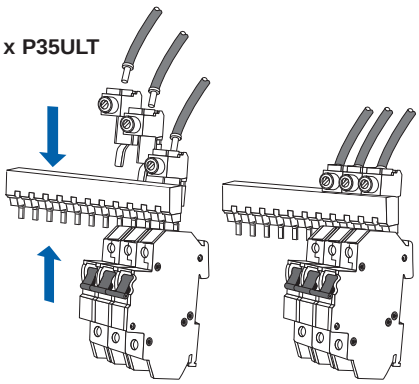
# Dimensions



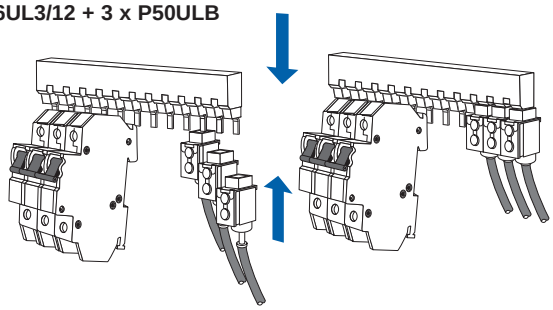




# Assembly Instructions

**3P16UL3/12 + 3 x P35ULT**



**3P16UL3/12 + 3 x P50ULB**



# Accessories

## Insulation Caps

| | |
|---|---|
| **Type/Cat. No:** | **BRUL** *(3 per strip)* |
| **Description:** | Insulation Cap |

# Altech UL489 Busbar Systems

## Configuration and Assembly of UL489 Busbars

UL489 Busbars are available in 3 different Pin Configurations per Phase, (6, 12 and 18 Pins).

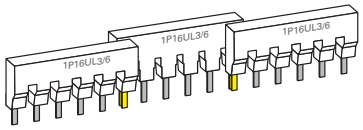
The UL489 busbar cannot be cut, since the creepage and clearance distance requirements from UL are too stringent. Therefore, to obtain the desired No. of Pins, Busbar-Pins can be overlapped as explained below:

1) Busbars are overlapped backwards to each other. Both Pins of each Busbar fit together in the terminals of the Miniature Circuit Breaker.
2 The Number of overlapping Pins of 2 Busbar must be a multiplier of the Number of Phases to keep existing Phase sequence. (Can be overlapped by more than the number of phases).
3) Any available combination of the 3 different Pin configurations is possible.
4) In most cases there is more than 1 combination possible.
5) For more possible configurations see Busbar Selection Table on page 21.

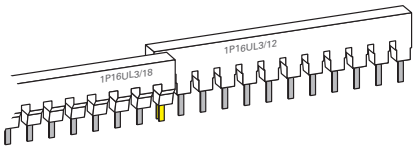
### Configuration Examples*

1 Phase

16 Pins: 3 x 1P16UL3/6

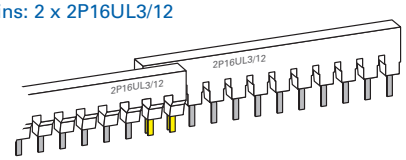



29 Pins: 1 x 1P16UL3/12 + 1 x 1P16UL3/18

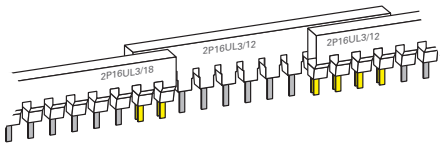



2 Phase

22 Pins: 2 x 2P16UL3/12

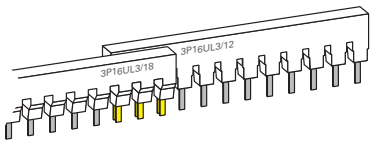



36 Pins: 2 x 2P16UL3/12 + 1 x 2P16UL3/18

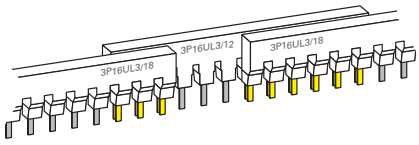



3 Phase

27 Pins: 1 x 3P16UL3/12 + 1 x 3P16UL3/18




39 Pins: 1 x 3P16UL3/12 + 2 x 3P16UL3/18




*For Questions, other configurations and detailed information please contact Altech Corp.

# Busbar Selection Table

Altech Corp.®

| No. of Pins | Necessary Busbars |
|---|---|
| **1 Phase System** | |
| 6 | 1x 1P16UL3/6 |
| 7 | 2x 1P16UL3/6 |
| 8 | 2x 1P16UL3/6 |
| 9 | 2x 1P16UL3/6 |
| 10 | 2x 1P16UL3/6 |
| 11 | 2x 1P16UL3/6 |
| 12 | 1x 1P16UL3/12 |
| | 3x 1P16UL3/6 |
| 13 | 2x 1P16UL3/12 |
| | 3x 1P16UL3/6 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/12 |
| 14 | 2x 1P16UL3/12 |
| | 3x 1P16UL3/6 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/12 |
| 15 | 2x 1P16UL3/12 |
| | 3x 1P16UL3/6 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/12 |
| 16 | 2x 1P16UL3/12 |
| | 3x 1P16UL3/6 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/12 |
| 17 | 2x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/12 |
| 18 | 1x 1P16UL3/18 |
| | 2x 1P16UL3/12 |
| | 2x 1P16UL3/6 + 1x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 2x 1P16UL3/12 |
| 19 | 2x 1P16UL3/12 |
| | 2x 1P16UL3/18 |
| | 2x 1P16UL3/6 + 1x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 2x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| 20 | 2x 1P16UL3/12 |
| | 2x 1P16UL3/18 |
| | 1x 1P16UL3/6 + 2x 1P16UL3/12 |
| | 2x 1P16UL3/6 + 1x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| 21 | 2x 1P16UL3/12 |
| | 2x 1P16UL3/18 |
| | 2x 1P16UL3/6 + 1x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 2x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| 22 | 2x 1P16UL3/12 |
| | 2x 1P16UL3/18 |
| | 2x 1P16UL3/6 + 1x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 2x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| 23 | 2x 1P16UL3/12 |
| | 2x 1P16UL3/18 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| 24 | 2x 1P16UL3/12 |
| | 2x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 2x 1P16UL3/6 + 1x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| 25 | 2x 1P16UL3/12 |
| | 2x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 2x 1P16UL3/6 + 1x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| 26 | 2x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 2x 1P16UL3/6 + 1x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| 27 | 2x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 2x 1P16UL3/6 + 1x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| 28 | 2x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 2x 1P16UL3/6 + 1x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| 29 | 2x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| 30 | 2x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| 31 | 2x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| 32 | 2x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| 33 | 2x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| 34 | 2x 1P16UL3/18 |
| | 3x 1P16UL3/12 |
| | 1x 1P16UL3/6 + 1x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| 35 | 2x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| 36 | 1x 1P16UL3/6 + 2x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| 37 | 1x 1P16UL3/6 + 2x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| 38 | 1x 1P16UL3/6 + 2x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| 39 | 1x 1P16UL3/6 + 2x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| 40 | 1x 1P16UL3/6 + 2x 1P16UL3/18 |
| | 2x 1P16UL3/12 + 1x 1P16UL3/18 |
| | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| 41 | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| 42 | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| 43 | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| 44 | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| 45 | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| 46 | 1x 1P16UL3/12 + 2x 1P16UL3/18 |
| | 3x 1P16UL3/18 |
| 47 | 3x 1P16UL3/18 |
| 48 | 3x 1P16UL3/18 |
| 49 | 3x 1P16UL3/18 |
| 50 | 3x 1P16UL3/18 |
| 51 | 3x 1P16UL3/18 |
| 52 | 3x 1P16UL3/18 |
| **2 Phase System** | |
| 6 | 1x 2P16UL3/6 |
| 8 | 2x 2P16UL3/6 |
| 10 | 2x 2P16UL3/6 |
| 12 | 3x 2P16UL3/6 |
| | 1x 2P16UL3/12 |
| 14 | 3x 2P16UL3/6 |
| | 2x 2P16UL3/12 |
| | 1x 2P16UL3/6 + 1x 2P16UL3/12 |
| 16 | 2x 2P16UL3/12 |
| | 1x 2P16UL3/6 + 1x 2P16UL3/12 |
| 18 | 1x 2P16UL3/18 |
| | 2x 2P16UL3/12 |
| | 2x 2P16UL3/6 + 1x 2P16UL3/12 |
| 20 | 2x 2P16UL3/6 + 1x 2P16UL3/12 |
| | 1x 2P16UL3/6 + 1x 2P16UL3/18 |
| | 2x 2P16UL3/12 |
| | 2x 2P16UL3/18 |
| | 1x 2P16UL3/12 + 1x 2P16UL3/18 |
| 22 | 2x 2P16UL3/12 |
| | 2x 2P16UL3/18 |
| | 1x 2P16UL3/6 + 1x 2P16UL3/18 |
| | 1x 2P16UL3/12 + 1x 2P16UL3/18 |
| 24 | 2x 2P16UL3/6 + 1x 2P16UL3/18 |
| | 1x 2P16UL3/6 + 2x 2P16UL3/12 |
| | 3x 2P16UL3/12 |
| | 2x 2P16UL3/18 |
| | 1x 2P16UL3/12 + 1x 2P16UL3/18 |
| 26 | 2x 2P16UL3/6 + 1x 2P16UL3/18 |
| | 1x 2P16UL3/6 + 2x 2P16UL3/12 |
| | 3x 2P16UL3/12 |
| | 2x 2P16UL3/18 |
| | 1x 2P16UL3/12 + 1x 2P16UL3/18 |
| 28 | 3x 2P16UL3/12 |
| | 2x 2P16UL3/18 |
| | 1x 2P16UL3/12 + 1x 2P16UL3/18 |
| 30 | 1x 2P16UL3/6 + 1x 2P16UL3/12 + 1x 2P16UL3/18 |
| | 3x 2P16UL3/12 |
| | 2x 2P16UL3/12 + 1x 2P16UL3/18 |
| | 2x 2P16UL3/18 |
| 32 | 1x 2P16UL3/6 + 1x 2P16UL3/12 + 1x 2P16UL3/18 |
| | 3x 2P16UL3/12 |
| | 2x 2P16UL3/12 + 1x 2P16UL3/18 |
| | 2x 2P16UL3/18 |
| 34 | 1x 2P16UL3/6 + 1x 2P16UL3/12 + 1x 2P16UL3/18 |
| | 2x 2P16UL3/12 + 1x 2P16UL3/18 |
| | 2x 2P16UL3/18 |
| 36 | 1x 2P16UL3/6 + 2x 2P16UL3/18 |
| | 3x 2P16UL3/18 |
| | 2x 2P16UL3/12 + 1x 2P16UL3/18 |
| | 1x 2P16UL3/12 + 2x 2P16UL3/18 |
| 38 | 1x 2P16UL3/6 + 2x 2P16UL3/18 |
| | 3x 2P16UL3/18 |
| | 2x 2P16UL3/12 + 1x 2P16UL3/18 |
| | 1x 2P16UL3/12 + 2x 2P16UL3/18 |
| 40 | 3x 2P16UL3/18 |
| | 1x 2P16UL3/12 + 2x 2P16UL3/18 |
| 42 | 3x 2P16UL3/18 |
| | 1x 2P16UL3/12 + 2x 2P16UL3/18 |
| 44 | 3x 2P16UL3/18 |
| | 1x 2P16UL3/12 + 2x 2P16UL3/18 |
| 46 | 3x 2P16UL3/18 |
| 48 | 3x 2P16UL3/18 |
| 50 | 3x 2P16UL3/18 |
| **3 Phase System** | |
| 9 | 2x 3P16UL3/6 |
| 12 | 1x 3P16UL3/12 |
| | 3x 3P16UL3/6 |
| 15 | 1x 3P16UL3/6 + 1x 3P16UL3/12 |
| | 2x 3P16UL3/12 |
| 18 | 1x 3P16UL3/18 |
| | 1x 3P16UL3/12 + 2x 3P16UL3/6 |
| | 2x 3P16UL3/12 |
| 21 | 2x 3P16UL3/12 |
| | 1x 3P16UL3/6 + 1x 3P16UL3/18 |
| | 1x 3P16UL3/12 + 1x 3P16UL3/18 |
| | 2x 3P16UL3/18 |
| 24 | 1x 3P16UL3/12 + 1x 3P16UL3/18 |
| | 2x 3P16UL3/6 + 1x 3P16UL3/18 |
| | 1x 3P16UL3/6 + 2x 3P16UL3/12 |
| | 3x 3P16UL3/12 |
| | 2x 3P16UL3/18 |
| 27 | 1x 3P16UL3/12 + 1x 3P16UL3/18 |
| | 2x 3P16UL3/18 |
| | 3x 3P16UL3/12 |
| 30 | 2x 3P16UL3/18 |
| | 2x 3P16UL3/12 + 1x 3P16UL3/18 |
| | 3x 3P16UL3/12 |
| | 1x 3P16UL3/6 + 1x 3P16UL3/12 + 1x 3P16UL3/18 |
| 33 | 2x 3P16UL3/18 |
| | 2x 3P16UL3/12 + 1x 3P16UL3/18 |
| 36 | 1x 3P16UL3/6 + 2x 3P16UL3/18 |
| | 2x 3P16UL3/12 + 1x 3P16UL3/18 |
| | 1x 3P16UL3/12 + 2x 3P16UL3/18 |
| | 3x 3P16UL3/18 |
| 39 | 1x 3P16UL3/12 + 2x 3P16UL3/18 |
| | 3x 3P16UL3/18 |
| 42 | 1x 3P16UL3/12 + 2x 3P16UL3/18 |
| | 3x 3P16UL3/18 |
| 45 | 3x 3P16UL3/18 |
| 48 | 3x 3P16UL3/18 |

Note: For detailed information and examples see page 20.

# UM (V-EA) Series

## UL508 Listed
## Manual Motor Controllers
### "Suitable as Motor Disconnect"

- DIN Rail Mounted
- 17.5mm width per pole
- Thermal Magnetic
- 0.3-60A / 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)

UL508 Listed
E137938

up to 25A
B,C,D curve

up to 25A
B,C,D curve

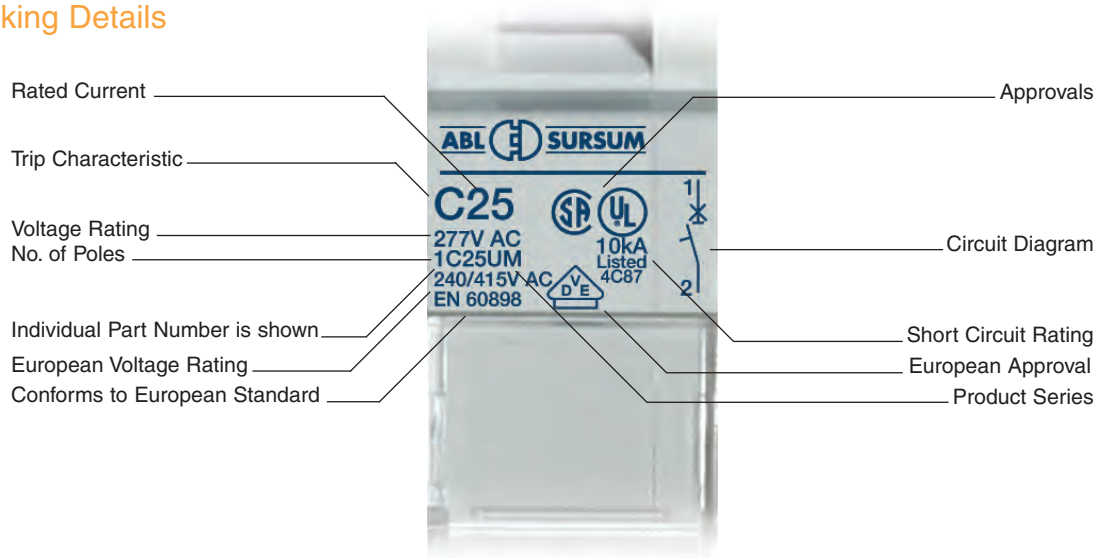
| | |
|---|---|
| **Current/ Voltage Rating** | 0.3-60A/480Y/277V AC<br>0.3-25A: 1 pole - 42V DC; 2 Pole - 80V DC<br>30-60A: 1 pole - 24V DC; 2 Pole - 60V DC |
| **Short Circuit Withstand Rating (UL/CSA - Ratings)** | 0.3-60A (RC): 10kA with UL-listed RK5 back-up fuse or MCCB |
| **Group Short Circuit Withstand Rating (UL/CSA - Ratings)** | 0.3-10A (RC): 10kA; 12-60A (RC): 5kA no branch circuit protection required |
| **Interrupting Capacity (VDE - Ratings)** | 0.3-63A (RC): 10kA |
| **Calibration Temperature** | 40°C (104°F) |
| **Operating Temperature** | -25°C to 55°C (-13°F to 131°F) |
| **Storage Temperature** | -40°C to 70°C (-40°F to 158°F) |
| **Terminal Size Acceptability** | Top: 18-3 AWG; Bottom: 18-2 AWG |
| **Terminal Torque (min/max)** | 2 Nm (17.7 lb.in.) / 2.5Nm (22.2 lb.in) |
| **Horse Power Ratings** | see page 46 |
| **Mechanical Endurance Ratings** | see page 47 |
| **Vibration Resistance** | > 15g according to DIN EN 60069-2-59 during a load with $I_1 = 1.05 \times I_N$ |
| **Degree of protection acc. IEC/EN 60529** | IP20 |
| **Mounting Orientation** | In any plane |

## Short Circuit Withstand Ratings for UM (V-EA) Manual Motor Controller

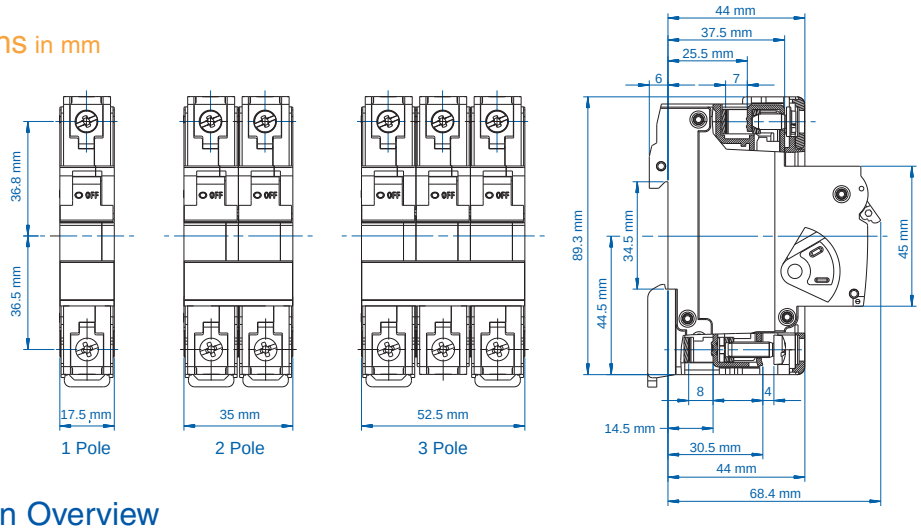
| Trip Curve | Amp Range \ Backup Protection | UL-Listed RK5-Fuse up to 10kA | UL-Listed MCCB up to 10kA | No BCP Required up to: |
|---|---|---|---|---|
| all | 0.3 - 10A | 4xRC*<br>min 15A, max 70A | 4xRC*<br>min 15A, max 70A | 10kA |
| all | 12 - 30/32A | 4xRC*<br>max 125A | 4xRC*<br>max 125A | 5kA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

## Marking Details




## Dimensions in mm




## Application Overview

| Trip-Characteristics* | | | | Applications | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Characteristic Trip Boundaries | | | | Lighting Wiring Protection Control Circuits | Business Equipment Appliances | Transformers | Power Supplies Heaters | Motors | | | | General Electronics | Solenoid | Semi-conductors Components/ devices with low surge-current and short circuit withstand capabilities | Reactive Load |
| Thermal Trip | | Magnetic Trip | | | | | | General | Low Inrush | High Inrush | High Efficiency | | | | |
| Must not Trip>100ms | Must Trip <1hr | Must not Trip>100ms | Must Trip 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.

# V-EA Series
# B-Trip Characteristic

**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.

UL508 Listed
E137938

upto 25A
B,C,D curve

## One Pole

Standard Pack: 12

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Voltage | Approvals |
|---|---|---|
| 1.0A | **1B1UM** | UL SP |
| 1.6A | **1B1.6UM** | UL SP |
| 2.0A | **1B2UM** | UL SP |
| 2.5A | **1B2.5UM** | UL SP |
| 3.0A | **1B3UM** | UL SP |
| 3.5A | **1B3.5UM** | UL SP |
| 4.0A | **1B4UM** | UL SP |
| 5.0A | **1B5UM** | UL SP |
| 6.0A | **1B6UM** | UL SP |
| 10A | **1B10UM** | UL SP |
| 13A | **1B13UM** | UL SP |
| 15A | **1B15UM** | UL SP |
| 16A | **1B16UM** | UL SP |
| 20A | **1B20UM** | UL SP |
| 25A | **1B25UZ** | UL SP |
| 30A | **1B30UM** | UL SP |
| 32A | **1B32UM** | UL SP |
| 40A | **1B40UM** | UL SP |
| 50A | **1B50UM** | UL SP |
| 60A | **1B60UM** | UL SP |
| 63A | **1B63UM** | |

## Three Pole

Standard Pack: 4

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 1.0A | **3B1UM** | UL SP |
| 1.6A | **3B1.6UM** | UL SP |
| 2.0A | **3B2UM** | UL SP |
| 2.5A | **3B2.5UM** | UL SP |
| 3.0A | **3B3UM** | UL SP |
| 3.5A | **3B3.5UM** | UL SP |
| 4.0A | **3B4UM** | UL SP |
| 5.0A | **3B5UM** | UL SP |
| 6.0A | **3B6UM** | UL SP |
| 10A | **3B10UM** | UL SP |
| 13A | **3B13UM** | UL SP |
| 15A | **3B15UM** | UL SP |
| 16A | **3B16UM** | UL SP |
| 20A | **3B20UM** | UL SP |
| 25A | **3B25UM** | UL SP |
| 30A | **3B30UM** | UL SP |
| 32A | **3B32UM** | UL SP |
| 40A | **3B40UM** | UL SP |
| 50A | **3B50UM** | UL SP |
| 60A | **3B60UM** | UL SP |
| 63A | **3B63UM** | |

## Two Pole

Standard Pack: 6

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 1.0A | **2B1UM** | UL SP |
| 1.6A | **2B1.6UM** | UL SP |
| 2.0A | **2B2UM** | UL SP |
| 2.5A | **2B2.5UM** | UL SP |
| 3.0A | **2B3UM** | UL SP |
| 3.5A | **2B3.5UM** | UL SP |
| 4.0A | **2B4UM** | UL SP |
| 5.0A | **2B5UM** | UL SP |
| 6.0A | **2B6UM** | UL SP |
| 10A | **2B10UM** | UL SP |
| 13A | **2B13UM** | UL SP |
| 15A | **2B15UM** | UL SP |
| 16A | **2B16UM** | UL SP |
| 20A | **2B20UM** | UL SP |
| 25A | **2B25UM** | UL SP |
| 30A | **2B30UM** | UL SP |
| 32A | **2B32UM** | UL SP |
| 40A | **2B40UM** | UL SP |
| 50A | **2B50UM** | UL SP |
| 60A | **2B60UM** | UL SP |
| 63A | **2B63UM** | |

## Add-on Neutral Pole

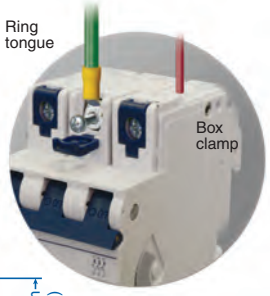
| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3-63A/ 480Y/277V | **N63UM** | UL SP |

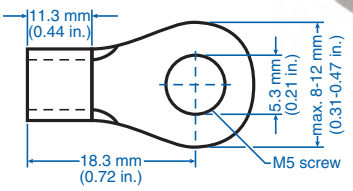
Standard Pack: 6

Weight:
0.775kg (1.71lb.)

## Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# V-EA Series
# C-Trip Characteristic

**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.

UL508 Listed
E137938

upto 25A
B,C,D curve

## One Pole

Standard Pack: 12

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 1C03UM | UL SP VDE |
| 0.5A | 1C05UM | UL SP VDE |
| 0.75A | 1C075UM | UL SP VDE |
| 1.0A | 1C1UM | UL SP VDE |
| 1.6A | 1C1.6UM | UL SP VDE |
| 2.0A | 1C2UM | UL SP VDE |
| 2.5A | 1C2.5UM | UL SP VDE |
| 3.0A | 1C3UM | UL SP VDE |
| 3.5A | 1C3.5UM | UL SP VDE |
| 4.0A | 1C4UM | UL SP VDE |
| 5.0A | 1C5UM | UL SP VDE |
| 6.0A | 1C6UM | UL SP VDE |
| 8.0A | 1C8UM | UL SP VDE |
| 10A | 1C10UM | UL SP VDE |
| 13A | 1C13UM | UL SP VDE |
| 15A | 1C15UM | UL SP |
| 16A | 1C16UM | UL SP VDE |
| 20A | 1C20UM | UL SP VDE |
| 25A | 1C25UM | UL SP VDE |
| 30A | 1C30UM | UL SP |
| 32A | 1C32UM | UL SP |
| 40A | 1C40UM | UL SP |
| 50A | 1C50UM | UL SP |
| 60A | 1C60UM | UL SP |
| 63A | 1C63UM | |

## Three Pole

Standard Pack: 4

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 3C03UM | UL SP VDE |
| 0.5A | 3C05UM | UL SP VDE |
| 0.75A | 3C075UM | UL SP VDE |
| 1.0A | 3C1UM | UL SP VDE |
| 1.6A | 3C1.6UM | UL SP VDE |
| 2.0A | 3C2UM | UL SP VDE |
| 2.5A | 3C2.5UM | UL SP VDE |
| 3.0A | 3C3UM | UL SP VDE |
| 3.5A | 3C3.5UM | UL SP VDE |
| 4.0A | 3C4UM | UL SP VDE |
| 5.0A | 3C5UM | UL SP VDE |
| 6.0A | 3C6UM | UL SP VDE |
| 8.0A | 3C8UM | UL SP VDE |
| 10A | 3C10UM | UL SP VDE |
| 13A | 3C13UM | UL SP VDE |
| 15A | 3C15UM | UL SP |
| 16A | 3C16UM | UL SP VDE |
| 20A | 3C20UM | UL SP VDE |
| 25A | 3C25UM | UL SP VDE |
| 30A | 3C30UM | UL SP |
| 32A | 3C32UM | UL SP |
| 40A | 3C40UM | UL SP |
| 50A | 3C50UM | UL SP |
| 60A | 3C60UM | UL SP |
| 63A | 3C63UM | |

## Two Pole

Standard Pack: 6

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 2C03UM | UL SP VDE |
| 0.5A | 2C05UM | UL SP VDE |
| 0.75A | 2C075UM | UL SP VDE |
| 1.0A | 2C1UM | UL SP VDE |
| 1.6A | 2C1.6UM | UL SP VDE |
| 2.0A | 2C2UM | UL SP VDE |
| 2.5A | 2C2.5UM | UL SP VDE |
| 3.0A | 2C3UM | UL SP VDE |
| 3.5A | 2C3.5UM | UL SP VDE |
| 4.0A | 2C4UM | UL SP VDE |
| 5.0A | 2C5UM | UL SP VDE |
| 6.0A | 2C6UM | UL SP VDE |
| 8.0A | 2C8UM | UL SP VDE |
| 10A | 2C10UM | UL SP VDE |
| 13A | 2C13UM | UL SP VDE |
| 15A | 2C15UM | UL SP |
| 16A | 2C16UM | UL SP VDE |
| 20A | 2C20UM | UL SP VDE |
| 25A | 2C25UM | UL SP VDE |
| 30A | 2C30UM | UL SP |
| 32A | 2C32UM | UL SP |
| 40A | 2C40UM | UL SP |
| 50A | 2C50UM | UL SP |
| 60A | 2C60UM | UL SP |
| 63A | 2C63UM | |

## Add-on Neutral Pole

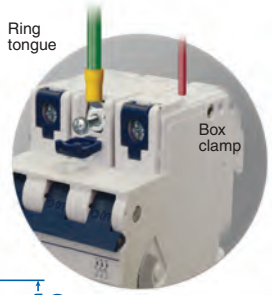
| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3-63A/ 480Y/277V | N63UM | UL SP |

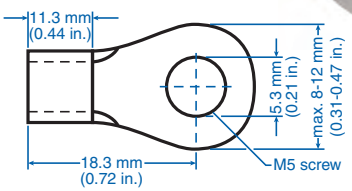
Standard Pack: 6

Weight:
0.775kg (1.71lb.)

## Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# V-EA Series D-Trip Characteristic

**Application Examples:**

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

UL508 Listed
E137938

upto 25A
B,C,D curve

## One Pole

Standard Pack: 12

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | **1D03UM** | UL SP VDE |
| 0.5A | **1D05UM** | UL SP VDE |
| 0.75A | **1D075UM** | UL SP VDE |
| 1.0A | **1D1UM** | UL SP VDE |
| 1.6A | **1D1.6UM** | UL SP VDE |
| 2.0A | **1D2UM** | UL SP VDE |
| 2.5A | **1D2.5UM** | UL SP VDE |
| 3.0A | **1D3UM** | UL SP VDE |
| 3.5A | **1D3.5UM** | UL SP VDE |
| 4.0A | **1D4UM** | UL SP VDE |
| 5.0A | **1D5UM** | UL SP VDE |
| 6.0A | **1D6UM** | UL SP VDE |
| 8.0A | **1D8UM** | UL SP VDE |
| 10A | **1D10UM** | UL SP VDE |
| 13A | **1D13UM** | UL SP VDE |
| 15A | **1D15UM** | UL SP |
| 16A | **1D16UM** | UL SP VDE |
| 20A | **1D20UM** | UL SP VDE |
| 25A | **1D25UM** | UL SP VDE |
| 30A | **1D30UM** | UL SP |
| 32A | **1D32UM** | UL SP |
| 40A | **1D40UM** | UL SP |
| 50A | **1D50UM** | UL SP |
| 60A | **1D60UM** | UL SP |
| 63A | **1D63UM** | |

## Three Pole

Standard Pack: 4

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | **3D03UM** | UL SP VDE |
| 0.5A | **3D05UM** | UL SP VDE |
| 0.75A | **3D075UM** | UL SP VDE |
| 1.0A | **3D1UM** | UL SP VDE |
| 1.6A | **3D1.6UM** | UL SP VDE |
| 2.0A | **3D2UM** | UL SP VDE |
| 2.5A | **3D2.5UM** | UL SP VDE |
| 3.0A | **3D3UM** | UL SP VDE |
| 3.5A | **3D3.5UM** | UL SP VDE |
| 4.0A | **3D4UM** | UL SP VDE |
| 5.0A | **3D5UM** | UL SP VDE |
| 6.0A | **3D6UM** | UL SP VDE |
| 8.0A | **3D8UM** | UL SP VDE |
| 10A | **3D10UM** | UL SP VDE |
| 13A | **3D13UM** | UL SP VDE |
| 15A | **3D15UM** | UL SP |
| 16A | **3D16UM** | UL SP VDE |
| 20A | **3D20UM** | UL SP VDE |
| 25A | **3D25UM** | UL SP VDE |
| 30A | **3D30UM** | UL SP |
| 32A | **3D32UM** | UL SP |
| 40A | **3D40UM** | UL SP |
| 50A | **3D50UM** | UL SP |
| 60A | **3D60UM** | UL SP |
| 63A | **3D63UM** | |

## Two Pole

Standard Pack: 6

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | **2D03UM** | UL SP VDE |
| 0.5A | **2D05UM** | UL SP VDE |
| 0.75A | **2D075UM** | UL SP VDE |
| 1.0A | **2D1UM** | UL SP VDE |
| 1.6A | **2D1.6UM** | UL SP VDE |
| 2.0A | **2D2UM** | UL SP VDE |
| 2.5A | **2D2.5UM** | UL SP VDE |
| 3.0A | **2D3UM** | UL SP VDE |
| 3.5A | **2D3.5UM** | UL SP VDE |
| 4.0A | **2D4UM** | UL SP VDE |
| 5.0A | **2D5UM** | UL SP VDE |
| 6.0A | **2D6UM** | UL SP VDE |
| 8.0A | **2D8UM** | UL SP VDE |
| 10A | **2D10UM** | UL SP VDE |
| 13A | **2D13UM** | UL SP VDE |
| 15A | **2D15UM** | UL SP |
| 16A | **2D16UM** | UL SP VDE |
| 20A | **2D20UM** | UL SP VDE |
| 25A | **2D25UM** | UL SP VDE |
| 30A | **2D30UM** | UL SP |
| 32A | **2D32UM** | UL SP |
| 40A | **2D40UM** | UL SP |
| 50A | **2D50UM** | UL SP |
| 60A | **2D60UM** | UL SP |
| 63A | **2D63UM** | |

## Add-on Neutral Pole

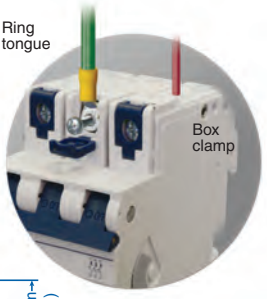
| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3-63A/ 480Y/277V | **N63UM** | UL SP |

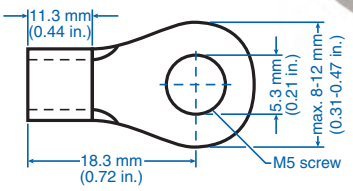
Standard Pack: 6

Weight:
0.775kg (1.71lb.)

## Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# V-EA Series
# E-Trip Characteristic

**Application Examples:**

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

UL508 Listed
E137938

## One Pole

Standard Pack: 12

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 1E03UM | UL SP |
| 0.5A | 1E05UM | UL SP |
| 0.75A | 1E075UM | UL SP |
| 1.0A | 1E1UM | UL SP |
| 1.6A | 1E1.6UM | UL SP |
| 2.0A | 1E2UM | UL SP |
| 2.5A | 1E2.5UM | UL SP |
| 3.0A | 1E3UM | UL SP |
| 3.5A | 1E3.5UM | UL SP |
| 4.0A | 1E4UM | UL SP |
| 5.0A | 1E5UM | UL SP |
| 6.0A | 1E6UM | UL SP |
| 8.0A | 1E8UM | UL SP |
| 10A | 1E10UM | UL SP |
| 12A | 1E12UM | UL SP |
| 13A | 1E13UM | UL SP |
| 15A | 1E15UM | UL SP |
| 16A | 1E16UM | UL SP |
| 20A | 1E20UM | UL SP |
| 25A | 1E25UM | UL SP |
| 30A | 1E30UM | UL SP |
| 32A | 1E32UM | UL SP |
| 40A | 1E40UM | UL SP |
| 50A | 1E50UM | UL SP |
| 60A | 1E60UM | |
| 63A | 1E63UM | |

## Three Pole

Standard Pack: 4

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 3E03UM | UL SP |
| 0.5A | 3E05UM | UL SP |
| 0.75A | 3E075UM | UL SP |
| 1.0A | 3E1UM | UL SP |
| 1.6A | 3E1.6UM | UL SP |
| 2.0A | 3E2UM | UL SP |
| 2.5A | 3E2.5UM | UL SP |
| 3.0A | 3E3UM | UL SP |
| 3.5A | 3E3.5UM | UL SP |
| 4.0A | 3E4UM | UL SP |
| 5.0A | 3E5UM | UL SP |
| 6.0A | 3E6UM | UL SP |
| 8.0A | 3E8UM | UL SP |
| 10A | 3E10UM | UL SP |
| 12A | 3E12UM | UL SP |
| 13A | 3E13UM | UL SP |
| 15A | 3E15UM | UL SP |
| 16A | 3E16UM | UL SP |
| 20A | 3E20UM | UL SP |
| 25A | 3E25UM | UL SP |
| 30A | 3E30UM | UL SP |
| 32A | 3E32UM | UL SP |
| 40A | 3E40UM | UL SP |
| 50A | 3E50UM | UL SP |
| 60A | 3E60UM | |
| 63A | 3E63UM | |

## Two Pole

Standard Pack: 6

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 2E03UM | UL SP |
| 0.5A | 2E05UM | UL SP |
| 0.75A | 2E075UM | UL SP |
| 1.0A | 2E1UM | UL SP |
| 1.6A | 2E1.6UM | UL SP |
| 2.0A | 2E2UM | UL SP |
| 2.5A | 2E2.5UM | UL SP |
| 3.0A | 2E3UM | UL SP |
| 3.5A | 2E3.5UM | UL SP |
| 4.0A | 2E4UM | UL SP |
| 5.0A | 2E5UM | UL SP |
| 6.0A | 2E6UM | UL SP |
| 8.0A | 2E8UM | UL SP |
| 10A | 2E10UM | UL SP |
| 12A | 2E12UM | UL SP |
| 13A | 2E13UM | UL SP |
| 15A | 2E15UM | UL SP |
| 16A | 2E16UM | UL SP |
| 20A | 2E20UM | UL SP |
| 25A | 2E25UM | UL SP |
| 30A | 2E30UM | UL SP |
| 32A | 2E32UM | UL SP |
| 40A | 2E40UM | UL SP |
| 50A | 2E50UM | UL SP |
| 60A | 2E60UM | UL SP |
| 63A | 2E63UM | |

## Add-on Neutral Pole

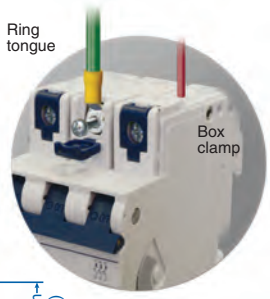
| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3-63A/ 480Y/277V | N63UM | UL SP |

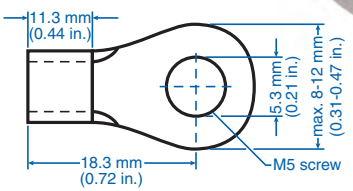
Standard Pack: 6

Weight:
0.775kg (1.71lb.)

## Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# V-EA Series G-Trip Characteristic

**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.

UL508 Listed
E137938

## One Pole

Standard Pack: 12

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 1G03UM | UL SP |
| 0.5A | 1G05UM | UL SP |
| 0.8A | 1G08UM | UL SP |
| 1.0A | 1G1UM | UL SP |
| 1.6A | 1G1.6UM | UL SP |
| 2.0A | 1G2UM | UL SP |
| 2.5A | 1G2.5UM | UL SP |
| 3.0A | 1G3UM | UL SP |
| 3.5A | 1G3.5UM | UL SP |
| 4.0A | 1G4UM | UL SP |
| 5.0A | 1G5UM | UL SP |
| 6.0A | 1G6UM | UL SP |
| 8.0A | 1G8UM | UL SP |
| 10A | 1G10UM | UL SP |
| 12A | 1G12UM | UL SP |
| 13A | 1G13UM | UL SP |
| 15A | 1G15UM | UL SP |
| 16A | 1G16UM | UL SP |
| 20A | 1G20UM | UL SP |
| 25A | 1G25UM | UL SP |
| 30A | 1G30UM | UL SP |
| 32A | 1G32UM | UL SP |
| 40A | 1G40UM | UL SP |
| 50A | 1G50UM | UL SP |
| 60A | 1G60UM | UL SP |
| 63A | 1G63UM | |

## Three Pole

Standard Pack: 4

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 3G03UM | UL SP |
| 0.5A | 3G05UM | UL SP |
| 0.8A | 3G08UM | UL SP |
| 1.0A | 3G1UM | UL SP |
| 1.6A | 3G1.6UM | UL SP |
| 2.0A | 3G2UM | UL SP |
| 2.5A | 3G2.5UM | UL SP |
| 3.0A | 3G3UM | UL SP |
| 3.5A | 3G3.5UM | UL SP |
| 4.0A | 3G4UM | UL SP |
| 5.0A | 3G5UM | UL SP |
| 6.0A | 3G6UM | UL SP |
| 8.0A | 3G8UM | UL SP |
| 10A | 3G10UM | UL SP |
| 12A | 3G12UM | UL SP |
| 13A | 3G13UM | UL SP |
| 15A | 3G15UM | UL SP |
| 16A | 3G16UM | UL SP |
| 20A | 3G20UM | UL SP |
| 25A | 3G25UM | UL SP |
| 30A | 3G30UM | UL SP |
| 32A | 3G32UM | UL SP |
| 40A | 3G40UM | UL SP |
| 50A | 3G50UM | UL SP |
| 60A | 3G60UM | UL SP |
| 63A | 3G63UM | |

## Two Pole

Standard Pack: 6

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 2G03UM | UL SP |
| 0.5A | 2G05UM | UL SP |
| 0.8A | 2G08UM | UL SP |
| 1.0A | 2G1UM | UL SP |
| 1.6A | 2G1.6UM | UL SP |
| 2.0A | 2G2UM | UL SP |
| 2.5A | 2G2.5UM | UL SP |
| 3.0A | 2G3UM | UL SP |
| 3.5A | 2G3.5UM | UL SP |
| 4.0A | 2G4UM | UL SP |
| 5.0A | 2G5UM | UL SP |
| 6.0A | 2G6UM | UL SP |
| 8.0A | 2G8UM | UL SP |
| 10A | 2G10UM | UL SP |
| 12A | 2G12UM | UL SP |
| 13A | 2G13UM | UL SP |
| 15A | 2G15UM | UL SP |
| 16A | 2G16UM | UL SP |
| 20A | 2G20UM | UL SP |
| 25A | 2G25UM | UL SP |
| 30A | 2G30UM | UL SP |
| 32A | 2G32UM | UL SP |
| 40A | 2G40UM | UL SP |
| 50A | 2G50UM | UL SP |
| 60A | 2G60UM | UL SP |
| 63A | 2G63UM | |

## Add-on Neutral Pole

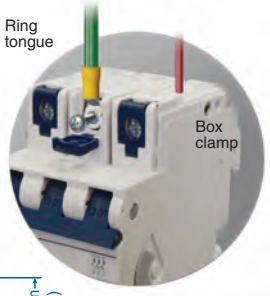
| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3-63A/ 480Y/277V | N63UM | UL SP |

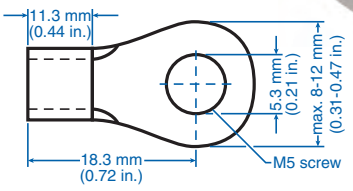
Standard Pack: 6

Weight:
0.775kg (1.71lb.)

## Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# V-EA Series Z-Trip Characteristic

**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.

UL508 Listed
E137938

## One Pole

Standard Pack: 12

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 1Z03UM | UL SP |
| 0.5A | 1Z05UM | UL SP |
| 0.75A | 1Z075UM | UL SP |
| 1.0A | 1Z1UM | UL SP |
| 1.6A | 1Z1.6UM | UL SP |
| 2.0A | 1Z2UM | UL SP |
| 2.5A | 1Z2.5UM | UL SP |
| 3.0A | 1Z3UM | UL SP |
| 3.5A | 1Z3.5UM | UL SP |
| 4.0A | 1Z4UM | UL SP |
| 5.0A | 1Z5UM | UL SP |
| 6.0A | 1Z6UM | UL SP |
| 8.0A | 1Z8UM | UL SP |
| 10A | 1Z10UM | UL SP |
| 12A | 1Z12UM | UL SP |
| 13A | 1Z13UM | UL SP |
| 15A | 1Z15UM | UL SP |
| 16A | 1Z16UM | UL SP |
| 20A | 1Z20UM | UL SP |
| 25A | 1Z25UM | UL SP |
| 30A | 1Z30UM | UL SP |
| 32A | 1Z32UM | UL SP |
| 40A | 1Z40UM | UL SP |
| 50A | 1Z50UM | UL SP |

## Three Pole

Standard Pack: 4

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 3Z03UM | UL SP |
| 0.5A | 3Z05UM | UL SP |
| 0.75A | 3Z075UM | UL SP |
| 1.0A | 3Z1UM | UL SP |
| 1.6A | 3Z1.6UM | UL SP |
| 2.0A | 3Z2UM | UL SP |
| 2.5A | 3Z2.5UM | UL SP |
| 3.0A | 3Z3UM | UL SP |
| 3.5A | 3Z3.5UM | UL SP |
| 4.0A | 3Z4UM | UL SP |
| 5.0A | 3Z5UM | UL SP |
| 6.0A | 3Z6UM | UL SP |
| 8.0A | 3Z8UM | UL SP |
| 10A | 3Z10UM | UL SP |
| 12A | 3Z12UM | UL SP |
| 13A | 3Z13UM | UL SP |
| 15A | 3Z15UM | UL SP |
| 16A | 3Z16UM | UL SP |
| 20A | 3Z20UM | UL SP |
| 25A | 3Z25UM | UL SP |
| 30A | 3Z30UM | UL SP |
| 32A | 3Z32UM | UL SP |
| 40A | 3Z40UM | UL SP |
| 50A | 3Z50UM | UL SP |

## Two Pole

Standard Pack: 6

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3A | 2Z03UM | UL SP |
| 0.5A | 2Z05UM | UL SP |
| 0.75A | 2Z075UM | UL SP |
| 1.0A | 2Z1UM | UL SP |
| 1.6A | 2Z1.6UM | UL SP |
| 2.0A | 2Z2UM | UL SP |
| 2.5A | 2Z2.5UM | UL SP |
| 3.0A | 2Z3UM | UL SP |
| 3.5A | 2Z3.5UM | UL SP |
| 4.0A | 2Z4UM | UL SP |
| 5.0A | 2Z5UM | UL SP |
| 6.0A | 2Z6UM | UL SP |
| 8.0A | 2Z8UM | UL SP |
| 10A | 2Z10UM | UL SP |
| 12A | 2Z12UM | UL SP |
| 13A | 2Z13UM | UL SP |
| 15A | 2Z15UM | UL SP |
| 16A | 2Z16UM | UL SP |
| 20A | 2Z20UM | UL SP |
| 25A | 2Z25UM | UL SP |
| 30A | 2Z30UM | UL SP |
| 32A | 2Z32UM | UL SP |
| 40A | 2Z40UM | UL SP |
| 50A | 2Z50UM | UL SP |

## Add-on Neutral Pole

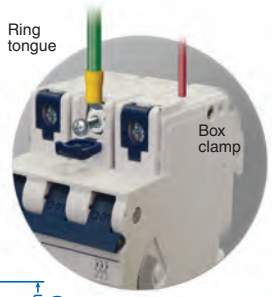
| Rated Current | Type/ Cat. No. | Approvals |
|---|---|---|
| 0.3-63A/ 480Y/277V | N63UM | UL SP |

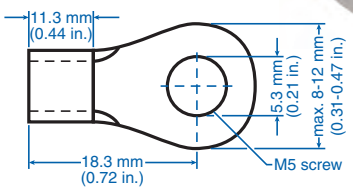
Standard Pack: 6

Weight:
0.775kg (1.71lb.)

## Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals

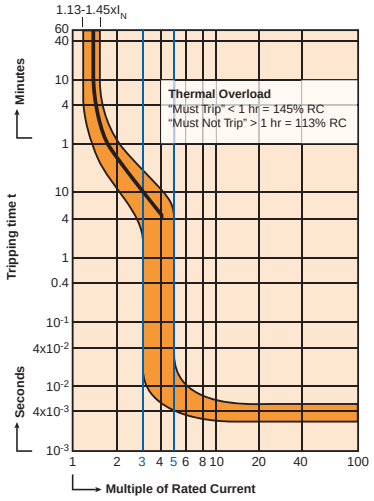


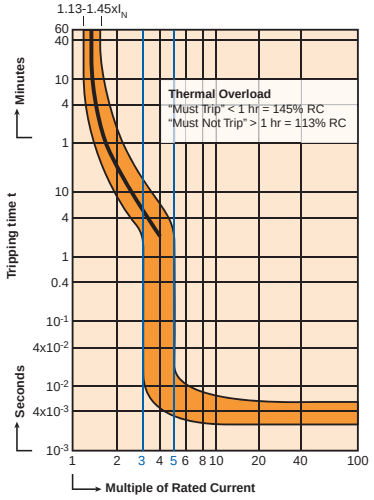

** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# V-EA Trip Curves

## B Trip Curve




1.0A Through 10A Rated Current

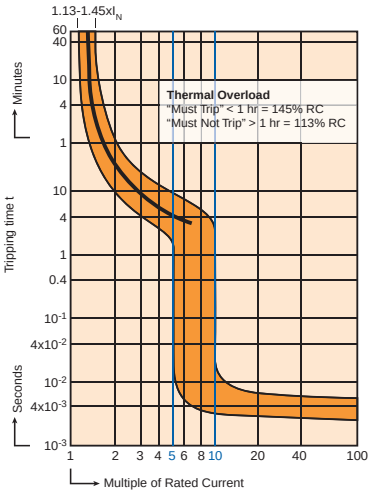



13A Through 63A Rated Current

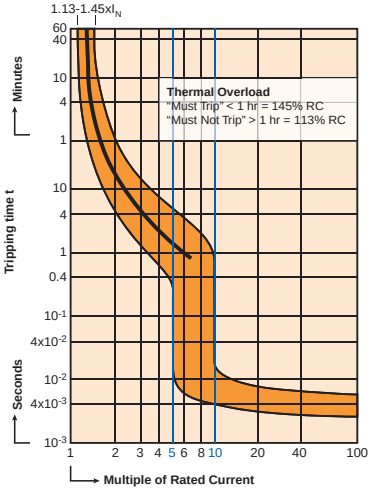
**"B" Magnetic Trip Parameters**
Rated current 1.0A to 63A.

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 Trip Curve




0.3A Through 10A Rated Current

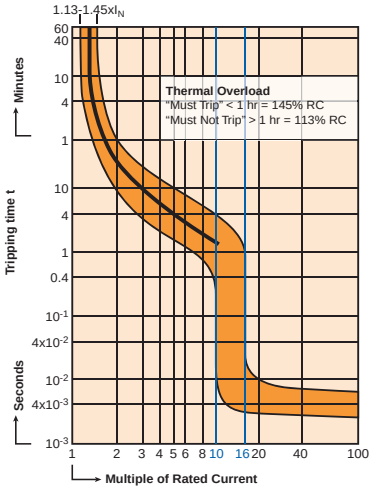



13A Through 63A Rated Current

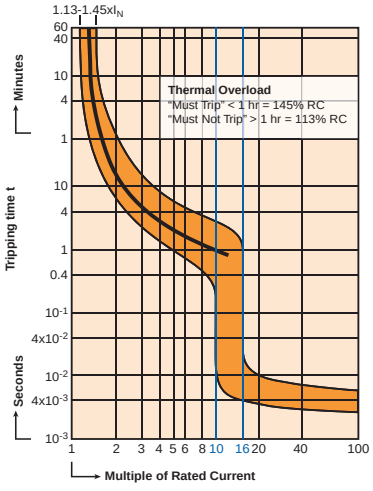
**"C" Magnetic Trip Parameters**
Rated current 0.3A to 63A.

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 Trip Curve




0.3A Through 10A Rated Current



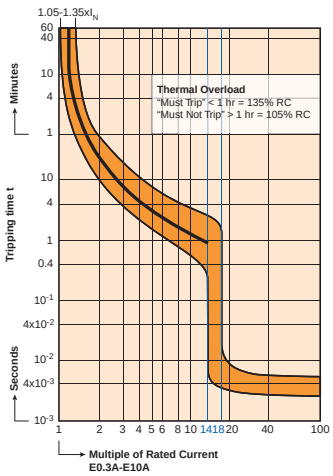

13A Through 63A Rated Current

**"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.

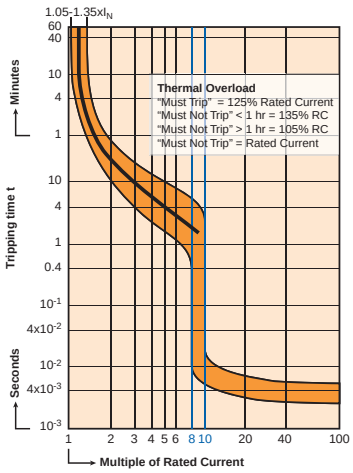
# V-EA Trip Curves

## E Trip Curve



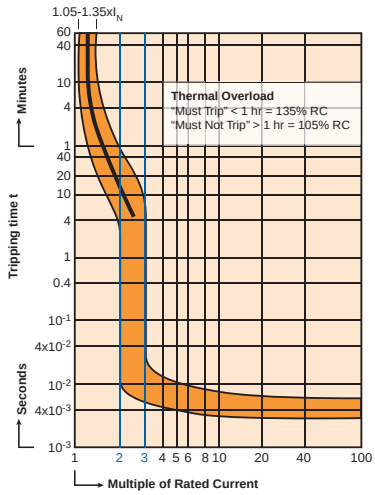

0.3A Through 10A Rated Current

## G Trip Curve

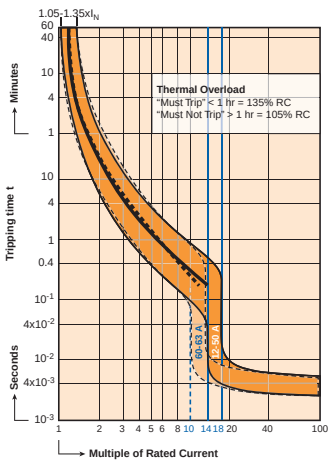



0.3A Through 10A Rated Current

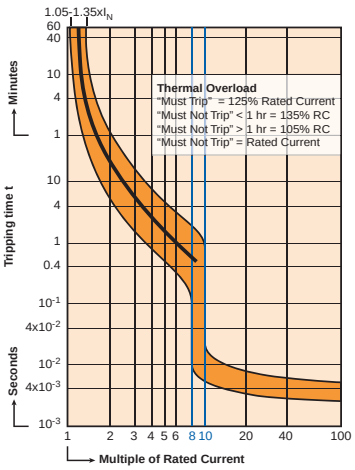
## Z Trip Curve



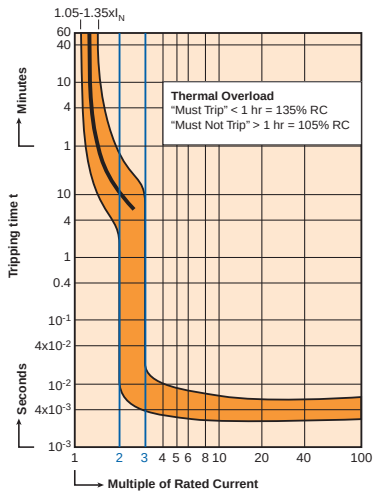

0.3A Through 10A Rated Current




12A Through 60A Rated Current




12A Through 63A Rated Current




12A Through 50A Rated Current

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

**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" 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 Parameters**
Rated Current, 0.3A to 50A.

**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 TABLE HORSEPOWER (SEE NOTE #2) USE FLA & LRC RATINGS WHERE NO HP RATING IS GIVEN | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | NOMINAL CIRCUIT VOLTAGE | | | | | |
| V-EA RATED CURRENT (SEE NOTE #1) | MOTOR NAMEPLATE FLA RATING | MOTOR NAMEPLATE STARTING/ LRC RATING | 110-120 VAC | 200 VAC | 208 VAC | 220-240 VAC | 265 VAC | 277 VAC |
| 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 | | <br>1/6hp<br>1/6hp | <br>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® 2011 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) USE FLA & LRC RATINGS WHERE NO HP IS LISTED | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V-EA RATED CURRENT (SEE NOTE #1) | MOTOR NAMEPLATE FLA RATING | MOTOR NAMEPLATE STARTING/ LRC RATING | 110-120 VAC | | 200 VAC | | 208 VAC | | 220-240 VAC (SEE NOTE #3) | | 440-480 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 | | | | | | | | | <br>1/2hp | <br>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 | | | <br>1/2hp<br>1/2hp | <br>1/2hp<br>1/2hp | <br>1/2hp<br>1/2hp | <br>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 | 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 | 10.0A | 84.0A | 1hp | 1hp | 2hp | 2hp | 2hp | 2hp | 3hp | 3hp | 5hp | 5hp |
| 12.0A<br>12.5A | 12.0A<br>12.5A | 100.8A<br>105.0A | 1 1/2hp<br>1 1/2hp | 1 1/2hp<br>1 1/2hp | 3hp<br>3hp | 3hp<br>3hp | 3hp<br>3hp | 3hp<br>3hp | 3hp<br>3hp | 3hp<br>3hp | 7 1/2hp<br>7 1/2hp | 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 | 5hp<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® 2011 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:

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

$$P_{LOSS\ P/P} = I^2_{OPERATING} \times R_{TABLE}$$

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 | — | 6,000 | — | 4,000 | 10,000 |
| AC Motor Starting Across the Line | 1,000 | — | 5,000 | 4,000 | 10,000 |
| AC Incandescent Lamps (Tungsten) | — | — | 6,000 | 4,000 | 10,000 |
| AC Electrical Discharge Lamps (Ballast) | — | 6,000 | — | 4,000 | 10,000 |
| AC Resistance | — | 6,000 | — | 4,000 | 10,000 |

| Manufacturers self certification | 20000 ON/OFF operations with no load |
|---|---|

# MA- Series

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

UL508 listed
E137938

CAN/CSA-C22.2 No.14 certified

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).

### Type Designation

| MA | 16 | U | M |
|---|---|---|---|
| **(a)** | **(b)** | **(c)** | **(d)** |

**(a)** = MA - Manual Motor Controller
**(b)** = Rated Current
**(c)** = U - US Housing
= R - US Housing + Ring Tongue
**(d)** = M - Part No. Designation

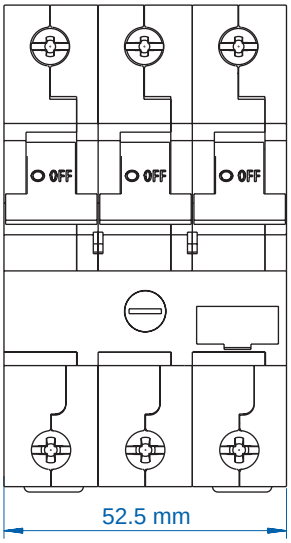
| | |
|---|---|
| **Voltage Rating** | 480Y/277V AC |
| **AIC (Interrupt Capacity)** | 0.16A-2.5A: 42kA; 4.0A-16A: 14kA; 20A-40A: 10kA |
| **Standard Short Circuit Withstand Rating (UL/CSA Ratings)** | 0.16A-2.5A: 42kA; 4.0A-16A: 14kA; 20A-40A: 10kA |
| **Group Short Circuit Ratings (UL/CSA Ratings)** | see above |
| **Typical Life** | 6,000 on/off operations with 2xRC |
| **Calibration Temperature** | 25°C, +0°, -5° (77°F, +0° -9°) |
| **Standard Pack and Weight** | 1/450g (1.0 lb.) |
| **Terminal Size Acceptability** | Top/Bottom: 18-3 AWG |
| **Terminal Torque (min/max)** | 2 Nm (17.7 lb.in.) / 2.5Nm (22.2 lb.in) |

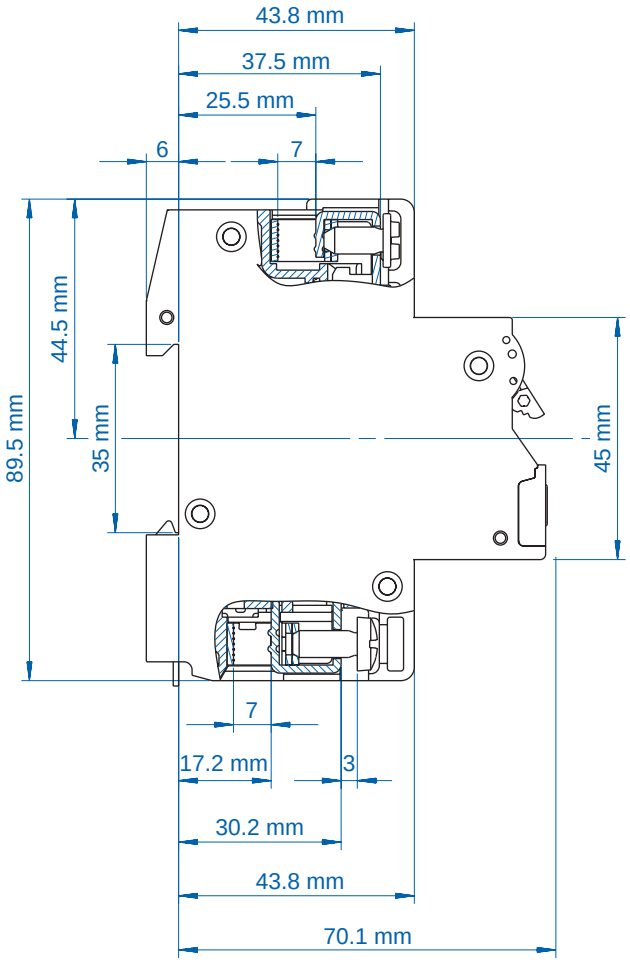
| Cat. No. | Rated Current | FLA Dial Adjustment Markings | GROUP SHORT CIRCUIT RATING AT 480VAC[a] (and BCP size) | 3Ø HORSEPOWER RATINGS AT NOMINAL LINE VOLTAGE (See Note for HEA Definition) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 110-120V HP (HEA) | 200V HP (HEA) | 208V HP (HEA) | 220-240V HP (HEA) | 460-480V HP (HEA) |
| **MA016UM** | 0.16A | 0.1/ 0.12/0.14/0.16 | 42kA$_{RMS}$ symmetrical (max. 1200A MCCB or RK5) | Through MA2.5U, ampere rated for motor circuits having a full-load-amperage (FLA) not exceeding the MA's general purpose rated current (RC, equals maximum dial setting) and a locked rotor current not exceeding 6 times the MA's RC. | | | | |
| **MA025UM** | 0.25A | 0.16/0.19/0.22/0.25 | | | | | | |
| **MA040UM** | 0.40A | 0.25/0.30/0.35/0.40 | | | | | | |
| **MA063UM** | 0.63A | 0.40/0.48/0.56/0.63 | | | | | | |
| **MA1.0UM** | 1.0A | 0.63/0.75/0.87/1.0 | | | | | | |
| **MA1.6UM** | 1.6A | 1.0/1.2/1.4/1.6 | | | | | | |
| **MA2.5UM** | 2.5A | 1.6/1.9/2.2/2.5 | | | | | | |
| **MA4.0UM** | 4.0A | 2.5/3.0/3.5/4.0 | 14kA$_{RMS}$ symmetrical (max. 350A MCCB or RK5) | 1/2 (4.0) | 3/4 (3.2) | 3/4 (3.1) | 1 (3.6) | 2 (3.42) |
| **MA6.3UM** | 6.3A | 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) |
| **MA10UM** | 10A | 6.3/7.5/8.7/10 | | 1 (7.2) | 2 (7.8) | 2 (7.5) | 3 (9.6) | 5 (7.6) |
| **MA16UM** | 16A | 10/12/14/16 | | 2 (13.6) | 3 (11.0) | 3 (10.6) | 5 (15.2) | 10 (14.0) |
| **MA20UM** | 20A | 16/17/18.5/20 | 10kA$_{RMS}$ symmetrical (max. 350A MCCB or RK5) | 3 (19.2) | 5 (17.5) | 5 (16.7) | 5 (15.2) | 10 (14.0) |
| **MA25UM** | 25A | 20/21.5/23/25 | | 3 (19.2) | 5 (17.5) | 7 1/2 (24.2) | 7 1/2 (22.0) | 15 (21.0) |
| **MA32UM** | 32A | 25/27/30/32 | | 5 (30.4) | 7 1/2 (25.0) | 7 1/2 (24.2) | 10 (28.0) | 20 (27.0) |
| **MA40UM** | 40A | 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%.

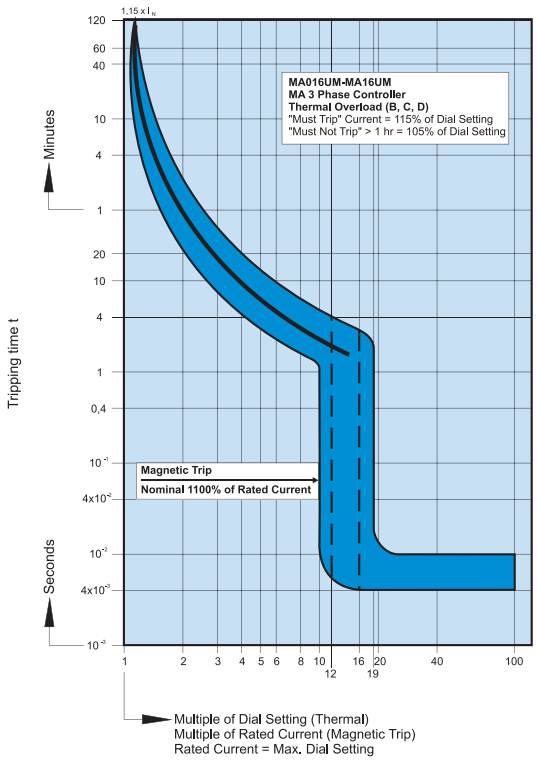
[a] The standard-circuit short-circuit rating is 14kA for all types. Group ratings can be used in a standard circuit (e.g., MA1.0U at 42kA), but a higher standard rating cannot be used in a group circuit (e.g., MA40U at 14kA only in standard circuit.)

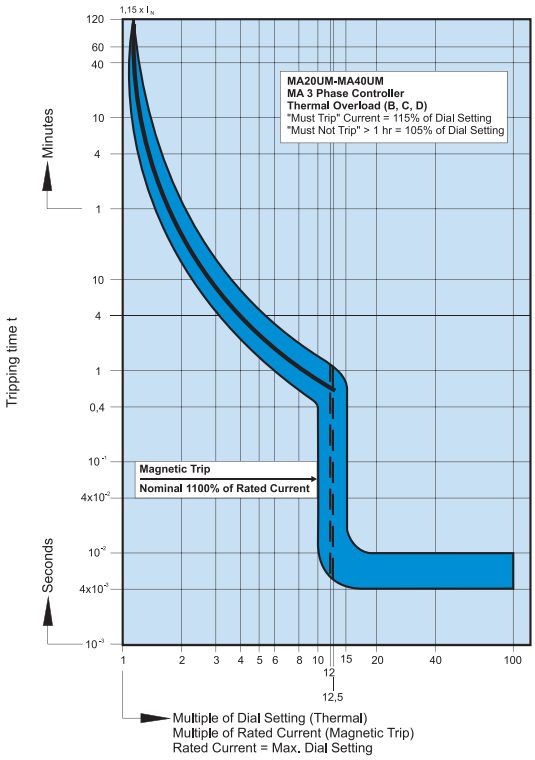
## Dimensions in mm




## MA- Series Trip Curves




*MA/USA Manual Motor Controller*

# UM (V-EA) and MA Accessories

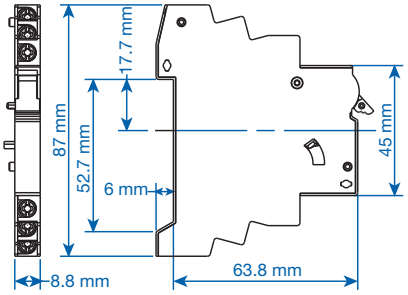
*For mounting instructions please refer to page 43.*

UL Listed
E137938

## Auxiliary Contact, Alarm Switch

| Type/ Cat No. | Description | Contacts Type | Std Pk |
|---|---|---|---|
| H10UM | 1 Auxiliary Contact | 1NO | 6 |
| H11UM | 2 Auxiliary Contacts | 1NO + 1NC | 6 |
| H12UM | 3 Auxiliary Contacts | 1NO + 2NC | 6 |
| H21UM | 3 Auxiliary Contacts | 2NO + 1NC | 6 |
| HLS11M* | 1 Auxiliary/1 Signal Contacts | 1CO + 1CO (Signal) | 6 |

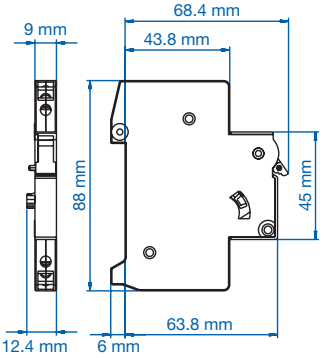
| | |
|---|---|
| **Rated Operating Currents** | 10A@240V AC<br>3A@110V DC<br>1A@220V DC |
| **Minimum Contact Load** | 1mA @ 24V DC |
| **Torque** | max. 0.8Nm (7 lb.in) |
| **Wire Range**: | |
| **Single Wire** | 1.0mm² - 2.5mm² (18-14 AWG) |
| **Stranded Wire** | 1.0mm² - 1.5mm² (18-16 AWG) |
| **Stranded Wire with Ferrule** | 1.0mm² - 1.5mm² (18-16 AWG) |




Dimensions HxxUM.

## Shunt Trip

| Type/ Cat No. | Rated Voltage $U_N$ | Max. Operating Current @ $U_N$ | Std Pk |
|---|---|---|---|
| FA12UM | 12V AC/DC | 1.3A | 5 |
| FA24UM | 24V AC/DC | 0.6A | 5 |
| FA48UM | 48 - 72V AC/DC | 0.2A | 5 |
| FA110UM | 110 - 240V AC/DC, 277V AC | 0.25A @ 110V<br>0.5A @ 240V<br>0.58A @ 277V | 5 |




Dimensions HLS11M.

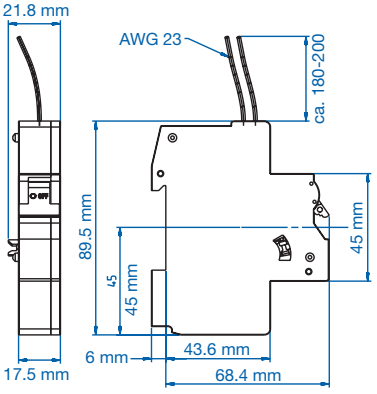
## Undervoltage Trip*

| Type/ Cat No. | Line Voltage $V_E$ | Std Pk |
|---|---|---|
| UA120UM | 120V AC, 60Hz | 5 |

Reset-Hold Voltage = 0.85 x $V_E$

Drop-Out Voltage = 0.35 ~ 0.7 x $V_E$

$V_E$ = Rated Voltage




Dimensions UA120UM.

* Not UL approved.

** UM (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.

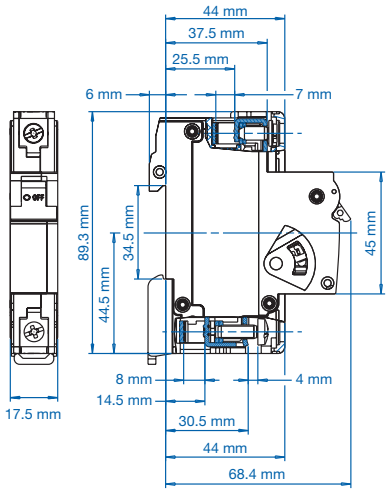
# UM (V-EA) and MA Accessories

*For mounting instructions please refer to page 43.*

UL Listed
E137938

## Neutral Pole

| Type/ Cat No. | Rated Current $I_N$ | Rated Voltage $U_N$ | Std Pk |
|---|---|---|---|
| N63UM | 0.3 - 63A | 480Y/277V AC | 6 |




Dimensions N63UM, FAxxUM.

## Touch Protection Caps

*to cover the terminal screw holes on the switching devices, neutral Poles and shunt trips for increased touch protection.*

| Type/ Cat No. | Std Pk |
|---|---|
| BS.UL | 100 |

## Cooling Spacer

| Type/ Cat No. | Std Pk |
|---|---|
| 15.960 | 1 |

## Mounting Screw 34mm

*to connect the auxiliary contact and shunt trip or neutral Pole to the circuit breaker.*

| Type/ Cat No. | Std Pk |
|---|---|
| E983419 | 10 |

## Lock-out Adapter**

| Type/ Cat No. | Std Pk |
|---|---|
| EASS | 10 |

# 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**

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 x $I_n$. The Manual Motor Controllers are built in accordance with IEC 947.

E137938

**Type Designation**

MS 016
(a) (b)

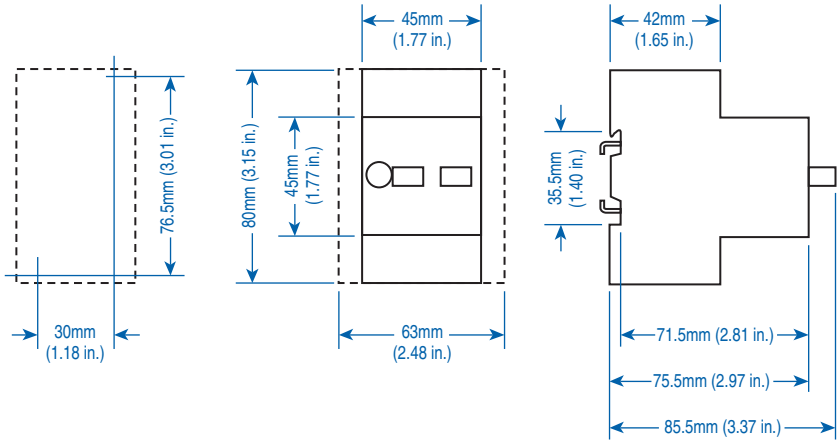
**(a)** = MS - Manual Motor Controller

**(b)** = Rated Current

| Type/ Cat. No. | Rated Current | Overload release adjustment/FLA (A) | Instantaneous setting (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) |
| **Short Circuit Withstanding Rating (UL/CSA Rating)** | 5kA |
| **Group Short Circuit Withstanding Rating (UL/CSA Rating)** | 5kA |
| **Interrupting Capacity (VDE - Ratings)** | 0.16-6.3A: Self protected<br>10-25A: 6kA |
| **Mechanical Endurance** | 10,000 on/off operations |
| **Standard Pack and Weight** | 1/250g (0.55lb) |
| **Terminal Size Acceptability** | 14-10 AWG |
| **Terminal Torque** | 1.8Nm (16lb. in.) |

**Dimensions**



# Accessories

## MS Three Phase Adjustable Trip Economy Manual Motor Controllers

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

| Width mm | Contacts | Type/ Cat. No. | Weight g/pc. | Std. 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/ Cat. No. | Weight g/pc. | Std. Pk. |
|---|---|---|
| **MS.G55** | 240 | 1 |

### Emergency-Stop

twist or key to release, red on yellow background

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

### Flush Mounting Enclosure IP55

with integrated PE(N) terminal

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

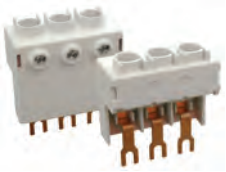
### Indicator Light

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

| Color | Type/ Cat. No. 220-240V | Type/ Cat. No. 380-440V | Weight g/pc. | Std. Pk. |
|---|---|---|---|---|
| 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 63A | Type/Cat. No. for 2 MS | for 3 MS | for 4 MS | for 5 MS |
|---|---|---|---|---|
| no spacing | **G45-14-2** | **G45-14-3** | **G45-14-4** | **G45-14-5** |
| with auxiliary switch (1/2 pole) spacing | **G54-14-2** | **G54-14-3** | **G54-14-4** | **G54-14-5** |



### Power Feed Block

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

# UR Series

## UL1077 Recognized Supplementary Protector

- DIN Rail Mounted
- 17.5mm width per pole
- Thermal Magnetic
- 0.5-60A / 480Y/277V AC, 50/60Hz
- 10kA Short Circuit Withstand Capacity
- Applications (on the load side of Branch Circuit Protection) include: Sensitive Electronics, Power Supplies, Appliance circuits, etc.

