Overview of Physical Attributes

L, M and R Series

1 Strong thermoplast housing.

2 Strong terminal barriers.

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

4 Removable circuit identification tag.

ON

5 Indicator window.

OFF

6 Trip curve (D) and amperage (15A) window display. D15

Ordering Nomenclature

L, M and R Series

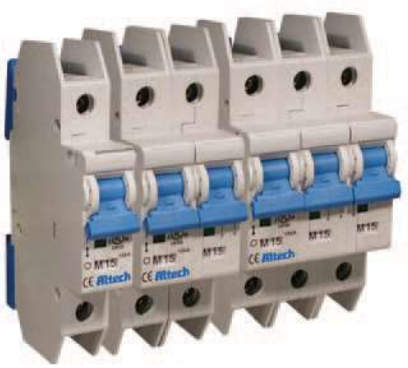
EXAMPLE

DC | 1 | CU | 25 | L

- Series: UL 489 = L / UL 508 = M / UL 1077 = R
- Current Rating: 0.3 – 63A
- Trip Curve (Series dependent; Z is special order): B, C, D, G, Z
- No. of Poles: 1, 2, 3, 4
- Current Type: DC = DC / Blank = AC

UL 489

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



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E305318

Current/ Voltage Rating	
AC Version *(one device - dual voltage ratings)* **DC Version**	0.2-63A/ 240V AC, 0.2-32A/ 480Y/277VAC 0.2-63A/ 125/ 250V DC
Poles	1, 2, 3 (4 poles available upon request.)
Trip Characteristics	C, D; AC and DC
Interrupting Capacity	10kA
Calibration Temperature	40°C (104°F)
Ambient Temperature	-25°C to 60°C (-13°F to 140°F)
Storage Temperature	-25°C to 75°C (-13°F to 167°F)
Terminal Size Acceptability and Terminal Torque	14-3 AWG: 17.7 lb-in. (2.0 Nm) 18-16 AWG: 25 lb-in.(2.8 Nm)
Electrical Life	6,000 switching cycles ON/ OFF
Mechanical Life	10,000 switching cycles ON/ OFF
Terminal Protection Degree	IP20 at front
Mounting Orientation	In any plane

Accessories *(see page 12-13)*

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

UL 508

M-Series - UL508 Manual Motor Controller with Disconnecting Mean

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E509480

Current/ Voltage Rating	
AC Version DC Rating	0.5-63A / 480Y/ 277V AC
Poles	1, 2, 3 (4 poles available upon request.)
Trip Characteristics	B, C, D, G
Short Circuit Withstand Rating (UL/CSA - Ratings)	0.5-6A (RC): 10kA with no back-up fuse 8-63A (RC): 10kA with UL-listed Class J back-up fuse; 5kA with no back-up fuse
Calibration Temperature	30°C (86°F)
Ambient Temperature	-25°C to 60°C (-13°C to 140°F)
Storage Temperature	-25°C to 75°C (-13°C to 167°F)
Terminal Size Acceptability and Terminal Torque	14-3 AWG: 17.7 lb-in. (2.0 Nm) 18-16 AWG: 25 lb-in. (2.8 Nm)
Terminal Protection Degree	IP20
Mounting Orientation	In any plane
Horsepower Ratings	see catalog

Accessories *(see page 22-23)*
- Auxiliary Contact
- Shunt Trip
- Neutral Pole
- Undervoltage (special order)
- Lock-out Adapter
- Front Mounting Kit with hardware

UL 1077

R Series UL1077 Recognized Supplementary Protector

c UL us
E301611

Current/ Voltage Rating	
AC Version	0.5-63A / 480Y/ 277V AC
Poles	1, 2, 3 (4 poles available upon request.)
Trip Characteristics	B, C, D
Short Circuit Withstand Rating	0.5-6A (RC): 10kA with no back-up fuse 8-63A (RC): 10kA with UL-listed Class J back-up fuse; 5kA with no back-up fuse
Calibration Temperature	30°C (86°F)
Ambient Temperature	-25°C to 60°C (-13° to 140°F)
Storage Temperature	-25°C to 75°C (-13° to 167°F)
Terminal Size Acceptability and Torque	14-3 AWG: 17.5 lb-in. (2.0 Nm) 18-16 AWG / 25 lb-in.(2.8 Nm)
Electrical Life	6,000 switching scycles ON/ OFF
Mechanical Life	10,000 cycles ON/ OFF
Terminal Protection Degree	IP20 at front
Mounting Orientation	In any plane

