

# 1489-M Specifications

Electrical Ratings	
Poles	1, 2, 3
Tripping characteristics	C, D
Rated current ( $I_n$ )	0.5...63 A
Rated frequency [f]	50/60 Hz
Rated insulation voltage $U_i$ per IEC/EN 60664-1	250V AC (phase to ground) 440V AC (phase to phase)
Overvoltage category	III
Pollution degree	3

Data per UL/CSA					
Rated voltage	AC	1-pole	C Curve	0.5...40 A	277V AC
			D Curve	50...63 A	240V AC
		2-, 3-pole	C Curve	0.5...40 A	480Y/277V AC
			D Curve	50...63 A	240V AC
	DC	1-pole		48V DC	
		2-pole		96V DC (2-pole in series)	
	Rated interrupting capacity per UL 489		10 kA		
	Reference temperature for tripping characteristics		40 °C		

Electrical endurance	6,000 operations (AC and DC); 1 cycle (1s - ON, 9s - OFF)
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Data per IEC/EN 60947-2			
Rated operational voltage ( $U_o$ )	1-pole		230V AC
	2-, 3-pole		400 V AC
Highest supply or utilization voltage ( $U_{max}$ )	AC	1-pole	253/440V AC
		2-, 3-pole	440V AC
	DC ★	1-pole	48V DC
		2-pole	96V DC
Min. operating voltage		12V AC, 12V DC	
Rated ultimate short-circuit breaking capacity ( $I_{CU}$ )		15 kA	
Rated service short-circuit breaking capacity ( $I_{CS}$ )		≤40 A: 11.25 kA >40 A: 7.5 kA	
Rated impulse withstand voltage $U_{imp}$ (1.2/50µs)		4 kV (test voltage 6.2kV at sea level, 5kV at 2,000m)	
Dielectric test voltage		2 kV (50/60Hz, 1 min.)	
Reference temperature for tripping characteristics		30 °C	
Electrical endurance		$I_n < 30A$ :20,000 ops.(AC) $I_n \geq 30A$ :10,000 ops. (AC) 1,000 ops. (DC)	
1 cycle (2s - ON, 13s - OFF, $I_n \leq 32A$ ),			
1 cycle (2s - ON, 28s - OFF, $I_n > 32A$ )			

★ Self-declared IEC DC ratings.

Mechanical Data	
Housing	Insulation group II, RAL 7035
Indicator window	red ON/green OFF
Protection degree per EN 60529	IP20, IP40 in enclosure with cover
Mechanical endurance	20,000 operations
Shock resistance per IEC/EN 60068-2-27	25 g - 2 shocks - 13 ms
Vibration resistance per IEC/EN 60068-2-6	5g - 20 cycles at 5...150...5 Hz with load 0.8 In

Environmental	
Environmental conditions (damp heat) per IEC/EN 60068-2-30	28 cycles with 55°C/90-96% and 25°C/95-100%
Ambient temperature $\Delta$	-25...+55 °C
Storage temperature	-40...+70 °C

Installation	
Terminal	Dual terminal
Cross-section of wire ◆ – solid, stranded (front/back terminal slot)	35/35 mm <sup>2</sup>
	18...4/18...10 AWG
Cross-section of wire – flexible (front/back terminal slot)	25/10 mm <sup>2</sup>
Multi-wire rating per UL, CSA	1 wire, 18...4 AWG
	2-4 wires†, 18...10 AWG
Cross-section of bus bars (back terminal slot)	10 mm <sup>2</sup>

Tightening torque	IEC	2.8 N·m
	UL/CSA	AWG 18...16: 13.3 in·lb, AWG 14...10: 17.7 in·lb, AWG 8...4: 39.8 in·lb

Screwdriver	No. 2 Pozidrive
Mounting	DIN Rail (EN 60715, 35 mm) with fast clip
Mounting position	Any
Supply	Optional

Approximate Dimensions and Weight	
Pole dimensions (H x D x W)	111 x 69 x 17.5 mm (4.37 x 2.72 x .69")
Pole weight	125 g (4.4 oz.)

Combination with Auxiliary Elements	
Auxiliary contact	Yes
Signal contact	Yes
Shunt trip	Yes

◆ 35 mm self-declared, not included in IEC/EN approval.

Δ Refer to the ambient temperature derating tables.

† Wires must be of like size and stranding. Up to two wires per terminal slot.

