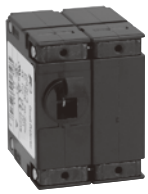
e-Front runners

MSA CONTROL

CP-F type
Circuit protectors

CP-P type
Circuit protectors

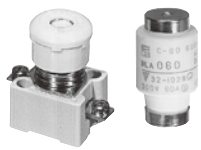
CP-B type
Circuit protectors



CP-V type
Circuit protectors

■ CIRCUIT PROTECTORS

■ LOW VOLTAGE CURRENT - LIMITING FUSES



AFaC and BaC types
HRC fuses

BLC, CR and CS types
Super Rapid Fuses

LOW
VOLTAGE
EQUIPMENT
Up to 600 Volts

INDIVIDUAL CATALOG 08

from D&C CATALOG 20th Edition

01 02 03 04 05 06 07 **08** 09 10 11 12

Fuji Electric FA Components & Systems Co., Ltd.

08 Circuit protectors
Low voltage fuses

CP-F slim type circuit protectors

250V AC/65V DC (1-pole) 0.1A to 30A
250V AC/125V DC (2-pole) 0.1A to 30A
250V AC (3-pole) 0.1A to 30A

■ Description

FUJI's compact and high-performance CP-F series circuit protectors incorporate FUJI's advanced technology.
Their thin sizes make them ideal for use as AC/DC line switches in office and industrial equipment.

■ Features

- Only 17.5mm wide — mounting space is reduced by 30% compared with conventional types.
- AC/DC common use
- Available with auxiliary switch and alarm switch
- Also available in types having inertia delay characteristics
- Trip-free mechanism
- IEC rail mounting

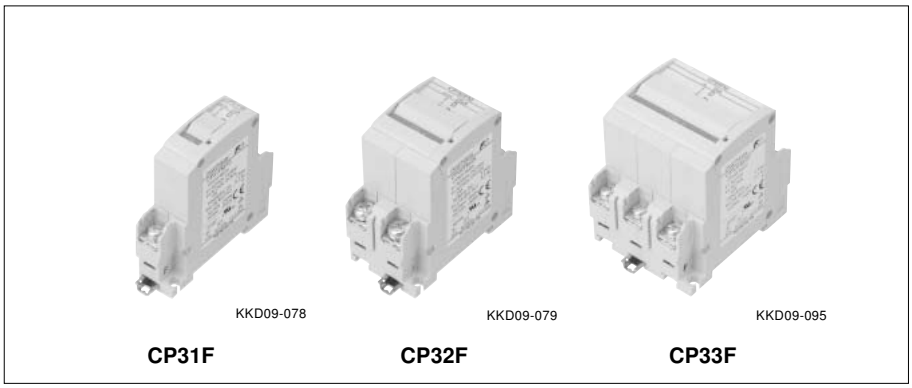
■ Standards

c UL us (File No.E96846)
TÜV (IEC)(R9650230)
CCC (China GB)(2003010309067080)

■ Accessories

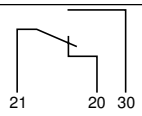
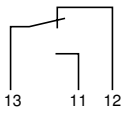
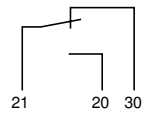
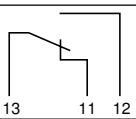
• Auxiliary switch (Type W)
This switch is used for ON-OFF lamp indicator or control circuit.

• Alarm switch (Type K)
This switch can be connected to a warning lamp or buzzer to indicate when the circuit protector has been tripped.
Auxiliary and alarm switches for low level circuit are also available on request. (Type W1, K1)



■ Specifications

Type		CP31F	CP32F	CP33F
Pole		1-pole	2-pole	3-pole
Rated insulation voltage (Ui)		250V AC 65V DC	250V AC 125V DC	250V AC –
Rated operatonal voltage (Ue)		240V AC 60V DC	240V AC 120V DC	240V AC –
Rated current		0.1, 0.3, 0.5, 1, 2, 3, 5, 7, 10, 15, 20, 25, 30A		
Rated breaking capacity		2500A at 240V AC 2500A at 60V DC (1-pole) 2500A at 120V DC (2-pole)		
Operating characteristic		Long time delay (AC circuit only) Medium time delay, Instantaneous tripping		
Tripping mechanism		Hydraulic-magnetic		
Ambient temperature		–10 to +60°C		
Dielectric strength		2000V AC 1min		
Electrical durability		10000 operations or more		
Terminals (Self-lifting)	Main circuit	M5 (25A or over), M4 (20A or less)		
	Auxiliary circuit	M3.5		
Mass (Approx.)		80g	160g	240g

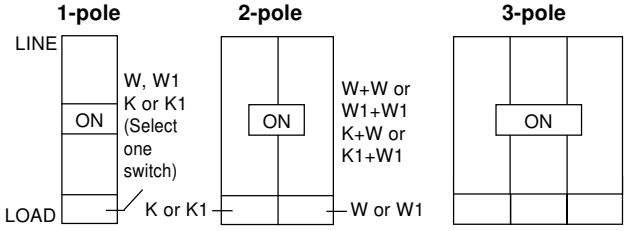
Main contact	Auxiliary switch/W	Alarm switch/K
ON		
OFF		
TRIP		

Ratings of auxiliary and alarm switches

Standard type (Type W, K)		
250V AC	Resistive load:	1A
	Inductive load:	0.5A
125V AC	Resistive load:	3A
	Inductive load:	1A
60V DC	Resistive load:	1A
	Inductive load:	0.5A
30V DC	Resistive load:	2A
	Inductive load:	1A

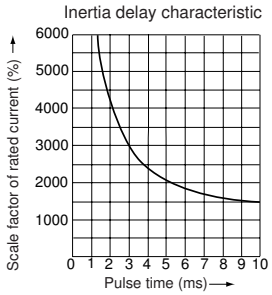
Minimum permissible load	
For low level circuit (Type W1, K1)	
24V DC	1mA
12V DC	2mA
6V DC	5mA

Number of auxiliary and alarm switches mountable

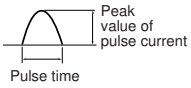


● Inertia delay device (Type D)

This inertia delay device is designed to prevent the circuit protector from operating erroneously due to such inrush current and to carry out an interruption within the prescribed operating characteristics in the face of an overcurrent.
The protector does not operate even when a pulse current of approx. 14 times (peak value) rated current with a pulse width of 10ms flows.

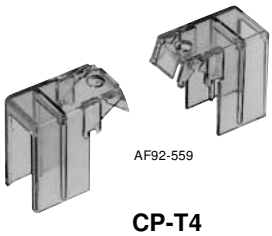


- Scale factor of the rated current (%)
  $\frac{\text{Peak value of pulse current}}{\text{Rated current of protector}} \times 100$
- Waveform of pulse current:
  Sinusoidal wave or parabolic pulse

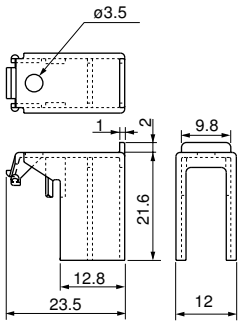


● Snap-on mounting terminal covers

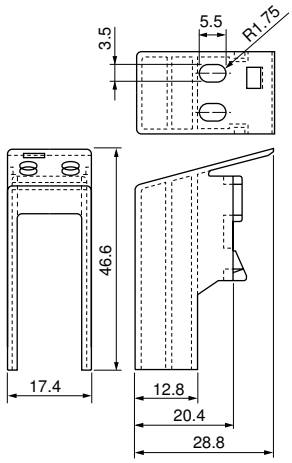
For main terminal: CP-T4
For auxiliary terminal: CP-T5



CP-T4

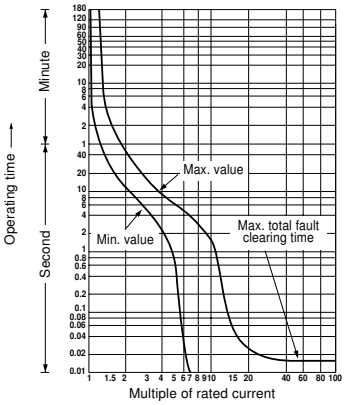


CP-T5

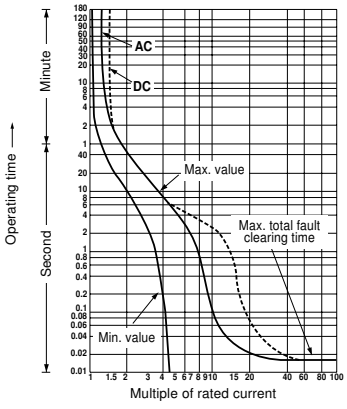


■ Characteristic curves

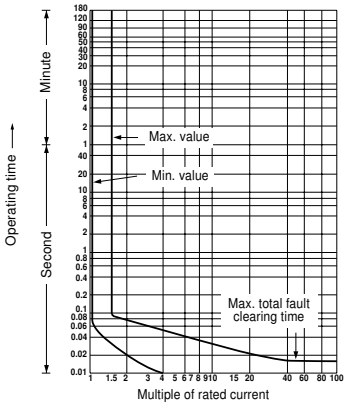
Long time delay tripping type AC circuit only



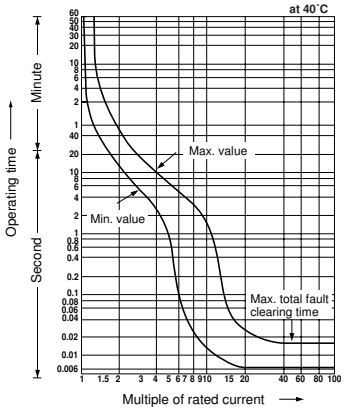
Medium time delay tripping type AC/DC circuit



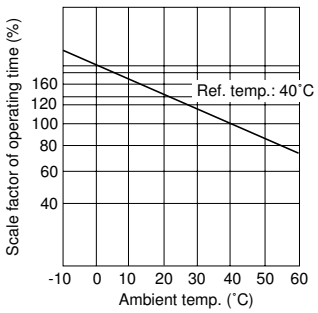
Instantaneous tripping type AC/DC circuit



Long time delay with inertia delay device AC circuit only



Ambient temperature compensation



■ Versions

	Operating characteristic	CP31F (1-pole) Type	CP32F (2-pole) Type	CP33F (3-pole) Type
Without inertia delay device	Long time Medium time Instantaneous	**CP31FS/□** **CP31FM/□** **CP31FI/□**	**CP32FS/□** **CP32FM/□** **CP32FI/□**	**CP33FS/□** **CP33FM/□** **CP33FI/□**
With inertia delay device	Long time Medium time Instantaneous	**CP31FS/□D** **CP31FM/□D** —	**CP32FS/□D** **CP32FM/□D** —	**CP33FS/□D** **CP33FM/□D** —
With standard auxiliary switch	Long time Medium time Instantaneous	**CP31FS/□W** **CP31FM/□W** **CP31FI/□W**	**CP32FS/□W** **CP32FM/□W** **CP32FI/□W**	**CP33FS/□W** **CP33FM/□W** **CP33FI/□W**
With standard auxiliary switch and inertia delay device	Long time Medium time Instantaneous	**CP31FS/□WD** **CP31FM/□WD** —	**CP32FS/□WD** **CP32FM/□WD** —	**CP33FS/□WD** **CP33FM/□WD** —
With standard alarm switch	Long time Medium time Instantaneous	**CP31FS/□K** **CP31FM/□K** **CP31FI/□K**	**CP32FS/□K** **CP32FM/□K** **CP32FI/□K**	**CP33FS/□K** **CP33FM/□K** **CP33FI/□K**
With standard alarm switch and inertia delay device	Long time Medium time Instantaneous	**CP31FS/□KD** **CP31FM/□KD** —	**CP32FS/□KD** **CP32FM/□KD** —	**CP33FS/□KD** **CP33FM/□KD** —
With auxiliary switch for low level circuit	Long time Medium time Instantaneous	**CP31FS/□W1** **CP31FM/□W1** **CP31FI/□W1**	**CP32FS/□W1** **CP32FM/□W1** **CP32FI/□W1**	**CP33FS/□W1** **CP33FM/□W1** **CP33FI/□W1**
With auxiliary switch for low level circuit and inertia delay device	Long time Medium time Instantaneous	**CP31FS/□W1D** **CP31FM/□W1D** —	**CP32FS/□W1D** **CP32FM/□W1D** —	**CP33FS/□W1D** **CP33FM/□W1D** —
With alarm switch for low level circuit	Long time Medium time Instantaneous	**CP31FS/□K1** **CP31FM/□K1** **CP31FI/□K1**	**CP32FS/□K1** **CP32FM/□K1** **CP32FI/□K1**	**CP33FS/□K1** **CP33FM/□K1** **CP33FI/□K1**
With alarm switch for low level circuit and inertia delay device	Long time Medium time Instantaneous	**CP31FS/□K1D** **CP31FM/□K1D** —	**CP32FS/□K1D** **CP32FM/□K1D** —	**CP33FS/□K1D** **CP33FM/□K1D** —

Note : □ Enter the rated current in the □ mark of the type number. 0.1A: 0.1, 0.3A; 0.3, 0.5A: 0.5 ------ 30A: 30

■ Type number nomenclature

CP3 1 F M / 5 W D

Basic type
CP3□F

Number of poles
1: 1-pole
2: 2-pole
3: 3-pole (AC circuit only)

Operating characteristics
S: Long time delay tripping (AC circuit only)
M: Medium time delay tripping
I: Instantaneous

Rated current

0.1: 0.1A	1: 1A	10: 10A
0.3: 0.3A	2: 2A	15: 15A
0.5: 0.5A	3: 3A	20: 20A
	5: 5A	25: 25A
	7: 7A	30: 30A

Inertia delay device
Blank: Without inertia delay device
D: With inertia delay device
(Except instantaneous type)

Accessories
Blank: Without accessory
W: With standard auxiliary switch
W1: With auxiliary switch for low level circuit
K: With standard alarm switch
K1: With alarm switch for low level circuit

WW: With two standard auxiliary switches

W1W1: With two auxiliary switches for low level circuits

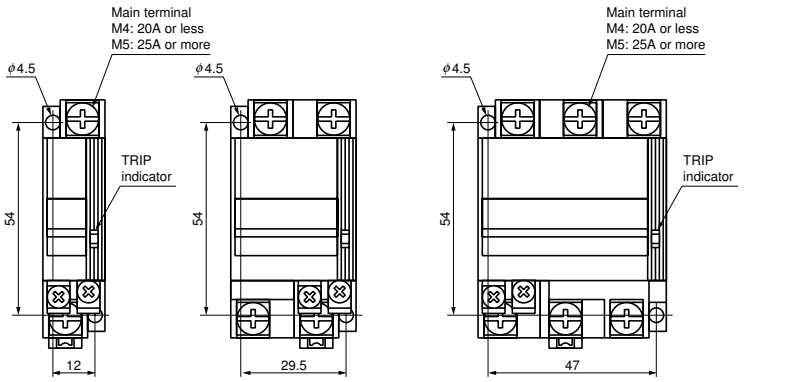
WK: With standard auxiliary and alarm switches

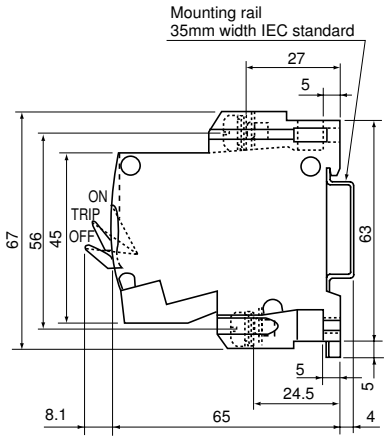
W1K1: With auxiliary and alarm switches for low level circuit

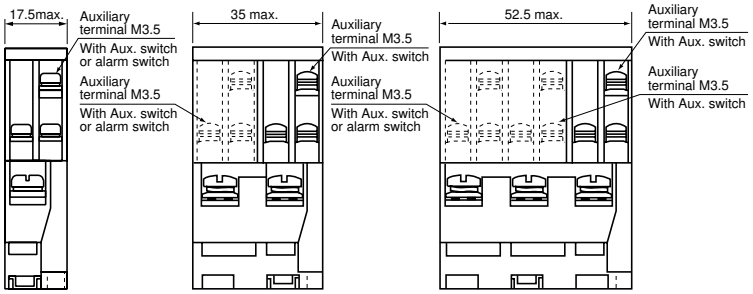
08

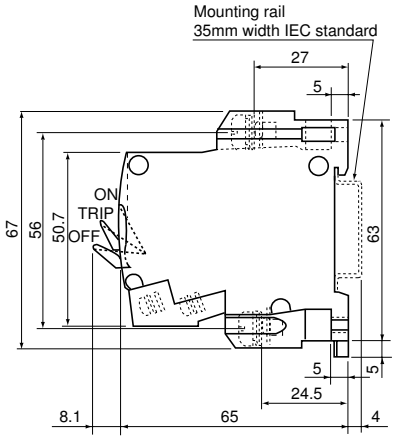
■ Dimensions, mm

1-pole 2-pole 3-pole

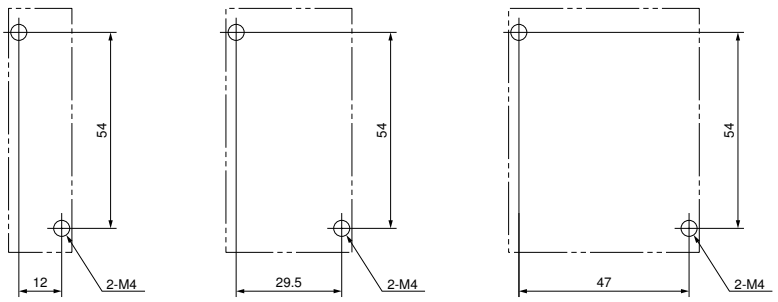








Panel drilling



CP31, CP31D, CP32D circuit protectors

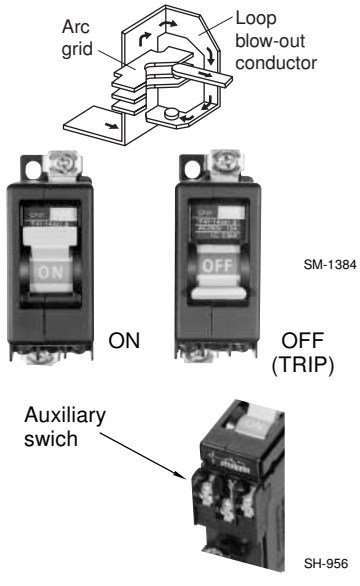
250V AC 0.3A to 30A
50V DC 0.3A to 30A

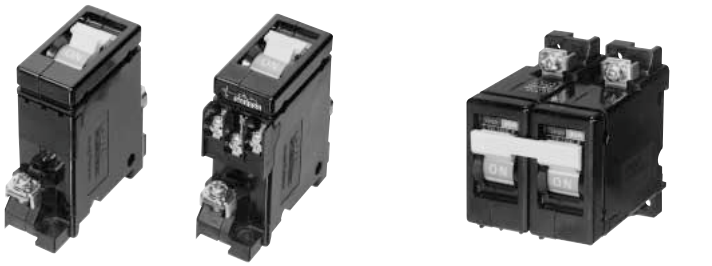
■ Description

The CP31 and CP32 have a similar functions to a molded case circuit breaker and they can be used for normal switching ON and OFF operations while breaking both overload and short-circuit currents. They are available in two time-current versions—an instantaneous and a time-delay version. A suitable type should be selected to match the thermal and permissible current requirements.
These are recommended for sequential control circuits, motor control circuits, solenoid-operated valves, heaters and solid-state applications.

■ Features

- Excellent arc interruption
  Since the arc extinguisher uses a loop blow-out system the arc is rapidly extinguished.
- Highly visible handle indication ON shows red and OFF or TRIP blue.
- When positioned at ON the operating handle is completely housed inside the molded case and does not protrude.
  This helps to prevent erroneous operation.
- Trip-free mechanism
- Also available with auxiliary switch SPDT.
- Two time-current versions—instantaneous operation and a time delay type. Select the model best suited to your protection needs.
- CP31D and CP32D types are of front and rail dual mounting.





Standard type **With auxiliary switch** **Rail mounting**

■ Time-delay tripping type

Rated current (A)	CP31 (1-pole) Front mounting Type	Rail mounting Type	CP31D (1-pole) Type	CP32D (2-pole) Type
0.3	**CP31/0.3**	**CP31/0.3X**	**CP31D/0.3**	**CP32D/0.3**
0.5	**CP31/0.5**	**CP31/0.5X**	**CP31D/0.5**	**CP32D/0.5**
1	**CP31/1**	**CP31/1X**	**CP31D/1**	**CP32D/1**
2	**CP31/2**	**CP31/2X**	**CP31D/2**	**CP32D/2**
3	**CP31/3**	**CP31/3X**	**CP31D/3**	**CP32D/3**
5	**CP31/5**	**CP31/5X**	**CP31D/5**	**CP32D/5**
7	**CP31/7**	**CP31/7X**	**CP31D/7**	**CP32D/7**
10	**CP31/10**	**CP31/10X**	**CP31D/10**	**CP32D/10**
15	**CP31/15**	**CP31/15X**	**CP31D/15**	**CP32D/15**
20	**CP31/20**	**CP31/20X**	**CP31D/20**	**CP32D/20**
25	**CP31/25**	**CP31/25X**	**CP31D/25**	**CP32D/25**
30	**CP31/30**	**CP31/30X**	**CP31D/30**	**CP32D/30**

■ Typical applications

These CP31 and CP32 protectors are used for normal on-off switching of the power supply while also providing overload protection of the load circuits.

Time-delay tripping type
- Control circuits
- Solenoid valves and motor circuits
- Heater circuits

Instantaneous tripping type
- Semiconductor circuits
- SCR (Silicon controlled rectifier) and triac circuits
- Computer peripheral equipment

■ Type number nomenclature

CP 3 1 □ □ / □ X W DC

Basic type

Frame size
3: 30A

Number of poles
1: 1-pole
2: 2-pole (CP32D)

Rated breaking capacity
Blank: 2.5kA at 250V AC
1.5kA at 50V DC
D: 1kA at 250V AC
1kA at 50V DC

Operating characteristics
Blank: Time-delay tripping
I: Instantaneous tripping
S: Long time-delay tripping (AC circuit only)

Rated current
0.3: 0.3A 7: 7A
0.5: 0.5A 10: 10A
1: 1A 15: 15A
2: 2A 20: 20A
3: 3A 25: 25A
5: 5A 30: 30A

Mounting and connection (CP31 only)
* Blank: Front mounting front connection
X: Rail mounting

Optional accessory
Blank: Without auxiliary switch
W: With auxiliary switch

Applied circuit
Blank: AC
DC : DC

* One and the same CP31D and CP32D can be used for both front mounting and rail mounting.