Accessories *(see page 30-31)*
- Auxiliary Contact
- Shunt Trip
- Neutral Pole
- Undervoltage (special order)
- Lock-out Adapter

L-Series
AC or DC
Miniature Molded Case Circuit Breakers

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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

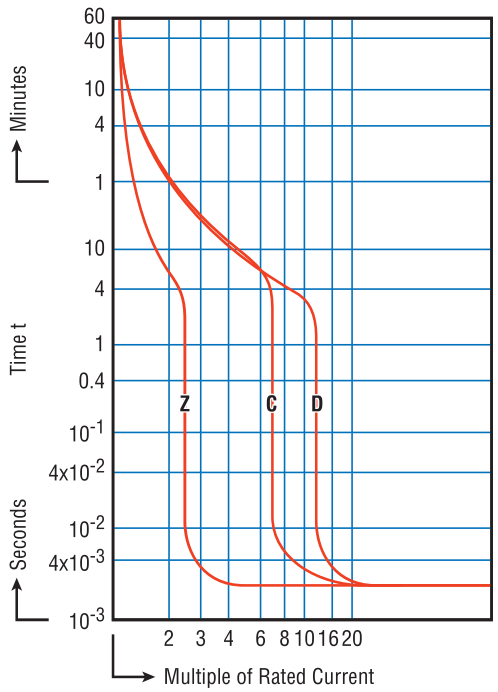
Current/ Voltage Rating	
AC Version *(one device - dual voltage ratings)* **DC Version**	0.2-63A/ 240V AC, 0.2-32A/ 480Y/277VAC 0.2-63A/ 125/ 250V DC
Poles	1, 2, 3 (4 poles available upon request.)
Trip Characteristics	C, D; AC and DC; (Z special order only)
Interrupting Capacity	10kA
Calibration Temperature	40°C (104°F)
Ambient Temperature	-25°C to 60°C (-13°F to 140°F)
Storage Temperature	-25°C to 75°C (-13°F to 167°F)
Terminal Size Acceptability and Terminal Torque	14-3 AWG: 17.7 lb-in. (2.0 Nm) 18-16 AWG: 25 lb-in.(2.8 Nm)
Electrical Life	6,000 switching cycles ON/ OFF
Mechanical Life	10,000 switching cycles ON/ OFF
Terminal Protection Degree	IP20 at front
Mounting Orientation	In any plane
Accessories	• Auxiliary Contact • Shunt Trip • Neutral Pole • Undervoltage Trip • Front Mounting Kit with hardware • Lock-out Adapter

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

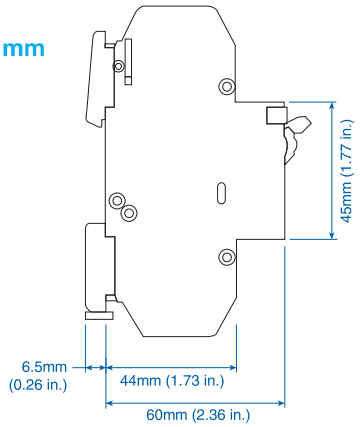
No. Poles	Type	0.2-32A	33-63A
1	DC	10kA@125V	10kA@125V
2	DC	10kA@250V	10kA@250V