C US
E137915

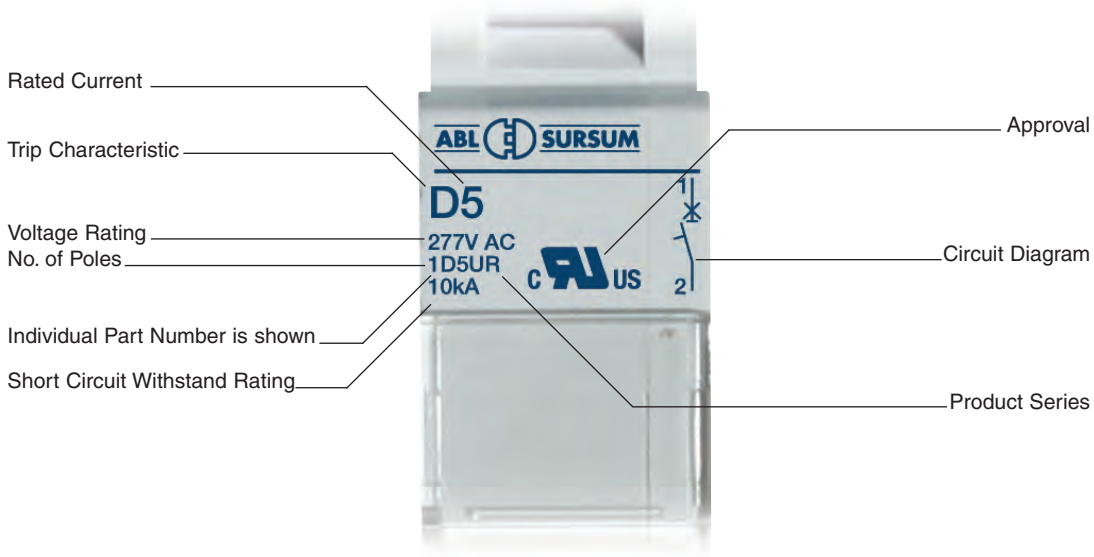
| UR - Series | |
|---|---|
| **Voltage Rating** | 0.5-60A / 480Y/277V AC |
| **Short Circuit Withstand Rating** | 0.5 - 10A (RC): 10 kA with no back-up fuse<br>8 - 63A (RC): 10 kA with UL-listed Class J back-up fuse;<br>5 kA with no back-up fuse |
| **Calibration Temperature** | 30°C (86°F) |
| **Ambient Temperature** | -25°C to +55°C (-13°F to 131°F ) |
| **Storage Temperature** | -40°C to +70°C (-40°F to 158°F ) |
| **Terminal Torque (min/max)** | 2 Nm (17.7 lb.in.) / 2.5Nm (22.2 lb.in) |
| **Electrical Life** | 6,000 switching cycles ON/ OFF |
| **Mechanical Life** | 10,000 switching cycles ON/ OFF |
| **Vibration Resistance** | > 15g according to DIN EN 60069-2-59 during a load with 1.05 x $I_N$ |
| **Resistance to mechanical shocks** | 25g @ 11ms |
| **Degree of protection acc. IEC/EN 60529** | IP20 |
| **Mounting Orientation** | In any plane |

## Short Circuit Withstand Ratings for R-Series Supplementary Protector

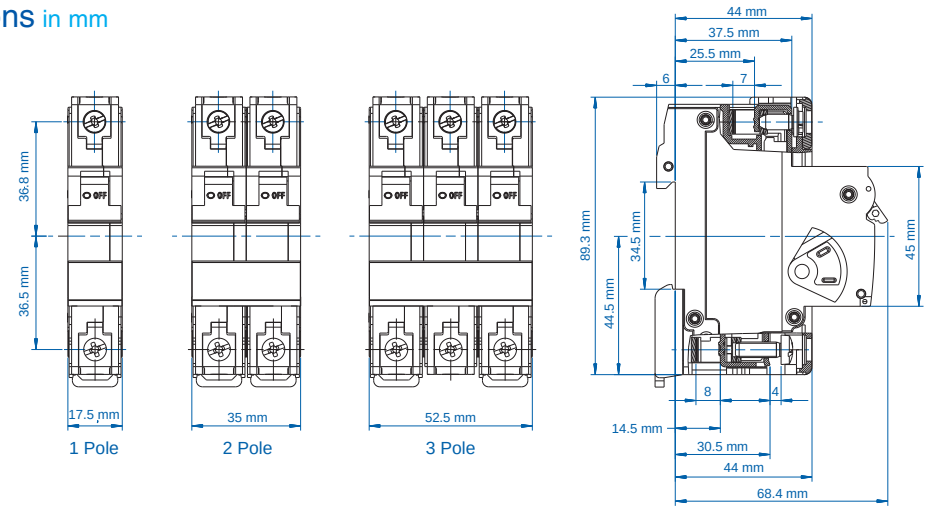
| Trip Curve | Amp Range | Backup Protection | |
|---|---|---|---|
| | | UL-Listed Class J Fuse up to 10kA | No Backup Fuse Required up to: |
| All | 0.5 - 10A | 70A | 10kA |
| All | 12 - 60A | 4xRC* | 5kA |

*up to nearest rated current

## Marking Details




## Dimensions in mm




## Application Overview

| Trip-Characteristics* | | | | Applications | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Characteristic Trip Boundaries | | | | Lighting Wiring Protection Control Circuits | Business Equipment Appliances | Control Transformers | Power Supplies | General Electronics | Reactive Load |
| Thermal Trip | | Magnetic Trip | | | | | | | |
| Must not Trip>100ms | Must Trip <1hr | Must not Trip>100ms | Must Trip 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 | 20xRC | | | | | | |

**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/Supplementary Protector 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/Supplementary Protector for his specific application.

# UR - Series B-Trip Characteristic

**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.

UL Recognized
E137915

## One Pole

Standard Pack: 12

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.5A | **1B05UR** | 277V AC |
| 1.0A | **1B1UR** | 277V AC |
| 2.0A | **1B2UR** | 277V AC |
| 3.0A | **1B3UR** | 277V AC |
| 4.0A | **1B4UR** | 277V AC |
| 5.0A | **1B5UR** | 277V AC |
| 6.0A | **1B6UR** | 277V AC |
| 8.0A | **1B8UR** | 277V AC |
| 10A | **1B10UR** | 277V AC |
| 12A | **1B12UR** | 277V AC |
| 13A | **1B13UR** | 277V AC |
| 15A | **1B15UR** | 277V AC |
| 16A | **1B16UR** | 277V AC |
| 20A | **1B20UR** | 277V AC |
| 25A | **1B25UR** | 277V AC |
| 30A | **1B30UR** | 277V AC |
| 32A | **1B32UR** | 277V AC |
| 40A | **1B40UR** | 277V AC |
| 50A | **1B50UR** | 277V AC |
| 60A | **1B60UR** | 277V AC |
| 63A* | **1B63UR** | 277V AC |

## Three Pole

Standard Pack: 4

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.5A | **3B05UR** | 480Y/277V AC |
| 1.0A | **3B1UR** | 480Y/277V AC |
| 2.0A | **3B2UR** | 480Y/277V AC |
| 3.0A | **3B3UR** | 480Y/277V AC |
| 4.0A | **3B4UR** | 480Y/277V AC |
| 5.0A | **3B5UR** | 480Y/277V AC |
| 6.0A | **3B6UR** | 480Y/277V AC |
| 8.0A | **3B8UR** | 480Y/277V AC |
| 10A | **3B10UR** | 480Y/277V AC |
| 12A | **3B12UR** | 480Y/277V AC |
| 13A | **3B13UR** | 480Y/277V AC |
| 15A | **3B15UR** | 480Y/277V AC |
| 16A | **3B16UR** | 480Y/277V AC |
| 20A | **3B20UR** | 480Y/277V AC |
| 25A | **3B25UR** | 480Y/277V AC |
| 30A | **3B30UR** | 480Y/277V AC |
| 32A | **3B32UR** | 480Y/277V AC |
| 40A | **3B40UR** | 480Y/277V AC |
| 50A | **3B50UR** | 480Y/277V AC |
| 60A | **3B60UR** | 480Y/277V AC |
| 63A* | **3B63UR** | 480Y/277V AC |

## Two Pole

Standard Pack: 6

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.5A | **2B05UR** | 480Y/277V AC |
| 1.0A | **2B1UR** | 480Y/277V AC |
| 2.0A | **2B2UR** | 480Y/277V AC |
| 3.0A | **2B3UR** | 480Y/277V AC |
| 4.0A | **2B4UR** | 480Y/277V AC |
| 5.0A | **2B5UR** | 480Y/277V AC |
| 6.0A | **2B6UR** | 480Y/277V AC |
| 8.0A | **2B8UR** | 480Y/277V AC |
| 10A | **2B10UR** | 480Y/277V AC |
| 12A | **2B12UR** | 480Y/277V AC |
| 13A | **2B13UR** | 480Y/277V AC |
| 15A | **2B15UR** | 480Y/277V AC |
| 16A | **2B16UR** | 480Y/277V AC |
| 20A | **2B20UR** | 480Y/277V AC |
| 25A | **2B25UR** | 480Y/277V AC |
| 30A | **2B30UR** | 480Y/277V AC |
| 32A | **2B32UR** | 480Y/277V AC |
| 40A | **2B40UR** | 480Y/277V AC |
| 50A | **2B50UR** | 480Y/277V AC |
| 60A | **2B60UR** | 480Y/277V AC |
| 63A* | **2B63UR** | 480Y/277V AC |

*63A is not UL Recognized.

## Add-on Neutral Pole

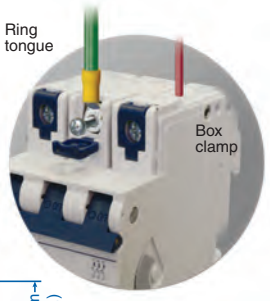
| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3-63A | **N63UM** | 480/277V AC |

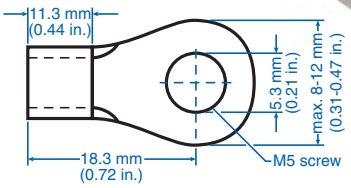
Standard Pack: 6

Weight:
0.775kg (1.71)

## Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# UR - Series
# C-Trip Characteristic

**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.

UL Recognized
E137915

## One Pole

Standard Pack: 12

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.5A | **1C05UR** | 277V AC |
| 1.0A | **1C1UR** | 277V AC |
| 2.0A | **1C2UR** | 277V AC |
| 3.0A | **1C3UR** | 277V AC |
| 4.0A | **1C4UR** | 277V AC |
| 5.0A | **1C5UR** | 277V AC |
| 6.0A | **1C6UR** | 277V AC |
| 8.0A | **1C8UR** | 277V AC |
| 10A | **1C10UR** | 277V AC |
| 12A | **1C12UR** | 277V AC |
| 13A | **1C13UR** | 277V AC |
| 15A | **1C15UR** | 277V AC |
| 16A | **1C16UR** | 277V AC |
| 20A | **1C20UR** | 277V AC |
| 25A | **1C25UR** | 277V AC |
| 30A | **1C30UR** | 277V AC |
| 32A | **1C32UR** | 277V AC |
| 40A | **1C40UR** | 277V AC |
| 50A | **1C50UR** | 277V AC |
| 60A | **1C60UR** | 277V AC |
| 63A* | **1C63UR** | 277V AC |

## Three Pole

Standard Pack: 4

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.5A | **3C05UR** | 480Y/277V AC |
| 1.0A | **3C1UR** | 480Y/277V AC |
| 2.0A | **3C2UR** | 480Y/277V AC |
| 3.0A | **3C3UR** | 480Y/277V AC |
| 4.0A | **3C4UR** | 480Y/277V AC |
| 5.0A | **3C5UR** | 480Y/277V AC |
| 6.0A | **3C6UR** | 480Y/277V AC |
| 8.0A | **3C8UR** | 480Y/277V AC |
| 10A | **3C10UR** | 480Y/277V AC |
| 12A | **3C12UR** | 480Y/277V AC |
| 13A | **3C13UR** | 480Y/277V AC |
| 15A | **3C15UR** | 480Y/277V AC |
| 16A | **3C16UR** | 480Y/277V AC |
| 20A | **3C20UR** | 480Y/277V AC |
| 25A | **3C25UR** | 480Y/277V AC |
| 30A | **3C30UR** | 480Y/277V AC |
| 32A | **3C32UR** | 480Y/277V AC |
| 40A | **3C40UR** | 480Y/277V AC |
| 50A | **3C50UR** | 480Y/277V AC |
| 60A | **3C60UR** | 480Y/277V AC |
| 63A* | **3C63UR** | 480Y/277V AC |

## Two Pole

Standard Pack: 6

Weight:
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.5A | **2C05UR** | 480Y/277V AC |
| 1.0A | **2C1UR** | 480Y/277V AC |
| 2.0A | **2C2UR** | 480Y/277V AC |
| 3.0A | **2C3UR** | 480Y/277V AC |
| 4.0A | **2C4UR** | 480Y/277V AC |
| 5.0A | **2C5UR** | 480Y/277V AC |
| 6.0A | **2C6UR** | 480Y/277V AC |
| 8.0A | **2C8UR** | 480Y/277V AC |
| 10A | **2C10UR** | 480Y/277V AC |
| 12A | **2C12UR** | 480Y/277V AC |
| 13A | **2C13UR** | 480Y/277V AC |
| 15A | **2C15UR** | 480Y/277V AC |
| 16A | **2C16UR** | 480Y/277V AC |
| 20A | **2C20UR** | 480Y/277V AC |
| 25A | **2C25UR** | 480Y/277V AC |
| 30A | **2C30UR** | 480Y/277V AC |
| 32A | **2C32UR** | 480Y/277V AC |
| 40A | **2C40UR** | 480Y/277V AC |
| 50A | **2C50UR** | 480Y/277V AC |
| 60A | **2C60UR** | 480Y/277V AC |
| 63A* | **2C63UR** | 480Y/277V AC |

*63A is not UL Recognized.

## Add-on Neutral Pole

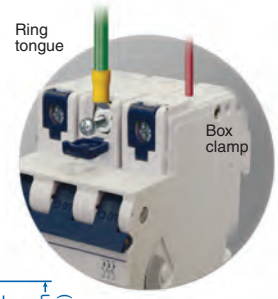
| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3-63A | **N63UM** | 480/277V AC |

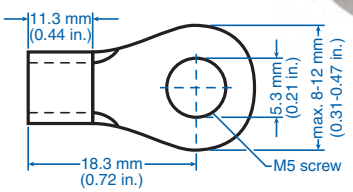
Standard Pack: 6

Weight:
0.775kg (1.71)

### Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# UR - Series D-Trip Characteristic

**Application Examples:**

Control transformers, power supplies, reactive loads. Relatively long thermal trip delay and very high magnetic trip point.

UL Recognized
E137915

## One Pole

**Standard Pack:** 12

**Weight:**
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.5A | **1D05UR** | 277V AC |
| 1.0A | **1D1UR** | 277V AC |
| 2.0A | **1D2UR** | 277V AC |
| 3.0A | **1D3UR** | 277V AC |
| 4.0A | **1D4UR** | 277V AC |
| 5.0A | **1D5UR** | 277V AC |
| 6.0A | **1D6UR** | 277V AC |
| 8.0A | **1D8UR** | 277V AC |
| 10A | **1D10UR** | 277V AC |
| 12A | **1D12UR** | 277V AC |
| 13A | **1D13UR** | 277V AC |
| 15A | **1D15UR** | 277V AC |
| 16A | **1D16UR** | 277V AC |
| 20A | **1D20UR** | 277V AC |
| 25A | **1D25UR** | 277V AC |
| 30A | **1D30UR** | 277V AC |
| 32A | **1D32UR** | 277V AC |
| 40A | **1D40UR** | 277V AC |
| 50A | **1D50UR** | 277V AC |
| 60A | **1D60UR** | 277V AC |
| 63A* | **1D63UR** | 277V AC |

## Three Pole

**Standard Pack:** 4

**Weight:**
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.5A | **3D05UR** | 480Y/277V AC |
| 1.0A | **3D1UR** | 480Y/277V AC |
| 2.0A | **3D2UR** | 480Y/277V AC |
| 3.0A | **3D3UR** | 480Y/277V AC |
| 4.0A | **3D4UR** | 480Y/277V AC |
| 5.0A | **3D5UR** | 480Y/277V AC |
| 6.0A | **3D6UR** | 480Y/277V AC |
| 8.0A | **3D8UR** | 480Y/277V AC |
| 10A | **3D10UR** | 480Y/277V AC |
| 12A | **3D12UR** | 480Y/277V AC |
| 13A | **3D13UR** | 480Y/277V AC |
| 15A | **3D15UR** | 480Y/277V AC |
| 16A | **3D16UR** | 480Y/277V AC |
| 20A | **3D20UR** | 480Y/277V AC |
| 25A | **3D25UR** | 480Y/277V AC |
| 30A | **3D30UR** | 480Y/277V AC |
| 32A | **3D32UR** | 480Y/277V AC |
| 40A | **3D40UR** | 480Y/277V AC |
| 50A | **3D50UR** | 480Y/277V AC |
| 60A | **3D60UR** | 480Y/277V AC |
| 63A* | **3D63UR** | 480Y/277V AC |

## Two Pole

**Standard Pack:** 6

**Weight:**
0.3A - 32A
1.75kg (3.86 lb.)
40A - 63A
2.07kg (4.56 lb.)

| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.5A | **2D05UR** | 480Y/277V AC |
| 1.0A | **2D1UR** | 480Y/277V AC |
| 2.0A | **2D2UR** | 480Y/277V AC |
| 3.0A | **2D3UR** | 480Y/277V AC |
| 4.0A | **2D4UR** | 480Y/277V AC |
| 5.0A | **2D5UR** | 480Y/277V AC |
| 6.0A | **2D6UR** | 480Y/277V AC |
| 8.0A | **2D8UR** | 480Y/277V AC |
| 10A | **2D10UR** | 480Y/277V AC |
| 12A | **2D12UR** | 480Y/277V AC |
| 13A | **2D13UR** | 480Y/277V AC |
| 15A | **2D15UR** | 480Y/277V AC |
| 16A | **2D16UR** | 480Y/277V AC |
| 20A | **2D20UR** | 480Y/277V AC |
| 25A | **2D25UR** | 480Y/277V AC |
| 30A | **2D30UR** | 480Y/277V AC |
| 32A | **2D32UR** | 480Y/277V AC |
| 40A | **2D40UR** | 480Y/277V AC |
| 50A | **2D50UR** | 480Y/277V AC |
| 60A | **2D60UR** | 480Y/277V AC |
| 63A* | **2D63UR** | 480Y/277V AC |

*63A is not UL Recognized.

## Add-on Neutral Pole

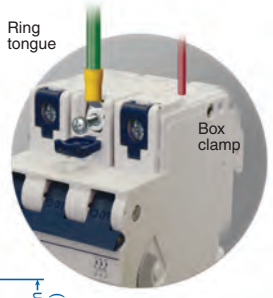
| Rated Current | Type/ Cat. No. | Rated Voltage |
|---|---|---|
| 0.3-63A | **N63UM** | 480/277V AC |

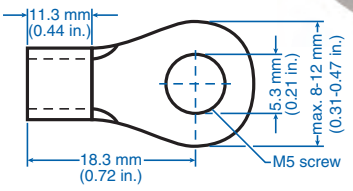
**Standard Pack:** 6

**Weight:**
0.775kg (1.71)

## Standard Dual Connection Terminal

- Box clamp terminals
  Top: 18-3 AWG;
  Bottom: 18-2 AWG
  (Line/Load reversible)
- Ring tongue terminals




** May differ by manufacturer. Top terminal ring tongue max. thickness 1.6mm.*

# UR Series Accessories

*For mounting instructions please refer to page 43.*

UL Listed
E137938

## Auxiliary Contact, Alarm Switch

| Type/ Cat No. | Description | Contacts Type | Std Pk |
|---|---|---|---|
| H10UM | 1 Auxiliary Contact | 1NO | 6 |
| H11UM | 2 Auxiliary Contacts | 1NO + 1NC | 6 |
| H12UM | 3 Auxiliary Contacts | 1NO + 2NC | 6 |
| H21UM | 3 Auxiliary Contacts | 2NO + 1NC | 6 |
| HLS11M* | 1 Auxiliary/ 1 Signal Contacts | 1CO + 1CO (Signal) | 6 |

| | |
|---|---|
| **Rated Operating Currents** | 10A@240V AC<br>3A@110V DC<br>1A@220V DC |
| **Minimum Contact Load** | 1mA @ 24V DC |
| **Torque** | max. 0.8Nm (7 lb.in) |
| **Wire Range**: | |
| **Single Wire** | 1.0mm² - 2.5mm² (18-14 AWG) |
| **Stranded Wire** | 1.0mm² - 1.5mm² (18-16 AWG) |
| **Stranded Wire with Ferrule** | 1.0mm² - 1.5mm² (18-16 AWG) |

## Shunt Trip

| Type/ Cat No. | Rated Voltage $U_N$ | Max. Operating Current @ $U_N$ | Std Pk |
|---|---|---|---|
| FA12UM | 12V AC/DC | 1.3A | 5 |
| FA24UM | 24V AC/DC | 0.6A | 5 |
| FA48UM | 48 - 72V AC/DC | 0.2A | 5 |
| FA110UM | 110 - 240 V AC/DC, 277V AC | 0.25A @ 110V<br>0.5A @ 240V<br>0.58A @ 277V | 5 |

## Undervoltage Trip*

| Type/ Cat No. | Line Voltage $V_E$ | Std Pk |
|---|---|---|
| UA120UM | 120V AC, 60Hz | 5 |

Reset-Hold Voltage = 0.85 x $V_E$
Drop-Out Voltage = 0.35 ~ 0.7 x $V_E$
$V_E$ = Rated Voltage

## Neutral Pole

| Type/ Cat No. | Rated Current $I_N$ | Rated Voltage $U_N$ | Std Pk |
|---|---|---|---|
| N63UM | 0.3 - 63A | 480Y/277V AC | 6 |

## Touch Protection Caps

*to cover the terminal screw holes on the switching devices, neutral Poles and shunt trips for increased touch protection.*

| Type/ Cat No. | Std Pk |
|---|---|
| BS.UL | 100 |

## Cooling Spacer

| Type/ Cat No. | Std Pk |
|---|---|
| 15.960 | 1 |

## Mounting Screw 34mm

*to connect the auxiliary contact and shunt trip or neutral Pole to the circuit breaker.*

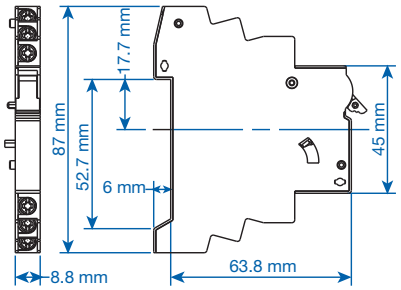
| Type/ Cat No. | Std Pk |
|---|---|
| E983419 | 10 |

## Lock-out Adapter**

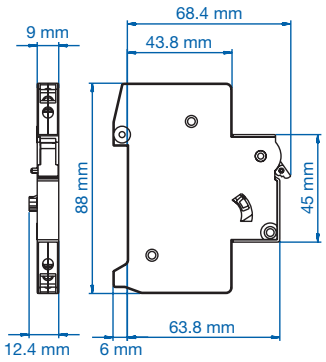
| Type/ Cat No. | Std Pk |
|---|---|
| EASS | 10 |

* Not UL approved.

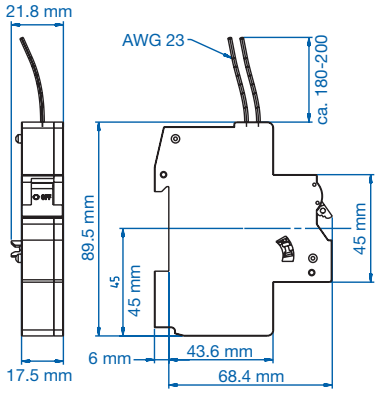
** UR series can also be locked in the on and off position by simply using a common lead or meter seal, which gets fed through the hole in the handle and a corresponding hole in the housing.



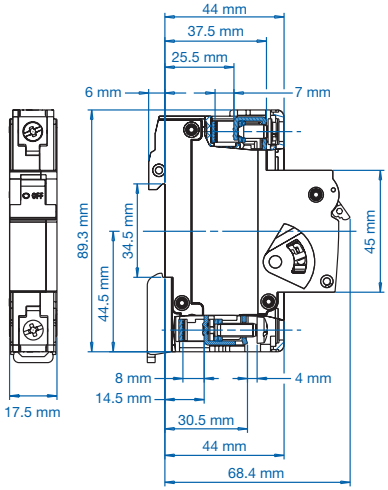

Dimensions HxxUM.




Dimensions HLS11M.



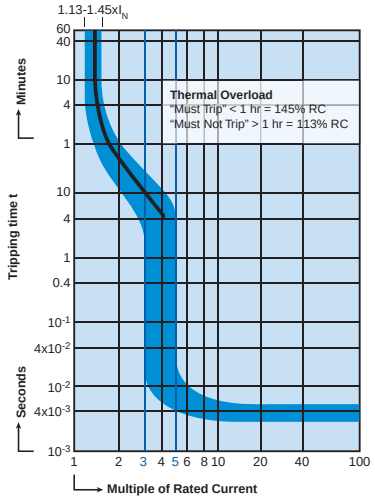

Dimensions UA120UM.



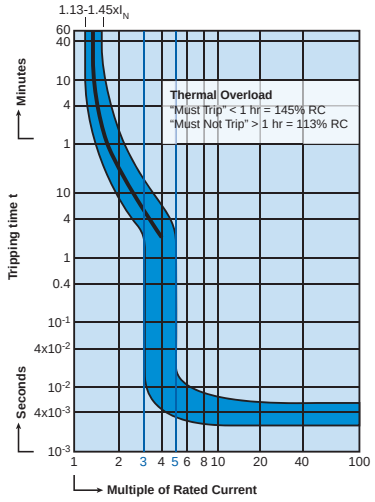

Dimensions N63UM, FAxxUM.

# UR Series Trip Curves

## B Trip Curve




0.5A Through 10A Rated Current

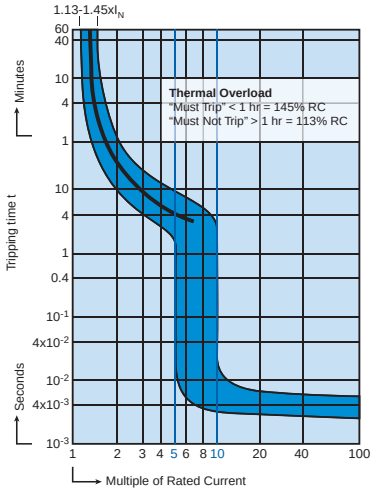



12A Through 63A Rated Current

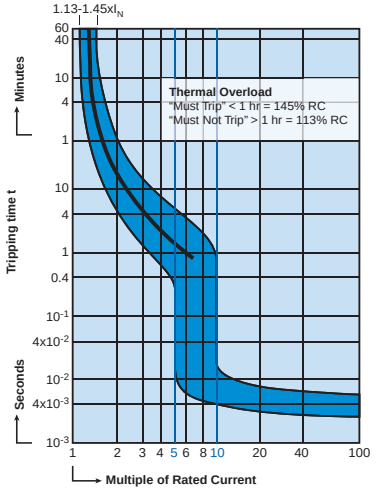
**"B" Magnetic Trip Parameters**
Rated current 0.5A to 63A.

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 Trip Curve




0.5A Through 10A Rated Current

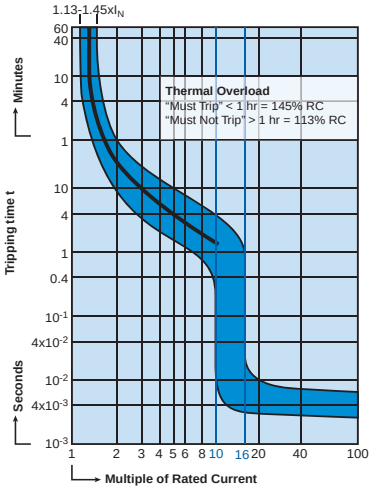



12A Through 63A Rated Current

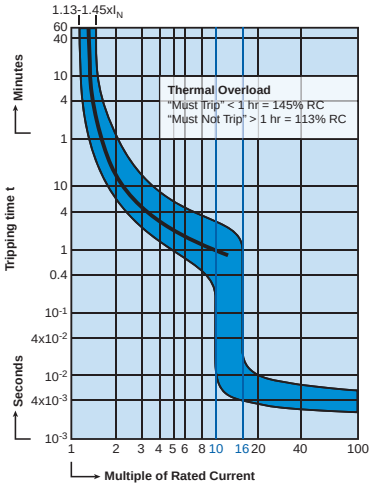
**"C" Magnetic Trip Parameters**
Rated current 0.5A to 63A.

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 Trip Curve




0.3A Through 10A Rated Current




12A Through 63A Rated Current

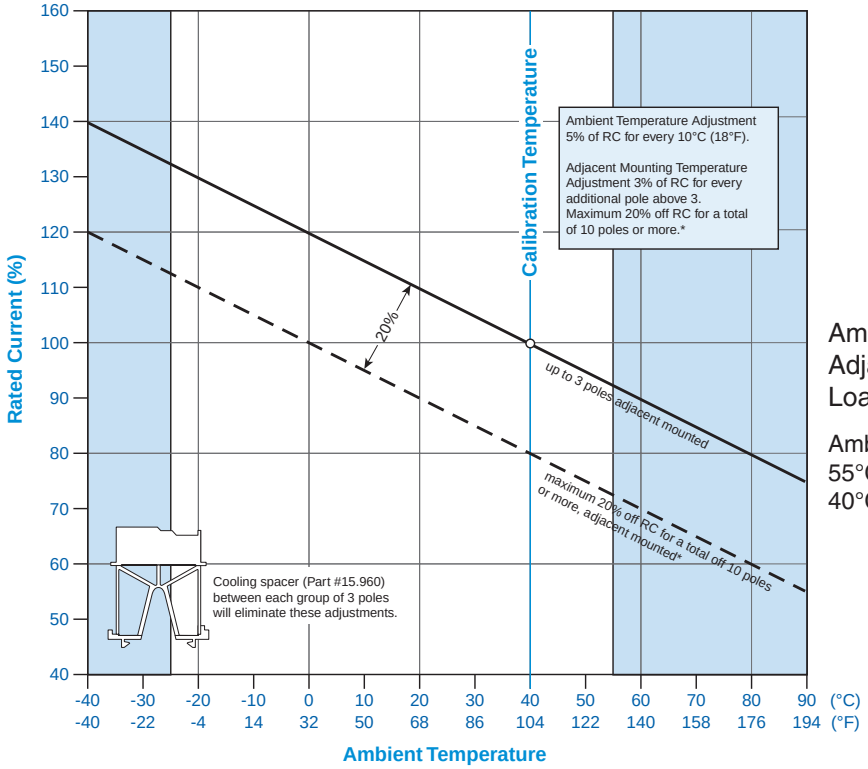
**"D" Magnetic Trip Parameters**
Rated current 0.5A to 63A.

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

## UR Series Internal Resistance

| Rated Current (A) | Trip Characteristic B (Ohm) | C (Ohm) | D (Ohm) |
|---|---|---|---|
| 0.5 | 8.0400 | 6.8540 | 6.0009 |
| 1.0 | 1.7000 | 1.7000 | 1.7560 |
| 2.0 | 0.4190 | 0.4190 | 0.4190 |
| 3.0 | 0.2020 | 0.2020 | 0.2020 |
| 4.0 | 0.1090 | 0.1090 | 0.1090 |
| 5.0 | 0.0654 | 0.0654 | 0.0654 |
| 6.0 | 0.0528 | 0.0528 | 0.0491 |
| 8.0 | 0.0278 | 0.0278 | 0.0240 |
| 10 | 0.0216 | 0.0216 | 0.0187 |
| 12/ 13 | 0.0113 | 0.0084 | 0.0085 |
| 15/ 16 | 0.0085 | 0.0085 | 0.0076 |
| 20 | 0.0067 | 0.0067 | 0.0064 |
| 25 | 0.0050 | 0.0050 | 0.0041 |
| 30/ 32 | 0.0032 | 0.0032 | 0.0027 |
| 40 | 0.0025 | 0.0025 | 0.0022 |
| 50 | 0.0019 | 0.0019 | 0.0018 |
| 60/ 63* | 0.0018 | 0.0018 | 0.0017 |

## Temperature Correction Curve (UL, DL, V-EA, MA and UR series)

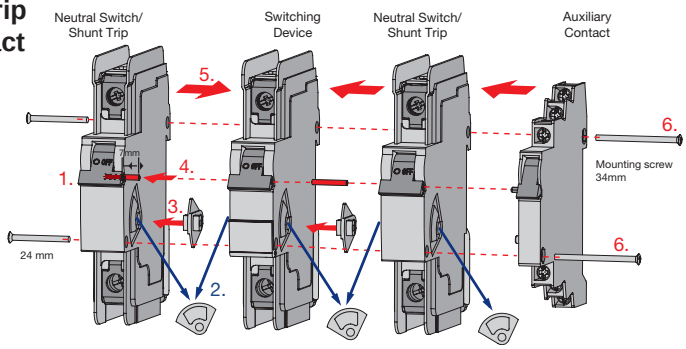



Ambient Temperature and Adjacent Mounting/ Loading Adjustment

Ambient Temperature 25°C to 55°C, Storage Temperature - 40°C to 70°C

## Accessory Mounting Instructions (UL, V-EA and UR series)

### Neutral / Shunt Trip + Auxiliary Contact

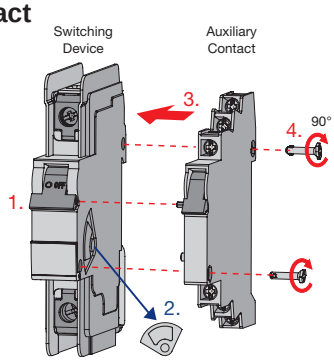



Neutral Poles N63UM, N32UL, N63UL or Shunt Trips FA..UM, FA..UL can be mounted on the right or left side of the circuit protection device.

1. Turn handle to off position.
2. Remove gray cover from the circuit protection device and accessory.
3. Insert linkage component between circuit protection device and neutral pole (N63UM, N32UL, N63UL) or shunt trip (FA..UM, FA..UL).
4. Insert connecting pin into handle.
5. Assemble circuit protection device and neutral pole (N63UM, N32UL, N63UL) or shunt trip (FA..UM, FL..UL).
6. The auxiliary contact (H..UM, H..UL) can also be mounted on the right side by using a different screw (E983419; see accessory pages 14, 32 or 41).

*After final assembly check operation by moving the handle to the ON/OFF position several times.*

### Auxiliary Contact




Auxiliary contact can be mounted on the right side of the circuit protection device only.