08

■ Operation

The operation of the magnetic overload release of the CP31, CP31D and CP32D circuit protectors are as shown in the sectional diagram Fig. 1. The magnetic tripping element of the circuit protector is simple—a solenoid coil wound around a hermetically-sealed non-magnetic cylinder containing a spring-loaded movable iron core and a silicon fluid. When currents less than the rated value flow no movement occurs in either the armature or iron core.
However, when a sustained overcurrent occurs the magnetic field is increased. This causes the iron core to move along the cylinder. Once the core reaches the opposite end of the cylinder the armature is attracted which causes the protector to trip as shown in Fig. 2 and 3.
When a short circuit occurs the magnetic flux produced in the coil alone is strong enough to attract the armature regardless of core position. This causes circuit to be interrupted instantaneously. (Fig. 4)

Fig. 1 Normal load

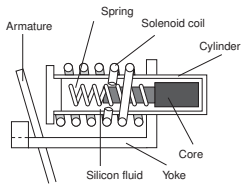


Fig. 2 Overcurrent

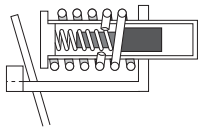


Fig. 3 Overcurrent trip

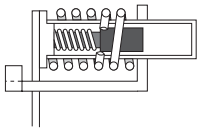
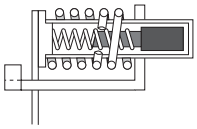
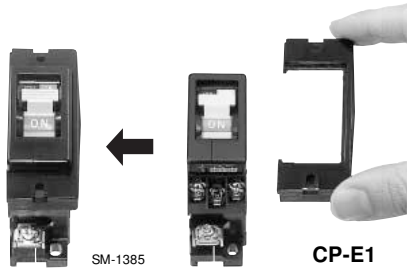


Fig. 4 Short-circuit current trip



■ Adaptor for flush mounting/CP-E1

These circuit protectors can be modified for flush mounting use by a snap-fitting adaptor CP-E1.



Flush mounting **Front mounting**

■ Snap-on mounting terminal covers

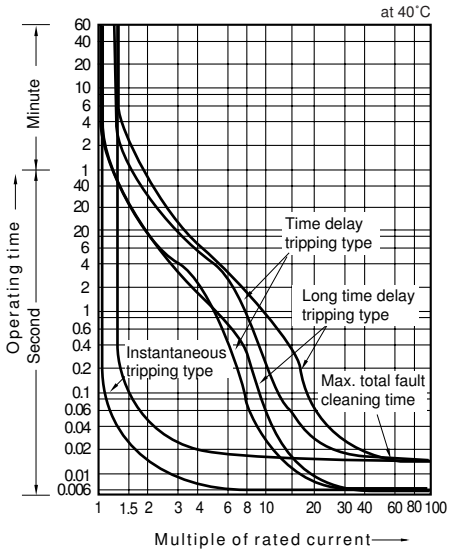
For main terminal: CP-T1
For auxiliary terminal: CP-T2

■ Specifications

Description	CP31	CP31D	CP32D
Pole	1-pole	1-pole	2-pole
Frame size	30 Amps.	30 Amps.	
Rated insulation voltage (Ui)	250V AC, 50V DC	250V AC, 50V DC	
Rated operational voltage (Ue)	250V AC, 50V DC	250V AC, 50V DC	
Rated current	0.3, 0.5, 1, 2, 3, 5, 7, 10, 15, 20, 25, 30A	0.3, 0.5, 1, 2, 3, 5, 7, 10, 15, 20, 25, 30A	
Rated breaking capacity	2500A at 250V AC 1500A at 50V DC	1000A at 250V AC 1000A at 50V DC	
Operating characteristic	Time-delay tripping Instantaneous tripping Long time delay tripping	Time-delay tripping Instantaneous tripping Long time delay tripping	
Ambient temperature	–10˚C to +60˚C	–10˚C to +60˚C	
Dielectric strength	2000V AC 1min.	2000V AC 1min.	
Mechanical durability	10000 operations	6000 operations	
Electrical durability	10000 operations	6000 operations	
Mass	Approx. 100g	Approx. 100g (1-pole), 200g (2-pole)	

Note: Specify DC only when ordering circuit protectors for DC circuits.

■ Characteristic curve

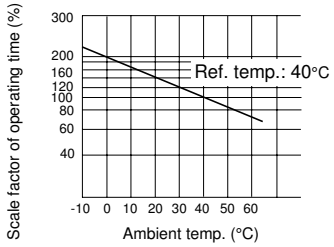


■ Auxiliary switch

Main contact	Auxiliary contact
ON	20 21 30
OFF or Trip	20 21 30

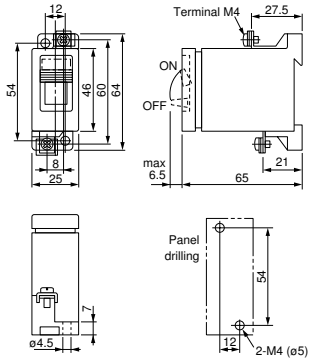
Auxiliary contact ratings	
250V AC	Resistive load: 1A Inductive load: 0.5A
125V AC	Resistive load: 3A Inductive load: 1A
50V DC	Resistive load: 1A Inductive load: 0.5A
30V DC	Resistive load: 2A Inductive load: 1A

Ambient temperature compensation
(Time delay tripping type)



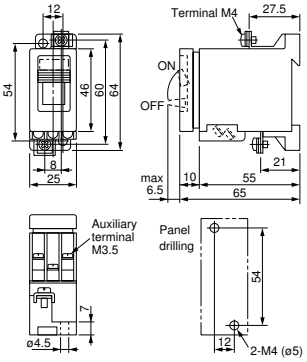
■ Dimensions, mm

• CP31
Front mounting type

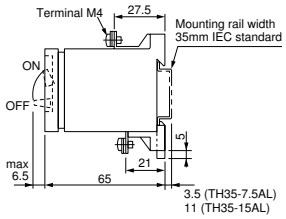


Mass: Approx. 100g

• CP31/W
With auxiliary switch



• CP31/X
Rail mounting type

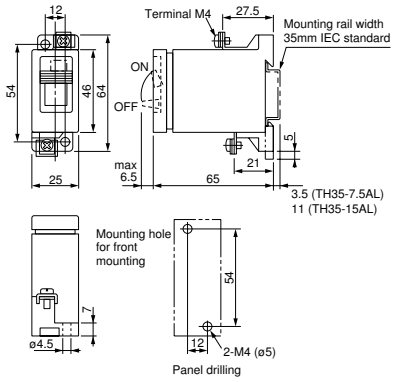


Mounting rail length: 900mm

Type	Material	Mounting pitch (Screw size)
TH35-7.5AL	Aluminium	200mm (M5)
TH35-15AL	Aluminium	400mm (M5)

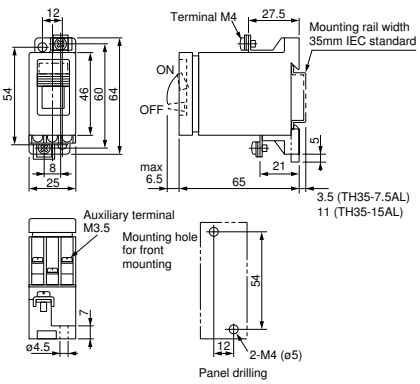
Clamp TS-XT

• CP31D
Front mounting/Rail mounting type

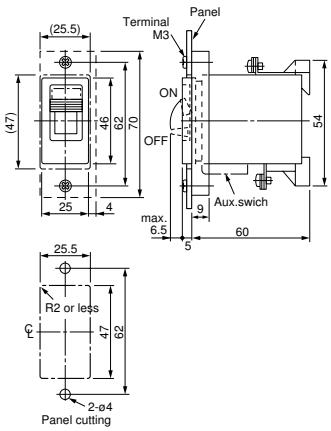


Mass: Approx. 100g

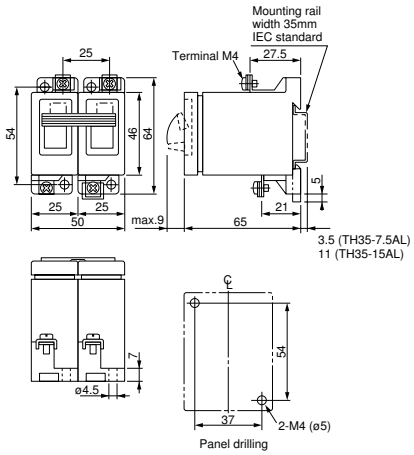
• CP31D/W
With auxiliary switch



• CP31, CP31D
Flush mounting type

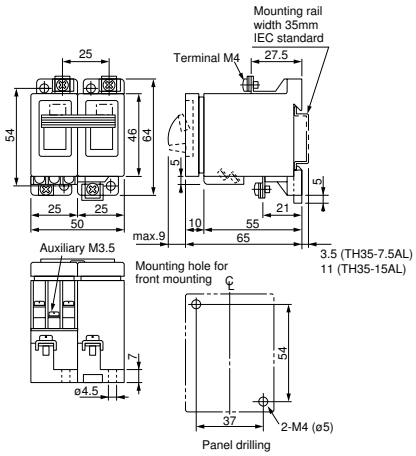


• CP32D
Front mounting/Rail mounting type



Mass: Approx. 200g

• CP32D/W
With auxiliary switch



Size of conductors

Type of terminal	Main terminal	Auxiliary terminal
Terminal screw*	M4	M3.5
Connectable wire sizes	1.25–5.5mm²	1.25–2mm²
Max. width of applicable crimp terminal	9.8mm (R1.25–4 to R5.5–4)	6.8mm (R2–3.5)
Tightening torque	1.0–1.3N·m	0.8–0.9N·m

Note: * Terminal screws are the self-lifting to facilitate wiring.

■ Ordering information

Specify the following:
1. Type number

08

CP-P circuit protectors

250V AC 0.3A to 25A
65V DC 0.3A to 25A

■ Description

CP-P circuit protectors are ideal for electronic circuit protection. The space required per pole is approximately 30% less than that for CP-E models allowing significant space savings. Application at any one of 12 rated currents in the range 0.3A to 25A is possible. CP-P circuit protectors have been approved by c UL us and TÜV Standards.

■ Features

- The mounting space is approximately 30% less than that required with CP-E models, and the width per pole has been reduced by approximately 15%.
- Conforms to IEC Standards. (Conforms to CE markings.)
- c UL us and TÜV approved.
- Operated with an easy-to-use toggle handle.
- Male tab soldering, and right angle terminals are available.

■ Standards

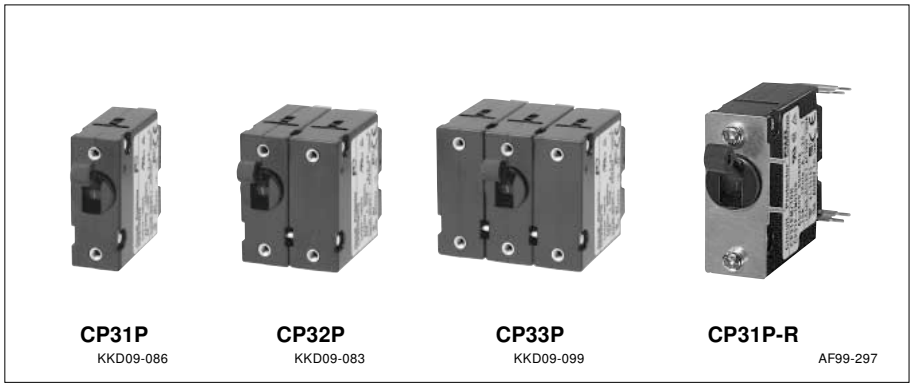
c UL us (File No.E96846)
TÜV (IEC)(R9750278)

■ Accessories

● Auxiliary switch (Type W)
This switch is used for indicator lamp or control circuit.

● Alarm switch (Type K)
This switch can be connected to a warning lamp or buzzer to indicate when the circuit protector has been tripped.

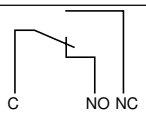
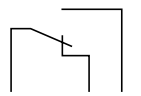
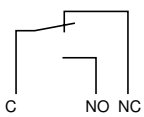
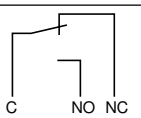
Auxiliary and alarm switches for low level circuit are also available on request. (Type W1, K1)



CP31P KKD09-086 **CP32P** KKD09-083 **CP33P** KKD09-099 **CP31P-R** AF99-297

■ Specifications

Type		CP31P	CP32P	CP33P	CP31P-R
Pole		1-pole	2-pole	3-pole	1-pole
Rated insulation voltage (Ui)		250V AC 50/60Hz, 65V DC			
Rated operational voltage (Ue)		240V AC, 60V DC			
Rated current		0.3, 0.5, 0.75, 1, 2, 3, 5, 7.5, 10, 15, 20, 25A			
Rated breaking capacity		1000A at 240V AC 1000A at 60V DC			
Operating characteristic		Long time delay, Medium time delay Short time delay, Instantaneous tripping			
Tripping mechanism		Hydraulic-magnetic			
Ambient temperature		-10˚C to +60˚C			
Electrical durability		10000 operations			
Terminals	Main circuit	Tab			Right angle
	Auxiliary circuit	Soldering			Right angle
Accessories	Auxiliary switch (W, W1)	Available			
	Alarm switch (K, K1)	Available			
Mass (Approx.)		40g	85g	130g	40g

Main contact	Auxiliary switch	Alarm switch
ON		
OFF		
TRIP		

Ratings of auxiliary and alarm switches

Standard type (Type W, K)	
250V AC	Resistive load: 3A Inductive load: 2A
125V AC	Resistive load: 3A Inductive load: 2A
30V DC	Resistive load: 3A Inductive load: 2A

Minimum permissible load	
For low level circuit (Type W1, K1)	
24V DC	1mA
12V DC	2mA
6V DC	5mA

■ Versions

	Operating characteristic	CP31P (1-pole) Type	CP32P (2-pole) Type	CP33P (3-pole) Type
Applied circuit AC	Long time	**CP31PS/□■**	**CP32PS/□■**	**CP33PS/□■**
	Medium time	**CP31PM/□■**	**CP32PM/□■**	**CP33PM/□■**
	Short time	**CP31PF/□■**	**CP32PF/□■**	**CP33PF/□■**
	Instantaneous	**CP31PI/□■**	**CP32PI/□■**	**CP33PI/□■**
Applied circuit DC	Long time	**CP31PS/□DC■**	**CP32PS/□DC■**	**CP33PS/□DC■**
	Medium time	**CP31PM/□DC■**	**CP32PM/□DC■**	**CP33PM/□DC■**
	Short time	**CP31PF/□DC■**	**CP32PF/□DC■**	**CP33PF/□DC■**
	Instantaneous	**CP31PI/□DC■**	**CP32PI/□DC■**	**CP33PI/□DC■**
With standard auxiliary switch	Long time	**CP31PS/□W■**	**CP32PS/□W■**	**CP33PS/□W■**
	Medium time	**CP31PM/□W■**	**CP32PM/□W■**	**CP33PM/□W■**
	Short time	**CP31PF/□W■**	**CP32PF/□W■**	**CP33PF/□W■**
	Instantaneous	**CP31PI/□W■**	**CP32PI/□W■**	**CP33PI/□W■**
Applied circuit DC	Long time	**CP31PS/□WDC■**	**CP32PS/□WDC■**	**CP33PS/□WDC■**
	Medium time	**CP31PM/□WDC■**	**CP32PM/□WDC■**	**CP33PM/□WDC■**
	Short time	**CP31PF/□WDC■**	**CP32PF/□WDC■**	**CP33PF/□WDC■**
	Instantaneous	**CP31PI/□WDC■**	**CP32PI/□WDC■**	**CP33PI/□WDC■**
With standard alarm switch	Long time	**CP31PS/□K■**	**CP32PS/□K■**	**CP33PS/□K■**
	Medium time	**CP31PM/□K■**	**CP32PM/□K■**	**CP33PM/□K■**
	Short time	**CP31PF/□K■**	**CP32PF/□K■**	**CP33PF/□K■**
	Instantaneous	**CP31PI/□K■**	**CP32PI/□K■**	**CP33PI/□K■**
Applied circuit DC	Long time	**CP31PS/□KDC■**	**CP32PS/□KDC■**	**CP33PS/□KDC■**
	Medium time	**CP31PM/□KDC■**	**CP32PM/□KDC■**	**CP33PM/□KDC■**
	Short time	**CP31PF/□KDC■**	**CP32PF/□KDC■**	**CP33PF/□KDC■**
	Instantaneous	**CP31PI/□KDC■**	**CP32PI/□KDC■**	**CP33PI/□KDC■**
With auxiliary switch for low level circuit	Long time	**CP31PS/□W1■**	**CP32PS/□W1■**	**CP33PS/□W1■**
	Medium time	**CP31PM/□W1■**	**CP32PM/□W1■**	**CP33PM/□W1■**
	Short time	**CP31PF/□W1■**	**CP32PF/□W1■**	**CP33PF/□W1■**
	Instantaneous	**CP31PI/□W1■**	**CP32PI/□W1■**	**CP33PI/□W1■**
Applied circuit DC	Long time	**CP31PS/□W1DC■**	**CP32PS/□W1DC■**	**CP33PS/□W1DC■**
	Medium time	**CP31PM/□W1DC■**	**CP32PM/□W1DC■**	**CP33PM/□W1DC■**
	Short time	**CP31PF/□W1DC■**	**CP32PF/□W1DC■**	**CP33PF/□W1DC■**
	Instantaneous	**CP31PI/□W1DC■**	**CP32PI/□W1DC■**	**CP33PI/□W1DC■**
With alarm switch for low level circuit	Long time	**CP31PS/□K1■**	**CP32PS/□K1■**	**CP33PS/□K1■**
	Medium time	**CP31PM/□K1■**	**CP32PM/□K1■**	**CP33PM/□K1■**
	Short time	**CP31PF/□K1■**	**CP32PF/□K1■**	**CP33PF/□K1■**
	Instantaneous	**CP31PI/□K1■**	**CP32PI/□K1■**	**CP33PI/□K1■**
Applied circuit DC	Long time	**CP31PS/□K1DC■**	**CP32PS/□K1DC■**	**CP33PS/□K1DC■**
	Medium time	**CP31PM/□K1DC■**	**CP32PM/□K1DC■**	**CP33PM/□K1DC■**
	Short time	**CP31PF/□K1DC■**	**CP32PF/□K1DC■**	**CP33PF/□K1DC■**
	Instantaneous	**CP31PI/□K1DC■**	**CP32PI/□K1DC■**	**CP33PI/□K1DC■**

Notes : □ Enter the rated current in the □ mark of the type number. 0.3A: 0.3, 0.5A: 0.5 ------ 25A: 25
■ Enter the main circuit terminal in the ■ mark.

