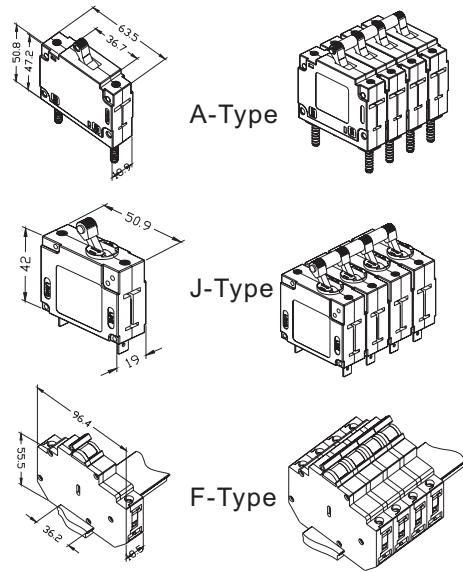




● Trip Curve Explanation and Time Delay Curve Selection

1. Determin require frequency, AC or DC
2. Determine required high inrush Tolerance.
(Tolerance to starting surges cause by high-resistance loads such as ferro-resonant power supplies which may last up to 10 milliseconds - 8 at 60 Hz).
Select lowest high inrush tolerance compatible with application.
3. Determine required curve characteristic base on application.

Long Time Delay (H-Curve)

Motor starting, locked rotor tolerance, general purpose application.

Medium Time Delay (G-Curve)

Transformer protection, capacitor load, special incandescent lamp load, general purpose application (most widely used curve).

Short Time Delay (F-Curve)

Electronic equipment.

Instantaneous Curve

(No deliberate time delay provided, Unusual circumstances in electronic equipment and other special application.

High Inrush

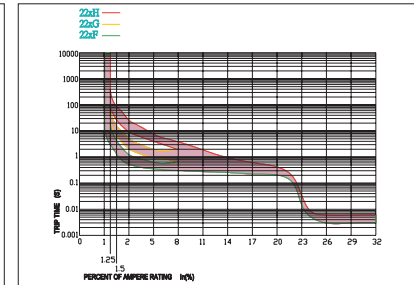
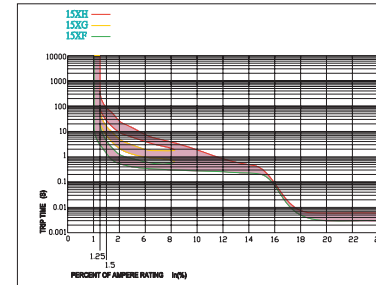
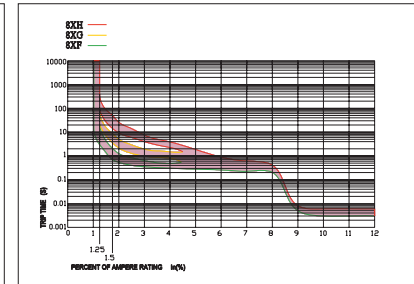
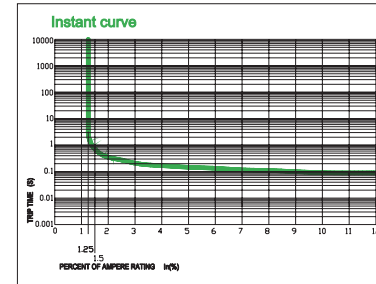
For special high-inrush requireement are available, Please consult CSC (Customer Service Center).

Tripping Specifications

Breakers (in standard wall-mounted position) shall hold 100% rated current. For table and ceiling mount-consult Application Engineering.

Noted:

All the curves shown describe breaker response with no pre-loading.
(Breakers do not carry current prior to application of overload for calibration testing.)
Curve are plotted at an ambient temperature of 25°C (77°C), with breakers in the standard wall-mounted position.



- To determine your **Complete Catalog Number**, you must start with appropriate **Series Prefix** and add the appropriate **Code Letters** and/or **Number** as in the examples below

- **Noted** : Series code pick up are for standard available CB. For information on specific and custom CB, consult Customer Service Center.