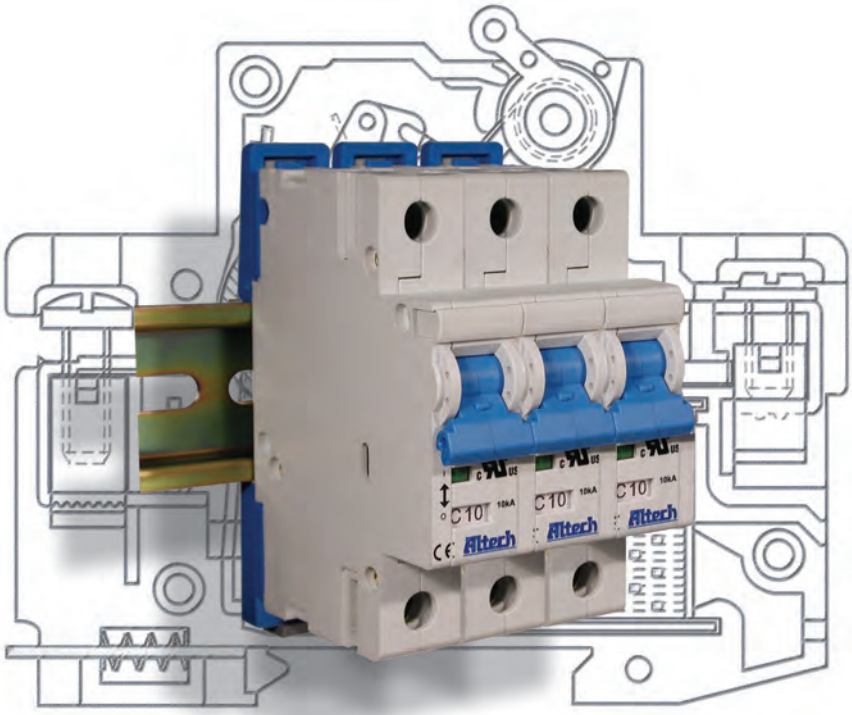
1. Turn handles to OFF position.
2. Remove gray cover from switching device.
3. Combine circuit protection device and auxiliary contact (H...UM, H...UL).
4. Insert mounting screws and connect the two devices by turning the screws 90° clockwise.

*After final assembly check operation by moving the handle to the ON/OFF position several times.*

# R-Series

## UL1077 Recognized Supplementary Protector

- DIN Rail Mounted
- 17.5mm width per pole
- Thermal Magnetic
- 480Y/277V AC, 50/60Hz
- 10kA Short Circuit Withstand Capacity
- Positive Trip indicator (Green - off/tripped, Red - on)
- Applications (on the load side of Branch Circuit Protection) include: Sensitive Electronics, Power Supplies, Appliance circuits, etc.



C US

E301611

| | |
|---|---|
| **Voltage Rating** | 480Y/277VAC |
| **Short Circuit Withstand Rating (UL - Ratings)** | 0.5-6A (RC): 10kA with no back-up fuse<br>8-63A (RC): 10kA with UL-listed Class J back-up fuse; 5kA with no back-up fuse |
| **Interrupting Capacity (IEC/EN60898/60947-2)** | 0.5-63A (RC): 10kA |
| **Calibration Temperature** | 30°C (86°F) |
| **Operating Temperature** | -25° to 60°C (-13° to 140°F) |
| **Storage Temperature** | -25° to 75°C (-13° to 167°F) |
| **Terminal Size Acceptability and Torque** | 14-3 AWG: 17.5 lb-in. (2.0 Nm)<br>18-16 AWG: 25 lb-in. (2.8 Nm) |
| **Terminal Protection Degree** | IP20 at front |
| **Electrical Life** | 6,000 cycles on/off |
| **Mechanical Life** | 10,000 cycles on/off |
| **Wire Connection** | copper wire only 60/75°C |
| **Vibration Resistance** | 3g (18-50Hz) |
| **Mounting Orientation** | In any plane |

**Indicator window**

ON

OFF

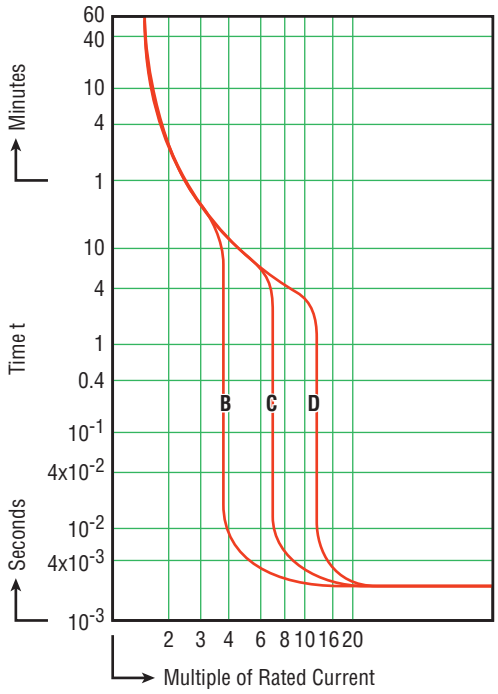
**Trip curve and amperage window display.**

### SHORT CIRCUIT WITHSTAND RATINGS FOR R-SERIES SUPPLEMENTARY PROTECTOR

| Trip Curve | Amp Range | Backup Protection | |
|---|---|---|---|
| | | UL-Listed Class J Fuse up to 10kA | No Backup Fuse Required up to: |
| All | 0.5 - 6A | 4xRC* | 10kA |
| All | 8 - 63A | 4xRC* | 5kA |

*up to nearest rated current

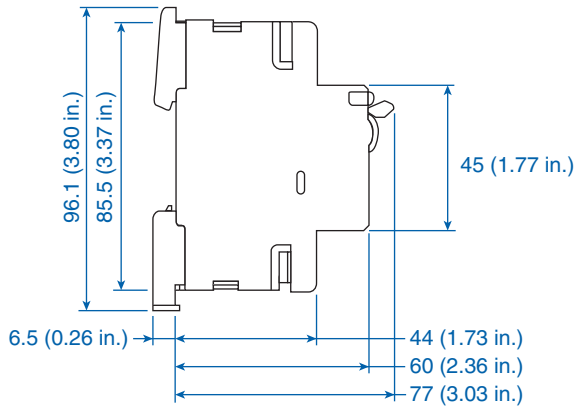
DC voltage rating: 48 VDC (self-certified).



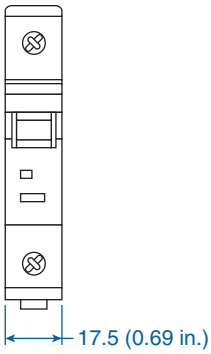

# Time versus Current Trip Curve

*For the exact trip curve, please refer to page 67.*

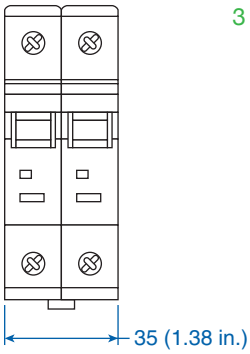
**Dimensions in mm**
**side view**



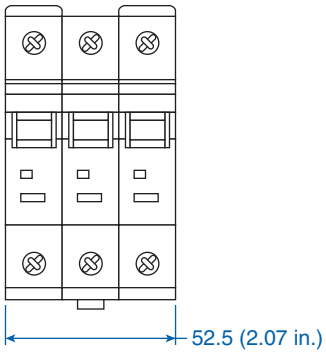

1 POLE




2 POLE




3 POLE




| Trip-Characteristics* | | | | Applications | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Characteristic Trip Boundaries | | | | Lighting Wiring Protection Control Circuits | Business Equipment Appliances | Control Transformers | Power Supplies | General Electronics | Reactive Load |
| Thermal Trip | | Magnetic Trip | | | | | | | |
| Must not Trip>100ms | Must Trip <1hr | Must not Trip>100ms | Must Trip 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 | 20xRC | | | | | | |

**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/Supplementary Protector 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/Supplementary Protector for his specific application.

# B-Trip Characteristic

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

C US
E301611

One Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.5A | 1BU05R |
| 1.0A | 1BU1R |
| 2.0A | 1BU2R |
| 3.0A | 1BU3R |
| 4.0A | 1BU4R |
| 5.0A | 1BU5R |
| 6.0A | 1BU6R |
| 8.0A | 1BU8R |
| 10A | 1BU10R |
| 12A | 1BU12R |
| 13A | 1BU13R |
| 15A | 1BU15R |
| 16A | 1BU16R |
| 20A | 1BU20R |
| 25A | 1BU25R |
| 30A | 1BU30R |
| 32A | 1BU32R |
| 40A | 1BU40R |
| 50A | 1BU50R |
| 60A | 1BU60R |
| 63A | 1BU63R |

**Standard Pack:** 12

**Weight:**
0.5A - 63A: 1.6kg (3.54 lb.)

Two Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.5A | 2BU05R |
| 1.0A | 2BU1R |
| 2.0A | 2BU2R |
| 3.0A | 2BU3R |
| 4.0A | 2BU4R |
| 5.0A | 2BU5R |
| 6.0A | 2BU6R |
| 8.0A | 2BU8R |
| 10A | 2BU10R |
| 12A | 2BU12R |
| 13A | 2BU13R |
| 15A | 2BU15R |
| 16A | 2BU16R |
| 20A | 2BU20R |
| 25A | 2BU25R |
| 30A | 2BU30R |
| 32A | 2BU32R |
| 40A | 2BU40R |
| 50A | 2BU50R |
| 60A | 2BU60R |
| 63A | 2BU63R |

**Standard Pack:** 6

**Weight:**
0.5A - 63A: 1.6kg (3.54 lb.)

Three Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.5A | 3BU05R |
| 1.0A | 3BU1R |
| 2.0A | 3BU2R |
| 3.0A | 3BU3R |
| 4.0A | 3BU4R |
| 5.0A | 3BU5R |
| 6.0A | 3BU6R |
| 8.0A | 3BU8R |
| 10A | 3BU10R |
| 12A | 3BU12R |
| 13A | 3BU13R |
| 15A | 3BU15R |
| 16A | 3BU16R |
| 20A | 3BU20R |
| 25A | 3BU25R |
| 30A | 3BU30R |
| 32A | 3BU32R |
| 40A | 3BU40R |
| 50A | 3BU50R |
| 60A | 3BU60R |
| 63A | 3BU63R |

**Standard Pack:** 4

**Weight:**
0.5A - 63A: 1.66kg (3.67 lb.)

**Four Pole**
**Please contact Altech.**

Non-standard current ratings available. Minimum quantities may apply. Please contact Altech for further details.

# C-Trip Characteristic

**Application Examples:**
Lighting, wiring protection, appliances, business equipment, and control circuit applications. Relatively long thermal trip delay and medium magnetic trip point.

C UL US
E301611

One Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.5A | 1CU05R |
| 1.0A | 1CU1R |
| 2.0A | 1CU2R |
| 3.0A | 1CU3R |
| 4.0A | 1CU4R |
| 5.0A | 1CU5R |
| 6.0A | 1CU6R |
| 8.0A | 1CU8R |
| 10A | 1CU10R |
| 12A | 1CU12R |
| 13A | 1CU13R |
| 15A | 1CU15R |
| 16A | 1CU16R |
| 20A | 1CU20R |
| 25A | 1CU25R |
| 30A | 1CU30R |
| 32A | 1CU32R |
| 40A | 1CU40R |
| 50A | 1CU50R |
| 60A | 1CU60R |
| 63A | 1CU63R |

**Standard Pack:** 12

**Weight:**
0.5A - 63A: 1.6kg (3.54 lb.)

Two Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.5A | 2CU05R |
| 1.0A | 2CU1R |
| 2.0A | 2CU2R |
| 3.0A | 2CU3R |
| 4.0A | 2CU4R |
| 5.0A | 2CU5R |
| 6.0A | 2CU6R |
| 8.0A | 2CU8R |
| 10A | 2CU10R |
| 12A | 2CU12R |
| 13A | 2CU13R |
| 15A | 2CU15R |
| 16A | 2CU16R |
| 20A | 2CU20R |
| 25A | 2CU25R |
| 30A | 2CU30R |
| 32A | 2CU32R |
| 40A | 2CU40R |
| 50A | 2CU50R |
| 60A | 2CU60R |
| 63A | 2CU63R |

**Standard Pack:** 6

**Weight:**
0.5A - 63A: 1.6kg (3.54 lb.)

Three Pole

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.5A | 3CU05R |
| 1.0A | 3CU1R |
| 2.0A | 3CU2R |
| 3.0A | 3CU3R |
| 4.0A | 3CU4R |
| 5.0A | 3CU5R |
| 6.0A | 3CU6R |
| 8.0A | 3CU8R |
| 10A | 3CU10R |
| 12A | 3CU12R |
| 13A | 3CU13R |
| 15A | 3CU15R |
| 16A | 3CU16R |
| 20A | 3CU20R |
| 25A | 3CU25R |
| 30A | 3CU30R |
| 32A | 3CU32R |
| 40A | 3CU40R |
| 50A | 3CU50R |
| 60A | 3CU60R |
| 63A | 3CU63R |

**Standard Pack:** 4

**Weight:**
0.5A - 63A: 1.66kg (3.67 lb.)

Four Pole
Please contact Altech.

Non-standard current ratings available. Minimum quantities may apply. Please contact Altech for further details.

# D-Trip Characteristic

**Application Examples:**
Control transformers, power supplies and reactive loads. Relatively long thermal trip delay and very high magnetic trip point.

C UL US CE

E301611

**One Pole**

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.5A | 1DU05R |
| 1.0A | 1DU1R |
| 2.0A | 1DU2R |
| 3.0A | 1DU3R |
| 4.0A | 1DU4R |
| 5.0A | 1DU5R |
| 6.0A | 1DU6R |
| 8.0A | 1DU8R |
| 10A | 1DU10R |
| 12A | 1DU12R |
| 13A | 1DU13R |
| 15A | 1DU15R |
| 16A | 1DU16R |
| 20A | 1DU20R |
| 25A | 1DU25R |
| 30A | 1DU30R |
| 32A | 1DU32R |
| 40A | 1DU40R |
| 50A | 1DU50R |
| 60A | 1DU60R |
| 63A | 1DU63R |

**Standard Pack:** 12

**Weight:**
0.5A - 63A: 1.6kg (3.54 lb.)

**Two Pole**

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.5A | 2DU05R |
| 1.0A | 2DU1R |
| 2.0A | 2DU2R |
| 3.0A | 2DU3R |
| 4.0A | 2DU4R |
| 5.0A | 2DU5R |
| 6.0A | 2DU6R |
| 8.0A | 2DU8R |
| 10A | 2DU10R |
| 12A | 2DU12R |
| 13A | 2DU13R |
| 15A | 2DU15R |
| 16A | 2DU16R |
| 20A | 2DU20R |
| 25A | 2DU25R |
| 30A | 2DU30R |
| 32A | 2DU32R |
| 40A | 2DU40R |
| 50A | 2DU50R |
| 60A | 2DU60R |
| 63A | 2DU63R |

**Standard Pack:** 6

**Weight:**
0.5A - 63A: 1.6kg (3.54 lb.)

**Three Pole**

| Rated Current | Type/ Cat. No. |
|---|---|
| 0.5A | 3DU05R |
| 1.0A | 3DU1R |
| 2.0A | 3DU2R |
| 3.0A | 3DU3R |
| 4.0A | 3DU4R |
| 5.0A | 3DU5R |
| 6.0A | 3DU6R |
| 8.0A | 3DU8R |
| 10A | 3DU10R |
| 12A | 3DU12R |
| 13A | 3DU13R |
| 15A | 3DU15R |
| 16A | 3DU16R |
| 20A | 3DU20R |
| 25A | 3DU25R |
| 30A | 3DU30R |
| 32A | 3DU32R |
| 40A | 3DU40R |
| 50A | 3DU50R |
| 60A | 3DU60R |
| 63A | 3DU63R |

**Standard Pack:** 4

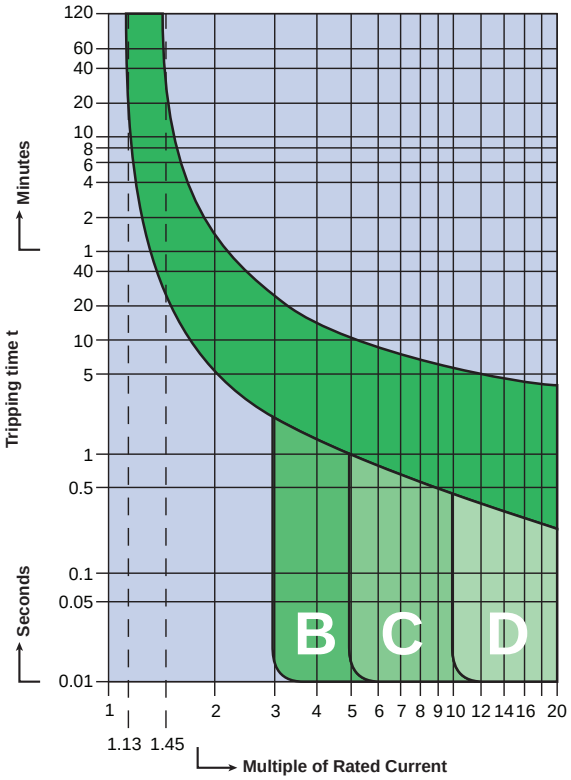
**Weight:**
0.5A - 63A: 1.66kg (3.67 lb.)

**Four Pole**
**Please contact Altech.**

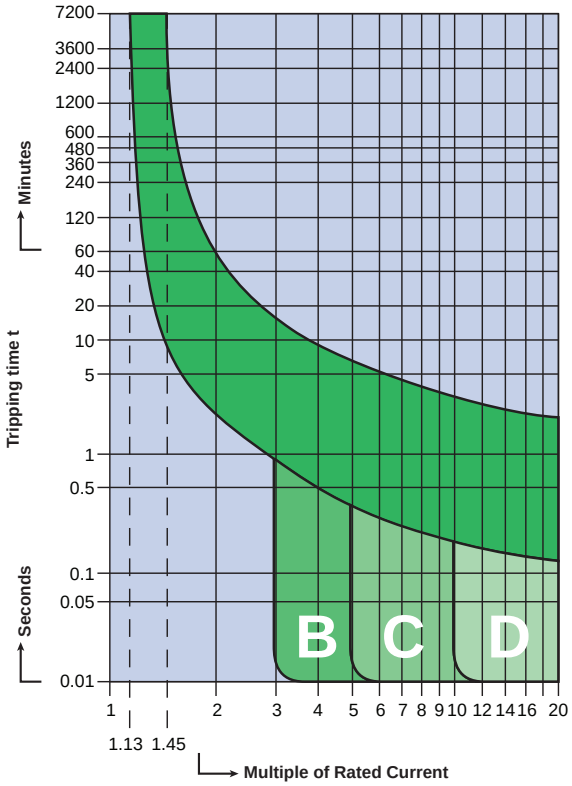
Non-standard current ratings available. Minimum quantities may apply. Please contact Altech for further details.

## R-Series Trip Curves

### B, C and D Trip
### Less than 10A




### B, C and D Trip
### 10A and higher




## Temperature and Power Loss Specifications

| Rated current of MCB | Internal Impedances & Power Loss | | | | | MCB Temperature Compensation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Internal impedance | Power loss on CB | Maximum allowable impedance of breakdown loop (0.2/0.4s) | | | Effective rated current allowing for ambient temperature. | | | | | | | | |
| | Z (m Ω) | P (W) | $Z_s$ (Ω) | | | I cor (A) | | | | | | | | |
| $I_n$ (A) | Char. B,C,D | Char. B,C,D | Char.B | Char.C | Char.D | Ambient Temperature | | | | | | | | |
| | | | | | | -20°C | -10°C | 0°C | 10°C | 20°C | 30°C | 40°C | 50°C | 60°C |
| 0.50 | 6600 | 1.7 | 42.0 | 51.1 | 28.8 | 0.61 | 0.59 | 0.57 | 0.55 | 0.53 | 0.50 | 0.47 | 0.44 | 0.42 |
| 1.00 | 1650 | 1.7 | 46.0 | 25.6 | 14.4 | 1.21 | 1.18 | 1.14 | 1.10 | 1.05 | 1.00 | 0.93 | 0.88 | 0.83 |
| 2.00 | 370 | 1.5 | 23.0 | 12.8 | 7.2 | 2.42 | 2.36 | 2.28 | 2.20 | 2.10 | 2.00 | 1.86 | 1.76 | 1.67 |
| 3.00 | 210 | 1.9 | 15.3 | 8.5 | 4.8 | 3.63 | 3.54 | 3.42 | 3.30 | 3.15 | 3.00 | 2.79 | 2.64 | 2.50 |
| 4.00 | 126 | 2.0 | 11.5 | 6.4 | 3.6 | 4.84 | 4.72 | 4.56 | 4.40 | 4.20 | 4.00 | 3.72 | 3.52 | 3.33 |
| 6.00 | 51 | 1.8 | 7.7 | 4.3 | 2.4 | 7.30 | 7.10 | 6.80 | 6.60 | 6.30 | 6.00 | 5.60 | 5.30 | 5.00 |
| 8.00 | 21 | 1.3 | 5.8 | 3.2 | 1.8 | 9.70 | 9.40 | 9.10 | 8.80 | 8.40 | 8.00 | 7.40 | 7.00 | 6.70 |
| 10.00 | 14.8 | 1.5 | 4.6 | 2.6 | 1.4 | 12.1 | 11.8 | 11.40 | 11.00 | 10.50 | 10.00 | 9.30 | 8.80 | 8.30 |
| 13.00 | 11.3 | 1.9 | 3.5 | 2.0 | 1.1 | 15.7 | 15.3 | 14.80 | 14.30 | 13.70 | 13.00 | 12.10 | 11.50 | 10.80 |
| 16.00 | 7.5 | 1.9 | 2.9 | 1.6 | 0.9 | 19.4 | 18.9 | 18.20 | 17.60 | 16.80 | 16.00 | 14.90 | 14.10 | 13.30 |
| 20.00 | 6.3 | 2.5 | 2.3 | 1.3 | 0.7 | 24.2 | 23.60 | 22.80 | 22.00 | 21.00 | 20.00 | 18.60 | 17.60 | 16.70 |
| 25.00 | 4.4 | 2.8 | 1.8 | 1.0 | 0.6 | 30.3 | 29.50 | 28.50 | 27.50 | 26.30 | 25.00 | 23.30 | 22.00 | 20.80 |
| 32.00 | 3.1 | 3.2 | 1.4 | 0.8 | 0.4 | 38.7 | 37.80 | 36.50 | 35.20 | 33.60 | 32.00 | 29.80 | 28.20 | 26.70 |
| 40.00 | 2.5 | 4.0 | 1.2 | 0.6 | 0.4 | 48.4 | 47.20 | 45.60 | 44.00 | 42.00 | 40.00 | 37.20 | 35.20 | 33.30 |
| 50.00 | 2.2 | 5.5 | 0.9 | 0.5 | 0.3 | 60.5 | 59.0 | 57.00 | 55.00 | 52.50 | 50.00 | 46.50 | 44.10 | 41.70 |
| 63.00 | 1.6 | 6.4 | 0.7 | 0.4 | 0.2 | 76.2 | 74.30 | 71.80 | 69.30 | 66.20 | 63.00 | 58.60 | 55.50 | 52.50 |

# Accessories

## R-Series Supplementary Protector

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Accessories can be factory or field mounted on R-Series supplementary protectors 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.

### Neutral Pole (63A/480Y/277 VAC)

| Description | Type/ Cat. No. | Cable Max | Cable Min | Torque Max | Torque Min |
|---|---|---|---|---|---|
| Neutral | ALTN2 | 25mm² AWG 3 | 2.5mm² AWG 12 | 2Nm 17.5 lb-in | 1.5Nm 12 lb-in |

**Standard Pack:** 10

**Weight:** 1.25kg (2.77 lb.)

Shunt Trip

Undervoltage Trip

### Shunt Trip and Undervoltage Trip

| Description | Shunt Trip Type/Cat. No. | Operational Voltage | Rated Coil Current | Undervoltage Trip* Type/Cat. No. |
|---|---|---|---|---|
| **AC Coil:** | | | | |
| 12V AC | FA12ACR | 8.4 - 13.2V | 6A | UV12ACR |
| 24V AC | FA24ACR | 16.8 - 26.4V | 2.8A | UV24ACR |
| 48V AC | FA48ACR | 33.6 - 52.8V | 0.8A | UV48ACR |
| 60V AC | FA60ACR | 42 - 66V | ~0.7A | UV60ACR |
| 110V AC | FA110ACR | 77 - 121V | 0.5A | UV110ACR |
| 120V AC | FA120ACR | 84 - 132V | ~0.5A | UV120ACR |
| 230V AC | FA230ACR | 161 - 253V | 0.6A | UV230ACR |
| 277V AC | FA277ACR | 194 - 305V | ~0.5A | UV277ACR |
| 400V AC | FA400ACR | 280 - 440V | 0.5A | UV400ACR |
| **DC Coil:** | | | | |
| 12V DC | FA12DCR | 8.4 - 13.2V | ~6A | UV12DCR |
| 24V DC | FA24DCR | 16.8 - 26.4V | 3A | UV24DCR |
| 48V DC | FA48DCR | 33.6 - 52.8V | 2A | UV48DCR |
| 110V DC | FA110DCR | 77 - 121V | 0.6A | UV110DCR |

* Reset-Hold Voltage = 0.85 x $V_E$; Drop-Out Voltage = 0.2 x $V_E$

**Standard Pack:** 10

**Weight:** 1.1kg (2.43 lb.)

| | |
|---|---|
| **Terminal Size - min/max** | 2.5 mm² (12 AWG) / 25mm² (3 AWG) |
| **Terminal Torque - min/max** | 1.5 Nm (12 lb. in.) / 2 Nm (17.5 lb. in.) |

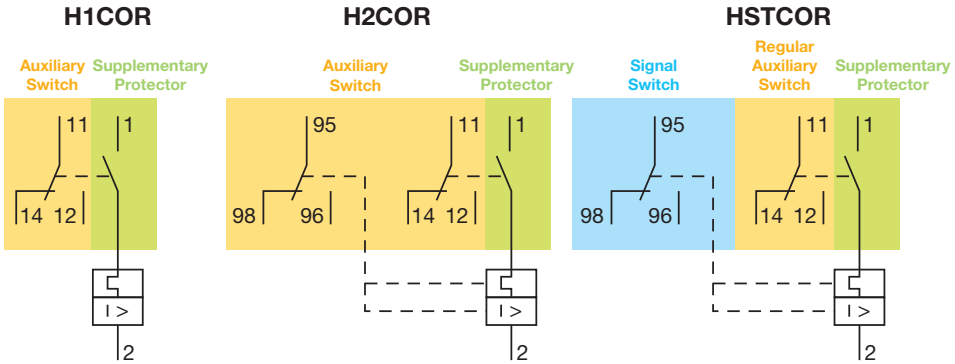
## Auxiliary Contact (4A/230 VAC)

| Description | Type/ Cat. No. | Cable Max | Cable Min | Torque Max | Torque Min |
|---|---|---|---|---|---|
| 1 x CO | H1COR | 2.5mm² AWG 12 | 0.5mm² AWG 20 | 0.5Nm 4 lb-in | 0.33Nm 3 lb-in |
| 2 x CO | H2COR | | | | |
| 1 x CO, 1 Signal & Test Button | HSTCOR | | | | |

**Standard Pack:** 15

**Weight:** H1COR: 0.5kg (1.32 lb.); H2COR, HSTCOR: 0.72kg (1.59 lb.)

## Wiring Diagram



## Lock-out Adapter

Luggage Lock

| Description | Type/ Cat. No. |
|---|---|
| Yellow | EASS2 |

**Standard Pack:** 10

**Weight:** 50g (1.76 oz.)

# Altech UL1077/508 Busbar System

UL508 listed
E205412

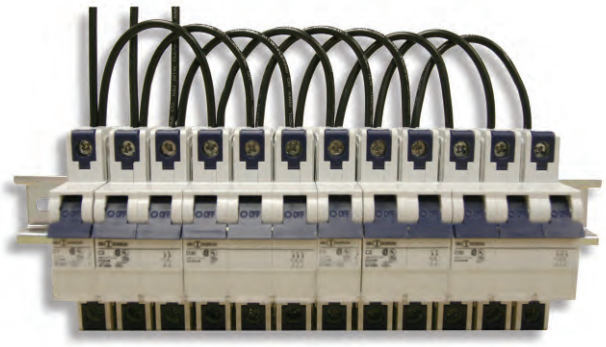
## UL1077/508 Listed Busbars

The Altech Busbar System is an innovative way to jumper up to 57 poles of Manual Motor Controllers (MMC) and Supplementary Protectors (SP).

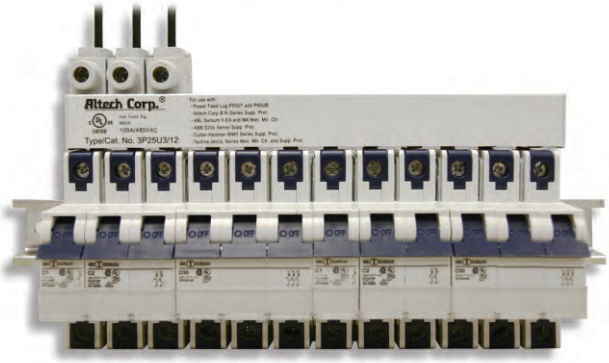
The advantages of this busbar system are:

- 30% Installation time savings
- Panel space savings
- Reduced maintenance
- High electrical ratings

Without Altech Busbar System



With Altech Busbar System




**Universal UL1077/508 Busbar fits most Supplementary Protectors and Manual Motor Controllers in the market!**

*Please contact Altech for details and further information.*

### UL1077/508 Busbar System

- 1-57 different pin configurations
- 1/2 pole spacing (auxiliary switch) available
- Power Feeding:
  Power Feed Lugs (115A), Direct Power Feed (115A), Power Feed Block (200A)
- UL recognized and listed for Altech's R-Series, ABL's UR, V-EA and MA Series of Manual Motor Controllers and Supplementary Protectors
- UL recognized and listed for use with most popular UL1077 supplementary protectors and UL508 Manual Motor Controllers in the market.
- Customers can cut the Busbar without losing the UL approval
- Line/Load reversible

| Technical Specifications | Busbars UL1077/ 508 |
|---|---|
| **Material of Busbar** | Copper |
| **Material of Insulation (Housing)** | Polyamide |
| **Electrical Ratings** | 18mm²: 80A/600V AC/DC*<br>25mm²: 100A/600V AC/DC* |
| **Short Circuit Withstand Rating** | 10kA |
| **Applying Standards** | UL508, VDE0660 Part 100 and 502, VDE 0606, VDE 0659 |

** 1000VDC ratings can be achieved by using all poles at the same voltage and polarity.*

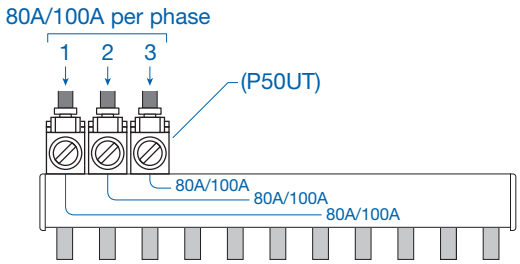
# Altech UL1077/508 Busbar System

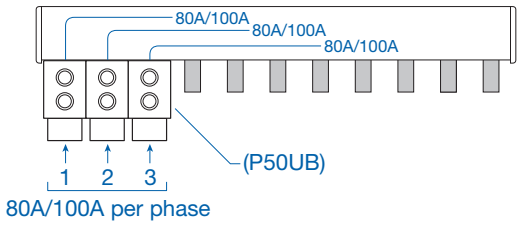
## Power Feed Methods

### 1) Start/ End Feed Method

**P50UT* / P50UB***

With the **P50UT** Power Feed Lug or the **P50UB** Modular Direct Power Feed as a Start/End Feeding Device a maximum input current of **80A/100A per Phase** can be achieved. 80A with 18mm² Busbar and 100A with 25mm² Busbar.

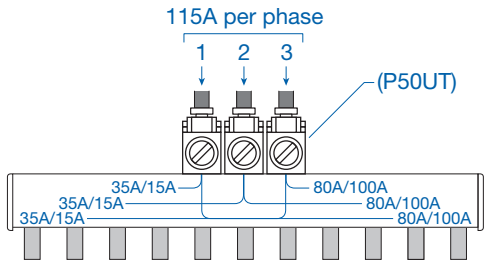


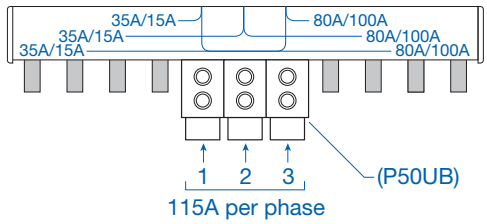




### 2) Center/ Middle Feed Method

**P50UT* / P50UB***

With the **P50UT** Power Feed Lug or the **P50UB** Modular Direct Power Feed as a Center/Middle Feeding Device a maximum input current of **115A per Phase** can be achieved. (18mm²: 80A + 35A; 25mm²: 100A + 15A)

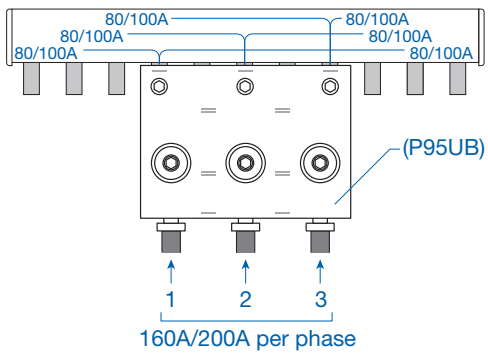



**P95UB***

With the **P95UB** Power Feed Block as a Center/Middle Feeding Device a maximum input current of **160A/200A per Phase** can be achieved (160A with 18mm² Busbar and 200A with 25mm² Busbar).

Note: The Power Feed Block can only be used with a standard spacing ***3 Phase*** UL1077/508 Busbar.

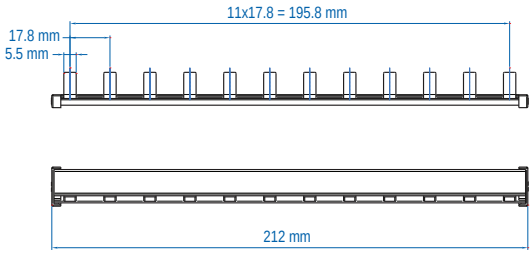


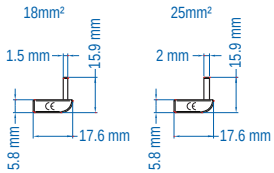

** For complete specifications and description of Feeding Devices see page 78-79.*

# 1 PHASE BUSBAR - standard spacing

18mm² for 80A

UL508 listed
E205412




shown: 1P18U1/12

| 18mm² for 80A* | | | 18mm² for 80A* | | |
|---|---|---|---|---|---|
| Type/ Cat. No. | No. of Pins | Length [mm] | Type/ Cat. No. | No. of Pins | Length [mm] |
| 1P18U1/2 | 2 | 32 | 1P18U1/30 | 30 | 536 |
| 1P18U1/3 | 3 | 54 | 1P18U1/31 | 31 | 554 |
| 1P18U1/4 | 4 | 79 | 1P18U1/32 | 32 | 572 |
| 1P18U1/5 | 5 | 88 | 1P18U1/33 | 33 | 590 |
| 1P18U1/6 | 6 | 106 | 1P18U1/34 | 34 | 608 |
| 1P18U1/7 | 7 | 122 | 1P18U1/35 | 35 | 626 |
| 1P18U1/8 | 8 | 140 | 1P18U1/36 | 36 | 638 |
| 1P18U1/9 | 9 | 158 | 1P18U1/37 | 37 | 656 |
| 1P18U1/10 | 10 | 177 | 1P18U1/38 | 38 | 674 |
| 1P18U1/11 | 11 | 195 | 1P18U1/39 | 39 | 692 |
| 1P18U1/12 | 12 | 212 | 1P18U1/40 | 40 | 710 |
| 1P18U1/13 | 13 | 230 | 1P18U1/41 | 41 | 728 |
| 1P18U1/14 | 14 | 248 | 1P18U1/42 | 42 | 746 |
| 1P18U1/15 | 15 | 269 | 1P18U1/43 | 43 | 764 |
| 1P18U1/16 | 16 | 286 | 1P18U1/44 | 44 | 782 |
| 1P18U1/17 | 17 | 304 | 1P18U1/45 | 45 | 800 |
| 1P18U1/18 | 18 | 322 | 1P18U1/46 | 46 | 818 |
| 1P18U1/19 | 19 | 340 | 1P18U1/47 | 47 | 836 |
| 1P18U1/20 | 20 | 354 | 1P18U1/48 | 48 | 854 |
| 1P18U1/21 | 21 | 374 | 1P18U1/49 | 49 | 872 |
| 1P18U1/22 | 22 | 392 | 1P18U1/50 | 50 | 890 |
| 1P18U1/23 | 23 | 410 | 1P18U1/51 | 51 | 908 |
| 1P18U1/24 | 24 | 428 | 1P18U1/52 | 52 | 926 |
| 1P18U1/25 | 25 | 446 | 1P18U1/53 | 53 | 942 |
| 1P18U1/26 | 26 | 464 | 1P18U1/54 | 54 | 960 |
| 1P18U1/27 | 27 | 482 | 1P18U1/55 | 55 | 978 |
| 1P18U1/28 | 28 | 500 | 1P18U1/56 | 56 | 996 |
| 1P18U1/29 | 29 | 518 | 1P18U1/57 | 57 | 1014 |

## ACCESSORIES

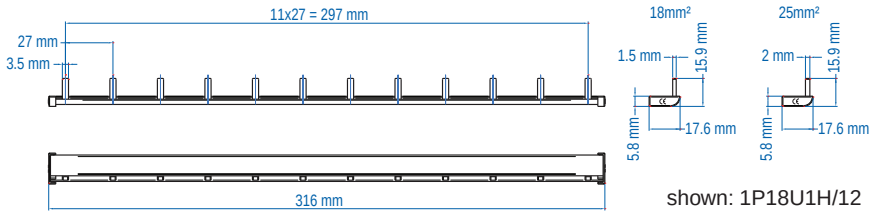
| Type/Cat. No: | P50UT-LP | P50UB | BRB5W | 18/25CAP1P |
|---|---|---|---|---|
| Description: | Power Feed Lug | Modular Direct Power Feed | Insulation Cap | End Cap |

* 25mm² version for 100A available upon request.