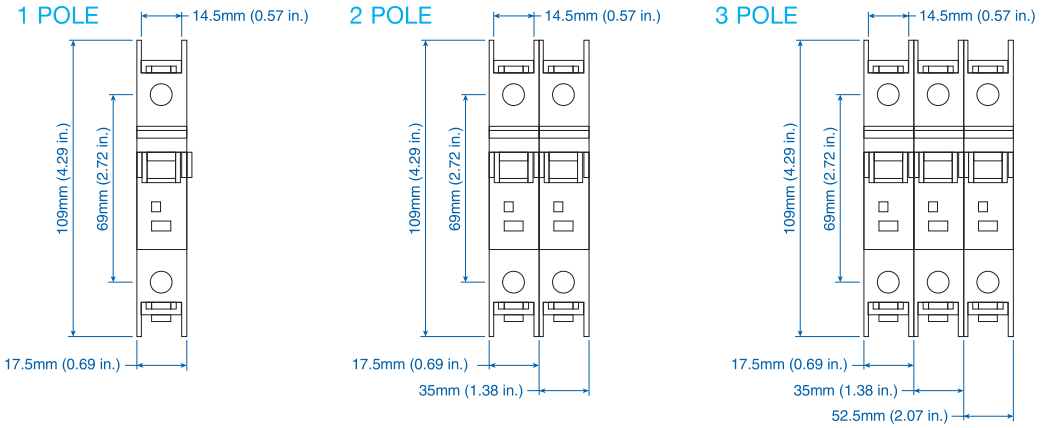


Time versus Current Trip Curve

For the exact trip curve, please refer to page 11

Dimensions in mm
side view





Trip-Characteristics*				AC Applications									DC Applications	
Characteristic Trip Boundaries				Lighting Wiring Protection Control Circuits	Business Equipment Appliances	Transformers	Power Supplies Heaters	Motors		Reactive Load	General Electronics	Semi-conductors Components/ devices with low surge-current and short circuit withstand capabilities	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/DC														
1.05xRC	1.35xRC	5xRC	10xRC											
D-Characteristics AC/DC														
1.05xRC	1.35xRC	10xRC	20xRC											
Z-Characteristics AC														
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 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 their 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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CE

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.

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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CE

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.

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.)

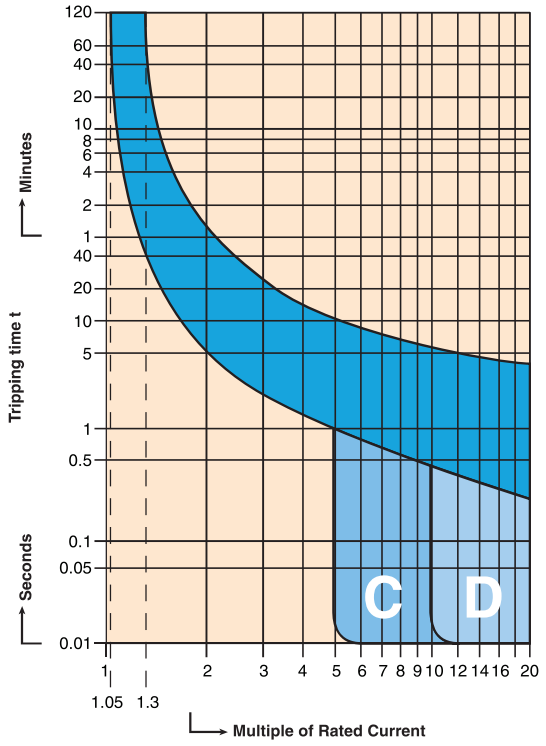
Two Pole

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

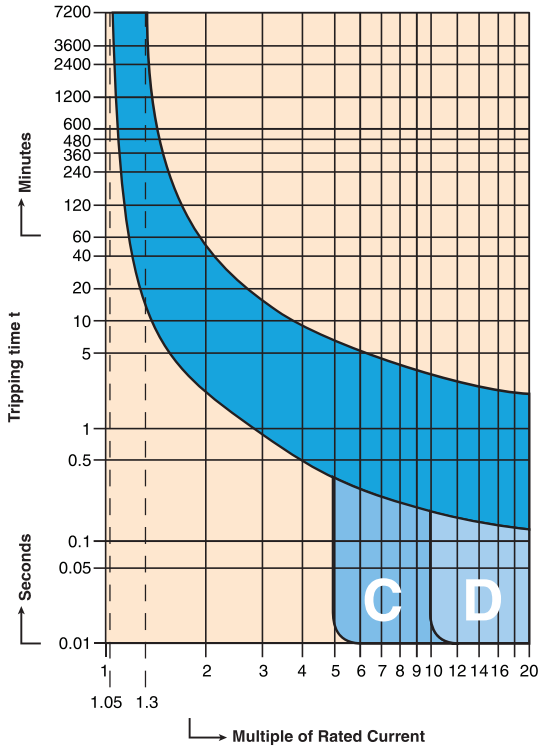
Standard Pack: 6

Weight: 1.7kg (3.74 lb.)

