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Hitachi Industrial Equipment Systems Co., Ltd.

<http://www.hitachi-ies.co.jp/english/index.htm>

For further information, please contact your nearest sales representative.

Hitachi Circuit Breakers & Miniature Circuit Breakers

Hitachi Circuit Breakers & Miniature Circuit Breakers



Hitachi Industrial Equipment Systems Co., Ltd.

Circuit Breakers & Miniature Circuit Breakers



Hitachi Industrial Equipment Systems Co., Ltd.

APPLICATIONS

Hitachi Circuit Breakers and Miniature Circuit Breakers are designed for circuit protection of low-voltage distribution systems. They are suitable for application as main breakers and for protection of branch and feeder circuits and connected apparatus. These breakers provide overload protection for conductors and short-circuit protection for all circuit elements

such as conductors, motors, and starters.

They are designed for use in switchboard, control centers, panel boards, combination starters, and separate individual enclosures. In these various enclosures, they are applicable to the requirements of lighting, distribution, and other power circuits.

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FUSE-FREE BREAKER

**NEW LINE-UPS WITH FULLY INTEGRATED CONFIGURATION,
ADVANCED PERFORMANCE AND SIMPLIFIED OPERATION**

Hitachi Global Series

Hitachi has been developing new Molded Case Circuit Breakers and now we have just launched new type circuit breakers and these are innovative high quality breakers, new technology fulfills improving the performance and new design satisfies all application requirements and world customers.

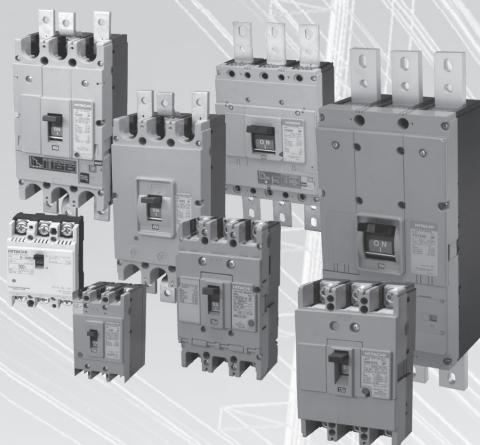
It's a new solution of the breakers.



FEATURES

New color of the face

Renew the color of the face of the breakers from black to brighter color, Light Gray, and the impression of the distribution panels will be improved brightly and sophisticated.



High breaking performance

Breaking performance of standard type (F series) are $I_{cs} = 100\%I_{cu}$ which is world level performance of the breaking current by new solution of breaking system and new breaking system reduces thermal and mechanical stress to distribution systems and they can be used any distribution system.

AF	60AF	100AF	250AF	400AF	600AF	800AF	1000AF	1200AF
Types	F-60RB	F-100KB FKX125-S FKX125-H	F-250FB F-250KC FKX250-S FKX250-H	F-400R FX400	F-600F FX600	F-800R FX800	FX1000	FX1200

Easy to install accessories

Easy to install the accessories and easy to change the specifications

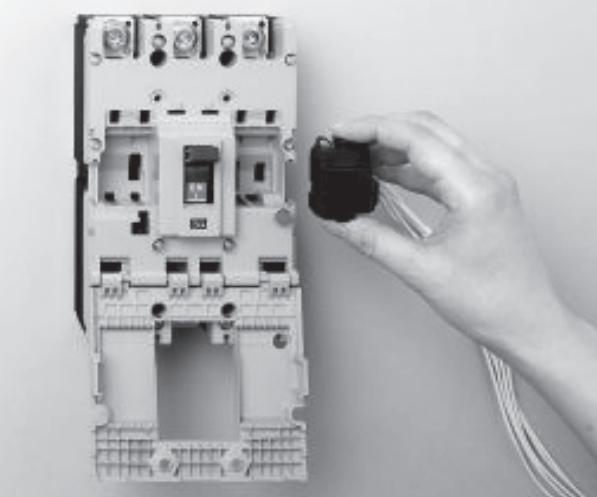
Hitachi Global series provides wide range of the frame and the varieties of accessories for customers. The specifications of breakers can be changed by cassette type internal accessories. They can be installed by users, quickly responding to changing specifications.

Applicable type are stated in table of Ratings and Specifications.

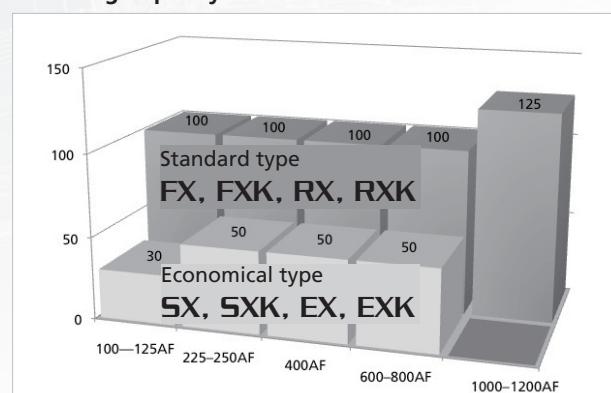
Dimensions are unified

Dimensions are unified for the economical and standard types, contributing to total cost reduction of the control panel.

Even height is unified in addition to the conventional projected area unification. This compatibility reduces the total cost in mounting panels. Interrupting capacity is also unified for the fuse-free breaker and earth leakage breaker within the frame of the same rated current, enabling easy, smooth replacement.



Breaking Capacity at 230V



CLASSIFICATION AND COMPOSITION

Hitachi Fuse-Free Breakers are produced in the variety of types shown below. Any type can be freely chosen according to the purposes of applications and circuit conditions, making it possible to design an electric circuit with high economy and reliability.

Fuse-Free Breaker for General Purpose		
F Series	L Series	S Series
<Fundamental>	<Current Limiting>	<Small>
		
30A – 1600A frame	50A – 800A frame	30A – 800A frame

Motor Breaker
M Series


30A – 225A frame

COMPOSITION IN TERMS OF INTERRUPTING CAPACITY

AC 230V — 240V

Frame (AF)

Transformer capacity (kVA)	- 30	50 – 100		150	200 – 500			750 – 1500	2000 – 3000			
Interrupting capacity kA (sym)	5	7.5	10	14	25	35	42	50	85	100	125	175
30	S-30E	F-30FB										
50	S-50EB	S-50SB							L-50E			
60		S-60RB		F-60RB								
100 125		S-100EB		S-100S	S-100SB	FXK125-S		FXK125-H		L-100E		
225 250				S-225SB, SXK225		FXK250-S F-250FB		FXK250-H F-250KC		L-225E		
400				SX400, S-400S				FX400, F-400R		L-400E		
600				SX600, S-600S				FX600, F-600F		L-600E		
800				SX800 S-800S				FX800 F-800R	F-800RH	L-800E		
1000 – 1200				FX1000, FX1200, F-1000K, F-1200K, F-1000C, F-1200C								
1600				F-1600CB, F-1600B, F-1600E								

AC 380V — 440V

Frame (AF)

Transformer capacity (kVA)	- 50		75 – 100		200 – 500			750 – 1000		1500 – 2000		2500 – 3500	
Interrupting capacity kA (sym)	1.5	2.5	5	7.5	10	15	18	22	25	30	35	50	85
30	S-30E	F-30FB											
50	S-50EB	S-50SB							L-50E				
60		S-60RB		F-60RB									
100 125				S-100S, S-100SB			FXK125-S		FXK125-H		L-100E		
225 250				S-225SB, SXK225			FXK250-S F-250FB		FXK250-H F-250KC		L-225E		
400				SX400 S-400S					FX400 F-400R		L-400E		
600				SX600 S-600S					FX600 F-600F		L-600E		
800				SX800, S-800S					FX800 F-800R	F-800RH	L-800E		
1000 – 1200				FX1000, FX1200, F-1000K, F-1200K, F-1000C, F-1200C									
1600				F-1600CB, F-1600B, F-1600E									



F Series



S Series

RATINGS AND SPECIFICATIONS

Table 1 F series

Type			F-30FB		F-60RB	F-60R	F-100S		FXK125-S		FXK125-H		F-100KB	
Appearance														
Number of poles			2	3	2	3	4	4	2 (*1)	3	2 (*1)	3	4	
Rated Current (A) (Base ambient temperature 40°C)			3 5 10 15 20 30		15 20 30 40 50 60		15 20 30 50 60 75 100		15 20 30 40 50 63 75 100 125		15 20 30 40 50 63 75 100 125		15 20 30 40 50 60 75 100	
Rated Insulation Voltage Ui (V)			690		690		690		690		690		690	
Rated Impulse withstand Voltage Uimp (kV)			6		6		8		8		8		8	
Rated Breaking Capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	—	—	—	—	—	—	—	—	—	—	
			440V	2.5/1	10/10		10/5		30/30		50/50			
			415V	2.5/1	10/10		10/5		30/30		50/50			
			400V	2.5/1	10/10		10/5		30/30		50/50			
			380V	2.5/1	10/10		10/5		30/30		50/50			
		DC	240V	7.5/2	25/25		35/18		50/50		100/100		85/85	
			230V	7.5/2	25/25		35/18		50/50		100/100		85/85	
	Dimensions (mm)		a	52	75	52	75	100	120	90	90	120		
		b	130		130		150		150		150			
		c	60		60		60		68		68		86	
		d	84		84		85		94		94		106	
Net Weight (kg)			0.48	0.6	0.53	0.74	0.96	1.3	1.4	1.4	1.4	1.4	2.3	
Standard Connection Type			Front Terminal		Front Terminal		Front Terminal		Front Terminal		Front Terminal			
Phase Separator for Line Side			○		● (*2)		●		● (*2)		● (*2)			
Interior Accessories	Alarm Switch	AL	○		○		○		○ ○ (*3)		○ ○ (*3)		○ ○	
	Auxiliary Switch	AUX	○		○		○		○ ○ (*3)		○ ○ (*3)		○ ○	
	Shunt Trip	SHT	○		○		○		○ ○ (*3)		○ ○ (*3)		○ ○	
	Undervoltage Trip	UVT	—		—		○		—		—		○ ○	
	Terminal Block	TB	○		○		○		○		○		○ ○	
		TB2	○		○		○		○		○		○ ○	
Exterior Accessories	Rear-connecting Stud		STB	STB-2M		STB-2M	STB-1B		STB-3H (Up to 50A: STB-2D)	STB-2S (Up to 50A: STB-2D)	STB-2S (Up to 50A: STB-2D)	STB-2S (Up to 50A: STB-2D)	STB-3J (Up to 50A: STB-2)	
	BSD		—	—		—	—		—	—	—	—	—	
	Flush Mounting Base Assembly		GKW(STB)	○	○		○		—	—	○ ○ (Up to 50A)	○ ○ (Up to 50A)	○ ○	
	GK-GKW(BSD)		—	—		—	—		○ ○ (Up to 50A)	○ ○ (Up to 50A)	—	—	—	
	Plug-in Mounting Base Assembly		PK	○	○		○		○ ○ (60A or more)	○ ○ (60A or more)	○ ○ (60A or more)	○ ○ (60A or more)	○ ○	
	Drawout Assembly		PDK	—	—		—		—	—	—	—	—	
	Mechanical Interlock		MIW	MIW-2E		MIW-2E	MIW-1C		MIW-2C	MIW-3H	MIW-3H	MIW-3D		
	Motor-operating Mechanism		MMK-S	—	—		—		○	○	○	○	○ ○	
			MMK-C	—	—		—		—	—	—	—	—	
			MMK	—	—		—		—	—	—	—	—	
	Lock Cover		LC	LC-2E		LC-2E	LC-1B		LC-2C	○	○	○	LC-2C	
	Handle Lock		HIL	○	○		○		○	○	○	○	○ ○	
	Handle Operating Mechanism		HA	HA-108		HA-108	HA-107		HA-104	—	—	—	HA-106	
			HM	—	HM-S12	—	HM-S12	HM-57	—	HM-S13	HM-S13	HM-S13	HM-S11	
Terminal Cover	Front Type	TMC	TMC-1		TMC-1		TMC-2C		TMC-2C	TMC-2C	TMC-2C	TMC-3C		
		Short Type	TMC-1S		TMC-1S		—		—	—	—	—	—	
		Long Type	TMC-2D		TMC-2D		—		—	—	—	—	—	
	Rear Type	BTC	BTC-1		BTC-1		BTC-2C		BTC-2C	BTC-2C	BTC-2C	BTC-3C		
IEC Rail 35 mm			○	○	—	—	—	—	—	—	—	—	—	
Automatic Tripping Device			Full Magnetic		Full Magnetic		Full Magnetic		Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic	Full Magnetic		
Trip Button			●	●	●	●	●	●	●	●	●	●		

Attention

- : Standard ○ : Option
- 2-pole types marked (*1) are supplied in 3-pole type.
- Please state "For DC" in case of DC use. Especially, state please state kind of the power supply in case of from 30 to 100AF.
- Flush Mounting Base Assembly, GKW are standard in case of up to 250AF and FX400.
- Please state that number of poles of breakers when order MIW.
- Installation of phase separators is required in case of types marked (*2).
- Tripping system of F-1000K and F-1200K are induction heat system, please state frequency when ordering.
- For DC use, the tripping character is only instantaneous trip in case of F-1000K and F-1200K.
- The accessories marked (*3) can be installed by customers.