### Power Loss Due to Current

Rated Current [A]	Power Loss Per Pole [W]	Rated Current [A]	Power Loss Per Pole [W]
0.5	1.4	15	2.4
1	1.4	16	2.5
1.6	1.8	20	2.5
2	1.8	25	3.2
3	1.6	30	3.5
4	1.8	32	3.7
5	1.9	35	4.1
6	2.0	40	4.5
7	1.1	50	4.5
8	1.5	60	4.9
10	2.1	63	5.4
13	2.3	—	—

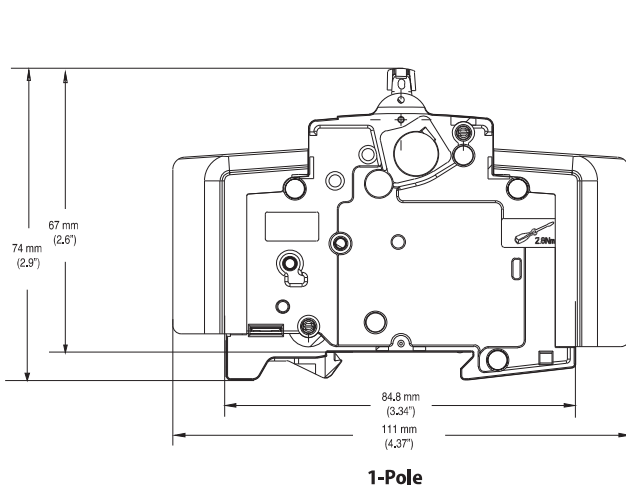
### Zero-stack Derating

The installation of several miniature circuit breaker side by side with rated current on all poles requires a correction factor to the rated current (not required if spacers are used).

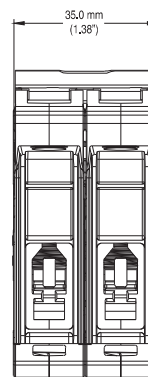
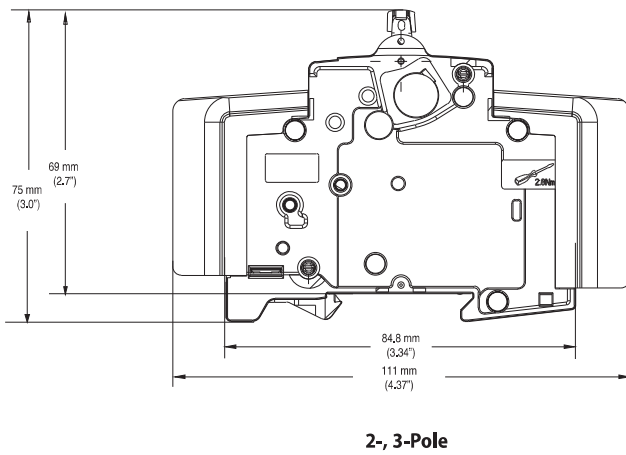
No. of Adjacent Devices	Factor
1	1
2,3	0.9
4,5	0.8
≥ 6	0.75

## Approximate Dimensions

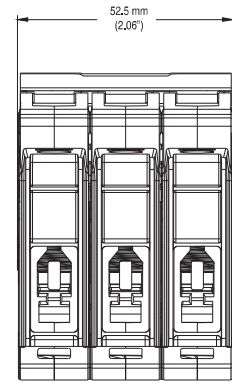
**Note:** Dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.



**1-Pole**



**2-Pole**



**3-Pole**

## Application Information

### Circuit Voltage

The Bulletin 1489-M circuit breakers are rated by voltage class. Applications should not exceed the listed voltage and current range.

### Circuit Frequency

The Bulletin 1489-M circuit breakers may be applied to frequencies of 50 Hz and 60 Hz without derating. For applications above 60 Hz, contact Rockwell Automation with specific application information for the derating of the circuit breakers.

### Available Short Circuit Current

The Bulletin 1489-M circuit breakers should only be applied in those applications in which the available short-circuit (or fault) current is less than or equal to 10 kA (US/Canada) and 15 kA (IEC).

### Tripping Characteristics

The trip curve characteristics are shown on the following pages. The trip bands shown for each breaker represent current tripping limits for a circuit breaker and are within the limits established by UL.

The standard tripping characteristic for Bulletin 1489-M is Type C. Type C has a magnetic trip activated at 5-10 times the rated current of the circuit breaker. The reference temperature for the thermal tripping characteristics is 30 °C. The Type C characteristic will suit most applications.

In rare occurrences when the Type C characteristic does not fully meet the application, Type D magnetic trip characteristic is available, allowing for transients approximately twice as high as the standard Type C.

For a specific current at 30 °C, a circuit breaker will open ("clear the circuit") automatically at some total time that will be within the minimum and maximum time shown on the curves. For example, a one-pole, 15 A, Bulletin 1489-M circuit breaker trips in not less than 1 s and not more than 200 s on a 30 A current. Because the UL standard defines this time spread, users should not specify exact tripping time. The lower current portion of the curves (upper left) depicts the time to trip due to thermal action and reflect overload protection of the wire and connect load. The higher current portion of the curves (lower right) depicts the trip due to magnetic action of the circuit breaker and reflects protection due to short circuit level currents.

### Application Considerations

*The following is a discussion of application considerations related to North American applications. When applying product to IEC regional requirements, follow IEC practices and guidelines.*

The selection of a specific ampere rating for a specific application is dependent on the type of load and duty cycle and is governed by the National Electrical Code (Canadian Electrical Code) and UL/CSA. In general, the codes require that overcurrent protection is at the current supply and at points where wire sizes are reduced. In addition, the codes state that conductors be protected according to their current carrying capacity. There are specific situations that require application consideration, such as motor circuit, and guidelines for the selection for transformer protection.

