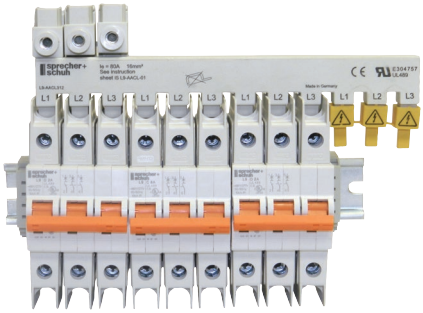
sprecher+schuh



Circuit Protection

Circuit Protection

Series L8 UL1077 Supplementary Protectors

Supplemental short circuit protection for a variety of applications up to 63 Amps

Sprecher+Schuh Series L8 Supplementary Protectors provide supplemental overcurrent protection for control circuits, solenoids, actuators, appliances, business equipment and a range of other applications where a high performance current limiting device is required. Advanced features and global approvals make them ideal for use in equipment installed throughout the world.

Broad product range

Series L8 Supplementary Protectors are available in up to 20 different current ratings from 0.5A to 63A, in one, two and three pole configurations. Over 180 base models are available with a full compliment of accessories.

Devices can be used in applications up to 480V AC and 48V DC with interrupting capacities up to 10kA.

Safety features provide enhanced protection

The terminals of Series L8 Supplementary Protectors provide IP20 protection to guard against accidental contact with live parts.

To aid troubleshooting, a color-coded indicator provides positive visual indication of the device status (green for OFF, red for ON) and isolation function.

Sprecher+Schuh Supplementary Protectors also incorporate a trip-free mechanism - ensuring that the device operation cannot be defeated by holding the operator in the ON position.

Easy installation

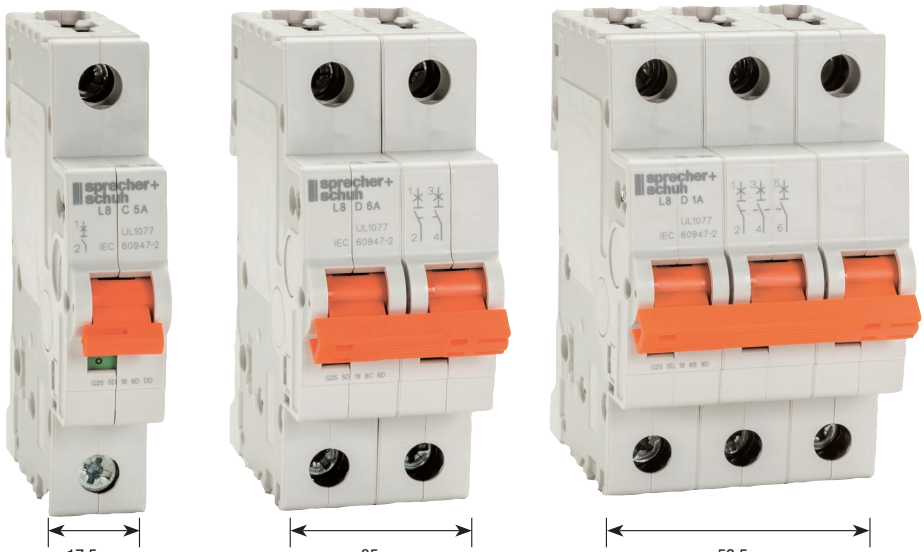
Sprecher+Schuh Supplementary Protectors mount on a standard 35mm DIN-rail. Wire terminals accept multiple conductors, and UL 508 approved bus bars can be used to quickly distribute power to many Supplementary Protectors simultaneously. In addition, power to the circuit breakers can be fed from the line or load side.

Global approvals for worldwide acceptance

Series L8 Supplementary Protectors are UL Recognized for use in the United States in accordance with NFPA 79 (NEC, National Electrical Code). The devices comply with UL 1077 and CSA 22.2 No.235, meeting the requirements for supplementary protectors intended for use as overcurrent protection where branch circuit protection is not required, or is provided by another device such as a fuse or molded case circuit breaker. These Supplementary Protectors also comply with IEC 60947-2 for use in commercial and residential applications and are CE marked.

L8 Series B Protection Devices

Series B L8 UL1077 supplementary protectors offer new features, expanded amp ranges and bus bar accessories. This catalog section reflects the new Series B L8 supplementary protectors. It is important to note that the Series B L8 devices and the previous version are not dimensionally the same or interchangeable with respect to accessories and bus bar accessories.



Three trip characteristics

All Sprecher+Schuh L8 Supplementary Protectors are available with three different tripping characteristics, Type "B", "C", and "D". The tripping characteristic defines the device's speed of response (trip-time) to various levels of overcurrent. Figure 1 shows trip-time versus overcurrent for Type B, C, and D devices. The time-current characteristics enable the device to be optimally matched to the application. For example, PLC outputs that can only tolerate minimal overcurrents are best protected by Supplementary Protectors with Type B trip characteristics.

Sprecher+Schuh L8 Supplementary Protectors are also current limiting - interrupting fault currents within one half cycle. Current limiting devices protect circuit components from damage by reducing the peak let-through current which causes damaging magnetic forces and let-through energy which generates heat.

Type "B" Characteristic

Developed primarily to protect conductors and low level signal devices such as PLCs. Instantaneous trip is three to five times the rated current of the Supplementary Protector (3~5 x I_n). The fast trip time of these devices minimizes damage to control circuit conductors from low-level faults.

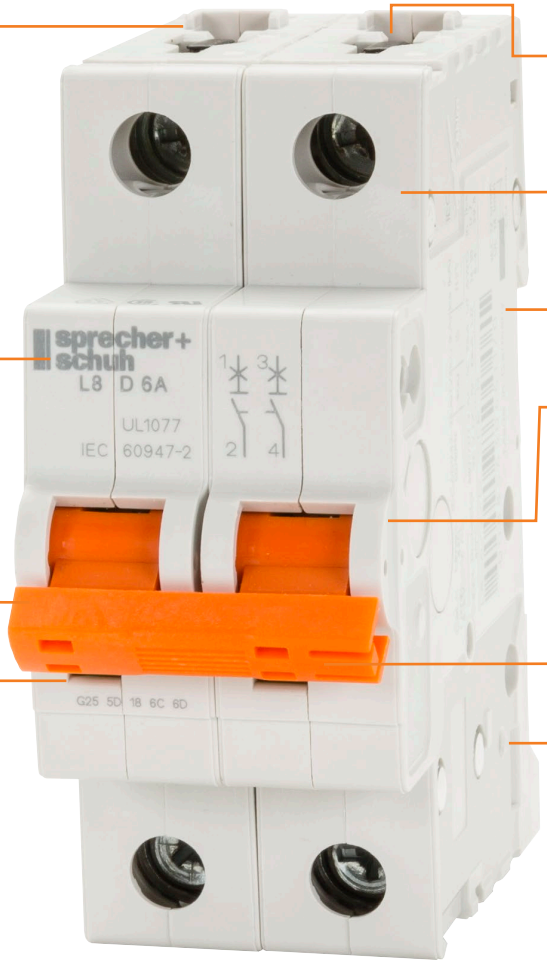
Type "C" Characteristic

Developed primarily for applications with moderate inrush currents such as lighting, control circuits and coils, computers and appliances. Instantaneous trip is five to ten times the rated current of the Supplementary Protector (5~10 x I_n). The higher instantaneous trip level prevents nuisance tripping, and components being protected can typically withstand higher fault currents without being damaged.

Type "D" Characteristic

Developed primarily for applications with high inrush currents, i.e., transformers, power supplies and heaters. Instantaneous trip is ten to twenty times the rated current of the Supplementary Protector (10~20 x I_n). The high instantaneous trip level prevents nuisance tripping, and components being protected can typically withstand higher fault currents without being damaged.

Compare these advanced features



Box lug terminals accept #18…#4 (1.0…25mm^2) wire as standard

Ratings to 480Y/277V AC @ 230/440V AC - 10kA Interrupt Rating

Magnetic trip elements provide Type B, C and D trip characteristics, while bimetallic elements protect against slight overloads.

Amp rating and trip curve characteristic clearly marked on the device for easy identification

Line and load side terminals designed with dual terminals which allows the connection of two wires, or both a wire and a bus bar.

Guarded No.2 pozidrive terminal screws with finger-safe IP20 protection

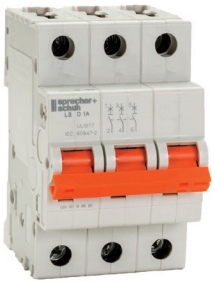
Devices install on standard 35mm DIN-rail (EN 50022)

Trip-free mechanism; device operation cannot be defeated by holding the operator in the ON position

Color coded indicator provides visual indication of the device status and isolation function

Available in one, two and three pole

Trip Characteristic B (3~5 x I_N) – *Resistive or slightly inductive loads* ❸❹

Rated Current (A)	1 Pole ❶			2 Pole ❷			3 Pole ❷		
									
	Catalog Number	Price Each	Std. Pkg.	Catalog Number	Price Each	Std. Pkg.	Catalog Number	Price Each	Std. Pkg.
0.5	L8-0.5/1/B	38	2	L8-0.5/2/B	82	1	L8-0.5/3/B	124	1
1	L8-1/1/B	38	2	L8-1/2/B	82	1	L8-1/3/B	124	1
2	L8-2/1/B	38	2	L8-2/2/B	82	1	L8-2/3/B	124	1
3	L8-3/1/B	38	2	L8-3/2/B	82	1	L8-3/3/B	124	1
4	L8-4/1/B	38	2	L8-4/2/B	82	1	L8-4/3/B	124	1
5	L8-5/1/B	38	2	L8-5/2/B	82	1	L8-5/3/B	124	1
6	L8-6/1/B	38	2	L8-6/2/B	82	1	L8-6/3/B	124	1
7	L8-7/1/B	38	2	L8-7/2/B	82	1	L8-7/3/B	124	1
8	L8-8/1/B	38	2	L8-8/2/B	82	1	L8-8/3/B	124	1
10	L8-10/1/B	38	2	L8-10/2/B	82	1	L8-10/3/B	124	1
13	L8-13/1/B	38	2	L8-13/2/B	82	1	L8-13/3/B	124	1
15	L8-15/1/B	38	2	L8-15/2/B	82	1	L8-15/3/B	124	1
16	L8-16/1/B	38	2	L8-16/2/B	82	1	L8-16/3/B	124	1
20	L8-20/1/B	40	2	L8-20/2/B	90	1	L8-20/3/B	137	1
25	L8-25/1/B	40	2	L8-25/2/B	90	1	L8-25/3/B	137	1
30	L8-30/1/B	40	2	L8-30/2/B	90	1	L8-30/3/B	137	1
32	L8-32/1/B	42	2	L8-32/2/B	99	1	L8-32/3/B	149	1
40	L8-40/1/B	44	2	L8-40/2/B	103	1	L8-40/3/B	155	1
50	L8-50/1/B	50	2	L8-50/2/B	118	1	L8-50/3/B	179	1
63	L8-63/1/B	59	2	L8-63/2/B	134	1	L8-63/3/B	204	1

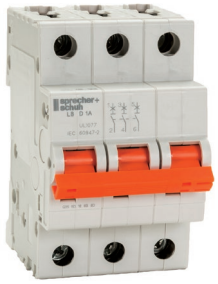
NEW

L8 Supplementary Protector Features:

- UL-1077 Approved, CSA 22.2 No. 235 and IEC/EN 60947-2
- Thermal Magnetic Overcurrent Protection
- Trip characteristics based on 40ºC ambient for UL/CSA
- Up to 10kA interruption ratings
- Finger safe design
- DIN-rail mounting

❶ 1-Pole ratings: UL/CSA 277VAC 48VDC, IEC 240/440VAC
❷ Multi-pole ratings: UL/CSA 480Y/277VAC 96VDC, IEC 440VAC
❸ See UL Short Circuit ratings U1/U2 in the technical data sections.
❹ This table represents L8 Series B offering.

Trip Characteristic C (5~10 x I_N) – *Inductive loads* ❸❹

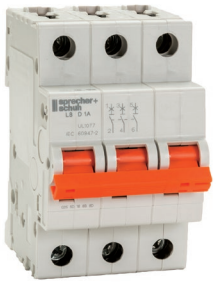
Rated Current (A)	1 Pole ❶			2 Pole ❷			3 Pole ❷		
									
	Catalog Number	Price Each	Std. Pkg.	Catalog Number	Price Each	Std. Pkg.	Catalog Number	Price Each	Std. Pkg.
0.5	L8-0.5/1/C	44	2	L8-0.5/2/C	101	1	L8-0.5/3/C	145	1
1	L8-1/1/C	44	2	L8-1/2/C	101	1	L8-1/3/C	145	1
2	L8-2/1/C	44	2	L8-2/2/C	101	1	L8-2/3/C	145	1
3	L8-3/1/C	44	2	L8-3/2/C	101	1	L8-3/3/C	145	1
4	L8-4/1/C	44	2	L8-4/2/C	101	1	L8-4/3/C	145	1
5	L8-5/1/C	44	2	L8-5/2/C	101	1	L8-5/3/C	145	1
6	L8-6/1/C	44	2	L8-6/2/C	101	1	L8-6/3/C	145	1
7	L8-7/1/C	44	2	L8-7/2/C	101	1	L8-7/3/C	145	1
8	L8-8/1/C	44	2	L8-8/2/C	101	1	L8-8/3/C	145	1
10	L8-10/1/C	44	2	L8-10/2/C	101	1	L8-10/3/C	145	1
13	L8-13/1/C	44	2	L8-13/2/C	101	1	L8-13/3/C	145	1
15	L8-15/1/C	44	2	L8-15/2/C	101	1	L8-15/3/C	145	1
16	L8-16/1/C	44	2	L8-16/2/C	101	1	L8-16/3/C	145	1
20	L8-20/1/C	44	2	L8-20/2/C	101	1	L8-20/3/C	145	1
25	L8-25/1/C	48	2	L8-25/2/C	111	1	L8-25/3/C	164	1
30	L8-30/1/C	48	2	L8-30/2/C	111	1	L8-30/3/C	164	1
32	L8-32/1/C	50	2	L8-32/2/C	111	1	L8-32/3/C	166	1
40	L8-40/1/C	55	2	L8-40/2/C	122	1	L8-40/3/C	183	1
50	L8-50/1/C	63	2	L8-50/2/C	143	1	L8-50/3/C	210	1
63	L8-63/1/C	71	2	L8-63/2/C	160	1	L8-63/3/C	239	1

L8 Supplementary Protector Features:

- UL-1077 Approved, CSA 22.2 No. 235 and IEC/EN 60947-2
- Thermal Magnetic Overcurrent Protection
- Trip characteristics based on 40ºC ambient for UL/CSA
- Up to 10kA interruption ratings
- Finger safe design
- DIN-rail mounting

❶ 1-Pole ratings: UL/CSA 277VAC 48VDC, IEC 240/440VAC
❷ Multi-pole ratings: UL/CSA 480Y/277VAC 96VDC, IEC 440VAC
❸ See UL Short Circuit ratings U1/U2 in the technical data sections.
❹ This table represents L8 Series B offering.

Trip Characteristic D (10~20 x I_N) – *Highly inductive loads* ❸❹

Rated Current (A)	1 Pole ❶			2 Pole ❷			3 Pole ❷			
										
	Catalog Number	Price Each	Std. Pkg.	Catalog Number	Price Each	Std. Pkg.	Catalog Number	Price Each	Std. Pkg.	
0.5	L8-0.5/1/D	44	2	L8-0.5/2/D	101	1	L8-0.5/3/D	145	1	NEW
1	L8-1/1/D	44	2	L8-1/2/D	101	1	L8-1/3/D	145	1	
2	L8-2/1/D	44	2	L8-2/2/D	101	1	L8-2/3/D	145	1	
3	L8-3/1/D	44	2	L8-3/2/D	101	1	L8-3/3/D	145	1	
4	L8-4/1/D	44	2	L8-4/2/D	101	1	L8-4/3/D	145	1	
5	L8-5/1/D	44	2	L8-5/2/D	101	1	L8-5/3/D	145	1	
6	L8-6/1/D	44	2	L8-6/2/D	101	1	L8-6/3/D	145	1	
7	L8-7/1/D	44	2	L8-7/2/D	101	1	L8-7/3/D	145	1	
8	L8-8/1/D	44	2	L8-8/2/D	101	1	L8-8/3/D	145	1	
10	L8-10/1/D	44	2	L8-10/2/D	101	1	L8-10/3/D	145	1	
13	L8-13/1/D	44	2	L8-13/2/D	101	1	L8-13/3/D	145	1	
15	L8-15/1/D	44	2	L8-15/2/D	101	1	L8-15/3/D	145	1	
16	L8-16/1/D	44	2	L8-16/2/D	101	1	L8-16/3/D	145	1	
20	L8-20/1/D	44	2	L8-20/2/D	101	1	L8-20/3/D	145	1	
25	L8-25/1/D	48	2	L8-25/2/D	111	1	L8-25/3/D	164	1	
30	L8-30/1/D	48	2	L8-30/2/D	111	1	L8-30/3/D	164	1	
32	L8-32/1/D	50	2	L8-32/2/D	111	1	L8-32/3/D	166	1	
40	L8-40/1/D	55	2	L8-40/2/D	122	1	L8-40/3/D	183	1	
50	L8-50/1/D	90	2	L8-50/2/D	197	1	L8-50/3/D	308	1	NEW
63	L8-63/1/D	119	2	L8-63/2/D	260	1	L8-63/3/D	407	1	

L8 Supplementary Protector Features:

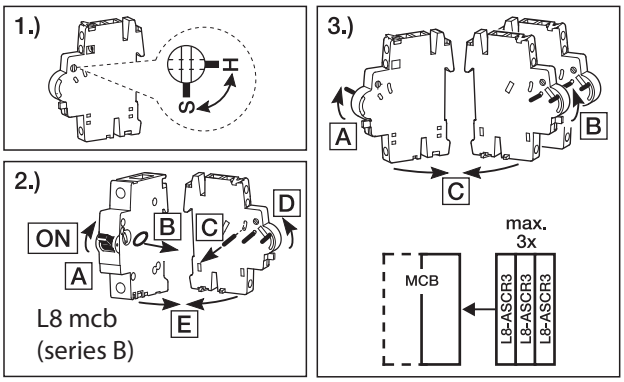
- UL-1077 Approved, CSA 22.2 No. 235 and IEC/EN 60947-2
- Thermal Magnetic Overcurrent Protection
- Trip characteristics based on 40ºC ambient for UL/CSA
- Up to 10kA interruption ratings
- Finger safe design
- DIN-rail mounting

❶ 1-Pole ratings: UL/CSA 277VAC 48VDC, IEC 240/440VAC
❷ Multi-pole ratings: UL/CSA 480Y/277VAC 96VDC, IEC 440VAC
❸ See UL Short Circuit ratings U1/U2 in the technical data sections.
❹ This table represents L8 Series B offering.

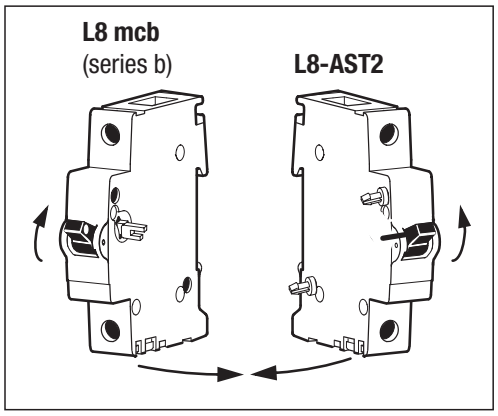
Accessories ❶

Module	Description	For use with…	UL/CSA Max. Current/Voltage	IEC Ratings Current/Voltage	Connection Diagrams	Catalog Number	Price Each
	**Auxiliary/Signal Contact** • Mounts on right side of L8 (series B only) ❷	All L8 Series B & Shunt Trips	1A @ 480 VAC 2A @ 277 VAC 1.5A @ 125 VDC 2A @ 60 VDC 4A @ 24 VDC	2A @ 230 V (AC-14) 1A @ 400 V (AC-14) 1.5A @ 110 V (DC-12) 1A @ 220 V (DC-12) 4A @ 24 V (DC-13) 2A @ 60 V (DC-13)	*1 NO/NC* *(1 C.O.)* 	**L8-ASCR3**	**71**
	**Shunt Trip –** • Remotely trips the device • Installs on right side of L8 (Series B only) ❸	All L8 Series B	110…415V AC 110...250V DC 12...60V AC/DC	110…415V AC 110...250V DC 12...60V AC/DC		**L8-AST1** **L8-AST2**	**166** **166**

L8-ASCR3 Assembly

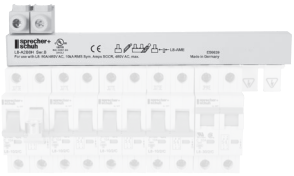
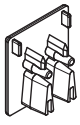
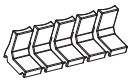
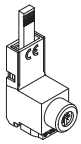
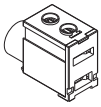


L8-AST1/2 Assembly



❶ This table represents L8 Series B offering.
❷ A maximum of 3 L8-ASCR3 auxiliary contacts may be installed with or without shunt trip per L8 Series B.
❸ A maximum of 3 ASCR3 plus one (1) L8-AST1/2 shunt trip allowed ber L8. The shunt must be mounted closest to the L8, then the signal contacts.