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 Icor (A)									Internal impedance Z (mΩ) char B, C, D, K	Power Loss B, C, D, K P (W)
	-20	-10	0	10	20	30	40	50	60		
0.2	0.25	0.24	0.24	0.23	0.22	0.21	0.2	0.19	0.18	45100.0	1.80
0.5	0.63	0.61	0.59	0.57	0.55	0.53	0.5	0.47	0.44	8000.0	2.00
1	1.24	1.21	1.18	1.14	1.1	1.05	1.0	0.93	0.88	2000.0	2.00
2	2.48	2.42	2.36	2.28	2.2	2.1	2.0	1.86	1.76	490.0	1.96
3	3.70	3.63	3.54	3.42	3.3	3.15	3.0	2.79	2.64	230.0	2.07
4	4.96	4.84	4.72	4.56	4.4	4.2	4.0	3.72	3.52	150.0	2.40
5	6.3	6.1	5.9	5.7	5.5	5.3	5.0	4.7	4.4	95.0	2.38
6	7.5	7.3	7.1	6.8	6.6	6.3	6.0	5.6	5.3	69.0	2.48
7	8.8	8.5	8.2	8.0	7.7	7.4	7.0	6.5	6.2	52.0	2.55
8	10.0	9.7	9.4	9.1	8.8	8.4	8.0	7.4	7.0	35.0	2.24
10	12.4	12.1	11.8	11.4	11.0	10.5	10.0	9.3	8.8	23.5	2.35
12	14.8	14.5	14.2	13.7	13.2	12.6	12.0	11.2	10.6	18.7	2.69
13	15.9	15.7	15.3	14.8	14.3	13.7	13.0	12.1	11.5	14.3	2.42
14	17.3	16.9	16.5	16.0	15.4	14.7	14.0	13.0	12.3	12.4	2.43
15	18.7	18.2	17.7	17.1	16.5	15.8	15.0	14.0	13.2	10.1	2.27
16	19.7	19.4	18.9	18.2	17.6	16.8	16.0	14.9	14.1	7.5	1.92
20	24.6	24.2	23.6	22.8	22.0	21.0	20.0	18.6	17.6	6.3	2.52
25	30.9	30.3	29.5	28.5	27.5	26.3	25.0	23.3	22.0	4.6	2.88
30	37.0	36.3	35.4	34.2	33.0	31.5	30.0	27.9	26.5	3.6	3.24
32	39.1	38.7	37.8	36.5	35.2	33.6	32.0	29.8	28.2	3.6	3.69
35	43.0	42.3	41.3	39.9	38.5	36.8	35.0	32.6	30.8	3.6	4.41
40	48.9	48.4	47.2	45.6	44.0	42.0	40.0	37.2	35.2	3.0	4.80
50	61.2	60.5	59.0	57.0	55.0	52.5	50.0	46.5	44.1	2.4	6.00
60	73.4	72.6	70.9	68.4	66.0	63.0	60.0	55.9	52.9	1.8	6.48

Accessories

L-Series Circuit Breakers

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E305318

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

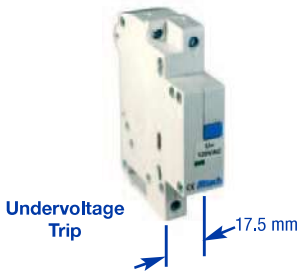
Weight: 1.2kg (2.64 lb.)

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

** Special order in conjunction with circuit breaker that is factory assembled (not field assembled).



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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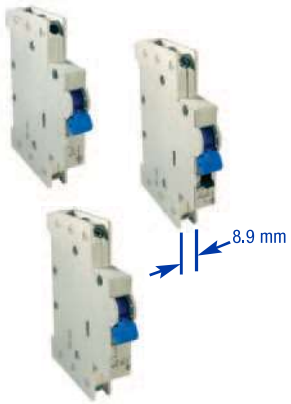