J	B	A	2-	00BG-	00-	030-	D	I	A
J-Type	It is require J-AC with M4 side screw terminal,	Toggle	2 poles	from left to right, with only and 8x with G Curve	without NVP and Aux sw selection	Switch only + 30 Amps	2 poles, handle spacers as kit	Black handle with I/O marking	M3 inserts, front mount

Selection Table The above example pick up code is **JBA2-00BG-00-030-DIA**

Series Prefix	Frequency and Terminal		Actuator	No. of Poles	Inrush/ Trip Curve and Circuit			NVP or Aux sw	Rate Current		Handle Location	Handle Color & Marking		Front Mount and others														
Code	Code / Type and frequency		Code / Type	Code / Type	Code / Type			Code / Type	Current (A) and approval		Code / Type	Code / Type		Code / Type/ Series														
A	A	Standard terminal with M5 threads (1-80A)	A Type AC	A- Toggle	1-1 pole	BF-8x, F curve	Series trip with F/ G/ H/ curve	00-Switch only 01-Aux. Sw 99-Instance	00-None	005-010(B)	cUL/ Semko for detail please check data inside	A		E		A-Black, ON/OFF	A- M3 B- 6-32											
	B	Plug-in (1-80A)		2-2 poles	BG-8x, G curve	01-NVP for 115 Vac		011-020(C)		A/ J/ F		B		F		B-White, ON/OFF												
	C	Fuse clip (1-20A)	3-3 poles	BH-8x, H curve	02-NVP for 230 Vac	021-030(D)		A/ F	C			G		C-Black, I/O ON/OFF	N-None													
	D	Saddle clamp with M5 threads (1-80A)	4-4 poles	B- Snap-in	CF-15x, F curve CG-15x, G curve CH-15x, H curve	03-DC for 6-65 Vdc 04-DC for 66-120 Vdc		031-050(E)	A/ F	D			H		I-Black, I/O (Standard execution)	**xxR- Snap in cover												
J	E	Std. terminal with M5 threads(1-80A)	A Type DC	R- Rocker	DF-22x, F curve DG-22x, G curve DH-22x, H curve	B2 C2 D2	Shunt trip with F curve	11-Aux sw for Alarm (on-off in same action) 12-Aux sw for Mid trip (only in trip action)	051-100(F)	A/ F	A		E		K-White, I/O ON/OFF	X- Special require, Call CSC												
	F	Plug-in (1-80A)										4-4 poles	B3 C3 D3	Relay trip with F curve	G			J-White, I/O										
	G	Fuse clip (1-20A)	J Type DC	X- Special Call CSC								XX-Customer special curve require are available, Please Call CSC.	B3 C3 D3	Relay trip with F curve	* NVP (No Voltage Protection) can not exist while aux sw is require.		* Aux sw is on standard execution, NO-NC/ Ag contact/ 2.8 Fast-on with 10.1A/ 250Vac,	* F-Type on available on Code A/ D/ H	C		H		G-Gray, I/ O					
	H	Saddle Clamp With M5 Threads (1-80A)																	D		H		H-Gray, I/ O ON/ OFF					
F	A	Quick connect, 6.3 x 0.8 (1-30A)	J Type AC	X- Special Call CSC	XX-Customer special curve require are available, Please Call CSC.	B3 C3 D3	Relay trip with F curve	* NVP (No Voltage Protection) can not exist while aux sw is require.	* Aux sw is on standard execution, NO-NC/ Ag contact/ 2.8 Fast-on with 10.1A/ 250Vac,	* F-Type on available on Code A/ D/ H	A								E		K-White, I/O ON/OFF	X- Special require Call CSC						
	B	Side screw with M5 (1-50A)																					J Type DC	X- Special Call CSC	D		H	
F	C	Right angle PCB Mount (1-25A)	J Type DC	X- Special Call CSC								XX-Customer special curve require are available, Please Call CSC.	B3 C3 D3	Relay trip with F curve	* NVP (No Voltage Protection) can not exist while aux sw is require.		* Aux sw is on standard execution, NO-NC/ Ag contact/ 2.8 Fast-on with 10.1A/ 250Vac,	* F-Type on available on Code A/ D/ H					A		E		K-White, I/O ON/OFF	X- Special require Call CSC
	D	Quick connect, 6.3 x 0.8 (1-30A)																										
F	E	Side Screw with M5 (1-50A)	J Type DC	X- Special Call CSC	XX-Customer special curve require are available, Please Call CSC.	B3 C3 D3	Relay trip with F curve	* NVP (No Voltage Protection) can not exist while aux sw is require.	* Aux sw is on standard execution, NO-NC/ Ag contact/ 2.8 Fast-on with 10.1A/ 250Vac,	* F-Type on available on Code A/ D/ H	A								E		K-White, I/O ON/OFF	X- Special require Call CSC						
	F	Right angle PCB Mount (1-25A)																										
F	A	AC with DIN Rail mounting	F Type	C-CB L-Leakage								Only for F-Type	* If multi-poles, need to repeat select on these 2 codes, from left to right.		* 2 different rating, need to repeat select, Both of NVP/ Aux sw and rate current too, from left to right.								A		E		K-White, I/O ON/OFF	X- Special require Call CSC
	D	DC with DIN Rail mounting																										