Accessories ❹

Accessory	Description	Devices per Meter	For use with…	Catalog Number	Price Each
	**Bus Bar, Pin Style 1-Phase ❷❸** Qty 1 bar at 1 meter	57	L8 1-pole, 80A max	**L8-A1B8**	**74**
			L8 1-pole, 100A max	**L8-A1B1**	**83**
		36	L8 1-pole w/ Aux, 80A max	**L8-A1B8H**	**76**
			L8 1-pole w/ Aux, 100A max	**L8-A1B1H**	**87**
	Bus Bar, Pin Style 2-Phase ❷❸ Qty 1 bar at 1 meter	29	L8 2-pole, 80A max	**L8-A2B8**	**167**
			L8 2-pole, 100A max	**L8-A2B1**	**185**
		22	L8 2-pole w/ Aux, 80A max	**L8-A2B8H**	**163**
			L8 2-pole w/ Aux, 100A max	**L8-A2B1H**	**188**
	Bus Bar, Pin Style 3-Phase ❷❸ Qty 1 bar at 1 meter	19	L8 3-pole, 80A max	**L8-A3B8**	**192**
			L8 3-pole, 100A max	**L8-A3B1**	**227**
		16	L8 3-pole w/ Aux, 80A max	**L8-A3B8H**	**193**
			L8 3-pole w/ Aux, 100A max	**L8-A3B1H**	**234**
 1-Phase  2- & 3-Phase	**End Caps**, sold only in pkgs of 10 ❶		L8 1-Phase Bus Bar L8 2-/3-Phase Bus Bar	**L8-A1E** **L8-AME**	**2** **3**
	**Protective Shroud**, sold only in pkgs of 10 ❶		All L8 bus bars	**L8-AAP**	**7**
 Straight  Low Profile	**Terminal Power Feed** • Sold only in pkgs of 10 ❶		L8 2-/3-Phase Bus Bar Straight Lug 10…1/0 AWG 6…50mm²	**L8-AAT1S**	**18**
			L8 1-Phase Bus Bar Offset Lug low profile 10…1/0 AWG 6…50mm²	**L8-AAT1LP**	**19**
	**Dedicated Power Feed** • Sold only in pkgs of 10 ❶		All L8 bus bars Offset Lug 14…1 AWG 2.5…50mm²	**L8-AAT2**	**18**
 1-pole  multi-pole	**Lock Out Toggle Mount –** • Fits securely over switch toggle. Prevents unauthorized activation of L8 or L9 (series B) during maintenance		L8 or L9 1-pole L8 or L9 Multi-pole (Series B Only)	**L8-ALOA1** **L8-ALOA2**	**33** **33**

❶ Sold in packages of 10. Price indicated is price per piece. Minimum order quantity 10. Example, one package of 10 pcs of L8-A1E is $20 (10 x $2).
❷ Cuttable, copper bus bar provided in 1 m length. UL 508 Listed, E56639, Category NMTR, cULus. CE to IEC 664 10 kA SCCR for use with L8 Supplementary protectors. See page M15 for dimensions.
❸ Bus Bars L8-_H are designed to accomodate the L8-ASCR3 Auxiliary Contact module, excluding Shunt Trip.
❹ This table represents L8 Series B offering.

Technical Information

Electrical Ratings

Number of Poles		1, 2, or 3
Tripping Characteristics		B, C, or D
Rated Current I_n		0.5…63A
Rated Frequency f		50/60 Hz
Rated Insulation voltage U_i acc. to IEC/EN 60664-1	Phase-to-ground	250V AC
	Phase-to-phase	440V AC
Overvoltage Category		III
Pollution Degree		3

Data acc. to UL/CSA ❺

Rated voltage	1-pole	AC	277V AC
		DC	48V DC
	2-pole	AC	480Y/277V AC
		DC	96V DC
	3-pole	AC	480Y/277V AC
Rated interrupting capacity per UL 1077			≤ 32 A: 10 kA (AC); > 32 A: 5kA (AC); 0.5...63 A: 10 kA (DC)
Application ❶			Supplementary protector for general use; application codes: TC1: [1P] 0L0 277V AC, [2P, 3P] 0L0 480Y/277V AC; SC: 10 kA (0.5...32 A), 5 kA (35...63 A), U2 480Y/277V AC; FW3
Reference temperature for tripping characteristics			40ºC
Electrical Endurance			6,000 ops (AC), 6,000 ops. (DC) 1 cycle (1s - ON, 9s - OFF)

Data acc. to IEC/EN 60947-2

Rated operational voltage U_e		1-pole	230V AC
		2-, 3-pole	400V AC
Highes supply or utilization voltage U_{max}	**AC**	1-pole	253V AC
		2-, 3-pole	440V AC
	DC ❷	1-pole	48V DC
		2-pole	96V DC
Min. operating voltage			12V AC/DC
Rated ultimate short-circuit breaking capacity Icu			15 kA
Rated service short-circuit breaking capacity Ics			≤40 A: 11.25 kA >40 A: 7.5 kA
Rated impulse withstand voltage Uimp. (1.2/50 µs)			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			
1 cycle (2s - ON, 13s - OFF, In ≤ 32A)		In < 30A:	20,000 operations (AC)
1 cycle (2s - ON, 28s - OFF, In > 32A)		In ≥30A:	10,000 ops. (AC); 1,000 ops. (DC)

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 ❸	-25…+55ºC
Storage temperature	-40…+70ºC

Installation

Terminal		Dual terminal
Cross-section of wire – solid, stranded (front/back terminal slot) ❹		35/35 mm²
		18…4/18…10 AWG
Flexible		25/10 mm²
Multi-wire rating per UL, CSA		1 wire, 18…4 AWG
		2-4 wires ❻, 18…10 AWG
Cross-section of bus bars (top / bottom)		10/10 mm²
Tightening torque	IEC	2.8 N•m
	UL/CSA	AWG 18...16: 8.85 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/Weight

Pole dimensions	H x D X W	88 x 69 x 17.5 mm (3.46" x 2.72" x 0.69")
Pole weight		115 g (4.1 oz)

Combination with Auxiliary Elements

Auxiliary contact	Yes
Signal contact	Yes
Shunt trip	Yes

❶ 2-pole/3-pole single pole load: TC2
❷ IEC DC Ratings Self-declared
❷ 35mm² self-declared. Not included in IEC/EN approval.
❹ Refer to Ambient Temperature Derating tables.
❺ UL File E65138
❻ 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		13	2.3
1	1.4		15	2.4
2	1.8		16	2.5
3	1.6		20	2.5
4	1.8		25	3.2
5	1.9		30	3.5
6	2.0		32	3.7
7	1.1		40	4.5
8	1.5		50	4.5
10	2.1		63	5.4

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).

Number of Adjacent Devices	Factor
1	1
2,3	0.9
4,5	0.8
≥ 6	0.75

L8 Supplementary Protection Devices Ambient Temperature Derating

Note: Application below 0º 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.

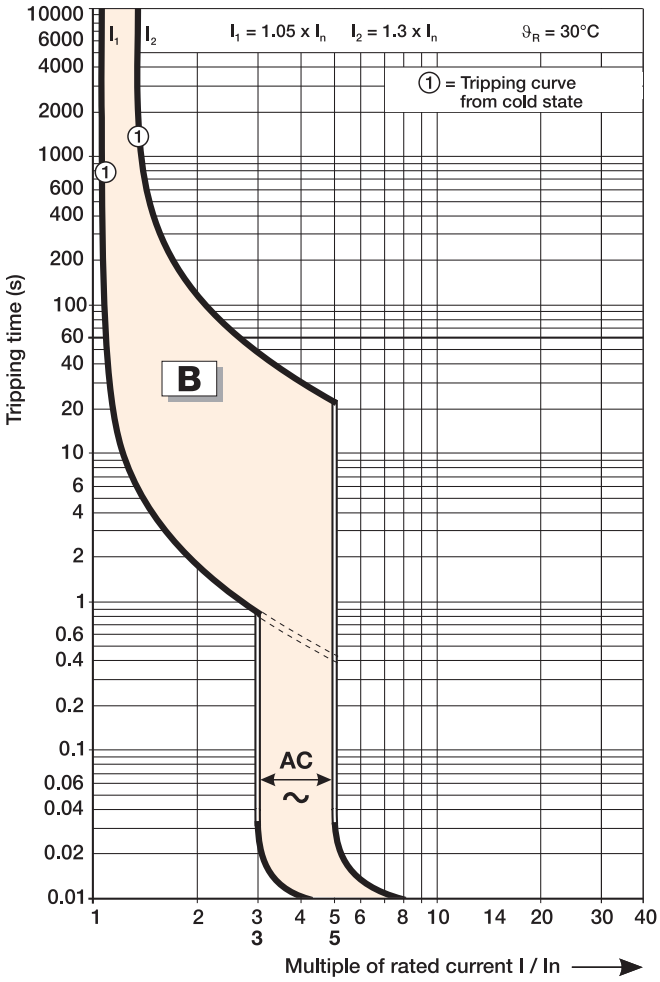
Temperature Derating, UL
Reference temperature = 40 °C

Current Rating [A]	Ambient temperature (°C)									
	-25	-20	-10	0	10	20	30	40	50	55
0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
1	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1	1.0	0.9
2	2.5	2.4	2.4	2.3	2.2	2.1	2.1	2	1.9	1.9
3	3.7	3.7	3.6	3.4	3.3	3.2	3.1	3	2.9	2.8
4	5.0	4.9	4.7	4.6	4.4	4.3	4.1	4	3.9	3.8
5	6.2	6.1	5.9	5.7	5.6	5.4	5.2	5	4.8	4.7
6	7.4	7.3	7.1	6.9	6.7	6.4	6.2	6	5.8	5.7
7	8.7	8.6	8.3	8.0	7.8	7.5	7.3	7	6.7	6.6
8	9.9	9.8	9.5	9.2	8.9	8.6	8.3	8	7.7	7.6
10	12.4	12.2	11.9	11.5	11.1	10.7	10.4	10	9.6	9.4
13	16.1	15.9	15.4	14.9	14.4	14.0	13.5	13	12.5	12.3
15	18.6	18.3	17.8	17.2	16.7	16.1	15.6	15	14.4	14.2
16	19.8	19.6	19.0	18.4	17.8	17.2	16.6	16	15.4	15.1
20	24.8	24.4	23.7	23.0	22.2	21.5	20.7	20	19.3	18.9
25	31.0	30.6	29.6	28.7	27.8	26.9	25.9	25	24.1	23.6
30	37.2	36.7	35.6	34.4	33.3	32.2	31.1	30	28.9	28.3
32	39.7	39.1	37.9	36.7	35.6	34.4	33.2	32	30.8	30.2
40	49.6	48.9	47.4	45.9	44.4	43.0	41.5	40	38.5	37.8
50	62.0	61.1	59.3	57.4	55.6	53.7	51.9	50	48.2	47.2
63	78.2	77.0	74.7	72.3	70.0	67.7	65.3	63	60.7	59.5

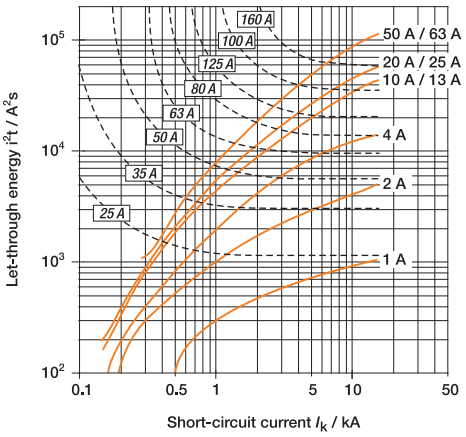
Temperature Derating, IEC
Reference temperature = 30 °C

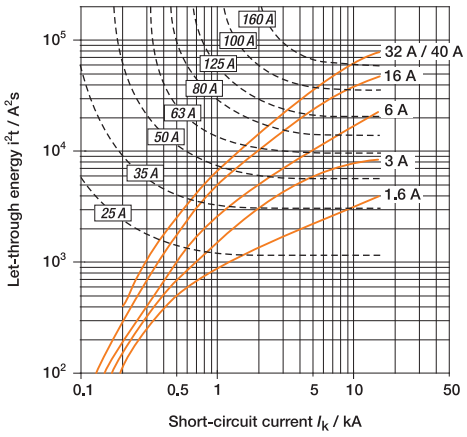
Current Rating [A]	Ambient temperature (°C)									
	-25	-20	-10	0	10	20	30	40	50	55
0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
1	1.2	1.2	1.1	1.1	1.1	1.0	1	1.0	0.9	0.9
2	2.3	2.3	2.2	2.2	2.1	2.1	2	1.9	1.9	1.9
3	3.5	3.5	3.4	3.3	3.2	3.1	3	2.9	2.8	2.8
4	4.7	4.6	4.5	4.4	4.2	4.1	4	3.9	3.8	3.7
5	5.8	5.8	5.6	5.5	5.3	5.2	5	4.9	4.7	4.6
6	7.0	6.9	6.7	6.5	6.4	6.2	6	5.8	5.6	5.6
7	8.2	8.1	7.8	7.6	7.4	7.2	7	6.8	6.6	6.5
8	9.3	9.2	9.0	8.7	8.5	8.2	8	7.8	7.5	7.4
10	11.7	11.5	11.2	10.9	10.6	10.3	10	9.7	9.4	9.3
13	15.1	15.0	14.6	14.2	13.8	13.4	13	12.6	12.2	12.0
15	17.5	17.3	16.8	16.4	15.9	15.5	15	14.6	14.1	13.9
16	18.6	18.4	17.9	17.4	17.0	16.5	16	15.5	15.0	14.8
20	23.3	23.0	22.4	21.8	21.2	20.6	20	19.4	18.8	18.5
25	29.1	28.8	28.0	27.3	26.5	25.8	25	24.3	23.5	23.1
30	35.0	34.5	33.6	32.7	31.8	30.9	30	29.1	28.2	27.8
32	37.3	36.8	35.8	34.9	33.9	33.0	32	31.0	30.1	29.6
40	46.6	46.0	44.8	43.6	42.4	41.2	40	38.8	37.6	37.0
50	58.3	57.5	56.0	54.5	53.0	51.5	50	48.5	47.0	46.3
63	73.4	72.5	70.6	68.7	66.8	64.9	63	61.1	59.2	58.3

Tripping Characteristics - B Curve

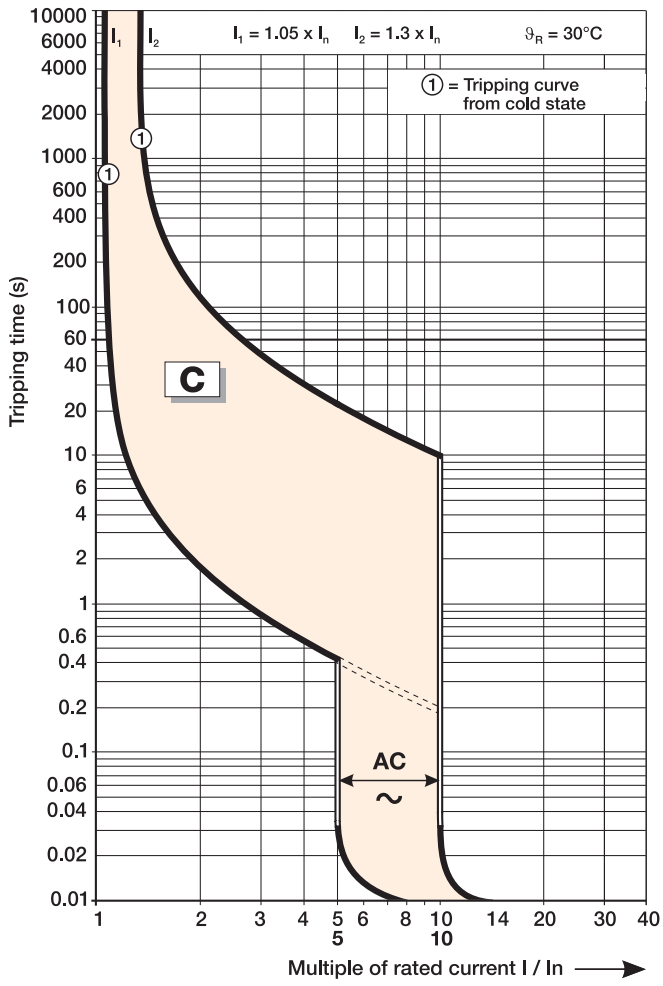


B and C Curve - 230/400V AC Let-through Energy

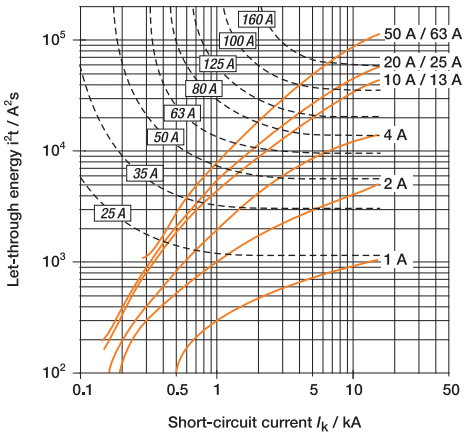


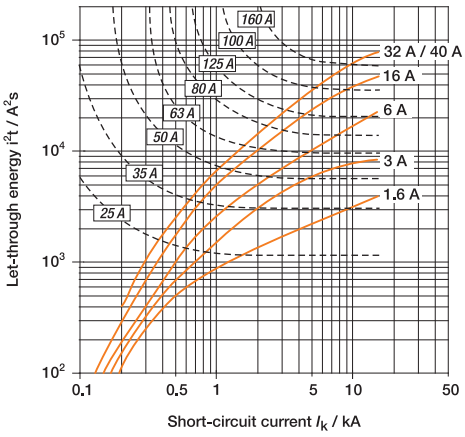


Tripping Characteristics - C Curve

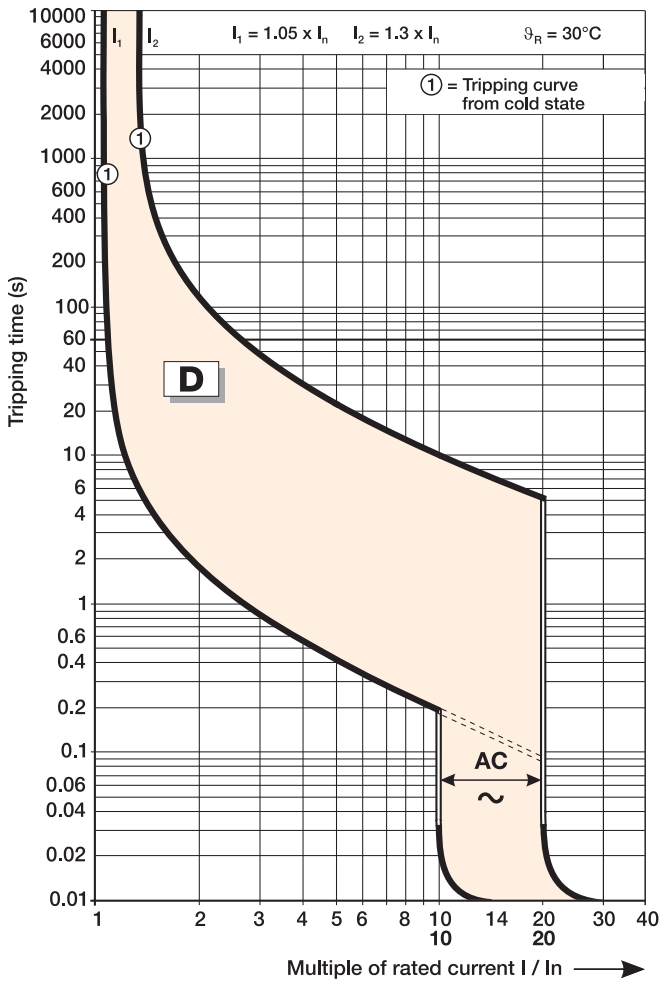


B and C Curve - 230/400V AC Let-through Energy

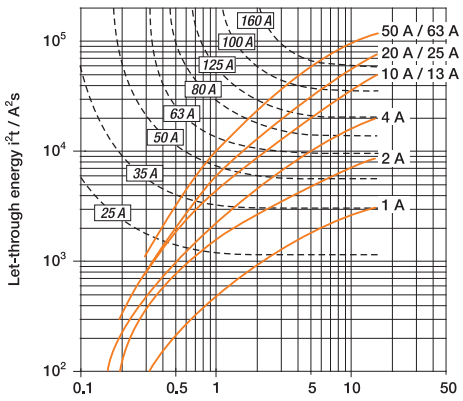


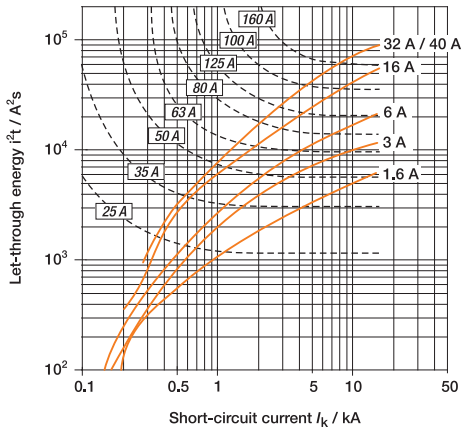


Tripping Characteristics - D Curve



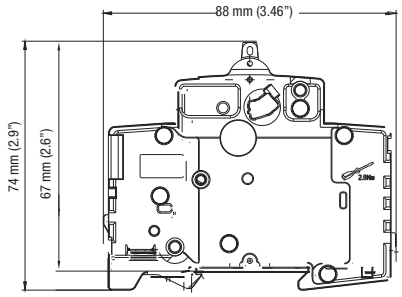
D Curve - 230/400V AC Let-through Energy