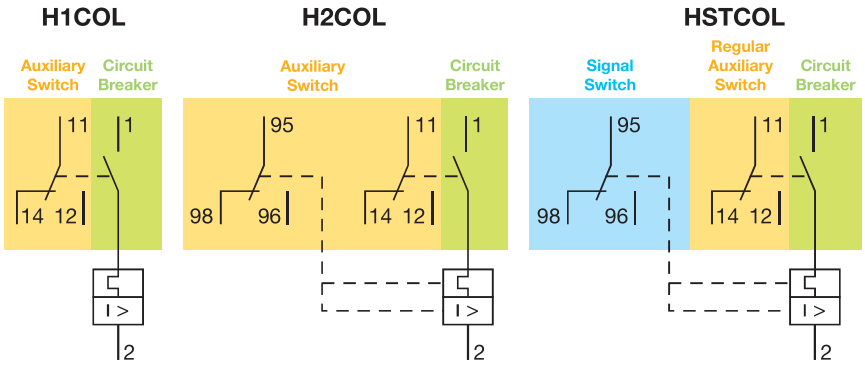
Auxiliary Contact (6A/120V AC; 3A/240V AC; 6A/24V DC; 0.5A/125V DC)

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

M-Series

M-Series - UL508 Manual Motor Controller with Disconnecting Mean

- 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 Include:
  - AC Motor Starting, Across the Line
  - AC General Use

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E509480

Voltage Rating	480Y/277VAC
Short Circuit Withstand Rating (UL - Ratings)	0.5-6A (RC): 10kA with no back-up fuse 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:	14-3 AWG: 17.5 lb-in. (2.0 Nm)
and Torque	18-16 AWG: 25 lb-in. (2.8 Nm)
Terminal Protection Degree	IP20
Vibration Resistance	3g (8-50Hz)

Indicator window

ON

OFF

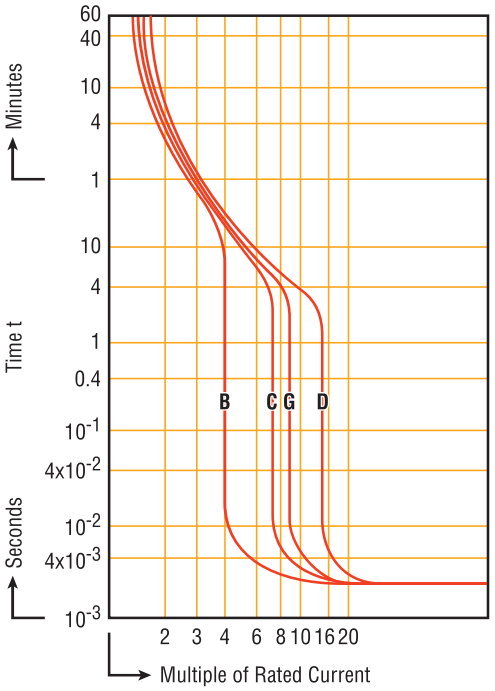
Trip curve and amperage window display.

SHORT CIRCUIT WITHSTAND RATINGS FOR M-SERIES MANAUL MOTOR CONTROLLER

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

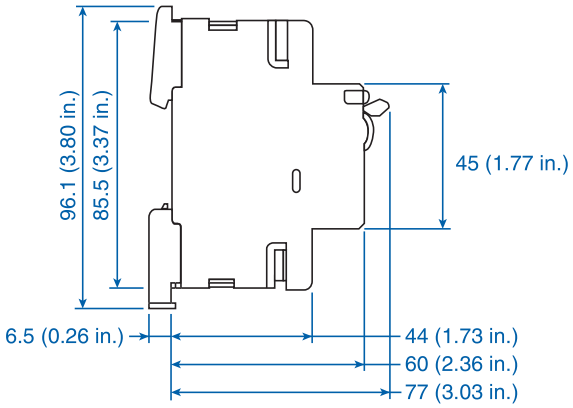
DC voltage rating: 48 VDC (self-certified).