■ Type number nomenclature

CP3 1 P M / 0.3 W DC P

Basic type

Number of poles
1: 1-pole
2: 2-pole
3: 3-pole

Operating characteristics
S: Long time delay tripping
M: Medium time delay tripping
F: Short time delay tripping
I: Instantaneous

Rated current

0.3: 0.3A	2: 2A	10: 10A
0.5: 0.5A	3: 3A	15: 15A
0.75: 0.75A	5: 5A	20: 20A
1: 1A	7.5: 7.5A	25: 25A

Main circuit terminal
Blank: Male tab terminal
P: Soldering terminal
R: Right angle terminal

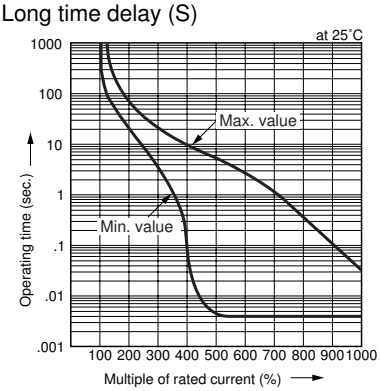
Applied circuit
Blank: AC DC: DC circuit

Accessories
Blank: Without accessory
W: With standard auxiliary switch
K: With standard alarm switch
W1: With auxiliary switch for low level circuit
K1: With alarm switch for low level circuit

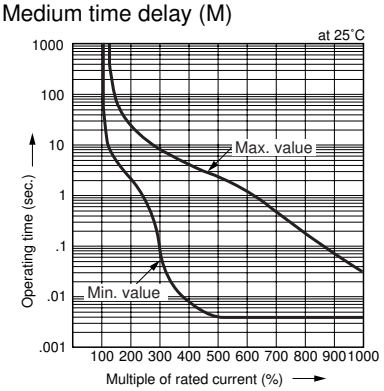
■ Characteristic curves

AC circuit

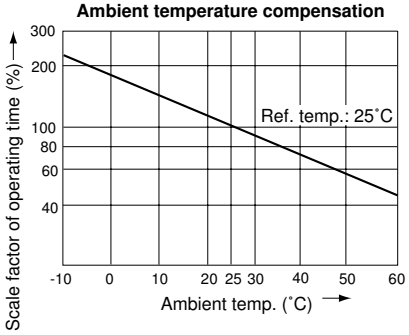
Long time delay (S)



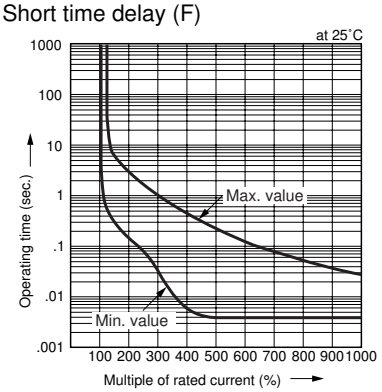
Medium time delay (M)



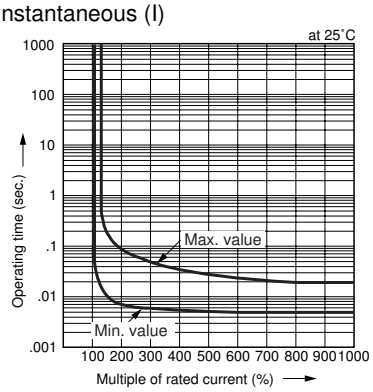
Ambient temperature compensation



Short time delay (F)



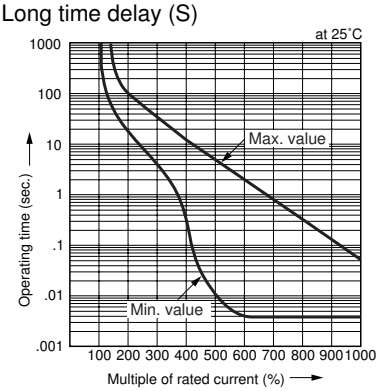
Instantaneous (I)



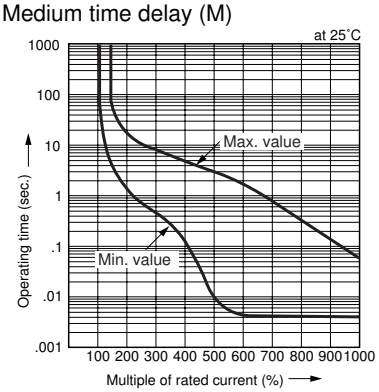
■ Characteristic curves

DC circuit

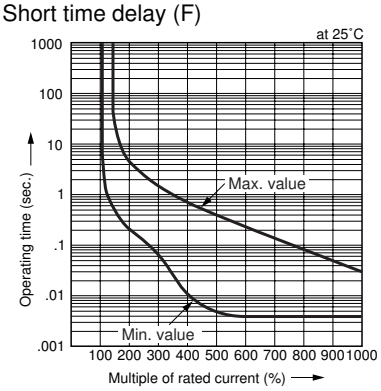
Long time delay (S)



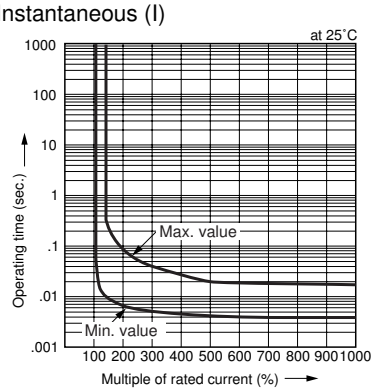
Medium time delay (M)



Short time delay (F)

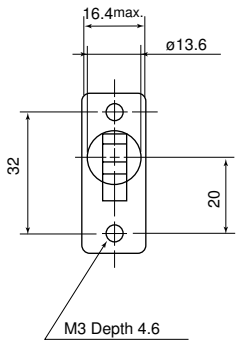


Instantaneous (I)

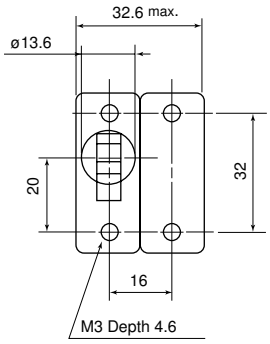


■ Dimensions, mm

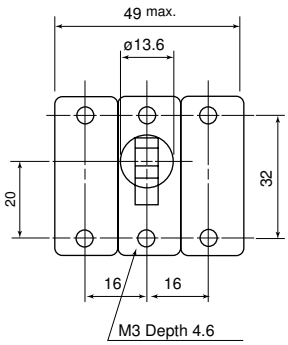
1-pole

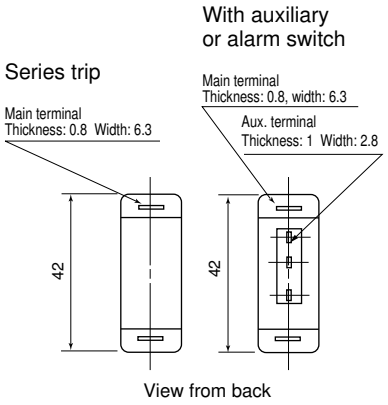


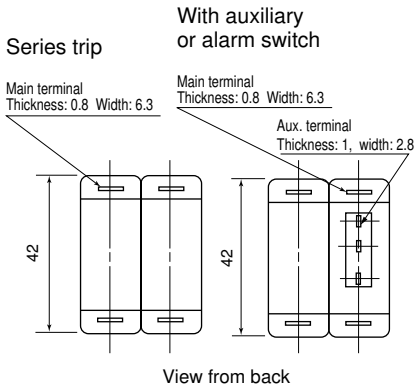
2-pole

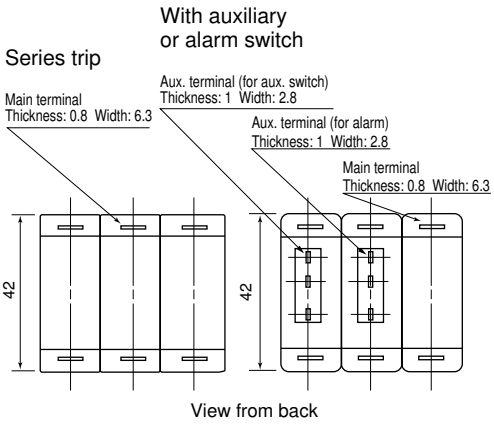


3-pole

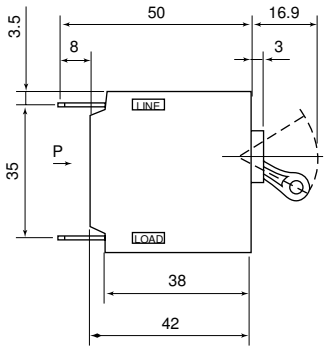




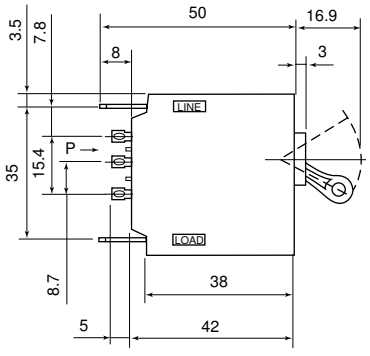




Series trip

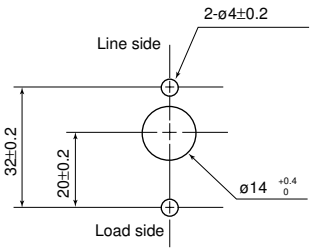


With auxiliary or alarm switch

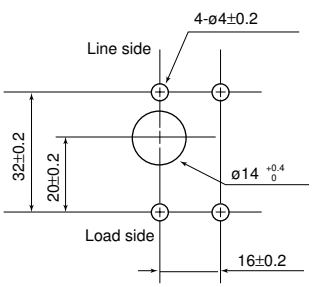


Panel drilling

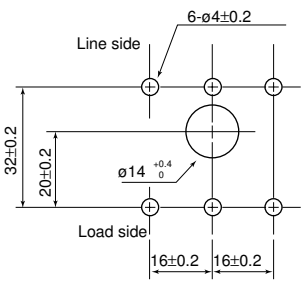
1-pole



2-pole



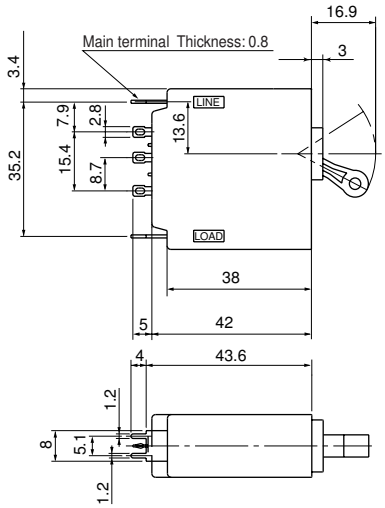
3-pole



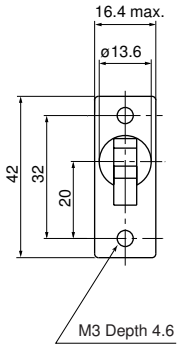
MSA CONTROL - (11) 3961-1171 - comercial@msacontrol.com.br

■ Dimensions, mm

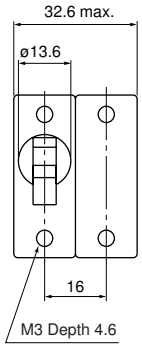
Soldering terminal
(With auxiliary terminal)



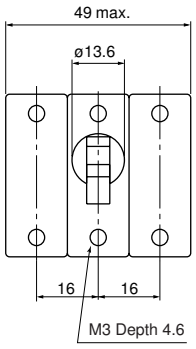
1-pole



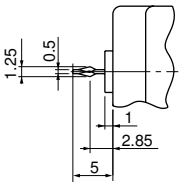
2-pole



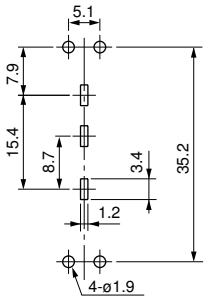
3-pole

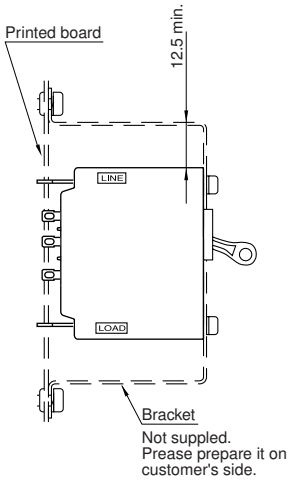


Aux. terminal

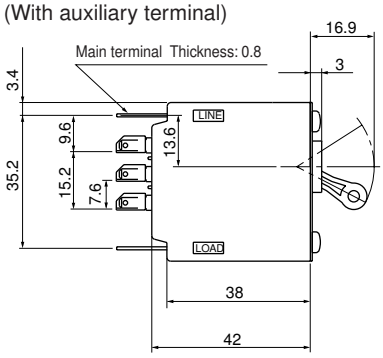


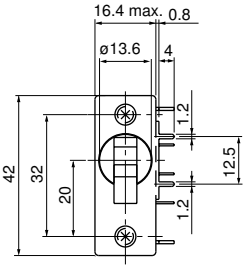
Panel drilling (1-pole)



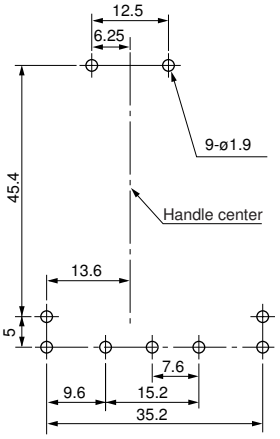


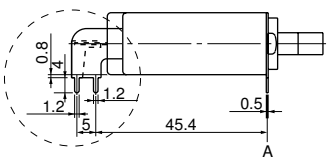
Right angle terminal
(With auxiliary terminal)



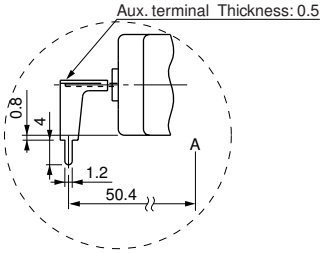


Panel drilling





Aux. terminal (Enlarged)



50A frame size circuit protectors

250V AC 0.3A to 50A
65V DC 0.3A to 50A

■ Features

- Available with ratings from 0.3A to 50A.
- Conforms to IEC Standards. (Conforms to CE markings.)
- cULus and TÜV approved.
- Rated breaking capacity of 1,500A at 240V AC.
- Stud terminals used.

■ Standards

cULus (File No.E96846)
TÜV (IEC)(R9750278)

■ Accessories

● Auxiliary switch (Type W)
This switch is used for ON-OFF lamp indicator or control circuit.

● Alarm switch (Type K)
This switch can be connected to a warning lamp or buzzer to indicate when the circuit protector has been tripped.

Auxiliary and alarm switch for low level circuit are also available on request. (Type W1, K1)

Ratings of auxiliary and alarm switches

Standard type (Type W, K)		
250V AC	Resistive load:	3A
	Inductive load:	2A
125V AC	Resistive load:	3A
	Inductive load:	2A
30V DC	Resistive load:	3A
	Inductive load:	2A

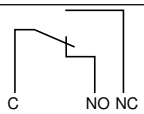
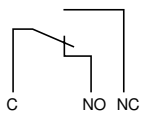
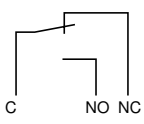
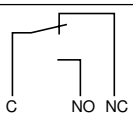
Minimum permissible load

Low level circuit (Type W1, K1)	
24V DC	1mA
12V DC	2mA
6V DC	5mA

CP51B KKD09-084 **CP52B** KKD09-092 **CP53B** KKD09-096

■ Specifications

Type		CP51B	CP52B	CP53B
Pole		1-pole	2-pole	3-pole
Rated insulation voltage (Ui)		250V AC 50/60Hz, 65V DC		
Rated operational voltage (Ue)		240V AC, 60V DC		
Rated current		0.3, 0.5, 0.75, 1, 2, 3, 5, 7.5, 10, 15, 20, 25, 30, 40, 50A		
Rated breaking capacity		1500A at 240V AC 1000A at 60V DC		
Operating characteristic		Long time delay, Medium time delay Short time delay, Instantaneous tripping		
Tripping mechanism		Hydraulic-magnetic		
Ambient temperature		-10˚C to +60˚C		
Electrical durability		10000 operations		
Terminals	Main circuit	Round stud		
	Auxiliary circuit	Soldering		
Accessories	Auxiliary switch (W, W1)	Available		
	Alarm switch (K, K1)	Available		
Mass (Approx.)		80g	180g	280g

Main contact	Auxiliary switch/W	Alarm switch/K
ON		
OFF		
TRIP		

■ Versions

	Operating characteristic	CP51B (1-pole) Type	CP52B (2-pole) Type	CP53B (3-pole) Type
Applied circuit AC	Long time	**CP51BS/□**	**CP52BS/□**	**CP53BS/□**
	Medium time	**CP51BM/□**	**CP52BM/□**	**CP53BM/□**
	Short time	**CP51BF/□**	**CP52BF/□**	**CP53BF/□**
	Instantaneous	**CP51BI/□**	**CP52BI/□**	**CP53BI/□**
Applied circuit DC	Long time	**CP51BS/□DC**	**CP52BS/□DC**	**CP53BS/□DC**
	Medium time	**CP51BM/□DC**	**CP52BM/□DC**	**CP53BM/□DC**
	Short time	**CP51BF/□DC**	**CP52BF/□DC**	**CP53BF/□DC**
	Instantaneous	**CP51BI/□DC**	**CP52BI/□DC**	**CP53BI/□DC**
With standard auxiliary switch	Long time	**CP51BS/□W**	**CP52BS/□W**	**CP53BS/□W**
	Medium time	**CP51BM/□W**	**CP52BM/□W**	**CP53BM/□W**
	Short time	**CP51BF/□W**	**CP52BF/□W**	**CP53BF/□W**
	Instantaneous	**CP51BI/□W**	**CP52BI/□W**	**CP53BI/□W**
Applied circuit DC	Long time	**CP51BS/□WDC**	**CP52BS/□WDC**	**CP53BS/□WDC**
	Medium time	**CP51BM/□WDC**	**CP52BM/□WDC**	**CP53BM/□WDC**
	Short time	**CP51BF/□WDC**	**CP52BF/□WDC**	**CP53BF/□WDC**
	Instantaneous	**CP51BI/□WDC**	**CP52BI/□WDC**	**CP53BI/□WDC**
With standard alarm switch	Long time	**CP51BS/□K**	**CP52BS/□K**	**CP53BS/□K**
	Medium time	**CP51BM/□K**	**CP52BM/□K**	**CP53BM/□K**
	Short time	**CP51BF/□K**	**CP52BF/□K**	**CP53BF/□K**
	Instantaneous	**CP51BI/□K**	**CP52BI/□K**	**CP53BI/□K**
Applied circuit DC	Long time	**CP51BS/□KDC**	**CP52BS/□KDC**	**CP53BS/□KDC**
	Medium time	**CP51BM/□KDC**	**CP52BM/□KDC**	**CP53BM/□KDC**
	Short time	**CP51BF/□KDC**	**CP52BF/□KDC**	**CP53BF/□KDC**
	Instantaneous	**CP51BI/□KDC**	**CP52BI/□KDC**	**CP53BI/□KDC**
With auxiliary switch for low level circuit	Long time	**CP51BS/□W1**	**CP52BS/□W1**	**CP53BS/□W1**
	Medium time	**CP51BM/□W1**	**CP52BM/□W1**	**CP53BM/□W1**
	Short time	**CP51BF/□W1**	**CP52BF/□W1**	**CP53BF/□W1**
	Instantaneous	**CP51BI/□W1**	**CP52BI/□W1**	**CP53BI/□W1**
Applied circuit DC	Long time	**CP51BS/□W1DC**	**CP52BS/□W1DC**	**CP53BS/□W1DC**
	Medium time	**CP51BM/□W1DC**	**CP52BM/□W1DC**	**CP53BM/□W1DC**
	Short time	**CP51BF/□W1DC**	**CP52BF/□W1DC**	**CP53BF/□W1DC**
	Instantaneous	**CP51BI/□W1DC**	**CP52BI/□W1DC**	**CP53BI/□W1DC**
With alarm switch for low level circuit	Long time	**CP51BS/□K1**	**CP52BS/□K1**	**CP53BS/□K1**
	Medium time	**CP51BM/□K1**	**CP52BM/□K1**	**CP53BM/□K1**
	Short time	**CP51BF/□K1**	**CP52BF/□K1**	**CP53BF/□K1**
	Instantaneous	**CP51BI/□K1**	**CP52BI/□K1**	**CP53BI/□K1**
Applied circuit DC	Long time	**CP51BS/□K1DC**	**CP52BS/□K1DC**	**CP53BS/□K1DC**
	Medium time	**CP51BM/□K1DC**	**CP52BM/□K1DC**	**CP53BM/□K1DC**
	Short time	**CP51BF/□K1DC**	**CP52BF/□K1DC**	**CP53BF/□K1DC**
	Instantaneous	**CP51BI/□K1DC**	**CP52BI/□K1DC**	**CP53BI/□K1DC**

Note : □ Enter the rated current in the □ mark of the type number. 0.3A: 0.3, 0.5A: 0.5 ------ 50A: 50

■ Type number nomenclature

CP5 1 B M / 0.3 W DC

Basic type
CP5□B

Number of poles
1: 1-pole
2: 2-pole
3: 3-pole

Operating characteristics
S: Long time delay tripping
M: Medium time delay tripping
F: Short time delay tripping
I: Instantaneous

Rated current

0.3: 0.3A	2: 2A	10: 10A	30: 30A
0.5: 0.5A	3: 3A	15: 15A	40: 40A
0.75: 0.75A	5: 5A	20: 20A	50: 50A
1: 1A	7.5: 7.5A	25: 25A	

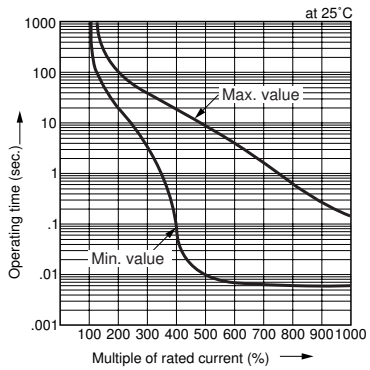
Applied circuit
Blank: AC DC: DC circuit

Accessories
Blank: Without accessory
W: With standard auxiliary switch
K: With standard alarm switch
W1: With auxiliary switch for low level circuit
K1: With alarm switch for low level circuit

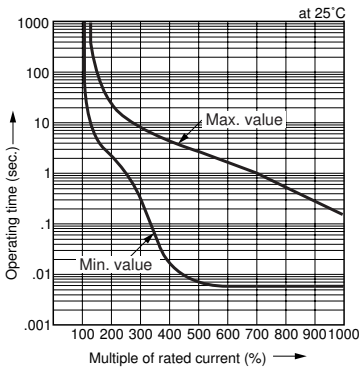
■ Characteristic curves

AC circuit

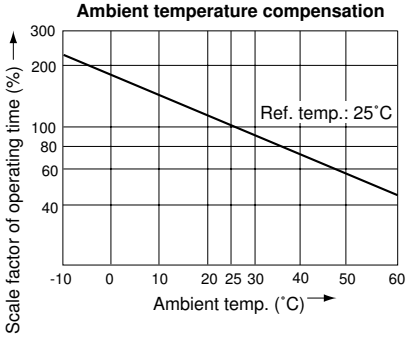
Long time delay (S)



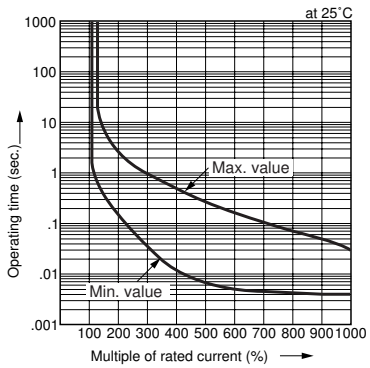
Medium time delay (M)



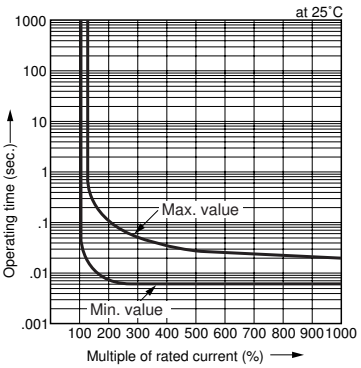
Ambient temperature compensation



Short time delay (F)



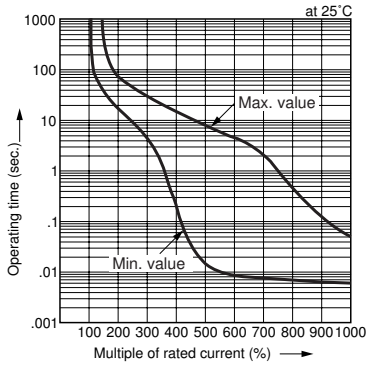
Instantaneous (I)



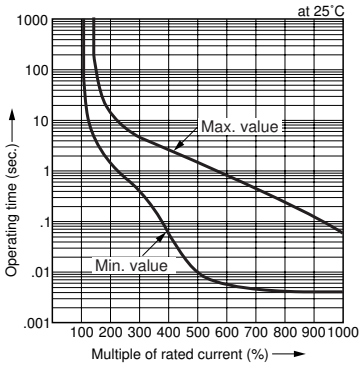
■ Characteristic curves

DC circuit

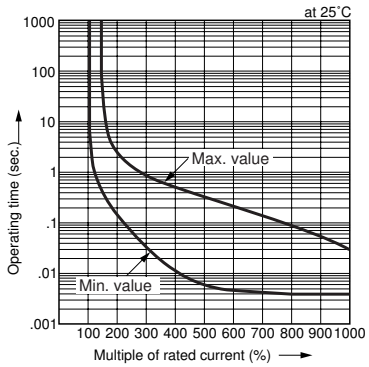
Long time delay (S)