The Bulletin 1489-M circuit breakers are "non-100% rated" as defined by UL 489, para 7.1.4.2. As such, the circuit breaker's rating should be loaded to no more than 80% if used with continuous loads.

Line and load may be reversed. The Bulletin 1489-M circuit breaker may be bottom fed.

### Branch Circuits

Bulletin 1489-M circuit breakers may be used to protect branch circuits. A branch circuit is the wiring portion of a system extending beyond the final overcurrent device protecting the circuit. Guidelines established in NEC, CEC, UL, and CSA should be used to determine the specific device. For example:

#### Motor Branch Circuit

Bulletin 1489-M circuit breakers are not horsepower rated because they are able to safely interrupt currents far in excess of the locked rotor value for a selected motor. This ability is recognized in the codes and standards and is also established by the UL and CSA tests described in UL 489 and CSA C22.2 No. 5 standards.

The size of a Bulletin 1489-M circuit breaker should be determined following the guidelines for an Inverse Time Circuit Breaker.

*References: NEC 430.51 and UL 489. Also see CEC and appropriate Canadian Standards.*

#### Transformer Protection

Bulletin 1489-M circuit breakers may be used for transformer protection following the guidelines established.

*References: NEC 450 and UL 489. Also see CEC and appropriate Canadian Standards.*

Heater Load, Lighting, and Other Load Protection  
Bulletin 1489-M circuit breakers may be used for protection of heater loads, lighting loads, and other loads following the guidelines established.

*References: NEC Article 31 and UL 508A. Also see CEC and appropriate Canadian Standards.*

### SWD Rating

The Bulletin 1489-M breakers (0.5 ... 20 A) are rated as Switch Duty (SWD) and as such may be applied to switch fluorescent lighting loads up to their current and voltage maximum.

### Coordinated Overcurrent Protection

Where an orderly shutdown is required to minimize the hazards to personnel and equipment, a system of coordination based upon the faulted or overloaded circuit is isolated by selective operation of only the overcurrent protective device closest to the overcurrent condition. The user should select devices that meet this requirement.

*References: NEC 240.12. Also see CEC.*

### HACR Rating

Bulletin 1489-M Circuit Breakers are rated as Heating, Air Conditioning and Refrigeration circuit breakers as defined by UL 489, paragraph 6.7 and may be used in this type of application.

### Current Limiting

Bulletin 1489-M Circuit Breakers are rated as current limiting circuit breakers as defined by UL 489, paragraph 8.6.

The Bulletin 1489-M line features the ability to achieve short circuit interruptions far more effectively than conventional breakers. In conventional circuit breakers, the short circuit interruption time required is approximately one or two half cycles of an AC sine wave. When the contacts open, the resulting arc continues to burn until the current level passes through zero. The arc may re-ignite because of the insufficient width of the contact gap. The current that flows until the arc is extinguished produces a heating effect proportional to the  $I^2t$  value (let-through-energy) of the fault current.

The Bulletin 1489-M device is designed to substantially reduce the amount of let-through-current and the resulting let-through-energy that can damage protected components. The Bulletin 1489-M has the ability to interrupt short circuit current within the first half cycle of the fault. Limiting let-through current and energy will protect against the harmful effects of overcurrent and is focused primarily on avoiding excessive heat and mechanical damage.

Both of these factors are proportional to the square of the current. Thermal energy is proportional to the square of the RMS value and magnetic forces are proportional to the square of the peak value. The most effective way to provide protection is to substantially limit let-through-energy. This provides the following advantages:

- Far less damage at the location of the short circuit.
- Fast electric separation of a faulty unit from the system, especially power supplies connected in parallel that are switched off when the voltage of the power bus drops below a certain level.
- Far less wear on the miniature circuit breaker itself. This means more safe interruptions.
- Better protection of all components in the short circuit path.
- Far wider range of selective action when used with an upstream protective device. (No nuisance shut downs from feeder line interruptions, causing a blackout in all connected branches.)

## Ambient Temperature Derating

The Bulletin 1489-M circuit breakers are rated in RMS amperes at a 40 °C (104 °F) ambient temperature per UL 489/CSA C22.2 No. 5. This temperature is used as the ambient temperature external to an industrial enclosure. If a circuit breaker is applied in a temperature that exceeds the 40 °C (104 °F) ambient rating, then the circuit breaker should be derated using the table below. For IEC 60947-2 standard, the products carry an ambient rating of 30 °C. Follow standard IEC application considerations for temperature rating in different ambient temperatures.

**Note:** Application below 0° C is for non-condensing atmosphere. Care should be taken for applications below 0 °C. These devices are not certified to operate correctly in the presence of ice.