# 1 PHASE BUSBAR - 1/2 pole spacing

18mm² for 80A

UL508 listed
E205412




shown: 1P18U1H/12

| 18mm² for 80A* | | |
|---|---|---|
| **Type/ Cat. No.** | **No. of Pins** | **Length [mm]** |
| 1P18U1H/2 | 2 | 40 |
| 1P18U1H/3 | 3 | 68 |
| 1P18U1H/4 | 4 | 95 |
| 1P18U1H/5 | 5 | 122 |
| 1P18U1H/6 | 6 | 150 |
| 1P18U1H/7 | 7 | 176 |
| 1P18U1H/8 | 8 | 204 |
| 1P18U1H/9 | 9 | 230 |
| 1P18U1H/10 | 10 | 258 |
| 1P18U1H/11 | 11 | 284 |
| 1P18U1H/12 | 12 | 316 |
| 1P18U1H/13 | 13 | 338 |
| 1P18U1H/14 | 14 | 365 |
| 1P18U1H/15 | 15 | 392 |
| 1P18U1H/16 | 16 | 420 |
| 1P18U1H/17 | 17 | 446 |
| 1P18U1H/18 | 18 | 474 |
| 1P18U1H/19 | 19 | 500 |

| 18mm² for 80A* | | |
|---|---|---|
| **Type/ Cat. No.** | **No. of Pins** | **Length [mm]** |
| 1P18U1H/20 | 20 | 528 |
| 1P18U1H/21 | 21 | 554 |
| 1P18U1H/22 | 22 | 582 |
| 1P18U1H/23 | 23 | 608 |
| 1P18U1H/24 | 24 | 635 |
| 1P18U1H/25 | 25 | 662 |
| 1P18U1H/26 | 26 | 690 |
| 1P18U1H/27 | 27 | 716 |
| 1P18U1H/28 | 28 | 744 |
| 1P18U1H/29 | 29 | 770 |
| 1P18U1H/30 | 30 | 798 |
| 1P18U1H/31 | 31 | 824 |
| 1P18U1H/32 | 32 | 852 |
| 1P18U1H/33 | 33 | 878 |
| 1P18U1H/34 | 34 | 905 |
| 1P18U1H/35 | 35 | 932 |
| 1P18U1H/36 | 36 | 960 |

## ACCESSORIES

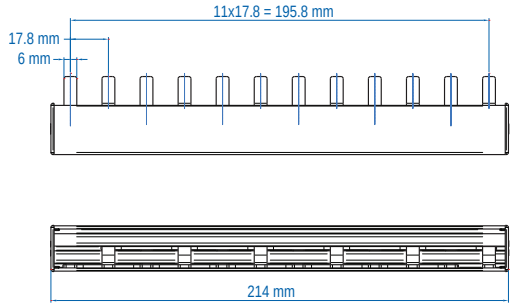
| **Type/Cat. No:** | **P50UT-LP** | **P50UB** | **BRB5W** | **18/25CAP1P** |
|---|---|---|---|---|
| **Description:** | Power Feed Lug | Modular Direct Power Feed | Insulation Cap | End Cap |

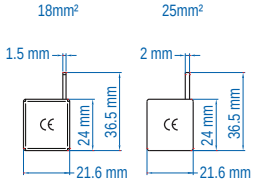
* 25mm² version for 100A available upon request.

# 2 PHASE BUSBAR - standard spacing

18mm² for 80A / 25mm² for 100A

UL508 listed
E205412




shown: 2P18U3/12

| 18mm² for 80A | | | 25mm² for 100A | | |
|---|---|---|---|---|---|
| Type/ Cat. No. | No. of Pins | Length [mm] | Type/ Cat. No. | No. of Pins | Length [mm] |
| 2P18U3/4 | 4 | 69 | 2P25U3/4 | 4 | 69 |
| 2P18U3/6 | 6 | 104 | 2P25U3/6 | 6 | 104 |
| 2P18U3/8 | 8 | 140 | 2P25U3/8 | 8 | 140 |
| 2P18U3/10 | 10 | 177 | 2P25U3/10 | 10 | 177 |
| 2P18U3/12 | 12 | 214 | 2P25U3/12 | 12 | 214 |
| 2P18U3/14 | 14 | 249 | 2P25U3/14 | 14 | 249 |
| 2P18U3/16 | 16 | 283 | 2P25U3/16 | 16 | 283 |
| 2P18U3/18 | 18 | 319 | 2P25U3/18 | 18 | 319 |
| 2P18U3/20 | 20 | 357 | 2P25U3/20 | 20 | 357 |
| 2P18U3/22 | 22 | 390 | 2P25U3/22 | 22 | 390 |
| 2P18U3/24 | 24 | 426 | 2P25U3/24 | 24 | 426 |
| 2P18U3/26 | 26 | 460 | 2P25U3/26 | 26 | 460 |
| 2P18U3/28 | 28 | 498 | 2P25U3/28 | 28 | 498 |
| 2P18U3/30 | 30 | 532 | 2P25U3/30 | 30 | 532 |
| 2P18U3/32 | 32 | 568 | 2P25U3/32 | 32 | 568 |
| 2P18U3/34 | 34 | 604 | 2P25U3/34 | 34 | 604 |
| 2P18U3/36 | 36 | 640 | 2P25U3/36 | 36 | 640 |
| 2P18U3/38 | 38 | 675 | 2P25U3/38 | 38 | 675 |
| 2P18U3/40 | 40 | 710 | 2P25U3/40 | 40 | 710 |
| 2P18U3/42 | 42 | 746 | 2P25U3/42 | 42 | 746 |
| 2P18U3/44 | 44 | 782 | 2P25U3/44 | 44 | 782 |
| 2P18U3/46 | 46 | 818 | 2P25U3/46 | 46 | 818 |
| 2P18U3/48 | 48 | 854 | 2P25U3/48 | 48 | 854 |
| 2P18U3/50 | 50 | 888 | 2P25U3/50 | 50 | 888 |
| 2P18U3/52 | 52 | 924 | 2P25U3/52 | 52 | 924 |
| 2P18U3/54 | 54 | 960 | 2P25U3/54 | 54 | 960 |
| 2P18U3/56 | 56 | 994 | 2P25U3/56 | 56 | 994 |

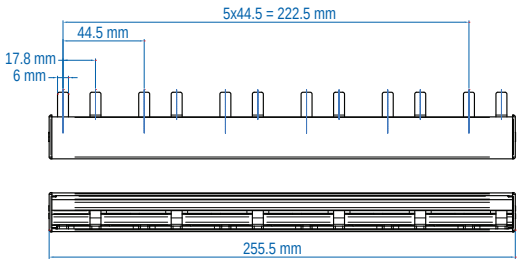
## ACCESSORIES

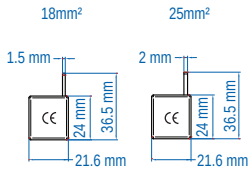
| Type/Cat. No: | P50UT | P50UB | BRB5W | 18/25CAP3P |
|---|---|---|---|---|
| Description: | Power Feed Lug | Modular Direct Power Feed | Insulation Cap | End Cap |

# 2 PHASE BUSBAR - 1/2 pole spacing

18mm² for 80A / 25mm² for 100A

UL508 listed
E205412




shown: 2P18U3H/12

| 18mm² for 80A | | | 25mm² for 100A | | |
|---|---|---|---|---|---|
| Type/ Cat. No. | No. of Pins | Length [mm] | Type/ Cat. No. | No. of Pins | Length [mm] |
| 2P18U3H/4 | 4 | 78 | 2P25U3H/4 | 4 | 78 |
| 2P18U3H/6 | 6 | 124 | 2P25U3H/6 | 6 | 124 |
| 2P18U3H/8 | 8 | 168 | 2P25U3H/8 | 8 | 168 |
| 2P18U3H/10 | 10 | 212 | 2P25U3H/10 | 10 | 212 |
| 2P18U3H/12 | 12 | 256 | 2P25U3H/12 | 12 | 256 |
| 2P18U3H/14 | 14 | 302 | 2P25U3H/14 | 14 | 302 |
| 2P18U3H/16 | 16 | 346 | 2P25U3H/16 | 16 | 346 |
| 2P18U3H/18 | 18 | 390 | 2P25U3H/18 | 18 | 390 |
| 2P18U3H/20 | 20 | 435 | 2P25U3H/20 | 20 | 435 |
| 2P18U3H/22 | 22 | 480 | 2P25U3H/22 | 22 | 480 |
| 2P18U3H/24 | 24 | 524 | 2P25U3H/24 | 24 | 524 |
| 2P18U3H/26 | 26 | 568 | 2P25U3H/26 | 26 | 568 |
| 2P18U3H/28 | 28 | 612 | 2P25U3H/28 | 28 | 612 |
| 2P18U3H/30 | 30 | 658 | 2P25U3H/30 | 30 | 658 |
| 2P18U3H/32 | 32 | 702 | 2P25U3H/32 | 32 | 702 |
| 2P18U3H/34 | 34 | 746 | 2P25U3H/34 | 34 | 746 |
| 2P18U3H/36 | 36 | 790 | 2P25U3H/36 | 36 | 790 |
| 2P18U3H/38 | 38 | 835 | 2P25U3H/38 | 38 | 835 |
| 2P18U3H/40 | 40 | 880 | 2P25U3H/40 | 40 | 880 |
| 2P18U3H/42 | 42 | 924 | 2P25U3H/42 | 42 | 924 |
| 2P18U3H/44 | 44 | 968 | 2P25U3H/44 | 44 | 968 |
| 2P18U3H/46 | 46 | 1012 | 2P25U3H/46 | 46 | 1012 |
| 2P18U3H/48 | 48 | 1058 | 2P25U3H/48 | 48 | 1058 |
| 2P18U3H/50 | 50 | 1102 | 2P25U3H/50 | 50 | 1102 |
| 2P18U3H/52 | 52 | 1146 | 2P25U3H/52 | 52 | 1146 |
| 2P18U3H/54 | 54 | 1192 | 2P25U3H/54 | 54 | 1192 |
| 2P18U3H/56 | 56 | 1235 | 2P25U3H/63 | 56 | 1235 |

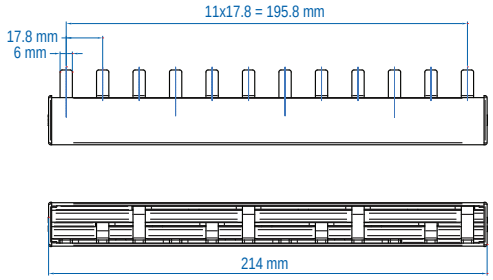
## ACCESSORIES

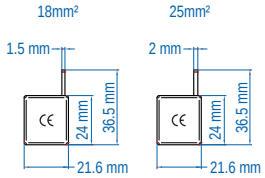
| Type/Cat. No: | P50UT | P50UB | BRB5W | 18/25CAP3P |
|---|---|---|---|---|
| Description: | Power Feed Lug | Modular Direct Power Feed | Insulation Cap | End Cap |

# 3 PHASE BUSBAR - standard spacing

18mm² for 80A / 25mm² for 100A

UL508 listed
E205412




shown: 3P18U3/12

| 18mm² for 80A | | | 25mm² for 100A | | |
|---|---|---|---|---|---|
| Type/ Cat. No. | No. of Pins | Length [mm] | Type/ Cat. No. | No. of Pins | Length [mm] |
| 3P18U3/6 | 6 | 104 | 3P25U3/6 | 6 | 104 |
| 3P18U3/9 | 9 | 159 | 3P25U3/9 | 9 | 159 |
| 3P18U3/12 | 12 | 214 | 3P25U3/12 | 12 | 214 |
| 3P18U3/15 | 15 | 266 | 3P25U3/15 | 15 | 266 |
| 3P18U3/18 | 18 | 318 | 3P25U3/18 | 18 | 318 |
| 3P18U3/21 | 21 | 374 | 3P25U3/21 | 21 | 374 |
| 3P18U3/24 | 24 | 427 | 3P25U3/24 | 24 | 427 |
| 3P18U3/27 | 27 | 481 | 3P25U3/27 | 27 | 481 |
| 3P18U3/30 | 30 | 545 | 3P25U3/30 | 30 | 545 |
| 3P18U3/33 | 33 | 586 | 3P25U3/33 | 33 | 586 |
| 3P18U3/36 | 36 | 639 | 3P25U3/36 | 36 | 639 |
| 3P18U3/39 | 39 | 692 | 3P25U3/39 | 39 | 692 |
| 3P18U3/42 | 42 | 746 | 3P25U3/42 | 42 | 746 |
| 3P18U3/45 | 45 | 800 | 3P25U3/45 | 45 | 800 |
| 3P18U3/48 | 48 | 854 | 3P25U3/48 | 48 | 854 |
| 3P18U3/51 | 51 | 906 | 3P25U3/51 | 51 | 906 |
| 3P18U3/54 | 54 | 960 | 3P25U3/54 | 54 | 960 |
| 3P18U3/57 | 57 | 1012 | 3P25U3/57 | 57 | 1012 |

## ACCESSORIES

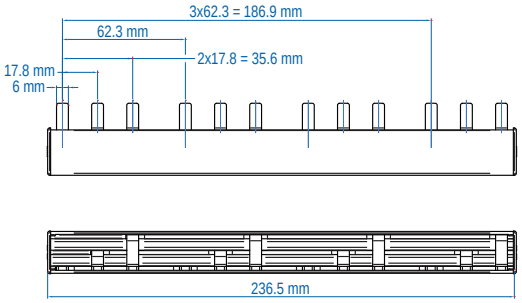
| Type/Cat. No: | P50UT | P50UB | P95UB |
|---|---|---|---|
| Description: | Power Feed Lug | Modular Direct Power Feed | Power Feed Block |

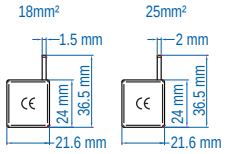
| Type/Cat. No: | BRB5W | 18/25CAP3P |
|---|---|---|
| Description: | Insulation Cap | End Cap |

# 3 PHASE BUSBAR - 1/2 pole spacing

18mm² for 80A / 25mm² for 100A

UL508 listed
E205412




shown: 3P18U3H/12

| 18mm² for 80A | | | 25mm² for 100A | | |
|---|---|---|---|---|---|
| Type/ Cat. No. | No. of Pins | Length [mm] | Type/ Cat. No. | No. of Pins | Length [mm] |
| 3P18U3H/6 | 6 | 114 | 3P25U3H/6 | 6 | 114 |
| 3P18U3H/9 | 9 | 176 | 3P25U3H/9 | 9 | 176 |
| 3P18U3H/12 | 12 | 235 | 3P25U3H/12 | 12 | 235 |
| 3P18U3H/15 | 15 | 302 | 3P25U3H/15 | 15 | 302 |
| 3P18U3H/18 | 18 | 364 | 3P25U3H/18 | 18 | 364 |
| 3P18U3H/21 | 21 | 426 | 3P25U3H/21 | 21 | 426 |
| 3P18U3H/24 | 24 | 488 | 3P25U3H/24 | 24 | 488 |
| 3P18U3H/27 | 27 | 550 | 3P25U3H/27 | 27 | 550 |
| 3P18U3H/30 | 30 | 612 | 3P25U3H/30 | 30 | 612 |
| 3P18U3H/33 | 33 | 675 | 3P25U3H/33 | 33 | 675 |
| 3P18U3H/36 | 36 | 738 | 3P25U3H/36 | 36 | 738 |
| 3P18U3H/39 | 39 | 800 | 3P25U3H/39 | 39 | 800 |
| 3P18U3H/42 | 42 | 862 | 3P25U3H/42 | 42 | 862 |
| 3P18U3H/45 | 45 | 924 | 3P25U3H/45 | 45 | 924 |
| 3P18U3H/48 | 48 | 982 | 3P25U3H/48 | 48 | 982 |
| 3P18U3H/51 | 51 | 1048 | 3P25U3H/51 | 51 | 1048 |
| 3P18U3H/54 | 54 | 1112 | 3P25U3H/54 | 54 | 1112 |
| 3P18U3H/57 | 57 | 1174 | 3P25U3H/57 | 57 | 1174 |

## ACCESSORIES

| Type/Cat. No: | P50UT | P50UB |
|---|---|---|
| Description: | Power Feed Lug | Modular Direct Power Feed |

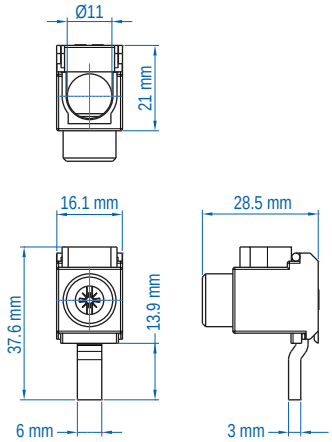
| Type/Cat. No: | BRB5W | 18/25CAP3P |
|---|---|---|
| Description: | Insulation Cap | End Cap |

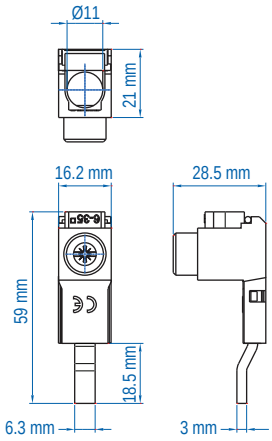
# Power Feed Devices

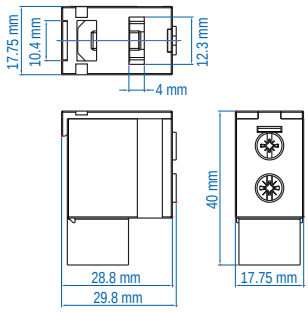
Easy connection of power supply wires to the busbar/MCB. Power Feed Devices ensure permanent connection.

| | Power Feed Lug | Power Feed Lug | Modular Direct Power Feed |
|---|---|---|---|
| | | | |
| | UL508 listed E205412 | UL508 listed E205412 | UL508 listed E205412 |
| **Type/Cat. No.** | **P50UT-LP** | **P50UT** | **P50UB** |
| **Electrical Ratings** | 115A/1000V AC/DC | 115A/1000V AC/DC | 115A/1000V AC/DC |
| **Wire Range** | 10-1/0 AWG Cu | 10-1/0 AWG Cu | 14-1 AWG Cu |
| **Wire Temperature Rating** | 60°C | 60°C | 75°C |
| **Recommended/ Required Torque** | 5.6Nm (50lb. in.) | 5.6Nm (50lb. in.) | Cable Side 3.5Nm/31 lb. in. (14-6AWG) 4Nm/35.4 lb. in. (4-1AWG) Busbar Side 2.5Nm/22 lb. in. |
| **Material of Lug/ Terminal** | Brass | Brass | Brass |
| **Insulation Material** | Polyamide | Polyamide | Polyamide |
| **For use with** | UL1077/508 18 and 25mm² 1 phase busbars | UL1077/508 18 and 25mm² 2, 3 phase busbars | UL1077/508 18 and 25mm² 1, 2, 3 phase busbars |

# Dimensions

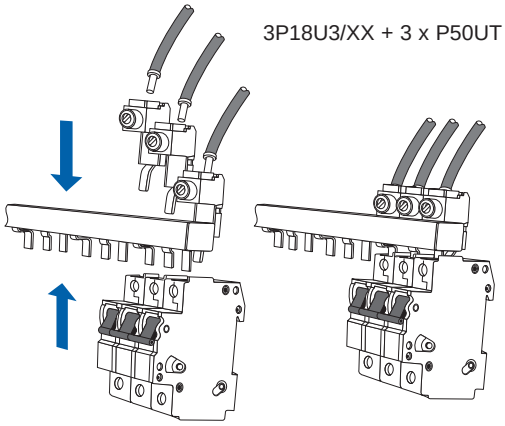


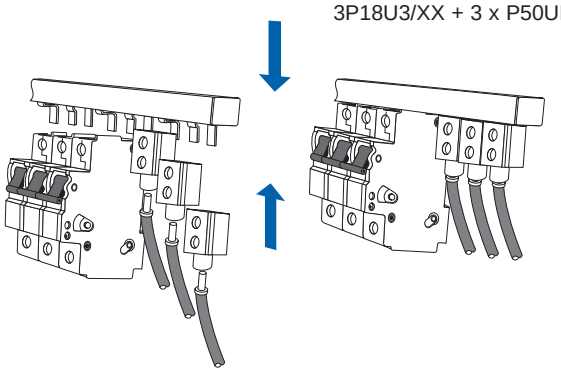




# Assembly Instructions

3P18U3/XX + 3 x P50UT



3P18U3/XX + 3 x P50UB



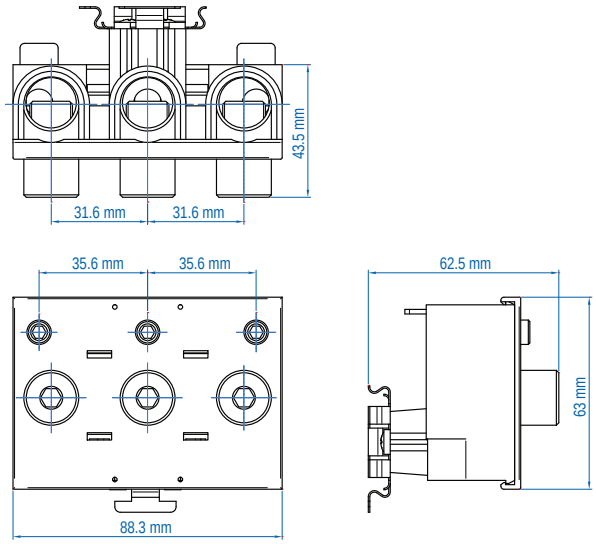
The power feed lugs (Cat. # P50UT) fit together with the lugs of the busbar in the terminals of the connected device.

## Power Feed Block

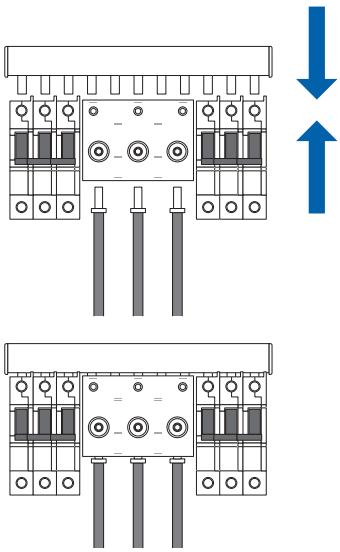
UL508 listed
E205412

| Type/Cat. No. | P95UB |
|---|---|
| Electrical Ratings | 200A/ 600V AC/DC |
| Wire Range | 1-4/0 AWG Cu |
| Wire Temperature Rating | 75°C |
| Recommended/ Required Torque | 19.5Nm (175lb. in.) |
| Material of Lug/ Terminal | Brass |
| Insulation Material | Polyamide |
| For use with | UL1077/508 18 and 25mm² 3 phase busbars (standard spacing only) |

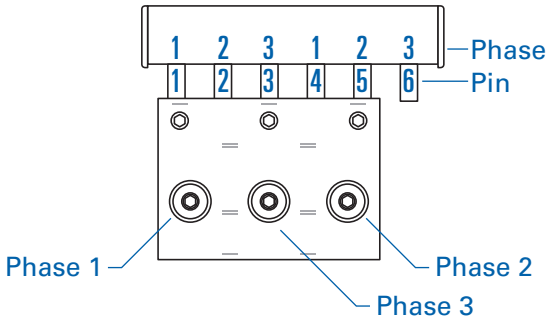
## Dimensions




## Assembly Instructions



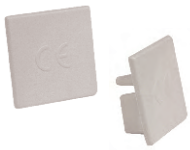
NOTE: The Power Feed Block uses the space of 5 Pins of the standard spacing Busbar (see drawing below). Phase 1 connects to Pin 1, Phase 2 to Pin 3 and Phase 3 to Pin 5. Pin 2 and 4 are not in use. Pin 6 should be covered with an insulation cap if phase sequence stays the same. Therefore, the Power Feed Block covers 6 pins to connect to the three phases.




## Miscellaneous Accessories

### End Caps

18/25CAP1P



18/25CAP3P

**Type/Cat. No:** **18/25CAP1P**
**For use with:** 18/25mm² 1 phase Busbar

**Type/Cat. No:** **18/25CAP3P**
**For use with:** 18/25mm² 2, 3 phase Busbar

### Insulation Caps

**Type/Cat. No:** **BRB5W** *(5 per strip)*
**For use with:** 18/25mm² 1, 2, 3 phase Busbar

# TR11 Series

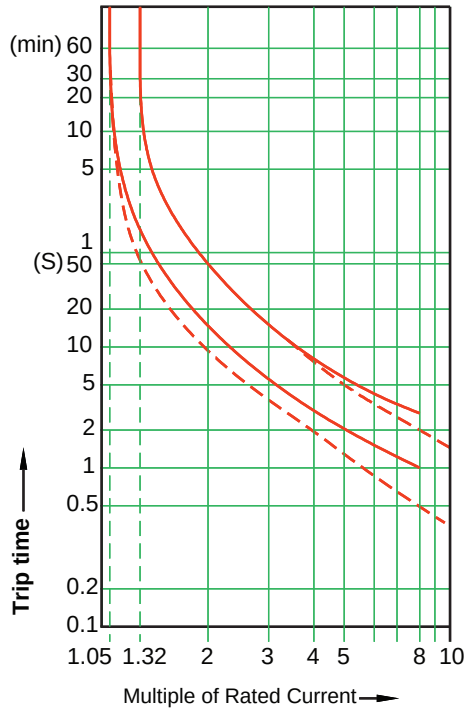
## UL1077 Recognized Supplementary Protector/ Circuit Breaker for Equipment

**Applications:**
Protection of Control Transformers, UPS, Power strips, Solenoids etc., against damage due to overload conditions.

E209569 up to 12 Amps

| | |
|---|---|
| Current Rating (A) | 0.1 - 16A |
| Standard Current Rating (A) | 0.1, 0.25, 0.5, 0.9, 1.0, 1.2, 1.5, 1.8, 2.0, 2.2, 2.5, 2.7, 3.0, 3.3, 4.0, 5.0, 6.0, 6.5, 7.0, 8.0, 9.0, 10.0, 12.0, 15.0, 16.0 |
| Rated Voltage | 240V AC, 50/60Hz, 50V DC / 24V DC (VDE) |
| Initial insulation resistance (500V DC) | > 100 M ohms. (As per EN 60934) |
| Dielectric strength | 1.5 KV for One minute. (As per EN 60934) |
| Overload Switching Capacity | 6 $I_n$ - AC up to 9.0A<br>4 $I_n$ - DC up to 12.0A (As per EN 60934)<br>60A AC/DC Max. - from 10.0A to 12.0A |
| Maximum Breaking Capacity | 8x $I_n$ AC/DC for <6.0A<br>60A AC/DC MAX. for > 6.0A |
| Power Loss | 1 - 2 Watts |
| Operating Temperature | Maximum 60°C Ambient |
| Operational Life at 2x$I_n$ | 1000 Cycles |
| Rated Conditional Short Circuit Current Capacity I nc1 (PC1) Ref.: EN60934 | 1000 Amps PC 1,240V AC, 24V DC, Ref.: EN60934<br>SC: 1KA, C1, 240V AC 50V DC<br>Ref.: CSA22.2 No.235-04, UL-1077 |
| Tripping Current Code TC | TC 2Ref.: CSA22.2 No. 235-04 |
| Overload Rating | OL0 240V AC, 50V DC, Ref.: CSA22.2 No. 235-04 |
| Application Type | General Industrial Ref.: CSA22.2 No. 235-04 |
| Method of Tripping | Thermal 'TO' Trip Free |
| Type of Actuation | Reset Type 'R' |
| Application Standards | CSA 22.2 No. 235-04, UL-1077, EN 60934 |
| Weight | aprox. 11g |
| Approvals | 0.1 - 16.0A 240V AC 50V DC; 0.5 - 12.0A 240V AC 24V DC |

### Operating Characteristic




Rated current < 6 A
≥ 6 A
Ambient Temperature 23°C

## ORDERING INSTRUCTIONS

TR11 – B – X – 63 – B – 1 – A – 7.0A

PRODUCT TYPE

MOUNTING TYPE
Body Mouting - B
Central nut - C
Snap fit - S
Wing clip - W
Wing clip - D
Wing clip - D1
PCB - P

TERMINAL CONFIGURATION
Terminal 1&2 - X
upto $I_n$ 12A
Terminal 2&3 - Y
$I_n$ >6A
Shunt terminal - N
Terminal 1, 2 & 3
Upto $I_n$ 6A

TERMINAL SIZE
6.3 - 63
4.8 - 48
2.8 - 28
PCB - 10

COLOUR OF THE SLIDER WITHOUT TRIP BAND
Black - B
White - W

COLOUR OF THE SLIDER WITH TRIP BAND
Black - BB (Black slider with white trip band)
White - WB (White slider with black trip band)

SLIDER MARKING
0 - None
1 - Vertical
2 - Horizontal

MOUNTING NUT
N - None
A - Knurled metal nut
B - Sloted knurled metal nut
C - Hex metal nut
D - Sealing knurled boot

CURRENT RATING
0.1 TO 16.0A

**Time Current Characteristics:**
The standard characteristic is valid for ambient temperatures of +23°C. If the device is to be used in an ambient temperature other than +23°C, allowances must be made when selecting the current rating according to the following guidelines:

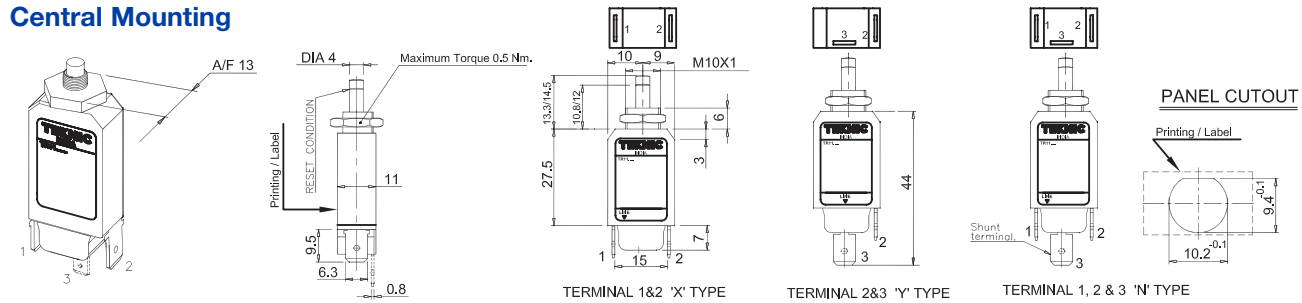
| Ambient temp.°C | -20 | -5 | 0 | +10 | +20 | +30 | +40 | +50 | +60 |
|---|---|---|---|---|---|---|---|---|---|
| Correction Factor | 0.8 | 0.88 | 0.9 | 0.96 | 1 | 1.05 | 1.12 | 1.2 | 1.3 |

| Example: | | |
|---|---|---|
| | Normal Continuous Current | 1.8A |
| | Ambient Temperature | 40°C |
| | Correction Factor | 1.12 |
| | Recommended Current Rating | 1.8 x 1.12 = 2.016 |
| | Select the nearest | 2.0A |

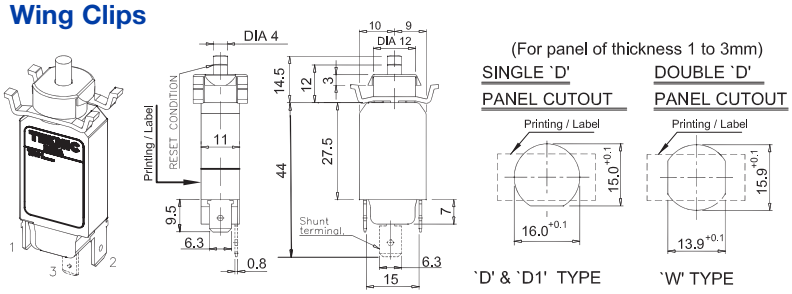
*** SPECIAL ORDER ONLY. Contact Altech for more details. TR11-C Series stocked; contact Altech for availability. PCB Mounting and additional Shunt Terminal available, please contact Altech.**

# TR-11 Dimensions & Mounting Options

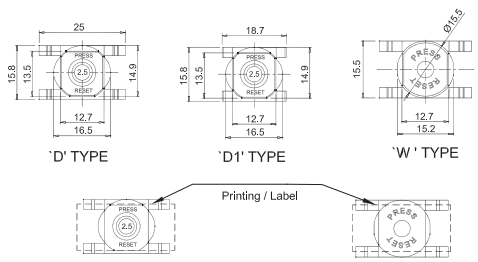
## Central Mounting



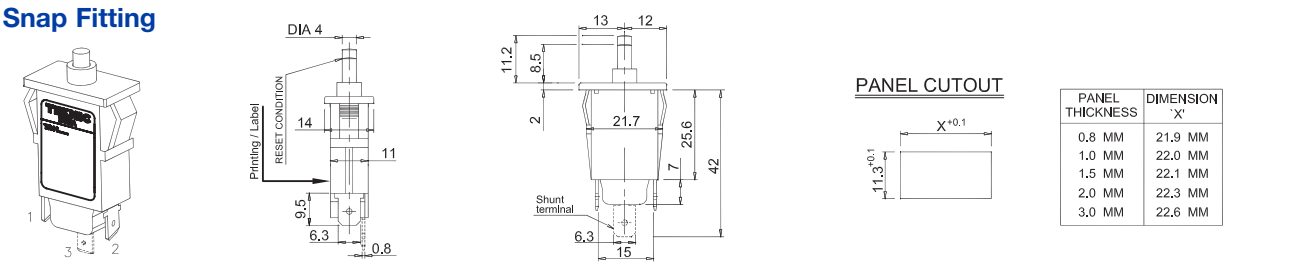

## Wing Clips




## Wing Clip Types

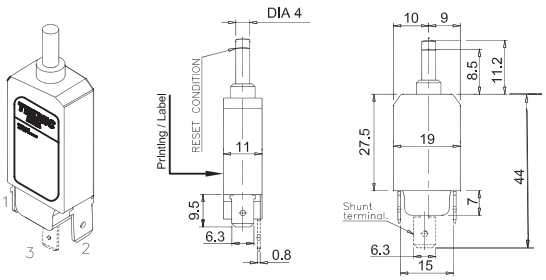



## Snap Fitting

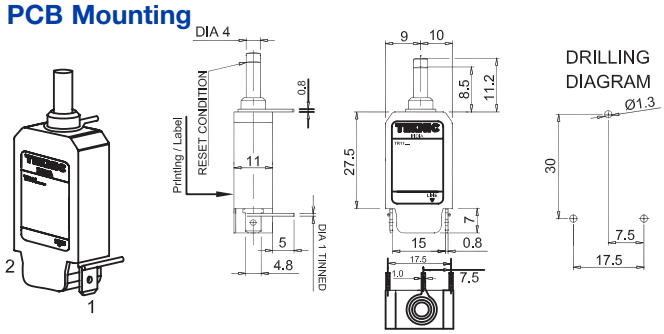



| PANEL THICKNESS | DIMENSION `X' |
|---|---|
| 0.8 MM | 21.9 MM |
| 1.0 MM | 22.0 MM |
| 1.5 MM | 22.1 MM |
| 2.0 MM | 22.3 MM |
| 3.0 MM | 22.6 MM |

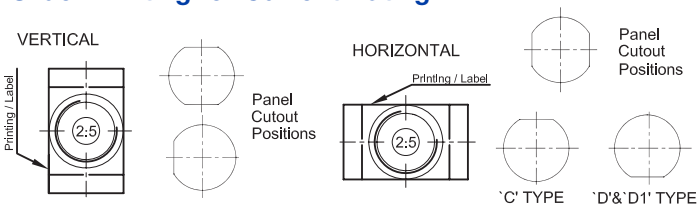
## Body Mounting



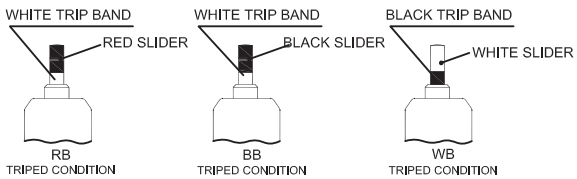

## PCB Mounting



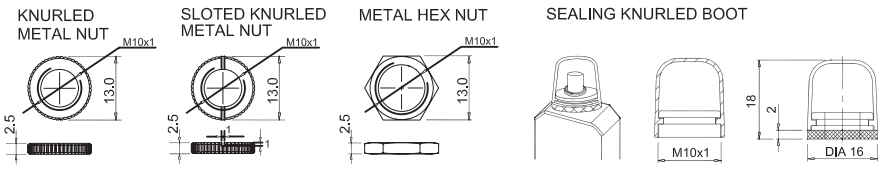

## Slider Printing for Current Rating




## Slider Color with Trip Band




## Accessories

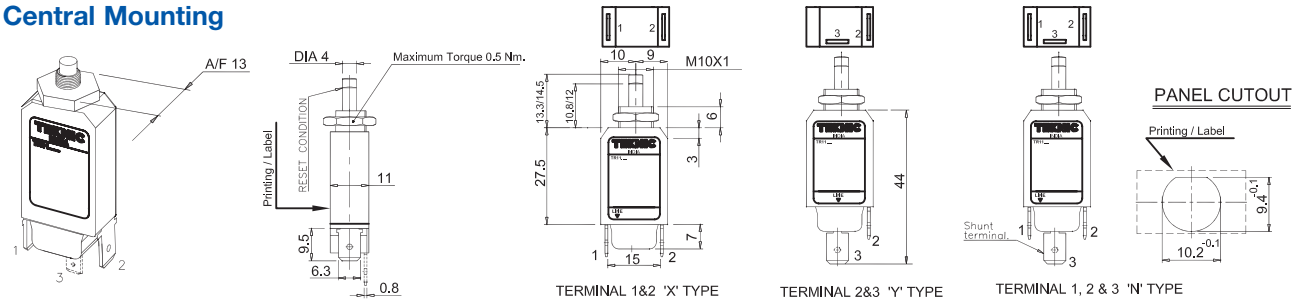



A sealing boot for central mounting Type (C) Circuit breaker to provide dust &splash protection (IP 54).