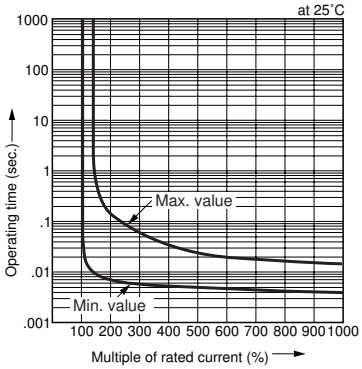
Medium time delay (M)



Short time delay (F)

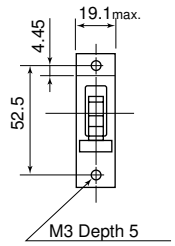


Instantaneous (I)

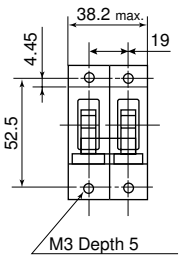


■ Dimensions, mm

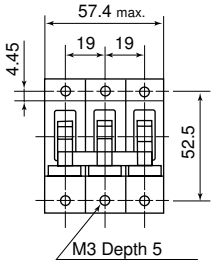
1-pole

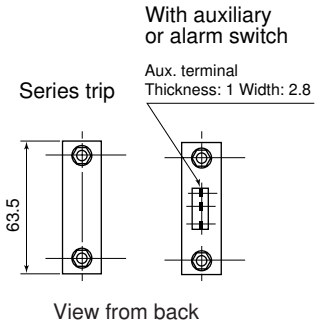


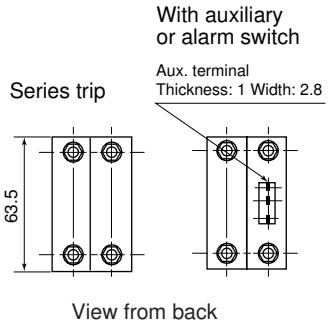
2-pole

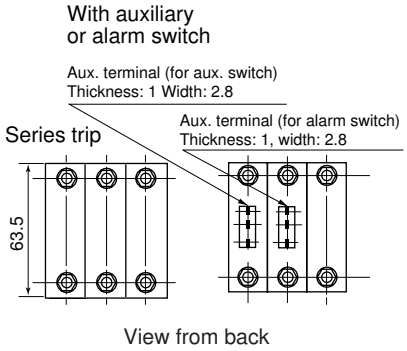


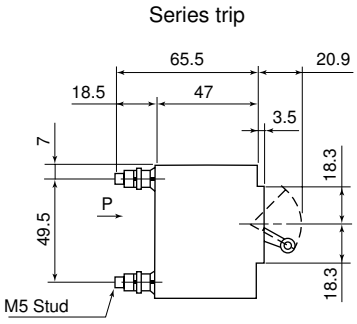
3-pole

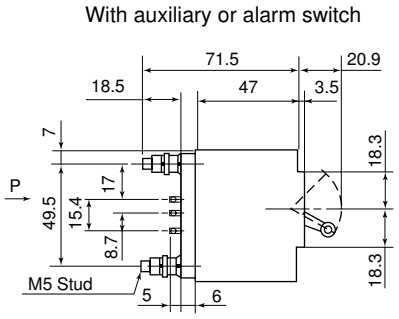






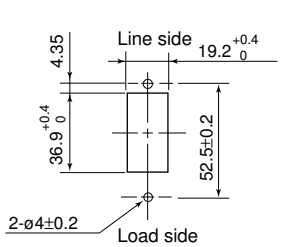




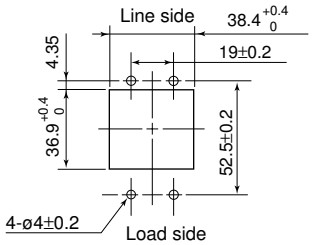


Panel drilling

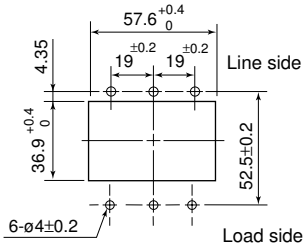
1-pole



2-pole



3-pole



MSA CONTROL - (11) 3961-1171 - comercial@msacontrol.com.br

CP-E and CP-V circuit protectors

250V AC 0.05A to 30A
65V DC 0.05A to 30A

■ Description

CP-E, CP-V circuit protectors have been specially developed for computers, communication equipment and peripheral applications. In these situations power irregularities can lead to serious and expensive damage, and reliable protective equipment is required. FUJI circuit protectors meet this need. These protectors are available with ratings from 50mA to 30A. They are widely used in FA, office machinery, communication equipment and industrial computer-controlled equipment. They are also suitable for extremely severe service since they can withstand mechanical shocks up to 981m/s^2.

■ Features

- Available in instantaneous, short time, medium time and long time delay types, thus making them suitable for a wide range of electronic applications.
- Also available in types having inertia delay characteristics. These do not trip due to inrush current.
- For internal circuits, series trip, shunt trip, relay trip and switch types are available.
- Circuit protectors with an auxiliary and alarm switch are also available.
- Single pole to 3-pole CP types can be operated with a single handle. Handle holes are easily made in panels.
- Widths down to 19mm.

■ Standards

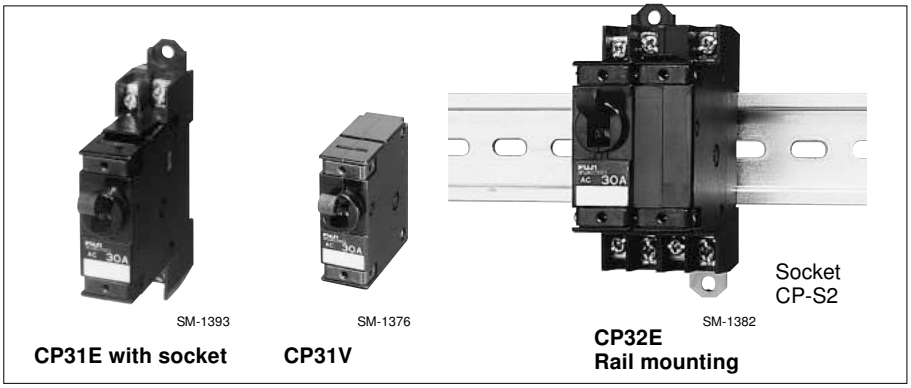
cULus : CP-E, CP-V (File No. E96846), (File No. E83461 for switch type), Socket CP-S (E96846SP, E83461, LR67978 (CSA C22.2 No.14))
TÜV (IEC): CP-V(R50064785)

■ Accessories

● Auxiliary switch (Type W)
This switch is used for indicator lamp or control circuit.

● Alarm switch (Type K)
This switch can be connected to a warning lamp or buzzer to indicate when the circuit protector has been tripped.

Auxiliary (W1) and alarm (K1) switch for low level circuit are also available on request.



CP31E with socket **CP31V** **CP32E Rail mounting**

■ Specifications

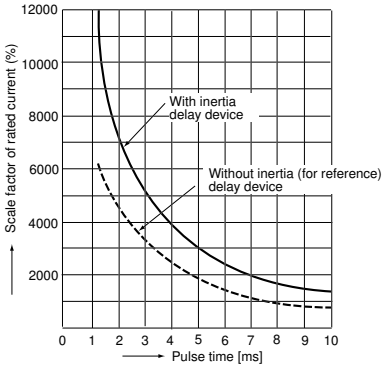
Type			CP31E, V	CP32E, V	CP33E, V	CP34E, V
Pole			1-pole	2-pole	3-pole	4-pole
Rated insulation voltage (Ui)			250V AC 50/60Hz, 65V DC			
Rated operational voltage (Ue)			250V AC 50/60Hz, 60V DC			
Rated current			0.05, 0.1, 0.25, 0.5, 0.75, 1, 2, 2.5, 3, 5, 7.5 10, 15, 20, 25, 30A			
Rated breaking capacity			1000A at 250V AC 1000A at 60V DC			
Operating characteristic			Long time delay, Medium time delay Short time delay, Instantaneous tripping			
Tripping mechanism			Hydraulic-magnetic			
Ambient temperature			–10˚C to +60˚C			
Electrical durability			10000 operations			
Terminals	Main circuit		Tab, screw, printed board			
	Auxiliary circuit		Tab, printed board			
Accessories	Auxiliary switch	(W, W1)	Available			
	Alarm switch	(K, K1)	Available			
	Inertia delay device	(D)	Available			
Mass (Approx.)			60g	120g	180g	240g

Ratings of auxiliary and alarm switches

250V AC	Resistive load: 3A Inductive load: 2A
125V AC	Resistive load: 5A Inductive load: 3A
60V DC	Resistive load: 1A Inductive load: 0.5A
30V DC	Resistive load: 4A Inductive load: 3A

● Inertia delay device (Type D)
When a circuit carrying loads such as transformers or lamps is closed, an extremely large inrush current flows. This inertia delay device is designed to prevent the circuit protector from operating erroneously due to such inrush current and to carry out an interruption within the prescribed operating characteristics in the face of an overcurrent.
For instance, the following graph explains that the protector does not operate even when a pulse current of approx. 18 times (peak value) rated current with a pulse width of 8ms flows.

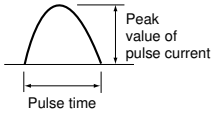
Inertia delay characteristics



- Scale factor of the rated current (%)

$$\frac{\text{Peak value of pulse current}}{\text{Rated current for protector}} \times 100$$

- Waveform of pulse current:
Sinusoidal wave or parabolic pulse



08

■ Versions

Internal circuit	Operating characteristics	CP31E (1-pole) Type	CP32E (2-pole) Type	CP33E (3-pole) Type	CP34E (4-pole) Type
Series trip type	Long time	**CP31E/□**	**CP32E/□**	**CP33E/□**	**CP34E/□**
	Medium time	**CP31EM/□**	**CP32EM/□**	**CP33EM/□**	**CP34EM/□**
	Short time	**CP31EF/□**	**CP32EF/□**	**CP33EF/□**	**CP34EF/□**
	Instantaneous	**CP31EI/□**	**CP32EI/□**	**CP33EI/□**	**CP34EI/□**
Series trip type With inertia delay device	Long time	**CP31E/□D**	**CP32E/□D**	**CP33E/□D**	**CP34E/□D**
	Medium time	**CP31EM/□D**	**CP32EM/□D**	**CP33EM/□D**	**CP34EM/□D**
	Short time	**CP31EF/□D**	**CP32EF/□D**	**CP33EF/□D**	**CP34EF/□D**
	Instantaneous	—	—	—	—
Series trip type With auxiliary switch	Long time	**CP31E/□W**	**CP32E/□W**	**CP33E/□W**	**CP34E/□W**
	Medium time	**CP31EM/□W**	**CP32EM/□W**	**CP33EM/□W**	**CP34EM/□W**
	Short time	**CP31EF/□W**	**CP32EF/□W**	**CP33EF/□W**	**CP34EF/□W**
	Instantaneous	**CP31EI/□W**	**CP32EI/□W**	**CP33EI/□W**	**CP34EI/□W**
Series trip type With auxiliary switch and inertia delay device	Long time	**CP31E/□WD**	**CP32E/□WD**	**CP33E/□WD**	**CP34E/□WD**
	Medium time	**CP31EM/□WD**	**CP32EM/□WD**	**CP33EM/□WD**	**CP34EM/□WD**
	Short time	**CP31EF/□WD**	**CP32EF/□WD**	**CP33EF/□WD**	**CP34EF/□WD**
	Instantaneous	—	—	—	—
Series trip type With alarm switch	Long time	**CP31E/□K**	**CP32E/□K**	**CP33E/□K**	**CP34E/□K**
	Medium time	**CP31EM/□K**	**CP32EM/□K**	**CP33EM/□K**	**CP34EM/□K**
	Short time	**CP31EF/□K**	**CP32EF/□K**	**CP33EF/□K**	**CP34EF/□K**
	Instantaneous	**CP31EI/□K**	**CP32EI/□K**	**CP33EI/□K**	**CP34EI/□K**
Series trip type With alarm switch and inertia delay device	Long time	**CP31E/□KD**	**CP32E/□KD**	**CP33E/□KD**	**CP34E/□KD**
	Medium time	**CP31EM/□KD**	**CP32EM/□KD**	**CP33EM/□KD**	**CP34EM/□KD**
	Short time	**CP31EF/□KD**	**CP32EF/□KD**	**CP33EF/□KD**	**CP34EF/□KD**
	Instantaneous	—	—	—	—
Shunt trip type	Long time	**CP31E2/□**	**CP32E2/□**	**CP33E2/□**	**CP34E2/□**
	Medium time	**CP31E2M/□**	**CP32E2M/□**	**CP33E2M/□**	**CP34E2M/□**
	Short time	**CP31E2F/□**	**CP32E2F/□**	**CP33E2F/□**	**CP34E2F/□**
	Instantaneous	**CP31E2I/□**	**CP32E2I/□**	**CP33E2I/□**	**CP34E2I/□**
Shunt trip type With inertia delay device	Long time	**CP31E2/□D**	**CP32E2/□D**	**CP33E2/□D**	**CP34E2/□D**
	Medium time	**CP31E2M/□D**	**CP32E2M/□D**	**CP33E2M/□D**	**CP34E2M/□D**
	Short time	**CP31E2F/□D**	**CP32E2F/□D**	**CP33E2F/□D**	**CP34E2F/□D**
	Instantaneous	—	—	—	—
Relay trip type (Current trip)	Long time	**CP31E3/□**	**CP32E3/□**	**CP33E3/□**	**CP34E3/□**
	Medium time	**CP31E3M/□**	**CP32E3M/□**	**CP33E3M/□**	**CP34E3M/□**
	Short time	**CP31E3F/□**	**CP32E3F/□**	**CP33E3F/□**	**CP34E3F/□**
	Instantaneous	**CP31E3I/□**	**CP32E3I/□**	**CP33E3I/□**	**CP34E3I/□**
Relay trip type With inertia delay device	Long time	**CP31E3/□D**	**CP32E3/□D**	**CP33E3/□D**	**CP34E3/□D**
	Medium time	**CP31E3M/□D**	**CP32E3M/□D**	**CP33E3M/□D**	**CP34E3M/□D**
	Short time	**CP31E3F/□D**	**CP32E3F/□D**	**CP33E3F/□D**	**CP34E3F/□D**
	Instantaneous	—	—	—	—
Switch type		**CP31E4/30**	**CP32E4/30**	**CP33E4/30**	**CP34E4/30**
Switch type With auxiliary switch		**CP31E4/30W**	**CP32E4/30W**	**CP33E4/30W**	**CP34E4/30W**
Relay trip type (Shunt trip)		**CP31E5/30**	**CP32E5/30**	**CP33E5/30**	**CP34E5/30**
Dual coil type	Long time	**CP31E6/□**	**CP32E6/□**	**CP33E6/□**	**CP34E6/□**
	Medium time	**CP31E6M/□**	**CP32E6M/□**	**CP33E6M/□**	**CP34E6M/□**
	Short time	**CP31E6F/□**	**CP32E6F/□**	**CP33E6F/□**	**CP34E6F/□**
	Instantaneous	**CP31E6I/□**	**CP32E6I/□**	**CP33E6I/□**	**CP34E6I/□**
Dual coil type With inertia delay device	Long time	**CP31E6/□D**	**CP32E6/□D**	**CP33E6/□D**	**CP34E6/□D**
	Medium time	**CP31E6M/□D**	**CP32E6M/□D**	**CP33E6M/□D**	**CP34E6M/□D**
	Short time	**CP31E6F/□D**	**CP32E6F/□D**	**CP33E6F/□D**	**CP34E6F/□D**
	Instantaneous	—	—	—	—

Notes: □ Enter the rated current in the □ mark of the type number.
0.05A: 0.05, 0.1A: 0.1, 0.25A: 0.25.....30A: 30
• When ordering types with auxiliary switch (**W1**) or alarm switch (**K1**), add suffix to type number.

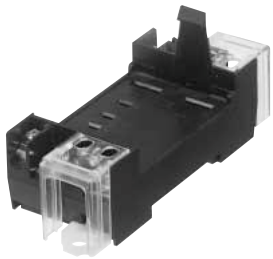
■ Versions

Internal circuit	Operating characteristics	CP31V (1-pole) Type	CP32V (2-pole) Type	CP33V (3-pole) Type	CP34V (4-pole) Type
Series trip type	Long time Medium time Short time Instantaneous	**CP31V/□** **CP31VM/□** **CP31VF/□** **CP31VI/□**	**CP32V/□** **CP32VM/□** **CP32VF/□** **CP32VI/□**	**CP33V/□** **CP33VM/□** **CP33VF/□** **CP33VI/□**	**CP34V/□** **CP34VM/□** **CP34VF/□** **CP34VI/□**
Series trip type With inertia delay device	Long time Medium time Short time Instantaneous	**CP31V/□D** **CP31VM/□D** **CP31VF/□D** —	**CP32V/□D** **CP32VM/□D** **CP32VF/□D** —	**CP33V/□D** **CP33VM/□D** **CP33VF/□D** —	**CP34V/□D** **CP34VM/□D** **CP34VF/□D** —
Series trip type With auxiliary switch	Long time Medium time Short time Instantaneous	**CP31V/□W** **CP31VM/□W** **CP31VF/□W** **CP31VI/□W**	**CP32V/□W** **CP32VM/□W** **CP32VF/□W** **CP32VI/□W**	**CP33V/□W** **CP33VM/□W** **CP33VF/□W** **CP33VI/□W**	**CP34V/□W** **CP34VM/□W** **CP34VF/□W** **CP34VI/□W**
Series trip type With auxiliary switch and inertia delay device	Long time Medium time Short time Instantaneous	**CP31V/□WD** **CP31VM/□WD** **CP31VF/□WD** —	**CP32V/□WD** **CP32VM/□WD** **CP32VF/□WD** —	**CP33V/□WD** **CP33VM/□WD** **CP33VF/□WD** —	**CP34V/□WD** **CP34VM/□WD** **CP34VF/□WD** —
Series trip type With alarm switch	Long time Medium time Short time Instantaneous	**CP31V/□K** **CP31VM/□K** **CP31VF/□K** **CP31VI/□K**	**CP32V/□K** **CP32VM/□K** **CP32VF/□K** **CP32VI/□K**	**CP33V/□K** **CP33VM/□K** **CP33VF/□K** **CP33VI/□K**	**CP34V/□K** **CP34VM/□K** **CP34VF/□K** **CP34VI/□K**
Series trip type With alarm switch and inertia delay device	Long time Medium time Short time Instantaneous	**CP31V/□KD** **CP31VM/□KD** **CP31VF/□KD** —	**CP32V/□KD** **CP32VM/□KD** **CP32VF/□KD** —	**CP33V/□KD** **CP33VM/□KD** **CP33VF/□KD** —	**CP34V/□KD** **CP34VM/□KD** **CP34VF/□KD** —
Shunt trip type	Long time Medium time Short time Instantaneous	**CP31V2/□** **CP31V2M/□** **CP31V2F/□** **CP31V2I/□**	**CP32V2/□** **CP32V2M/□** **CP32V2F/□** **CP32V2I/□**	**CP33V2/□** **CP33V2M/□** **CP33V2F/□** **CP33V2I/□**	**CP34V2/□** **CP34V2M/□** **CP34V2F/□** **CP34V2I/□**
Shunt trip type With inertia delay device	Long time Medium time Short time Instantaneous	**CP31V2/□D** **CP31V2M/□D** **CP31V2F/□D** —	**CP32V2/□D** **CP32V2M/□D** **CP32V2F/□D** —	**CP33V2/□D** **CP33V2M/□D** **CP33V2F/□D** —	**CP34V2/□D** **CP34V2M/□D** **CP34V2F/□D** —
Switch type		**CP31V4/30**	**CP32V4/30**	**CP33V4/30**	**CP34V4/30**
Switch type With auxiliary switch		**CP31V4/30W**	**CP32V4/30W**	**CP33V4/30W**	**CP34V4/30W**

Notes: □ Enter the rated current in the □ mark of the type number.
0.05A: 0.05, 0.1A: 0.1, 0.25A: 0.25.....30A: 30
• When ordering types with auxiliary switch (**W1**) or alarm switch (**K1**), add suffix to type number.