FXK250-S		F-250FB		FXK250-H		F-250KC		F-400R			FX400			F-600F			FX600	
																		
2 (*1)	3	4	2 (*1)	3	4	2 (*1)	3	4	2 (*1)	3	2 (*1)	3	4	2 (*1)	3	4	3	
125 200	150 225	175 250	125 200	150 225	175 250	250 300	300 400	200/225/250 300/350/400 adjustable	500 600	500 600	300/350/400 500/600 adjustable	500 600	500 600	500/500 500/600 adjustable	500/500 500/600 adjustable	500/500 500/600 adjustable	500/500 500/600 adjustable	
690			690			690			690		690			690		690		
8			8			8			8		8			8		8		
—			—		—	—		—	—		—			—		—		
30/30			50/50			50/50			50/50		50/50			50/50		50/50		
30/30			50/50			50/50			50/50		50/50			50/50		50/50		
30/30			50/50			50/50			50/50		50/50			50/50		50/50		
30/30			50/50			50/50			50/50		50/50			50/50		50/50		
50/50	85/85		100/100	85/85		100/100			100/100		100/100			100/100		100/100		
50/50	85/85		100/100	85/85		100/100			100/100		100/100			100/100		100/100		
25/13	—	—	40/20	—	—	40/40	—	—	—	—	40/40	—	—	—	—	—	—	
25/13	—	—	40/20	—	—	40/40	—	—	—	—	40/40	—	—	—	—	—	—	
105	140		105	140		140		185	140		210		280		210		210	
165			165			257			257		274			274				
68	103		68	103		103			103		103			103		103		
95	127		95	127		133			133		141			141		141		
1.6	3.1		1.6	3.1		5.3	6.1	8.2	5.1	5.9	10		13		9.7			
Front Terminal		Front Terminal		Front Bar Terminal			Front Bar Terminal			Front Bar Terminal			Front Bar Terminal			Front Bar Terminal		
● (*2)		● (*2)		● (*2)		● (*2)		● (*2)		● (*2)		● (*2)		● (*2)		● (*2)		
○ (*3)	○	○ (*3)	○	○		○		○ (*3)	○	○		○		○ (*3)	○	○ (*3)		
○ (*3)	○	○ (*3)	○	○		○		○ (*3)	○	○		○		○ (*3)	○	○ (*3)		
○ (*3)	○	○ (*3)	○	○		○		○ (*3)	○	○		○		○ (*3)	○	○ (*3)		
—		—		—		○		○	—	—	—	—		—	—	—		
○		○		○		○		○	○	○	○	○		○	○	○		
○		○		○		○		○	○	○	○	○		○	○	○		
—		—		—		—		—	—	—	—	—		—	—	—		
○		○		○		○		○	○	○	○	○		○	○	○		
—		—		—		—		—	—	—	—	—		—	—	—		
MIW-4M	MIW-4H	MIW-4M	MIW-4H	MIW-5D			MIW-5F			MIW-5			MIW-5G					
—		—		—		—	—	—	—	—	—	—	—	—	—	—		
—		—		—		○		○	○	○	○	○	○	○	○	○		
—		—		—		—		—	—	—	—	—	—	—	—	—		
LC-4J	LC-4H	LC-4J	LC-4H	—			—			—			—			—		
HL-4J	○	HL-4J	○	HL-5		HL-5		HL-5	HL-6		HL-6		HL-6		HL-6		HL-6	
HA-210	HA-206	HA-210	HA-206	HA-405		HA-405		HA-406	HA-402		HA-402		HA-402		HA-402		HA-402	
HM-S25	HM-S21	HM-S25	HM-S21	HM-405		HM-405		HM-406	HM-402		HM-402		HM-402		HM-402		HM-407	
TMC-4J	TMC-4H	TMC-4J	TMC-4H	TMC-5B		TMC-5B		TMC-5B	TMC-5D		TMC-5D		TMC-5D		TMC-5D		TMC-5D	
TMC-4JS	—	TMC-4JS	—	—		—		—	—		—		—		—		—	
—	—	—	—	—		—		—	—		—		—		—		—	
BTC-4J	—	BTC-4J	—	BTC-5B		BTC-5B		BTC-5B	—		—		—		—		—	
—	—	—	—	—		—		—	—		—		—		—		—	
Thermal-Magnetic		Thermal-Magnetic		Thermal-Magnetic			Electronic Relay			Thermal-Magnetic			Electronic Relay					
●		●		●		●		●	●		●		●		●		●	

Table 1 F series

Type			F-800R		FX800		F-800RH		F-1000K		F-1000C	
Appearance												
Number of poles			3	4	3		3	4	3	4	3	4
Rated Current (A) (Base ambient temperature 40°C)			700	800	400/450/500 600/700/800 adjustable		700	800	1000		500/600/700 800/900/1000 adjustable	
Rated Insulation Voltage Ui (V)			690		690		690		690		690	
Rated Impulse withstand Voltage Uimp (kV)			8		8		8		8		8	
Rated Breaking Capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	—	—	—	—	—	—	—	—	
			440V	50/50	50/50	85/43	85/22	85/22	85/22	85/22	85/22	
			415V	50/50	50/50	85/43	85/22	85/22	85/22	85/22	85/22	
			400V	50/50	50/50	85/43	85/22	85/22	85/22	85/22	85/22	
			380V	50/50	50/50	85/43	85/22	85/22	85/22	85/22	85/22	
			240V	100/100	100/100	125/63	125/32	125/32	125/32	125/32	125/32	
			230V	100/100	100/100	125/63	125/32	125/32	125/32	125/32	125/32	
		DC	250V	40/40	—	40/40	—	40/10	—	—	—	
			125V	40/40	—	40/40	—	40/10	—	—	—	
Dimensions (mm)		a	210	280	210	210	280	210	280	210	280	
		b	274		274	274		410		410		
		c	103		103	103		150		150		
		d	141		141	141		190		190		
Net Weight (kg)			10.5	13.5	11	10.5	13.5	26	33	26	33	
Standard Connection Type			Front Bar Terminal		Front Bar Terminal		Front Bar Terminal		Front Bar Terminal			
Phase Separator for Line Side			● (*2)		● (*2)		● (*2)		● (*2)			
Interior Accessories	Alarm Switch	AL	○	○ (*3)	○	○	○	○	○	○	○	
	Auxiliary Switch	AUX	○	○ (*3)	○	○	○	○	○	○	○	
	Shunt Trip	SHT	○	○ (*3)	○	○	○	○	○	○	○	
	Undervoltage Trip	UVT	○	○	○	○	○	○	○	○	○	
	Terminal Block	TB	○	○	○	○	○	○	○	○	○	
		TB2	○	○	○	○	○	○	○	○	○	
Exterior Accessories	Rear-connecting Stud	STB	—	—	—	—	—	—	—	—	—	
		BSD	○	○	○	○	○	○	○	○	○	
	Flush Mounting Base Assembly	GKW(STB)	—	—	—	—	—	—	—	—	—	
		GK•GKW(BSD)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	
	Plug-in Mounting Base Assembly	PK	○	○	○	○	○	○	○	○	○	
	Drawout Assembly	PDK	—	—	—	—	—	—	—	—	—	
	Mechanical Interlock	MIW	MIW-5	MIW-5G	MIW-5	MIW-8	MIW-8	MIW-8	MIW-8	MIW-8	MIW-8	
	Motor-operating Mechanism	MMK-S	—	—	—	—	—	—	—	—	—	
		MMK-C	○	○	○	○	○	○	○	○	○	
		MMK	—	—	—	—	—	—	—	—	—	
	Lock Cover	LC	—	—	—	—	—	—	—	—	—	
	Handle Lock	HL	HL-6	HL-6	HL-6	HL-6	○	○	○	○	○	
	Handle Operating Mechanism	HA	HA-402	HA-402	HA-402	HA-402	HA-801	HA-801	HA-801	HA-801	HA-801	
		HM	HM-402	HM-407	HM-402	HM-402	—	—	—	—	—	
	Terminal Cover	TMC	TMC-5D	TMC-5D	TMC-5D	TMC-5D	TMC-6	TMC-6	TMC-6	TMC-6	TMC-6	
		Short Type	—	—	—	—	—	—	—	—	—	
		Long Type	—	—	—	—	—	—	—	—	—	
		Rear Type	BTC	—	—	—	—	—	—	—	—	
IEC Rail 35 mm			—	—	—	—	—	—	—	—	—	
Automatic Tripping Device			Thermal-Magnetic		Electronic Relay		Thermal-Magnetic		Thermal-Magnetic		Electronic Relay	
Trip Button			●	●	●	●	●	●	●	●	●	

Attention

- : Standard ○ : Option
- 2-pole types marked with (*)1 are supplied in 3-pole type.
- Please state "For DC" in case of DC use. Especially, state please state kind of the power supply in case of from 30 to 100AF.
- Flush Mounting Base Assembly, GKW are standard in case of up to 250AF and FX400.
- Please state that number of poles of breakers when order MIW.
- Installation of phase separators is required in case of types marked (*2).
- Tripping system of F-1000K and F-1200K are induction heat system, please state frequency when ordering.
- For DC use, the tripping character is only instantaneous trip in case of F-1000K and F-1200K.
- The accessories marked (*)3 can be installed by customers.

FX1000	F-1200K	F-1200C	FX1200	F-1600CB	F-1600B	F-1600E
						
3	3 4	3 4	3	3 4	3 4	3 4
500/600/700 800/900/1000 adjustable	1200	600/700/800 1000/1200 adjustable	600/700/800 1000/1200 adjustable	800/900/1000 1200/1400/1600 adjustable	1000 1200 1400 1600	800/900/1000 1200/1400/1600 adjustable
690	690	690	690	690	690	690
8	8	8	8	8	8	8
—	—	—	—	—	—	45/34
85/85	85/22	85/22	85/85	85/22	85/22	85/64
85/85	85/22	85/22	85/85	85/22	85/22	85/64
85/85	85/22	85/22	85/85	85/22	85/22	100/75
85/85	85/22	85/22	85/85	85/22	85/22	100/75
125/125	125/32	125/32	125/125	125/32	125/32	125/94
125/125	125/32	125/32	125/125	125/32	125/32	125/94
—	40/10	—	—	—	40/10	—
—	40/10	—	—	—	40/10	—
210	210	280	210 280	210	210 280	210 280
410	410	410	410	410	410	370
150	150	150	150	150	150	140
190	190	190	190	190	190	191
26	26 33	26 33	26	37 49	37 49	27 36
Front Bar Terminal	Front Bar Terminal	Front Bar Terminal				
● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	—
○ (*3)	○	○	○ (*3)	○	○	○
○ (*3)	○	○	○ (*3)	○	○	○
○ (*3)	○	○	○ (*3)	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	—
—	—	—	—	—	—	—
○	○	○	○	○	○	○
—	—	—	—	—	—	—
○ (GK)	○ (GK)	○ (GK)				
○	○	○	○	—	—	—
—	—	—	—	—	—	○
MIW-8	MIW-8	MIW-8	MIW-8	MIW-8D	MIW-8D	○
—	—	—	—	—	—	—
○	○	○	○	○	○	—
—	—	—	—	—	—	○
—	—	—	—	—	—	○
○	○	○	○	○	○	○
HA-801	HA-801	HA-801	HA-801	HA-801	HA-801	○
—	—	—	—	—	—	—
TMC-6B	TMC-6	TMC-6	TMC-6B	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
Electronic Relay	Thermal-Magnetic	Electronic Relay	Electronic Relay	Electronic Relay	Magnetic	Electronic Relay
●	●	●	●	●	●	●

Table 2 S series

Type			S-30S		S-30E		S-50E		S-50EB		S-50SB		S-60RB		S-100EB				
Appearance																			
Number of poles			2	3	2	3	2	3	2	3	2	3	2	3	2	3			
Rated Current (A) (Base ambient temperature 40°C)			3 5 10 15 20 30	3 5 10 15 20 30	5 10 15 20 30 40 50	5 10 15 20 30 40 50	5 10 15 20 30 50	5 10 15 20 30 50	5 10 15 20 30 50 60	5 10 15 20 30 50	5 10 15 20 30 50 60	60 75 100							
Rated Insulation Voltage Ui (V)			500	500	500	500	690	690	250										
Rated Impulse withstand Voltage Uimp (kV)			—	4	—	4	6	6	6										
Rated Breaking Capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	—	—	—	—	—	—	—	—	—	—	—	—	—			
			440V	—	—	—	—	—	2.5/1	5/2	—	—	—	—	—	—			
			415V	—	1.5/1	—	1.5/1	—	2.5/1	5/2	—	—	—	—	—	—			
			400V	1.5/1	1.5/1	1.5/1	1.5/1	1.5/1	2.5/1	5/2	—	—	—	—	—	—			
			380V	1.5/1	—	1.5/1	—	2.5/1	5/2	—	—	—	—	—	—	—			
			240V	2.3/1.3	—	2.3/1.3	—	7.5/2	10/3	—	—	—	—	—	—	—			
			230V	2.5/1.3	5/2	2.3/1.3	5/2	7.5/2	10/3	—	—	—	—	—	—	—			
	DC		250V	—	—	—	—	2.5/1	—	2.5/1	—	2.5/1	—	—	—	—			
			125V	—	—	—	—	5/2	—	5/2	—	5/2	—	—	—	—			
Dimensions (mm)			a	50	75	50	75	50	75	52	75	52	75	52	75				
			b	95	—	96	—	96	—	130	—	130	—	130	—				
			c	60	—	60	—	60	—	60	—	60	—	60	—				
			d	79	—	76	—	76	—	84	—	84	—	84	—				
Net Weight (kg)			0.32	0.47	0.25	0.37	0.32	0.47	0.25	0.37	0.48	0.6	0.5	0.7	0.5	0.7			
Standard Connection Type			Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal			
Phase Separator for Line Side (*2)			—	—	—	—	—	—	—	○	○	○	○	○	○	○			
Interior Accessories	Alarm Switch	AL	—	○	—	○	—	○	○	○	○	○	○	○	○	○			
	Auxiliary Switch	AUX	—	○	—	○	—	○	○	○	○	○	○	○	○	○			
	Shunt Trip	SHT	—	○	—	○	—	○	○	○	○	○	○	○	○	○			
	Undervoltage Trip	UVT	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
	Terminal Block	TB	—	—	—	—	—	—	○	○	○	○	○	○	○	○			
		TB2	—	○	—	○	—	○	○	○	○	○	○	○	○	○			
Exterior Accessories	Rear-connecting Stud		STB	—	—	—	—	—	—	STB-2M	STB-3K (Up to 50A: STB-2M)		STB-3K (Up to 50A: STB-2M)						
	BSD		—	—	—	—	—	—	—	—	—	—	—	—	—	—			
	Flush Mounting Base Assembly		GKW(STB)	—	—	—	—	—	○	○	○	○	○	○	○	○			
	GK-GKW(BSD)		—	—	—	—	—	—	—	—	—	—	—	—	—	—			
	Plug-in Mounting Base Assembly		PK	—	—	—	—	—	○	○	○	○	○	○	○	○			
	Drawout Assembly		PDK	—	—	—	—	—	—	—	—	—	—	—	—	—			
	Mechanical Interlock		MIW	—	—	—	—	—	—	MIW-2E	MIW-2E	MIW-2E	MIW-2E	MIW-2E	MIW-2E	MIW-2E			
	MMK-S		—	—	—	—	—	—	—	—	—	—	—	—	—	—			
	MMK-C		—	—	—	—	—	—	—	—	—	—	—	—	—	—			
	MMK		—	—	—	—	—	—	—	—	—	—	—	—	—	—			
	Lock Cover		LC	LC-0B	LC-03	LC-0B	LC-03	LC-0B	LC-03	LC-2G	LC-2G	LC-2G	LC-2G	LC-2G	LC-2G	LC-2G			
	Handle Lock		HL	—	—	—	—	—	—	HL-2G	HL-2G	HL-2G	HL-2G	HL-2G	HL-2G	HL-2G			
	Handle Operating Mechanism	HA		—	—	—	—	—	—	HA-108	HA-108	HA-108	HA-108	HA-108	HA-108	HA-108			
		HM		—	—	—	—	—	—	—	HM-S12	HM-S12	HM-S12	HM-S12	HM-S12	HM-S12	HM-S12		
	Terminal Cover	TMC		TMC-0C	TMC-0A	TMC-0G	TMC-0C	TMC-0A	TMC-0G	TMC-1	TMC-1	TMC-1	TMC-1	TMC-1	TMC-1	TMC-1			
		Short Type		—	—	—	—	—	—	TMC-1S	TMC-1S	TMC-1S	TMC-1S	TMC-1S	TMC-1S	TMC-1S			
		Long Type		—	—	—	—	—	—	TMC-2D	TMC-2D	TMC-2D	TMC-2D	TMC-2D	TMC-2D	TMC-2D			
IEC Rail 35 mm			●	●	●	●	●	●	○	○	○	○	○	○	○	○			
Automatic Tripping Device			Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic			
Trip Button			●	—	●	●	—	●	—	●	●	●	●	●	●	●			