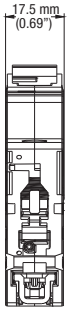


L8 Supplementary Protectors *(Series B…B, C & D)*

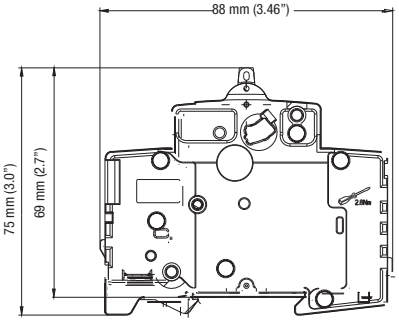
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



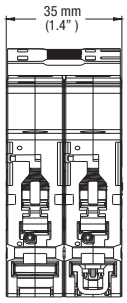
1-Pole



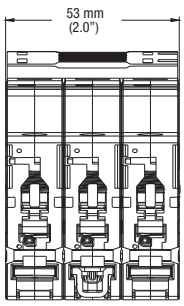
1-Pole



2- & 3-Pole

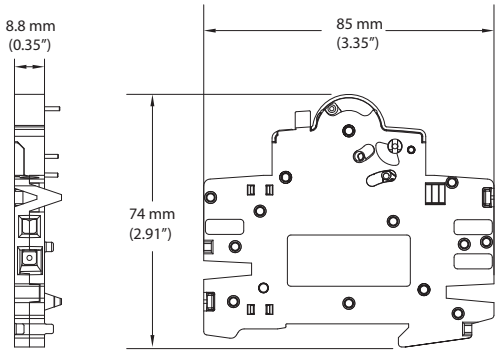


2-Pole

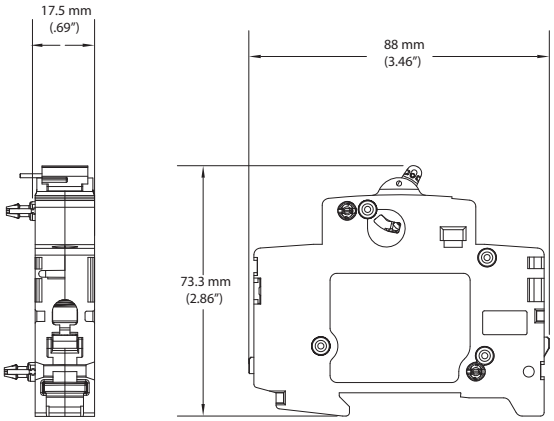


3-Pole

Auxiliary Contact/Signal Alarm *(L8-ASCR3)*

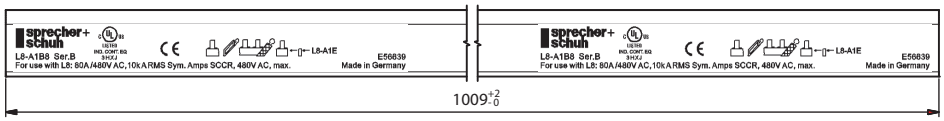


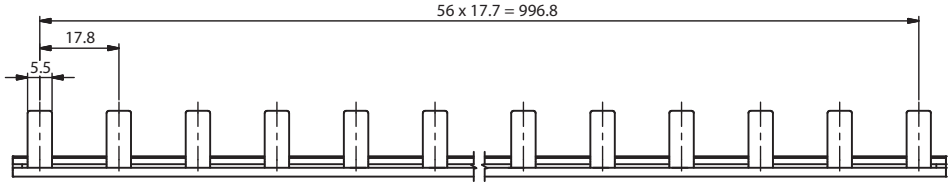
Shunt Trip Modules *(L8-AST1/2)*

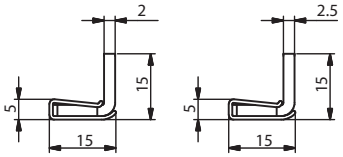


L8 - 1-Pole Bus Bars *(L8-A1B…)*

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

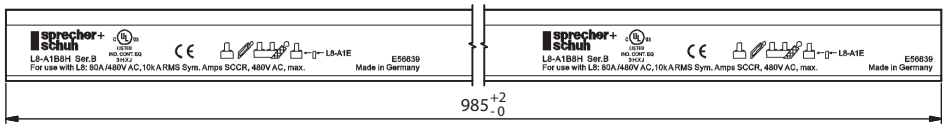


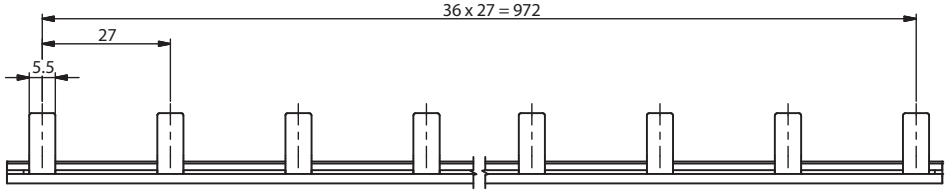


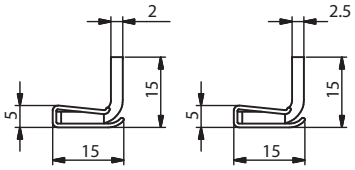


L8-A1B8 L8-A1B1

L8 - 1-Pole Bus Bars with Auxiliary *(L8-A1B…H)*



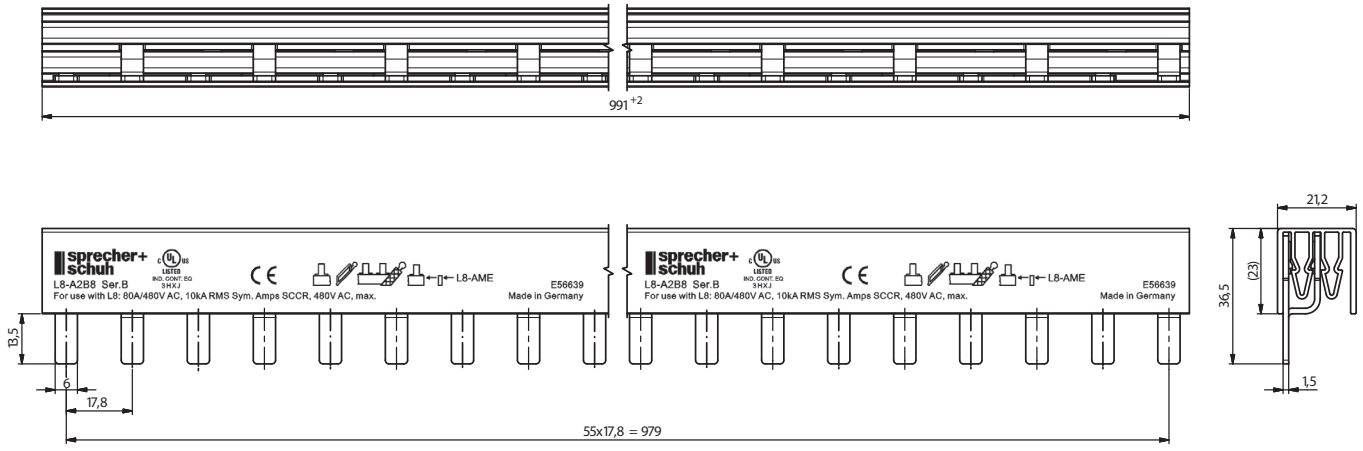




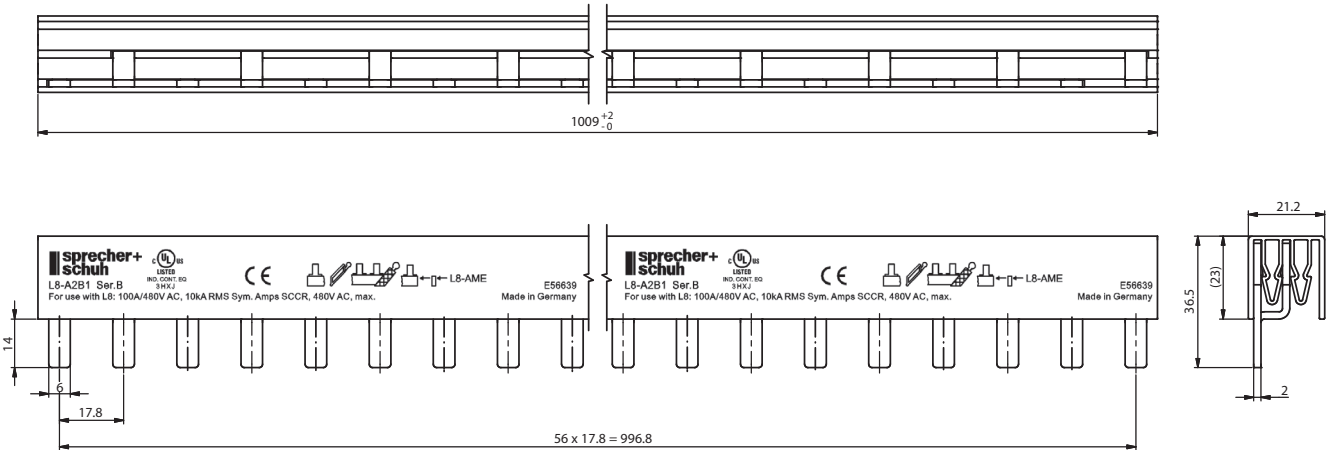
L8-A1B8H L8-A1B1H

L8-A2B8 - 2 Pole Bus Bars

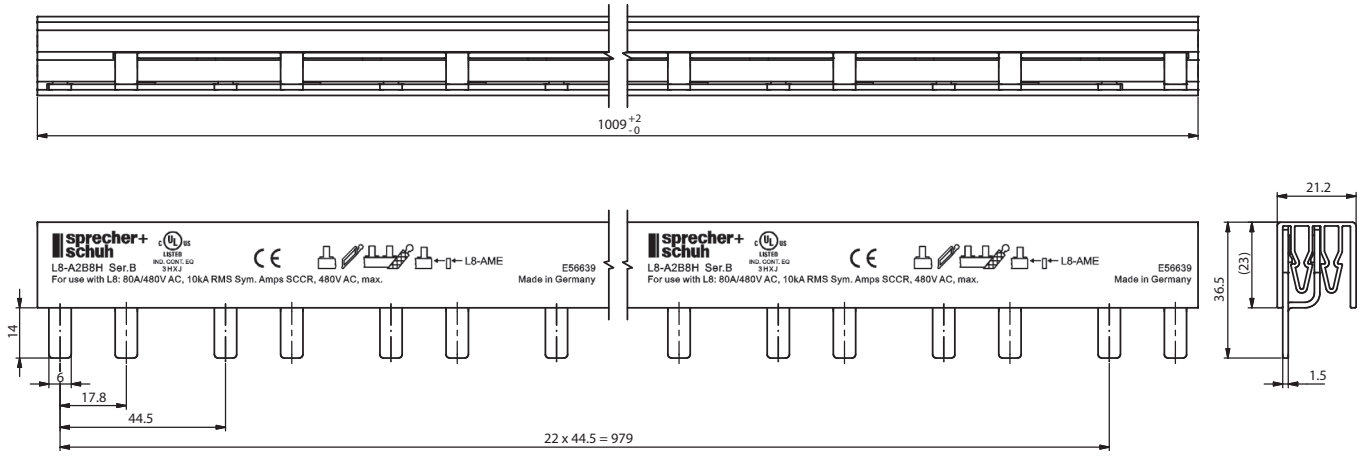
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



L8-A2B1 - 2 Pole Bus Bars

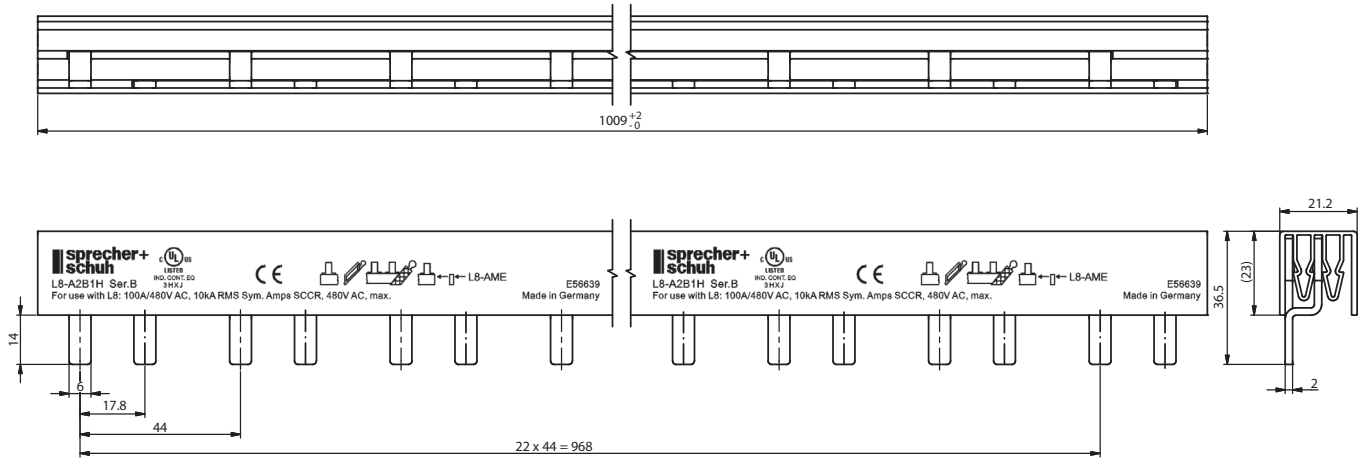


L8-A2B8H - 2 Pole Bus Bars w/ Auxiliary

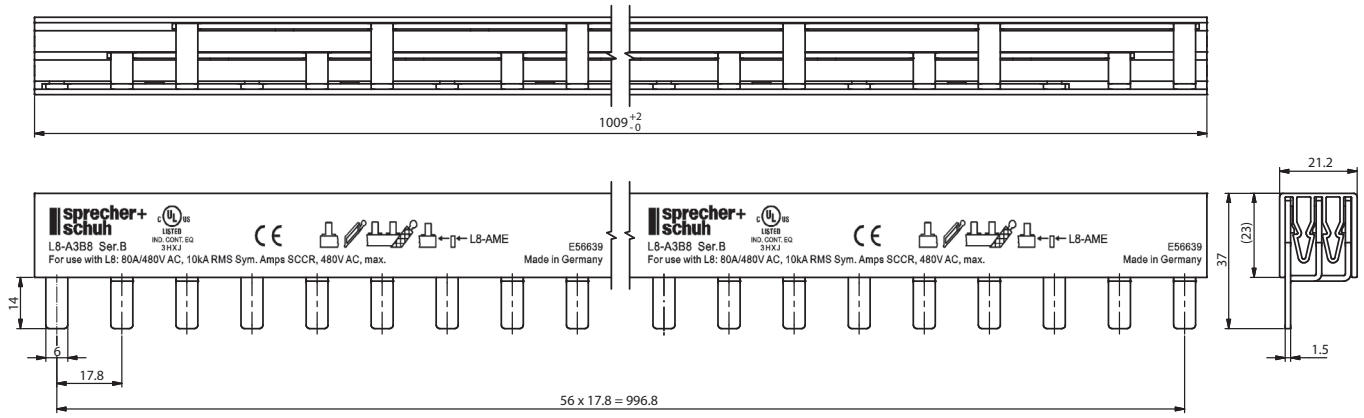


L8-A2B1H - 2 Pole Bus Bars w/ Auxiliary

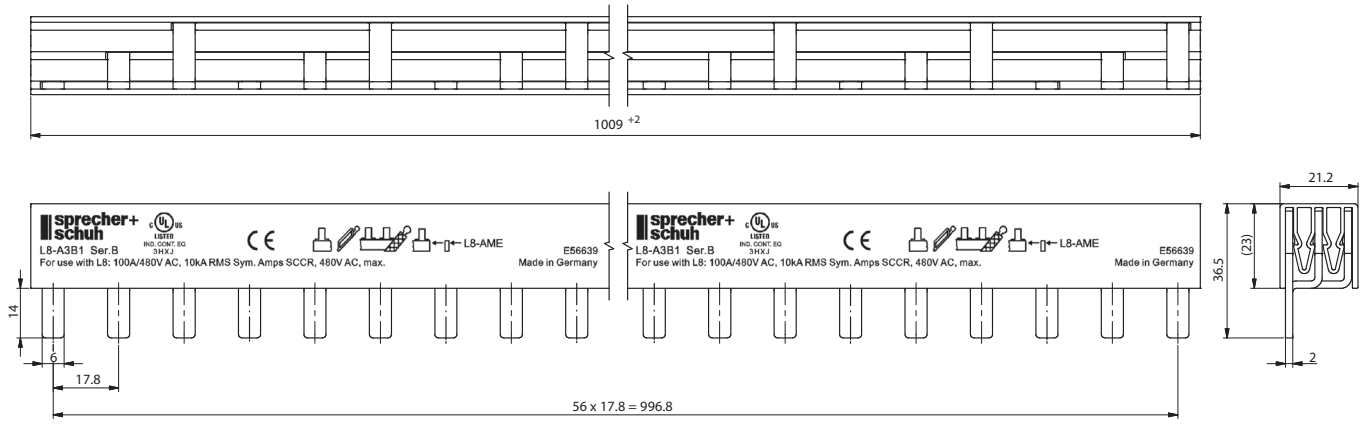
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



L8-A3B8 - 3 Pole Bus Bars

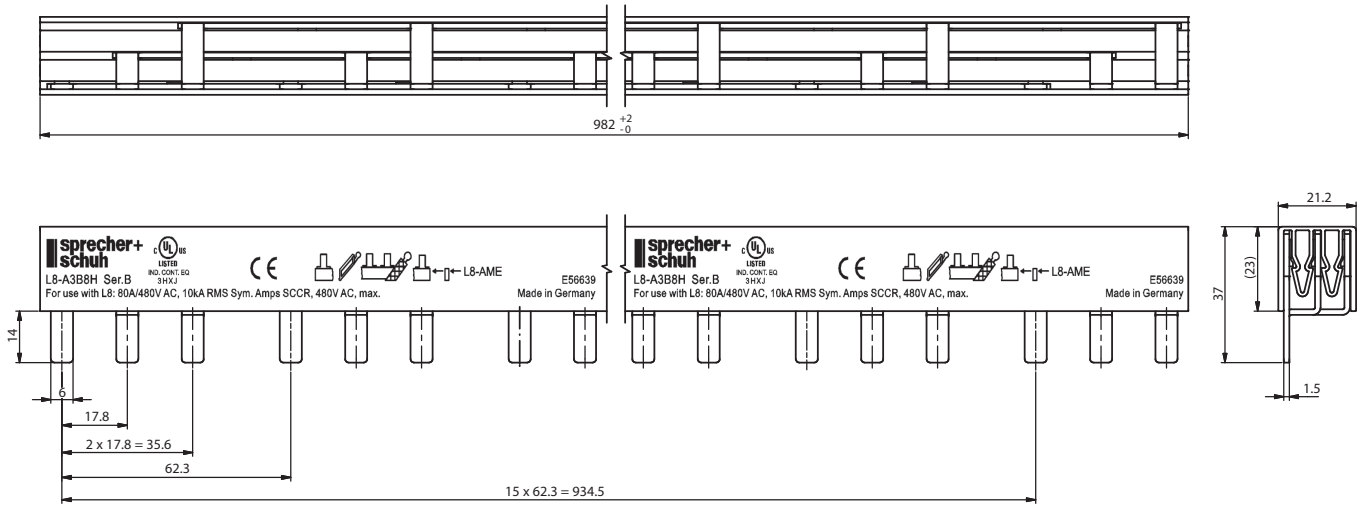


L8-A3B1 - 3 Pole Bus Bars

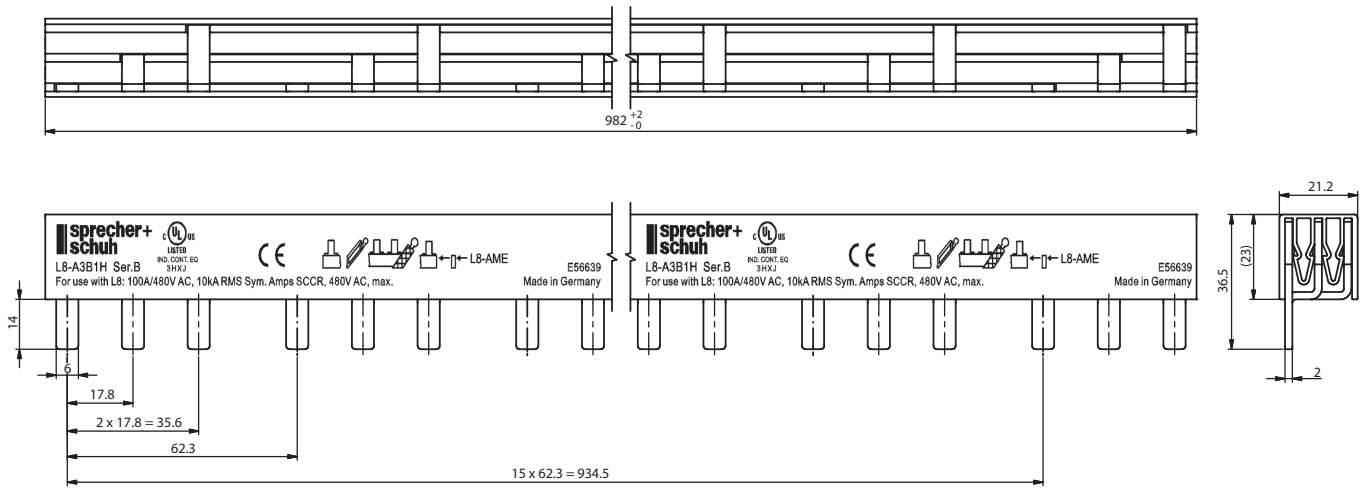


L8-A3B8H - 3 Pole Bus Bars w/ Auxiliary

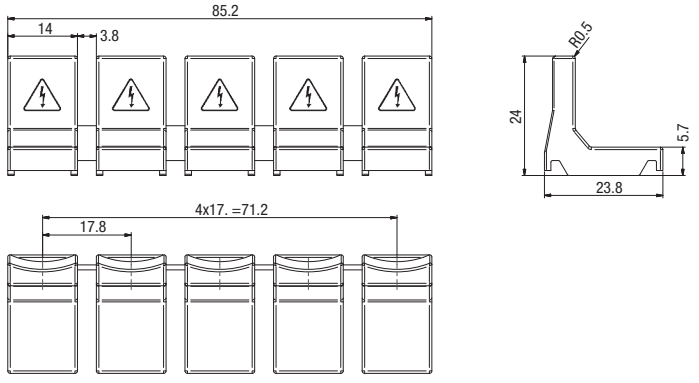
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