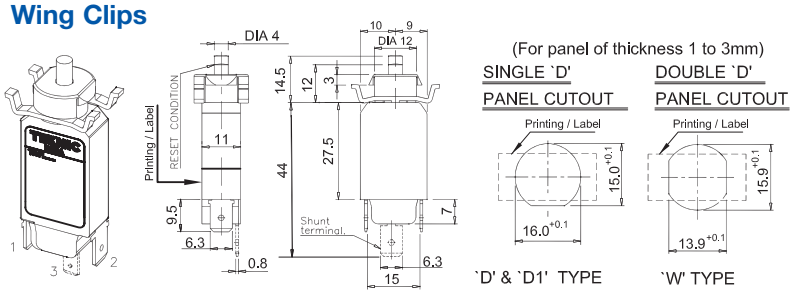
**Dimensions in mm** (to convert to inches multiply by 0.03937)

# TR-11 Dimensions & Mounting Options

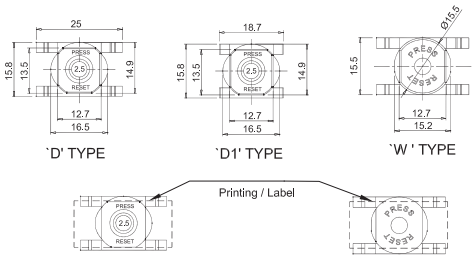
## Central Mounting



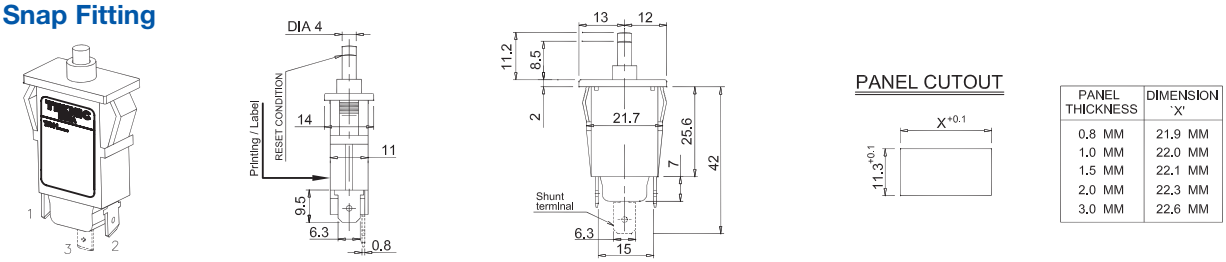

## Wing Clips




## Wing Clip Types

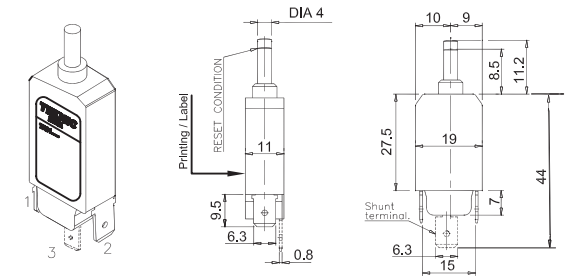



## Snap Fitting

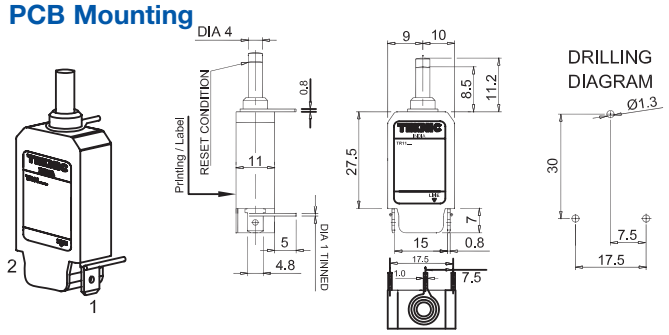



| PANEL THICKNESS | DIMENSION `X' |
|---|---|
| 0.8 MM | 21.9 MM |
| 1.0 MM | 22.0 MM |
| 1.5 MM | 22.1 MM |
| 2.0 MM | 22.3 MM |
| 3.0 MM | 22.6 MM |

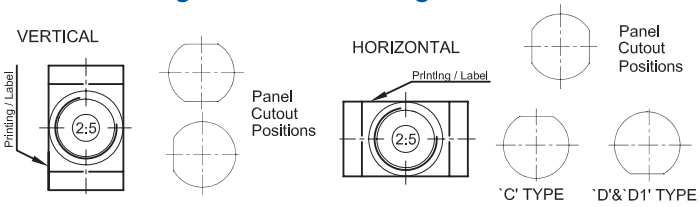
## Body Mounting



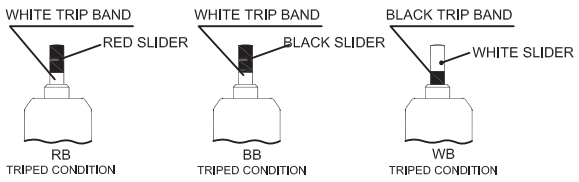

## PCB Mounting



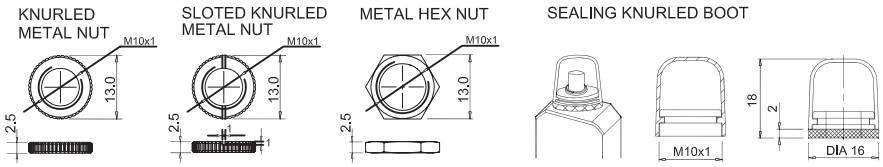

## Slider Printing for Current Rating




## Slider Color with Trip Band




## Accessories




A sealing boot for central mounting Type (C) Circuit breaker to provide dust &splash protection (IP 54).

**Dimensions in mm** (to convert to inches multiply by 0.03937)

# TR20 Series

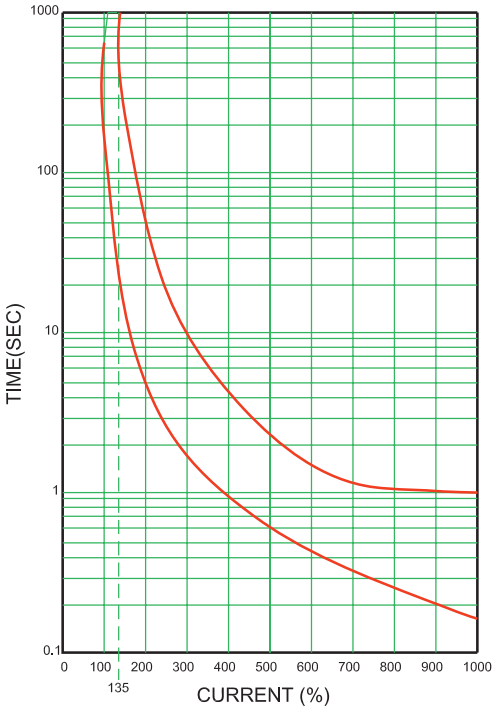
## UL1077 Recognized Supplementary Protector/ Circuit Breaker for Equipment

**Applications:**
Protection of Control Transformers, UPS, Power strips, Solenoids etc., against damage due to overload conditions.

E209569 up to 12 Amps

| | |
|---|---|
| Application Type | General Industrial Ref. CSA22.2 No.235-04 |
| Function | SPST |
| Standard Current Rating (A) | 3, 4, 5, 6, 7, 8, 10, 12, 15, 16 & 20<br>AC-Inductive, DC-Resistive |
| Rated Voltage | 125/125V AC, 50/60 Hz, 50V DC |
| Method of tripping | Thermol TO, Cycling trip - free |
| Type of Actuation | Reset Type 'R' |
| Initial insulation resistance | > 100 M ohms. (DC500V) |
| Dielectric strength | 1.500 KV for 1 minute |
| Impulse withstand voltage | 2.5kV Ref.: EN 60934 |
| Contact Gap | Micro disconnection(μ) Ref.: EN60934 |
| Housing Material | Thermoplastic / Thermoset |
| Slider Material | Thermoset |
| Contact Material | Silver alloy |
| Terminal Material | Copper alloy |
| Fixing | By a nut or snap fitting |
| Resettable overload capacity | 10 times the rated current |
| Overload capacity | 2 times rated current for 50 switching cycles min.<br>Ref.: UL 1077 |
| Rated Short Circuit Capacity $I_{cn}$<br>Ref.: EN60934 | Min 6 times the rated current ($6_{In}$) for 250V AC (Inductive)<br>Min 4 times the rated current ($4_{In}$) for 50V DC (Resistive) |
| Rated Conditional Short Circuit Current Capacity $I_{nc1}$ (PC1)<br>Ref.: EN60934 | 1000 Amps 125/250V AC, 50V DC<br>SC: 1kA, C1, 125/250V AC, 50V AC<br>Ref.: CSA22.2 No.235-04, UL-1077 |
| Tripping Current Code TC | TC 2Ref.: CSA22.2 No. 235-04 |
| Overload Rating | OLO 125/250V AC, 50V DC, Ref.: CSA 22.2 No. 235-04 |
| Weight | aprox. 17g |
| Application Standards | UL 1077, CSA 22.2 No. 235-04, EN 60934 |
| Approvals | |

### Operating Characteristic




## ORDERING INSTRUCTIONS

TR20 – C – 63 S – B 1 – A – 7.0A – 2

PRODUCT TYPE

MOUNTING TYPE
- A Plastic 3/8"-27UNS
- B Plastic M11
- W Wing clip

TERMINAL SIZE
- 63 6.3 x 0.8mm

TERMINAL CONFIGURATION
- S Straight
- L 90° Bend,Left side
- R 90 Bend, Right side

SLIDER COLOR
- B Black
- W White with trip indication

SLIDER MARKING
- 0 None
- 1 White, Vertical
- 2 Black, Vertical
- 3 White, Horizontal
- 4 Black, Horizontal

MOUNTING NUT
- N None or wing clip
- A Plastic knurled
- B Metal knurled
- C Metal Hex Nut
- D Sealing knurled boot

CURRENT RATING
3A, 4A, 5A, 6A, 7A, 8A, 10A, 12A, 15A, 10A & 20A

INDICATOR PLATE
- 0 None
- 1 Black letters on Aluminium Background
- 2 Silver Letters on Black Background

**Time Current Characteristics:**
The standard characteristic is valid for ambient temperatures of +25°C. If the device is to be used in an ambient temperature other than +25°C, allowances must be made when selecting the current rating according to the following guidelines:

| Ambient temp. °C | -20 | -10 | 0 | +10 | +25 | +30 | +35 | |
|---|---|---|---|---|---|---|---|---|
| Multiplication Factor 3A to 4A | 0.8 | 0.85 | 0.9 | 0.9 | 1 | 1 | 1.1 | |
| Multiplication Factor 5A to 20A | 0.8 | 0.85 | 0.88 | 0.9 | 1 | 1.1 | 1.3 | 1.4 |

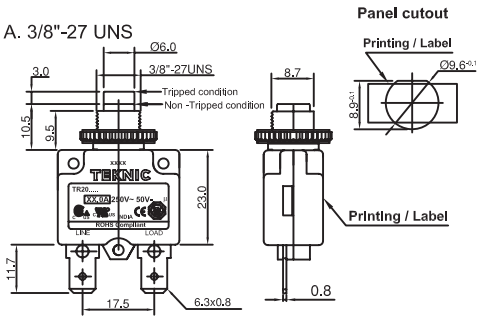
| | | |
|---|---|---|
| Example: | Normal Continuous Current | 5.0A |
| | Ambient Temperature | 40°C |
| | Multiplication Factor | 1.1 |
| | Selected rated current at +40°C | 5 x 1.1 = 5.5 |
| | Ambient temperature | 6.0A (nearest) |

*** SPECIAL ORDER ONLY. Contact Altech for more details.**
**PCB Mounting and additional Shunt Terminal available, please contact Altech.**

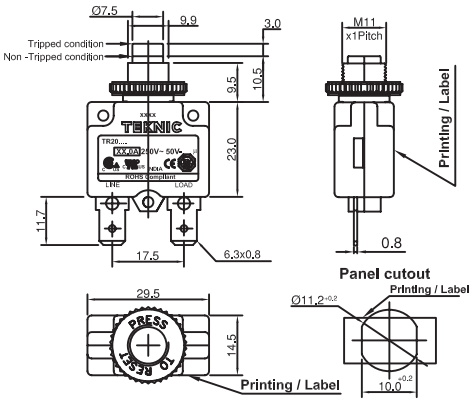
# TR-20 Dimensions & Mounting Options

## Central Mounting

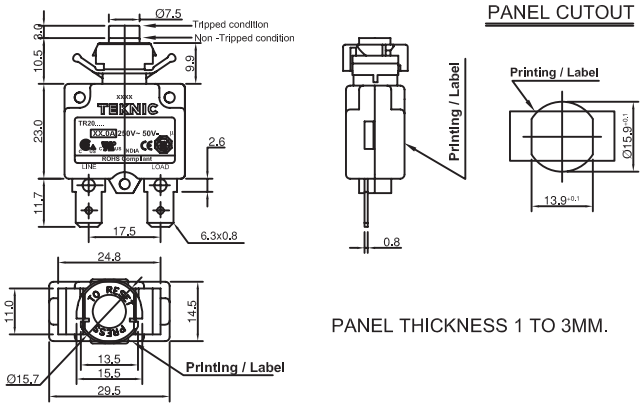
A. 3/8"-27 UNS




C. M11



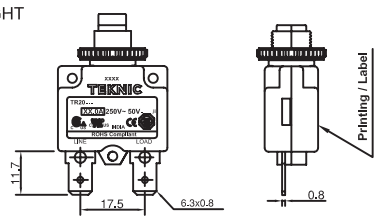

## Wing Clips

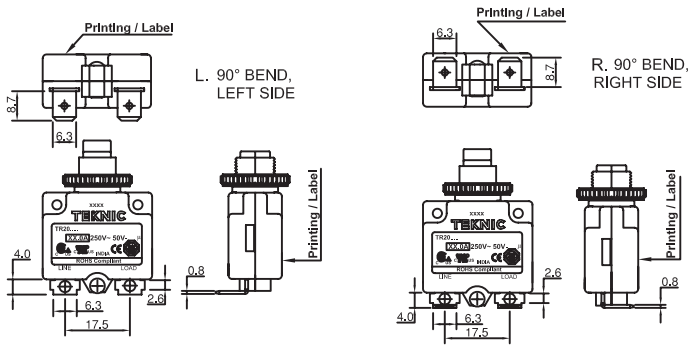



PANEL THICKNESS 1 TO 3MM.

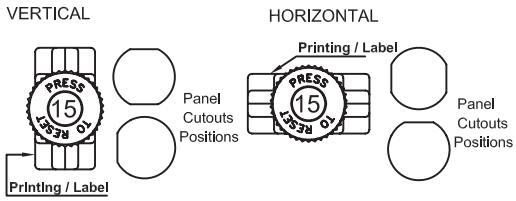
## Terminal Options

S.STRAIGHT

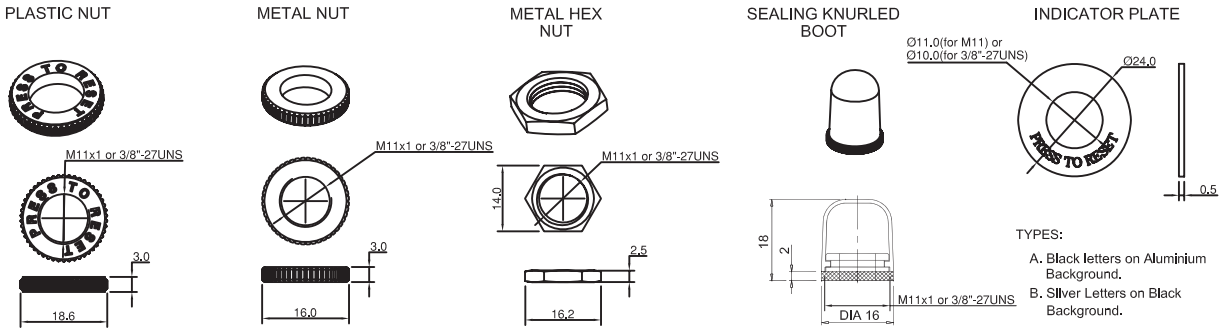



## Slider Printing for Current Rating




## Accessories




**Dimensions in mm** (to convert to inches multiply by 0.03937)

# TR30 Series

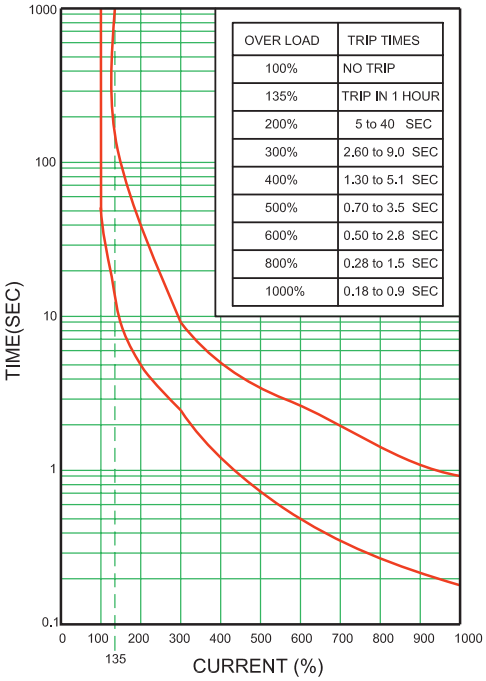
## UL1077 Recognized Supplementary Protector/ Circuit Breaker for Equipment

**Applications:**
Protection of Control Transformers, UPS, Power strips, Solenoids etc., against damage due to overload conditions.

E209569 — up to 12 Amps

| | |
|---|---|
| Application Type | General Industrial Ref. CSA22.2 No.235-04 |
| Function | SPST |
| Standard Current Rating (A) | 5A-25A<br>5A, 6A, 7A, 10A, 12A, 15A, 20A, 25A, 30A & 35A |
| Rated Voltage | 125/125V AC, 50/60 Hz, 50V DC |
| Method of tripping | Thermol TO, Cycling trip - free |
| Type of Actuation | Reset Type 'R' |
| Initial insulation resistance | > 100 M ohms. (DC500V) |
| Dielectric strength | 1.500 KV for 1 minute |
| Impulse withstand voltage | 2.5kV Ref.: EN 60934 |
| Contact Gap | Micro disconnection(μ) Ref.: EN60934 |
| Housing Material | Thermoset - UL94-V0 flammability class |
| Slider Material | Thermoset - UL94-V0 flammability class |
| Contact Material | Silver alloy |
| Terminal Material | Copper alloy |
| Fixing | By a nut or snap fitting |
| Resettable overload capacity | 10 times the rated current |
| Rated Short Circuit Capacity $I_{cn}$ Ref.: EN60934 | Min 6 times the rated current ($6_{In}$) for 250V AC (Inductive)<br>Min 4 times the rated current ($4_{In}$) for 50V DC (Resistive) |
| Rated Conditional Short Circuit Current Capacity $I_{nc1}$ (PC1)<br>As per EN60934<br>As per CSA 22.2 No. 235-04 & UL 1077 | 1kA, 5 to 15A, 250V AC, 2kA, 20 to 35A, 250V AC, 1kA, 5 to 35A, 50V DC<br>1kA, C1, 50V Dc, -(5-35A); 500A, U3, 125V AC, -(20-35A); 1kA, U1a, 125V AC, -(5-35A); 2kA, C1, 125V AC, -(5-35A); 1kA, C1, 250V AC, -(5-15A); 2kA, C1, 250V AC, -(20-35A) |
| Tripping Current Code TC | TC 3 Ref.: CSA22.2 No. 235-04 |
| Overload Rating<br>As per CSA 22.2 No. 235-04 | 5-35A - OL0 125/250V AC, 50V DC;<br>5-35A - OL1 125V AC; 5-35A - OL1 250V AC |
| Weight | aprox. 25g |
| Application Standards | UL 1077, CSA 22.2 No. 235-04, EN 60934, UL 1500 |
| Approvals | |
| Ignition Protected | Compliant as per UL 1500<br>(Standard for safety for Ignition protection test for Marine products) |

### Operating Characteristic




| OVER LOAD | TRIP TIMES |
|---|---|
| 100% | NO TRIP |
| 135% | TRIP IN 1 HOUR |
| 200% | 5 to 40 SEC |
| 300% | 2.60 to 9.0 SEC |
| 400% | 1.30 to 5.1 SEC |
| 500% | 0.70 to 3.5 SEC |
| 600% | 0.50 to 2.8 SEC |
| 800% | 0.28 to 1.5 SEC |
| 1000% | 0.18 to 0.9 SEC |

## ORDERING INSTRUCTIONS

TR30 – C – 63 S – W 1 – A – 7.0A – 2

PRODUCT TYPE

MOUNTING TYPE
- A Plastic 3/8"-27UNS
- B Plastic M11
- C Metal 3/8"-27UNS
- D Metal M11
- E Metal M12
- W Wing clip

TERMINAL SIZE
- 63 6.3 x 0.8mm

TERMINAL CONFIGURATION
- S Straight
- L 90° Bend,Left side
- R 90 Bend, Right side
- T Screw type terminal (#8-32NCF pan head screw with external teeth star washer)

SLIDER COLOR
- W White
- RB Red slider with white trip band
- BB Black slider with white trip band

SLIDER MARKING
- 0 None
- 1 Vertical
- 2 Horizontal

Note: Color of marking is standard. On red / black slider -white marking white slider -black marking.

MOUNTING NUT
- N None or wing clip
- A Plastic knurled
- B Metal knurled
- C Metal Hex Nut
- D Sealing knurled boot

CURRENT RATING
5A, 6A, 7A, 10A, 12A, 15A, 20A, 25A, 30A & 35A

INDICATOR PLATE
- 0 None
- 1 Black letters on Aluminium Background
- 2 Silver Letters on Black Background

*** SPECIAL ORDER ONLY. Contact Altech for more details.**
**PCB Mounting and additional Shunt Terminal available, please contact Altech.**

### Time Current Characteristics:

The standard characteristic is valid for ambient temperatures of +25°C. If the device is to be used in an ambient temperature other than +25°C, allowances must be made when selecting the current rating according to the following guidelines:

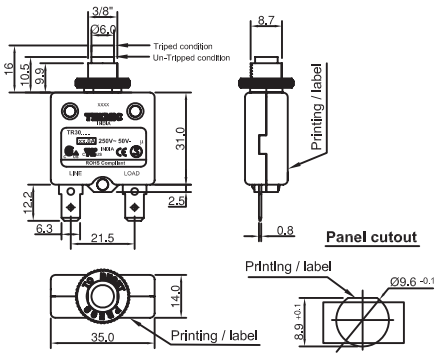
| Ambient temp. °C | -5 | -0 | +10 | +20 | +25 | +30 | +40 | +50 | +60 |
|---|---|---|---|---|---|---|---|---|---|
| Multiplication Factor 5A | 0.9 | 0.92 | 0.95 | 0.98 | 1 | 1.12 | 1.15 | 1.25 | 1.5 |
| Multiplication Factor 56A to 30A | 0.9 | 0.92 | 0.95 | 0.98 | 1 | 1.05 | 1.15 | 1.25 | 1.35 |
| Multiplication Factor 35A | 0.9 | 0.93 | 0.95 | 0.98 | 1 | 1.05 | 1.15 | 1.25 | 1.35 |

| Example: | | |
|---|---|---|
| | Normal Continuous Current | 5.0A |
| | Ambient Temperature | 40°C |
| | Multiplication Factor | 1.15 |
| | Selected rated current at +40°C ambient temperature | 5 x 1.15 = 5.75<br>6.0A (nearest) |

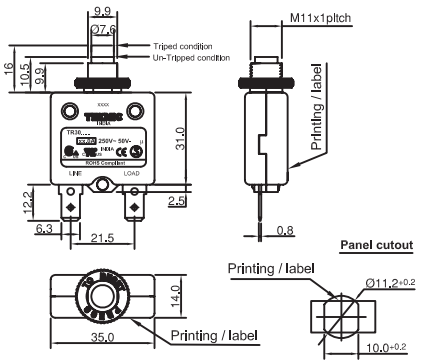
# TR-30 Dimensions & Mounting Options

## Central Mounting

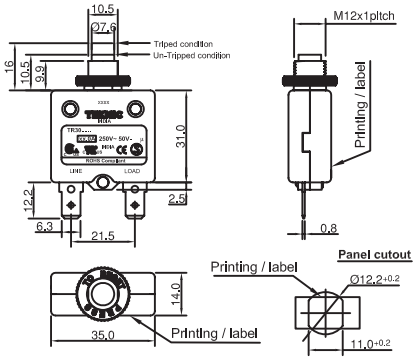
A/C. 3/8"-27 UNS



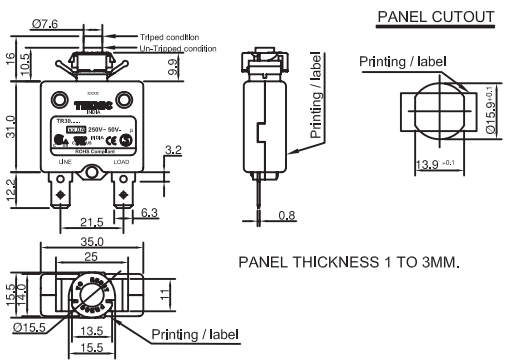

B/D. M11




E. M12

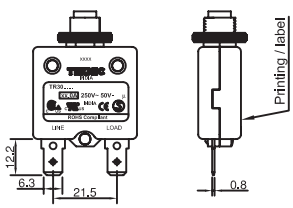



## Wing Clips

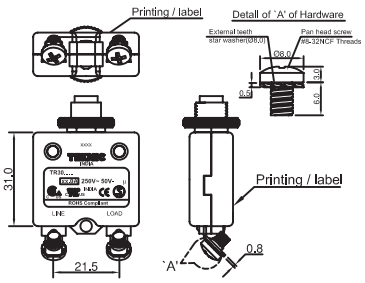



## Terminal Options

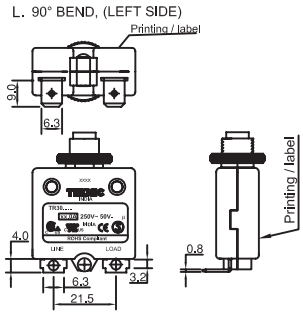
S.STRAIGHT



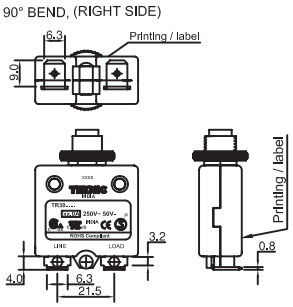

T. SCREW TYPE (#8 - 32NCF Threads)



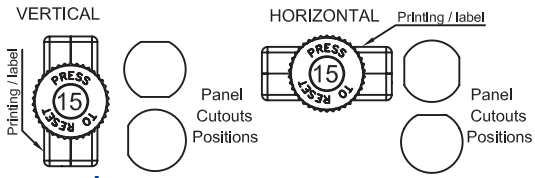

L. 90° BEND, (LEFT SIDE)



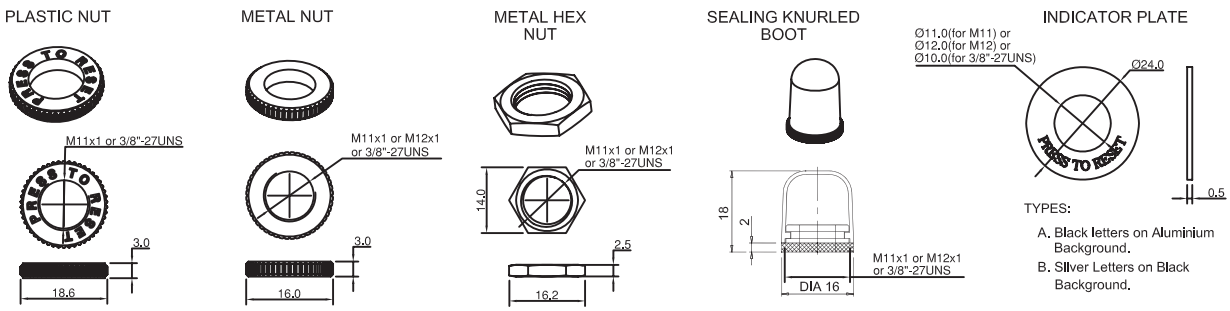

R. 90° BEND, (RIGHT SIDE)




## Slider Printing for Current Rating




## Accessories




**Dimensions in mm** (to convert to inches multiply by 0.03937)

# RP - Series
# RCCB Earth Leakage Circuit Breakers

RCCB Series compact Earth Leakage Circuit Breakers detect and interrupt earth (ground) faults. They are VDE approved for the European system of protecting people, animals, equipment and property from dangerous line-to-ground and shock hazard currents.

US applications include ground-fault protection of equipment (GFPE) using the 10mA and 30mA fault current ratings, especially when high distributed capacitance or other leakages cause excessive nuisance trips at lower fault currents. Applications for the 300mA and 500mA ratings are equipment protection and fire prevention, limiting the energy of a fault to less than the minimum ignition energy for many materials.

**Type Designation**

**RP** ___ ___ ___
**(a)** **(b)** **(c)**

**(a)** = 2-2 pole; 4-4 pole
**(b)** = 1-16A; 2-25A; 3-40A; 4-63A; 5-80A; 6-100A; 7-125A
**(c)** = 01 - 10mA
= 03 - 30mA
= 30 - 300mA
= 50 - 500mA

**RP2**

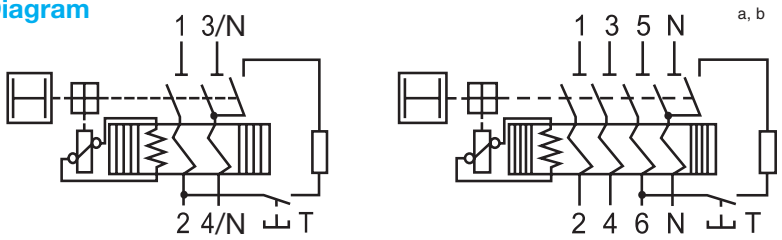
**RP4**

| Maximum Rated Line Current | Fault Trip Current | Cat. No. | Fault Trip Current | Cat. No. |
|---|---|---|---|---|
| 16A | 10mA | **RP2101** | | |
| 25A | 30mA | **RP2203** | 30mA | **RP4203** |
| 25A | 300mA | **RP2230** | 300mA | **RP4230** |
| 25A | | | 500mA | RP4250 |
| 40A | 30mA | **RP2303** | 30mA | **RP4303** |
| 40A | 300mA | **RP2330** | 300mA | **RP4330** |
| 40A | | | 500mA | RP4350 |
| 63A | 30mA | RP2403 | 30mA | **RP4403** |
| 63A | 300mA | RP2430 | 300mA | **RP4430** |
| 63A | 500mA | RP2450 | 500mA | RP4450 |
| 80A | | | 30mA | RP4503 |
| 80A | | | 300mA | RP4530 |
| 80A | | | 500mA | RP4550 |
| 100A | | | 30mA | RP4603 |
| 100A | | | 300mA | RP4630 |
| 100A | | | 500mA | RP4650 |
| 125A | | | 30mA | RP4703 |
| 125A | | | 300mA | RP4730 |
| 125A | | | 500mA | RP4750 |

**Stock items are shown in BOLD.**

| | | |
|---|---|---|
| **Voltage Rating (maximum)** | 230V AC, 50Hz | 400Y/230V AC, 50Hz |
| **Short Circuit Withstand Rating** | No back-up fuse: Rated current (RC) 16/25/40A: 500A; RC 63/80A: 800A; RC 100A: 1000A; RC 125A-1250A. With back-up fuse: 10kA; Size of fuse: (2 pole version): RC 25/40/63: 100A; (4 pole version): RC 25/40/63A: 100A; RC 80/100/125A: 125A | |
| **Fault Trip Current Calibration** | FI trips are calibrated at less than fault trip current for ensured safety (Typical trip range between 66.6-83.3% fault trip current, e.g., typical trip at 20-25mA for fault RC of 30mA) | |
| **Typical Life** | Fully functional after 5,000 operations to DIN/VDE 0664T10, IEC 61008-1 and 2000 additional fault current trips. | |
| **Standard Pack and Weight** | 1/230g (0.6 lb.) | 1/420-460g (0.9 lb.-1.0 lb.) |
| **Terminal Size Acceptability** | 1.5-50mm$^2$ (16-1 AWG) | 1.5-50mm$^2$ (16-1 AWG) |
| **Terminal Torque** | 3Nm (26.5 lb.in.) | 3Nm (26.5 lb.in.) |

## Circuit Diagram

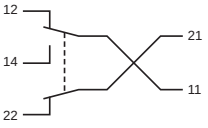



[a] For 2-Phase applications, terminal 5 and 6 (next to Neutral terminals) must be connected to one phase for the test circuit to be operable.

[b] For voltage systems without a neutral conductor. Please use jumper from "1" or "3" to top "N" terminal. This will assure proper functioning of the "test" circuit.

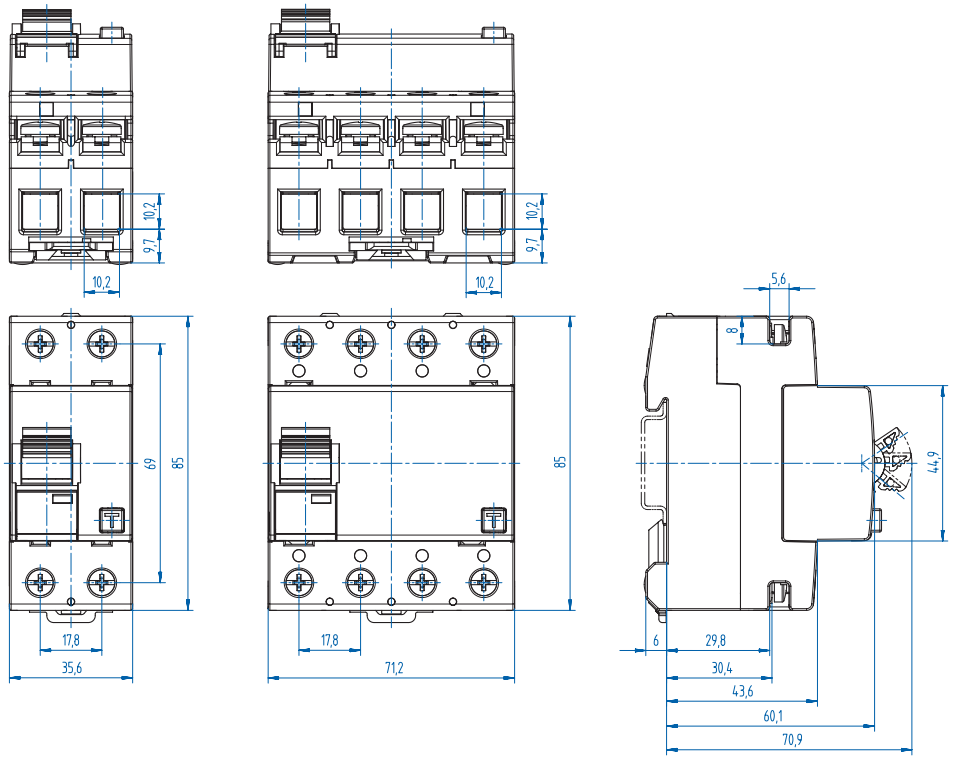
*Note: If the power system has a marked conductor, it must connect through the FI and not be grounded at any point downstream.*

## RH11 - Auxiliary Contact and Signal Switch (switchable) (C.O./N.C.)

| Contact Rating | Wire Size | Torque | Cat. No. | Circuit Diagram |
|---|---|---|---|---|
| 6A / 230V AC<br>1A / 110V DC | 1-1.5mm$^2$ (16 AWG) | max. 0.8Nm (7lb.in.) | **RH11** |  |

Std. Pk.: 1
Unit Weight: 45 grams (0.12 lb.)
Width: 9mm (.354in.)