**1489-M  
UL Derating  
Reference Temp: 40°C**

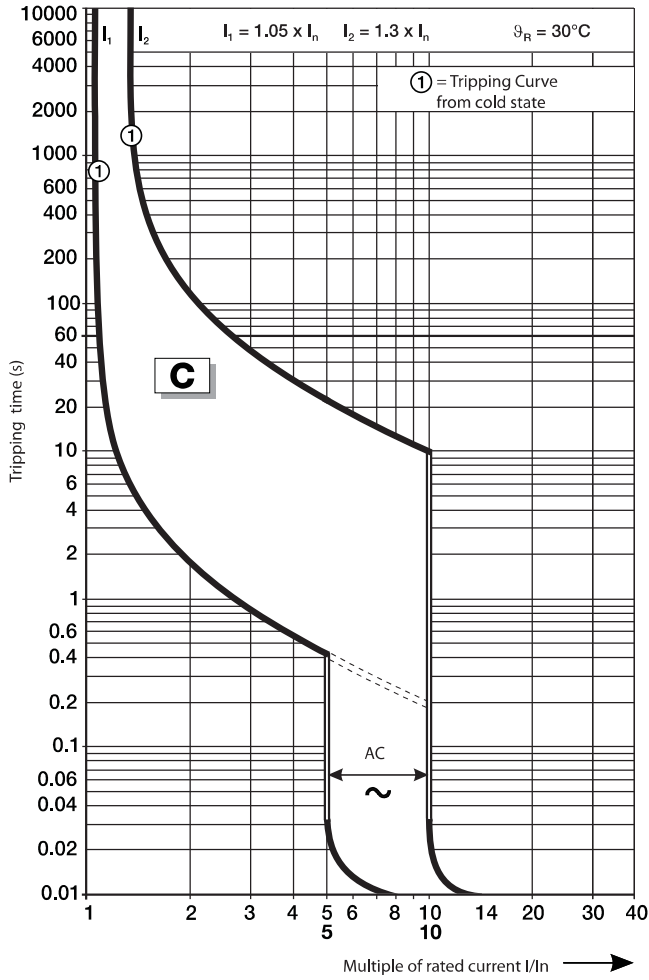
RU200	Ambient Temperature (°C)											
In(A)	-40	-30	-20	-10	0	10	20	30	40	50	60	70
0.5	0.65	0.63	0.61	0.59	0.57	0.56	0.54	0.52	0.5	0.48	0.46	0.44
1	1.30	1.26	1.22	1.19	1.15	1.11	1.07	1.04	1	0.96	0.93	0.89
1.6	2.06	2.01	1.96	1.90	1.84	1.78	1.72	1.66	1.6	1.54	1.48	1.42
2	2.60	2.52	2.44	2.37	2.30	2.22	2.15	2.07	2	1.93	1.85	1.78
3	3.89	3.78	3.67	3.56	3.44	3.33	3.22	3.11	3	2.89	2.78	2.67
4	5.19	5.04	4.89	4.74	4.59	4.44	4.30	4.15	4	3.85	3.70	3.56
5	6.50	6.31	6.13	5.94	5.75	5.56	5.38	5.19	5	4.81	4.63	4.44
6	7.77	7.55	7.33	7.11	6.89	6.67	6.44	6.22	6	5.78	5.56	5.33
7	9.10	8.84	8.58	8.31	8.05	7.79	7.53	7.26	7	6.74	6.48	6.21
8	10.36	10.07	9.78	9.48	9.18	8.89	8.59	8.30	8	7.70	7.41	7.11
10	13.00	12.60	12.20	11.90	11.50	11.10	10.70	10.40	10	9.60	9.30	8.90
13	16.90	16.40	15.90	15.40	14.90	14.40	14.00	13.50	13	12.50	12.00	11.60
15	19.50	18.94	18.38	17.81	17.25	16.69	16.13	15.56	15	14.44	13.88	13.31
16	20.60	20.10	19.60	19.00	18.40	17.80	17.20	16.60	16	15.40	14.80	14.20
20	26.00	25.20	24.40	23.70	23.00	22.20	21.50	20.70	20	19.30	18.50	17.80
25	32.40	31.50	30.60	29.60	28.70	27.80	26.90	25.90	25	24.10	23.20	22.20
30	39.00	37.88	36.75	35.63	34.50	33.38	32.25	31.13	30	28.88	27.75	26.63
32	41.50	40.30	39.10	37.90	36.70	35.60	34.40	33.20	32	30.80	29.60	28.40
35	45.50	44.19	42.88	41.56	40.25	38.94	37.63	36.31	35	33.69	32.38	31.06
40	51.90	50.40	48.90	47.40	45.90	44.40	43.00	41.50	40	38.50	37.00	35.60
50	64.90	63.00	61.10	59.30	57.40	55.60	53.70	51.90	50	48.20	46.30	44.50
60	78.00	75.75	73.50	71.25	69.00	66.75	64.50	62.25	60	57.75	55.50	53.25
63	81.60	79.30	77.00	74.70	72.30	70.00	67.70	65.30	63	60.70	58.30	56.00