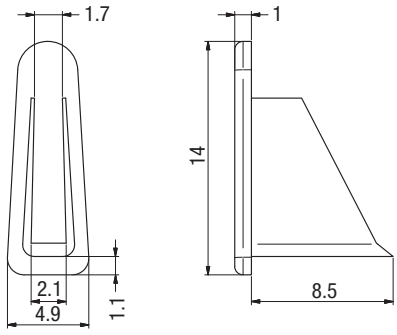
L8-A3B1H - 3 Pole Bus Bars w/ Auxiliary



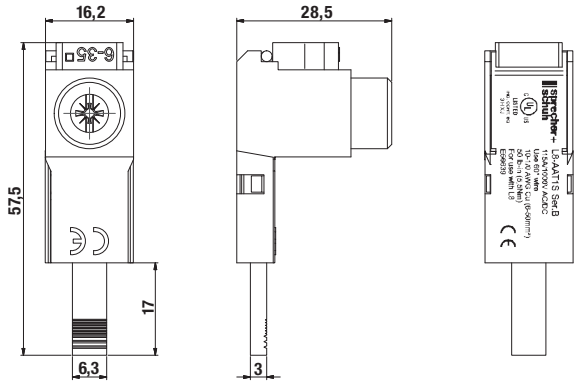
L8-AAP - Protective Shroud



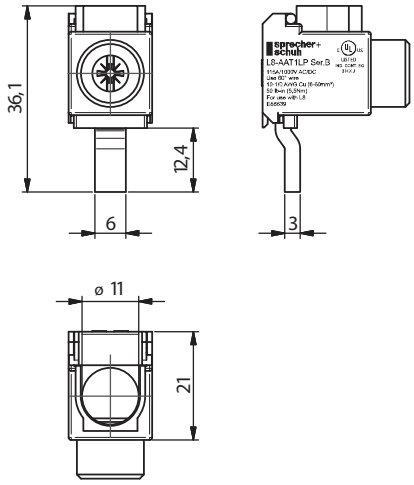
L8-A1E - End Cap 1-Phase



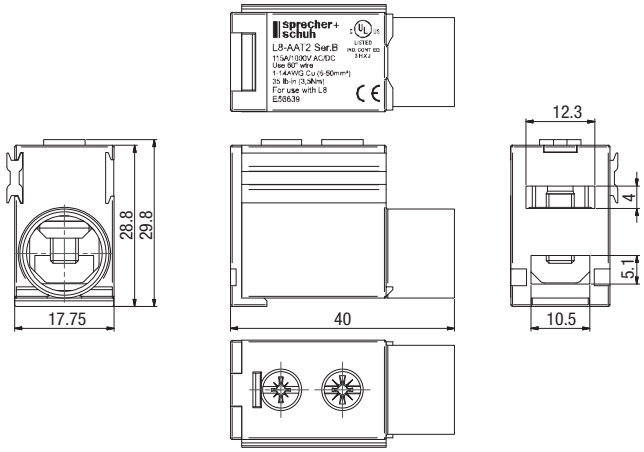
L8-AAT1S - Terminal Lug



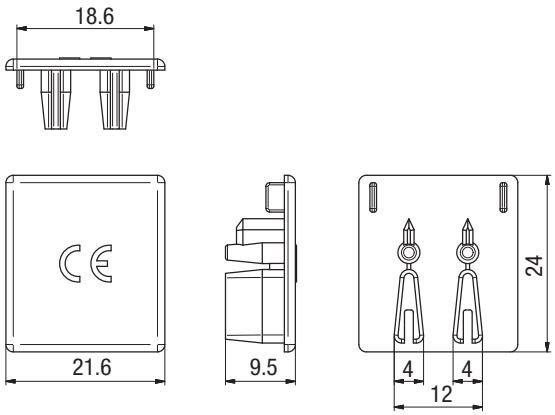
L8-AAT1LP - Terminal Lug



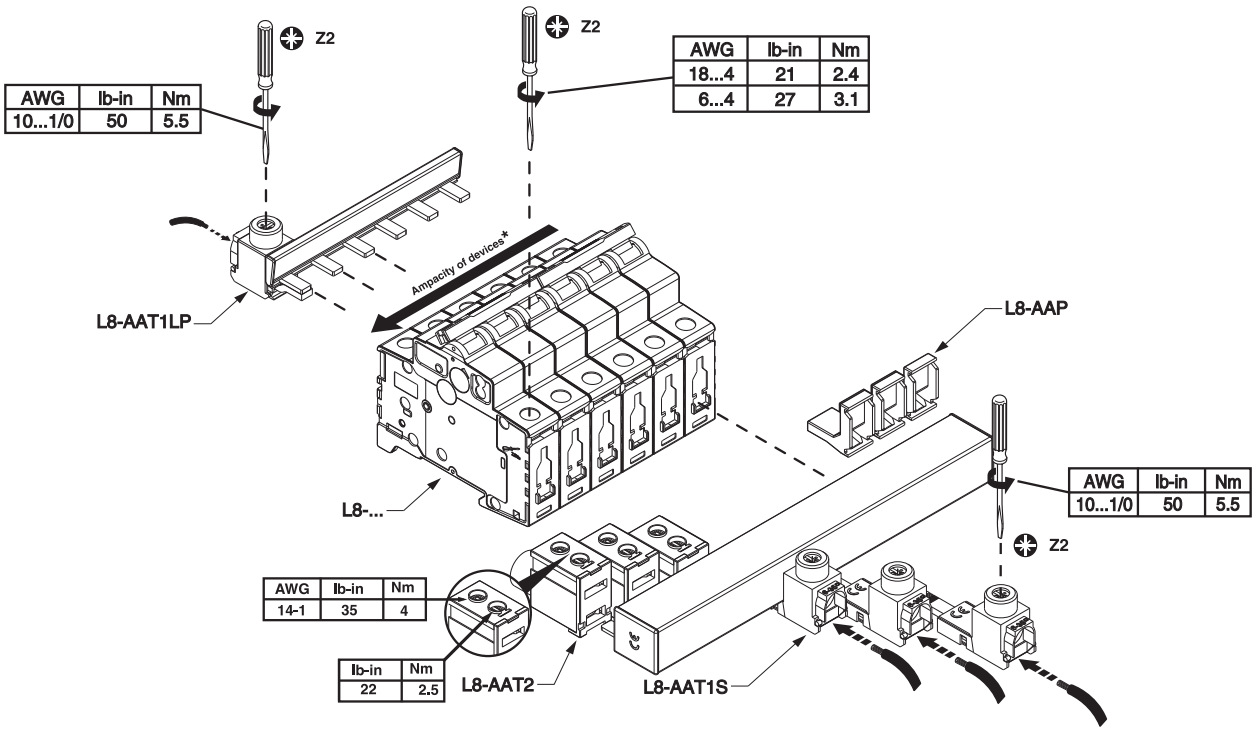
L8-AAT2 - Power Feed



L8-AME - End Cap 2- & 3-Phase

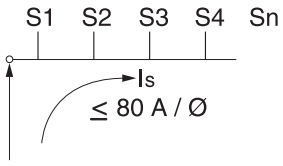


Applying L8 Bus Bars & Accessories



80AMP

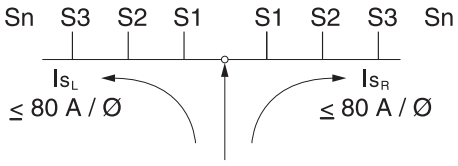
End Feed



L8-A1B8...
L8-A2B8...
L8-A3B8...

Ie = Is ≤ 80 A / Ø

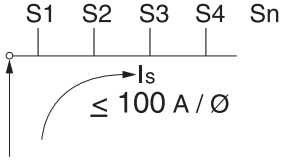
Other Feed



Ie = IsL + IsR ≤ 80 A / Ø

100AMP

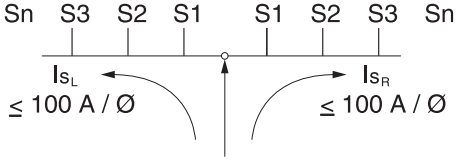
End Feed



L8-A1B1...
L8-A2B1...
L8-A3B1...

Ie = Is ≤ 100 A / Ø

Other Feed



Ie = IsL + IsR ≤ 100 A / Ø

Notes

Series L9 UL489 Miniature Circuit Breakers

Industrial Circuit Breakers for Branch Circuit Protection up to 63 Amps

Sprecher+Schuh includes a line of circuit breakers approved for branch circuit applications in the United States and Canada and certified as a Miniature Circuit Breaker for IEC applications.

Broad product range & flexibility

The Sprecher + Schuh L9 Miniature Circuit Breakers provide a variety of product configurations by offering current ranges of 0.5A to 63A with voltage ranges of 240V AC and 480Y/277V AC. The Series L9 DIN Rail-mounted circuit breakers are similar in width and current range to circuit breakers with the added benefit of providing listed branch circuit protection circuit breaker for US/Canada applications.

Also available for control circuit applications are add-on auxiliary and signal contacts plus shunt trip modules to provide modern control circuit applications. A lock-off attachment is available for applications requiring that feature.

Safety features provide enhanced protection

The series L9 Miniature Circuit Breakers feature finger-safe IP20 from the front of the circuit breaker to guard against accidental contact with live parts.

To aid troubleshooting, a color-coded indicator provides positive visual indication of the device status (green for OFF, red for ON and isolation function).

The Series L9 also incorporate a trip free mechanism - ensuring that the device operation cannot be defeated by holding the operator in the ON position.

Easy installation

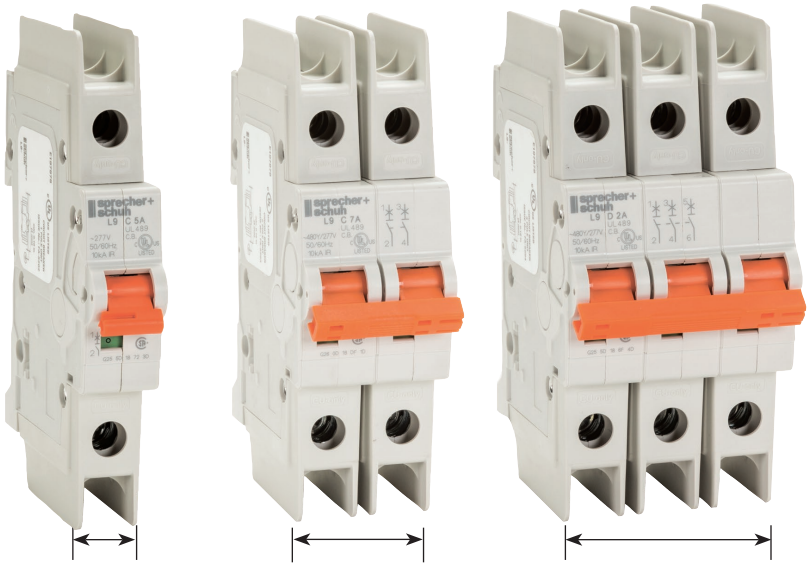
The Series L9 Miniature Circuit Breakers mount on a standard 35mm DIN-rail. Wire terminals accept multiple conductors. In addition, power to the circuit breakers can be fed from the line or load side.

Global approvals for worldwide acceptance

The Sprecher + Schuh L9 Circuit Breakers are UL489 listed, CSA 22.2 No. 5.1 approved and meets IEC 60 947-2. The Series L9 also have an HACR rating (heating and air conditioning) as well as a "Switching Duty" (SWD) rating from 0.5 to 20A. Switching Duty ratings are related to fluorescent light applications only, not High intensity discharge (HID) lights or any other types of loads. Advanced features and global approvals make the Series L9 an ideal product for use in industrial equipment installed throughout the world.

L9 Series B Circuit Breakers

Series B L9 UL489 circuit breakers offer new features, expanded amp ranges and bus bar accessories. This catalog section reflects the new Series B L9 circuit breakers. It is important to note that the Series B L9 devices and the previous version are not dimensionally the same or interchangeable with respect to accessories and the bus bar system.



Product Design & Application

The Series L9 products are thermal-magnetic (inverse time) circuit breakers offering the benefits of a modern circuit breaker design in a compact size. The L9 is used mainly in control circuit applications where branch circuit approved circuit breakers are required.

Because of its range of protection (from 0.5 to 63A) many customers may use this product for protection of load devices where fuses or other supplementary protector devices previously were used in the U.S. and Canada.

Protection of PLC I/O, solenoids, power supplies and control transformers along with providing the listed branch circuit protection is available in one device.

Description

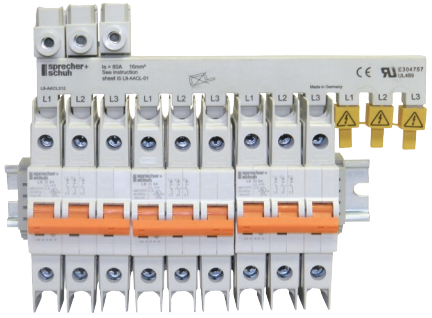
L9 Circuit Breakers for Branch Circuit protection are available one (1)-, two (2-), and three (3-) pole construction and are rated 0.5 to 63A at 240VC AC and 0.5 to 40A at 480Y/277V AC for North American applications (UL 489 and CSA 22.2 No. 5.1). For IEC applications, the products are rated 415V AC 0.5 to 40A.

Continuous Current Rating

Standard current ratings are: 0.5A, 1A, 1.6A, 2A, 3A, 4A, 5A, 6A, 7A, 8A, 10A, 15A, 16A, 20A, 25A, 30A, 32A, 35A, 40A, 50A, 60A and 63A.

The L9 circuit breakers are rated in RMS amperes at 40°C (104°F) ambient temperature per the UL 489 (CSA 22.2 No. 5.1) standard. This temperature is generally used as the average temperature within an industrial enclosure. If a circuit breaker is applied in a temperature that exceeds 40°C (104°F) ambient, then the circuit breaker should be derated. For IEC 60 947-2 standard, the products carry an ambient rating of 30° C. Follow standard IEC application considerations for temperature rating in different ambient temperatures.

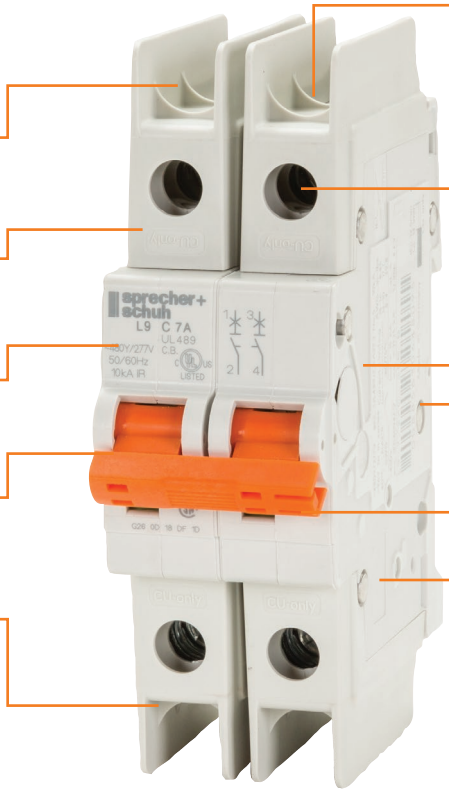
The characteristic trip curves are shown on page M39. The trip bands shown for each breaker represent current tripping limits for a circuit breaker and are within the limits established by UL.



For a specific current at 40°C (104°F), 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.

Example: The L9 time-current graph on page M34 shows that a one-pole, 15 A, L9 circuit breaker trips in not less than 10 sec, and not more than 120 sec. 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) depict 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 the magnetic action of the circuit breaker and reflects protection due to short circuit level currents.

Compare these advanced features



Box lug terminals accept #18…#4 AWG wire as standard

Current limiting and interrupting capacity of 10kA at 480Y/277V AC.

Amp rating and trip curve characteristic clearly marked on the device for easy identification.

Trip-free mechanism; device operation cannot be defeated by holding the operator in the ON position

Available in one, two and three pole

Line and load side terminals designed with dual terminals which allows the connection of two wires, or both a wire and a bus bar.

Guarded No.2 pozidrive terminal screws with finger-safe IP20 protection

Accepts right-mounted shunt trips, auxiliary and signal contacts.

Devices install on standard 35mm DIN-rail (EN 50022)

Color coded indicator provides visual indication of the device status and isolation function

Magnetic trip elements provide Type C and D trip characteristics (IEC and EN 60947-2), while bimetallic elements protect against slight overloads.

Trip Characteristic C (5~10 x I_N) – *Inductive loads* ❻

❶ UL/CSA Max. Volt.	Interrupt Rating (kA)	Rated Current (A)	1 Pole ❷ Catalog Number	Price Each	Std. Pkg.	2 Pole ❸ Catalog Number	Price Each	Std. Pkg.	3 Pole Catalog Number	Price Each	Std. Pkg.	
480Y/277	10	0.5	L9-0.5/1/C	97	2	L9-0.5/2/C	185	1	L9-0.5/3/C	251	1	
		1	L9-1/1/C	97	2	L9-1/2/C	185	1	L9-1/3/C	251	1	NEW
		1.6	L9-1.6/1/C	97	2	L9-1.6/2/C	185	1	L9-1.6/3/C	251	1	
		2	L9-2/1/C	97	2	L9-2/2/C	185	1	L9-2/3/C	251	1	
		3	L9-3/1/C	97	2	L9-3/2/C	185	1	L9-3/3/C	251	1	
		4	L9-4/1/C	97	2	L9-4/2/C	185	1	L9-4/3/C	251	1	
		5	L9-5/1/C	97	2	L9-5/2/C	185	1	L9-5/3/C	251	1	
		6	L9-6/1/C	97	2	L9-6/2/C	185	1	L9-6/3/C	251	1	
		7	L9-7/1/C	97	2	L9-7/2/C	185	1	L9-7/3/C	251	1	
		8	L9-8/1/C	97	2	L9-8/2/C	185	1	L9-8/3/C	251	1	
		10	L9-10/1/C	97	2	L9-10/2/C	185	1	L9-10/3/C	251	1	
		13	L9-13/1/C	97	2	L9-13/2/C	185	1	L9-13/3/C	251	1	
		15	L9-15/1/C	97	2	L9-15/2/C	185	1	L9-15/3/C	251	1	
		16	L9-16/1/C	97	2	L9-16/2/C	185	1	L9-16/3/C	251	1	
		20	L9-20/1/C	97	2	L9-20/2/C	185	1	L9-20/3/C	251	1	
		25	L9-25/1/C	107	2	L9-25/2/C	198	1	L9-25/3/C	251	1	
		30	L9-30/1/C	110	2	L9-30/2/C	211	1	L9-30/3/C	279	1	
		32	L9-32/1/C	110	2	L9-32/2/C	211	1	L9-32/3/C	279	1	
		35	L9-35/1/C ❹	110	2	L9-35/2/C ❹	211	1	L9-35/3/C ❹	279	1	NEW
		40	L9-40/1/C ❹	115	2	L9-40/2/C ❹	227	1	L9-40/3/C ❹	292	1	
240	10	50	L9-50/1/C ❺	133	2	L9-50/2/C ❺	256	1	L9-50/3/C ❺	351	1	NEW
		60	L9-60/1/C ❺	133	2	L9-60/2/C ❺	256	1	L9-60/3/C ❺	351	1	
		63	L9-63/1/C ❺	133	2	L9-63/2/C ❺	256	1	L9-63/3/C ❺	351	1	

L9 Miniature Circuit Breaker Features:

- UL-489 listed for Branch Circuit protection and CSA 22.2 No. 5.1 Approved
- Thermal magnetic protection
- Trip characteristic based on 40°C ambient for UL/CSA
- All ratings are HACR rated (SWD rated up to 20 A)
- Finger safe design (front)
- DIN rail mounting

❶ See page M28 for IEC 60947-2 miniature circuit breaker ratings.
❷ 1-Pole 277V AC 0.5…40A; 240V AC 50…63A, 48V DC 0.5…63A
❸ 2-Pole (series) 96V DC 0.5…63A
❹ New 480Y/277VAC ratings for Series B only.
❺ New extended amp range for Series B only.
❻ This table represents L9 Series B offering.