Feature/ Benefits

- * Variable range currents with adjust control.
- * All Type showing mid trip to verify working.
- * Plug/ Side Screw, Snap-in/ Rocker.

Typical Applications

- * Small Generator, Telecom Equipment.
- * Industrial Machine, Robot, Computer.
- * Medical Equipment, Vending Machines.
- * Controllers, TDX, Inverter Welding machine.

cUL 1077
EN 60934
EN 60947-2
IEC-CB

RoHS

Patrolling A-Type Electronic-Hybrid, Magnetic C. B.



Current range up to 100A 50 / 60 Hz, 100A / 125 Vdc

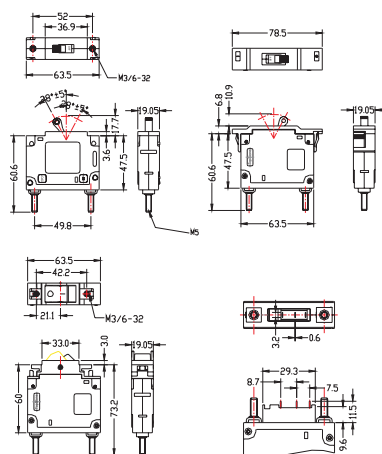
Patent reserved in China/ Taiwan/ Japan/ Germany and US
US: 7,132.911 B2 China: ZL 2003 2 0117416.9 Germany: 203 16 554.3

Type of tripping	Electronic Magnetic trip
Rated voltage(Ue)	AC 480 / 415 / 277 / 250 / 125V DC 125 / 80 / 65 V
Rated current (In)	AC / DC 1-100A
Conditional short circuit current (Isc)	AC / DC 10,000A
Rated switching capacity (Icn)	EN60934, PC1, AC 250V, 6 x In EN60934, PC1, DC 125V, 4 x In
Degree of protection	II
Tripping current	TC-1 rating
Auxiliary switch	Yes
No Voltage Protection	Under voltage with 0 voltage release is available.
Terminal type	Plug In 1-80A Fuse clip 1-20A Screw terminal M5, 1-80A Saddle clamp 1-80A

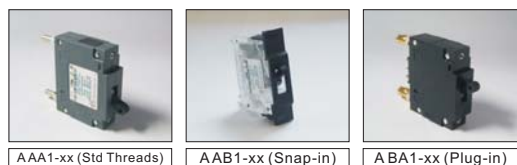
EN 60934	Voltage (V)	Freq. (Hz)	no. of poles	Rating (A)	Icn (A)	Isc (PC1)
	120/240	50/60	1,2,3	1-70	4,000	10,000
	250	50/60	1,2,3	1-30	3,000	10,000
	250	50/60	1,2,3	1-50	2,000	10,000
	250	50/60	1,2,3	1-70	1,000	10,000
EN 60947-2	Voltage	Freq.	poles	Rating	Icu(A)	Ics(A)
	230	50/60	1	1-63	5,000A	5,000
	400,415	50/60	2,3,4	1-63	5,000A	5,000
	80	DC	1-2	1-100	5,000	10,000
	80	DC	1-2	1-63	5,000A	5,000
cUL 1077 CSA 22.2 No.235-04	Voltage	Freq.	poles	Rating	Icu(A)	Ics(A)
	120/ 240	50/60	1-2	1-80	5,000	
	208, 240, 277	50/60	1-2	1-80	5,000	
	208, 240, 480	50/60	3-4	1-80	5,000	
	125	DC	1-4	1-50	2,000	