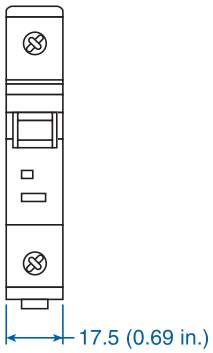
Time versus Current Trip Curve

For the exact trip curve, please refer to page 20

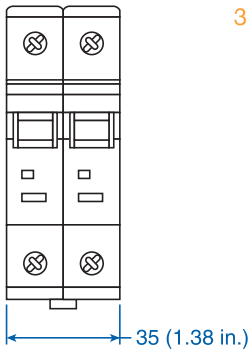
Dimensions in mm
side view



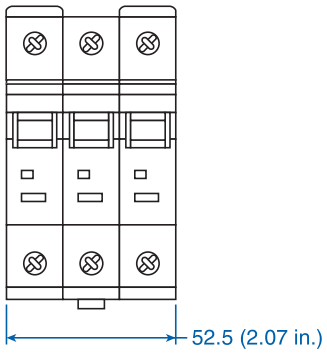
1 POLE



2 POLE



3 POLE



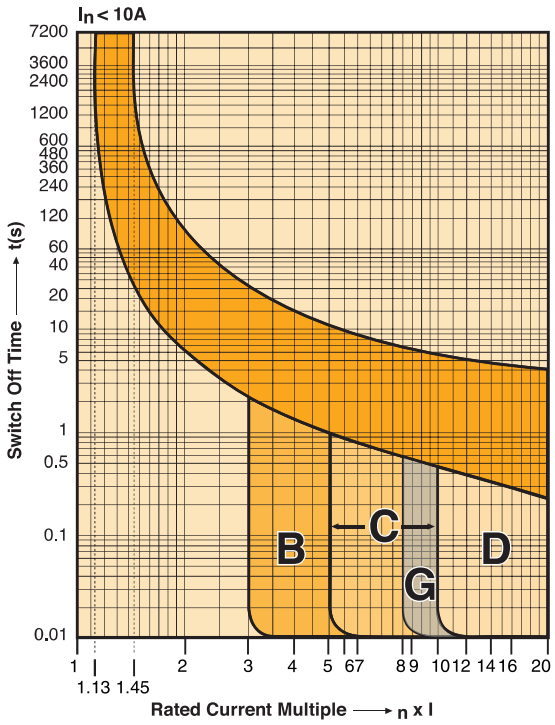
Trip-Characteristics*				Applications									
Characteristic Trip Boundaries				Lighting Wiring Protection Control Circuits	Business Equipment Appliances	Transformers	Power Supplies Heaters	Motors			General Electronics	Solenoid	Reactive Load
Thermal Trip		Magnetic Trip						General	Low Inrush	High Inrush			
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										
G-Characteristics				✓		✓		✓	✓			✓	
1.05xRC	1.35xRC	8xRC	10xRC										

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

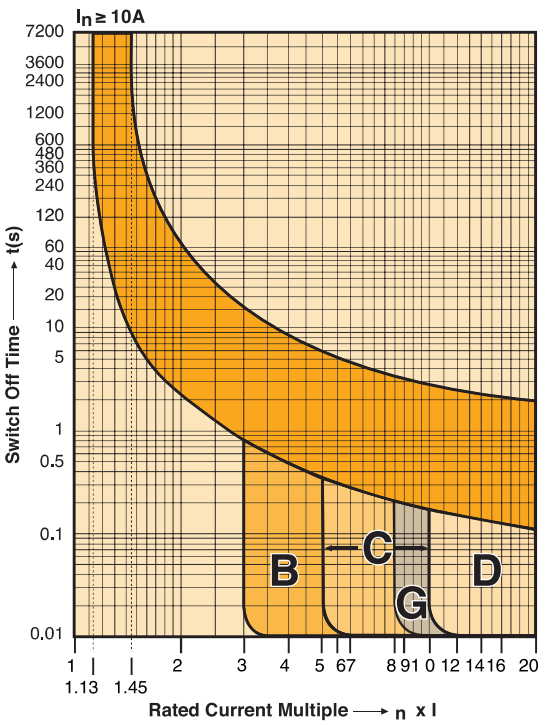
Warning!
This information should only be used as a selection guide. The use of a Miniature Circuit Breaker/Manual Motor Controller in an application with a certain Trip-Characteristic always requires prototype testing! It is the responsibility of the circuit design engineer to select the appropriate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

M-Series Trip Curves

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



B, C, G 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.								
I_n (A)	Z (m Ω)	P (W)	Z_s (Ω)			I cor (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

M-Series - UL508 Manual Motor Controller with Disconnecting Mean

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

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

** Special order in conjunction with circuit breaker that is factory assembled (not field assembled).

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.)