Trip Characteristic D (10~20 x I_N) – *Highly inductive loads* ❻

❶ UL/CSA Max. Volt.	Interrupt Rating (kA)	Rated Current (A)	1 Pole ❷			2 Pole ❸			3 Pole		
											
			Catalog Number	Price Each	Std. Pkg.	Catalog Number	Price Each	Std. Pkg.	Catalog Number	Price Each	Std. Pkg.
480Y/277	10	0.5	L9-0.5/1/D	97	2	L9-0.5/2/D	186	1	L9-0.5/3/D	256	1
		1	L9-1/1/D	97	2	L9-1/2/D	186	1	L9-1/3/D	256	1
		1.6	L9-1.6/1/D	97	2	L9-1.6/2/D	186	1	L9-1.6/3/D	256	1
		2	L9-2/1/D	97	2	L9-2/2/D	186	1	L9-2/3/D	256	1
		3	L9-3/1/D	97	2	L9-3/2/D	186	1	L9-3/3/D	256	1
		4	L9-4/1/D	97	2	L9-4/2/D	186	1	L9-4/3/D	256	1
		5	L9-5/1/D	97	2	L9-5/2/D	186	1	L9-5/3/D	256	1
		6	L9-6/1/D	97	2	L9-6/2/D	186	1	L9-6/3/D	256	1
		7	L9-7/1/D	97	2	L9-7/2/D	186	1	L9-7/3/D	256	1
		8	L9-8/1/D	97	2	L9-8/2/D	186	1	L9-8/3/D	256	1
		10	L9-10/1/D	97	2	L9-10/2/D	186	1	L9-10/3/D	256	1
		13	L9-13/1/D	97	2	L9-13/2/D	186	1	L9-13/3/D	256	1
		15	L9-15/1/D	97	2	L9-15/2/D	186	1	L9-15/3/D	256	1
		16	L9-16/1/D	97	2	L9-16/2/D	186	1	L9-16/3/D	256	1
		20	L9-20/1/D	97	2	L9-20/2/D	186	1	L9-20/3/D	256	1
		25	L9-25/1/D	107	2	L9-25/2/D	199	1	L9-25/3/D	285	1
		30	L9-30/1/D	110	2	L9-30/2/D	199	1	L9-30/3/D	285	1
		32	L9-32/1/D	110	2	L9-32/2/D	199	1	L9-32/3/D	285	1
		35	L9-35/1/D ❹	115	2	L9-35/2/D ❹	199	1	L9-35/3/D ❹	285	1
240	10	40	L9-40/1/D	115	2	L9-40/2/D	212	1	L9-40/3/D	310	1
		50	L9-50/1/D ❺	139	2	L9-50/2/D ❺	262	1	L9-50/3/D ❺	376	1
		60	L9-60/1/D ❺	139	2	L9-60/2/D ❺	262	1	L9-60/3/D ❺	376	1
		63	L9-63/1/D ❺	139	2	L9-63/2/D ❺	262	1	L9-63/3/D ❺	376	1

NEW

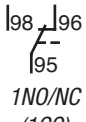
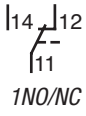
NEW

L9 Miniature Circuit Breaker Features:

- UL-489 listed for Branch Circuit protection and CSA 22.2 No. 5.1 Approved
- Thermal magnetic protection
- Trip characteristic based on 40°C ambient for UL/CSA
- All ratings are HACR rated (SWD rated up to 20 A)
- Finger safe design (front)
- DIN rail mounting

❶ See page M28 for IEC 60947-2 miniature circuit breaker ratings.
❷ 1-Pole 277V AC 0.5…35A; 240V AC 40…63A, 48V DC 0.5…63A
❸ 2-Pole (series) 96V DC 0.5…63A
❹ New 480Y/277VAC ratings for Series B only.
❺ New extended amp range for Series B only.
❻ This table represents L9 Series B offering.

Accessories ❶❷❸

Module	Description	For use with…	UL/CSA Max. Current/Voltage	IEC Ratings Current/Voltage	Connection Diagrams	Catalog Number	Price Each
	**Signal Contact** • Mounts on right side of L9 (series B only) • Contacts change state only during an electrical (or tripped) operation.	All L9 Series B & Shunt Trips	1A @ 480V AC 2A @ 277V AC 1.5A @ 125V DC 2A @ 60V DC 4A @ 24V DC	2A @ 230V (AC-14) 1A @ 400V (AC-14) 1.5A @ 110V (DC-12) 1A @ 220V (DC-12) 4A @ 24V (DC-13) 2A @ 60V (DC-13)	 *1NO/NC (1CO)*	**L9-AMRS3**	**74**
	**Auxiliary Contact** • Mounts on right side of L9 (series B only) • Contacts change state when L9 breaker is operated either manually or electrically.	All L9 Series B & Shunt Trips	1A @ 480V AC 2A @ 277V AC 1.5A @ 125V DC 2A @ 60V DC 4A @ 24V DC	2A @ 230V (AC-14) 1A @ 400V (AC-14) 1.5A @ 110V (DC-12) 1A @ 220V (DC-12) 4A @ 24V (DC-13) 2A @ 60V (DC-13)	 *1NO/NC (1CO)*	**L9-AMRA3**	**74**
	**Shunt Trip –** • Remotely trips the device • Installs on right side of L9 (Series B only)	All L9 Series B	110…415V AC 110...250V DC 12...60V AC/DC	~ ~		**L9-AMST1** **L9-AMST2**	**156** **156**
 **1-pole** **multi-pole**	**Lock Out Toggle Mount –** • Fits securely over switch toggle. Prevents unauthorized activation of L8 or L9 (series B) during maintenance				L8 or L9 1-pole L8 or L9 Multi-pole (Series B only)	**L8-AL0A1** **L8-AL0A2**	**33** **33**

❶ A maximum of one shunt trip, two signal contacts, or two auxiliary contacts may be installed per L9 Circuit Breaker.

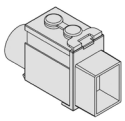
❷ A maximum of three accessories may be installed per L9 Circuit Breaker. The shunt trip must be mounted closest to the L9, then the signal contact, then the auxiliary contact(s). For allowed combinations, and installation instructions please contact your local Sprecher + Schuh representative.

❸ **IMPORTANT NOTE** - All accessories designed to function with L9 Series B Circuit Breakers only, and are not interchangeable with previous L8 or L9 versions.

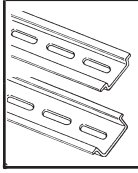
L9 Bus Bars ❶❸❹❺❻

Description	No. of Poles	No. of Phases	Length ❷	UL Max. Amps @ 40°C	No. of Circuit Breakers	Catalog Number	Price Each	Pkg Qty
Bus Bar 	6	1	106 mm	80	6	**L9-AMCL106**	**66**	10
	12		212 mm		12	**L9-AMCL112**	**105**	
	18		318 mm		18	**L9-AMCL118**	**142**	
	6	2	106 mm		3	**L9-AMCL206**	**77**	
	12		212 mm		6	**L9-AMCL212**	**123**	
	18		318 mm		9	**L9-AMCL218**	**174**	
	6	3	106 mm		2	**L9-AMCL306**	**89**	
	12		212 mm		4	**L9-AMCL312**	**143**	
	18		318 mm		6	**L9-AMCL318**	**203**	

L9 Bus Bar Accessories ❶❻

Accessory	Description	Wire Range	Catalog Number	Price Each	Pkg Qty
Terminal Lug 	**Terminal Lug** • 1-pole for circuit breaker termination	#14 ... #2 AWG 2.5 ... 35mm²	**L9-AMCLT35**	**51**	10
	**Dedicated Power Feed**	#14 ... #1 AWG 2.5 ... 50mm²	**L9-AMCLT50D**	**60**	10
	**Protective Cover** • For covering unused terminations • 3 pole set (May be separated)	~	**L9-AMCLPS**	**7**	10

Other Accessories

Accessory	Description	Catalog Number	Price
	**DIN-rail -** 2 meter lengths (6' 6")		
	Top Hat, low profile (price per rail)	**3F**	**See page A54**
	Top Hat, high profile (price per rail)	**3AF**	

❶ cULus, UL508 E56639, EN60947-2, CE Marked.
❷ Total length from Circuit Breaker to Circuit Breaker when mounted on bus bars (not measurement of bus bar length).
❸ Bus bar can not be cut.
❹ Use of multiple bus bars permitted with overlap joint. Maximum of two joints permitted.
❺ **IMPORTANT NOTE** - All L9-AMCL... bus bars are designed for use with L9 Series B Circuit Breakers only, and are not interchangeable with previous L9 versions.
❻ Price indicated is price for each piece. Example: one package of 10 pcs of L9-AMCLT35 is $510 total (10 x $51).

Technical Information

Electrical Ratings

Number of Poles		1, 2, or 3
Tripping Characteristics		C, D
Rated Current I_n		0.5…63A
Rated Frequency f		50/60 Hz
Rated Insulation voltage U_i acc. to IEC/EN 60664-1	Phase-to-ground	250V AC
	Phase-to-phase	440V AC
Overvoltage Category		III
Pollution Degree		3

Data acc. to UL/CSA ❹

Rated voltage	**AC**	1-pole	C Curve	0.5...40 A: 277V AC
				50...63 A: 240V AC
			D Curve	0.5...35 A: 277V AC
				40...63 A: 240V AC
		2-pole	C Curve	0.5...40 A: 480Y/277V AC
				50...63 A: 240V AC
		3-pole	D Curve	0.5...35 A: 480Y/277V AC
				40...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 1 cycle (1s - ON, 9s -OFF)				6,000 operations (AC and DC);

Data acc. to IEC/EN 60947-2

Rated operational voltage U_e		1-pole	230V AC
		2-, 3-pole	400V AC
Highes supply or utilization voltage U_{max}	**AC**	1-pole	253/440V AC
		2-, 3-pole	440V AC
	DC ❶	1-pole	48V DC
		2-, 3-pole	96V DC
Min. operating voltage			12V AC, 12V DC
Rated ultimate short-circuit breaking capacity Icu			15 kA
Rated service short-circuit breaking capacity Ics			≤40 A: 11.25 kA >40 A: 7.5 kA
Rated impulse withstand voltage Uimp.			(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			
1 cycle (2s - ON, 13s - OFF, In ≤ 32A)		In < 30A:	20,000 operations (AC)
1 cycle (2s - ON, 28s - OFF, In > 32A)		In ≥30A:	10,000 ops. (AC); 1,000 ops. (DC)

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 conditions (damp heat) per IEC/EN 60068-2-30	°C/RH	28 cycles with 55°C/90-96% and 25°C/95-100%
Ambient temperature ❸		-25…+55ºC
Storage temperature		-40…+70ºC

Installation

Housing		Terminal Dual terminal
Cross-section of wire solid, stranded (front/back terminal slot) ❷		35/35 mm²
		18…4/18…10 AWG
Flexible (front/back terminal slot)		25/10 mm²
Multi-wire rating per UL/CSA		1 wire; 18…4 AWG
		2-4 wires ❺; 18…10 AWG
Cross-section of bus bars (back terminal slot)		10 mm²
Tightening torque	IEC	2.8 N•m
	UL/CSA	AWG 18...16: 8.85 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/Weight

Pole dimensions	H x D X W	111 x 69 x 17.5 mm (4.37" x 2.72" x 0.69")
Pole weight		125 g (4.4 oz)

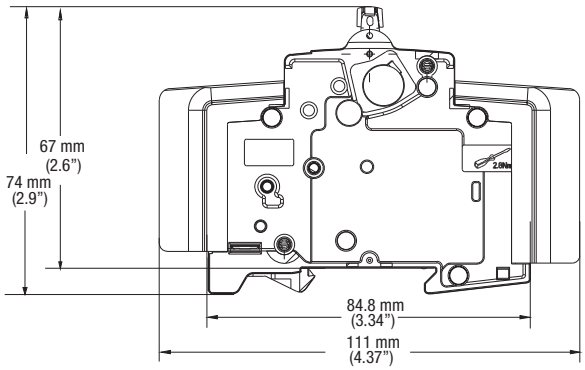
Combination with Auxiliary Elements

Auxiliary contact	Yes
Signal contact	Yes
Shunt trip	Yes

❶ Self-declared IEC DC ratings.
❷ 35mm self-declared. Not included in IEC/EN approval.
❸ Refer to Ambient Temperature tables.
❹ UL file E197878.
❺ Wires must be of like size and stranding. Up to two wires per terminal slot.

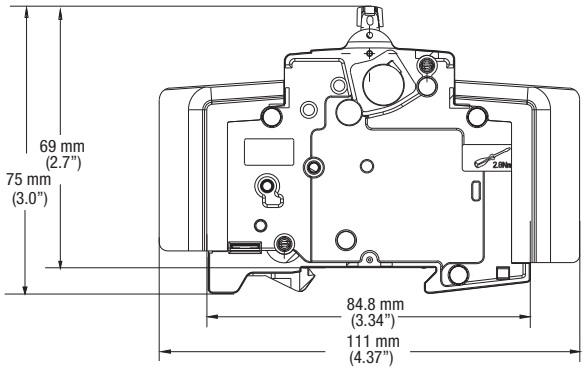
L9 Miniature Circuit Breakers *(Series B…Curve C & D)*

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

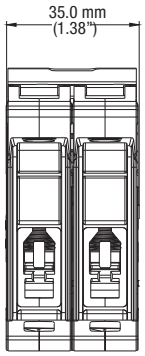


1-Pole

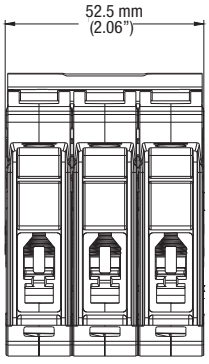
1-Pole



2-, 3-Pole

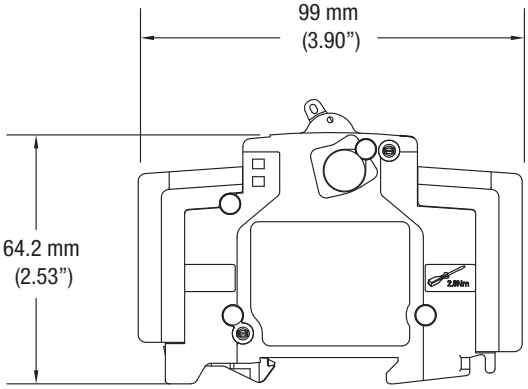


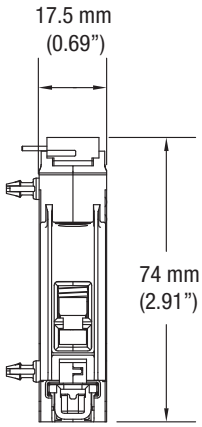
2-Pole



3-Pole

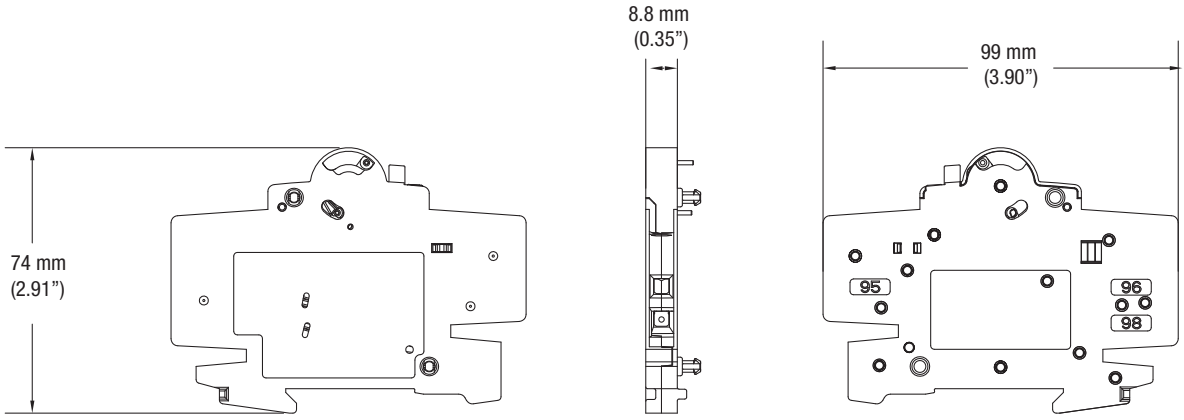
Shunt Trip *(L9-AMST1, -AMST2)*



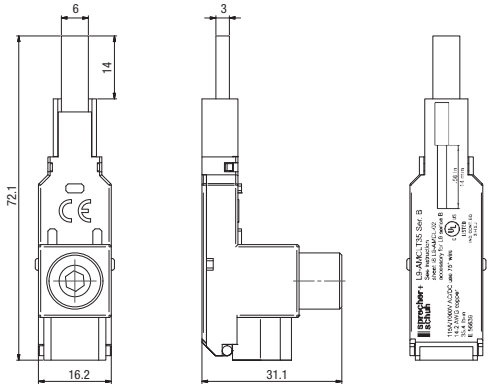


Signal Contact *(L9-AMRS3)* and Auxiliary Contact *(L9-AMRA3)*

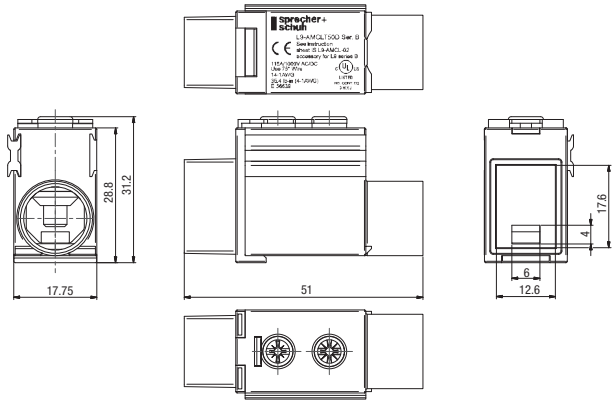
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



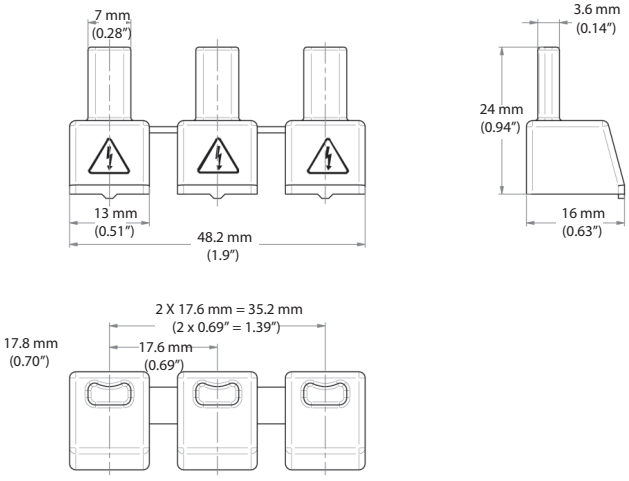
L9-AMCLT35 - Terminal Lug



L9-AMCLT50D - Power Feed

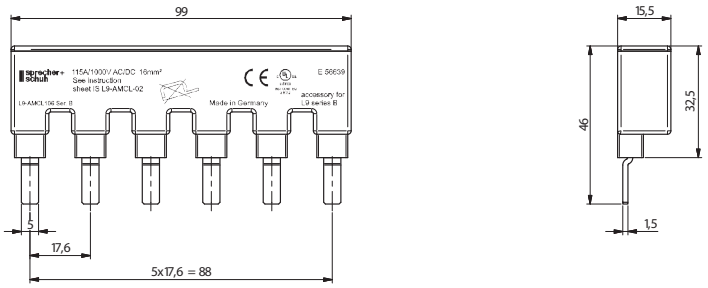


L9-AMCLPS - Protective Cover

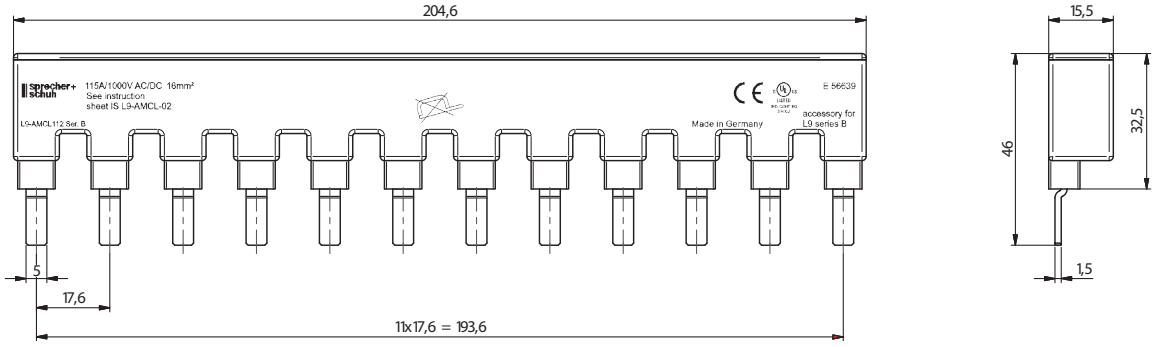


L9 -AMCL_06 - 6 Pole Bus Bars

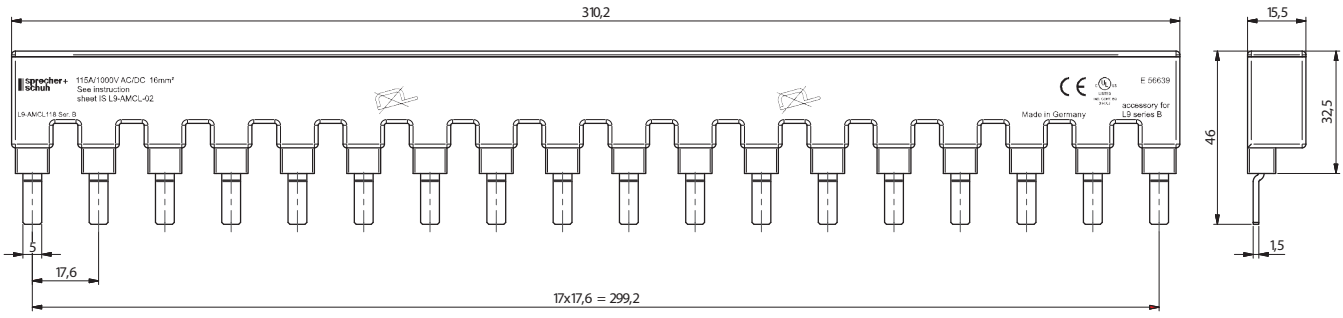
Dimensions are in millimeters (inches). Dimensions not intended for manufacturing purposes.