■ Sockets (CP3□E only)

No. of poles	Circuit protector Type	Auxiliary contact	Alarm contact	Socket Type	Terminal cover Type
1-pole	CP31E, 31E4	–	–	**CP-S1**	**CP-T3**
	CP31E/ W, 31E4/ W	1NO	–	**CP-S1A**	
		1NC	–	**CP-S1B**	
	CP31E/K	–	1NC	**CP-S1A**	
		–	1NO	**CS-S1B**	
2-pole	CP32E, 32E4	–	–	**CP-S2**	
	CP32E/W, 32E4/W	SPDT	–	**CP-S2C**	
	CP32E/K	–	SPDT		



AF91-566

■ Type number nomenclature

CP3 1 E 2 M / □ W D DC N (AC 200V)

Basic type
CP3□E ( ), CP3□V (, IEC)

Number of poles
1: 1-pole 3: 3-pole
2: 2-pole 4: 4-pole

Internal circuit
Blank: Series trip type
2: Shunt trip type
3: Relay trip type (Current trip) *
4: Switch type
5: Relay trip type (Shunt trip) *
6: Dual coil *
* for CP3□E only

Operating characteristics
Blank: Long time delay
M: Medium time delay
F: Short time delay
I: Instantaneous

Rated current

0.05: 0.05A	2: 2A	10: 10A
0.1: 0.1A	2.5: 2.5A	15: 15A
0.25: 0.25A	3: 3A	20: 20A
0.5: 0.5A	5: 5A	25: 25A
0.75: 0.75A	7.5: 7.5A	30: 30A
1: 1A		

Rated tripping voltage
(for CP3□E5 and CP3□E6 only)
- Relay trip type (shunt trip type) / CP3□E5
  200V, 100V, 48V, 24V AC 50/60Hz or DC
- Dual coil type / CP3□E6
  100V, 50V, 32V, 24V, 12V, 6V AC 50/60Hz or DC

Main terminal
Blank: Tab terminal
N: Screw terminal (series trip type and switch type)
P: Printed board type (CP3□E only)

Circuit voltage
Blank: AC circuit
DC: DC circuit

Inertia delay device
Blank: Without inertia delay device
D: With inertia delay device
(Except instantaneous type)

Accessories
Blank: Without accessories
W: With standard auxiliary switch
(For series and switch types)
W1: With auxiliary switch for low level circuit
K: With standard alarm switch (For series type)
K1: With alarm switch for low level circuit

■ Ordering information

Specify the following:
1. Type number
(Including rated tripping voltage)

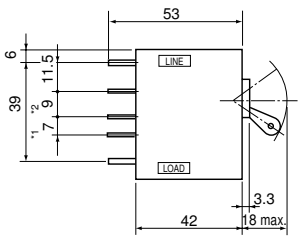
MSA CONTROL - (11) 3961-1171 - comercial@msacontrol.com.br

■ Dimensions, mm

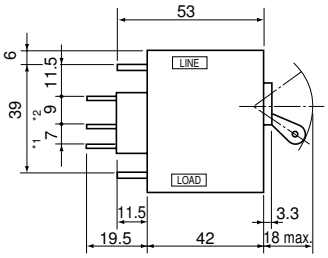
• Series trip and switch types

Tab terminal

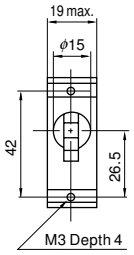
CP31E, CP31E4



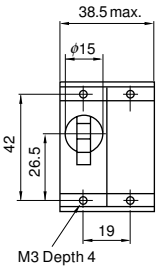
CP31V, CP31V4



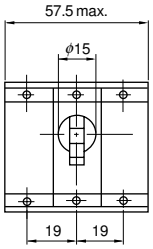
1-pole



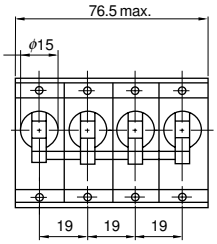
2-pole



3-pole

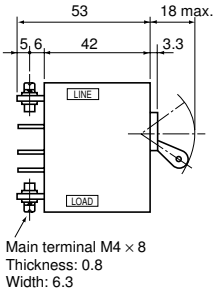


4-pole

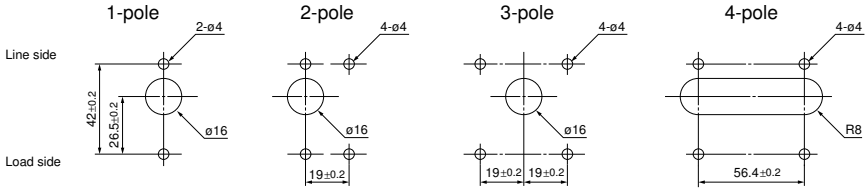


*1 With auxiliary switch (W1), With alarm switch (K1) : 6
*2 With auxiliary switch (W1), With alarm switch (K1) : 10

Screw terminal

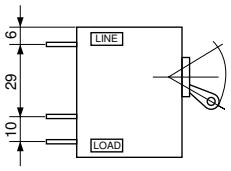


Panel drilling



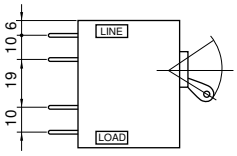
• Shunt trip type

Tab terminal

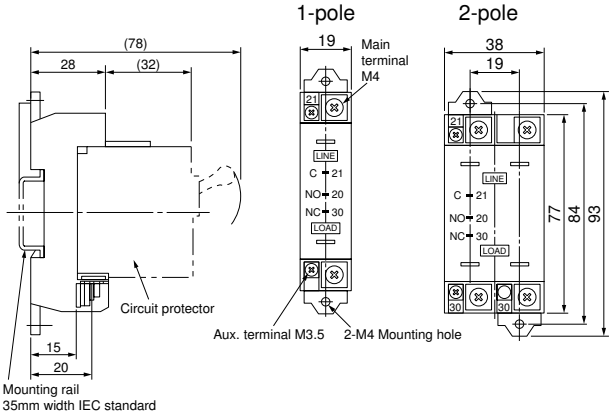


• Relay trip type (CP-E only)

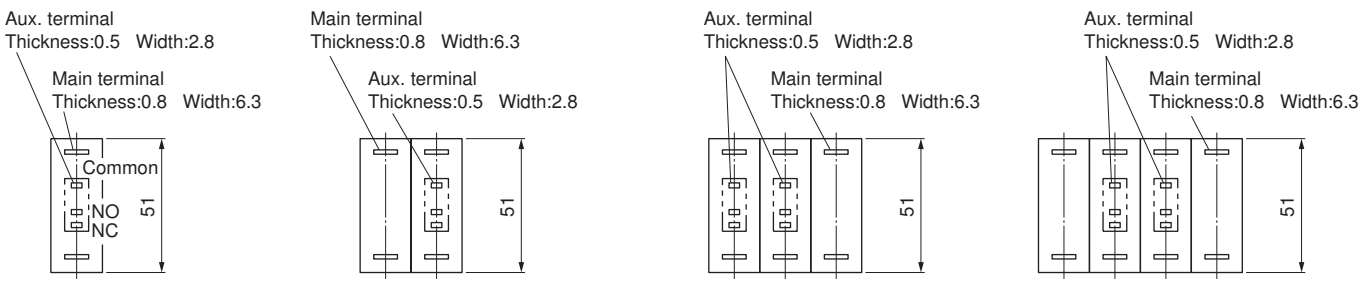
Tab terminal



Socket for rail mounting (CP-E/Series trip and switch types)

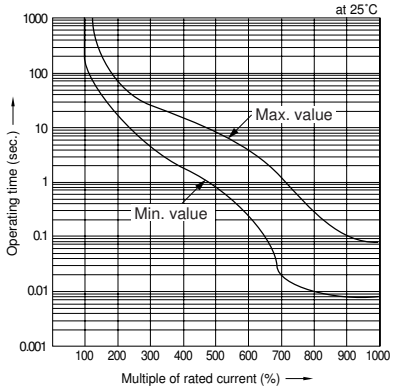


Terminal arrangement

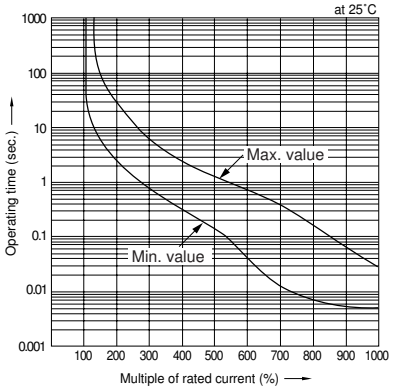


■ Characteristic curves

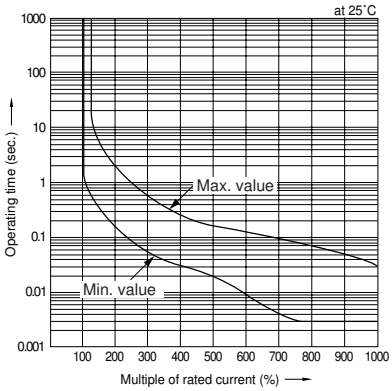
AC circuit
Long time dealy (S)



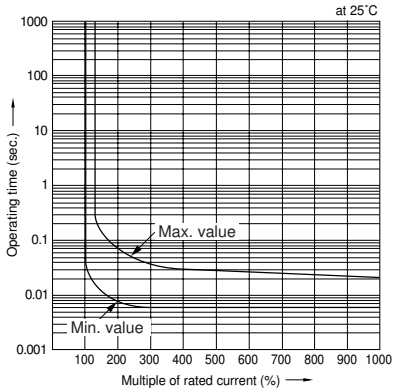
Medium time delay (M)



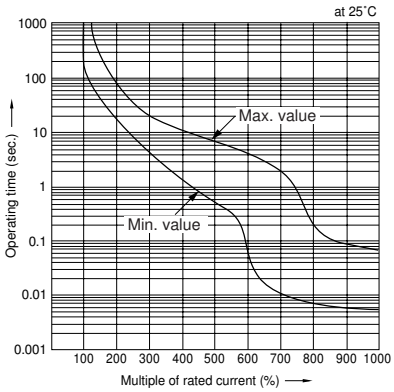
Short time delay (F)



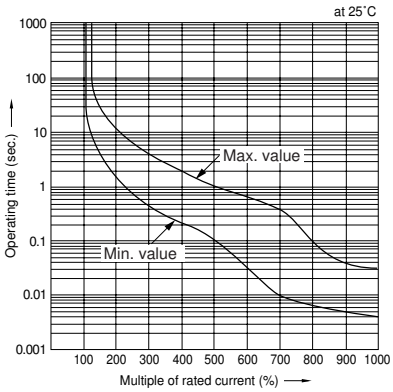
AC circuit
Instantaneous (I)



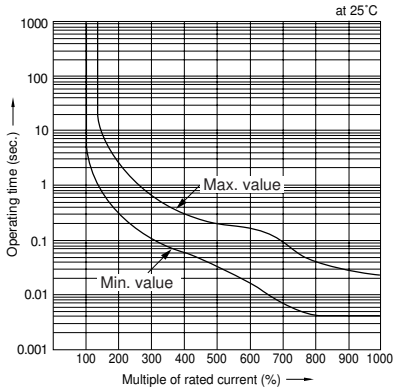
DC circuit
Long time delay



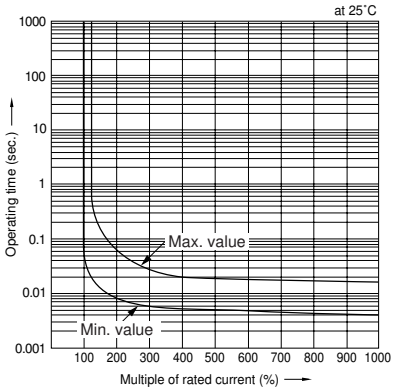
Medium time delay (M)



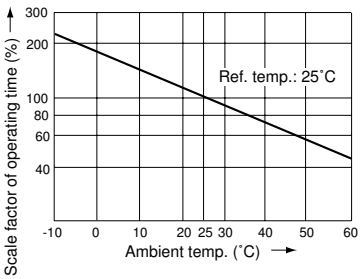
DC circuit
Short time delay (F)



Instantaneous (I)

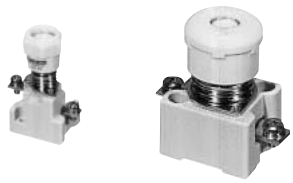


Ambient temperature compensation



■ Description

FUJI low voltage current-limiting fuses are designed to give protection to power supply and distribution circuits and equipment such as motor starter and semiconductors.
Since they can be supplied in a variety of types and ratings any circuit capacities can be accurately matched.
FUJI current-limiting fuses have a high interrupting capacity and will prevent thermal and mechanical damage from heavy short circuits.



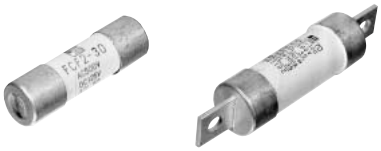
AF97-635,634

AFaC and BaC type current-limiting fuses

These fuses have a high interrupting capacity of 100kA at 600V AC or DC and are suitable for power and control circuits. The fuse is a plug-in type, and it can easily be replaced by removing a screw cap.

■ **Rated current:** 3 – 400 Amps

For further information see page 08/26.



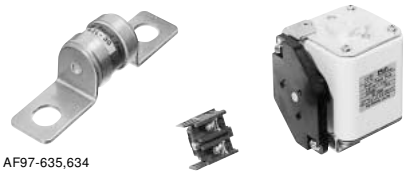
AF97-642

FCF and FCK type current-limiting fuses

These fuses are provided with special links with low-temperature melting characteristics, and are suitable for general power circuits because of their high interrupting capacity and good current-limiting performance.
They are available in two types, a center-blade type and a solid ferrule type, with an insulated fuse body of high quality porcelain.

■ **Rated current:** 1 – 600 Amps

For further information see page 08/29.



AF97-635,634

BLC, CR and CS type Super Rapid Fuses

These fuses are used exclusively for the protection of semiconductors, thyristors and silicon diodes. Since their total clearing I^2t is very small protective coordination with semi-conductors is very easily carried out.

■ **Rated current:**
BLC type: 12 – 140 Amps
CR type: 30 – 600 Amps
CS type: 40 – 4700 Amps

For further information see page 08/31.

■ Quick selection table

(CS fuse: Typical value)

Series	Voltage	Interrupting capacity rms sym (kA) 20 35 50 100 200	Application
AFaC	600V AC DC	3 to 100 Amps	General use
BaC		125 to 200 Amps	
		250 to 400 Amps	
FCF	500V AC	1 to 60 Amps	General use
FCK	500V AC	3 to 600 Amps	
BLC	550V AC	12 to 140 Amps	Semi-conductor protection
CR2L(S)	250V AC	10 to 600 Amps	
CR6L	600V AC	20 to 600 Amps	
CS5F	500V AC	40 to 1500 Amps	
CS10F	1000V AC	80 to 1500 Amps	
CS15F	1500V AC	450 to 1250 Amps	

08

AFaC and BaC type current-limiting fuses

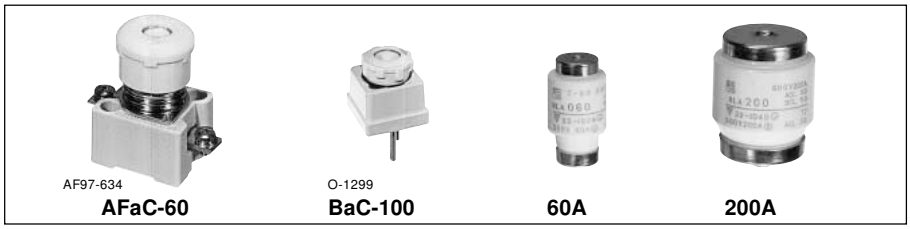
600V AC/DC, 3–400 Amps

■ Description

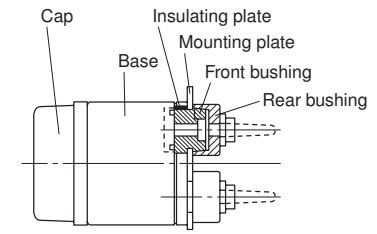
The AFaC and BaC type have an excellent current-limiting performance with an interrupting capacity as high as 100kA at 600V AC/DC. They are suitable for power circuits and control circuit applications including general power cubicles, distribution equipment, motor starters, load centers and control centers. The fuse assembly comprises base, screw cap, fuse link and adapter ring. The universal surface mounting terminals are provided with screws while the rear connection type are supplied with stud bolts. The fuse link can easily and safely be replaced by simply removing a screw cap.

The diameter of the solid ferrule fuse link varies according to the rated current. The higher the rating, the greater the diameter.

As a safety feature the screw cap can only be tightened when the fuse link matches with the adapter ring located inside the base. This prevents the cap from being tightened even when fuse link with larger ratings is inserted. The operating blown indication tip can be observed through the screw cap window. The tip color indicates the current rating – for instance, pink indicates 3A and red 10A. The tip is ejected to show that the fuse has blown. Both the base and the screw cap are made from a high class porcelain insulating material to ensure trouble-free operation. The fuse can be replaced without isolating the circuit. Since the fuse link is housed in a highly reliable porcelain barrel it is strong mechanically and thermally with no danger of explosion or production of noxious gases when blown.

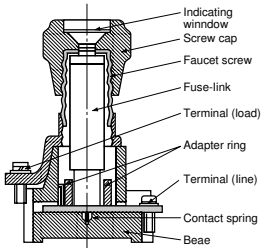


Rear connection type



Thickness of mounting plate: 3.2mm or less

Surface connection type



■ Components of AFaC and BaC type

Parts	 FA776		 SD-39	 SD-39	 SDO 0091M	 SD-63	
Rated current (A)	Fuse-link Type	Color of indicator	Screw cap Type	Base Surface connection Type	Rear connection Type	Adapter ring Type	Color of adapter ring
3	**BLA003**	Pink	**Pa30**	**AFa30**	**Ba30**	**R3**	Pink
5	**BLA005**	Brown				**R5**	Brown
10	**BLA010**	Red				**R10**	Red
15	**BLA015**	Gray				**R15**	Gray
20	**BLA020**	Blue				**R20**	Blue
30	**BLA030**	Violet				—	—
40	**BLA040**	Black	**Pa60**	**AFa60**	**Ba60**	**R40**	Black
60	**BLA060**	Light red				—	—
75	**BLA075**	Silver	**Pa100**	**AFa100**	**Ba100**	**R75**	Silver
100	**BLA100**	Red				—	—
125	**BLA125**	Yellow	**Pa200**	**AFa200**	**Ba200**	**R125**	Yellow
150	**BLA150**	Light red				**R150**	Light red
200	**BLA200**	Blue				—	—
250	**BLA250**	Green	**Pa400**	**AFa400**	**Ba400**	**R250**	Green
300	**BLA300**	White				**R300**	White
400	**BLA400**	Black				—	—

Minimum ordering quantity

• Fuse-link	BLA003 to 030	100 pcs.	• Base	AFa30	Ba30	100 pcs.
	BLA 040, 060	20		AFa60	Ba60	50
	BLA 075 to 200	10		AFa100	Ba100	10
	BLA 250 to 400	5		AFa200	Ba200	5
				AFa400	Ba400	1
• Screw cap	Pa30	100 pcs.	• Adapter ring	R3 to 20, R75		100 pcs.
	Pa60	50		R40, R125 to 300		50
	Pa100	10				
	Pa200	5				
	Pa400	1				

■ Specifications

Fuse-link Type	Rated current (A)	Rated voltage	Interrupting capacity (kA)	Max. interrupting I^2t (Amp^2 x sec.)	
BLA003	3	600V AC	100	28	
BLA005	5	DC		110	
BLA010	10			500	
BLA015	15		100	750	
BLA020	20			1.3	10^3
BLA030	30			5	10^3
BLA040	40		100	9.2	10^3
BLA060	60			27	10^3
BLA075	75		100	70	10^3
BLA100	100			100	10^3
BLA125	125		50	290	10^3
BLA150	150			390	10^3
BLA200	200			500	10^3
BLA250	250		20	1800	10^3
BLA300	300			2200	10^3
BLA400	400			3000	10^3

■ Ordering information

Specify the following:
1. Type number

Fuse-link
BLA 003

Rated current
Ex. 003 : 3 Amps
075 : 75 Amps
200 : 200 Amps

Fuse-link

Base
AFa 30

Frame size
30: For 3 to 30A
60: For 40, 60A
100: For 75, 100A
200: For 125, 150, 200A
400: For 250, 300, 400A

Connection
AFa: Surface
Ba : Rear

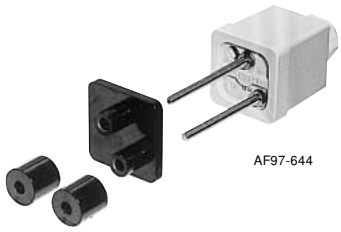
Screw cap
Pa 30

Frame size
30: For 3 to 30A
60: For 40, 60A
100: For 75, 100A
200: For 125, 150, 200A
400: For 250, 300, 400A

Screw cap

■ Mounting on steel panel

To mount a rear connection base Ba on a steel panel, an insulting plate and some bushings are used. Kits for 30, 60, 100, 200 and 400A base are available. Please specify your base type when ordering.
Two front bushings are used with 100, 200 and 400A base only.
Example: Insulating plate and bushings for Ba30



AF97-644

■ Tightening tool

It is recommended that fuses with ratings of over 100A be tightened with a special tool since there is the possibility of overheating if the screw cap is not adequately tightened. This exclusive use tool is sold separately.