Temperature	-40? to +85?
Humidity	IEC 68-2-3
Endurance	10,000 switching operations with 6,000 at rate current 50/ 60 Hz
Approx. Weight	1 pole 88 g 3 poles 268 g 2 poles 178 g 4 poles 360 g
Torque allowed for inserts screw	M3; 6-32/ 0.6-0.8 Nm M4; M5/ 0.4-0.6 Nm

Protection	Following IEC529
Shock and Vibration	Following IEC 68-2-27 and IEC 68-2-6
Approvals	Semko/ cUL/ CB
Dielectric strength	3,750 Vac 50/ 60 Hz
Insulation resistance	100 MΩ under 500 Vdc
Auxiliary switches	240 Vac 10A / 24 Vdc 8A
Time delay	Wide range available



Dimension for A-type



Feature/ Benefits

- * Special No Voltage Protect is available.
- * Variable range currents with adjust control.
- * All Type showing mid trip to verify working.
- * Plug/ Side Screw, Snap-in/ Rocker.

Typical Applications

- * Machine tools, Telecom Equipment.
- * Industrial Machine, CNC
- * Medical Equipment, Vending Machines
- * Controllers, Elevators, F/A O/A Equipment.

cUL 1077
EN 60934
EN 60947-2
IEC-CB

RoHS

Patrolling J-Type Electronic-Hybrid, Magnetic C.B.



Current range up to 50A 50 / 60 Hz, 30A 400 Hz, 50A / 80 Vdc

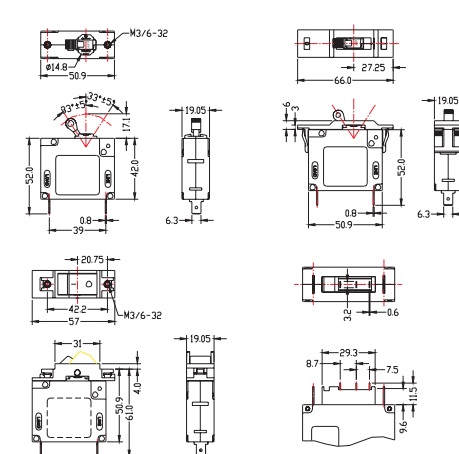
Patent reserved in China/ Taiwan/ Japan/ Germany and US
US: 7,132.911 B2 China: ZL 2003 2 0117416.9 Germany: 203 16 554.3

Type of tripping	Electronic Magnetic trip
Rated voltage(Ue)	AC 415 / 400 / 250 / 125V DC 80 / 65 V
Rated current (In)	AC / DC 1-50A
Conditional short circuit current (Isc)	AC/ DC 5,000A
Rated switching capacity (Icn)	EN60934, PC1, AC 250 V, 6 X In EN60934, PC1, DC 80 V, 4 X In
Degree of protection	II
Tripping current	TC-1 rating
Auxiliary switch	Yes
No Voltage Protection	Under voltage with 0 voltage release is available.
Terminal type	Quick connect, 6 x 0.8 1-30A Side screw, 1-50A with M5 Right angel PCB Mount 1-25A

EN 60934	Voltage (V)	Freq. (Hz)	no. of poles	Rating (A)	Icn (A)	Isc (PC1)
	250	50/60	1	1-30	3,000	5,000
	250/125	50/60	1,2,3	31-50	2,000	5,000
	415	50/60	1	1-30	3,000	5,000
	415	50/60	1	1-30	3,000	5,000
EN 60947-2	Voltage	Freq.	poles	Rating	Icu(A)	Ics(A)
	230	50/60/400	1	1-30	2,000	2,000
	400	51/60/400	2,3,4	1-30	2,000	2,000
	80	DC	1,2	1-30	2,000	2,000
	65	DC	1	1-50	2,000	2,000
cUL 1077 CSA 22.2 No.235-04	Voltage	Freq.	poles	Rating	Icu(A)	Ics(A)
	120/ 240	50/60	1-2	1-50	5,000	
	208, 240, 277	50/60	1-2	1-50	5,000	
	208, 240, 480	50/60	3-4	1-50	5,000	
	80	DC	1-4	1-50	1,500	