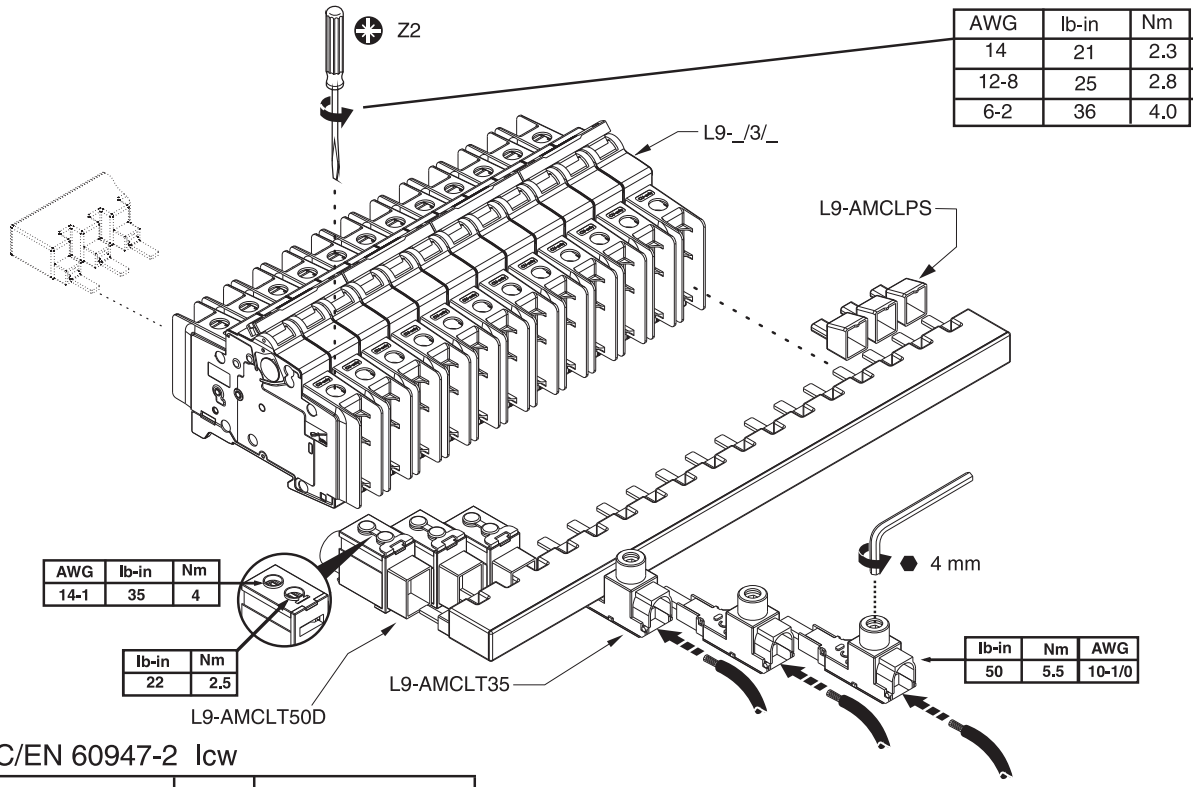
L9-AMCL_12 - 12 Pole Bus Bars



L9-AMCL_18 - 18 Pole Bus Bars



Applying L9 Bus Bars & Accessories



AWG	lb-in	Nm
14	21	2.3
12-8	25	2.8
6-2	36	4.0

AWG	lb-in	Nm
14-1	35	4

lb-in	Nm
22	2.5

lb-in	Nm	AWG
50	5.5	10-1/0

IEC/EN 60947-2 Icw

Ue	Ue VAC	L9-AMCL Icw Amps
t = 1s, L9-AMCL	240/415	10000

UL SCCR

Ue	L9-_/_/_ In Amps	Ue VAC	L9-AMCL SCCR RMS Sym Amps
L9-AMCL, L9-_/_/_	0.5-25	480Y/277	10000
	30-40	240	10000

	L9-_/1/_	L9-_/2/_	L9-_/3/_
L9-AMCL106	6	-	-
L9-AMCL112	12	-	-
L9-AMCL118	18	-	-
L9-AMCL206	-	3	-
L9-AMCL212	-	6	-
L9-AMCL218	-	9	-
L9-AMCL306	-	-	2
L9-AMCL312	-	-	4
L9-AMCL318	-	-	6
L9-AMCLT35	1	2	3
L9-AMCLT50D	1	2	3

NOTE: Do not cut bus bars. Maximum of 3 bus bars allowed in any combination of the same phase configuration. Multiple bus bars must be installed back-to-back.

Methods
of Applying
CIRCUIT
PROTECTION

This information is provided to aid in proper system design and utilization of circuit protection devices in North American applications. Be sure to consider all applicable local and national codes for your particular installation.

Applying L8 Supplementary Protectors in accordance with UL & NEC Guidelines

Sprecher+Schuh Series L8 Supplementary Protectors are recognized by Underwriters Laboratories (UL). Representative samples of this product have been evaluated by UL and meet applicable US safety standards. In general, the UL Component Recognition service covers the evaluation of components that will later be used in a complete product or system. L8 Supplementary Protectors are defined as UL Recognized supplementary overcurrent protective devices under the standard of UL 1077.

UL 508A, a procedure covering industrial control panels, offers guidelines in applying supplementary overcurrent protective devices. The general areas of acceptability are in the primary and secondary protection of control transformers, and also control circuit protection. Other uses of Mini-CB's may be submitted to UL for further investigation.

Per UL 508A, before utilizing a supplementary device for control transformer overcurrent protection, the supplementary device must meet the following restrictions:

Unless otherwise specified it is used with protection, either fuse or circuit breakers upstream from the supplementary device, rated at 400 percent of the supplementary protector rating but not less than 20A for device rated 150V or less and 15A for devices rated 150V or more.

(Reference: UL 508A procedure prescribed only)

Protection of Control Transformers

Control transformers can generate an almost infinite current spike on start-up while attempting to overcome core saturation. Only the resistance of the control transformer windings and the inductance of the circuit limit the large current draw. The inrush spikes are of short duration (1/8 to 1/4 of a cycle), typically reaching between 8~20 x I_n. Therefore, selecting a Mini-CB with the proper current rating and high inrush trip characteristics is ideal to avoid nuisance tripping. Sprecher+Schuh Series L8 "C" & "D" type Supplementary Protectors offer high inrush capabilities from 5~10 x I_n and 10~20 x I_n respectively.

Selecting the proper Mini-CB current ratings for the primary and secondary protection of control transformers (per UL/NEC) is as follows:

Primary Overcurrent Protection for Control Transformers

Control Circuits: If the rated primary current is less than 2 amps, the maximum rating of the overcurrent device is 500%. If the rated primary current is more than 2 amps, the maximum rating of the overcurrent device is 250%.

Secondary Overcurrent Protection for Control Transformers

Control Circuits: If the rated secondary current is less than 9 amps, the maximum rating of the overcurrent device is 167%. If 9 amps or more, the maximum rating of the overcurrent device is 125%. The next larger size of an overcurrent device may be used if 125% does not correspond to a standard size.

(Reference: UL 508 32.7, UL 845 11.16 & 11.17, NEC 430-72(c) exception No. 2, 450-3(b) 1 & 2)

Example *(see table for more calculated results)*
Primary & Secondary Protection of a Control Transformer:
50VA Pri. 480/ Sec. 120V

Primary Mini-CB Selection

- 50VA/480V = 0.10A rated transformer primary current
- 0.10A is less than 2, therefore may increase up to 500%
- 0.10A x 500% = 0.52A, Select L8-.5/2/D (0.5 amp 2-Pole)
- Upstream BCPD must be rated at 400% of the selected Mini-CB rating
- 0.5A x 400% = 2A, since rated below 15A at 150V or more, the minimum BCPD is 15A per NEC-240.6

Primary Control Transformer Calculations *(480 / 240V)*

Transformer VA	Primary Volts	Rated Amps ❶	Selected L8 Mini-CB	Maximum Upstream BCPD ❷
50	480	0.10	0.5	15A
100	480	0.21	1	15A
150	480	0.31	1	15A
200	480	0.42	2	15A
250	480	0.52	2	15A
300	480	0.63	3	15A
500	480	1.04	5	25A
1000	480	2.08	5	25A
50	240	0.21	1	15A
100	240	0.42	2	15A
150	240	0.63	3	15A
200	240	0.83	4	15A
250	240	1.04	5	25A
300	240	1.25	6	25A
500	240	2.08	5	25A
1000	240	4.17	10	60A

❶ If the rated primary current is less than 2 amps, the maximum rating of the overcurrent device is 500%. If the rated primary current is more than 2 amps, the maximum rating of the overcurrent device is 250%.
❷ Minimum standard BCPD ampere rating is 15A per NEC-240.6.

Applying L8 Supplementary Protectors in accordance with UL & NEC Guidelines *(continued)*

Secondary Supplementary Protectors Selection

- 50VA/120V = 0.42A rated transformer secondary current
- 0.42A is less than 9, therefore may increase up to 167%
- 0.42A x 167% =0.70A, Select L8-1/1/D or L8-1/1/C (1 amp 1-Pole)

Secondary Control Transformer Calculations *(120 / 24V)*

Transformer VA	Secondary Volts	Rated Amps ❶	Selected L8 Mini-CB
50	120	0.42	1
100	120	0.83	2
150	120	1.25	2
200	120	1.67	3
250	120	2.08	4
300	120	2.50	4
500	120	4.17	7
1000	120	8.33	13
50	24	2.08	4
100	24	4.17	7
150	24	6.25	10
200	24	8.33	13
250	24	10.42	13
300	24	12.50	16
500	24	20.83	30
1000	24	41.67	50

Protection of Control Circuit Devices

Control circuit devices can also generate inrush currents during startup, though not as intense as control transformers. Devices such as control relays, starter coils, and solenoids exhibit typical inrush levels between 6~10 x In. Also, protection of conductor wires or low-level signal devices such as PLCs may exhibit even lower inrush levels ranging from 3~5 x In. Depending on the inrush, an Mini-CB with a type "B" or "C" trip characteristic will perform the task.

Control Circuit Conductor Protection

The relationship between the control circuit conductor size and rating of the protective device must be in compliance with the tabulated data per UL 508.

(Reference: UL 508A procedure prescribed only)

Where can supplementary overcurrent protectors not be used?

- Branch Circuit Protection Device (BCPD)
- Power Transformer Primary Protection
- Power Transformer Secondary Protection
- Protection of Loads such as for Motors, Heater, Lamps, and General use

Supplementary protectors may be submitted to UL for further investigation for other uses.

❶ If the rated secondary current is less than 9 amps, the maximum rating of the overcurrent device is 167%. If 9 amps or more, the maximum rating of the overcurrent device is 125%.

Applying L9 UL489 Miniature Circuit Breakers in accordance with UL & NEC Guidelines *(continued)*

Description

L9 Circuit Breakers for Branch Circuit protection are available one (1)-, two (2-), and three (3-) pole construction and are rated 0.5 to 63A at 240VC AC and 0.5 to 40A at 480Y/277V AC (D Curve to 35A) for North American applications (UL 489 and CSA 22.2 No. 5.1). For IEC applications, the products are rated 415V AC 0.5 to 63A.

Thermal Magnetic Circuit Breakers

The L9 Thermal Magnetic Circuit Breakers are general-purpose devices suitable for the majority of industrial, inverse time circuit breaker applications. They combine thermal and magnetic trip actions and provide accurate overload and short-circuit protection for conductors and connected equipment.

Circuit Breaker Application Information

Selection of a L9 circuit breaker with appropriate circuit protection includes consideration of:

- Circuit Voltage
- Circuit Frequency
- Available Short Circuit Current
- Continuous Current Rating
- Application Considerations
- Special Operating Conditions

Circuit Voltage

The L9 circuit breakers are rated by voltage class. Applications should not exceed the listed voltage and current range.

Circuit Frequency

The L9 circuit breakers may be applied to frequencies of 50 and 60 Hz without derating. For applications above 60 Hz, contact Sprecher + Schuh with specific application information for the derating of the circuit breakers.

Available Short Circuit Current

The L9 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).

Region	Max. Voltage	Current Range
IEC Regions	253V AC (1-pole) 440V AC (2-/3-pole)	0.5...63A
	48V DC (1-pole) 96V DC (2-/3-pole)	0.5...63A
North America (UL 489 & CSA 22.2 No. 5.1)	240V AC	0.5...63A
	480Y/277V AC	0.5...40A (D Curve to 35A)
	1-pole 48V DC	0.5...63A
	2-pole 96V DC	0.5...63A

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 L9 circuit breakers 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, L9 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.

Applying L9 UL489 Miniature Circuit Breakers in accordance with UL & NEC Guidelines *(continued)*

Application Considerations

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 Electric Code (Canadian Electric 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 L9 circuit breakers are “non 100% rated” as defined 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.

Branch Circuits

L9 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, CED, UL and CSA should be used to determine the specific device.

1. **Motor Branch Circuit**

   L9 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 22.2 No 5.1 standards.

2. **Transformer Protection**

   L9 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. References: NEC 450 and UL 489. Also see CEC and appropriate Canadian Standards.

3. **Heater Load, Lighting, and Other Load Protection**

   L9 circuit breakers may be used for protection of heater loads, lighting loads and other loads following the guidelines established. References: NED Article 31 and UL 508A. Also see CEC and appropriate Canadian Standards.

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

L9 Circuit Breakers are rated as Heating, Air Conditioning and Refrigeration circuit breakers as defined by UL489, paragraph 6.7 and may be used in this type of application.

SWD Rating

L9 breakers (0.5 ... 20A) are rated as SWD and as such may be applied to switch fluorescent lighting loads up to their current and voltage maximum.

Current Limiting

L9 Circuit Breakers are rated as current limiting circuit breakers as defined by UL 489, paragraph 8.6.

The L9 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 L9 device is designed to substantially reduce the amount of let-through-current and the resulting let-through-energy that can damage protected components. The L9 has the ability to interrupt short circuit current within the first half cycle of the fault. Limiting letthrough current and energy will protect against the harmful effects of overcurrent and is focused primarily on avoiding the following:

- Excessive Heat
- 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 letthrough-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.)

Applying L9 UL489 Miniature Circuit Breakers in accordance with UL & NEC Guidelines *(continued)*

Ambient Temperature Deratings

The L9 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 0º 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.

Temperature Derating, UL
Reference temperature = 40 °C

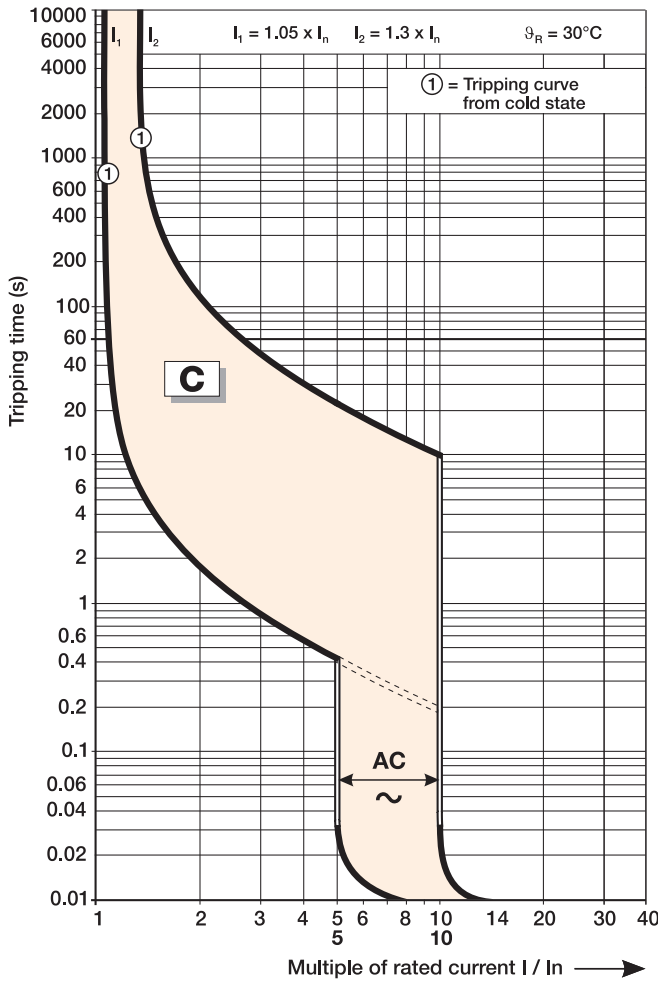
Current Rating [A]	Ambient temperature (°C)									
	-25	-20	-10	0	10	20	30	40	50	55
0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
1	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1	1.0	0.9
1.6	2.0	2.0	1.9	1.8	1.8	1.7	1.7	1.6	1.5	1.5
2	2.5	2.4	2.4	2.3	2.2	2.1	2.1	2	1.9	1.9
3	3.7	3.7	3.6	3.4	3.3	3.2	3.1	3	2.9	2.8
4	5.0	4.9	4.7	4.6	4.4	4.3	4.1	4	3.9	3.8
5	6.2	6.1	5.9	5.7	5.6	5.4	5.2	5	4.8	4.7
6	7.4	7.3	7.1	6.9	6.7	6.4	6.2	6	5.8	5.7
7	8.7	8.6	8.3	8.0	7.8	7.5	7.3	7	6.7	6.6
8	9.9	9.8	9.5	9.2	8.9	8.6	8.3	8	7.7	7.6
10	12.4	12.2	11.9	11.5	11.1	10.7	10.4	10	9.6	9.4
13	16.1	15.9	15.4	14.9	14.4	14.0	13.5	13	12.5	12.3
15	18.6	18.3	17.8	17.2	16.7	16.1	15.6	15	14.4	14.2
16	19.8	19.6	19.0	18.4	17.8	17.2	16.6	16	15.4	15.1
20	24.8	24.4	23.7	23.0	22.2	21.5	20.7	20	19.3	18.9
25	31.0	30.6	29.6	28.7	27.8	26.9	25.9	25	24.1	23.6
30	37.2	36.7	35.6	34.4	33.3	32.2	31.1	30	28.9	28.3
32	39.7	39.1	37.9	36.7	35.6	34.4	33.2	32	30.8	30.2
35	43.4	42.8	41.5	40.2	38.9	37.6	36.3	35	33.7	33.1
40	49.6	48.9	47.4	45.9	44.4	43.0	41.5	40	38.5	37.8
50	62.0	61.1	59.3	57.4	55.6	53.7	51.9	50	48.2	47.2
60	74.4	73.3	71.1	68.9	66.7	64.4	62.2	60	57.8	56.7
63	78.2	77.0	74.7	72.3	70.0	67.7	65.3	63	60.7	59.5