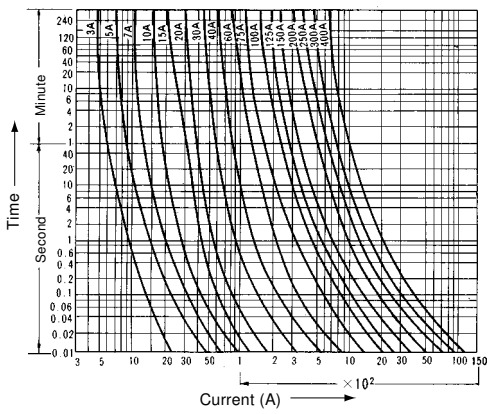
Type	Screw cap type
Pa100H	Pa100
Pa200H	Pa200
Pa400H	Pa400

AF90-316

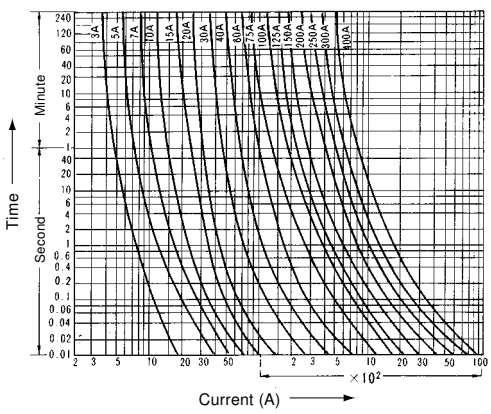
08

■ Characteristic curves

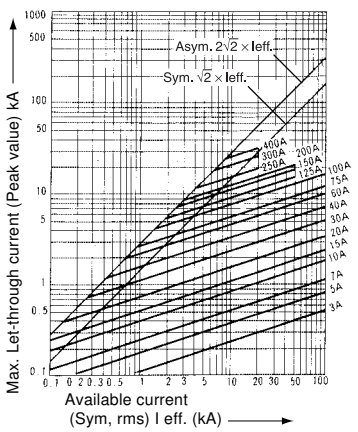
Melting time-current characteristic



Permissible time-current characteristic



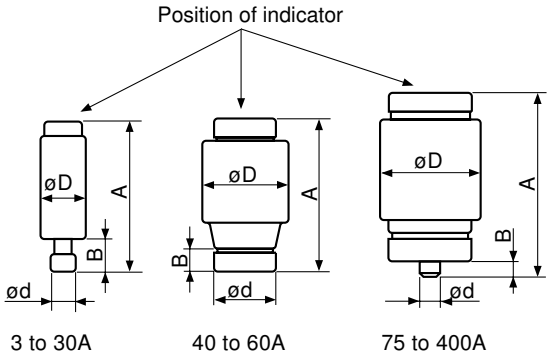
Current-limiting characteristic



MSA CONTROL - (11) 3961-1171 - comercial@msacontrol.com.br

■ Dimensions, mm

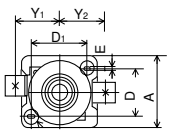
• Fuse-link



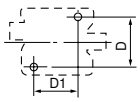
Type	Rated current (A)	A	B	øD	ød	Mass (g)
BLA003	3	50	10	13	8	12
BLA005	5	50	10	13	8	12
BLA010	10	50	10	13	8	12
BLA015	15	50	10	13	10	12
BLA020	20	50	10	13	10	12
BLA030	30	50	10	13	14	12
BLA040	40	50	10	27	16	47
BLA060	60	50	10	27	20	62
BLA075	75	63	5.4	34	5	120
BLA100	100	63	5.4	34	8	120
BLA125	125	63	5.4	47	5	215
BLA150	150	63	5.4	47	8	215
BLA200	200	63	5.4	47	10	215
BLA250	250	63	5.4	61	5	380
BLA300	300	63	5.4	61	8	380
BLA400	400	63	5.4	61	10	380

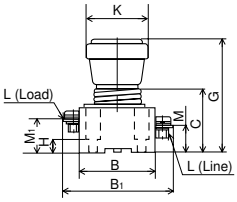
• Base and cap

Surface connection
AFaC-3 to 200



Panel drilling

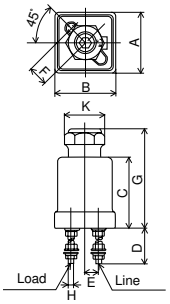


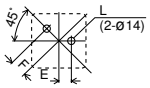


Type	A	B	B1	C (max.)	D	D1	øE	G (max.)	H	K	L	M	M1	Y1	Y2	Mass (g)
AFaC-3 to 30	34	42	55	46.5	24	22	5	78.5	10	32	M5	18	24	22	22	100
AFaC-40 to 60	52	59	82	51	34	38	5.5	88	10	47	M6	21	26	33	33.5	290
AFaC-75 to 100	67	87	125	71	40	64	7	118	28	72	M8	27.5	29.5	50	50	950
AFaC-125 to 200	77	107	150	73	51	82	7	120	28	87	M10	34	35	60	59.5	1465

Rear connection
BaC-3 to 200

Panel drilling



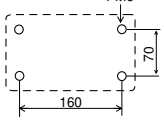


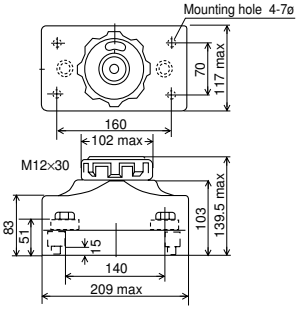
Type	A (max.)	B (max.)	C	D	E	F	G (max.)	H	K (max.)	øL	Mass (g)
BaC-3 to 30	47	47	52	62	10	14	78.5	M5	32	6(14)	220
BaC-40 to 60	66	66	54	65	18	22.5	87.5	M6	47	7(14)	470
BaC-75 to 100	85.5	85.5	71	70	22	30	112.5	M8	72	9(25)	1200
BaC-125 to 200	112	112	78	75	28	39	120	M10	87	11(25)	2115

( ): In the case the steel plate is used.

Surface connection
AFaC-250 to 400
Mass: 4.37kg

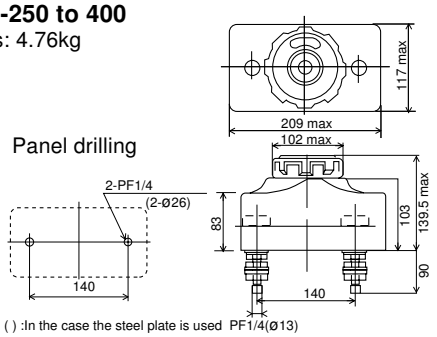
Panel drilling





Rear connection
BaC-250 to 400
Mass: 4.76kg

Panel drilling



( ) :In the case the steel plate is used PF1/4(ø13)

FCF, FCK type current-limiting fuses
500V AC
FCF Up to 60 Amps
FCK Up to 600 Amps

■ Description

FCF and FCK HRC fuses use a specially designed low-temperature melting element, a feature of 'dual element' fuses. There is no fuse deterioration due to overcurrent phenomena such as rush current at the time of motor starting and they also feature time-lag operation characteristics. They operate rapidly and positively in the face of destructive short circuit currents. Since they are current-limiting fuses with a high capacity of 50kA (FCF types: 1 – 60 Amps) they are suitable for many types of power and control circuits. The fuse link is housed in a ceramic barrel with excellent thermal and mechanical characteristics and is packed in silica sand which prevents arcing. Thus there are no fears of explosion or production of noxious gases. The FCF's link end is a solid ferrule-type and available in 1 – 60 Amps ratings. The FCK is a center blade-type and available in 3 – 600 Amps ratings. The fuse links for the 75 Amps FCK and larger sizes are provided with a blown fuse indicator.


FCF series fuse-link


SD-240
FCK series fuse-link


AF97-643
Blown fuse indicator


T-7

■ Ordering information

Specify the following:
1. Type number

FCF series

Rated current (A)	Interrupting capacity (kA)	Fuse-link Type
1	50	**FCF2-1**
3		**FCF2-3**
5		**FCF2-5**
10		**FCF2-10**
15		**FCF2-15**
20		**FCF2-20**
30		**FCF2-30**
40		**FCF2-40**
50		**FCF2-50**
60		**FCF2-60**

Note: Minimum ordering quantity
Fuse-link: 100 pcs.

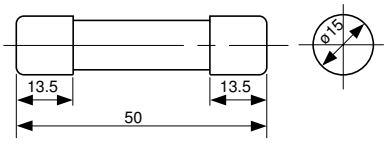
FCK series

Rated current (A)	Interrupting capacity (kA)	Fuse-link Type
3	35	**FCK2-3**
5		**FCK2-5**
10		**FCK2-10**
15		**FCK2-15**
20		**FCK2-20**
30		**FCK2-30**
40		**FCK2-40**
50		**FCK2-50**
60		**FCK2-60**
75		**FCK2-75**
100		**FCK2-100**
125		**FCK2-125**
150		**FCK2-150**
200		**FCK2-200**
250		**FCK2-250**
300		**FCK2-300**
400		**FCK2-400**
500		**FCK2-500**
600		**FCK2-600**

Note: Minimum ordering quantity
Fuse-link: 100 pcs.

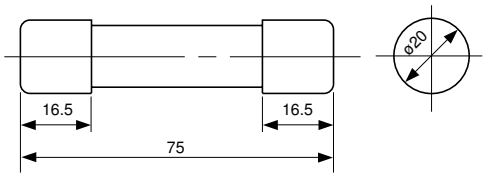
■ Dimensions, mm

● **Fuse-link**
FCF2-1 to 30



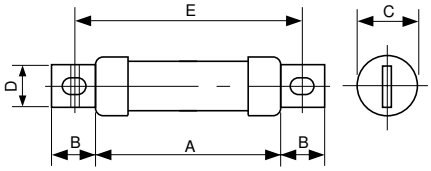
Mass: 20g

FCF2-40 to 60



Mass: 80g

● **Fuse-link**
FCK2-3 to 600

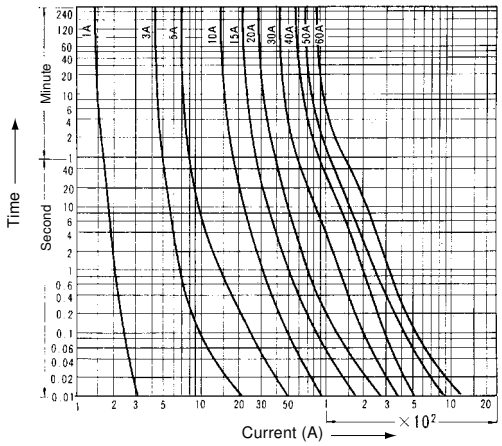


Type	A	B	C	D	E	Mass (g)
FCK2-3 to 30	50	15	ø19.8	13	66.5	35
FCK2-40 to 60	75	19	ø24.9	16	96	95
FCK2-75, 100	95	25	ø31	20	122.5	180
FCK2-125 to 200	110	35	ø45	30	148.5	470
FCK2-250 to 400	120	50	ø63	40	170	1100
FCK2-500, 600	145	60	ø75	50	205	2000

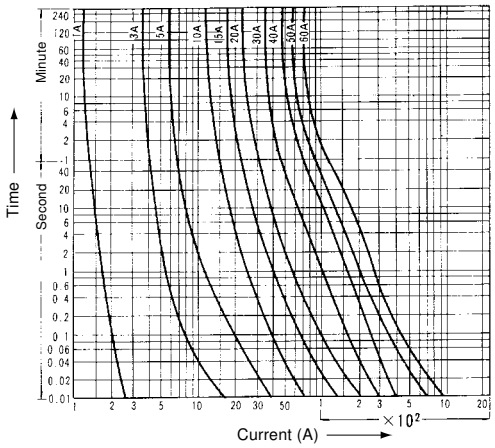
■ Characteristic curves

● FCF type

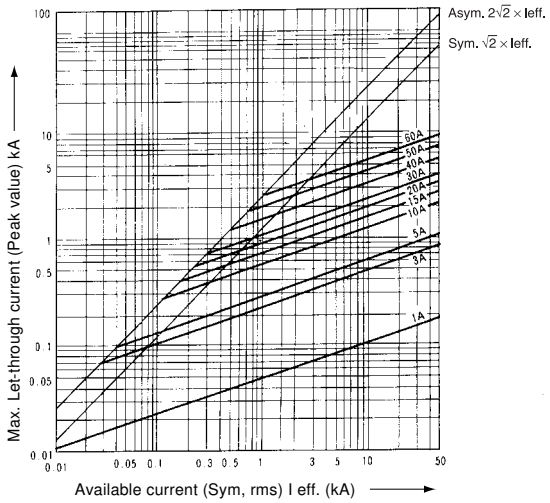
Melting time-current characteristic



Permissible time-current characteristic

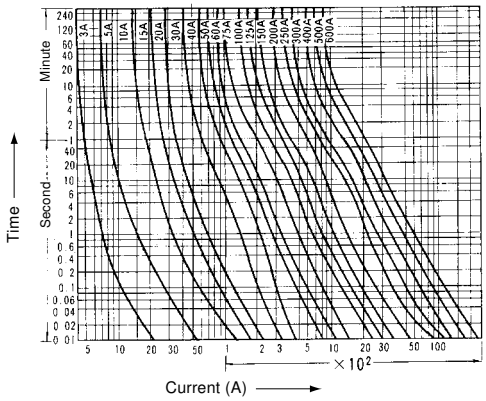


Current limiting characterisitc

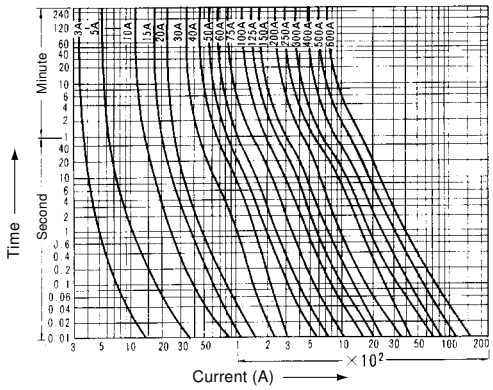


● FCK type

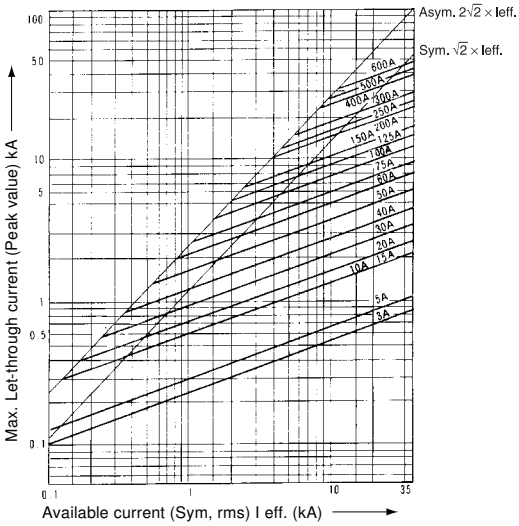
Melting time-current characteristic



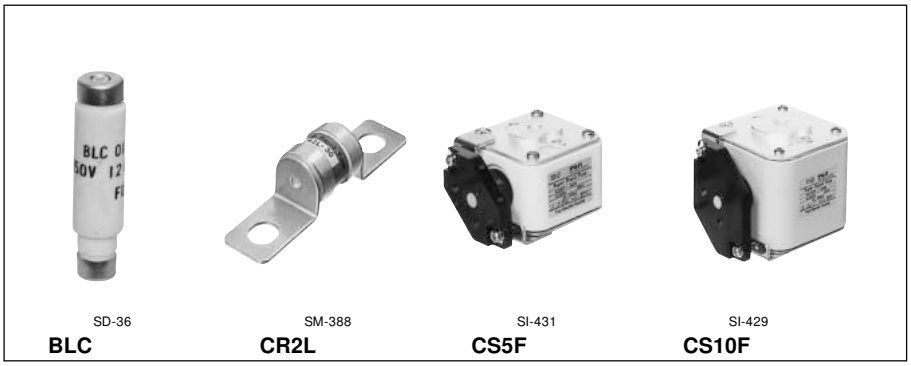
Permissible time-current characteristic



Current limiting characterisitc



BLC, CR and CS types
Super Rapid Fuses
150–1500 Volts AC
10–4700 Amps



■ Description
The FUJI BLC, CR and CS types are extremely reliable fuses which have been specially developed to provide protection for silicon diodes and thyristors and are suitable for inverters using semiconductors or transformers-rectifiers. FUJI Super Rapid Fuses are designed with a very small total I^2t value which gives them a high speed interrupting action in the face of abnormal currents.
In addition the arc voltage generated at the time of interruption has a low value so that faults will not influence related electric machinery and equipment.
These fuses can carry out the protection of many types of circuits rating from the semiconductor overcurrents to destructive short-circuiting faults-i.e. when the semiconductors short or circuits fail the sound elements will be quickly isolated from the fault circuits.

■ Features
- The total clearing I^2t is small and the semiconductor circuit is completely protected.
- Since the peak arc voltage at the time of interruption is low damage to other equipment does not occur.
- High interrupting capacity of 200kA at 1000V AC
- The CS type is provided with a blown fuse indicator. An alarm contact block (1NO or 1NC) can also be attached.

■ **UL recognized**: CR2L/UL,CR2LS/UL, CR6L/UL
(File No. E92312)
CSA certificated: CR2LS/UL
(File No. LO4000-4090)
TÜV: CR2LS/UL (10-100A),
CR2L/UL (150-350A)
(Rep. No. E9450643E02)
CR6L/UL (50-300A)
(Rep. No. E9560543E02)

■ Specifications

Rated current (A)	Rated voltage	Peak arc voltage (V)	Max. interrupting I^2t (Amp² sec.) 10^3	Watt loss (W)	Fuse-link Type
12	550V AC	1550	0.09	5.1	**BLC012-1**
20		1550	0.27	8.5	**BLC020-1**
23		1550	0.39	10	**BLC023-1**
45		1380	1.8	19	**BLC045-1**
75		1250	5	32	**BLC075-1**
90		1250	11.5	38	**BLC090-1**
120		1200	33	51	**BLC120-1**
140		1200	100	59	**BLC140-1**
30	250V AC	Max. 500	0.35	4.0	**CR2L-30**
50			0.85	6.0	**CR2L-50**
75			2.3	9.0	**CR2L-75**
100			4.0	12.0	**CR2L-100**
125			6.5	14.0	**CR2L-125**
140			7.0	16.0	**CR2L-140**
150			9.5	18.0	**CR2L-150**
175			13	21.0	**CR2L-175**
200			17	23.0	**CR2L-200**
225			22	26.0	**CR2L-225**
260			27	30.0	**CR2L-260**
300			38	35.0	**CR2L-300**
325			49	37.0	**CR2L-325**
350			60	37.0	**CR2L-350**
400			103	39.0	**CR2L-400**
450			140	46.0	**CR2L-450**
500			160	48.0	**CR2L-500**
550			200	51.0	**CR2L-550**
600			215	56.0	**CR2L-600**

Interrupting capacity
BLC ..... 100kA at 550V AC
CR2L .... 100kA at 250V AC

Rated current (A)	Rated voltage	Peak arc voltage (V)	Max. interrupting I^2t (Amp² sec.) 10^3	Watt loss (W)	Fuse-link Type
10	250V AC	Max. 500	0.04	1.2	**CR2LS-10**
20			0.17	3.0	**CR2LS-20**
30			0.35	4.0	**CR2LS-30**
50			0.85	6.0	**CR2LS-50**
75			2.3	9.0	**CR2LS-75**
100			4.0	12.0	**CR2LS-100**
20	600V AC	Max. 1200	0.14	4.0	**CR6L-20**
30			0.35	7.0	**CR6L-30**
50			1.8	9.0	**CR6L-50**
75			3.0	12.5	**CR6L-75**
100			7.0	15	**CR6L-100**
150			18	22.0	**CR6L-150**
200			30	34.0	**CR6L-200**
250			70	37.0	**CR6L-250**
300			95	40.0	**CR6L-300**
350			150	45.0	**CR6L-350**
400			200	55	**CR6L-400**
500			390	60	**CR6L-500**
600			700	70	**CR6L-600**

Interrupting capacity
CR2LS . 100kA at 250V AC
CR6L .... 100kA at 600V AC

■ Specifications

Rated current (A)	Inter-rupting capacity (kA)	Max. interrupting I^2t (Amp^2 sec.) 10^3	Watt loss (W)	Fuse-link Type
4700	150 at 125V AC	14000	310	**CS1F-4700**
2000	150 at	1950	124	**CS2F-2000**
3000	250V AC	5500	216	**CS2F-3000**
40	200 at	1	6.4	**CS5F-40**
75	500V AC	3.5	12	**CS5F-75**
100		5	17	**CS5F-100**
150		10	25	**CS5F-150**
200		18.5	34	**CS5F-200**
250		33	42	**CS5F-250**
300		64	45	**CS5F-300**
350		85	56	**CS5F-350**
400		122	57	**CS5F-400**
450		131	62	**CS5F-450**
500		159	73	**CS5F-500**
600		257	80	**CS5F-600**
800		600	114	**CS5F-800**
1000		1200	110	**CS5F-1000**
1000		843	167	**CS5F-1000-P**
1200		1800	114	**CS5F-1200**
1200		1311	200	**CS5F-1200-P**
1500		3600	209	**CS5F-1500**
1000	200 at	1800	125	**CS8F-1000**
1200	800V AC	2500	176	**CS8F-1200**
1500		4400	220	**CS8F-1500**
80	200 at	10	17	**CS10F-80**
100	1000V AC	16	21	**CS10F-100**
150		37	27	**CS10F-150**
200		63	37	**CS10F-200**
250		110	44	**CS10F-250**
300		148	53	**CS10F-300**
350		211	70	**CS10F-350**
400		307	74	**CS10F-400**
500		420	90	**CS10F-500**
560		410	102	**CS10F-560**
630		450	135	**CS10F-630**
750		640	156	**CS10F-750**
800		1259	211	**CS10F-800-P**
1000		1722	245	**CS10F-1000-P**
1250		2250	330	**CS10F-1250-P**
1500		3200	334	**CS10F-1500-C**
450	100 at	350	134	**CS15F-450**
630	1500V AC	760	170	**CS15F-630**
900		1400	280	**CS15F-900-P**
1250		3050	350	**CS15F-1250-P**

Note:
- Peak arc voltage
  CS1F ..... Max. 450V
  CS2F ..... Max. 750V
  CS5F ..... Max. 1000V
  CS8F ..... Max. 2000V
  CS10F ... Max. 2000V
  CS15F ... Less than 3000V
- An alarm contact block AHX2905 (1NO) or AHX2915 (1NC) can be attached to CS type. (Sold separately) *See page 08/40.*

Note: UL recognized fuse
In the UL recognized fuses, a fuse with a blown inidcation fuse, or a fuse both with a blown indication fuse and a precision switch is also UL recognized.
Examples: CR2L-200G/UL
CR2LS-30S/UL
CR6L-100G/UL

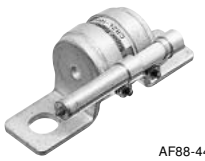
■ Specifications (UL-recognized, CSA certified, TÜV)

Rated current (A)	Rated voltage	Inter-rupting capacity (kA)	Max. interrupting I^2t (Amp^2 sec.) 10^3	Watt loss (W)	Fuse-link Type
10	250V AC	10 at AC	0.04	1.2	**CR2LS-10/UL**
20	400V DC	(pf: 0.8)	0.17	3.0	**CR2LS-20/UL**
30		10 at DC	0.35	4.0	**CR2LS-30/UL**
50		(L/R: 2ms)	0.85	6.0	**CR2LS-50/UL**
75			2.3	9.0	**CR2LS-75/UL**
100			4.0	12.0	**CR2LS-100/UL**
150			9.5	18.0	**CR2L-150/UL**
200			17	23.0	**CR2L-200/UL**
260			27	30.0	**CR2L-260/UL**
350			60	37.0	**CR2L-350/UL**
400			103	39.0	**CR2L-400/UL**
450			140	46.0	**CR2L-450/UL**
500			160	48.0	**CR2L-500/UL**
550			200	51.0	**CR2L-550/UL**
600			215	56.0	**CR2L-600/UL**
20	600V AC	100 at AC	0.14	4.0	**CR6L-20/UL**
30	680V DC	(pf: 0.8) 10 at DC (L/R: 2ms)	0.35	7.0	**CR6L-30/UL**
50			1.8	9.0	**CR6L-50/UL**
75			3.0	12.5	**CR6L-75/UL**
100			7.0	15.0	**CR6L-100/UL**
150		100 at AC (pf: 0.8)	18	22.0	**CR6L-150/UL**
200		50 at DC (L/R: 2ms)	30	34.0	**CR6L-200/UL**
300			95	40.0	**CR6L-300/UL**

Note:
- Peak arc voltage
  CR2LS, CR2L .... Max. 500V
  CR6L ..... Max. 1200V
- The peak arc voltage is obtained by interruption caused by the listed interrupting current at rated voltage.
- This indcates the values when the conductors specified in UL Standards are connected and rated current apply.
- TÜV: CR2LS, 2L: Up to 350A
  CR6L: 50 to 300A

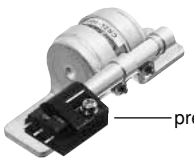
■ CR type fuse with optional accessory

Fuse with blown indication fuse
CR2L (S)- □ G



AF88-446

Fuse with blown indication fuse and precision switch
CR2L (S)- □ S



AF88-445

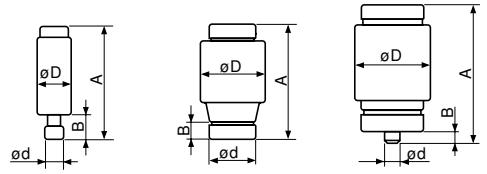
Precision switch (SPDT)
CRX-1

AF88-442

■ Dimensions, mm

• BLC

BLC012, 020, 023 **BLC045** **BLC075 to 140**



Type	Rated current (A)	A	B	øD	ød	Color of indicator	Mass (g)
BLC012-1	12	50	10	13	10	Grey	12
BLC020-1	20	50	10	13	14	Yellow	12
BLC023-1	23	50	10	13	14	Violet	12
BLC045-1	45	50	10	27	20	White	62
BLC075-1	75	63	6	34	5	Silver	120
BLC090-1	90	63	6	34	8	Red	120
BLC120-1	120	63	6	47	8	Yellow	120
BLC140-1	140	63	6	47	8	Light red	215

Note: The BLC type fuse link requires a holder in use. The size of the holder differs according to the fuse ratings. Select the most suitable one after referring to the Table on *page 08/40*.
For drawings see *page 08/28*.