Temperature	-40? to +85?
Humidity	IEC 68-2-3
Endurance	10,000 switching operations with 6,000 at rate current 50/ 60 Hz
Approx. Weight	1 pole 56 g 3 poles 170 g 2 poles 114 g 4 poles 230 g
Torque allowed for inserts screws	M3; 6-32/ 0.6-0.8 Nm M4; M5/ 0.4-0.6 Nm

Protection	Following IEC529
Shock and Vibration	Following IEC 68-2-27 and IEC 68-2-6
Approvals	Semko/ cUL/ CB
Dielectric strength	3,750 Vac 50/ 60 Hz
Insulation resistance	100 MO under 500 Vdc
Auxiliary switches	240 Vac 10A / 24 Vdc 8A
Time delay	Wide range available



Dimension for J-type



circuit and other dimension

Internal Circuits					Standard vs. Alarm-sw / Mid-trip excution			
	Series trip	Switch only	Series trip with aux. contact	Shunt trip				
Code	B.C.D / F.G.H	00	01	B.C.D / 2				
A-Type					OFF			
					ON			
J-Type					Mid-trip (electronic trip)			
Deminsion for A-Type					A-Type Panel cutout			
Saddle		Plug-in						
Fuse clip		Shunt tap						
Dimension for J-Type					J-Type Panel cutout			
Quick connect								
Side screw								
PCB mount								



Feature/ Benefits

- * Variable range currents with adjust control.
- * All Type showing mid trip to verify working.
- * Wide choice of characteristic (Adaptability).
- * Availability of AC and DC in the same frame size.

cUL 1077
EN 60934
EN 60947-2
IEC-CB

RoHS

Typical Applications

- * Communication Equipment.
- * Transportation Equipment.
- * Air Condition, Rectifiers, UPS, Condenser.
- * Controllers, TDX, Inverter Welding machine.

Patrolling F-Type Electronic-Hybrid, Magnetic Circuit Breaker



Current range up to 100A 50/ 60 Hz, 100A/ 250 Vac, 70A/ 360 Vdc

Patent reserved in China/ Taiwan/ Japan/ Germany and US
US: 7,132,911 B2 China: ZL 2003 2 0117416.9 Germany: 203 16 554.3

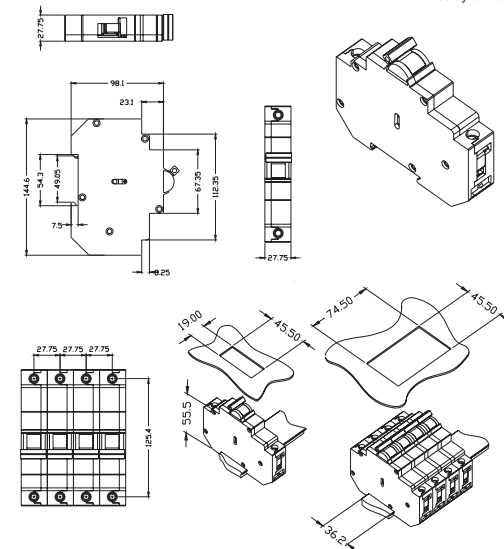
Type of tripping	Electronic Magnetic trip
Rated voltage Ue	AC 480 / 420 / 277 / 240 / 120V DC 360 / 250 / 180V
Rated current (In)	AC / DC 1 -100A
Conditional short circuit current (Icn)	AC / DC 10,000A
Rated switching capacity (Icn)	EN60934, PC1, AC 250V, 6 x In EN60934, Pc1, DC 125 V, 4 x In
Degree of protection	II
Tripping Current	TC-1 rating
Auxiliary switch	No
No Voltage Protection	Under voltage with 0 voltage release is available.
Mounting type	DIN Railway mount