Temperature Derating, IEC
Reference temperature = 30 °C

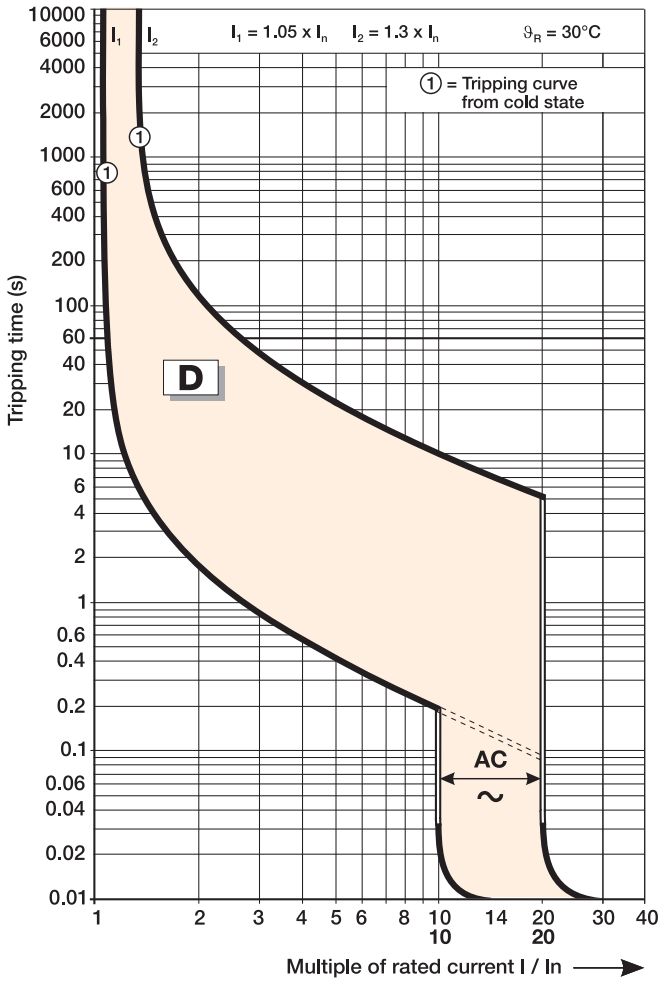
Current Rating [A]	Ambient temperature (°C)									
	-25	-20	-10	0	10	20	30	40	50	55
0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
1	1.2	1.2	1.1	1.1	1.1	1.0	1	1.0	0.9	0.9
1.6	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.5	1.5
2	2.3	2.3	2.2	2.2	2.1	2.1	2	1.9	1.9	1.9
3	3.5	3.5	3.4	3.3	3.2	3.1	3	2.9	2.8	2.8
4	4.7	4.6	4.5	4.4	4.2	4.1	4	3.9	3.8	3.7
5	5.8	5.8	5.6	5.5	5.3	5.2	5	4.9	4.7	4.6
6	7.0	6.9	6.7	6.5	6.4	6.2	6	5.8	5.6	5.6
7	8.2	8.1	7.8	7.6	7.4	7.2	7	6.8	6.6	6.5
8	9.3	9.2	9.0	8.7	8.5	8.2	8	7.8	7.5	7.4
10	11.7	11.5	11.2	10.9	10.6	10.3	10	9.7	9.4	9.3
13	15.1	15.0	14.6	14.2	13.8	13.4	13	12.6	12.2	12.0
15	17.5	17.3	16.8	16.4	15.9	15.5	15	14.6	14.1	13.9
16	18.6	18.4	17.9	17.4	17.0	16.5	16	15.5	15.0	14.8
20	23.3	23.0	22.4	21.8	21.2	20.6	20	19.4	18.8	18.5
25	29.1	28.8	28.0	27.3	26.5	25.8	25	24.3	23.5	23.1
30	35.0	34.5	33.6	32.7	31.8	30.9	30	29.1	28.2	27.8
32	37.3	36.8	35.8	34.9	33.9	33.0	32	31.0	30.1	29.6
35	40.8	40.3	39.2	38.2	37.1	36.1	35	34.0	32.9	32.4
40	46.6	46.0	44.8	43.6	42.4	41.2	40	38.8	37.6	37.0
50	58.3	57.5	56.0	54.5	53.0	51.5	50	48.5	47.0	46.3
60	69.9	69.0	67.2	65.4	63.6	61.8	60	58.2	56.4	55.5
63	73.4	72.5	70.6	68.7	66.8	64.9	63	61.1	59.2	58.3

Tripping Characteristics

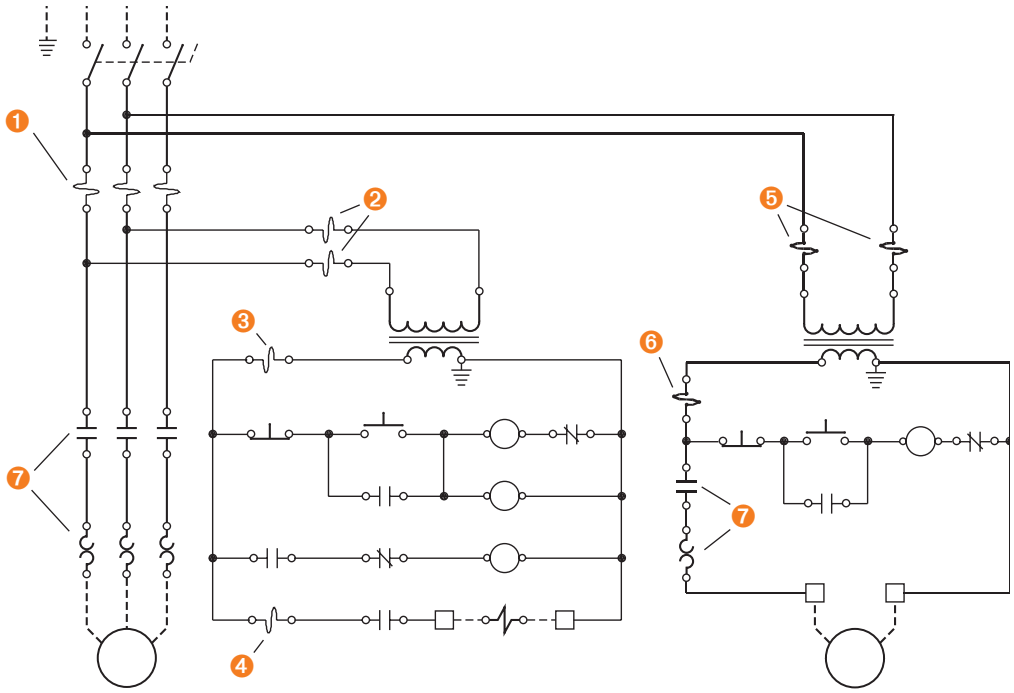
C Curve



D Curve



Defining Electrical Standards Relating to Protection Devices



❶ Branch Circuit Protection Device (BCPD)
Acceptable components
- Branch circuit protection device (UL489)
- Self-protected Type E manual motor controller (UL508-E)

❷ Control Transformer Primary Protection
Acceptable components
- UL-listed fuses (UL512)
- Branch circuit protection device (UL489)
- Supplementary protective device (UL1077)

❸ Control Transformer Secondary Protection
Acceptable components
- Supplementary protective device (UL1077)
- Miscellaneous, miniature and micro fuses

❹ Supplementary Circuit Protection
Acceptable components
- Supplementary protective device (UL1077)
- Branch circuit protection device (UL489)
- Miscellaneous, miniature and micro fuses

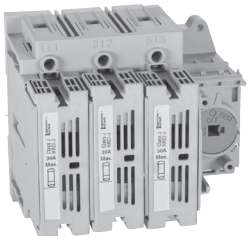
❺ Power Transformer Fuse/Branch Circuit Protection
Acceptable components
- Branch circuit protection device or power-related transformer fuses (UL489/512)

❻ Power Transformer Fuse/Branch Circuit Protection
Acceptable components
- Branch circuit protection device or power-related transformer fuses (UL489/512)

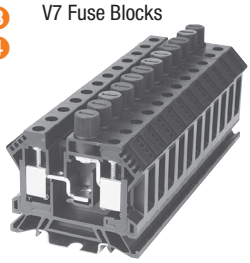
❼ Motor Load Protection
- Manual motor controllers (UL508-E)

Sprecher + Schuh Products

❶ L11 Disconnect Switch



❸ ❹ V7 Fuse Blocks



❶ ❻ ❼ KT7 Motor Circuit Protector

❶ ❷ ❸ ❹ ❺ ❻ KTU7 Molded Case Circuit breaker

❷ ❸ ❹ L8 Supplementary Protector

❶ ❷ ❸ ❹ ❺ ❻ L9 Miniature Circuit Breaker

❷ ❸ ❹ ❺ ❻ Ambus Fuse Holder

M Circuit Protection

Defining Electrical Standards Relating to Protection Devices

Circuit protection devices should be applied in accordance with the product specifications, as well as local and national electrical codes. Sprecher+Schuh protection devices offer equipment manufacturers a product that meets both US and international protection standards. A variety of Sprecher+Schuh Protection Devices are approved by Underwriters Laboratory's standards and are applicable for use under the guidelines of the National Electric Code (NEC). Internationally, Sprecher+Schuh Protection Devices are CE marked and meet CSA and IEC standards for worldwide acceptance.

Sprecher+Schuh Protection Devices are an excellent choice for a wide variety of electrical protection circuits. See the listings below to gain a broader understanding of additional electrical standards pertaining to other types of circuit protection.

UL 508 Manual Motor Controllers

A manual motor controller is suitable for use as an ON/OFF (make/break) controller for motors and other loads. These devices also have an overload tripping function which must be compliant with applicable tests for an overload relay. In addition, an overload tripping device must operate independently of the manipulation of the handle (trip free).

A listed Manual Motor Controller, additionally marked "Suitable as a Motor Disconnect," shall be permitted as a disconnecting means where installed between the final motor branch-circuit short-circuit, transformer protection, device and the motor. General uses: control circuit, transformer protection, motor loads, general use loads, lighting loads, resistive loads.

Although Sprecher+Schuh Supplementary Protectors are not listed as UL 508 manual motor controllers, Sprecher + Schuh offers our KT7 Motor Controller series, which does meet the UL 508 standard at a competitive price.

UL 489 Branch Circuit Protection

Products UL Listed for Branch Circuit Protection, which are approved and evaluated according to the UL 489 Standard for "Molded Case Circuit Breakers" (usually applicable at 240V maximum when associated with Supplementary Protectors). General uses: Branch Circuit Protection Device (BCPD), protect motor loads, protect external loads such as receptacles or HVAC & refrigeration equipment.

CSA C22.2 No. 5.1

Products evaluated according to the Canadian Standards Association (CSA), which are intended to protect branch circuits in accordance with the Canadian Electric Code (CEC). The CSA C22.2 No. 5.1 standard is closely related to the UL 489 standard.

UL 1077 Supplementary Protection

UL recognized supplementary protectors evaluated according to UL 1077 standard. Supplementary protectors are intended for use as overcurrent protection within an appliance or other electrical equipment where branch circuit protectors shall not be used as substitutes for UL 489 branch circuit protective devices. General uses: control circuit components such as relay coils, starter coils, timers and remote solenoids... etc.; control transformers protection (primary & secondary); sensitive internal electronic circuitry.

CSA C22.2 No. 235

The CSA C22.2 No. 235 Standard is closely related to the UL 1077 Supplementary Protector standard.

IEC 60947-2 Standard

Electrical standards for industrial applications using circuit protection.

wöhner
ALLES MIT SPANNUNG

AMBUS® EasySwitch DIN-rail Mounted Fuse Holders

The design standard for fuse block overcurrent protection

Wohner's AMBUS® EasySwitch Fuse Blocks feature the latest enclosed design for the ultimate in safety and convenience. Built for control and power circuits, the AMBUS line is DIN-rail mountable, compact and reliable. Both AC and DC models are available, with and without blown fuse indication.

Sized for many applications

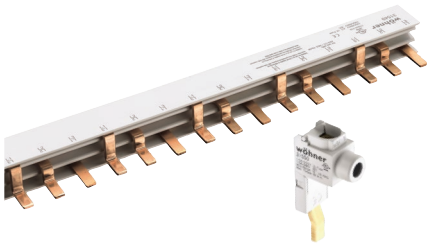
AMBUS Fuse Blocks are available in one, two and three pole configurations for the following fuse types:

- Class CC
- Midget; 1-1/2 x 13/32
- DC rated fuses up to 30A
- Class J 30A fuses
- Class J 60A fuses

All AC fuse blocks are rated to 600V, with 12-72V AC/DC models available for midget and Class CC fuses. All devices carry a withstand rating to 200kA. Midget fuse blocks are rated to 50kA.

Enclosed design offers many advantages

Unlike "open" fuse blocks that were extremely dangerous, the enclosed design of the AMBUS series features IP2 dead-front construction under IEC and DIN standards. In operation, there is no access to live fuses or fuse clips. With the flip of a finger, fuse access is gained via a levered compartment on the front of the holder that isolates the fuse from the line power. This makes fuse changeout quick, easy, convenient... *and safe*.

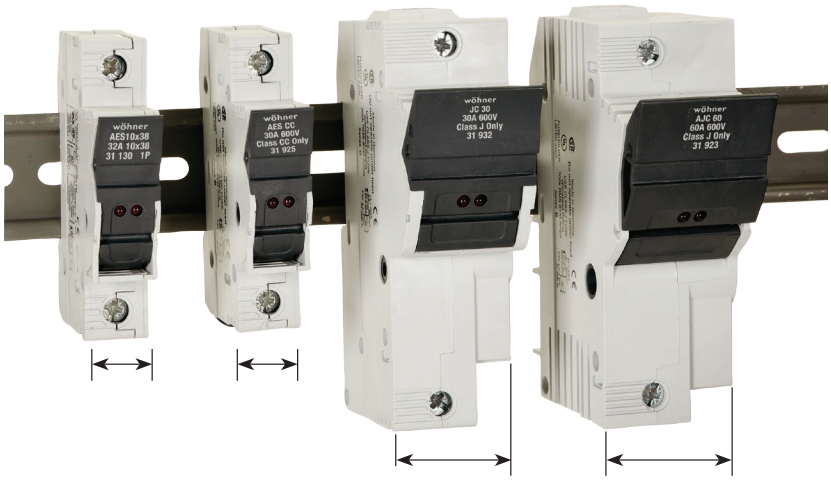


Other great features

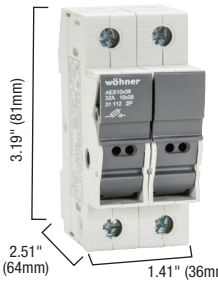
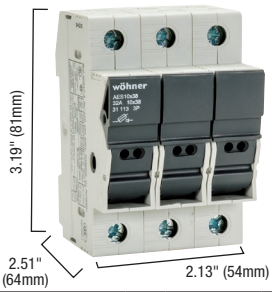
The AMBUS line is compact, saving up to 15% in panel space over conventional fuse blocks. The entire line is also DIN-rail mountable, resulting in extra savings in panel building time. All models are available with blown fuse indication, saving time on maintenance and troubleshooting. The bodies are made up of tough and durable polyamide, known for its exceptional insulating properties. Wire terminals accept multiple conductors, and UL 508 approved bus bars can be used to quickly distribute power to many AMBUS Fuse Holders simultaneously.

International approvals

Class CC and J fuse holders are UL listed for branch circuit protection in electrical distribution systems. They are excellent for small motor loads and group protection of small motors. Midget holders are UL listed for control circuit protection. The entire line is CSA Approved and carries the CE Mark for use in international markets.



DIN-rail Mounted Fuse Holders – Midget Fuses *(1-1/2 x 13/32)* ❶❷

Ordering and Technical Information	One Pole			Two Pole			Three Pole		
									
	Catalog Number	**Price Ea.** (Std Pkg)	**Pkg Qty**	**Catalog Number**	**Price Ea.** (Std Pkg)	**Pkg Qty**	**Catalog Number**	**Price Ea.** (Std Pkg)	**Pkg Qty**
Fuse Holder -									
Without Blown Fuse LED	**31 110**	**19**	12	**31 112**	**38**	6	**31 113**	**57**	4
With Blown Fuse LED	**31 130**	**27**	12	**31 132**	**57**	6	**31 133**	**85**	4
12-72V AC/DC (with LED indicator)	**31 930**	**27**	12						
Accessories									
DIN-rail		**See page A58**			**See page A58**			**See page A58**	
Top Hat, low profile (priced per rail)	**3F**		12	**3F**		12	**3F**		12
Top Hat, high profile (priced per rail)	**3AF**		12	**3AF**		12	**3AF**		12
End Anchors		**See Section N**			**See Section N**			**See Section N**	
DIN Rail — Normal Duty	**V7-EA35**		50	**V7-EA35**		50	**V7-EA35**		50
DIN Rail — Heavy Duty	**V7-EAH35**		10	**V7-EAH35**		10	**V7-EAH35**		10

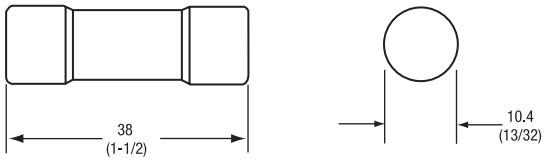
Fuse Block Specifications						
Approvals	c UL us LISTED	CSA	c UL us LISTED	CSA	c UL us LISTED	CSA
Voltage Rating	600V AC/DC	600V AC/DC	600V AC/DC	600V AC/DC	600V AC/DC	600V AC/DC
Maximum Current	30 A	30 A	30 A	30 A	30 A	30 A
Wire Range: 1 Wire per Terminal	#18…4 AWG (0.75…25 mm^2)		#18…4 AWG (0.75…25 mm^2)		#18…4 AWG (0.75…25 mm^2)	
Wire Range: 2 Wires per Terminal ❸	#18…8 AWG (0.75…10 mm^2)		#18…8 AWG (0.75…10 mm^2)		#18…8 AWG (0.75…10 mm^2)	
Wire Strip Length	0.43" (11 mm)		0.43" (11 mm)		0.43" (11 mm)	
Recommended Tightening Torque	#18…8 AWG: 22 lb•in #6…4 AWG: 26 lb•in 0.75…25mm^2: 2.5 N•m		#18…8 AWG: 22 lb•in #6…4 AWG: 26 lb•in 0.75…25mm^2: 2.5 N•m		#18…8 AWG: 22 lb•in #6…4 AWG: 26 lb•in 0.75…25mm^2: 2.5 N•m	
Working Voltage (indicating circuit) 31 930	110…600V AC/DC 12…72V AC/DC		110…600V AC/DC ~		110…600V AC/DC ~	
Leakage Current (indicating circuit)	2mA		2mA		2mA	
Withstand Rating	50kA		50kA		50kA	
Fuse Type	Midget fuses only ❶		Midget fuses only ❶		Midget fuses only ❶	
Operating Temperature	–4°…+130°F (–20°…+55°C)		–4°…+130°F (–20°…+55°C)		–4°…+130°F (–20°…+55°C)	
Contact Material	Silver, Ag		Silver, Ag		Silver, Ag	

Common Midget Fuse Applications

- Transformer secondary protection
- Supplemental protection of:
  - Control circuits
  - Lighting
  - Solenoids

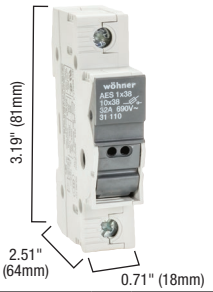
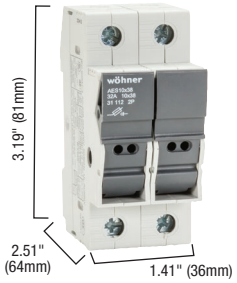
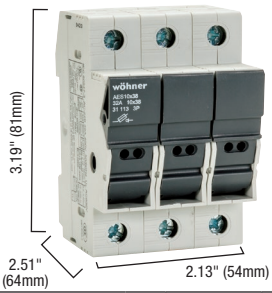
Approvals

Typical Midget Fuse Dimensions ❶



❶ Fuses not offered by Sprecher + Schuh.
❷ Wohner UL File E230163, CSA 110285
❸ Both wires must be the same size.