**1489-M  
IEC Derating  
Reference Temp: 30°C**

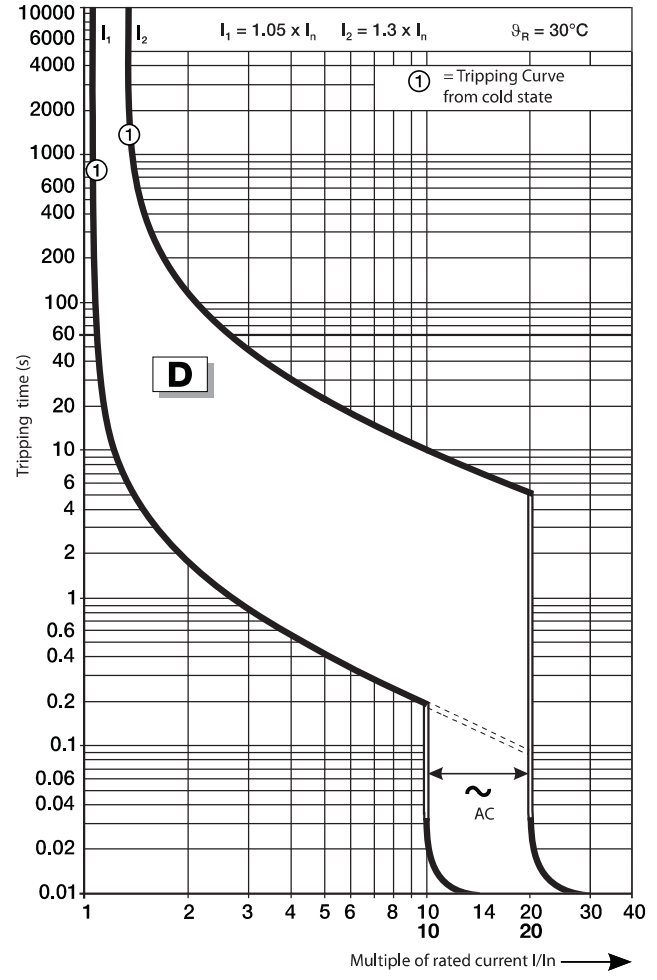
RU200	Ambient Temperature (°C)											
In(A)	-40	-30	-20	-10	0	10	20	30	40	50	60	70
0.5	0.63	0.61	0.59	0.57	0.56	0.54	0.52	0.5	0.48	0.46	0.44	0.43
1	1.26	1.22	1.19	1.15	1.11	1.07	1.04	1	0.96	0.93	0.89	0.85
1.6	2.01	1.96	1.90	1.84	1.78	1.72	1.66	1.6	1.54	1.48	1.42	1.36
2	2.52	2.44	2.37	2.30	2.22	2.15	2.07	2	1.93	1.85	1.78	1.70
3	3.78	3.67	3.56	3.44	3.33	3.22	3.11	3	2.89	2.78	2.67	2.56
4	5.04	4.89	4.74	4.59	4.44	4.30	4.15	4	3.85	3.70	3.56	3.41
5	6.31	6.13	5.94	5.75	5.56	5.38	5.19	5	4.81	4.63	4.44	4.25
6	7.55	7.33	7.11	6.89	6.67	6.44	6.22	6	5.78	5.56	5.33	5.11
7	8.84	8.58	8.31	8.05	7.79	7.53	7.26	7	6.74	6.48	6.21	5.95
8	10.07	9.78	9.48	9.18	8.89	8.59	8.30	8	7.70	7.41	7.11	6.82
10	12.60	12.20	11.90	11.50	11.10	10.70	10.40	10	9.60	9.30	8.90	8.50
13	16.40	15.90	15.40	14.90	14.40	14.00	13.50	13	12.50	12.00	11.60	11.10
15	18.94	18.38	17.81	17.25	16.69	16.13	15.56	15	14.44	13.88	13.31	12.75
16	20.10	19.60	19.00	18.40	17.80	17.20	16.60	16	15.40	14.80	14.20	13.60
20	25.20	24.40	23.70	23.00	22.20	21.50	20.70	20	19.30	18.50	17.80	17.00
25	31.50	30.60	29.60	28.70	27.80	26.90	25.90	25	24.10	23.20	22.20	21.30
30	37.88	36.75	35.63	34.50	33.38	32.25	31.13	30	28.88	27.75	26.63	25.50
32	40.30	39.10	37.90	36.70	35.60	34.40	33.20	32	30.80	29.60	28.40	27.30
35	44.19	42.88	41.56	40.25	38.94	37.63	36.31	35	33.69	32.38	31.06	29.75
40	50.40	48.90	47.40	45.90	44.40	43.00	41.50	40	38.50	37.00	35.60	34.10
50	63.00	61.10	59.30	57.40	55.60	53.70	51.90	50	48.20	46.30	44.50	42.60
60	75.75	73.50	71.25	69.00	66.75	64.50	62.25	60	57.75	55.50	53.25	51.00
63	79.30	77.00	74.70	72.30	70.00	67.70	65.30	63	60.70	58.30	56.00	53.70