Attention

- : Standard ○ : Option
- 2-pole types marked with (*)1 are supplied in 3-pole type.
- Please state "For DC" in case of DC use . Especially, state please state kind of the power supply in case of from 30AF to 100AF.
- Please state that number of poles of breakers when order MIW.
- Installation of phase separators is required in case of types marked (*2).
- The accessories marked (*3) can be installed by customers.

S-100SB	S-100S	S-225SB	SXK225	S-400S	SX400	S-600S	SX600	S-800S	SX800
									
2 3	2 3	2 (*1) 3	2 (*1) 3	2 (*1) 3	2 (*1) 3	2 (*1) 3	2 (*1) 3	3	3
60 75 100	60 75 100	125 150 175 200 225	125 150 175 200 225	250 300 350 400	200/225/250 300/350/400 adjustable	500 600	300/350/400 500/600 adjustable	700 800	400/450/500 600/700/800 adjustable
690	690	690	690	690	690	690	690	690	690
6	6	6	6	8	8	8	8	8	8
—	—	—	—	—	—	—	—	—	—
10/3	10/3	15/8	15/8	36/18	36/18	36/18	36/18	36/18	36/18
10/3	10/3	15/8	15/8	36/18	36/18	36/18	36/18	36/18	36/18
10/3	10/3	15/8	15/8	36/18	36/18	36/18	36/18	36/18	36/18
10/3	10/3	15/8	15/8	36/18	36/18	36/18	36/18	36/18	36/18
35/9	25/7	35/18	35/18	50/25	50/25	50/25	50/25	85/43	85/43
35/9	25/7	35/18	35/18	50/25	50/25	50/25	50/25	85/43	85/43
5/2 —	5/2 —	10/5 —	10/5 —	25/13 —	— —	40/20 —	— —	40/20	—
7.5/2 —	7.5/2 —	15/8 —	15/8 —	25/13 —	— —	40/20 —	— —	40/20	—
52 75	65 90	105	105	140	140	210	210	210	210
130	150	165	165	257	257	274	274	274	274
60	60	60	68	103	103	103	103	103	103
84	85	85	95	133	133	141	141	141	141
0.53 0.74	0.7 1	1.6	1.6	5.3 6.1	5.1 5.9	10	9.7	10.5	11
Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal
● (*2)	○	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)
○	○	○	○ (*3)	○	○ (*3)	○	○ (*3)	○	○ (*3)
○	○	○	○ (*3)	○	○ (*3)	○	○ (*3)	○	○ (*3)
○	○	○	○ (*3)	○	○ (*3)	○	○ (*3)	○	○ (*3)
—	— ○	—	—	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○
STB-3K (Up to 50A:STB-2M)	STB-3H (Up to 50A:STB-2D)	—	—	—	—	—	—	—	—
—	—	○	○	○	○	○	○	○	○
○	○	—	—	—	—	—	—	—	—
—	—	○	○	○ (GK)	○	○ (GK)	○ (GK)	○ (GK)	○ (GK)
○	○	—	—	○	○	○	○	○	○
—	—	—	—	—	—	—	—	—	—
MIW-2E	MIW-2C	MIW-4F	MIW-4L	MIW-5D	MIW-5F	MIW-5	MIW-5G	MIW-5	MIW-5G
—	—	○	—	—	—	—	—	—	—
—	—	—	—	○	○	○	○	○	○
—	—	—	—	—	—	—	—	—	—
LC-2G	LC-2C	LC-4E	LC-2F	—	—	—	—	—	—
HL-2G	○	HL-4E	HL-2F	HL-5	HL-5	HL-6	HL-6	HL-6	HL-6
HA-108	HA-104	HA-207	HA-209	HA-405	HA-406	HA-402	HA-402	HA-402	HA-402
— HM-S12	—	HM-S22	HM-S23	HM-405	HM-406	HM-402	HM-407	HM-402	HM-407
TMC-1	TMC-2C	TMC-4K	TMC-4J	TMC-5B	TMC-5B	TMC-5D	TMC-5D	TMC-5D	TMC-5D
TMC-1S	—	TMC-4JS	TMC-4JS	—	—	—	—	—	—
TMC-2D	—	—	—	—	—	—	—	—	—
BTC-1	BTC-2C	BTC-4G	BTC-4J	BTC-5B	BTC-5B	—	—	—	—
○	—	—	—	—	—	—	—	—	—
Full Magnetic	Full Magnetic	Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic	Electronic Relay	Thermal-Magnetic	Electronic Relay	Thermal-Magnetic	Electronic Relay
●	●	●	●	●	●	●	●	●	●

Table 3 L series

Type			L-50E		L-100E		L-225E		L-400E		L-600E		L-800E			
Appearance																
Number of poles			3	4	3	4	3	4	3	4	3	4	3	4		
Rated Current (A) (Base ambient temperature 40°C)			5 10 15 20 30 50		15 20 30 50 60 75 100		125 150 175 200 225		250 300 350 400		500 600		700 800			
Rated Insulation Voltage Ui (V)			690		690		690		690		690		690			
Rated Impulse withstand Voltage Uimp (kV)			8		8		8		8		8		8			
Rated Breaking Capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	—	—	—	—	—	—	—	—	—	—	—		
			440V	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32		
			415V	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32		
			400V	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32		
			380V	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32	125/32		
			240V	175/88	175/88	175/88	175/88	175/88	175/88	175/88	175/88	175/88	175/88	175/88		
			230V	175/88	175/88	175/88	175/88	175/88	175/88	175/88	175/88	175/88	175/88	175/88		
		DC	250V	—	—	—	—	—	—	—	—	—	—	—		
Dimensions (mm)			a	90	120	90	120	140	185	140	185	210	280	210	280	
			b	150		150		257		257		274		274		
			c	103		103		103		103		103		103		
			d	123		123		133		133		141		141		
	Net Weight (kg)		2.0	2.5	2.0	2.5	5.2	7.0	6.1	8.2	10.0	13.0	10.5	13.5		
Standard Connection Type			Front Terminal		Front Terminal		Front Terminal		Front Bar Terminal		Front Bar Terminal		Front Bar Terminal			
Phase Separator for Line Side (*2)			● (*2)		● (*2)		● (*2)		● (*2)		● (*2)		● (*2)			
Interior Accessories	Alarm Switch		AL	○	○	○	○	○	○	○	○	○	○	○		
	Auxiliary Switch		AUX	○	○	○	○	○	○	○	○	○	○	○		
	Shunt Trip		SHT	○	○	○	○	○	○	○	○	○	○	○		
	Undervoltage Trip		UVT	○	○	○	○	○	○	○	○	○	○	○		
	Terminal Block	TB	○	○	○	○	○	○	○	○	○	○	○	○		
		TB2	○	○	○	○	○	○	○	○	○	○	○	○		
Exterior Accessories	Rear-connecting Stud		STB	○	○	—	—	—	—	—	—	—	—	—		
	BSD		—	—	○	○	○	○	○	○	○	○	○	○		
	Flush Mounting Base Assembly	GKW(STB)	○	○	—	—	—	—	—	—	—	—	—	—		
		GK+GKW(BSD)	—	—	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)		
	Plug-in Mounting Base Assembly		PK	○	○	○	○	○	○	○	○	○	○	○		
	Drawout Assembly		PDK	—	—	—	—	—	—	—	—	—	—	—		
	Mechanical Interlock		MIW	MIW-3E	MIW-3E	MIW-5D	MIW-5D	MIW-5	MIW-5	MIW-5	MIW-5	MIW-5	MIW-5	MIW-5		
	Motor-operating Mechanism	MMK-S	○	○	—	—	—	—	—	—	—	—	—	—		
		MMK-C	—	—	○	○	○	○	○	○	○	○	○	○		
		MMK	—	—	—	—	—	—	—	—	—	—	—	—		
	Lock Cover		LC	LC-2C	LC-2C	—	—	—	—	—	—	—	—	—		
	Handle Lock		HL	○	○	HL-5	HL-5	HL-5	HL-6	HL-6	HL-6	HL-6	HL-6	HL-6		
	Handle Operating Mechanism		HA	HA-106	HA-106	HA-405	HA-405	HA-405	HA-402	HA-402	HA-402	HA-402	HA-402	HA-402		
	HM		HM-S11	HM-S11	HM-S11	HM-405	HM-405	HM-405	HM-402	HM-402	HM-402	HM-402	HM-402	HM-402		
Terminal Cover	TMC		TMC-3C	TMC-3C	TMC-5B	TMC-5B	TMC-5B	TMC-5D	TMC-5D	TMC-5D	TMC-5D	TMC-5D	TMC-5D	TMC-5D		
	Short Type		—	—	—	—	—	—	—	—	—	—	—	—		
	Long Type		—	—	—	—	—	—	—	—	—	—	—	—		
IEC Rail 35 mm			BTC	BTC-3C	BTC-3C	BTC-5B	BTC-5B	BTC-5B	BTC-5B	BTC-5B	BTC-5B	BTC-5B	BTC-5B	BTC-5B		
Automatic Tripping Device			Full Magnetic		Full Magnetic		Thermal-Magnetic		Thermal-Magnetic		Thermal-Magnetic		Thermal-Magnetic			
Trip Button			●		●		●		●		●		●			

Attention

- : Standard ○ : Option
- Please state "For DC" in case of DC use. Especially, state please state kind of the power supply in case of from 30 to 100AF.
- Please state that number of poles of breakers when order MIW.
- Installation of phase separators is required in case of types marked (*2).
- The accessories marked (*3) can be installed by customers.