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E509480

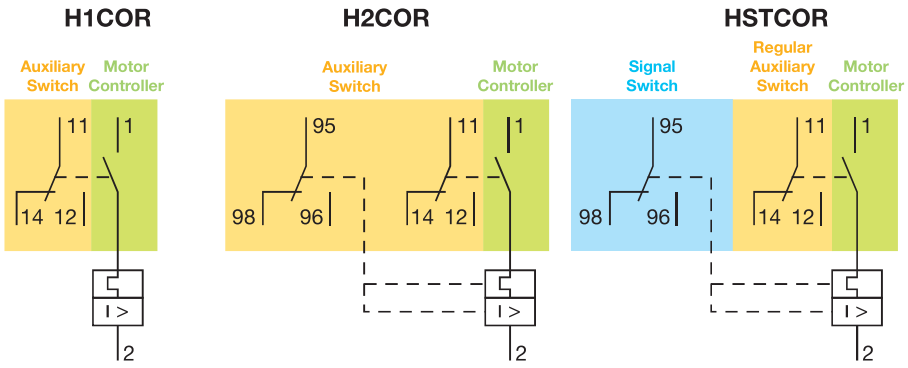
Auxiliary Contact (4A/230 VAC)

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

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.

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CE

Voltage Rating	480Y/277VAC
Short Circuit Withstand Rating (UL - Ratings)	0.5-6A (RC): 10kA with no back-up fuse 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) 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

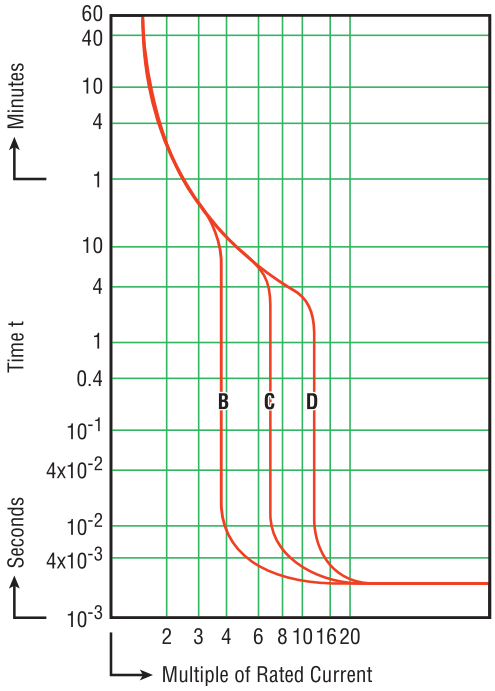
Trip curve and amperage window display.

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

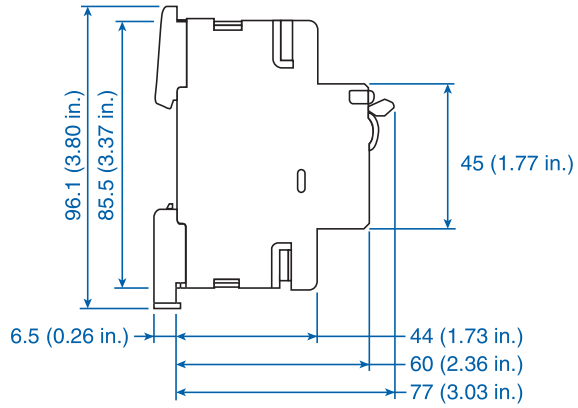
DC voltage rating: 48 VDC (self-certified).



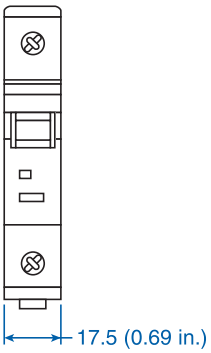
Time versus Current Trip Curve

For the exact trip curve, please refer to page 29

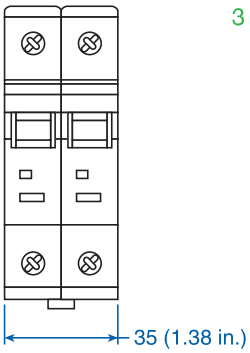
Dimensions in mm
side view



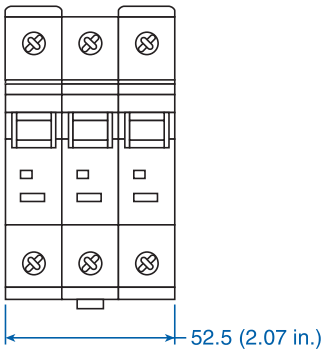
1 POLE



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 their 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.