## Dimensions in mm




**RP2** **RP4** **RP2 and RP4**

| | |
|---|---|
| **Temperature Range** | Environmental Information marked with “Snowflake” approval for -25°C to 40°C (-13°F to 104°F) ambient temperature. (Temperature effect on RC: for every 10°C temperature rise above 40°C decrease RC by 7%.) |
| **Fluctuating Climate Conditions** | According to IEC 60068-2-30: heat (25°C~55°C), relative humidity (93%~95%) |
| **Electrical Shock Protection** | Uninsulated electrically live parts within 30mm of the operating handle are “finger safe” (terminal screw heads) and uninsulated live parts within 100mm of the operating handle are “back-of-hand safe” (terminals). |
| **Impact/Shock Protection** | 20g with impact force half-cycle sinusoidal and 20ms duration, 18 impacts total with 6 on each principal axis (3 impacts each face). FI is DIN Rail mounted during the test, and electrically loaded with 25% of Fault RC. Successful testing required no trip during the test, no damage and no loosened parts. |
| **Vibration/Seismic Resistance** | 5g, at frequency of ≤80Hz, applied for 30 minutes along each of the three principal axes, plus 5 minutes of application at every established critical resonant frequency. FI is DIN Rail mounted during the test, and loaded with 25% Fault RC. To pass, the FI did not trip at 25% Fault RC, but did trip between each of the principal axis tests when the fault current was raised to 125% Fault RC, and there was no damage and no loosened parts. Suitable for machinery and mobile vehicle applications. |
| **Protection Class** | IP20; higher protection Class is dependent on housing. |
| **Non-Sinusoidal Fault** | The FI is tested and approval stamped for tripping sensitivity to non-sinusoidal fault currents, which become zero or almost zero within one cycle of the line frequency. Waveforms and allowed trip-current ranges are as follows:<br>1. AC Sinusoidal Fault - 0.5-1.0 times Fault RC<br>2a. Pulsating DC Fault;<br>Positive and Negative Half-Waves - 0.35-1.4 times Fault RC<br>2b. Phased Half-Wave, 90° - 0.25-1.4 times Fault RC<br>Phased Half-Wave, 135° - 0.11-1.4 times Fault RC<br>3. Pulsating DC on 6mA<br>DC (continuous) Base - Max. 1.4 times Fault RC + 6mA |
| **Insulation Category** | At VDE rated voltage, suitable for Class C environments with relatively high dust and moisture levels and little HVAC control, e.g., industrial, commercial, agricultural; on machine tools, hoists, warehouse equipment, etc.; in boiler rooms, unheated storage, covered shipping/receiving, open workshops, etc. |

# Index


| Part No. | Page |
|---|---|
| 15.960 | 16 |
| 15.960 | 59 |
| 18/25CAP1P | 79 |
| 18/25CAP3P | 79 |
| 1B05UR | 56 |
| 1B1.6UM | 38 |
| 1B10UM | 38 |
| 1B10UR | 56 |
| 1B12UR | 56 |
| 1B13UM | 38 |
| 1B13UR | 56 |
| 1B15UM | 38 |
| 1B15UR | 56 |
| 1B16UM | 38 |
| 1B16UR | 56 |
| 1B1UM | 38 |
| 1B1UR | 56 |
| 1B2.5UM | 38 |
| 1B20UM | 38 |
| 1B20UR | 56 |
| 1B25UR | 56 |
| 1B25UZ | 38 |
| 1B2UM | 38 |
| 1B2UR | 56 |
| 1B3.5UM | 38 |
| 1B30UM | 38 |
| 1B30UR | 56 |
| 1B32UM | 38 |
| 1B32UR | 56 |
| 1B3UM | 38 |
| 1B3UR | 56 |
| 1B40UM | 38 |
| 1B40UR | 56 |
| 1B4UM | 38 |
| 1B4UR | 56 |
| 1B50UM | 38 |
| 1B50UR | 56 |
| 1B5UM | 38 |
| 1B5UR | 56 |
| 1B60UM | 38 |
| 1B60UR | 56 |
| 1B63UM | 38 |
| 1B63UR | 56 |
| 1B6UM | 38 |
| 1B6UR | 56 |
| 1B8UR | 56 |
| 1BU05R | 64 |
| 1BU10R | 64 |
| 1BU12R | 64 |
| 1BU13R | 64 |
| 1BU15R | 64 |
| 1BU16R | 64 |
| 1BU1R | 64 |
| 1BU20R | 64 |
| 1BU25R | 64 |
| 1BU2R | 64 |
| 1BU30R | 64 |
| 1BU32R | 64 |
| 1BU3R | 64 |
| 1BU40R | 64 |
| 1BU4R | 64 |
| 1BU50R | 64 |
| 1BU5R | 64 |
| 1BU60R | 64 |
| 1BU63R | 64 |
| 1BU6R | 64 |
| 1BU8R | 64 |
| 1C03DL | 14 |
| 1C03UL | 12 |
| 1C03UM | 39 |
| 1C05DL | 14 |
| 1C05UL | 12 |
| 1C05UM | 39 |
| 1C05UR | 57 |
| 1C075UM | 39 |
| 1C1.6DL | 14 |
| 1C1.6UL | 12 |
| 1C1.6UM | 39 |
| 1C10DL | 14 |
| 1C10UL | 12 |
| 1C10UM | 39 |
| 1C10UR | 57 |
| 1C12DL | 14 |
| 1C12UL | 12 |
| 1C12UR | 57 |
| 1C13DL | 14 |
| 1C13UL | 12 |
| 1C13UM | 39 |
| 1C13UR | 57 |
| 1C15DL | 14 |
| 1C15UL | 12 |
| 1C15UM | 39 |
| 1C15UR | 57 |
| 1C16DL | 14 |
| 1C16UL | 12 |
| 1C16UM | 39 |
| 1C16UR | 57 |
| 1C1DL | 14 |
| 1C1UL | 12 |
| 1C1UM | 39 |
| 1C1UR | 57 |
| 1C2.5UM | 39 |
| 1C20DL | 14 |
| 1C20UL | 12 |
| 1C20UM | 39 |
| 1C20UR | 57 |
| 1C25DL | 14 |
| 1C25UL | 12 |
| 1C25UM | 39 |
| 1C25UR | 57 |
| 1C2DL | 14 |
| 1C2UL | 12 |
| 1C2UM | 39 |
| 1C2UR | 57 |
| 1C3.5UM | 39 |
| 1C30DL | 14 |
| 1C30UL | 12 |
| 1C30UM | 39 |
| 1C30UR | 57 |
| 1C32DL | 14 |
| 1C32UL | 12 |
| 1C32UM | 39 |
| 1C32UR | 57 |
| 1C3DL | 14 |
| 1C3UL | 12 |
| 1C3UM | 39 |
| 1C3UR | 57 |
| 1C40DL | 14 |
| 1C40UL | 12 |
| 1C40UM | 39 |
| 1C40UR | 57 |
| 1C4DL | 14 |
| 1C4UL | 12 |
| 1C4UM | 39 |
| 1C4UR | 57 |
| 1C50DL | 14 |
| 1C50UL | 12 |
| 1C50UM | 39 |
| 1C50UR | 57 |
| 1C5DL | 14 |
| 1C5UL | 12 |
| 1C5UM | 39 |
| 1C5UR | 57 |
| 1C60DL | 14 |
| 1C60UL | 12 |
| 1C60UM | 39 |
| 1C60UR | 57 |
| 1C63DL | 14 |
| 1C63UL | 12 |
| 1C63UM | 39 |
| 1C63UR | 57 |
| 1C6DL | 14 |
| 1C6UL | 12 |
| 1C6UM | 39 |
| 1C6UR | 57 |
| 1C8DL | 14 |
| 1C8UL | 12 |
| 1C8UM | 39 |
| 1C8UR | 57 |
| 1CU02L | 22 |
| 1CU05L | 22 |
| 1CU05R | 65 |
| 1CU1.6L | 22 |
| 1CU10L | 22 |
| 1CU10R | 65 |
| 1CU12L | 22 |
| 1CU12R | 65 |
| 1CU13L | 22 |
| 1CU13R | 65 |
| 1CU15L | 22 |
| 1CU15R | 65 |
| 1CU16L | 22 |
| 1CU16R | 65 |
| 1CU1L | 22 |
| 1CU1R | 65 |
| 1CU20L | 22 |
| 1CU20R | 65 |
| 1CU25L | 22 |
| 1CU25R | 65 |
| 1CU2L | 22 |
| 1CU2R | 65 |
| 1CU30L | 22 |
| 1CU30R | 65 |
| 1CU32L | 22 |
| 1CU32R | 65 |
| 1CU3L | 22 |
| 1CU3R | 65 |
| 1CU40L | 22 |
| 1CU40R | 65 |
| 1CU4L | 22 |
| 1CU4R | 65 |
| 1CU50L | 22 |
| 1CU50R | 65 |
| 1CU5L | 22 |
| 1CU5R | 65 |
| 1CU60L | 22 |
| 1CU60R | 65 |
| 1CU63L | 22 |
| 1CU63R | 65 |
| 1CU6L | 22 |
| 1CU6R | 65 |
| 1CU8L | 22 |
| 1CU8R | 65 |
| 1D03DL | 15 |
| 1D03UL | 13 |
| 1D03UM | 40 |
| 1D05DL | 15 |
| 1D05UL | 13 |
| 1D05UM | 40 |
| 1D05UR | 58 |
| 1D075UM | 40 |
| 1D1.6DL | 15 |
| 1D1.6UL | 13 |
| 1D1.6UM | 40 |
| 1D10DL | 15 |
| 1D10UL | 13 |
| 1D10UM | 40 |
| 1D10UR | 58 |
| 1D12DL | 15 |
| 1D12UL | 13 |
| 1D12UR | 58 |
| 1D13DL | 15 |
| 1D13UL | 13 |
| 1D13UM | 40 |
| 1D13UR | 58 |
| 1D15DL | 15 |
| 1D15UL | 13 |
| 1D15UM | 40 |
| 1D15UR | 58 |
| 1D16DL | 15 |
| 1D16UL | 13 |
| 1D16UM | 40 |
| 1D16UR | 58 |
| 1D1DL | 15 |
| 1D1UL | 13 |
| 1D1UM | 40 |
| 1D1UR | 58 |
| 1D2.5UM | 40 |
| 1D20DL | 15 |
| 1D20UL | 13 |
| 1D20UM | 40 |
| 1D20UR | 58 |
| 1D25DL | 15 |
| 1D25UL | 13 |
| 1D25UM | 40 |
| 1D25UR | 58 |
| 1D2DL | 15 |
| 1D2UL | 13 |
| 1D2UM | 40 |
| 1D2UR | 58 |
| 1D3.5UM | 40 |
| 1D30DL | 15 |
| 1D30UL | 13 |
| 1D30UM | 40 |
| 1D30UR | 58 |
| 1D32DL | 15 |
| 1D32UL | 13 |
| 1D32UM | 40 |
| 1D32UR | 58 |
| 1D3DL | 15 |
| 1D3UL | 13 |
| 1D3UM | 40 |
| 1D3UR | 58 |
| 1D40DL | 15 |
| 1D40UL | 13 |
| 1D40UM | 40 |
| 1D40UR | 58 |
| 1D4DL | 15 |
| 1D4UL | 13 |
| 1D4UM | 40 |
| 1D4UR | 58 |
| 1D50DL | 15 |
| 1D50UL | 13 |
| 1D50UM | 40 |
| 1D50UR | 58 |
| 1D5DL | 15 |
| 1D5UL | 13 |
| 1D5UM | 40 |
| 1D5UR | 58 |
| 1D60DL | 15 |
| 1D60UL | 13 |
| 1D60UM | 40 |
| 1D60UR | 58 |
| 1D63DL | 15 |
| 1D63UL | 13 |
| 1D63UM | 40 |
| 1D63UR | 58 |
| 1D6DL | 15 |
| 1D6UL | 13 |
| 1D6UM | 40 |
| 1D6UR | 58 |
| 1D8DL | 15 |
| 1D8UL | 13 |
| 1D8UM | 40 |

# Index


| Part No. | Page |
|---|---|
| 1D8UR | 58 |
| 1DU02L | 23 |
| 1DU05L | 23 |
| 1DU05R | 66 |
| 1DU1.6L | 23 |
| 1DU10L | 23 |
| 1DU10R | 66 |
| 1DU12L | 23 |
| 1DU12R | 66 |
| 1DU13L | 23 |
| 1DU13R | 66 |
| 1DU15L | 23 |
| 1DU15R | 66 |
| 1DU16L | 23 |
| 1DU16R | 66 |
| 1DU1L | 23 |
| 1DU1R | 66 |
| 1DU20L | 23 |
| 1DU20R | 66 |
| 1DU25L | 23 |
| 1DU25R | 66 |
| 1DU2L | 23 |
| 1DU2R | 66 |
| 1DU30L | 23 |
| 1DU30R | 66 |
| 1DU32L | 23 |
| 1DU32R | 66 |
| 1DU3L | 23 |
| 1DU3R | 66 |
| 1DU40L | 23 |
| 1DU40R | 66 |
| 1DU4L | 23 |
| 1DU4R | 66 |
| 1DU50L | 23 |
| 1DU50R | 66 |
| 1DU5L | 23 |
| 1DU5R | 66 |
| 1DU60L | 23 |
| 1DU60R | 66 |
| 1DU63L | 23 |
| 1DU63R | 66 |
| 1DU6L | 23 |
| 1DU6R | 66 |
| 1DU8L | 23 |
| 1DU8R | 66 |
| 1E03UM | 41 |
| 1E05UM | 41 |
| 1E075UM | 41 |
| 1E1.6UM | 41 |
| 1E10UM | 41 |
| 1E12UM | 41 |
| 1E13UM | 41 |
| 1E15UM | 41 |
| 1E16UM | 41 |
| 1E1UM | 41 |
| 1E2.5UM | 41 |
| 1E20UM | 41 |
| 1E25UM | 41 |
| 1E2UM | 41 |
| 1E3.5UM | 41 |
| 1E30UM | 41 |
| 1E32UM | 41 |
| 1E3UM | 41 |
| 1E40UM | 41 |
| 1E4UM | 41 |
| 1E50UM | 41 |
| 1E5UM | 41 |
| 1E60UM | 41 |
| 1E63UM | 41 |
| 1E6UM | 41 |
| 1E8UM | 41 |
| 1G03UM | 42 |
| 1G05UM | 42 |
| 1G08UM | 42 |
| 1G1.6UM | 42 |
| 1G10UM | 42 |
| 1G12UM | 42 |
| 1G13UM | 42 |
| 1G15UM | 42 |
| 1G16UM | 42 |
| 1G1UM | 42 |
| 1G2.5UM | 42 |
| 1G20UM | 42 |
| 1G25UM | 42 |
| 1G2UM | 42 |
| 1G3.5UM | 42 |
| 1G30UM | 42 |
| 1G32UM | 42 |
| 1G3UM | 42 |
| 1G40UM | 42 |
| 1G4UM | 42 |
| 1G50UM | 42 |
| 1G5UM | 42 |
| 1G60UM | 42 |
| 1G63UM | 42 |
| 1G6UM | 42 |
| 1G8UM | 42 |
| 1P16UL3/12 | 30 |
| 1P16UL3/18 | 30 |
| 1P16UL3/6 | 30 |
| 1P18U1/10 | 72 |
| 1P18U1/11 | 72 |
| 1P18U1/12 | 72 |
| 1P18U1/13 | 72 |
| 1P18U1/14 | 72 |
| 1P18U1/15 | 72 |
| 1P18U1/16 | 72 |
| 1P18U1/17 | 72 |
| 1P18U1/18 | 72 |
| 1P18U1/19 | 72 |
| 1P18U1/2 | 72 |
| 1P18U1/20 | 72 |
| 1P18U1/21 | 72 |
| 1P18U1/22 | 72 |
| 1P18U1/23 | 72 |
| 1P18U1/24 | 72 |
| 1P18U1/25 | 72 |
| 1P18U1/26 | 72 |
| 1P18U1/27 | 72 |
| 1P18U1/28 | 72 |
| 1P18U1/29 | 72 |
| 1P18U1/3 | 72 |
| 1P18U1/30 | 72 |
| 1P18U1/31 | 72 |
| 1P18U1/32 | 72 |
| 1P18U1/33 | 72 |
| 1P18U1/34 | 72 |
| 1P18U1/35 | 72 |
| 1P18U1/36 | 72 |
| 1P18U1/37 | 72 |
| 1P18U1/38 | 72 |
| 1P18U1/39 | 72 |
| 1P18U1/4 | 72 |
| 1P18U1/40 | 72 |
| 1P18U1/41 | 72 |
| 1P18U1/42 | 72 |
| 1P18U1/43 | 72 |
| 1P18U1/44 | 72 |
| 1P18U1/45 | 72 |
| 1P18U1/46 | 72 |
| 1P18U1/47 | 72 |
| 1P18U1/48 | 72 |
| 1P18U1/49 | 72 |
| 1P18U1/5 | 72 |
| 1P18U1/50 | 72 |
| 1P18U1/51 | 72 |
| 1P18U1/52 | 72 |
| 1P18U1/53 | 72 |
| 1P18U1/54 | 72 |
| 1P18U1/55 | 72 |
| 1P18U1/56 | 72 |
| 1P18U1/57 | 72 |
| 1P18U1/6 | 72 |
| 1P18U1/7 | 72 |
| 1P18U1/8 | 72 |
| 1P18U1/9 | 72 |
| 1P18U1H/10 | 73 |
| 1P18U1H/11 | 73 |
| 1P18U1H/12 | 73 |
| 1P18U1H/13 | 73 |
| 1P18U1H/14 | 73 |
| 1P18U1H/15 | 73 |
| 1P18U1H/16 | 73 |
| 1P18U1H/17 | 73 |
| 1P18U1H/18 | 73 |
| 1P18U1H/19 | 73 |
| 1P18U1H/2 | 73 |
| 1P18U1H/20 | 73 |
| 1P18U1H/21 | 73 |
| 1P18U1H/22 | 73 |
| 1P18U1H/23 | 73 |
| 1P18U1H/24 | 73 |
| 1P18U1H/25 | 73 |
| 1P18U1H/26 | 73 |
| 1P18U1H/27 | 73 |
| 1P18U1H/28 | 73 |
| 1P18U1H/29 | 73 |
| 1P18U1H/3 | 73 |
| 1P18U1H/30 | 73 |
| 1P18U1H/31 | 73 |
| 1P18U1H/32 | 73 |
| 1P18U1H/33 | 73 |
| 1P18U1H/34 | 73 |
| 1P18U1H/35 | 73 |
| 1P18U1H/36 | 73 |
| 1P18U1H/4 | 73 |
| 1P18U1H/5 | 73 |
| 1P18U1H/6 | 73 |
| 1P18U1H/7 | 73 |
| 1P18U1H/8 | 73 |
| 1P18U1H/9 | 73 |
| 1Z03UM | 43 |
| 1Z05UM | 43 |
| 1Z075UM | 43 |
| 1Z1.6UM | 43 |
| 1Z10UM | 43 |
| 1Z12UM | 43 |
| 1Z13UM | 43 |
| 1Z15UM | 43 |
| 1Z16UM | 43 |
| 1Z1UM | 43 |
| 1Z2.5UM | 43 |
| 1Z20UM | 43 |
| 1Z25UM | 43 |
| 1Z2UM | 43 |
| 1Z3.5UM | 43 |
| 1Z30UM | 43 |
| 1Z32UM | 43 |
| 1Z3UM | 43 |
| 1Z40UM | 43 |
| 1Z4UM | 43 |
| 1Z50UM | 43 |
| 1Z5UM | 43 |
| 1Z6UM | 43 |
| 1Z8UM | 43 |
| 2B05UR | 56 |
| 2B1.6UM | 38 |
| 2B10UM | 38 |
| 2B10UR | 56 |
| 2B12UR | 56 |
| 2B13UM | 38 |
| 2B13UR | 56 |
| 2B15UM | 38 |
| 2B15UR | 56 |
| 2B16UM | 38 |
| 2B16UR | 56 |
| 2B1UM | 38 |
| 2B1UR | 56 |
| 2B2.5UM | 38 |
| 2B20UM | 38 |
| 2B20UR | 56 |
| 2B25UM | 38 |
| 2B25UR | 56 |
| 2B2UM | 38 |
| 2B2UR | 56 |
| 2B3.5UM | 38 |
| 2B30UM | 38 |
| 2B30UR | 56 |
| 2B32UM | 38 |
| 2B32UR | 56 |
| 2B3UM | 38 |
| 2B3UR | 56 |
| 2B40UM | 38 |
| 2B40UR | 56 |
| 2B4UM | 38 |
| 2B4UR | 56 |
| 2B50UM | 38 |
| 2B50UR | 56 |
| 2B5UM | 38 |
| 2B5UR | 56 |
| 2B60UM | 38 |
| 2B60UR | 56 |
| 2B63UM | 38 |
| 2B63UR | 56 |
| 2B6UM | 38 |
| 2B6UR | 56 |
| 2B8UR | 56 |
| 2BU05R | 64 |
| 2BU10R | 64 |
| 2BU12R | 64 |
| 2BU13R | 64 |
| 2BU15R | 64 |
| 2BU16R | 64 |
| 2BU1R | 64 |
| 2BU20R | 64 |
| 2BU25R | 64 |
| 2BU2R | 64 |
| 2BU30R | 64 |
| 2BU32R | 64 |
| 2BU3R | 64 |
| 2BU40R | 64 |
| 2BU4R | 64 |
| 2BU50R | 64 |
| 2BU5R | 64 |
| 2BU60R | 64 |
| 2BU63R | 64 |
| 2BU6R | 64 |
| 2BU8R | 64 |
| 2C03DL | 14 |
| 2C03UL | 12 |
| 2C03UM | 39 |
| 2C05DL | 14 |
| 2C05UL | 12 |
| 2C05UM | 39 |
| 2C05UR | 57 |
| 2C075UM | 39 |
| 2C1.6DL | 14 |
| 2C1.6UL | 12 |
| 2C1.6UM | 39 |
| 2C10DL | 14 |
| 2C10UL | 12 |
| 2C10UM | 39 |
| 2C10UR | 57 |
| 2C12DL | 14 |

# Index


| Part No. | Page |
|---|---|
| 2C12UL | 12 |
| 2C12UR | 57 |
| 2C13DL | 14 |
| 2C13UL | 12 |
| 2C13UM | 39 |
| 2C13UR | 57 |
| 2C15DL | 14 |
| 2C15UL | 12 |
| 2C15UM | 39 |
| 2C15UR | 57 |
| 2C16DL | 14 |
| 2C16UL | 12 |
| 2C16UM | 39 |
| 2C16UR | 57 |
| 2C1DL | 14 |
| 2C1UL | 12 |
| 2C1UM | 39 |
| 2C1UR | 57 |
| 2C2.5UM | 39 |
| 2C20DL | 14 |
| 2C20UL | 12 |
| 2C20UM | 39 |
| 2C20UR | 57 |
| 2C25DL | 14 |
| 2C25UL | 12 |
| 2C25UM | 39 |
| 2C25UR | 57 |
| 2C2DL | 14 |
| 2C2UL | 12 |
| 2C2UM | 39 |
| 2C2UR | 57 |
| 2C3.5UM | 39 |
| 2C30DL | 14 |
| 2C30UL | 12 |
| 2C30UM | 39 |
| 2C30UR | 57 |
| 2C32DL | 14 |
| 2C32UL | 12 |
| 2C32UM | 39 |
| 2C32UR | 57 |
| 2C3DL | 14 |
| 2C3UL | 12 |
| 2C3UM | 39 |
| 2C3UR | 57 |
| 2C40DL | 14 |
| 2C40UL | 12 |
| 2C40UM | 39 |
| 2C40UR | 57 |
| 2C4DL | 14 |
| 2C4UL | 12 |
| 2C4UM | 39 |
| 2C4UR | 57 |
| 2C50DL | 14 |
| 2C50UL | 12 |
| 2C50UM | 39 |
| 2C50UR | 57 |
| 2C5DL | 14 |
| 2C5UL | 12 |
| 2C5UM | 39 |
| 2C5UR | 57 |
| 2C60DL | 14 |
| 2C60UL | 12 |
| 2C60UM | 39 |
| 2C60UR | 57 |
| 2C63DL | 14 |
| 2C63UL | 12 |
| 2C63UM | 39 |
| 2C63UR | 57 |
| 2C6DL | 14 |
| 2C6UL | 12 |
| 2C6UM | 39 |
| 2C6UR | 57 |
| 2C8DL | 14 |
| 2C8UL | 12 |
| 2C8UM | 39 |
| 2C8UR | 57 |
| 2CU02L | 22 |
| 2CU05L | 22 |
| 2CU05R | 65 |
| 2CU1.6L | 22 |
| 2CU10L | 22 |
| 2CU10R | 65 |
| 2CU12L | 22 |
| 2CU12R | 65 |
| 2CU13L | 22 |
| 2CU13R | 65 |
| 2CU15L | 22 |
| 2CU15R | 65 |
| 2CU16L | 22 |
| 2CU16R | 65 |
| 2CU1L | 22 |
| 2CU1R | 65 |
| 2CU20L | 22 |
| 2CU20R | 65 |
| 2CU25L | 22 |
| 2CU25R | 65 |
| 2CU2L | 22 |
| 2CU2R | 65 |
| 2CU30L | 22 |
| 2CU30R | 65 |
| 2CU32L | 22 |
| 2CU32R | 65 |
| 2CU3L | 22 |
| 2CU3R | 65 |
| 2CU40L | 22 |
| 2CU40R | 65 |
| 2CU4L | 22 |
| 2CU4R | 65 |
| 2CU50L | 22 |
| 2CU50R | 65 |
| 2CU5L | 22 |
| 2CU5R | 65 |
| 2CU60L | 22 |
| 2CU60R | 65 |
| 2CU63L | 22 |
| 2CU63R | 65 |
| 2CU6L | 22 |
| 2CU6R | 65 |
| 2CU8L | 22 |
| 2CU8R | 65 |
| 2D03DL | 15 |
| 2D03UL | 13 |
| 2D03UM | 40 |
| 2D05DL | 15 |
| 2D05UL | 13 |
| 2D05UM | 40 |
| 2D05UR | 58 |
| 2D075UM | 40 |
| 2D1.6DL | 15 |
| 2D1.6UL | 13 |
| 2D1.6UM | 40 |
| 2D10DL | 15 |
| 2D10UL | 13 |
| 2D10UM | 40 |
| 2D10UR | 58 |
| 2D12DL | 15 |
| 2D12UL | 13 |
| 2D12UR | 58 |
| 2D13DL | 15 |
| 2D13UL | 13 |
| 2D13UM | 40 |
| 2D13UR | 58 |
| 2D15DL | 15 |
| 2D15UL | 13 |
| 2D15UM | 40 |
| 2D15UR | 58 |
| 2D16DL | 15 |
| 2D16UL | 13 |
| 2D16UM | 40 |
| 2D16UR | 58 |
| 2D1DL | 15 |
| 2D1UL | 13 |
| 2D1UM | 40 |
| 2D1UR | 58 |
| 2D2.5UM | 40 |
| 2D20DL | 15 |
| 2D20UL | 13 |
| 2D20UM | 40 |
| 2D20UR | 58 |
| 2D25DL | 15 |
| 2D25UL | 13 |
| 2D25UM | 40 |
| 2D25UR | 58 |
| 2D2DL | 15 |
| 2D2UL | 13 |
| 2D2UM | 40 |
| 2D2UR | 58 |
| 2D3.5UM | 40 |
| 2D30DL | 15 |
| 2D30UL | 13 |
| 2D30UM | 40 |
| 2D30UR | 58 |
| 2D32DL | 15 |
| 2D32UL | 13 |
| 2D32UM | 40 |
| 2D32UR | 58 |
| 2D3DL | 15 |
| 2D3UL | 13 |
| 2D3UM | 40 |
| 2D3UR | 58 |
| 2D40DL | 15 |
| 2D40UL | 13 |
| 2D40UM | 40 |
| 2D40UR | 58 |
| 2D4DL | 15 |
| 2D4UL | 13 |
| 2D4UM | 40 |
| 2D4UR | 58 |
| 2D50DL | 15 |
| 2D50UL | 13 |
| 2D50UM | 40 |
| 2D50UR | 58 |
| 2D5DL | 15 |
| 2D5UL | 13 |
| 2D5UM | 40 |
| 2D5UR | 58 |
| 2D60DL | 15 |
| 2D60UL | 13 |
| 2D60UM | 40 |
| 2D60UR | 58 |
| 2D63DL | 15 |
| 2D63UL | 13 |
| 2D63UM | 40 |
| 2D63UR | 58 |
| 2D6DL | 15 |
| 2D6UL | 13 |
| 2D6UM | 40 |
| 2D6UR | 58 |
| 2D8DL | 15 |
| 2D8UL | 13 |
| 2D8UM | 40 |
| 2D8UR | 58 |
| 2DU02L | 23 |
| 2DU05L | 23 |
| 2DU05R | 66 |
| 2DU1.6L | 23 |
| 2DU10L | 23 |
| 2DU10R | 66 |
| 2DU12L | 23 |
| 2DU12R | 66 |
| 2DU13L | 23 |
| 2DU13R | 66 |
| 2DU15L | 23 |
| 2DU15R | 66 |
| 2DU16L | 23 |
| 2DU16R | 66 |
| 2DU1L | 23 |
| 2DU1R | 66 |
| 2DU20L | 23 |
| 2DU20R | 66 |
| 2DU25L | 23 |
| 2DU25R | 66 |
| 2DU2L | 23 |
| 2DU2R | 66 |
| 2DU30L | 23 |
| 2DU30R | 66 |
| 2DU32L | 23 |
| 2DU32R | 66 |
| 2DU3L | 23 |
| 2DU3R | 66 |
| 2DU40L | 23 |
| 2DU40R | 66 |
| 2DU4L | 23 |
| 2DU4R | 66 |
| 2DU50L | 23 |
| 2DU50R | 66 |
| 2DU5L | 23 |
| 2DU5R | 66 |
| 2DU60L | 23 |
| 2DU60R | 66 |
| 2DU63L | 23 |
| 2DU63R | 66 |
| 2DU6L | 23 |
| 2DU6R | 66 |
| 2DU8L | 23 |
| 2DU8R | 66 |
| 2E03UM | 41 |
| 2E05UM | 41 |
| 2E075UM | 41 |
| 2E1.6UM | 41 |
| 2E10UM | 41 |
| 2E12UM | 41 |
| 2E13UM | 41 |
| 2E15UM | 41 |
| 2E16UM | 41 |
| 2E1UM | 41 |
| 2E2.5UM | 41 |
| 2E20UM | 41 |
| 2E25UM | 41 |
| 2E2UM | 41 |
| 2E3.5UM | 41 |
| 2E30UM | 41 |
| 2E32UM | 41 |
| 2E3UM | 41 |
| 2E40UM | 41 |
| 2E4UM | 41 |
| 2E50UM | 41 |
| 2E5UM | 41 |
| 2E60UM | 41 |
| 2E63UM | 41 |
| 2E6UM | 41 |
| 2E8UM | 41 |
| 2G03UM | 42 |
| 2G05UM | 42 |
| 2G08UM | 42 |
| 2G1.6UM | 42 |
| 2G10UM | 42 |
| 2G12UM | 42 |
| 2G13UM | 42 |
| 2G15UM | 42 |
| 2G16UM | 42 |
| 2G1UM | 42 |
| 2G2.5UM | 42 |
| 2G20UM | 42 |