EN 60934	Voltage (V)	Freq. (Hz)	no. of poles	Rating (A)	Icn (A)	Icn (PC1)
420/240	50/60	1,2,3,4	1-70	10,000	10,000	
420/240	50/60	1,2,3,4	1-100	5,000	10,000	
420	50/60	1,2,3,4	1-70	10,000	10,000	
420	50/60	1,2,3,4	1-100	5,000	10,000	
180	DC	1	1-100	3,000	10,000	
250	DC	2	1-100	3,000	10,000	
360	DC	3	1-70	1,500	10,000	
EN60947-2 Appendix AB Ue=230Vac(2P), 400Vac(4P) In=1-63A I _{lim} =30-500mA typeAC						
cUL 1077 CSA 22.2 No.235-04	Voltage	Freq.	poles	Rating	Icu(A)	
	208, 240, 277	50/60	1-2	1-100	10,000	
	208, 240, 480	50/60	3-4	1-80	10,000	
	480	50/60	3-4	1-80	10,000	

Temperature	-40? to +85?
Humidity	IEC 68-2-3
Endurance	10,000 switching operations with 6,000 at rate current 50/ 60 Hz
Approx. Weight	1 pole 110 g 3 poles 336 g 2 poles 222 g 4 poles 448 g

Protection	Following IEC529
Shock	Following IEC 68-2-27
Vibration	Following IEC 68-2-6
Approvals	Semko / cUL/ CB
Dielectric strength	3,750 Vac 50/ 60 Hz
Insulation resistance	100 MΩ under 500 Vdc
Time delay	Wide range available
Torque allowed for inserts	M3; 6-32/ 0.6-0.8 Nm

Ready on 2008



Dimension for F-type



F AC4-xx (4P CB)



F AC1-xx (1P CB)



cUL 1077
EN 60934

RoHS

Feature/Benefits

- * Trip current up to 60 Amps.
- * Widely range for accessory
- * Rubber cap available

Typical Applications

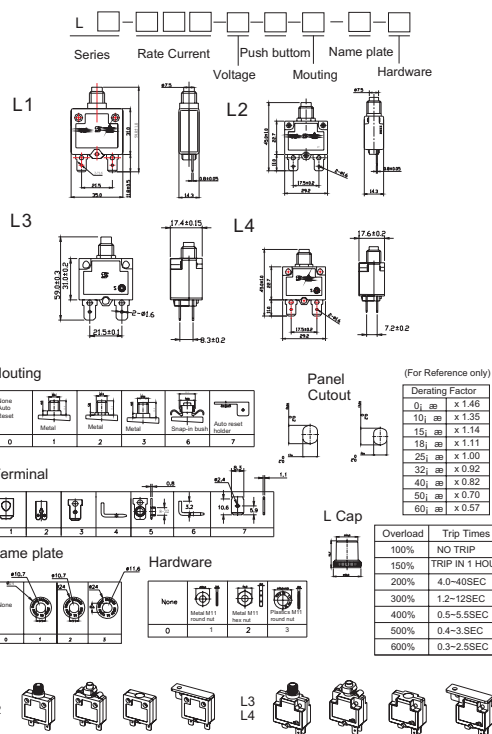
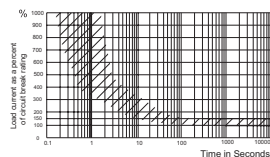
- * Computer.
- * Power Supplies.
- * Appliance
- * Fitness equipment

Patrolling L-Type Thermal Type Circuit Breaker



Trip current range: L1 / L3 up to 45A, L2 / L4 up to 30A

Series	L1	35 x 31 x 14.5	L3	35 x 28 x 17.9
	L2	29.2 x 22.6 x 14.5	L4	29.2 x 22.6 x 17.9
Rate current	L1,L3 Max. 60A L2,L4 Max. 30A Detail safety rating, Please call CSC			
Voltage	1 2	DC 50V AC 125-250V		
Push Button Option	0-Auto Reset 1,2,3-Black with different printing 6,7,8-White with different printing A,B,C-Red with different printing Detail specific, please call CSC			
Mounting	0-None 1,2,3,6,7-Please see drawing express			
Terminal	1,2,3,4,5,6,7 Please see drawing express			
Name Plate	0,1,2,3 Drawing express	Mounting Hardware	0,1,2,3,5 Drawing express	
Rated current (In)	L1: 5 -40A for cUL, 3-40A for TUV L2: 2-15A for cUL, 3-20A for TUV			
Conditional short circuit current (Inc)	EN60934, PC1, AC 250V, 1,00 0A PC1, DC 65V, 1,00 0A Icu=1,000A, 125Vac / 50Vdc Icu= 200A, 250Vac			
Rated switching capacity (Icn)	EN60934, PC1, AC 250V, 6 x In PC1, DC 125V, 4 x In			
Accessories	Rubber cap is available			
Dielectric strength	AC 4000V			
Tripping current	TC-2 rating			