Table 4 M series

Type			MS-30E	MS-50EB	MS-50SB	MS-100SB	MFXK100-S	MS-225SB	MSXK225	MFXK225-S		
Appearance												
Number of poles			3	3	3	3	3	3	3	3		
Rated Current (A) (Base ambient temperature 40°C)			0.8 1.2 1.4 2 2.5 4 5 6.3 7.1 8 10 12 16 25 32	10 12 16 25 32 40 45	0.7 1.4 2.3 2.6 4.2 5.6 7.4 9 10 14 16 25 33 40 45	60 75 90	60 75 90	125 150 175 225	125 150 175 225	125 150 175 225		
Rated Insulation Voltage Ui (V)			500	500	690	690	690	690	690	690		
Rated Impulse withstand Voltage Uimp (kV)			4	4	6	6	8	6	6	8		
Rated Breaking Capacity (kA)	IEC 60947-2 (Icu/lcs)	AC	690V	—	—	—	—	—	—	—		
			500V	—	—	1.5/1	2.5/1	10/10	5/3	5/3		
			440V	—	—	2.5/1	10/3	30/30	15/8	15/8		
			415V	1.5/1	1.5/1	2.5/1	10/3	30/30	15/8	30/15		
			400V	1.5/1	1.5/1	2.5/1	10/3	30/30	15/8	30/15		
			380V	—	—	2.5/1	10/3	30/30	15/8	30/15		
			240V	—	—	7.5/2	35/9	50/50	35/18	50/25		
			230V	5/2	5/2	7.5/2	35/9	50/50	35/18	50/25		
Dimensions (mm)			a	75	75	75	90	105	105	105		
			b	96	96	130	130	150	165	165		
			c	60	60	60	60	68	68	68		
			d	76	76	84	84	94	95	95		
Net Weight (kg)			0.37	0.37	0.6	0.74	1.6	1.6	1.6	1.6		
Standard Connection Type			Front Terminal	Front Terminal	Front Terminal	Front Terminal						
Phase Separator for Line Side (*2)			—	—	○	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)		
Interior Accessories	Alarm Switch	AL	○	○	○	○	○	○	○ (*3)	○ (*3)		
	Auxiliary Switch	AUX	○	○	○	○	○	○	○ (*3)	○ (*3)		
	Shunt Trip	SHT	○	○	○	○	○	○	○ (*3)	○ (*3)		
	Undervoltage Trip	UVT	—	—	—	—	—	—	—	—		
	Terminal Block		TB	—	—	○	○	○	○	○		
	TB2		○	○	○	○	○	○	○	○		
Exterior Accessories	Rear-connecting Stud		STB	—	—	STB-2M	STB-3K	—	—	—		
	BSD		—	—	—	—	—	○	○	○		
	Flush Mounting Base Assembly		GKW(STB)	—	—	○	○	—	—	—		
	GK•GKW(BSD)		—	—	—	—	—	○	○	○		
	Plug-in Mounting Base Assembly		PK	—	—	○	○	○	—	○		
	Drawout Assembly		PDK	—	—	—	—	—	—	—		
	Mechanical Interlock		MIW	—	—	MIW-2E	MIW-2E	—	MIW-4F	MIW-4L	MIW-4M	
	MMK-S		—	—	—	—	—	○	—	—		
	MMK-C		—	—	—	—	—	—	—	—		
	MMK		—	—	—	—	—	—	—	—		
	Lock Cover		LC	LC-03	LC-03	LC-2G	LC-2G	○	LC-4E	LC-2F	LC-4J	
	Handle Lock		HL	—	—	HL-2G	HL-2G	○	HL-4E	HL-2F	HL-4J	
	Handle Operating Mechanism		HA	—	—	HA-108	HA-108	—	HA-207	HA-209	HA-210	
	HM		—	—	HM-S12	HM-S12	HM-S13	HM-S22	HM-S23	HM-S25		
Terminal Cover	Front Type	TMC	TMC-0G	TMC-0G	TMC-1	TMC-1	TMC-2C	TMC-4K	TMC-4J	TMC-4J		
		Short Type	—	—	TMC-1S	TMC-1S	—	TMC-4JS	TMC-4JS	TMC-4JS		
		Long Type	—	—	TMC-2D	TMC-2D	—	—	—	—		
	Rear Type	BTC	—	—	BTC-1	BTC-1	BTC-2C	BTC-4G	BTC-4J	BTC-4J		
IEC Rail 35 mm			●	●	○	○	—	—	—	—		
Automatic Tripping Device			Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic		
Trip Button			—	—	●	●	●	●	●	●		

Attention

- : Standard ○ : Option
- Please state that number of poles of breakers when order MIW.
- Installation of phase separators is required in case of types marked (*2).
- The accessories marked (*3) can be installed by customers.

Table 5 Selecting Table of a Motor Breaker for 3-phase Induction Motor

200 – 220V AC

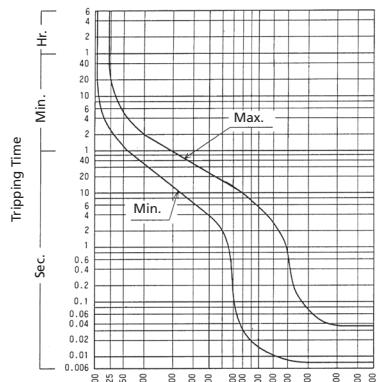
Motor Capacity (kW)	Motor Breaker		Motor Capacity (kW)	Motor Breaker	
	Rated Current (A)	Type		Rated Current (A)	Type
0.2	1.4	MS-30E	11	45	MS-50EB, MS-50SB
0.4	2.5		15	60	MS-100SB, MFXK100-S
0.75	4		18.5	75	
1.5	8		22	90	MS-225SB, MFXK225-S
2.2	10		30	(125)*	
3.7	16		37	(150)*	
5.5	25				
7.5	32				

Note:

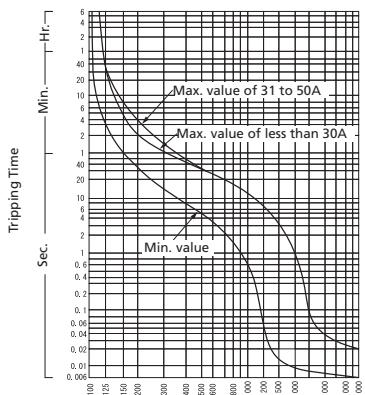
- Starting conditions are set within 3 seconds at 500% (2 seconds at 600%) of full load current for types MS-30E, MS-50EB, MS-50SB and within 8 seconds at 500% (5 seconds at 600%) of full load current for other types.
- Specify the rated current since the figures with asterisks are the mere reference current.

● Overcurrent Tripping Characteristics

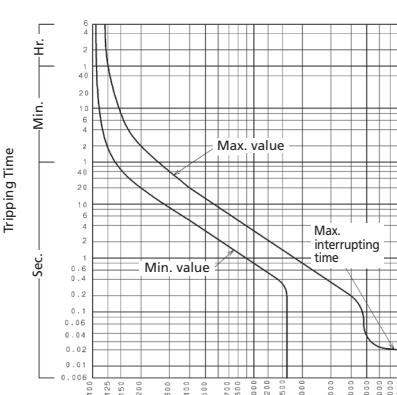
MS-30E, MS-50EB



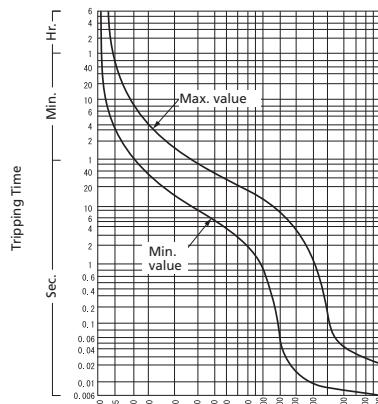
MS-50SB



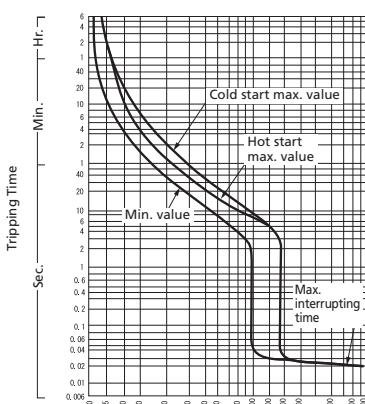
MFXK100-S



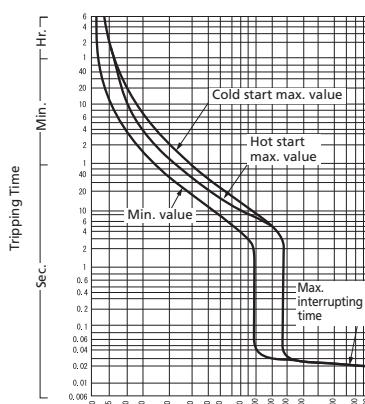
MS-100SB



MS-225SB



MFXK225-S



CONSTRUCTION

Hitachi Fuse-Free Breaker is comprised a switching mechanism, arc extinguishing devices, and a tripping unit contained in a compact molded case.

■ Switching Mechanism

The switching mechanism is a quick-make/quick-break type utilizing a trip-free toggle mechanism.

■ Arc Extinguishing Device

The series of grid plates is mounted in parallel between supports of insulating material. The slots in the steel plates extend directly over the contacts and draw the arc from moving contact up into the divided chamber.

The arc is thus confined, divided and extinguished.

■ Tripping Unit

The tripping unit of the Fuse-Free Breaker is produced in two types: a thermal-magnetic type and a full-magnetic type. The tripping unit is provided for each pole of the breaker, and if any one pole operates, all of the poles open the circuit simultaneously.

■ Positive Indication

The handle position gives positive indication of whether the breaker is ON (top), OFF (down) or tripped (midway).

Fig. 1 Thermal Magnetic Type

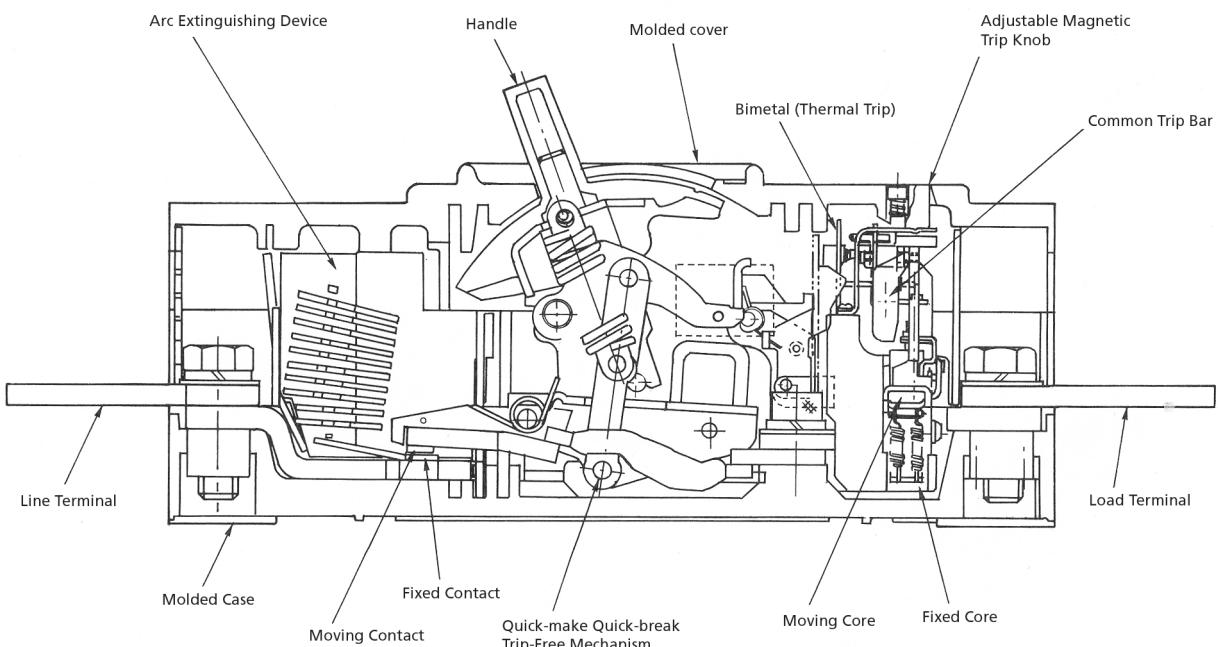
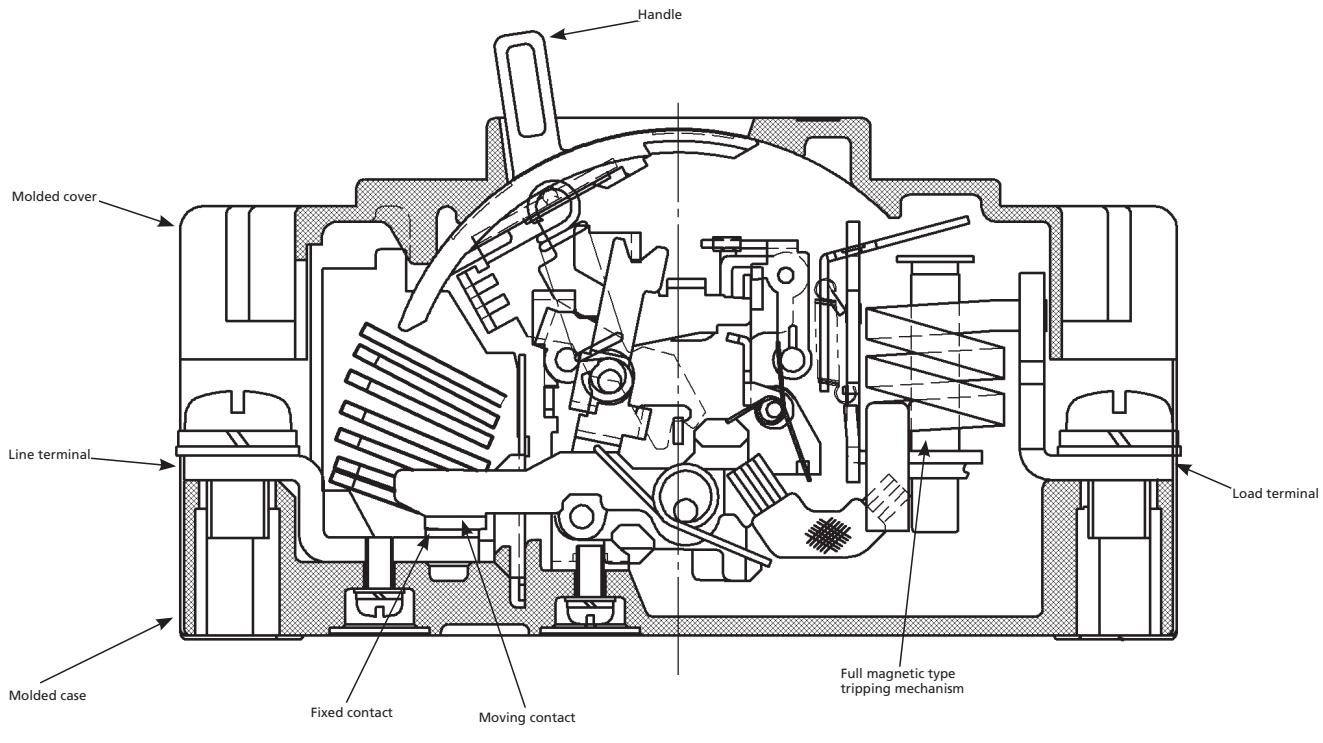
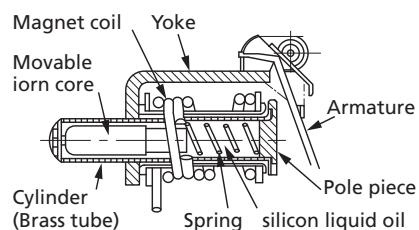


Fig. 2 Full magnetic Type



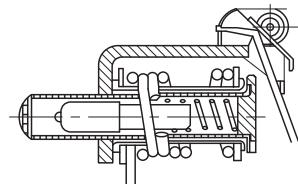
Principle (How the tripping mechanism operates)

Fig. 3 Normality



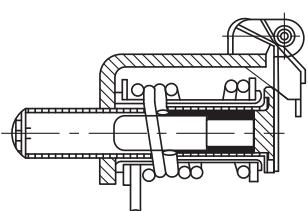
This figure shows that the movable iron core and armature do not move at less than rated current of the breaker.