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CE

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
CE

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
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

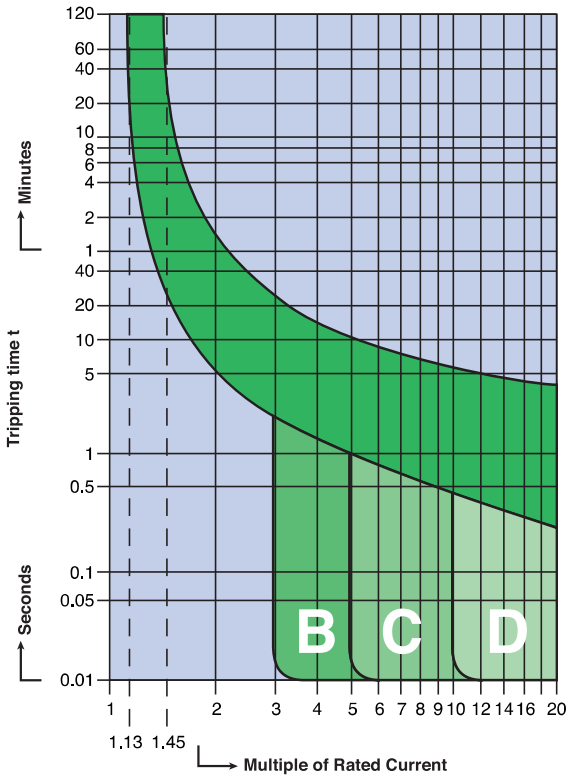
Weight:
0.5A - 63A: 1.66kg (3.67 lb.)

Four Pole
Please contact Altech.

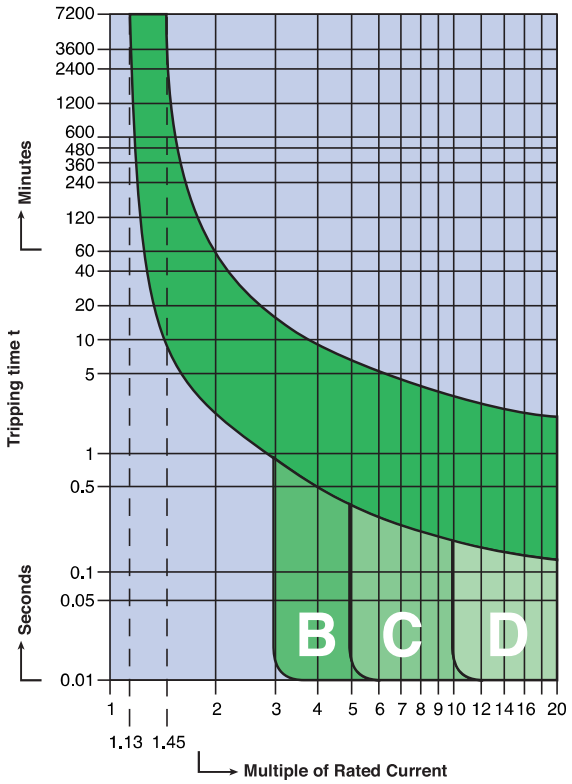
Non-standard current ratings available. Minimum quantities may apply. Please contact Altech for further details.

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.)

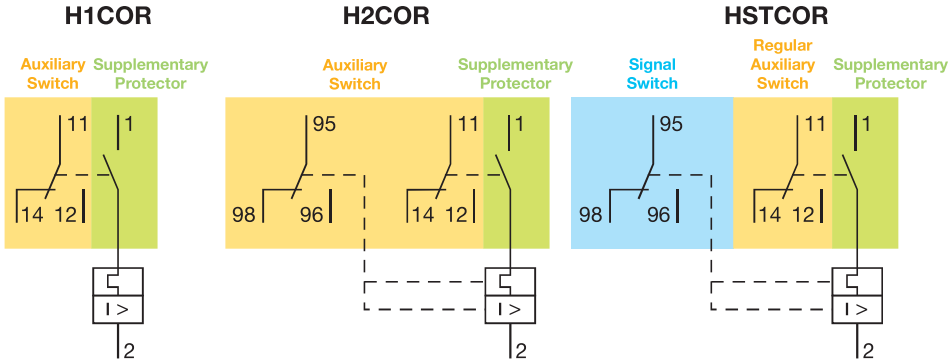
Auxiliary Contact (4A/230 VAC)

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