Feature/Benefits

- * Insensitive to momentary overload
- * Self-resetting characteristics
- * Protect safety to critical area

Typical Applications

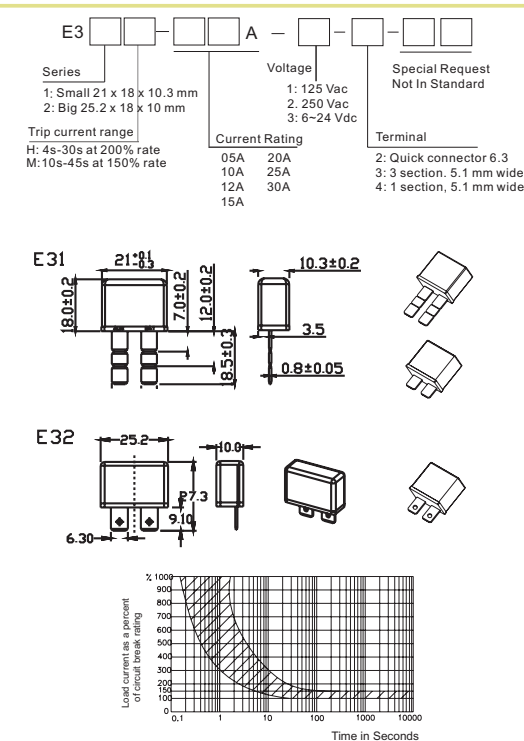
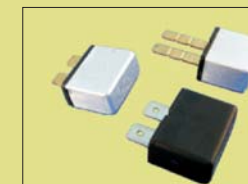
- * Battery charger protect
- * Car, Marine, circuit protect

RoHS

Trip current range : Up to 35A, AC / DC

Series	E31	21.0 x 18 x 10.3
	E32	25.2 x 18 x 10.0
Trip current	H	4s-30s at 200% rate current
	M	10s-45s at 150% rate current
Current	XX	05-30A
Voltage	1	125 Vac
	2	250 Vdc
	3	6-24 Vdc
Terminal	2	Quick connect.6.3
	3	3 section, breakable,5.1x0.8mm(E31..3)
	4	1 section, breakable,5.1x0.8mm(E31..4)
Special	X	Customization
Cycles on-off when load is excessive		
Type of tripping	Thermal Trip	
Case material	Plastic	
Function	Single pole, with series trip	
Rated voltage (Ue)	AC 120/ 240 DC 6-14V	
Rated current (In)	AC/ DC 15,20,25,30A	
Dielectric strength	1800V 1 min.	
Insulation resistance	100MΩ under 500Vdc	
Electrical endurance	>4,000cycles@battery short circuit	
Over Load Percentage	100%	No Trip within 30 minute
	150%	Trip within 30 min.
	200%	Trip in 4.0-40 sec.
	300%	Trip in 1.2-12 sec.

Patrolling E3-Type Thermal Type Circuit Breaker



Patrolling E5-Type Thermal Type Circuit Breaker

Feature/ Benefits

- * Insensitive to momentary overload
- * Self-resetting characteristics
- * Protect safety to critical area