Fig. 4 Time-Delay Action (1)



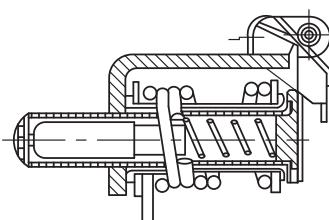
When overcurrent flows through the magnet coil, only the movable iron core moves for the pole piece, overcoming viscosity of the silicon liquid oil.

Fig. 5 Time-Delay Action (2)



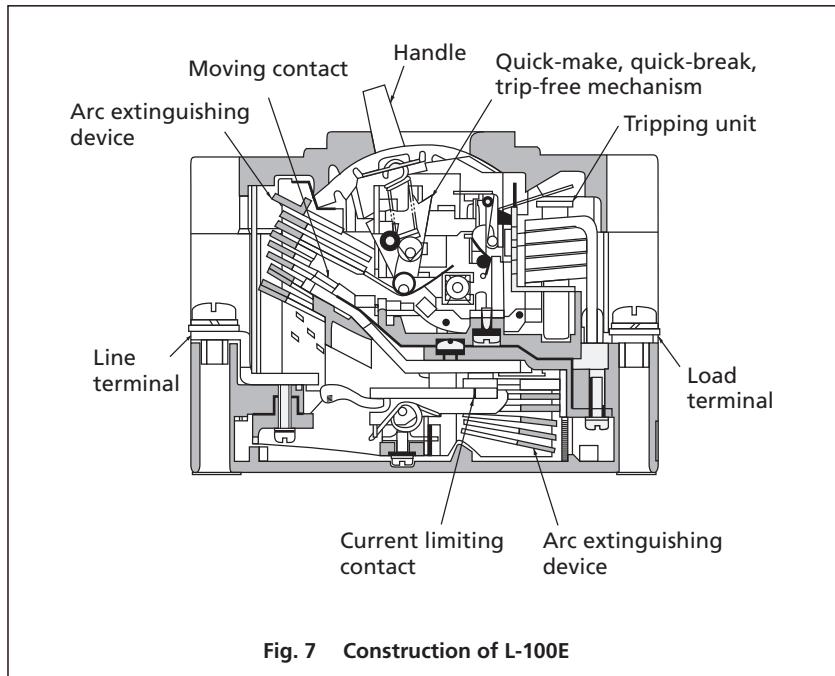
The armature is pulled at the pole piece, overcoming the core spring by increasing of the flux, and the armature operates the tripping mechanism of the breaker.

Fig. 6 Instantaneous Action



When a large current flows through the magnet coil, take short circuit for instance, armature is pulled at pole piece instantly without moving iron core, and it operates the tripping mechanism of the breaker.

Construction of Current-Limiting Type Breakers (L series)



L-Series breakers rapidly interrupt high faulty current by electromagnetic repulsing mechanism.

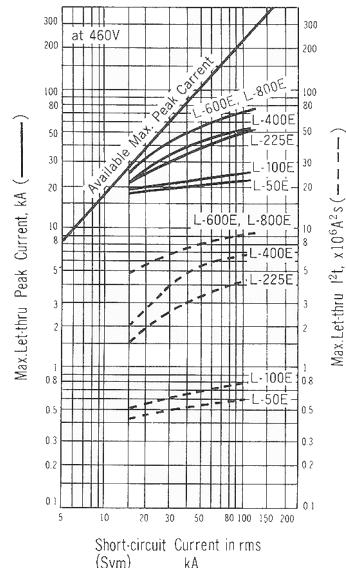
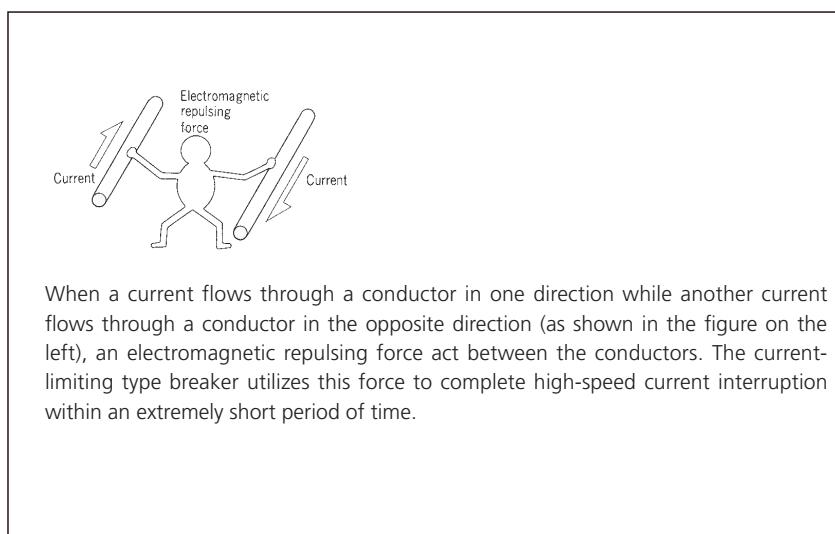
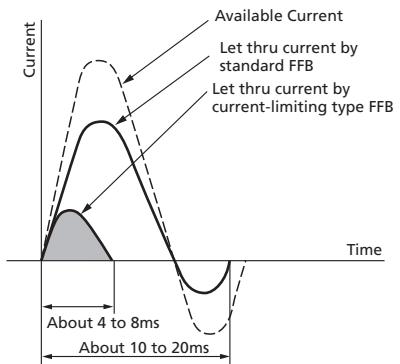


Fig. 8 Current limiting characteristics

Function of Hitachi Current-Limiting Type Breaker is as follows:

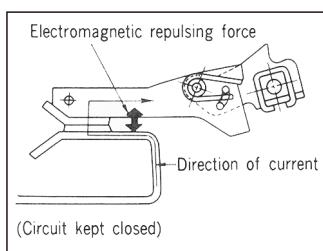


Fig. 9-1

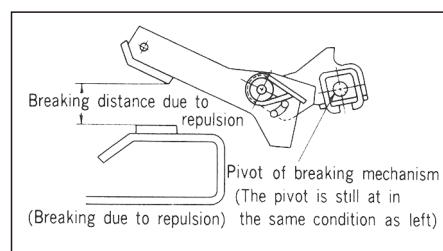


Fig. 9-2

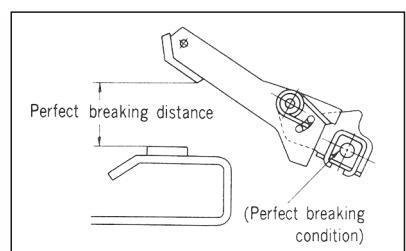


Fig. 9-3

When a short circuit current flows through this breaker, an electromagnetic repulsive force works in the direction shown above.

The electromagnetic repulsive force causes the moving contact to swing apart from the fixed contact before the breaking mechanism functions, accomplishing extremely quick breaking.

The breaking mechanism has functioned to open the circuit.

Construction of Electronics Type Breakers (FX400 – FX1200)

Excellent Current Limiting Function

Owing to high-speed current interruption, excellent current limiting is achievable. Thus breaker stress with respect to temperature or mechanic is reduced circuits are securely protected.

Higher MT current Reduces Miss trip by motors rush Current

Instantaneous tripping current is now greater *than conventional models. Reduces probability of miss trip at high inrush current. Improvement of the voltage equilibrium characteristic of the earth leakage breaker.

*In-house comparison

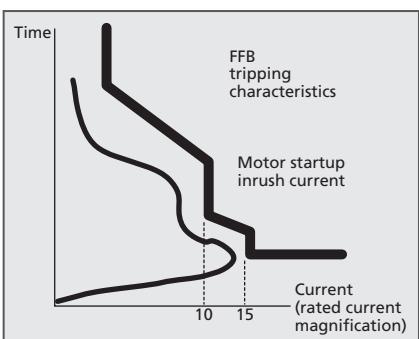
Double Instantaneous Trip*

Double electronic and mechanical instantaneous tripping characteristic protects equipments from short circuit.

Easy Coordination*

Tripping characteristics include adjustable long time delay & short time delay in proportion to long time delay (setting current x 1,000%) are contribute to easier coordination with other electric appliance such as down stream circuit breakers, transformers and wires.

*over 400A frame



Frame	MT Current
400A	5,000A
600A	8,000A
800A	10,000A
1,000A	17,000A
1,200A	20,000A

(FFB)



CHARACTERISTICS

1. Overcurrent Tripping

Because of its tripping device with proper time-delay characteristics, Hitachi Fuse-Free Breaker automatically opens circuits for overcurrents up to about 800% of its ampere rating. For heavy short-circuit currents, its instantaneous magnetic tripping device functions to break the circuit. These characteristics are specified in Circuit Breakers IEC60947-2, as shown in Table 6, according to which Hitachi Fuse-Free Breaker is designed.

■ Full-magnetic type

The rated current of a full-magnetic type which has no thermal element will not undergo a change despite variations in ambient temperature. Instead, the viscosity of the oil in its dash pot relay varies with temperature, causing the operating time to change as shown in Fig. 11. The rate of change in the operating time which the example below illustrates is as follows: If this tripping device adjusted to an ambient temperature of 40°C is employed at a site whose ambient temperature is 50°C, and if it trips over a circuit because of an overcurrent, its operating time will be reduced to 85% of standard time.

Table 6 Overcurrent Tripping characteristics

All poles loaded	Conventional non-tripping current	Conventional tripping current	Conventional time (h)
Conventional non-tripping current	Conventional tripping current		
1.05 times current setting	1.3 times current setting		2*

*1 hour when $\ln \leq 63A$

<Base ambient temperature>

Tripping device of Hitachi Fuse-Free Breaker is factory-adjusted for application at an ambient temperature of 40°C, the base ambient temperature specified by IEC standard.

■ Thermal-magnetic type

When employing or testing a thermal-magnetic type at ambient temperatures other than 40°C, the operating current for tripping varies (as shown in Fig. 10). It is necessary to compensate for the rated current according to the temperature compensation curve prepared for each frame. Application of the temperature curve is as follows:

The compensation current I is represented by:

$$I = \frac{I_1 \times 100}{X(\%)}$$

Where I = value of compensation current, I_1 = value of current required at certain ambient temperature, and X = rate of increase or decrease of current at a certain ambient temperature compensation curve for determining the amount of compensation for the rated current value. The example shown below illustrates that the rated current of a device adjusted at the base ambient temperature 40°C at a site whose ambient temperature is 50°C decreases to 90% of the rating.

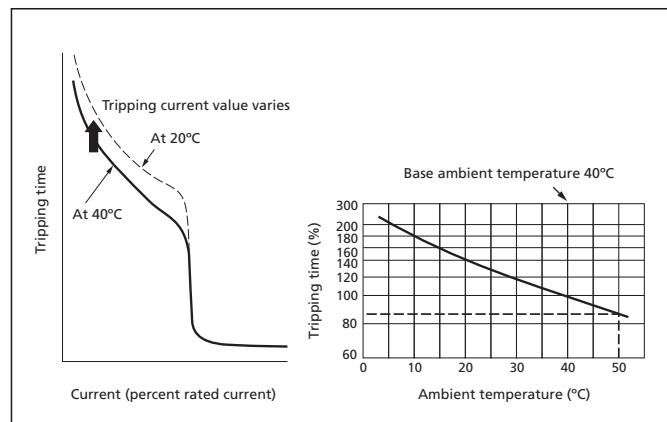


Fig. 11 Example of Application of Ambient Temperature Compensation Curve for Full-magnetic Type

<Maximum applicable temperature>

Fuse-Free Breaker is applicable to ambient temperatures up to 50°C. Application at a site whose ambient temperature exceeds 50°C is a special case, for which users are requested to contact Hitachi for advice.

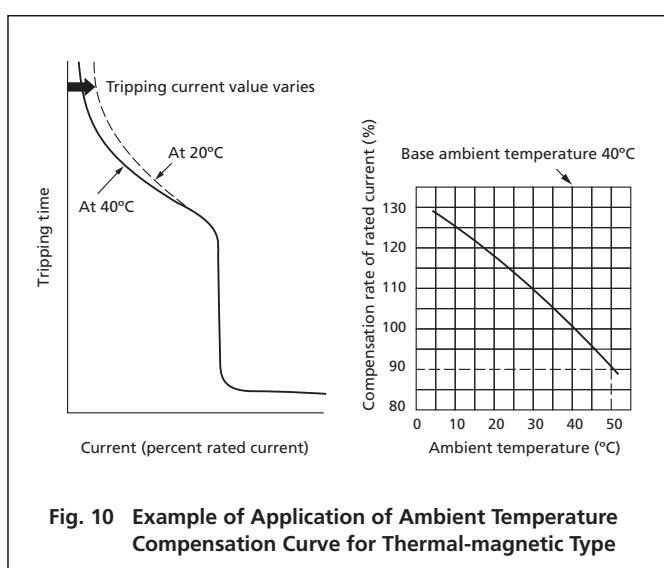
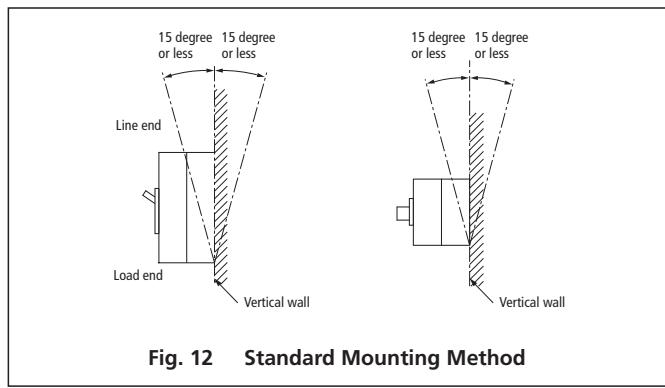


Fig. 10 Example of Application of Ambient Temperature Compensation Curve for Thermal-magnetic Type

CAUTION

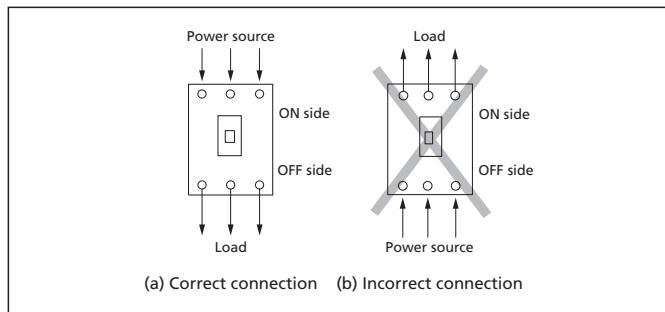
1. Standard mounting is shown in the diagram below.