DIN-rail Mounted Fuse Holders – Class CC Fuses ❶❷❸

Ordering and Technical Information	One Pole			Two Pole			Three Pole		
									
	Catalog Number	**Price Ea.** (Std Pkg)	**Pkg Qty**	**Catalog Number**	**Price Ea.** (Std Pkg)	**Pkg Qty**	**Catalog Number**	**Price Ea.** (Std Pkg)	**Pkg Qty**
Fuse Holder -									
Without Blown Fuse LED	**31 295**	**17**	12	**31 296**	**38**	6	**31 297**	**57**	4
With Blown Fuse LED	**31 298**	**26**	12	**31 299**	**56**	6	**31 300**	**85**	4
12-72V AC/DC (with LED indicator)	**31 929**	**26**	12						
Accessories									
DIN-rail		**See page A58**			**See page A58**			**See page A58**	
Top Hat, low profile (priced per rail)	**3F**		12	**3F**		12	**3F**		12
Top Hat, high profile (priced per rail)	**3AF**		12	**3AF**		12	**3AF**		12
End Anchors		**See Section N**			**See Section N**			**See Section N**	
DIN Rail — Normal Duty	**V7-EA35**		50	**V7-EA35**		50	**V7-EA35**		50
DIN Rail — Heavy Duty	**V7-EAH35**		10	**V7-EAH35**		10	**V7-EAH35**		10

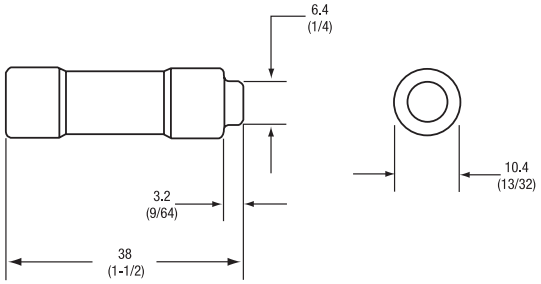
Fuse Block Specifications						
Approvals	c UL us LISTED	CSA	c UL us LISTED	CSA	c UL us LISTED	CSA
Voltage Rating	600V AC/DC	600V AC/DC	600V AC/DC	600V AC/DC	600V AC/DC	600V AC/DC
Maximum Current	30 A	30 A	30 A	30 A	30 A	30 A
Wire Range: 1 Wire per Terminal	#18…4 AWG (0.75…25 mm²)		#18…4 AWG (0.75…25 mm²)		#18…4 AWG (0.75…25 mm²)	
Wire Range: 2 Wires per Terminal ❹	#18…8 AWG (0.75…10 mm²)		#18…8 AWG (0.75…10 mm²)		#18…8 AWG (0.75…10 mm²)	
Wire Strip Length	0.43" (11 mm)		0.43" (11 mm)		0.43" (11 mm)	
Recommended Tightening Torque	#18…8 AWG: 22 lb•in #6…4 AWG: 26 lb•in 0.75…25mm²: 2.5 N•m		#18…8 AWG: 22 lb•in #6…4 AWG: 26 lb•in 0.75…25mm²: 2.5 N•m		#18…8 AWG: 22 lb•in #6…4 AWG: 26 lb•in 0.75…25mm²: 2.5 N•m	
Working Voltage (indicating circuit) 31 929	110…600V AC/DC 12…72V AC/DC		110…600V AC/DC ~		110…600V AC/DC ~	
Leakage Current (indicating circuit)	2mA		2mA		2mA	
Withstand Rating	200kA		200kA		200kA	
Fuse Type	Class CC fuses only ❶		Class CC fuses only ❶		Class CC fuses only ❶	
Operating Temperature	–4°…+130°F (–20°…+55°C)		–4°…+130°F (–20°…+55°C)		–4°…+130°F (–20°…+55°C)	
Contact Material	Silver, Ag		Silver, Ag		Silver, Ag	

Common Class CC Applications

- Control transformer protection
- Motor circuits
- Branch circuit protection
- Lighting loads
- General purpose loads
- Heating loads

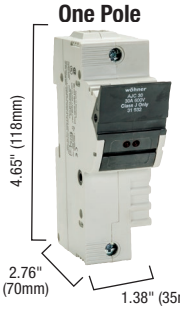
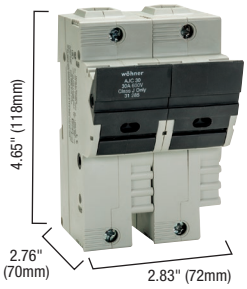
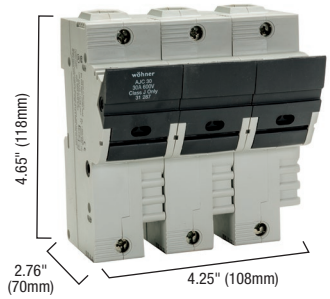
Approvals

Typical Class CC Fuse Dimensions ❶



❶ Fuses not offered by Sprecher + Schuh.
❷ All major fuse brands and current ranges have been evaluated for this fuse holder. Due to the heat they generate, the following fuses must be derated:
Ferraz Shamut ATQR 1.25 I = 0.42 A max.
Ferraz Shamut ATQR 1.40 I = 0.47 A max.
❸ Wohner UL File E230163, CSA 110285
❹ Both wires must be the same size.

DIN-rail Mounted Fuse Holders – Class J Fuses, 30A ❶❷

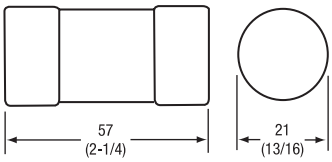
Ordering and Technical Information	One Pole			Two Pole			Three Pole		
									
	Catalog Number	**Price Ea.** (Std Pkg)	**Pkg Qty**	**Catalog Number**	**Price Ea.** (Std Pkg)	**Pkg Qty**	**Catalog Number**	**Price Ea.** (Std Pkg)	**Pkg Qty**
Fuse Holder -									
Without Blown Fuse LED	**31 284**	**38**	12	**31 285**	**79**	6	**31 287**	**118**	4
With Blown Fuse LED	**31 932**	**44**	12	**31 933**	**91**	6	**31 934**	**136**	4
Accessories									
DIN-rail		**See page A58**			**See page A58**			**See page A58**	
Top Hat, low profile (priced per rail)	**3F**		12	**3F**		12	**3F**		12
Top Hat, high profile (priced per rail)	**3AF**		12	**3AF**		12	**3AF**		12
End Anchors		**See Section N**			**See Section N**			**See Section N**	
DIN Rail — Normal Duty	**V7-EA35**		50	**V7-EA35**		50	**V7-EA35**		50
DIN Rail — Heavy Duty	**V7-EAH35**		10	**V7-EAH35**		10	**V7-EAH35**		10
Fuse Block Specifications									
Approvals	c UL us LISTED	CSA		c UL us LISTED	CSA		c UL us LISTED	CSA	
Voltage Rating	600V AC/DC	600V AC/DC		600V AC/DC	600V AC/DC		600V AC/DC	600V AC/DC	
Maximum Current	30 A	30 A		30 A	30 A		30 A	30 A	
Wire Range: 1 Wire per Terminal	#18…1 AWG (0.74…50 mm²)			#18…1 AWG (0.74…50 mm²)			#18…1 AWG (0.74…50 mm²)		
Wire Range: 2 Wires per Terminal ❸	#18…6 AWG (0.75…16 mm²)			#18…6 AWG (0.75…16 mm²)			#18…6 AWG (0.75…16 mm²)		
Wire Strip Length	0.79" (20 mm)			0.79" (20 mm)			0.79" (20 mm)		
Recommended Tightening Torque	35 lb•in (4 N•m)			35 lb•in (4 N•m)			35 lb•in (4 N•m)		
Working Voltage (indicating circuit)	110…600V AC/DC			110…600V AC/DC			110…600V AC/DC		
Leakage Current (indicating circuit)	2.0 mA			2.0 mA			2.0 mA		
Withstand Rating	200kA			200kA			200kA		
Fuse Type	Class J fuses only ❶			Class J fuses only ❶			Class J fuses only ❶		
Operating Temperature	–4°…+130°F (–20°…+55°C)			–4°…+130°F (–20°…+55°C)			–4°…+130°F (–20°…+55°C)		
Contact Material	Silver, Ag			Silver, Ag			Silver, Ag		

Common Class J Applications

- Motor circuits
- Feeders and mains
- Branch circuit protection
- Lighting, heating and general loads
- Power transformers
- Control transformers
- Control circuits

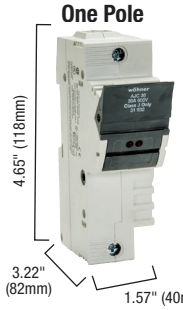
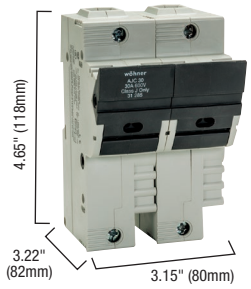
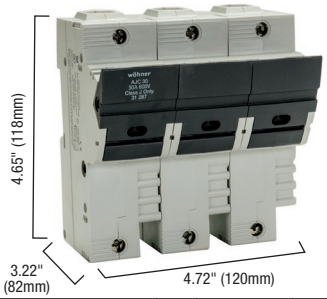
Approvals

Typical Class J (1-30A) Fuse Dimensions ❶



❶ Fuses not offered by Sprecher + Schuh.
❷ Wohner UL File E230163, CSA 110285
❸ Both wires must be the same size.

DIN-rail Mounted Fuse Holders – Class J Fuses, 60A ❶❷

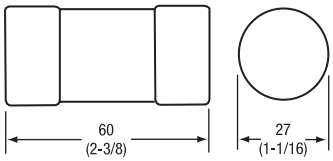
Ordering and Technical Information	One Pole			Two Pole			Three Pole		
									
	Catalog Number	**Price Ea.** (Std Pkg)	**Pkg Qty**	**Catalog Number**	**Price Ea.** (Std Pkg)	**Pkg Qty**	**Catalog Number**	**Price Ea.** (Std Pkg)	**Pkg Qty**
Fuse Holder -									
Without Blown Fuse LED	**31 920**	**43**	12	**31 921**	**89**	6	**31 922**	**134**	4
With Blown Fuse LED	**31 923**	**49**	12	**31 924**	**101**	6	**31 925**	**152**	4
Accessories									
DIN-rail		**See page A58**			**See page A58**			**See page A58**	
Top Hat, low profile (priced per rail)	**3F**		12	**3F**		12	**3F**		12
Top Hat, high profile (priced per rail)	**3AF**		12	**3AF**		12	**3AF**		12
End Anchors		**See Section N**			**See Section N**			**See Section N**	
DIN Rail — Normal Duty	**V7-EA35**		50	**V7-EA35**		50	**V7-EA35**		50
DIN Rail — Heavy Duty	**V7-EAH35**		10	**V7-EAH35**		10	**V7-EAH35**		10
Fuse Block Specifications									
Approvals	c UL us LISTED			c UL us LISTED			c UL us LISTED		
Voltage Rating	600V AC/DC	600V AC/DC		600V AC/DC	600V AC/DC		600V AC/DC	600V AC/DC	
Maximum Current	60 A	60 A		60 A	60 A		60 A	60 A	
Wire Range: 1 Wire per Terminal	#14…1 AWG (2.5…50 mm²)			#14…1 AWG (2.5…50 mm²)			#14…1 AWG (2.5…50 mm²)		
Wire Range: 2 Wires per Terminal ❸	#14…6 AWG (2.5…16 mm²)			#14…6 AWG (2.5…16 mm²)			#14…6 AWG (2.5…16 mm²)		
Wire Strip Length	0.79" (20 mm)			0.79" (20 mm)			0.79" (20 mm)		
Recommended Tightening Torque	35 lb•in (4 N•m)			35 lb•in (4 N•m)			35 lb•in (4 N•m)		
Working Voltage (indicating circuit)	110…600V AC/DC			110…600V AC/DC			110…600V AC/DC		
Leakage Current (indicating circuit)	2.0 mA			2.0 mA			2.0 mA		
Withstand Rating	200kA			200kA			200kA		
Fuse Type	Class J fuses only ❶			Class J fuses only ❶			Class J fuses only ❶		
Operating Temperature	–4°…+130°F (–20°…+55°C)			–4°…+130°F (–20°…+55°C)			–4°…+130°F (–20°…+55°C)		
Contact Material	Silver, Ag			Silver, Ag			Silver, Ag		

Common Class J Applications

- Motor circuits
- Feeders and mains
- Branch circuit protection
- Lighting, heating and general loads
- Power transformers
- Control transformers
- Control circuits

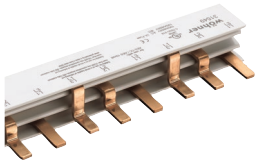
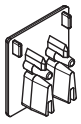
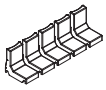
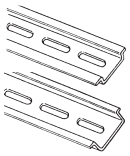
Approvals

Typical Class J (31-60A) Fuse Dimensions ❶



❶ Fuses not offered by Sprecher + Schuh.
❷ Wohner UL File E230163, CSA 110285
❸ Both wires must be the same size.

Accessories

Accessory	Description	Devices per Meter	Bus Protection Max. Fuse Types	Ampacity	For use with…	Catalog Number	Price Each
	**Bus Bar, Pin Style 1-Phase** ❷ Qty 1 bar at 1 meter	57	200A	100A max	Class CC or Midget, 1-pole	**31 548**	**83**
	Bus Bar, Pin Style 2-Phase ❷ Qty 1 bar at 1 meter	29	200A	100A max	Class CC or Midget, 2-pole	**31 561**	**185**
	Bus Bar, Pin Style 3-Phase ❷ Qty 1 bar at 1 meter	19	200A	100A max	Class CC or Midget, 3-pole	**31 549**	**227**
 1-Phase  2- & 3-Phase	**End Caps**, sold only in pkgs of 10 ❶				1-Phase Bus Bar 2-/3-Phase Bus Bar	**31 042** **31 552**	**2** **3**
	**Protective Shroud**, sold only in pkgs of 10 ❶				All Wohner bus bars	**31 035**	**7**
	**Terminal Lug**, sold only in pkgs of 10 ❶				80A to 100A	**31 550**	**17**
	**DIN-rail -** 2 meter lengths (6' 6") Top Hat, low profile (price per rail) Top Hat, high profile (price per rail)					 **3F** **3AF**	 **See page A51**

❶ Sold in packages of 10. Price indicated is price per piece. Minimum order quantity 10. Example, one package of 10 pcs of 31566 is $20 (10 x $2).

❷ Cuttable, copper bus bar provided in 1 m length. UL 508 Listed, E123577, Category NMTR, cULus. CE to IEC 664 10 kA SCCR for use with AMBUS® Type CC and Midget Fuse Holders. Contact factory for dimensions.

Cross Reference Series FH8 to AMBUS® EasySwitch

Description	FH8 Catalog Number	AMBUS Catalog Number
FUSE BLK MIDGET 1-Pole	FH8-1PM30	31 110
FUSE BLK MIDGET 1-Pole w/LED	FH8-1PM30-L	31 130
FUSE BLK MIDGET 1-Pole w/LED 12-72V AC/DC	FH8-1PM30-D1	31 930
FUSE BLK MIDGET 2-Pole	FH8-2PM30	31 112
FUSE BLK MIDGET 2-Pole w/LED	FH8-2PM30-L	31 132
FUSE BLK MIDGET 3-Pole	FH8-3PM30	31 113
FUSE BLK MIDGET 3-Pole w/LED	FH8-3PM30-L	31 133
FUSE BLK CLASS CC 1-Pole	FH8-1PC30	31 295
FUSE BLK CLASS CC 1-Pole w/LED	FH8-1PC30-L	31 298
FUSE BLK CLASS CC 1-Pole w/LED 12-72V AC/DC	FH8-1PC30-D1	31 929
FUSE BLK CLASS CC 2-Pole	FH8-2PC30	31 296
FUSE BLK CLASS CC 2-Pole w/LED	FH8-2PC30-L	31 299
FUSE BLK CLASS CC 3-Pole	FH8-3PC30	31 297
FUSE BLK CLASS CC 3-Pole w/LED	FH8-3PC30-L	31 300
FUSE BLK CLASS J 30A 1-Pole	FH8-1PJ30	31 284
FUSE BLK CLASS J 30A 1-Pole w/LED	FH8-1PJ30-L	31 932
FUSE BLK CLASS J 30A 2-Pole	FH8-2PJ30	31 285
FUSE BLK CLASS J 30A 2-Pole w/LED	FH8-2PJ30-L	31 933
FUSE BLK CLASS J 30A 3-Pole	FH8-3PJ30	31 287
FUSE BLK CLASS J 30A 3-Pole w/LED	FH8-3PJ30-L	31 934
FUSE BLK CLASS J 60A 1-Pole	FH8-1PJ60	31 920
FUSE BLK CLASS J 60A 1-Pole w/LED	FH8-1PJ60-L	31 923
FUSE BLK CLASS J 60A 2-Pole	FH8-2PJ60	31 921
FUSE BLK CLASS J 60A 2-Pole w/LED	FH8-2PJ60-L	31 924
FUSE BLK CLASS J 60A 3-Pole	FH8-3PJ60	31 922
FUSE BLK CLASS J 60A 3-Pole w/LED	FH8-3PJ60-L	31 925
BUSBAR 1PH 80A	FHL8-A1B8	31 548
BUSBAR 1PH 100A	FHL8-A1B1	31 548
BUSBAR 2PH 80A	FHL8-A2B8	31 561
BUSBAR 2PH 100A	FHL8-A2B1	31 561
BUSBAR 3PH 80A	FHL8-A3B8	31 549
BUSBAR 3PH 100A	FHL8-A3B1	31 549
BUSBAR END CAP 1PH	FHL8-A1E	31 042
BUSBAR END CAP 2/3PH	FHL8-AME	31 552
BUSBAR SHROUD	FHL8-AAP	31 035
TERMINAL LUG 2/3P	FHL8-AAT1	31 550

Control Transformers - Primary ❶

Transformer	Max. Value	Fuse Block	Max. Value	Fuse Block	Max. Value	Fuse Block	Max. Value	Fuse Block
VA	208V		240V		480		575V	
50	1.125	30A	1.0	30A	0.5	30A	0.4	30A
100	2.25	30A	2.0	30A	1.0	30A	0.6	30A
150	3.5	30A	3.0	30A	1.5	30A	1.25	30A
200	4.5	30A	4.0	30A	2.0	30A	1.6	30A
250	6.0	30A	5.0	30A	2.5	30A	2.0	30A
300	7.0	30A	6.25	30A	3.0	30A	2.5	30A
500	6.0	30A	5.0	30A	5.0	30A	4.0	30A
1000	12.0	30A	10.0	30A	5.0	30A	8.0	30A
1500	17.5	30A	15.0	30A	7.5	30A	6.25	30A
2000	20.0	30A	20.0	30A	10.0	30A	8.0	30A
3000	35.0	60A	30.0	60A	15.0	30A	12.0	30A
5000	60.0	60A	50.0	60A	25.0	30A	20.0	30A
7500	~	~	~	~	35.0	60A	30.0	60A
10000	~	~	~	~	50.0	60A	40.0	60A

Control Transformers - Secondary

Transformer	Max. Value	Fuse Block	Max. Value	Fuse Block
VA	24V		120V	
50	3.2	30A	0.6	30A
100	6.25	30A	1.25	30A
150	10.0	30A	2.0	30A
200	12.0	30A	2.5	30A
250	15.0	30A	3.2	30A
300	20.0	30A	4.0	30A
500	30.0	30A	6.25	30A
1000	60.0	60A	12.0	30A
1500	~	~	17.5	30A
2000	~	~	25.0	30A
3000	~	~	35.0	60A
5000	~	~	60.0	60A
7500	~	~	~	~
10000	~	~	~	~

The Maximum Values listed in the tables are calculated from the following procedures, which can be found in the NEC . Always compute the Max. Value for your specific application prior to selecting a fuse block.

Calculating NEC Maximum Values

Selecting the proper fuse block current ratings for the primary and secondary protection of control transformers (per UL/NEC) is as follows:

Primary Overcurrent Protection for Control Transformers

Control Circuits: If the rated primary current is less than 2 amps, the maximum rating of the overcurrent device is 500%. If the rated primary current is more than 2 amps, the maximum rating of the overcurrent device is 250%.

Secondary Overcurrent Protection for Control Transformers

Control Circuits: If the rated secondary current is less than 9 amps, the maximum rating of the overcurrent device is 167%. If 9 amps or more, the maximum rating of the overcurrent device is 125%. The next larger size of an overcurrent device may be used if 125% does not correspond to a standard size.

Reference: UL 508 19.3, NEC 430-72(c) exception No. 2, 450-3(b) 1 & 2

Primary Fuse Block Selection Example:

1000VA Transformer
480V Primary
1000/480 = 2.08 Amps [May increase by 250% if above 2A]
2.08 x 250% = 5.21 Amps
Select 30A AMBUS® Class CC fuse block for 5A Class CC Fuse

Secondary Fuse Block Selection Example:

5000VA Transformer
120V Secondary
5000/120 = 41.7 Amps [May increase by 125% if above 9A]
41.7 x 125% = 52.1 Amps
Select 60A AMBUS® Class J fuse block for 50A Class J Fuse

❶ Class CC and Class J fuses may be used for Primary Protection, contact fuse manufacturer for specific use.

Three Phase Motor Loads ❶❷❸

Horsepower	FLA	Fuse Block	FLA	Fuse Block	FLA	Fuse Block	FLA	Fuse Block
	208V		240V		480V		575V	
1/2	2.4	30A	2.2	30A	1.1	30A	0.9	30A
3/4	3.5	30A	3.2	30A	1.6	30A	1.3	30A
1	4.6	30A	4.2	30A	2.1	30A	1.7	30A
1-1/2	6.6	30A	6.0	30A	3.0	30A	2.4	30A
2	7.5	30A	6.8	30A	3.4	30A	2.7	30A
3	10.6	30A	9.6	30A	4.8	30A	3.9	30A
5	16.8	30A	15.2	30A	7.6	30A	6.1	30A
7-1/2	24.2	60A	22.0	60A	11.0	30A	9.0	30A
10	30.8	60A	28.0	60A	14.0	30A	11.0	30A
15	~	~	42.0	60A	21.0	30A	17.0	30A
20	~	~	~	~	27	60A	22.0	60A
25	~	~	~	~	34	60A	27.0	60A
30	~	~	~	~	40	60A	32.0	60A
40	~	~	~	~	~	~	41.0	60A

Single Phase Motor Loads ❶❷❸

Horsepower	FLA	Fuse Block	FLA	Fuse Block
	115V		230V	
1/6	4.4	30A	2.2	30A
1/4	5.8	30A	2.9	30A
1/3	7.2	30A	3.6	30A
1/2	9.8	30A	4.9	30A
3/4	13.8	30A	6.9	30A
1	16	30A	8	30A
1-1/2	20	30A	10	30A
2	24	60A	12	30A
3	34	60A	17	30A
5	~	~	28	60A
7-1/2	~	~	40	60A
10	~	~	50	60A

❶ Fuse block size is based on Class J Type time-delay fuses for typical motor acceleration up to 5 seconds. Limited use of Class CC fuse blocks may be used for motor loads, contact fuse manufacturer for acceptance.
❷ FLA Data is in accordance with UL-508 Table 42.2 & NEC Tables 430-148 & 150.
❸ Selection of fuse block should be based on selected fuse manufacturer data.