# Index


| Part No. | Page |
|---|---|
| 2G25UM | 42 |
| 2G2UM | 42 |
| 2G3.5UM | 42 |
| 2G30UM | 42 |
| 2G32UM | 42 |
| 2G3UM | 42 |
| 2G40UM | 42 |
| 2G4UM | 42 |
| 2G50UM | 42 |
| 2G5UM | 42 |
| 2G60UM | 42 |
| 2G63UM | 42 |
| 2G6UM | 42 |
| 2G8UM | 42 |
| 2P16UL3/12 | 31 |
| 2P16UL3/18 | 31 |
| 2P16UL3/6 | 31 |
| 2P18U3/10 | 74 |
| 2P18U3/12 | 74 |
| 2P18U3/14 | 74 |
| 2P18U3/16 | 74 |
| 2P18U3/18 | 74 |
| 2P18U3/20 | 74 |
| 2P18U3/22 | 74 |
| 2P18U3/24 | 74 |
| 2P18U3/26 | 74 |
| 2P18U3/28 | 74 |
| 2P18U3/30 | 74 |
| 2P18U3/32 | 74 |
| 2P18U3/34 | 74 |
| 2P18U3/36 | 74 |
| 2P18U3/38 | 74 |
| 2P18U3/4 | 74 |
| 2P18U3/40 | 74 |
| 2P18U3/42 | 74 |
| 2P18U3/44 | 74 |
| 2P18U3/46 | 74 |
| 2P18U3/48 | 74 |
| 2P18U3/50 | 74 |
| 2P18U3/52 | 74 |
| 2P18U3/54 | 74 |
| 2P18U3/56 | 74 |
| 2P18U3/6 | 74 |
| 2P18U3/8 | 74 |
| 2P18U3H/10 | 75 |
| 2P18U3H/12 | 75 |
| 2P18U3H/14 | 75 |
| 2P18U3H/16 | 75 |
| 2P18U3H/18 | 75 |
| 2P18U3H/20 | 75 |
| 2P18U3H/22 | 75 |
| 2P18U3H/24 | 75 |
| 2P18U3H/26 | 75 |
| 2P18U3H/28 | 75 |
| 2P18U3H/30 | 75 |
| 2P18U3H/32 | 75 |
| 2P18U3H/34 | 75 |
| 2P18U3H/36 | 75 |
| 2P18U3H/38 | 75 |
| 2P18U3H/4 | 75 |
| 2P18U3H/40 | 75 |
| 2P18U3H/42 | 75 |
| 2P18U3H/44 | 75 |
| 2P18U3H/46 | 75 |
| 2P18U3H/48 | 75 |
| 2P18U3H/50 | 75 |
| 2P18U3H/52 | 75 |
| 2P18U3H/54 | 75 |
| 2P18U3H/56 | 75 |
| 2P18U3H/6 | 75 |
| 2P18U3H/8 | 75 |
| 2P25U3/10 | 74 |
| 2P25U3/12 | 74 |
| 2P25U3/14 | 74 |
| 2P25U3/16 | 74 |
| 2P25U3/18 | 74 |
| 2P25U3/20 | 74 |
| 2P25U3/22 | 74 |
| 2P25U3/24 | 74 |
| 2P25U3/26 | 74 |
| 2P25U3/28 | 74 |
| 2P25U3/30 | 74 |
| 2P25U3/32 | 74 |
| 2P25U3/34 | 74 |
| 2P25U3/36 | 74 |
| 2P25U3/38 | 74 |
| 2P25U3/4 | 74 |
| 2P25U3/40 | 74 |
| 2P25U3/42 | 74 |
| 2P25U3/44 | 74 |
| 2P25U3/46 | 74 |
| 2P25U3/48 | 74 |
| 2P25U3/50 | 74 |
| 2P25U3/52 | 74 |
| 2P25U3/54 | 74 |
| 2P25U3/56 | 74 |
| 2P25U3/6 | 74 |
| 2P25U3/8 | 74 |
| 2P25U3H/10 | 75 |
| 2P25U3H/12 | 75 |
| 2P25U3H/14 | 75 |
| 2P25U3H/16 | 75 |
| 2P25U3H/18 | 75 |
| 2P25U3H/20 | 75 |
| 2P25U3H/22 | 75 |
| 2P25U3H/24 | 75 |
| 2P25U3H/26 | 75 |
| 2P25U3H/28 | 75 |
| 2P25U3H/30 | 75 |
| 2P25U3H/32 | 75 |
| 2P25U3H/34 | 75 |
| 2P25U3H/36 | 75 |
| 2P25U3H/38 | 75 |
| 2P25U3H/4 | 75 |
| 2P25U3H/40 | 75 |
| 2P25U3H/42 | 75 |
| 2P25U3H/44 | 75 |
| 2P25U3H/46 | 75 |
| 2P25U3H/48 | 75 |
| 2P25U3H/50 | 75 |
| 2P25U3H/52 | 75 |
| 2P25U3H/54 | 75 |
| 2P25U3H/56 | 75 |
| 2P25U3H/6 | 75 |
| 2P25U3H/8 | 75 |
| 2Z03UM | 43 |
| 2Z05UM | 43 |
| 2Z075UM | 43 |
| 2Z1.6UM | 43 |
| 2Z10UM | 43 |
| 2Z12UM | 43 |
| 2Z13UM | 43 |
| 2Z15UM | 43 |
| 2Z16UM | 43 |
| 2Z1UM | 43 |
| 2Z2.5UM | 43 |
| 2Z20UM | 43 |
| 2Z25UM | 43 |
| 2Z2UM | 43 |
| 2Z3.5UM | 43 |
| 2Z30UM | 43 |
| 2Z32UM | 43 |
| 2Z3UM | 43 |
| 2Z40UM | 43 |
| 2Z4UM | 43 |
| 2Z50UM | 43 |
| 2Z5UM | 43 |
| 2Z6UM | 43 |
| 2Z8UM | 43 |
| 3B05UR | 56 |
| 3B1.6UM | 38 |
| 3B10UM | 38 |
| 3B10UR | 56 |
| 3B12UR | 56 |
| 3B13UM | 38 |
| 3B13UR | 56 |
| 3B15UM | 38 |
| 3B15UR | 56 |
| 3B16UM | 38 |
| 3B16UR | 56 |
| 3B1UM | 38 |
| 3B1UR | 56 |
| 3B2.5UM | 38 |
| 3B20UM | 38 |
| 3B20UR | 56 |
| 3B25UM | 38 |
| 3B25UR | 56 |
| 3B2UM | 38 |
| 3B2UR | 56 |
| 3B3.5UM | 38 |
| 3B30UM | 38 |
| 3B30UR | 56 |
| 3B32UM | 38 |
| 3B32UR | 56 |
| 3B3UM | 38 |
| 3B3UR | 56 |
| 3B40UM | 38 |
| 3B40UR | 56 |
| 3B4UM | 38 |
| 3B4UR | 56 |
| 3B50UM | 38 |
| 3B50UR | 56 |
| 3B5UM | 38 |
| 3B5UR | 56 |
| 3B60UM | 38 |
| 3B60UR | 56 |
| 3B63UM | 38 |
| 3B63UR | 56 |
| 3B6UM | 38 |
| 3B6UR | 56 |
| 3B8UR | 56 |
| 3BU05R | 64 |
| 3BU10R | 64 |
| 3BU12R | 64 |
| 3BU13R | 64 |
| 3BU15R | 64 |
| 3BU16R | 64 |
| 3BU1R | 64 |
| 3BU20R | 64 |
| 3BU25R | 64 |
| 3BU2R | 64 |
| 3BU30R | 64 |
| 3BU32R | 64 |
| 3BU3R | 64 |
| 3BU40R | 64 |
| 3BU4R | 64 |
| 3BU50R | 64 |
| 3BU5R | 64 |
| 3BU60R | 64 |
| 3BU63R | 64 |
| 3BU6R | 64 |
| 3BU8R | 64 |
| 3C03UL | 12 |
| 3C03UM | 39 |
| 3C05UL | 12 |
| 3C05UM | 39 |
| 3C05UR | 57 |
| 3C075UM | 39 |
| 3C1.6UL | 12 |
| 3C1.6UM | 39 |
| 3C10UL | 12 |
| 3C10UM | 39 |
| 3C10UR | 57 |
| 3C12UL | 12 |
| 3C12UR | 57 |
| 3C13UL | 12 |
| 3C13UM | 39 |
| 3C13UR | 57 |
| 3C15UL | 12 |
| 3C15UM | 39 |
| 3C15UR | 57 |
| 3C16UL | 12 |
| 3C16UM | 39 |
| 3C16UR | 57 |
| 3C1UL | 12 |
| 3C1UM | 39 |
| 3C1UR | 57 |
| 3C2.5UM | 39 |
| 3C20UL | 12 |
| 3C20UM | 39 |
| 3C20UR | 57 |
| 3C25UL | 12 |
| 3C25UM | 39 |
| 3C25UR | 57 |
| 3C2UL | 12 |
| 3C2UM | 39 |
| 3C2UR | 57 |
| 3C3.5UM | 39 |
| 3C30UL | 12 |
| 3C30UM | 39 |
| 3C30UR | 57 |
| 3C32UL | 12 |
| 3C32UM | 39 |
| 3C32UR | 57 |
| 3C3UL | 12 |
| 3C3UM | 39 |
| 3C3UR | 57 |
| 3C40UL | 12 |
| 3C40UM | 39 |
| 3C40UR | 57 |
| 3C4UL | 12 |
| 3C4UM | 39 |
| 3C4UR | 57 |
| 3C50UL | 12 |
| 3C50UM | 39 |
| 3C50UR | 57 |
| 3C5UL | 12 |
| 3C5UM | 39 |
| 3C5UR | 57 |
| 3C60UL | 12 |
| 3C60UM | 39 |
| 3C60UR | 57 |
| 3C63UL | 12 |
| 3C63UM | 39 |
| 3C63UR | 57 |
| 3C6UL | 12 |
| 3C6UM | 39 |
| 3C6UR | 57 |
| 3C8UL | 12 |
| 3C8UM | 39 |
| 3C8UR | 57 |
| 3CU02L | 22 |
| 3CU05L | 22 |
| 3CU05R | 65 |
| 3CU1.6L | 22 |
| 3CU10L | 22 |
| 3CU10R | 65 |
| 3CU12L | 22 |
| 3CU12R | 65 |
| 3CU13L | 22 |
| 3CU13R | 65 |
| 3CU15L | 22 |
| 3CU15R | 65 |
| 3CU16L | 22 |

# Index


| Part No. | Page |
|---|---|
| 3CU16R | 65 |
| 3CU1L | 22 |
| 3CU1R | 65 |
| 3CU20L | 22 |
| 3CU20R | 65 |
| 3CU25L | 22 |
| 3CU25R | 65 |
| 3CU2L | 22 |
| 3CU2R | 65 |
| 3CU30L | 22 |
| 3CU30R | 65 |
| 3CU32L | 22 |
| 3CU32R | 65 |
| 3CU3L | 22 |
| 3CU3R | 65 |
| 3CU40L | 22 |
| 3CU40R | 65 |
| 3CU4L | 22 |
| 3CU4R | 65 |
| 3CU50L | 22 |
| 3CU50R | 65 |
| 3CU5L | 22 |
| 3CU5R | 65 |
| 3CU60L | 22 |
| 3CU60R | 65 |
| 3CU63L | 22 |
| 3CU63R | 65 |
| 3CU6L | 22 |
| 3CU6R | 65 |
| 3CU8L | 22 |
| 3CU8R | 65 |
| 3D03UL | 13 |
| 3D03UM | 40 |
| 3D05UL | 13 |
| 3D05UM | 40 |
| 3D05UR | 58 |
| 3D075UM | 40 |
| 3D1.6UL | 13 |
| 3D1.6UM | 40 |
| 3D10UL | 13 |
| 3D10UM | 40 |
| 3D10UR | 58 |
| 3D12UL | 13 |
| 3D12UR | 58 |
| 3D13UL | 13 |
| 3D13UM | 40 |
| 3D13UR | 58 |
| 3D15UL | 13 |
| 3D15UM | 40 |
| 3D15UR | 58 |
| 3D16UL | 13 |
| 3D16UM | 40 |
| 3D16UR | 58 |
| 3D1UL | 13 |
| 3D1UM | 40 |
| 3D1UR | 58 |
| 3D2.5UM | 40 |
| 3D20UL | 13 |
| 3D20UM | 40 |
| 3D20UR | 58 |
| 3D25UL | 13 |
| 3D25UM | 40 |
| 3D25UR | 58 |
| 3D2UL | 13 |
| 3D2UM | 40 |
| 3D2UR | 58 |
| 3D3.5UM | 40 |
| 3D30UL | 13 |
| 3D30UM | 40 |
| 3D30UR | 58 |
| 3D32UL | 13 |
| 3D32UM | 40 |
| 3D32UR | 58 |
| 3D3UL | 13 |
| 3D3UM | 40 |
| 3D3UR | 58 |
| 3D40UL | 13 |
| 3D40UM | 40 |
| 3D40UR | 58 |
| 3D4UL | 13 |
| 3D4UM | 40 |
| 3D4UR | 58 |
| 3D50UL | 13 |
| 3D50UM | 40 |
| 3D50UR | 58 |
| 3D5UL | 13 |
| 3D5UM | 40 |
| 3D5UR | 58 |
| 3D60UL | 13 |
| 3D60UM | 40 |
| 3D60UR | 58 |
| 3D63UL | 13 |
| 3D63UM | 40 |
| 3D63UR | 58 |
| 3D6UL | 13 |
| 3D6UM | 40 |
| 3D6UR | 58 |
| 3D8UL | 13 |
| 3D8UM | 40 |
| 3D8UR | 58 |
| 3DU02L | 23 |
| 3DU05L | 23 |
| 3DU05R | 66 |
| 3DU1.6L | 23 |
| 3DU10L | 23 |
| 3DU10R | 66 |
| 3DU12L | 23 |
| 3DU12R | 66 |
| 3DU13L | 23 |
| 3DU13R | 66 |
| 3DU15L | 23 |
| 3DU15R | 66 |
| 3DU16L | 23 |
| 3DU16R | 66 |
| 3DU1L | 23 |
| 3DU1R | 66 |
| 3DU20L | 23 |
| 3DU20R | 66 |
| 3DU25L | 23 |
| 3DU25R | 66 |
| 3DU2L | 23 |
| 3DU2R | 66 |
| 3DU30L | 23 |
| 3DU30R | 66 |
| 3DU32L | 23 |
| 3DU32R | 66 |
| 3DU3L | 23 |
| 3DU3R | 66 |
| 3DU40L | 23 |
| 3DU40R | 66 |
| 3DU4L | 23 |
| 3DU4R | 66 |
| 3DU50L | 23 |
| 3DU50R | 66 |
| 3DU5L | 23 |
| 3DU5R | 66 |
| 3DU60L | 23 |
| 3DU60R | 66 |
| 3DU63L | 23 |
| 3DU63R | 66 |
| 3DU6L | 23 |
| 3DU6R | 66 |
| 3DU8L | 23 |
| 3DU8R | 66 |
| 3E03UM | 41 |
| 3E05UM | 41 |
| 3E075UM | 41 |
| 3E1.6UM | 41 |
| 3E10UM | 41 |
| 3E12UM | 41 |
| 3E13UM | 41 |
| 3E15UM | 41 |
| 3E16UM | 41 |
| 3E1UM | 41 |
| 3E2.5UM | 41 |
| 3E20UM | 41 |
| 3E25UM | 41 |
| 3E2UM | 41 |
| 3E3.5UM | 41 |
| 3E30UM | 41 |
| 3E32UM | 41 |
| 3E3UM | 41 |
| 3E40UM | 41 |
| 3E4UM | 41 |
| 3E50UM | 41 |
| 3E5UM | 41 |
| 3E60UM | 41 |
| 3E63UM | 41 |
| 3E6UM | 41 |
| 3E8UM | 41 |
| 3G03UM | 42 |
| 3G05UM | 42 |
| 3G08UM | 42 |
| 3G1.6UM | 42 |
| 3G10UM | 42 |
| 3G12UM | 42 |
| 3G13UM | 42 |
| 3G15UM | 42 |
| 3G16UM | 42 |
| 3G1UM | 42 |
| 3G2.5UM | 42 |
| 3G20UM | 42 |
| 3G25UM | 42 |
| 3G2UM | 42 |
| 3G3.5UM | 42 |
| 3G30UM | 42 |
| 3G32UM | 42 |
| 3G3UM | 42 |
| 3G40UM | 42 |
| 3G4UM | 42 |
| 3G50UM | 42 |
| 3G5UM | 42 |
| 3G60UM | 42 |
| 3G63UM | 42 |
| 3G6UM | 42 |
| 3G8UM | 42 |
| 3P16UL3/12 | 32 |
| 3P16UL3/18 | 32 |
| 3P16UL3/6 | 32 |
| 3P18U3/12 | 76 |
| 3P18U3/15 | 76 |
| 3P18U3/18 | 76 |
| 3P18U3/21 | 76 |
| 3P18U3/24 | 76 |
| 3P18U3/27 | 76 |
| 3P18U3/30 | 76 |
| 3P18U3/33 | 76 |
| 3P18U3/36 | 76 |
| 3P18U3/39 | 76 |
| 3P18U3/42 | 76 |
| 3P18U3/45 | 76 |
| 3P18U3/48 | 76 |
| 3P18U3/51 | 76 |
| 3P18U3/54 | 76 |
| 3P18U3/57 | 76 |
| 3P18U3/6 | 76 |
| 3P18U3/9 | 76 |
| 3P18U3H/12 | 77 |
| 3P18U3H/15 | 77 |
| 3P18U3H/18 | 77 |
| 3P18U3H/21 | 77 |
| 3P18U3H/24 | 77 |
| 3P18U3H/27 | 77 |
| 3P18U3H/30 | 77 |
| 3P18U3H/33 | 77 |
| 3P18U3H/36 | 77 |
| 3P18U3H/39 | 77 |
| 3P18U3H/42 | 77 |
| 3P18U3H/45 | 77 |
| 3P18U3H/48 | 77 |
| 3P18U3H/51 | 77 |
| 3P18U3H/54 | 77 |
| 3P18U3H/57 | 77 |
| 3P18U3H/6 | 77 |
| 3P18U3H/9 | 77 |
| 3P25U3/12 | 76 |
| 3P25U3/15 | 76 |
| 3P25U3/18 | 76 |
| 3P25U3/21 | 76 |
| 3P25U3/24 | 76 |
| 3P25U3/27 | 76 |
| 3P25U3/30 | 76 |
| 3P25U3/33 | 76 |
| 3P25U3/36 | 76 |
| 3P25U3/39 | 76 |
| 3P25U3/42 | 76 |
| 3P25U3/45 | 76 |
| 3P25U3/48 | 76 |
| 3P25U3/51 | 76 |
| 3P25U3/54 | 76 |
| 3P25U3/57 | 76 |
| 3P25U3/6 | 76 |
| 3P25U3/9 | 76 |
| 3P25U3H/12 | 77 |
| 3P25U3H/15 | 77 |
| 3P25U3H/18 | 77 |
| 3P25U3H/21 | 77 |
| 3P25U3H/24 | 77 |
| 3P25U3H/27 | 77 |
| 3P25U3H/30 | 77 |
| 3P25U3H/33 | 77 |
| 3P25U3H/36 | 77 |
| 3P25U3H/39 | 77 |
| 3P25U3H/42 | 77 |
| 3P25U3H/45 | 77 |
| 3P25U3H/48 | 77 |
| 3P25U3H/51 | 77 |
| 3P25U3H/54 | 77 |
| 3P25U3H/57 | 77 |
| 3P25U3H/6 | 77 |
| 3P25U3H/9 | 77 |
| 3Z03UM | 43 |
| 3Z05UM | 43 |
| 3Z075UM | 43 |
| 3Z1.6UM | 43 |
| 3Z10UM | 43 |
| 3Z12UM | 43 |
| 3Z13UM | 43 |
| 3Z15UM | 43 |
| 3Z16UM | 43 |
| 3Z1UM | 43 |
| 3Z2.5UM | 43 |
| 3Z20UM | 43 |
| 3Z25UM | 43 |
| 3Z2UM | 43 |
| 3Z3.5UM | 43 |
| 3Z30UM | 43 |
| 3Z32UM | 43 |
| 3Z3UM | 43 |
| 3Z40UM | 43 |
| 3Z4UM | 43 |
| 3Z50UM | 43 |
| 3Z5UM | 43 |
| 3Z6UM | 43 |

# Index


| Part No. | Page |
|---|---|
| 3Z8UM | 43 |
| ALTN2 | 68 |
| ALTN2L | 26 |
| BRB5W | 79 |
| BS.UL | 16 |
| BS.UL | 59 |
| DC1CU02L | 24 |
| DC1CU05L | 24 |
| DC1CU1.6L | 24 |
| DC1CU10L | 24 |
| DC1CU12L | 24 |
| DC1CU13L | 24 |
| DC1CU15L | 24 |
| DC1CU16L | 24 |
| DC1CU1L | 24 |
| DC1CU20L | 24 |
| DC1CU25L | 24 |
| DC1CU2L | 24 |
| DC1CU30L | 24 |
| DC1CU32L | 24 |
| DC1CU3L | 24 |
| DC1CU40L | 24 |
| DC1CU4L | 24 |
| DC1CU50L | 24 |
| DC1CU5L | 24 |
| DC1CU60L | 24 |
| DC1CU63L | 24 |
| DC1CU6L | 24 |
| DC1CU8L | 24 |
| DC1DU02L | 24 |
| DC1DU05L | 24 |
| DC1DU1.6L | 24 |
| DC1DU10L | 24 |
| DC1DU12L | 24 |
| DC1DU13L | 24 |
| DC1DU15L | 24 |
| DC1DU16L | 24 |
| DC1DU1L | 24 |
| DC1DU20L | 24 |
| DC1DU25L | 24 |
| DC1DU2L | 24 |
| DC1DU30L | 24 |
| DC1DU32L | 24 |
| DC1DU3L | 24 |
| DC1DU40L | 24 |
| DC1DU4L | 24 |
| DC1DU50L | 24 |
| DC1DU5L | 24 |
| DC1DU60L | 24 |
| DC1DU63L | 24 |
| DC1DU6L | 24 |
| DC1DU8L | 24 |
| DC2CU02L | 24 |
| DC2CU05L | 24 |
| DC2CU1.6L | 24 |
| DC2CU10L | 24 |
| DC2CU12L | 24 |
| DC2CU13L | 24 |
| DC2CU15L | 24 |
| DC2CU16L | 24 |
| DC2CU1L | 24 |
| DC2CU20L | 24 |
| DC2CU25L | 24 |
| DC2CU2L | 24 |
| DC2CU30L | 24 |
| DC2CU32L | 24 |
| DC2CU3L | 24 |
| DC2CU40L | 24 |
| DC2CU4L | 24 |
| DC2CU50L | 24 |
| DC2CU5L | 24 |
| DC2CU60L | 24 |
| DC2CU63L | 24 |
| DC2CU6L | 24 |
| DC2CU8L | 24 |
| DC2DU02L | 24 |
| DC2DU05L | 24 |
| DC2DU1.6L | 24 |
| DC2DU10L | 24 |
| DC2DU12L | 24 |
| DC2DU13L | 24 |
| DC2DU15L | 24 |
| DC2DU16L | 24 |
| DC2DU1L | 24 |
| DC2DU20L | 24 |
| DC2DU25L | 24 |
| DC2DU2L | 24 |
| DC2DU30L | 24 |
| DC2DU32L | 24 |
| DC2DU3L | 24 |
| DC2DU40L | 24 |
| DC2DU4L | 24 |
| DC2DU50L | 24 |
| DC2DU5L | 24 |
| DC2DU60L | 24 |
| DC2DU63L | 24 |
| DC2DU6L | 24 |
| DC2DU8L | 24 |
| E983419 | 16 |
| E983419 | 59 |
| EASS | 16 |
| EASS | 59 |
| EASS2 | 69 |
| EASS2L | 27 |
| FA110ACL | 26 |
| FA110ACR | 68 |
| FA110DCL | 26 |
| FA110DCR | 68 |
| FA110UL | 16 |
| FA110UM | 50 |
| FA110UM | 59 |
| FA120ACL | 26 |
| FA120ACR | 68 |
| FA12ACL | 26 |
| FA12ACR | 68 |
| FA12DCL | 26 |
| FA12DCR | 68 |
| FA12UL | 16 |
| FA12UM | 50 |
| FA12UM | 59 |
| FA230ACL | 26 |
| FA230ACR | 68 |
| FA24ACL | 26 |
| FA24ACR | 68 |
| FA24DCL | 26 |
| FA24DCR | 68 |
| FA24UL | 16 |
| FA24UM | 50 |
| FA24UM | 59 |
| FA277ACL | 26 |
| FA277ACR | 68 |
| FA400ACL | 26 |
| FA400ACR | 68 |
| FA48ACL | 26 |
| FA48ACR | 68 |
| FA48DCL | 26 |
| FA48DCR | 68 |
| FA48UL | 16 |
| FA48UM | 50 |
| FA48UM | 59 |
| FA60ACL | 26 |
| FA60ACR | 68 |
| FMA1PL | 27 |
| FMA2PL | 27 |
| FMA3PL | 27 |
| G45-14-2 | 53 |
| G45-14-3 | 53 |
| G45-14-4 | 53 |
| G45-14-5 | 53 |
| G54-14-2 | 53 |
| G54-14-3 | 53 |
| G54-14-4 | 53 |
| G54-14-5 | 53 |
| GE2-14 | 53 |
| H10UL | 16 |
| H10UM | 50 |
| H10UM | 59 |
| H11UL | 16 |
| H11UM | 50 |
| H11UM | 59 |
| H12UL | 16 |
| H12UM | 50 |
| H12UM | 59 |
| H1COL | 27 |
| H1COR | 69 |
| H21UL | 16 |
| H21UM | 50 |
| H21UM | 59 |
| H2COL | 27 |
| H2COR | 69 |
| HLS11L* | 16 |
| HLS11M | 59 |
| HLS11M* | 50 |
| HMS01 | 53 |
| HMS02 | 53 |
| HMS10 | 53 |
| HMS11 | 53 |
| HMS20 | 53 |
| HSTCOL | 27 |
| HSTCOR | 69 |
| MA016UM | 48 |
| MA025UM | 48 |
| MA040UM | 48 |
| MA063UM | 48 |
| MA1.0UM | 48 |
| MA1.6UM | 48 |
| MA10UM | 48 |
| MA16UM | 48 |
| MA2.5UM | 48 |
| MA20UM | 48 |
| MA25UM | 48 |
| MA32UM | 48 |
| MA4.0UM | 48 |
| MA40UM | 48 |
| MA6.3UM | 48 |
| MS.F55 | 53 |
| MS.G55 | 53 |
| MS.PS2 | 53 |
| MS.PV | 53 |
| MS.SLG2 | 53 |
| MS.SLG3 | 53 |
| MS.SLJ2 | 53 |
| MS.SLJ3 | 53 |
| MS.SLR2 | 53 |
| MS.SLR3 | 53 |
| MS.SLW2 | 53 |
| MS.SLW3 | 53 |
| MS016 | 52 |
| MS025 | 52 |
| MS04 | 52 |
| MS063 | 52 |
| MS1 | 52 |
| MS1.6 | 52 |
| MS10 | 52 |
| MS16 | 52 |
| MS2.5 | 52 |
| MS20 | 52 |
| MS25 | 52 |
| MS4 | 52 |
| MS6.3 | 52 |
| N32UL | 16 |
| N63UL | 16 |
| N63UM | 59 |
| P35ULT | 33 |
| P50UB | 78 |
| P50ULB | 33 |
| P50UT | 78 |
| P50UT-LP | 78 |
| P95UB | 79 |
| RP2101 | 86 |
| RP2203 | 86 |
| RP2230 | 86 |
| RP2303 | 86 |
| RP2330 | 86 |
| RP2403 | 86 |
| RP2430 | 86 |
| RP2450 | 86 |
| RP4203 | 86 |
| RP4230 | 86 |
| RP4250 | 86 |
| RP4303 | 86 |
| RP4330 | 86 |
| RP4350 | 86 |
| RP4403 | 86 |
| RP4430 | 86 |
| RP4450 | 86 |
| RP4503 | 86 |
| RP4530 | 86 |
| RP4550 | 86 |
| RP4603 | 86 |
| RP4630 | 86 |
| RP4650 | 86 |
| RP4703 | 86 |
| RP4730 | 86 |
| RP4750 | 86 |
| TR11-xx | 80 |
| TR20-xx | 82 |
| TR30-xx | 84 |
| UA120UL | 16 |
| UA120UM | 50 |
| UA120UM | 59 |
| UV110ACL | 26 |
| UV110ACR | 68 |
| UV110DCL | 26 |
| UV110DCR | 68 |
| UV120ACL | 26 |
| UV120ACR | 68 |
| UV12ACL | 26 |
| UV12ACR | 68 |
| UV12DCL | 26 |
| UV12DCR | 68 |
| UV230ACL | 26 |
| UV230ACR | 68 |
| UV24ACL | 26 |
| UV24ACR | 68 |
| UV24DCL | 26 |
| UV24DCR | 68 |
| UV277ACL | 26 |
| UV277ACR | 68 |
| UV400ACL | 26 |
| UV400ACR | 68 |
| UV48ACL | 26 |
| UV48ACR | 68 |
| UV48DCL | 26 |
| UV48DCR | 68 |
| UV60ACL | 26 |
| UV60ACR | 68 |

# Terms & Conditions

**TITLE** - Title to the products of ALTECH shall remain with ALTECH until payment is made in full by Customer. Such reservation of title is for the purpose of securing the purchase price and shall not relieve Customer of the duty to inspect the products upon receipt, to notify ALTECH of any deficiencies or defects, and to exercise due care in the use, installation, operation, and maintenance of the products when on the premise of the Customer or under the control of the Customer. Notwithstanding any reservation of title by ALTECH, risk of loss shall pass to customer at any time of shipment.

**SHIPMENT AND DELIVERY** - All orders for destination in the mainland United States (less Hawaii, Alaska and non-continental United States possessions) will be shipped F.O.B. Flemington, N.J. All destination, shipping and other charges shall be paid by the Customer in accordance with ALTECH's then current shipping and billing practices.

Delivery dates given in the acceptance of any order are approximate. ALTECH shall not be liable for delays in delivery or in performance due to causes beyond its reasonable control including acts of God, acts of Customer, acts of civil or military authority, fires, strikes or other labor disturbances, war, riot or delays in transportation. In the event of such delay, the date of delivery or performance shall be extended for a period equal to the time lost by reason of the delay.

**PRICE** - PRICES in any ALTECH publication are subject to change without prior notification. Catalog prices are based on prices published in the current price list. All written quotations are valid for thirty (30) days from the date of quotation. Customer shall pay all sales, use, excise or similar taxes whenever ALTECH must itself pay and/or collect such tax from Customer arising out of the sale.

**PAYMENT** - Customer agrees to make payment within thirty (30) days of date of the invoice from ALTECH. Customer agrees to pay a late payment charge of one and one-half percent (1.5% per month, or the maximum late payment charge permitted by applicable law, whichever is less, on any unpaid amount for each calendar month (or fraction thereof) that such payment is in default. Orders amounting to less than $100.00 will be billed at $100.00 plus freight. Full carton purchases are required. In the event of referral to an attorney for collection, reasonable attorney's fees for collection of the overdue amount shall be paid by Customer. In the event payment is not received within 30 days from the date of invoice, any discount shall be cancelled and the full list price will be due.

**LIMITED WARRANTY** - ALTECH warrants to Customer that the equipment purchases shall be free from defects in material and workmanship under normal use and service for a period of one year from shipment.

Written notice as an explanation of the circumstances of any claim that the equipment has proved defective in material or workmanship shall be given promptly by the Customer to ALTECH.

ALTECH will not be liable for any misuse, improper operations, improper installation, improper maintenance, alteration, modification, accident or unusual degradation of the equipment or parts due to an unsuitable installation environment.

No representation of other affirmation of facts, including but not limited to statements regarding capacity, suitability for use or performance of the equipment, shall be or be deemed to be a warranty or representation by ALTECH for any purpose, nor give rise to any liability or obligation of ALTECH whatsoever.

Customer's sole and exclusive remedy in the event of breach of warranty, as set forth herein, is expressly limited to (1) the correction of the defect by adjustment, repair, modification, or replacement, or (2) issuance of a credit or refund of the purchase price for the defective equipment at ALTECH's election and sole expense.

EXCEPT AS SPECIFICALLY PROVIDED IN THIS AGREEMENT, THERE ARE NO OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

THIS WARRANTY EXTENDS ONLY TO THE CUSTOMER FROM ALTECH OR ITS AUTHORIZED DISTRIBUTOR.

**LIMITATION OF LIABILITY** - IN NO EVENT, SHALL ALTECH BE LIABLE FOR LOSS OF PROFITS, INDIRECT, SPECIAL, CONSEQUENTIAL OR OTHER SIMILAR DAMAGES ARISING OUT OF ANY BREACH OF THIS AGREEMENT OR OBLIGATIONS UNDER THE AGREEMENT.

ALTECH SHALL NOT BE LIABLE FOR ANY DAMAGES CAUSED BY DELAY IN SHIPMENT, INSTALLATION OR FURNISHING OF EQUIPMENT OR SERVICES UNDER THIS AGREEMENT.

No action arising out of any claimed breach of this Agreement may be brought by either party more than two (2) years after the cause of action has accrued.

**PATENT INDEMNITY** - ALTECH shall defend or settle any suit or proceeding brought against Customer based on a claim that any equipment made to ALTECH design and furnished hereunder constitutes an infringement of any existing United States patent, provided (ALTECH) is notified promptly in writing and is given complete authorization and information required for the defense, and ALTECH shall pay all damages and costs awarded against Customer, but shall not be responsible for any costs, expense or compromise incurred or made by Customer without ALTECH's prior written consent. If any equipment is in ALTECH's opinion likely to or does become the subject of a claim for patent infringement, ALTECH may at its option and expense procure for Customer the right to continue using the device, modify it to become non-infringing, but in the event ALTECH is not reasonably able to modify, substitute, or otherwise procure for Customer the right to continue using it, ALTECH will remove such equipment and refund to Customer the amount paid in excess of a reasonable rental for past use.

ALTECH shall not be liable for any infringement or claim based upon use of the equipment in combination with other equipment not supplied by ALTECH or with modifications made by Customer.

The foregoing states the entire liability of ALTECH to Customer arising from patent infringement.

**SELLER'S REMEDIES** - Should Customer fail to make any payment within ten (10) days of its due date, or fail to perform any other of the Customer's obligation hereunder upon thirty (30) days written notice, or should Customer be or become insolvent or be a party to any bankruptcy receivership proceeding prior to full payment of all amounts payable hereunder, ALTECH may: (a) with or without demand or notice to customer declare the entire amount unpaid immediately due and payable; (b) enter upon the premises where the equipment may be found and remove it (Customer shall assemble the equipment and make it available to ALTECH at a place reasonably convenient to both parties and shall permit and assist ALTECH in effecting the retaking and removal of the equipment); and (c) sell any or all the equipment as permitted under applicable law, applying the proceeds of the sale to payment of the expenses of retaking, repairing and selling the equipment, reasonable attorney fees and to the satisfaction of all indebtedness then due and unpaid under this Agreement. Any surplus shall be paid to Customer and any deficiency shall be paid to ALTECH by Customer.

The remedies provided herein shall be cumulative and in addition to all other remedies provided by law or equity or under the Uniform Commercial Code.

**GOVERNING LAW** - This agreement will be governed by the Laws of the State of New Jersey.

**GENERAL** - This Agreement shall only become effective and binding when either (a) it has been accepted and executed by an authorized representative of ALTECH, or (b) the equipment has been shipped to Customer, with or without acceptance in writing hereon. Notice of acceptance is hereby waived by Customer. Customer hereby acknowledges receipt of a true and complete copy hereof.

No addition to or modification of any of the Terms and Conditions of Sale as they appear herein shall be binding upon ALTECH unless signed in writing by duly authorized representative of ALTECH in Flemington, N.J.

Typographical and clerical errors in quotations, orders and acknowledgments are subject to correction.

This Agreement is not assignable without the prior written consent of ALTECH. Any attempt to assign any of the rights, duties or obligations of this Agreement without such consent is void.

If any provision or provisions of this Agreement shall be held to be invalid, illegal or unenforceable, the validity, legality and enforceability, of the remaining provisions shall not in any way be affected or impaired thereby.

ALTECH is not responsible for failure to fulfill its obligation under this Agreement due to causes beyond its control, or except as agreed herein.

THE CUSTOMER ACKNOWLEDGES THAT HE HAS READ THE AGREEMENT, UNDERSTANDS IT, AND AGREES TO BE BOUND BY ITS TERMS AND CONDITIONS. FURTHERMORE, THE CUSTOMER AGREES THAT IT IS THE COMPLETE AND EXCLUSIVE STATEMENT OF THE AGREEMENT BETWEEN THE PARTIES, WHICH SUPERSEDES ALL PROPOSALS OR PRIOR AGREEMENTS, ORAL OR WRITTEN, EXPRESSED OR IMPLIED, AND ALL OTHER COMMUNICATIONS BETWEEN THE PARTIES RELATING TO THE SUBJECT MATTER OF THIS AGREEMENT.

# Here are other great products available from Altech!

### *Smart Relays and Digital Timers*

Supports up to 48 I/Os (32 digital inputs & 16 digital outputs). DST Feature Available. Backlit LCD Screen for display & modification of pre-selected parameters of functional blocks, viewing I/O status and programming on the device. PC software for programming, online & offline simulation, documentation & printing. Designed for use in automation for commercial & Industrial sectors. Modbus Communication. UL 508 (UL File No. E352868), IEC 61000-3-2 and IEC 61000-4-2-1~11. 250 lines of ladder programming. 16 soft text messages, Time Switches, Compare Counters, Timers, Counters & 12 analog functions.

### *Interface Modules and Power Supplies*

Altech offers a wide range of DIN Rail or panel mount cable interface modules, relay interface modules, power supplies, carrier modules, and custom designed modules. Cable to connector models include: D-Sub connectors, ribbon cable connectors, and Dip socket connectors to terminals. Standard relay modules from 1 to 16 channels, and safety relay modules from 1 to 16 channels and up to 10 poles are included. The catalog also contains switching power supplies, linear power supplies, and custom designed interface modules.

### *Contactors, Mini Contactors, Overload Relays and Manual Motor Starters*

Contactors
- UL508 • CSA C22.2 No.14
- IEC 60947-2 & IEC 60947-4-2
- 1/2HP up to 600HP @ 480V AC
- Direct Mounting Overload Relays
- Full line of accessories
  UL508 Type E Manual Motor Starters
- UL508 (Type E self-protected
  Manual Motor Controller)
- CSA C22.2 No.14
- IEC 60947-2 & IEC 60947-4-2
- Type F combination Manual Motor
  Controller (with MC-Series Contactor)

### *Terminal Blocks*

Altech offers a NEW Terminal Block catalog with the most competitively priced blocks in the industry. We feature screw and spring clamp models for DIN rail and panel mount applications. This advanced line of wire termination products will increase your design options and help to get the job done more efficiently. Our line of blocks include feed-through (single, double or triple level), distribution, ground, fuse, disconnect, thermocouple, surge suppressor and indicator. A wide variety of accessories, tools and ferrules are available.

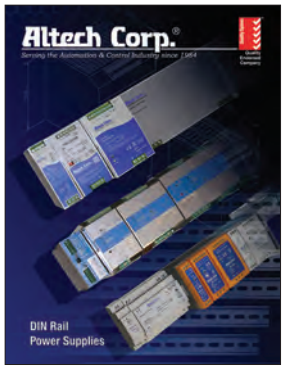
### *Industrial Enclosures*

Altech offers a broad selection of non-metallic and aluminum Industrial Enclosures to meet your diverse design requirements. Sizes range from 1.97 x 2.05 x 1.38 to 35.43 x 11.81 x 5.59 inches. Materials include polycarbonate, polystyrene, polypropylene, ABS or aluminum. Polycarbonate and aluminum series have been recently expanded. Protection up to IP67 (NEMA 4, 4X). Smooth sidewalls or sidewalls with knockouts. Enclosures can be mounted directly onto a panel, frame or other mounting surfaces. EMI / RFI Coating is available. Competitive cover printing is available. Hinge Kits. Customization available.

### *Liquid Tight Strain Reliefs*

This 64-page catalog introduces Altech's full line Liquid Tight Strain Reliefs (Cord Grips) which are used to seal cable entries, keep contaminant's from entering enclosures, provide strain relief and thus reduce stress on components and termination points inside enclosures. Available in standard, high-performance, and economy versions, functions include Straight-Through, Increased Strain Relief, Bend Protection, Pull/Bend Protection, Multi-conductor, Flat Cable and EMI/RFI. They can be used with almost any type of cable, cord or conductor - solid, stranded, flat, shielded, high temperature, etc.

### *DIN Rail Power Supplies*




Altech DIN RAIL mountable power supplies have Universal AC input. They are suitable for industrial and automation applications. UL508 Listed or UL Recognized. Single and Three phases up to 960W. Outputs of 5V, 12V, 15V, 24V and 48V. Class 2 devices are available. Installed on DIN rail TS35/ 7.5 or 15. Protections of Short circuit / Overload / Overvoltage / Over temperature. Cooling by free air convection. All-In-One DC-UPS, battery based. Ultra Capacitor DC-UPS, no battery required. Worldwide approvals. 3 year warranty.

### *Motor Disconnect Switches*

Altech's line of Motor Disconnect Switches are UL 508 listed as Manual Motor Controllers for AC Motor Starting Across-the-line and AC General use. This new 16 page catalog includes the 3 different handle designs, which are all available in gray/black or yellow/red housings. Electrical ratings are 25-150A / 600V. The switches are non-fused DIN Rail mountable. Neat features include: snap-on auxiliary switches, door mounting kit and a retrofit 30A fuse holder. Also featured are Enclosed Motor Disconnect Switches & Fused Enclosed Motor Disconnect Switch (30A) in plastic or stainless housings.

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