# Tripping Characteristics

## C Curve

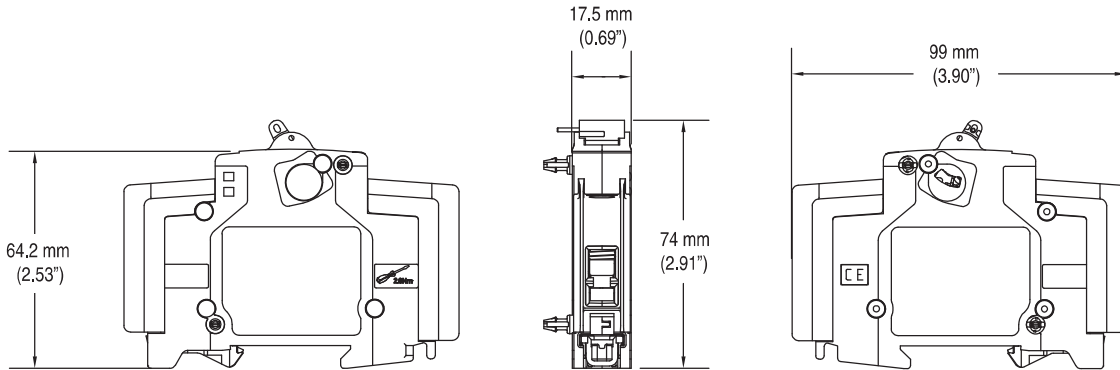


## D Curve

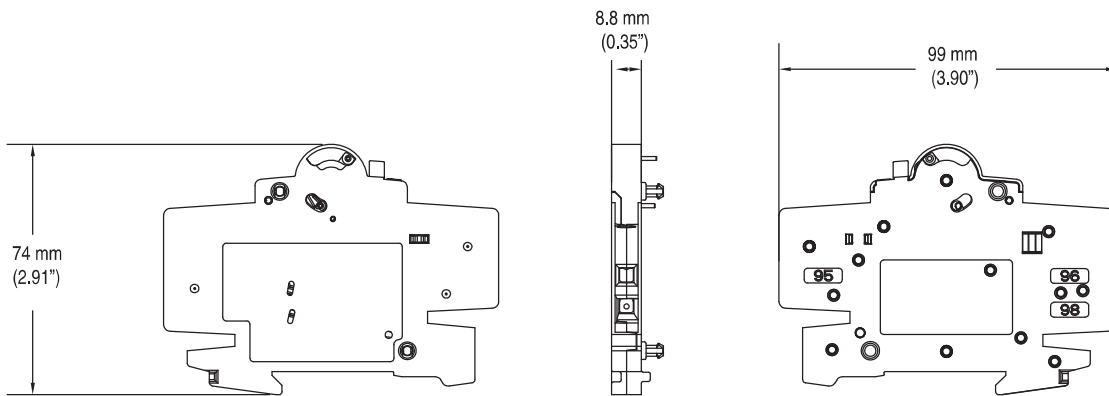


## Accessory Approximate Dimensions

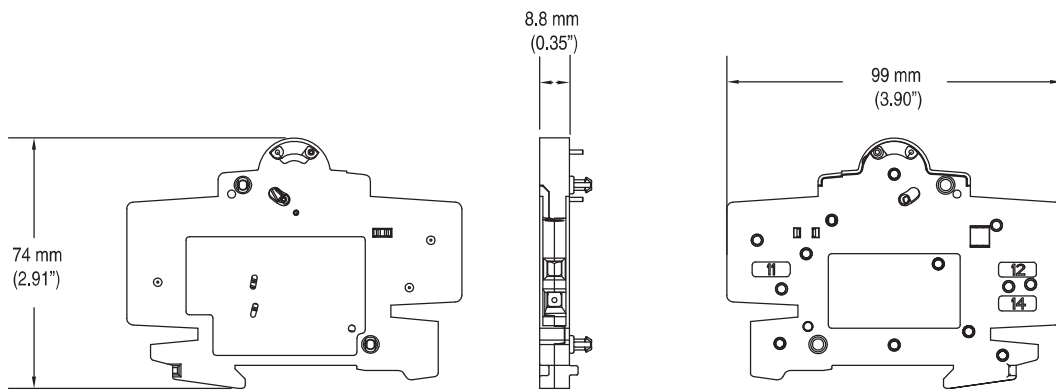
**Note:** Dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.