■ Ordering information

Specify the following:
1. Type number

■ Type number nomenclature

BLC 012-1

Rated current: 12 to 140A
Plug-in type super rapid fuse

CS 10F-1000 □-P/ UL

UL recognized (CR2L, CR2LS, CR6L)
CSA certificated (CR2LS)
TÜV (CR2LS, CR2L, CR6L)

2-fuse connected parallel

Optional accessory *(See page 08/44)*
G: With blown indication fuse
S: With blown indication fuse and precision switch

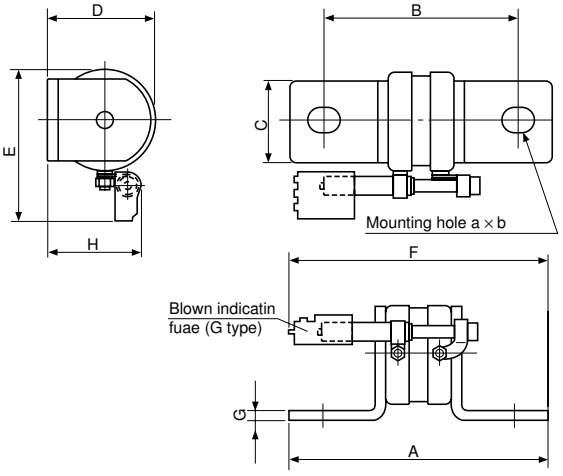
Rated current
10 to 4700A

Rated voltage

2L, 2LS:	250V AC,	6L:	600V AC
1F:	150V AC,	2F:	250V AC
5F:	500V AC,	8F:	800V AC
10F:	1000V AC,	15F:	1500V AC

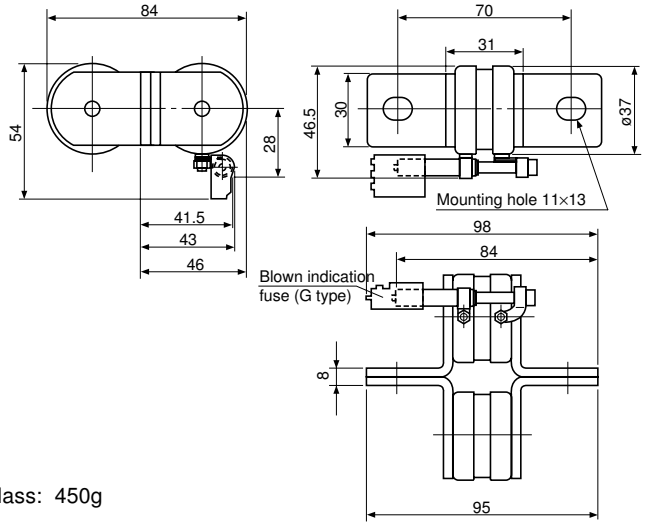
CR: Barrel-shaped super rapid fuse
CS: Cubic-shaped super rapid fuse

• CR2L-450 or smaller, CR2LS



Type	A	B	C	D	E	a	b	F	G	H	Mass
CR2L-30 CR2L-50	80	58	18	21.5	37	9	11	90	1.5	26.5	42g
CR2L-75 CR2L-100 CR2L-125 CR2L-140 CR2L-150 CR2L-175	80	58	20	30.5	44	9	11	90	3	32.5	100g
CR2L-200 CR2L-225 CR2L-260 CR2L-300 CR2L-325	85	60	25	33.5	47	11	13	93	3.2	33.5	130g
CR2L-350 CR2L-400 CR2L-450	95	70	30	42	54	11	13	98	4	39	220g
CR2LS-10 CR2LS-20 CR2LS-30 CR2LS-50 CR2LS-75 CR2LS-100	56	42	12	18.5	34.5	6.5	8.5	78	2	25	28g

• CR2L-500 to -600



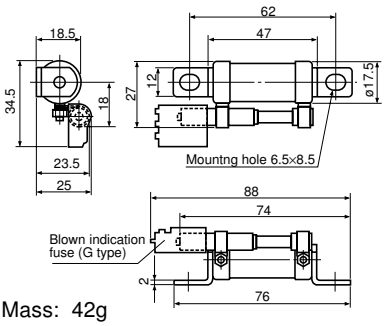
Mass: 450g

Dimensions for reference only. Confirm before construction begins.

Note: The dimensions of the fuses with suffix. UL are the same as those of the standard ones.

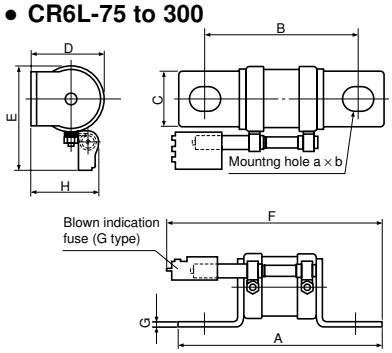
■ Dimensions, mm

• CR6L-20, CR6L-30, CR6L-50

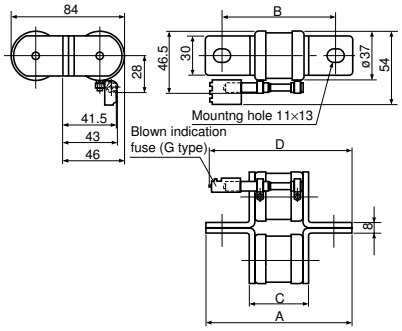


Mass: 42g

• CR6L-75 to 300



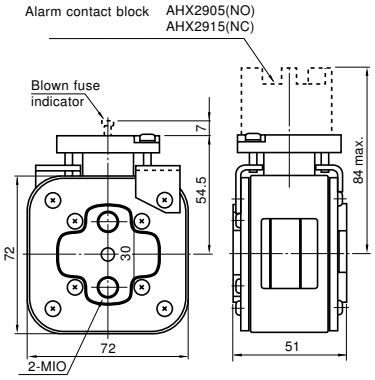
• CR6L-350 to 600



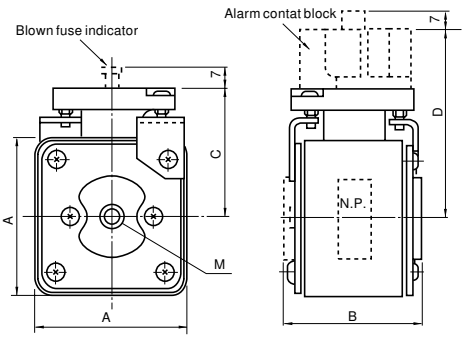
Type	A	B	C	D	E	F	G	H	a	b	Mass (g)
CR6L-75 CR6L-100 CR6L-150	95	70	25	34	47	102	3.2	33.5	11	13	150
CR6L-200 CR6L-250 CR6L-300	107	82	30	42	54	107	4	39	11	13	246

Type	A	B	C	D	Mass (g)
CR6L-350	107	82	43	107	493
CR6L-400 CR6L-500	121	96	43	114	522
CR6L-600	121	96	47.4	114	545

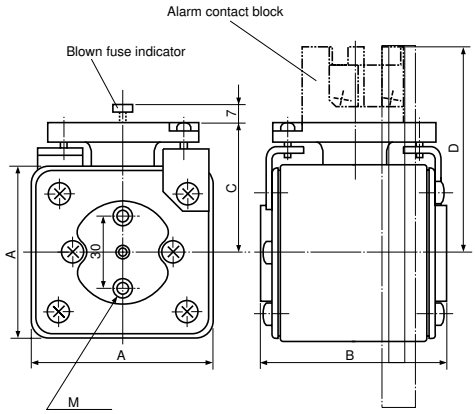
• CS1F-4700
CS2F-2000, 3000



• CS5F-40 to 1500
CS10F-80 to 750
CS15F-450, 630



• CS8F-1000, 1200, 1500



Mass: 800g

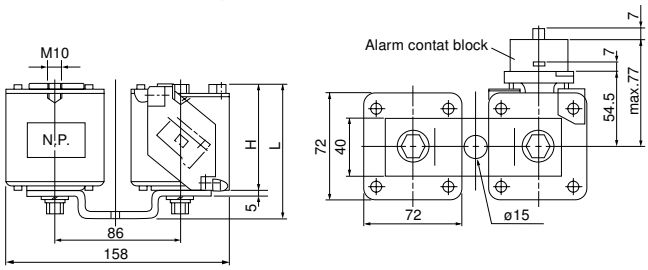
Voltage	Type	A	B	C	D (Max.)	M	Mass (g)
500V	CS5F-40 CS5F-75 CS5F-100 CS5F-150 CS5F-200	47	47	42.5	65.5	M8	320
	CS5F-250 CS5F-300 CS5F-350	57	51	47	70	M8	510
	CS5F-400 CS5F-450 CS5F-500 CS5F-600 CS5F-800	72	51	54.5	77	M10	800
	CS5F-1000 CS5F-1200 CS5F-1500	72	51	54.5	77	M12	830

Voltage	Type	A	B	C	D (Max.)	M	Mass (g)
800V	CS8F-1000 CS8F-1200	72	74	54.5	84	M12	1060
	CS8F-1500	72	82	54.5	84	M8	1150
1000V	CS10F-80 CS10F-100	47	71	42.5	65.5	M8	420
	CS10F-150 CS10F-200 CS10F-250	57	74	47	70	M8	690
	CS10F-300 CS10F-350 CS10F-400 CS10F-500 CS10F-630 CS10F-750	72	74	54.5	77	M10	1060
1500V	CS15F-450 CS15F-630	72	105	54.7	77	M10	1400

MSA CONTROL - (11) 3961-1171 - comercial@msacontrol.com.br

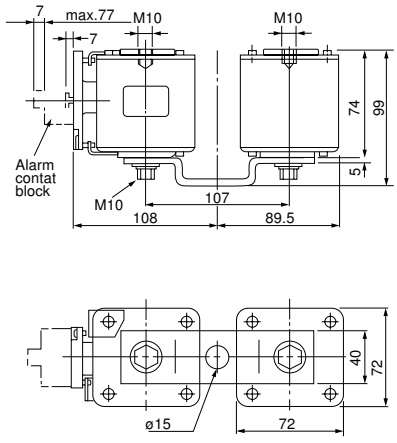
■ Dimensions, mm

• CS5F-P CS10F-P, CS15F-P



Voltage	Type	H	L	Mass (g)
500V	CS5F-1000-P CS5F-1200-P	51	69	1900
1000V	CS10F-800-P CS10F-1000-P CS10F-1250-P	74	92	2420
1500V	CS15F-900-P CS15F-1250-P	105	123	3100

• CS10F-1500-C

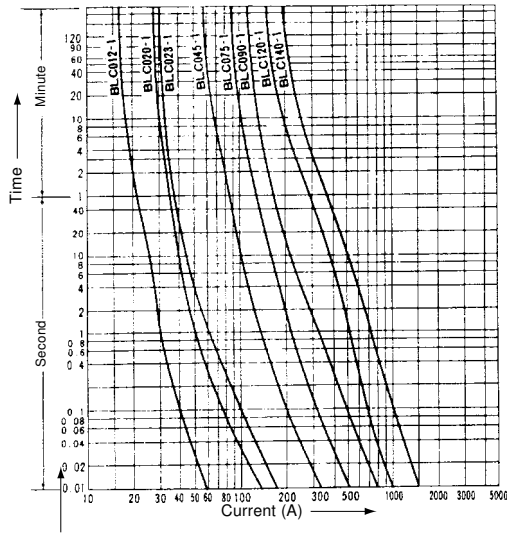


Mass: 2500g

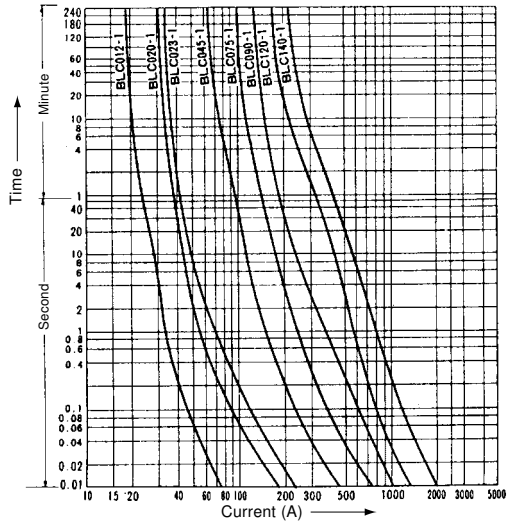
■ Characteristic curves

BLC

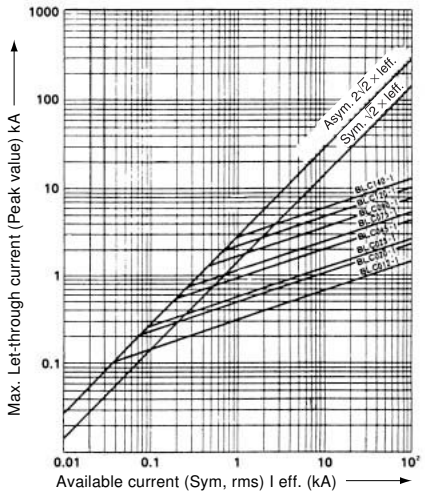
Melting time-current characteristic



Operating time-current characteristic



Current-limiting characteristic

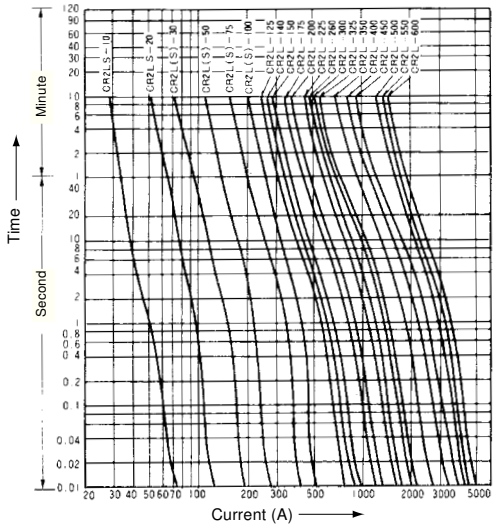


08

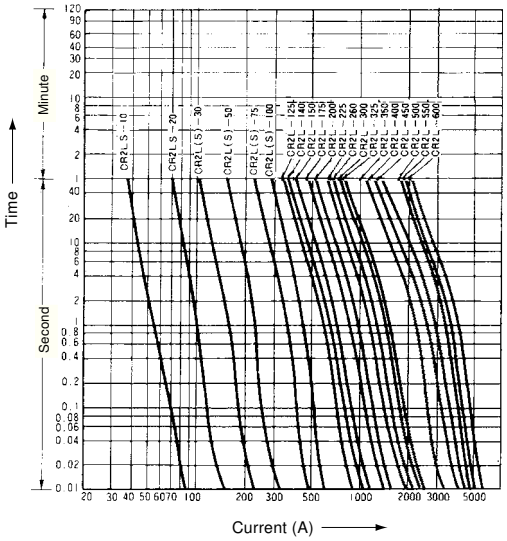
MSA CONTROL - (11) 3961-1171 - comercial@msacontrol.com.br

■ Characteristic curves

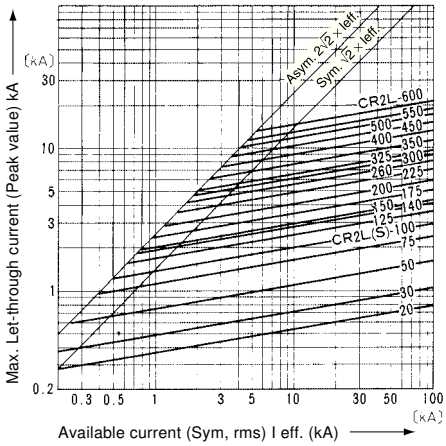
CR2L, CR2LS
Melting time-current characteristic



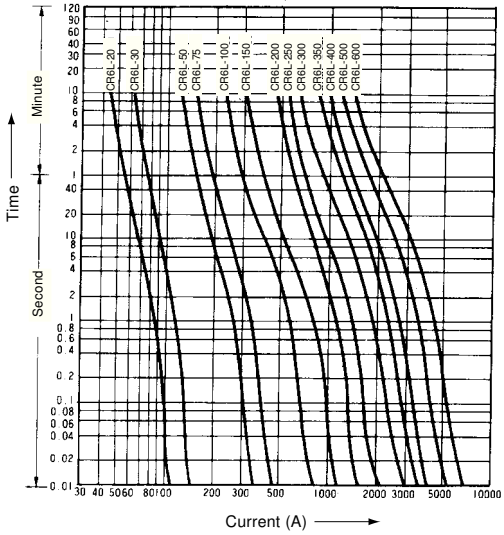
Operating time-current characteristic



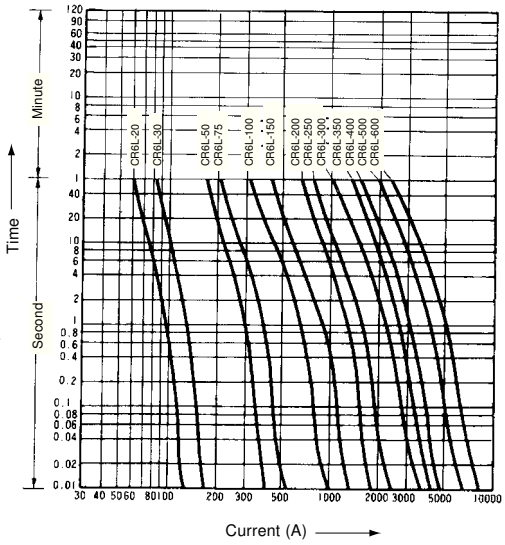
Current-limiting characteristic



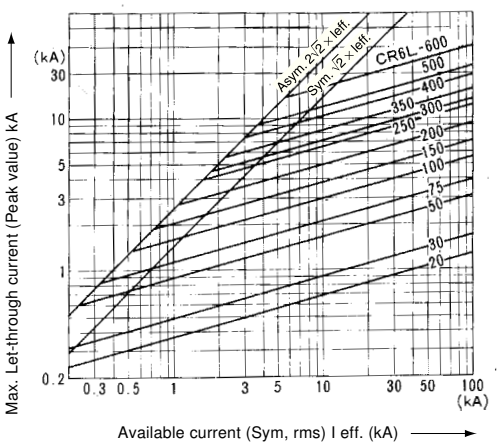
CR6L
Melting time-current characteristic