If mounting in another direction is inevitable, contact Hitachi for advice.

2. Reversible connection types are available.

Reverse connection is basically prohibited (See following figure (Fig.13))



But reversible connection type available as follows:

Frame	F series	S series	Maximum applicable voltage	Remarks
100AF	F-100KB	—		
225AF	FXK250-S, FXK250-H	S-225SB, SXK225		1. Please state "Reversible connection type" when ordered.
400AF	F-400R	S-400S		
600AF	F-600F	S-600S		
800AF	F-800F, F-800RH	S-800S		2. Installation of phase separators on the load side is required.
1000AF	F-1000K	—		
1200AF	F-1200K	—		

3. Don't install the breaker at a site whose ambient temperature of an installation site exceeds 50°C. If installing the breaker in such a high ambient temperature is unavoidable, contact with Hitachi in advance.

4. Application of full magnetic type for DC circuit

Breakers for AC and breakers for DC are separately calibrated, and different application cannot be performed.

If DC application, please specify pure DC, single-phase full-wave rectified or three-phase full-wave rectified, etc.

5. Insulation clearance on line end of FFB is as follows:

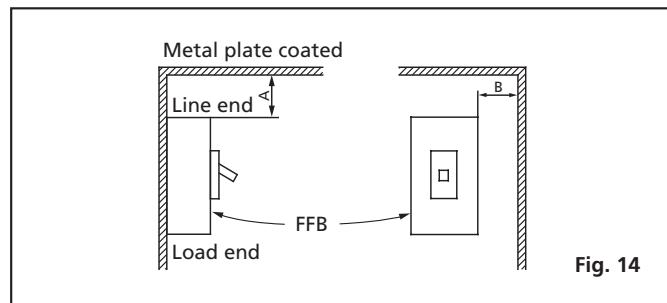
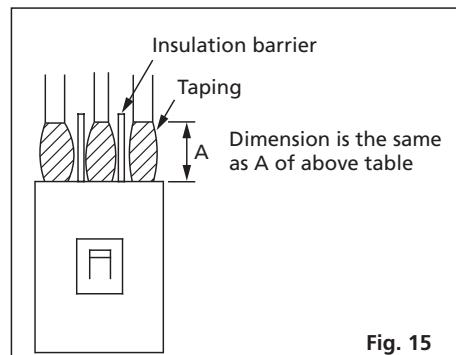


Table 7 Insulation Clearance

Classification	FFB frame	Minimum dimensions (mm)	
		A	B
1	30A Frame, 50A Frame (Excluding L-50E) 60A Frame	30	25
2	L-50E 100A Frame	40	40
3	125A 225A 250A Frame	50	40
4	F-250FB F-250KC	100	40
5	400A Frame, 600A Frame, 800A Frame	80 (110)	50
6	1000A Frame, 1200A Frame, 1600A Frame	150 (190)	100

6. Insulation of line side's living parts

It is recommended that line side's live parts of front connected type breakers are insulated by insulation tape or insulation barrier.



SELECTION

1. Select a breaker type according to the purpose

- Protection of general wiring: Table 1 to 4
- Protection of motor: Table 5
- Protection of branch lamp circuit: Table 6
- Protection against earth leakage

<Consideration to available short circuit current>

In estimating short circuit currents, there are many considerations, such as characteristics of transformer, connecting wire size and the distance from the transformer to the faulty point and so on.

The below charts bring you an easy solution for selecting the breaker type.

2. Estimate the available short-circuit current and select economical frames — whose interrupting capacity is higher than that estimation — from among the following series:

- F series: Standard type for general service
- S series: Small-scaled and low-cost, economical type
- L series: High-performance, current-limiting, high-interrupting capacity type

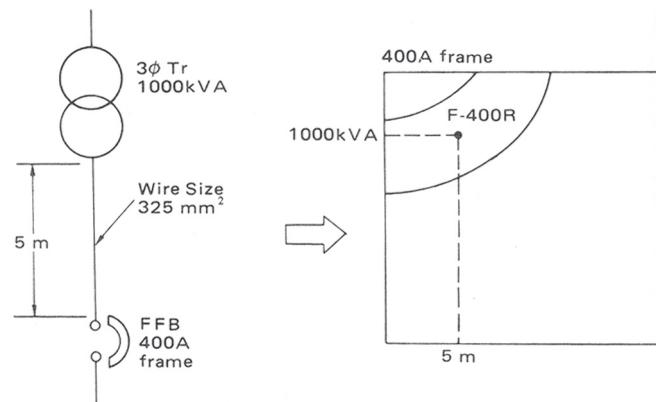
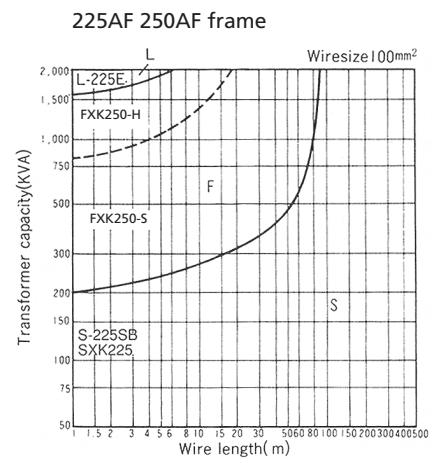
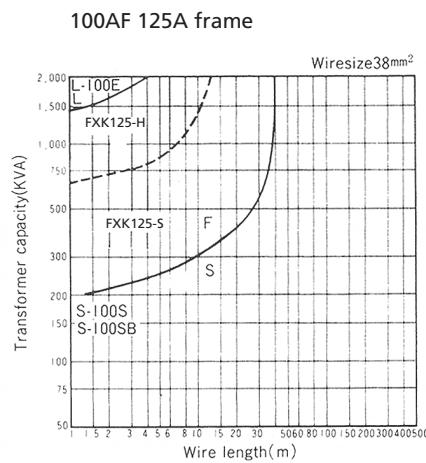
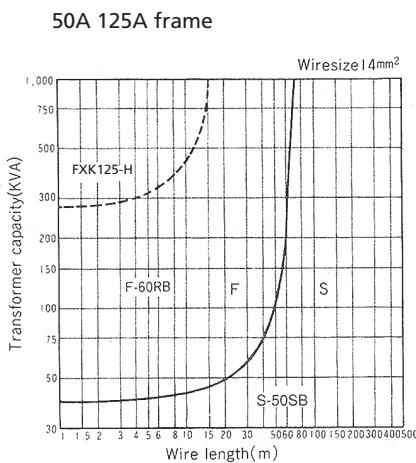
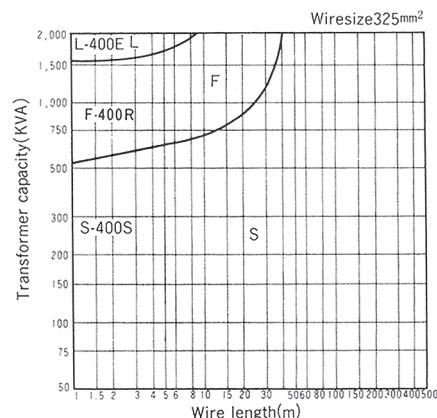


Fig. 16 Example of selection

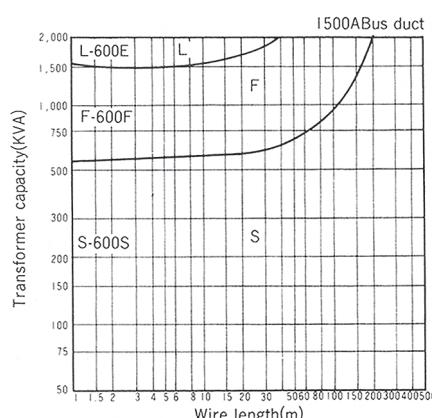
AC 460V (Transformer voltage: 415V)



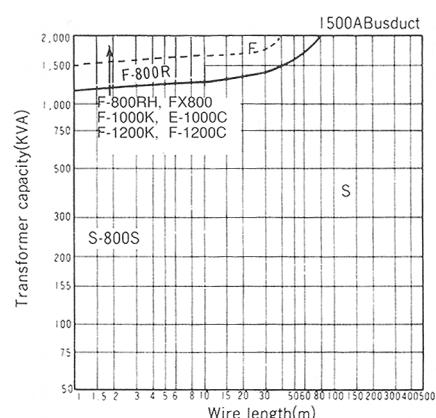
400A frame



600A frame



800A, 1000A, 1200A frame



3. Select the rated current as follows:

- Rated currents for heater and lamp circuits

Select a circuit breaker whose current rating corresponds to the value of the current allowable for the circuit.

- The rated current of a motor circuit is selected as follows:

<For general type breakers for protection of wiring>

■ Rated current of branch circuit for motor

Table 8, 9, 10, 11 shows rated currents of the breakers which have been selected on condition that they will not effect erroneous operation at motor starting time. Where two or more motors are connected to one branch circuit, the sum of the rated currents of these motors forms the basis for selecting the rated current of the breakers.

■ Rated Current of main circuit for motor

The motor groups connected to this circuit are divided into subgroups, each consisting of motors which are started simultaneously.

Each subgroup is regarded as one motor for convenience (and the sum of the full load current of each motor within this subgroup is regarded as the full load current of this virtual motor). Then select the rated current of a subgroup whose full-load current is largest from the Table 8, 9, 10, 11.

The sum of this tentative rated current and the full-load current of all the other subgroups is selected as the rated current of the breaker under consideration.

Table 8 Directly Starting a 3-phase Induction Motor (400 – 440V AC)

Motor		Rated current (A)	FFB										
Capacity (kW)	Full-load current (A)		2.5	5	7.5	10	15	22	25	30	35	43	50
0.2	0.7	15	F-30FB S-60RB F-60RB	S-50SB	S-100S S-100SB	FXK125-S	FXK125-H	L-50E	L-100E	L-225E	L-400E	L-600E	L-800E
0.4	1.4	15											
0.75	2.3	15											
1.5	4.2	15											
2.2	5.6	15											
3.7	9.0	20											
5.5	14	30											
7.5	16	30											
11	25	50											
15	33	60											
18.5	40	60											
22	45	75	S-225SB SXK225	S-400S	SX400	FXK250-S	FXK250-H	L-225E	L-400E	L-600E	L-800E	L-100E	L-100E
30	60	100											
37	75	100											
45	90	150											
55	(110)	175											
75	(150)	225	S-600S	S-800S	S-800S	FX800	F-800R F-800RH L-800E	L-800E	L-600E	L-400E	L-225E	L-100E	L-100E
90	(180)	225											
110	(220)	350											
150	(300)	500											
190	(380)	600											

Note: (1) The starting conditions are set within 15 seconds at 500% (10 seconds at 600%) of full load current.

Table 9 Star-delta Starting a 3-phase Induction Motor (400 – 440V AC)

Motor		Rated current (A)	FFB											
Capacity (kW)	Full-load current (A)		2.5	5	7.5	10	15	22	25	30	35	43	50	85
For a capacity of 15 kW or less, select the same breaker among those for direct-starting														
18.5	40	75	S-100S S-100SB	S-400S	SX400	FXK125-S	FXK125-H	L-100E	L-225E	L-400E	L-600E	L-800E	L-100E	
22	45	75												
30	60	100												
37	75	125												
45	90	150												
55	(110)	175												
75	(150)	225												
90	(180)	350												
110	(220)	400												
150	(300)	600												
190	(380)	700												

Table 10 Selecting table of Fuse-Free Breaker for Motor Branch Circuit Directly Starting 3-phase Induction Motor (200 – 220V AC)

Motor			FFB									
Capacity (kW)	Full-load current (A)	Rated current (A)	Interrupting capacity (kA) Sym									
			5	10	14	25	30	35	42	50	85	175
0.2	1.4	15	S-30E S-30FB	S-60RB	F-60RB	FXK125-S	FXK125-H	L-50E	FXK125-S	FXK125-H	L-50E	FXK125-S
0.4	2.6	15										
0.75	4.2	15										
1.5	7.4	15										
2.2	10	20										
3.7	16	30										
5.5	25	50										
7.5	33	60										
11	45	75										
15	60	100										
18.5	75	100	S-100EB	S-100S S-100SB	S-100SB	FXK125-S	FXK125-H	L-100E	FXK125-S	FXK125-H	L-100E	FXK125-S
22	90	150										
30	(120)	200										
37	(150)	225										
45	(180)	225										
55	(220)	350										
60	(240)	400										
75	(300)	500										
90	(360)	600										

Table 11 Star-delta Starting a 3-phase Induction Motor (200 – 220V AC)

Motor			FFB									
Capacity (kW)	Full-load current (A)	Rated current (A)	Interrupting capacity (kA) Sym									
			2.5	5	10	14	25	30	35	50	85	175
For a capacity of 15 kW or less, select the same breaker among those for direct-starting												
18.5	75	125	S-225SB SXK225	S-225SB SXK225	S-225SB SXK225	FXK250-S	FXK250-H	L-225E	FXK250-S	FXK250-H	L-225E	FXK250-S
22	90	150										
30	(120)	200										
37	(150)	225										
45	(180)	350										
55	(220)	400										
60	(240)	500										
75	(300)	600										
90	(360)	700										

<Breaker Used for Protection of Motor Against Overload>

A motor breaker is used to protect wiring and a motor against overload. Its rated current is about the same value as full-load current of the motor. The applicable conditions are subject to the following restrictions:

- 1) Only one motor is installed on the circuit under consideration.
- 2) Starting current is less than 600% of the full-load current and motor load is light (for specific requirements for each rated current, refer to Table 12).