**1489-AMST1 and 1489-AMST2**



**1489-AMRS3**

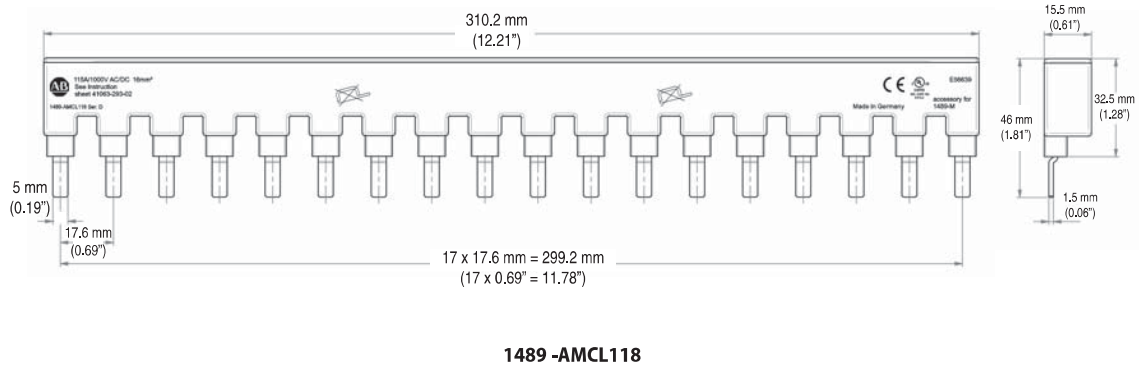
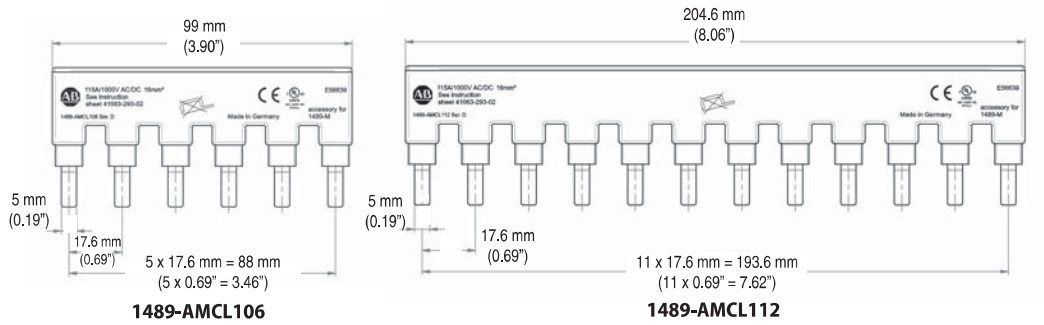


**1489-AMRA3**

## Bus Bar Approximate Dimensions

Note: Dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.

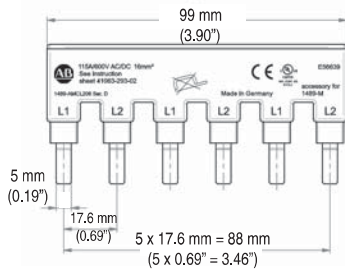
### 1-Phase Bus Bars



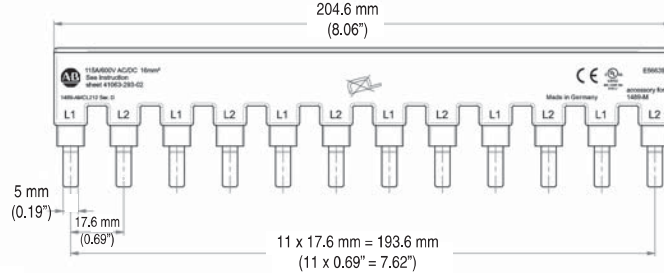
## Bus Bar Approximate Dimensions

Note: Dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.