Typical Applications

- * Battery charger protect
- * Car, Marine, circuit protect

RoHS

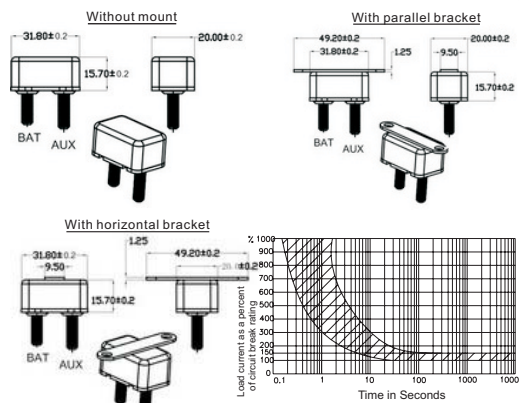
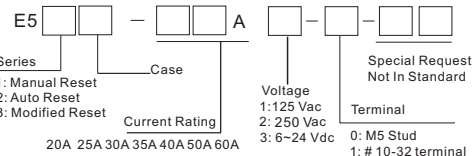


Trip current range : Up to 70A, AC / DC

Series	E51 E52 E53	Manual Reset Automatic Reset, Modified Reset
Case	1: 2: 3: 6: 7: 8:	Metal, w/o mount bracket Metal, with horizontal bracket Metal, with parallel bracket Plastic, w/o mount bracket Plastic, with horizontal bracket Plastic, with parallel bracket
Current	XX	20~70A
Voltage	1 2 3	125 Vac 250 Vdc 6-24 Vdc
Terminal	0 1 4	M5, Threads terminal 10-32, Threads terminal Quick connect, 4,7 x 0.8
Special	X	Customization,
Cycles on-off when load is excessive		

Type of tripping	Thermal Trip
Terminal Type	E5 M5 / 10-32, Threads terminal
Function	Single pole, with series trip
Rated voltage (Ue)	AC 120/ 240 DC 6~14V
Rated current (In)	AC/ DC 15,20,25,30A for E3,70A for E5
Dielectric strength	1800V 1 min.
Insulation resistance	100MQ under 500Vdc
Electrical endurance	>4,000cycles@battery short circuit

Over Load Percentage	100%	No Trip within 30 minute
	150%	Trip within 30 min.
	200%	Trip in 4.0~40 sec.
	300%	Trip in 1.2~12 sec.



Patrolling E9-Type Thermal Type Circuit Breaker

Feature/ Benefits

- * Insensitive to momentary overload
- * Self-resetting characteristics
- * Protect safety to critical area

Typical Applications

- * Battery charger protect
- * Car, Marine, circuit protect

RoHS

Meets SAE J1625

J1171 (Ignition protected)



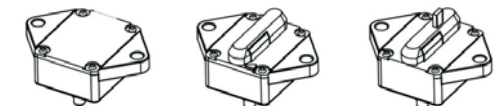
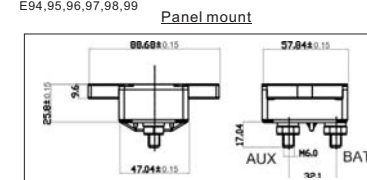
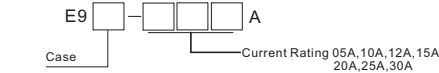
Trip current range : 60-150A, DC

Series	E94 E95 E96 E97 E98 E99	Panel mount ,rhombus shape, auto reset Panel mount ,rhombus shape, manual reset Panel mount ,rhombus shape, switchable reset Surface mount with stud insulator, auto reset Surface mount with stud insulator, manual reset Surface mount w/stud insulator, switchable reset
Type	1 2 3	Automatic reset, rated to 30Vdc Manual reset Automatic reset(switchable),rated to 48Vdc Surface mount, protective stud insulated included.
Current	XX	60A,90A,100A,120A,150A
Terminal		Stud terminal 1/4-28 threads per inch
Torque		Rating: 50in-lb (5.6Nm) max.
Operating Temp.		-31°C ~82°C (-25°F~180°F)
Storage Temp.		-34°C ~149°C (-30°F~300°F)

Cycles on-off when load is excessive

Type of tripping	Thermal Trip
Casing material	Thermal plastic UL rated 94V0 Splash and dust proof at Ip67 rating
Function	Single pole, with series trip
Interrupt Capacity	3000A
Dielectric strength	1800V 1 min.
Insulation resistance	100MQ under 500Vdc
Electrical endurance	>4,000cycles@battery short circuit

Over Load Percentage	100%	No Trip within 30 minute
	150%	Trip within 30 min.
	200%	Trip in 4.0~40 sec.
	300%	Trip in 1.2~12 sec.



Surface mount