When the above restrictions cannot be met use a general type FFB.

When ordering, please specify the Frame (selected by the interrupting capacity) and the rated current. (About the same as full load current of the motor.)

• When using the breaker for the transformer primary circuit.

Since exciting inrush current may be 20 to 30 times the transformer rated current, the breaker rated current should be selected more than two times the transformer rated current.

Table 12 Applicable Conditions of Motor Breaker

Rated current (Amperes)	Starting condition	
	Starting current/full load current	Starting time
50 or less	500%	Within 3 sec
	600%	Within 2 sec
From 51 to 150	500%	Within 8 sec
	600%	Within 5 sec

4. Application to discrimination coordination

In a discrimination coordination system, only the breaker nearest the fault opens to isolate the faulty circuit from the rest of the power system. This system results in maximum continuity of service.

ELECTRONICS TYPE breakers are best suited to application as the upstream (main) breaker.

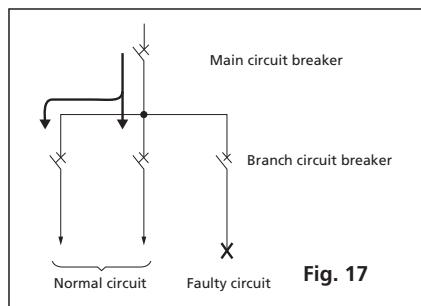


Fig. 17

Table 13 Discrimination between standard FFBs and ELECTRONICS TYPE FFBs

230V class

FFB for branch circuit Type	FFB for main circuit Type	Interrupting Capacity(kA)	FX400	FX600	FX800	FX1000	FX1200	F-1600CB
F-30FB		5	5	5	5	5	5	5
F-50FC		10	5	7.5	7.5	10	10	10
F-60RB		25	5	10	10	25	25	25
F-50HB		35	5	10	10	35	35	35
FKK125-H		100	5	14	14	85	85	85
FKK125-S		50	5	10	10	50	50	50
FKK125-H		100	5	14	14	85	85	85
FKK250-S, FKK250-H, F-250FB, F-250KC		85/100	4	10	10	35	35	65
FX400, F-400R		100	—	—	10	18	22	25
F-600F, FX600		100	—	—	—	—	22	25
F-800F, FX800, F-800R		100	—	—	—	—	—	25
FX1000		125	—	—	—	—	—	—
FX1200		125	—	—	—	—	—	—
S-30E, S-50EB, S-50SB		5	4	5	5	5	5	5
S-100EB, S-60RB		10	4	7.5	7.5	10	10	10
S-100SB		35	5	14	14	25	25	25
S-225SB, SXK225		35	4	10	10	25	25	25
SX400, S-400S		50	—	—	10	18	22	25
SX600, S-600S		50	—	—	—	—	22	25
SX800, S-800S		85	—	—	—	—	—	25
L-50E		175	5	14	14	125	125	125
L-100E		175	5	14	14	125	125	125
L-225E		175	4	10	10	42	65	125
L-400E		175	—	—	10	18	22	42
L-600E		175	—	—	—	—	22	42
L-800E		175	—	—	—	—	—	42

380V class

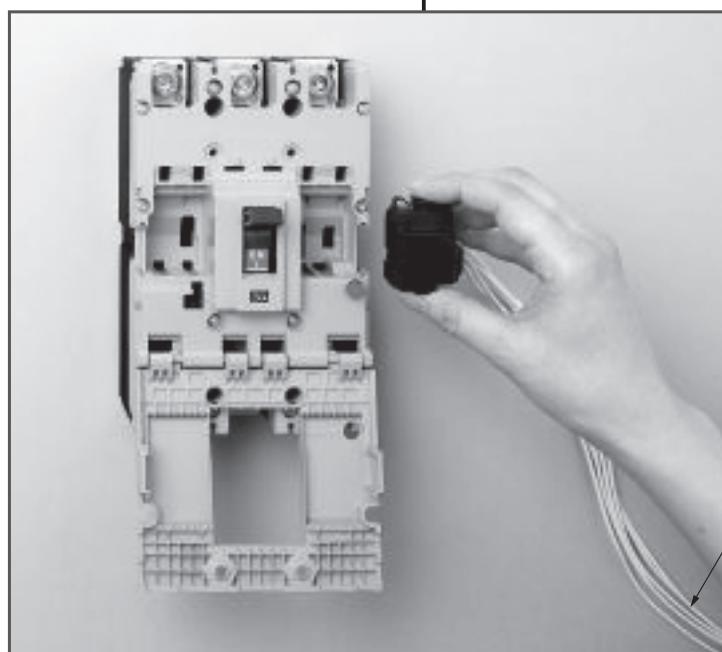
FFB for branch circuit Type	FFB for main circuit Type	Interrupting Capacity(kA)	FX400	FX600	FX800	FX1000	FX1200	F-1600CB
F-30FB		2.5	2.5	2.5	2.5	2.5	2.5	2.5
F-50FC		7.5	4	7.5	7.5	7.5	7.5	7.5
F-60RB		10	4	7.5	7.5	10	10	10
FKK125-H		50	4	7.5	7.5	50	50	50
FKK125-S		30	4	7.5	7.5	25	25	25
FKK125-H		50	4	7.5	7.5	35	50	50
FKK250-S, F-250FB		30	4	7.5	7.5	22	22	30
FKK250-H, F-250KC		50	4	7.5	7.5	22	22	30
FX400, F-400R		50	—	—	7.5	18	22	22
F-600F, FX600		50	—	—	—	—	22	22
FX800, F-800R		50	—	—	—	—	—	22
FX1000		85	—	—	—	—	—	—
FX1200		85	—	—	—	—	—	—
S-50SB		2.5	2.5	2.5	2.5	2.5	2.5	2.5
S-60RB		5	4	5	5	5	5	5
S-100S, S-100SB		10	4	7.5	7.5	10	10	10
S-225SB, SXK225		15	4	7.5	7.5	15	15	15
SX400, S-400S		35	—	—	7.5	22	22	22
SX600, S-600S		35	—	—	—	—	22	22
SX800, S-800S		35	—	—	—	—	—	22
L-50E		125	4	10	10	30	30	85
L-100E		125	4	10	10	30	30	85
L-225E		125	4	7.5	7.5	22	22	50
L-400E		125	—	—	7.5	18	22	22
L-600E		125	—	—	—	—	22	22
L-800E		125	—	—	—	—	—	22

ACCESSORIES

Interior Accessories

■ Available accessories inside of FFB are as follows:

Undervoltage Trip (UVT)	Shunt Trip (SHT)
<p>The Undervoltage Trip is used to automatically trip the breaker when the line voltage drops to 35 to 70% of its normal value. The standard mounting method of the breaker with this trip is vertically on the wall with its line end positioned upward.</p>	<p>The Shunt Trip is used to trip the breaker electrically from a remote point. Since this trip coil does not have a continuous rating, the coil circuit must be broken by making connections to the load end of the breaker (Fig. 20 (a)). If a separate power supply is to be used, the customer is requested to specify an auxiliary switch to prevent the coil from being burnt by overheating (Fig. 20 (b)). The standard mounting method of the breaker with this trip is on the wall with its line end positioned upward.</p>



Lead wire
0.5mm² PVC-insulated wire (yellow),
0.5 meter long

Alarm Switch (AL)	Auxiliary Switch (AUX)												
<p>When the breaker is tripped, this switch closes to energize an indicating light or sound an alarm. It employs a microswitch equipped with a C-contact.</p>	<p>The auxiliary switch, a device interlocked with opening and closing operation of a breaker, is used to open or close control circuits as the breaker operates. It employs a microswitch equipped with a C-contact.</p>												
■ Terminal Symbols and Connection Condition of AL Switch													
<table border="1"> <thead> <tr> <th>Condition of Breaker</th><th>Connection condition of AL switch</th></tr> </thead> <tbody> <tr> <td>ON and OFF</td><td> <p>S-1 (S-4) —○— S-2 (S-5) ○— S-3 (S-6)</p> </td></tr> <tr> <td>Tripped</td><td> <p>S-1 (S-4) —○— S-2 (S-5) ○— S-3 (S-6)</p> </td></tr> </tbody> </table> <p>() : for 2C contacts</p>	Condition of Breaker	Connection condition of AL switch	ON and OFF	<p>S-1 (S-4) —○— S-2 (S-5) ○— S-3 (S-6)</p>	Tripped	<p>S-1 (S-4) —○— S-2 (S-5) ○— S-3 (S-6)</p>	■ Terminal Symbols and Connection Condition of AUX Switch <table border="1"> <thead> <tr> <th>Condition of Breaker</th><th>Connection condition of AUX switch</th></tr> </thead> <tbody> <tr> <td>ON and OFF</td><td> <p>A-1 (A-4) —○— A-2 (A-5) ○— A-3 (A-6)</p> </td></tr> <tr> <td>OFF or Tripped</td><td> <p>A-1 (A-4) —○— A-2 (A-5) ○— A-3 (A-6)</p> </td></tr> </tbody> </table> <p>() : for 2C contacts</p>	Condition of Breaker	Connection condition of AUX switch	ON and OFF	<p>A-1 (A-4) —○— A-2 (A-5) ○— A-3 (A-6)</p>	OFF or Tripped	<p>A-1 (A-4) —○— A-2 (A-5) ○— A-3 (A-6)</p>
Condition of Breaker	Connection condition of AL switch												
ON and OFF	<p>S-1 (S-4) —○— S-2 (S-5) ○— S-3 (S-6)</p>												
Tripped	<p>S-1 (S-4) —○— S-2 (S-5) ○— S-3 (S-6)</p>												
Condition of Breaker	Connection condition of AUX switch												
ON and OFF	<p>A-1 (A-4) —○— A-2 (A-5) ○— A-3 (A-6)</p>												
OFF or Tripped	<p>A-1 (A-4) —○— A-2 (A-5) ○— A-3 (A-6)</p>												

Terminal Block for Interior Accessories



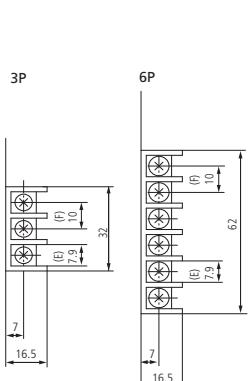
TB



TB2

Fig. 18 External View of a Breaker with Terminal Block for an Interior Accessory

TB



TB2

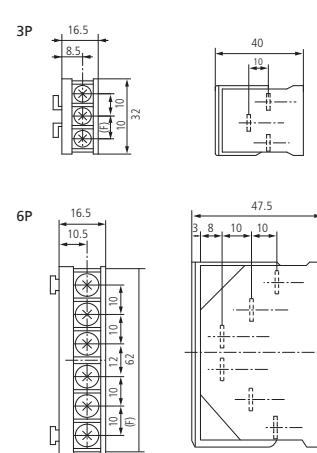
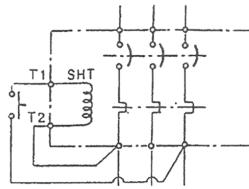


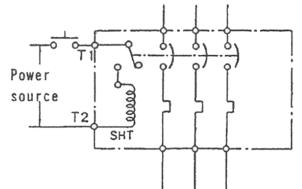
Fig. 19 Dimensions of FFB with Terminal Block for Interior Accessory

Table 14 Rating of Alarm Switch and Auxiliary Switch

	Voltage	Rated current	Time constant
AC	250V	2A	—
	500V	1A	
DC	110V	0.5A	10 ms or less
	220V	0.25A	



(a) Uni-power



(b) Separate power
(excepting F-250FB F-250KC)

Fig. 20 Wiring Diagram of Shunt Trip

Table 15 Coil rating of SHT and UVT

Type	SHT		UVT	
	Voltage	Input (VA)	Voltage	Input (VA)
S-30E, S-50EB, S-225SB, SXK225	AC 100-110V AC 200-220V AC 230-240V AC 380V AC 400-440V AC 480V	100 (for 400V: 200VA)	—	—
F-30FB, S-50SB, F-60RB, F-50KB, L-50E, S-100EB, S-100S, S-100SB, F-100S, F-100RB, F-100KB, L-100E	(Common use for 50 and 60 Hz)	200	50Hz AC 100V 200V 230V 240V	60Hz AC 100V 110V 200V 220V
FXK125-S, FXK125-H, FXK250-S, FXK250-H, F-250FB, F-250KC			—	—
L-225E, S-400S, SX400, F-400R, FX400, L-400E	DC 100V DC 110V	50Hz AC 100V 200V 230V 240V 400V 415V	50Hz AC 100V 110V 200V 220V 400V 440V	20
S-600S, SX600, F-600F, FX600, L-600E, S-800S, SX800, F-800R, F-800RH, FX800, L-800E, FX1000, FX1200, F-1000C, F-1000K, F-1200C, F-1200K, F-1600CB, F-1600B			60Hz AC 100V 110V 200V 220V 400V 440V	30

Table 16 Applicability of interior accessories

Type	F S L M	F-30FB F-60RB		F-100S F-100KB		★FXK125-S ★FXK125-H ★FXK250-H ★FXK250-S F-250FB F-250KC	★FX400 F-400R	★FX600 F-1200K ★FX800 F-1600B F-600F F-800R F-1000K F-800RH	★FX1000 ★FX1200 F-1600CB
		S-30E S-50EB	S-50SB, S-100EB, S-100SB, S-60RB	S-100S	S-225SB ★SXK225				
				L-50E L-100E					
Number of poles	MS-30E MS-50EB	MS-50SB MS-100SB				★MFHK100-S ★MFHK225-S MS-225SB MF-250FB	2, 3	2, 3, 4	2, 3, 4
		2	3	2	3				
AL									
AUX									
SHT									
UVT									
AL + AUX									
AL + SHT									
AL + UVT									
AUX + SHT									
AUX + UVT									
AL + AUX + SHT									
AL + AUX + UVT									



Handle of Breaker

AL

AUX

SHT

UVT

Notes:

1. 2C means that it can be mounted 1C, if required.
2. *: Terminal block (TB) for UVT wiring is equipped.
3. The accessories of marked ★ types can be installed by customers.
4. AL 2C or AUX 2C is available in case of FXK125-S/H and FXK250-S/H

Exterior Accessories

■ Accessories mounted on the outside of breaker are as follows:

- Rear Connecting Stud (STB) and Bar Stud (BSD)
- Plug-in Mounting Base Assembly (PK)
- Flush Mounting Base Assembly (GK)
- Mechanical Interlock (MI)
- Motor Operating Mechanism (MMK, MMK-C)
- Electro-magnetic Operating Mechanism (MK-C)
- Handle Operating Mechanism

1. Rear Connecting Stud (STB) and Bar Stud (BSD)

Rear connecting stud is used as rear connecting terminal.