Operating time-current characteristic



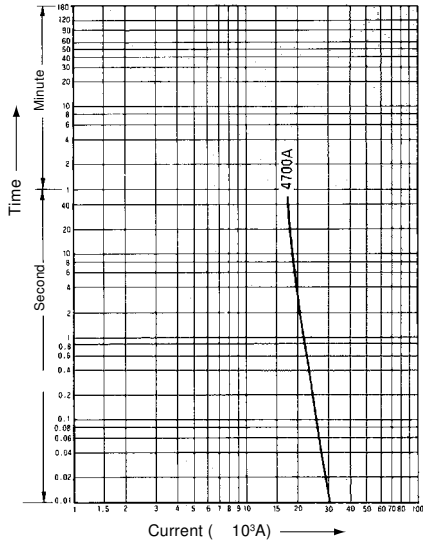
Current-limiting characteristic



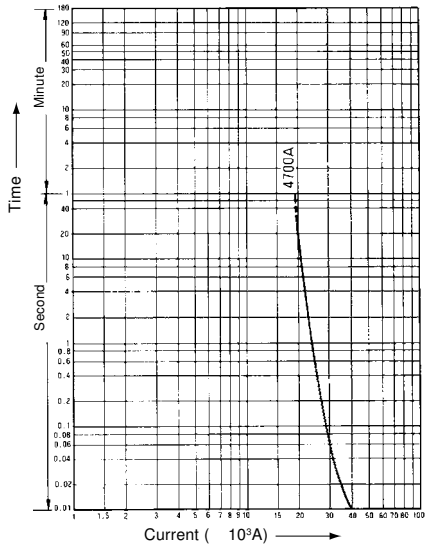
■ Characteristic curves

CS1F

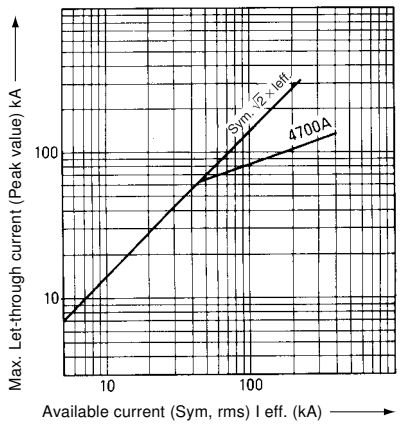
Melting time-current characteristic



Operating time-current characteristic

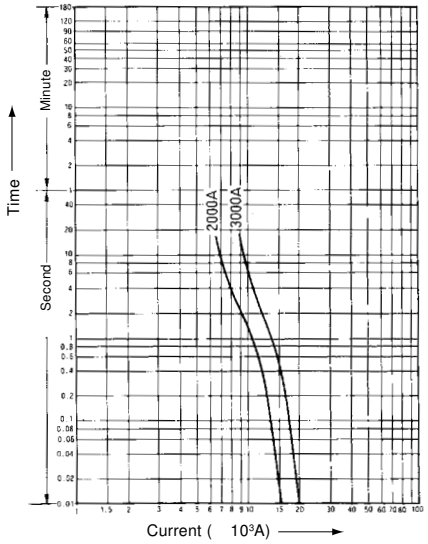


Current-limiting characteristic

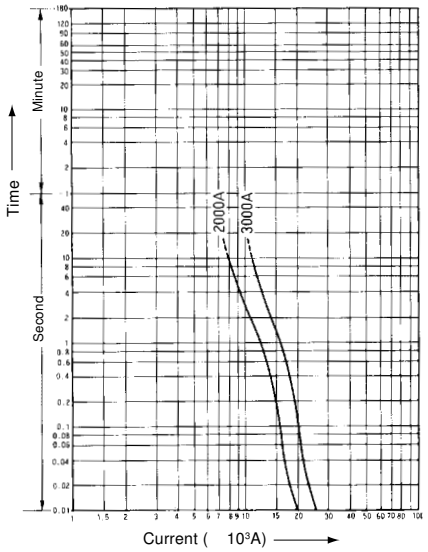


CS2F

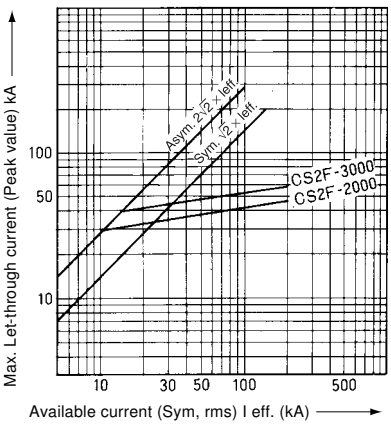
Melting time-current characteristic



Operating time-current characteristic



Current-limiting characteristic

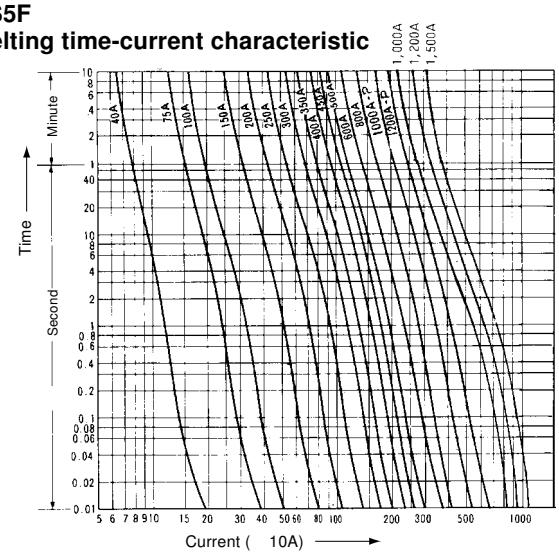


08

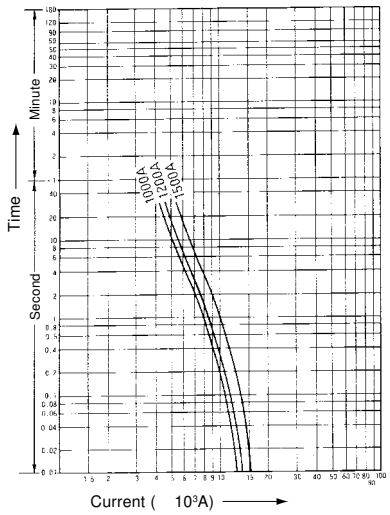
MSA CONTROL - (11) 3961-1171 - comercial@msacontrol.com.br

■ Characteristic curves

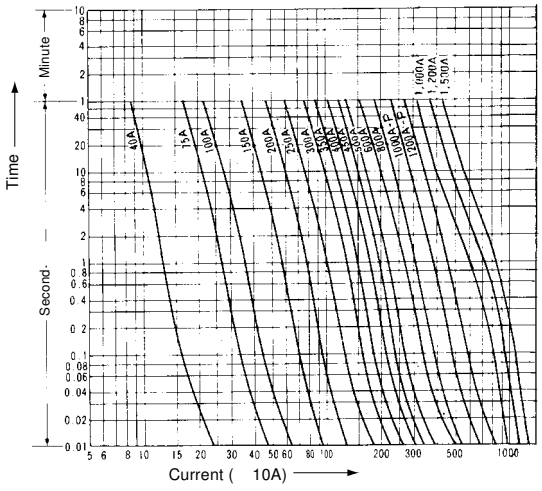
CS5F
Melting time-current characteristic



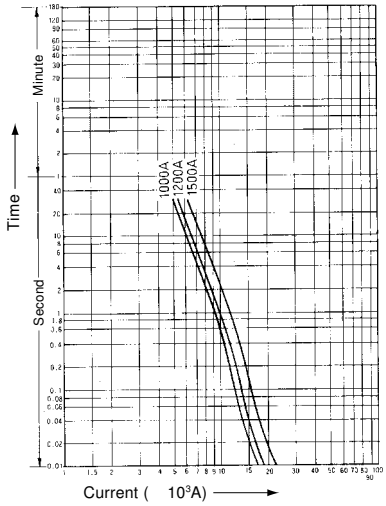
CS8F
Melting time-current characteristic



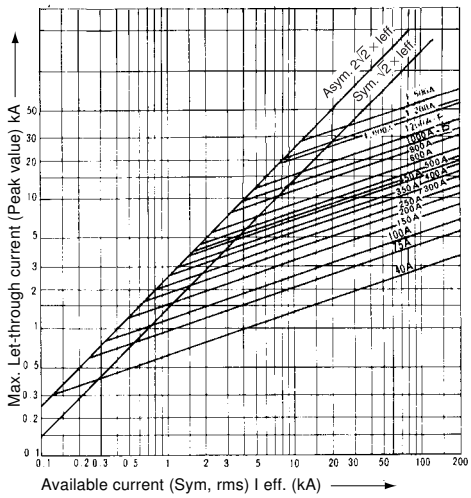
Operating time-current characteristic



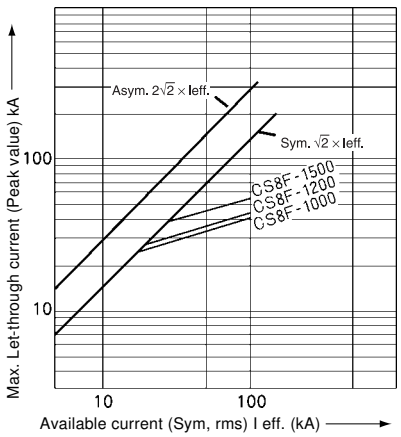
Operating time-current characteristic



Current-limiting characteristic



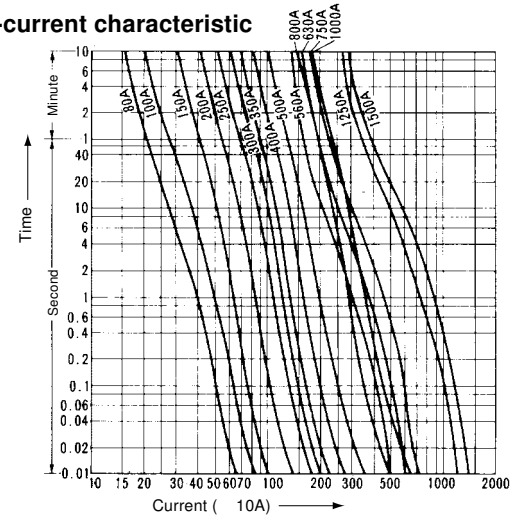
Current-limiting characteristic



■ Characteristic curves

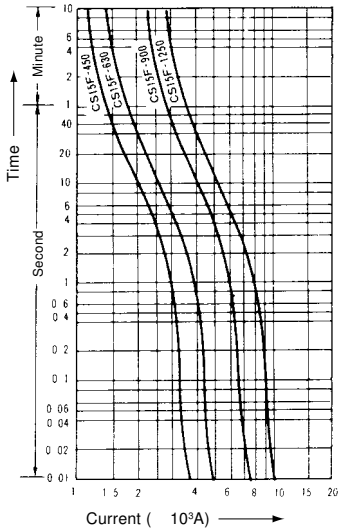
CS10F

Melting time-current characteristic

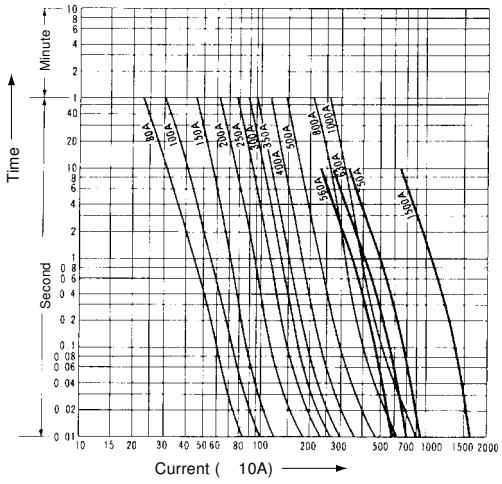


CS15F

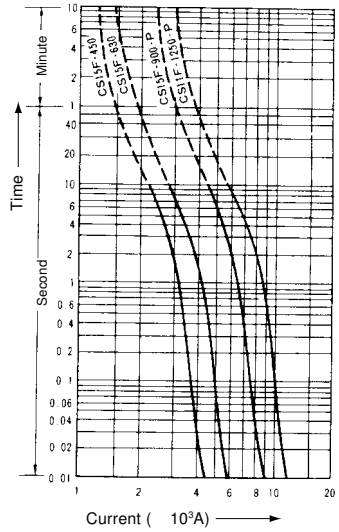
Melting time-current characteristic



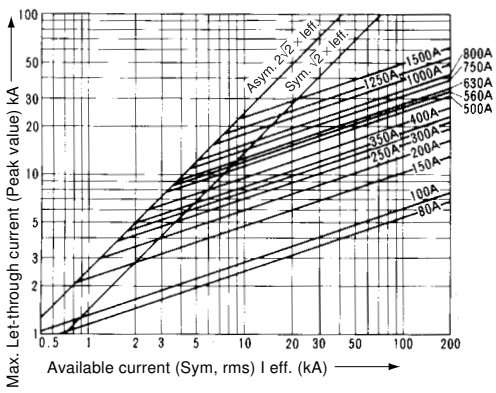
Operating time-current characteristic



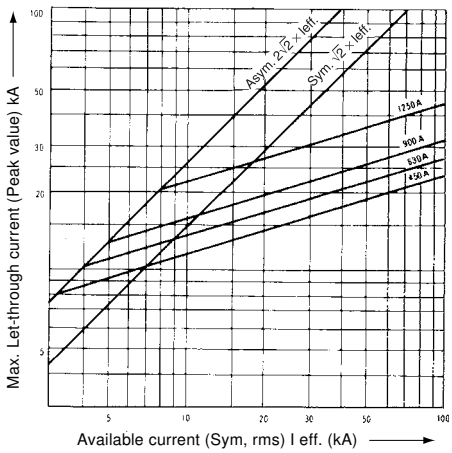
Operating time-current characteristic



Current-limiting characteristic



Current-limiting characteristic



■ Operating indication

• Blown fuse indication

FUJI Super Rapid Fuses are available in BLC, CR and CS types. These types have different methods of indicating a blown fuse.

• BLC type

A blown fuse is indicated by the color tip on the ferrule of the fuse being ejected as shown in Fig. 1. This can be seen through the window of the fuse holder.

• CR type

This fuse does not have a blown indicator but if a trigger fuse is connected as shown in Fig. 2 this will provide the alarm for blown fuse.

• CS type

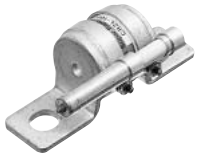
This fuse is provided with a blown fuse indicator. In this case a pin in the contact pad is ejected after the fuse has been blown. If electrical connections for lamps or alarms are required fit the contact block (1NO or 1NC) to the pad as shown in Fig. 3.

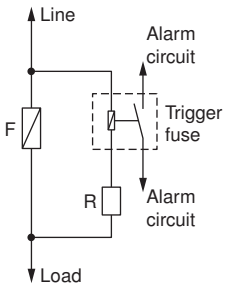
Fig. 1

SD-36

BLC type

Fig. 2





AF88-446

CR type

Fig. 3

Alarm contact block AHX2905, 2915

SM-385

CS10F

SH-384

CS 10F with alarm contact block

■ Alarm contact block ratings

Type	Contact	Rated voltage (V)	AC		DC			
			Inductive cosφ=0.3~1		Resistive load		Inductive load	
			Rated operational current (A)	Rated capacity (VA)	Rated operational current (A)	Rated capacity (W)	Rated operational current (A)	Rated capacity (W)
AHX2905	1NO	24	6	150	6	150	6	150
		110	6	660	2.5	275	1.3	140
		220	6	1320	1	220	0.45	100
AHX2915	1NC	440	2.5	1100	0.4	175	0.2	85
		550	2	1100	0.3	165	0.15	85

■ Fuse holder for BLC type fuse

FUJI BLC fuses require special holders. Select the most suitable one which corresponds to the rated current of the fuse.

Dimensions: *See page 08/28*.

SD-36

Fuse link BLC

AF88-439

Fuse holder Surface connection

Fuse link Type	Rated current (A)	Base Surface connection Type	Base Rear connection Type	Screw cap Type	Adaptor ring Type
BLC012-1	12	AFa30	Ba30	Pa30	R20
BLC020-1	20	AFa30	Ba30	Pa30	–
BLC023-1	23	AFa30	Ba30	Pa30	–
BLC045-1	45	AFa60	Ba60	Pa60	–
BLC075-1	75	AFa100	Ba100	Pa100	R75
BLC090-1	90	AFa100	Ba100	Pa100	–
BLC120-1	120	AFa200	Ba200	Pa200	–
BLC140-1	140	AFa200	Ba200	Pa200	–

■ Application and selection guide BLC, CR and CS-type – Super rapid fuse

When selecting fuses for semiconductor rectifier circuit protection the following conditions must be satisfied.
For additional details contact FUJI.

■ Conditions of application

1. The rated interrupting current of the fuse must be greater than the estimated short circuit current of the circuit.

   Available short circuit current of rectifier circuit $<$ Rated interrupting current of fuse

2. The let-thru current value of fuse must be less than the allowable 1/2 cycle surge current value.

   Fuse let-thru current value $\leqq$ Semiconductor – 1/2 cycle allowable surge current 10ms (at 50Hz)

3. The total clearing I^2t value which the fuse requires to complete interruption must be less than the allowable I^2t value of semiconductor.

   Fuse – total clearing I^2t $\leqq$ Semiconductor – I^2t

4. The rated current of the fuse must be greater than the average forward current of the semiconductor.

   Fuse – rated current $>$ Semiconductor – average forward current

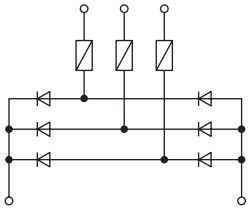
5. The rated current and voltage of the fuse must be greater than those of the rectifier circuit.

   Fuse – rated current and voltage $>$ Rectifier circuit – current and voltage

Method of application

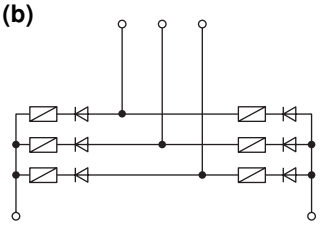
Semiconductor rectifier equipment has a variety of rectifier circuits. Taking the 3-phase bridge rectifier circuit as an example – Fig. (a) and (b) as shown in the following.
Although the number of fuses used in the line fuse method (a) is half the number used in the element fuse method (b), the fuses must have a larger current capacity.

Fig. (a)



Line fuse method
In this method the fuses are connected to the AC line side.

Fig. (b)



Element fuse method
In this method the fuses are connected in series to the semiconductor element.

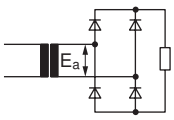
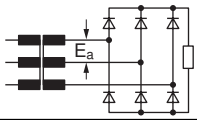
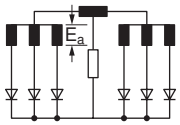
■ Fuse ratings

When selecting fuses various factors such as protection, coordination and load, etc. must be considered.
However, in this catalog the main matters such as voltage, current and I^2t only are explained.

• Rated voltage

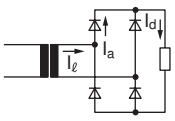
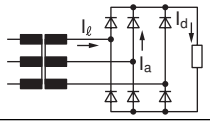
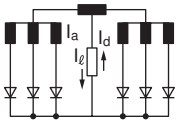
The rated voltage of the fuse indicates the maximum operational voltage and this also indicates the root-mean-square value of the AC sinusoidal wave voltage. Select fuses having a rated voltage exceeding the voltage obtained by the formula shown in the following table. (Fig. 1)
Do not select current-limiting fuses with rated voltages drastically exceeding the rectifier circuit voltage. It is necessary to consider the arc voltage.

Fig. 1 Rated voltage required by fuses

Wire connection type	Wiring diagram	Rated voltage of Fuse (V_{FN} rms) For line fuse	For element fuse
Single-phase bridge		$V_{FN} \geqq a \cdot E_a$	$V_{FN} \geqq a \cdot E_a$
3-phase bridge		$V_{FN} \geqq a \cdot E_a$	$V_{FN} \geqq a \cdot E_a$
3-phase, double star		$V_{FN} \geqq a \cdot \sqrt{3} \cdot E_a$	$V_{FN} \geqq a \cdot \sqrt{3} \cdot E_a$

Remarks: The 'a' is a coefficient where the regulation of the AC input voltage is taken into account. This is a=1.1 in case of voltage regulation ±10%.

Fig. 2 Element current and line current

Wire connection type	Wiring diagram	Element fuse method Element current I_a	Line fuse method Line current I_ℓ
Single-phase bridge		$Ia = \frac{Id}{\sqrt{2}} = 0.707d$	$I\ell = d$
3-phase bridge		$Ia = \frac{Id}{\sqrt{3}} = 0.577dI$	$I\ell = \sqrt{\frac{2}{3}}\ Id = 0.816dI$
3-phase, double star		$I\ell = Ia = \frac{Id}{2\sqrt{3}} = 0.289dI$	

08

• Rated current
The current values in fuses in the line fuse system and the element fuse system are different. Obtain the correct current value from the table on *page 08/41* (Fig. 2).
When selecting the rated current of a fuse choose a fuse having an amperage rating greater than the current which flows in the semi-conductor if the load is continuous and a fixed current.
If the current which flows in the semiconductor is greater than the rated current of the fuse connect the fuses in parallel. However, in this case, if the numbers of fuses arranged in parallel are 'n', then the I^2t value of the fuse will be $n^2 \cdot I^2t$ and n^2 times the I^2t value of one fuse. This should be taken into consideration when protective coordination is taken into account.
In the case of the circuit where the load rapidly varies the fuse element will suffer from mechanical deterioration and be damaged by thermal stress. In loads of this type the deterioration characteristics of the fuse must be closely considered.
Moreover if the fuse current – time characteristics of the fuse selected is less than the overload characteristics of the semiconductor element then complete protection can be obtained. However, if the semiconductor element has a large capacity then protective cooperation is very difficult to arrange. The fuses are used to isolate the shorted semiconductor element circuit from sound operating circuits.

■ Total clearing I^2t
The total clearing I^2t of fuse is a very important factor when considering the protective coordination of the semiconductor. This total clearing I^2t is the value where the arcing I^2t is added to the melting I^2t. Therefore it is necessary to satisfy the following formula.

Fuse – total clearing I^2t $\leqq$ Semiconductor I^2t

The total clearing I^2t of fuse depends upon the operational voltage and interrupting current.

Therefore, for this reason if a 500 Volts fuse is used in a 300 Volts circuit the total clearing I^2t is reduced by 50–70%. However, the reduction rate varies according to the type of fuse construction. This must be checked and confirmed once more.

Example
I^2t
All I^2t values are ampere^2 seconds.

The I^2t data for silicon diodes or thyristor elements are normally given in their respective catalogs. If the A^2S data is not given in their catalog obtain the value in the following manner. If protection is needed for a 250V, 150A (I_o) diode having a maximum allowable peak half sine wave current of 2700A, it is important that the fuse has a total I^2t value lower than that of the diode.

Calculation

$$\text{Maximum } I^2t \text{ diode} = \left(\frac{1 \text{ Peak}}{2}\right)^2 0.0167$$
$$= \left(\frac{2700}{2}\right)^2 0.0167$$
$$= 30{,}400A^2 \text{ Sec.}$$

From the table (*Page 08/38*), the fuse with a total I^2t nearest to 30,400A^2 Sec. is the 260 Ampere fuse (CR 2L-260).

■ Interrupting current
The rated interrupting current of the fuse must exceed the maximum value (Symmetrical RMS value) of the estimated circuit fault current.

■ Peak arc voltage
In the case of the current-limiting fuse an arc voltage (overvoltage) is generated at the time of interruption due to its fusible element construction. It is necessary to check that this peak arc voltage does not exceed the semiconductor's maximum (Non-repetitive peak) reverse voltage value.

■ Current limitation
Select a fuse whose let-thru current value does not exceed the allowable 1/2 cycle surge current of the semiconductor. The allowable surge current is the peak value of the current which in case at 50Hz is allowed to flow for 10ms. In the current-limiting fuse the fault must be cleared in the shortest possible time or in the first 1/2 cycle.
Available current is the current which would flow if the fuse were not current-limiting.
This would cause damage to equipment. Let-thru current is the actual current allowed to flow by the current limiting action of the fuse. A number of let-thru current graphs are given in this catalog and example is given in the following paragraph. The method of reading this graph is provided for your reference.

How to find a let-thru current – Example
Fuse: 200 Amps 500V
Available R.M.S symmetrical current:
100,000 Amps
Let-thru peak current (Instantaneous):
11,600 Amps
Let-thru R.M.S. current
11,600 ÷ 1.7 = 6,800 Amps
This example clearly shows that while a 100kA (rms, sym) current is available, the fuse limits the current let-thru to 6,800 Amperes (rms, sym).