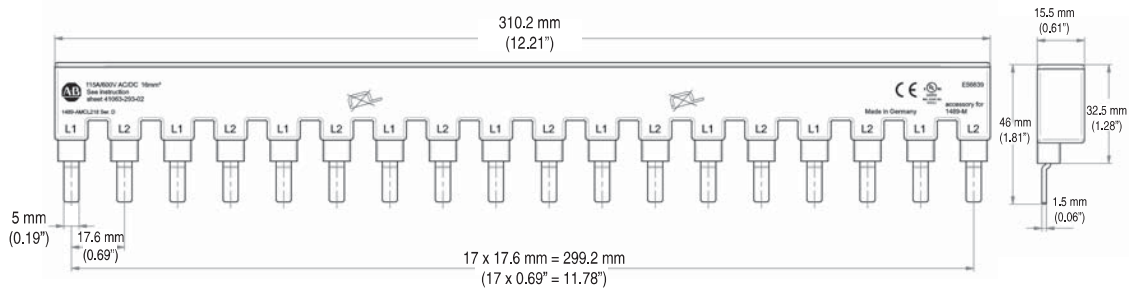
### 2-Phase Bus Bars



**1489-AMCL206**



**1489-AMCL212**

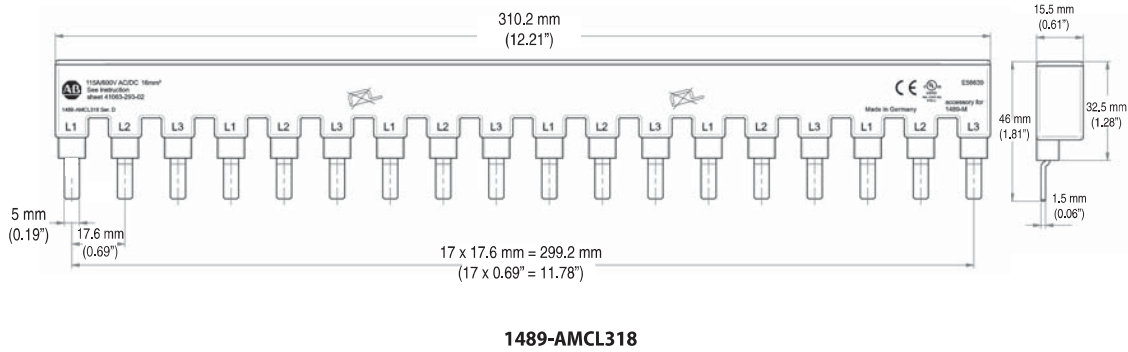
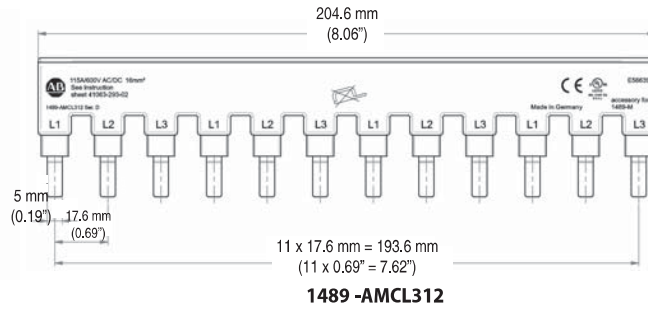
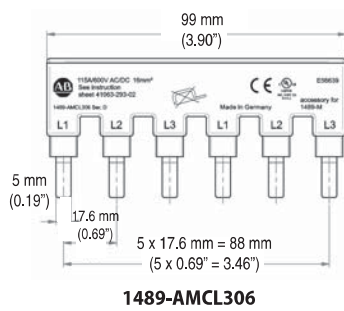


**1489-AMCL218**

## Bus Bar Approximate Dimensions

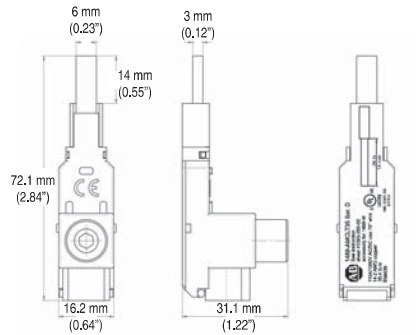
Note: Dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.

### 3-Phase Bus Bars

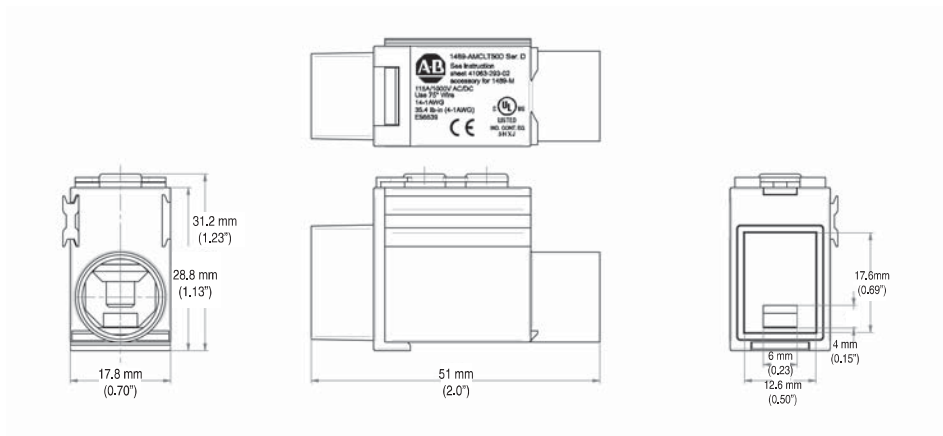


## Bus Bar Accessory Approximate Dimensions

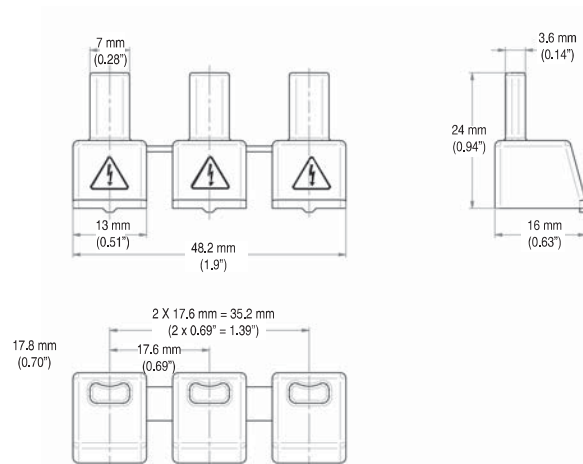
Note: Dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.



**1489-AMCLT35**



**1489-AMCLT50D**



**1489-AMCLPS**