Fig. 21 FFB with Rear Connecting Studs

For 600A frame or less and S-800S, molded insulating bushings are provided.

2. Plug-in Mounting Base Assembly (PK)

The plug-in mounting base assembly is an accessory demounting a breaker by saving the trouble of removing the connection wiring from it when inspecting or replacing a breaker mounted on a switchboard or a panel board.



Fig. 22 FFB with Plug-in Mounting Base Assembly

3. Flush-mounting Base Assembly (GKW, GK)

The flush-mounting base assembly is an accessory for mounting a breaker on a switchboard. A breaker is secured via insulating bushings to an exclusive mounting frame by using screws as same method as the rear connecting stud or bar stud. A rectangular hole sized a little larger than that of a breaker is cut into the switchboard and the breaker is embedded into this hole and secured to the switchboard by the mounting frame. The flush plate is mounted on the breaker.

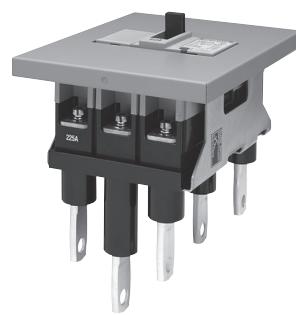


Fig. 23 FFB with Flush-mounting Base Assembly

4. Mechanical Interlock (MIW)

This mechanical interlock prevent from any of two breakers to be closed.

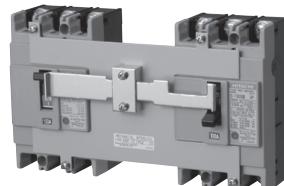


Fig. 24 FFB with Mechanical Interlock

5. Drawout Mechanism (PDK)

The drawout mechanism is an accessory for easy mounting and removal of F-1600E.

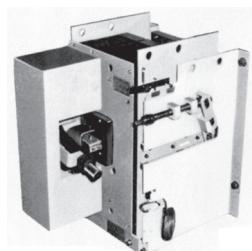


Fig. 25 FFB with Drawout Mechanism

6. Motor Operating Mechanism (MMK-S)

- This mechanism is suitable to remote control a breaker by utilizing a motor. Since the control circuit is self holding type, the operation of this mechanism is completed by brief closing of push button switch contact. As soon as completing of operation, the control circuit is opened and the motor is stopped by instant operation of a limit switch.
- The manual operation is also available.



Fig. 26 Motor Operating Mechanism

Table 17 Standard Ratings of Motor Operated Mechanism

Type		MMK-S			
Type of FFB	F series	3P		4P	
		FXK125-S FXK125-H	FX400 F-400R	F100KB F-250FB F-250KC	F-400R
	L series	L-50E L-100E	L-225E L-400E	L-50E L-100E	L-225E L-400E
	S series	S-225SB SXK225	SX400 S-400S	—	—
Max. operational current peak (A)	DC100	—			
	DC110	—			
	AC100	0.2 (0.6)	0.3 (0.9)	0.2 (0.6)	0.3 (0.9)
	AC110	—			
	AC200	0.1 (0.3)	0.15 (0.45)	0.1 (0.3)	0.15 (0.45)
	AC220	—			
Power supply (VA)		500	100	50	100

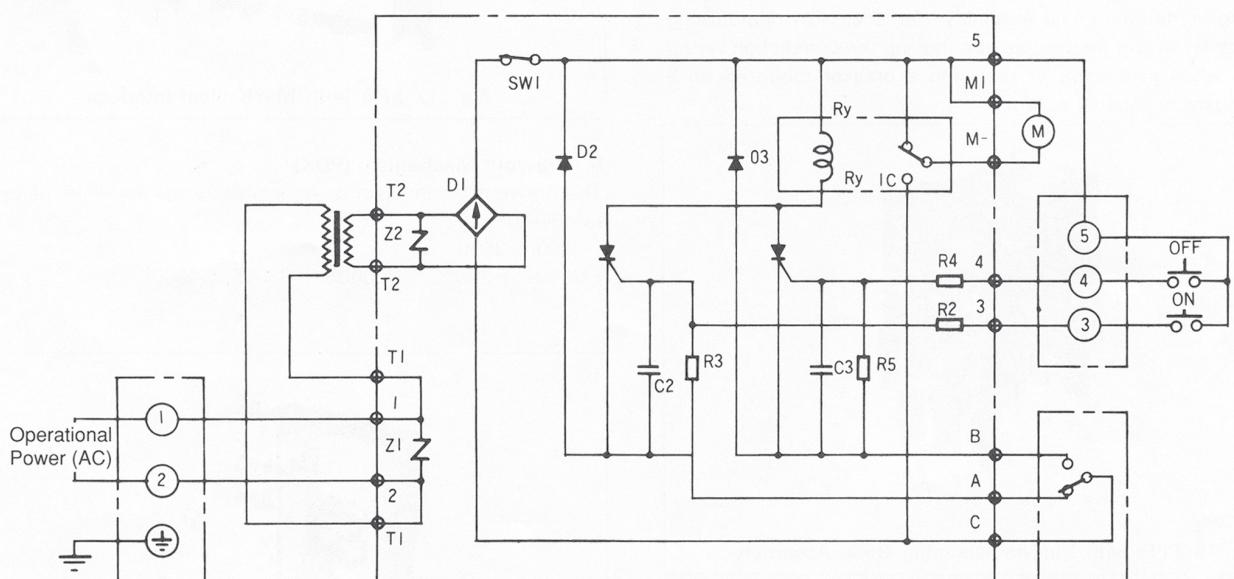
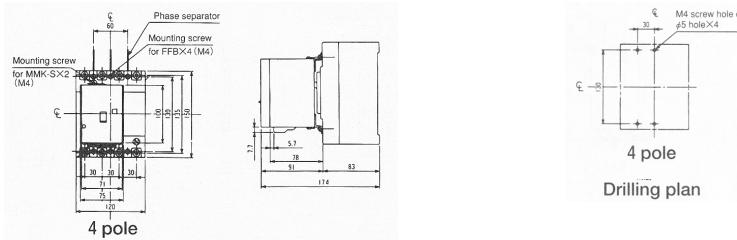


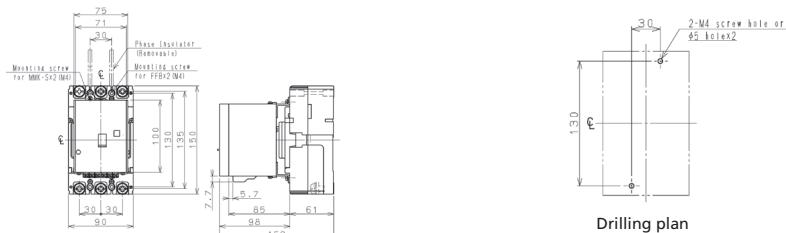
Fig. 27 Control Circuit of Motor Operating Mechanism

DIMENSIONS OF MMK-S

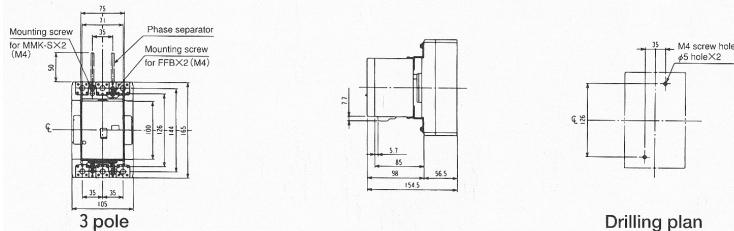
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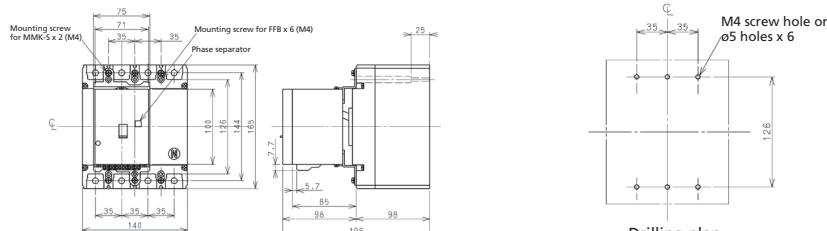
FXK125-S, FXK125-H



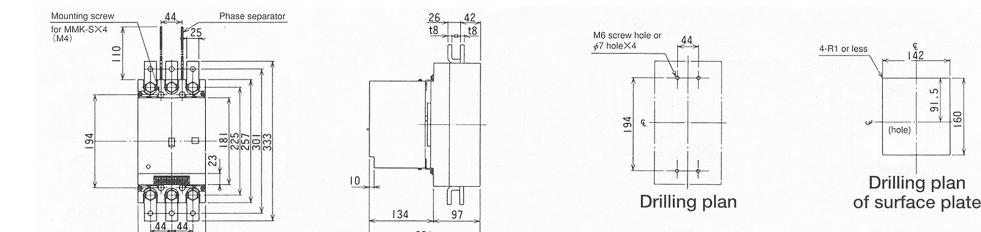
S-225SB



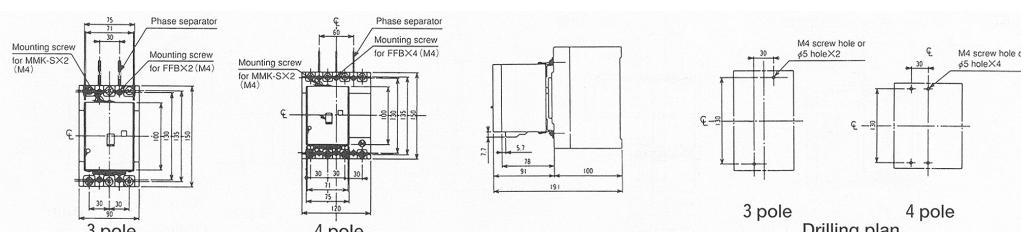
F-250FB, F-250KC



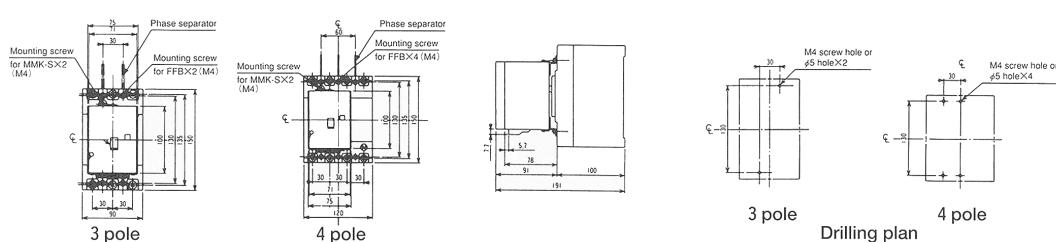
SX400, FX400



L-50E



L-100E



7. Motor Operating Mechanism (MMK-C)

- This mechanism is suitable to remote control a breaker by utilizing a motor. There is one type as follows.

MMK-C (Compact Type): The breaker is operated by rotation of a single phase series commutator motor with reduction gear.

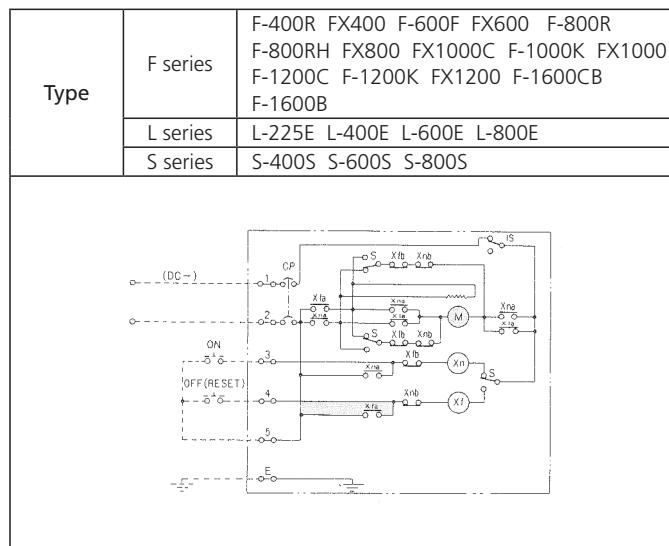


Fig. 28 Motor Operating Mechanism

*excepting 4 poles FFB

Table 18 Standard Ratings of Motor Operated Mechanism

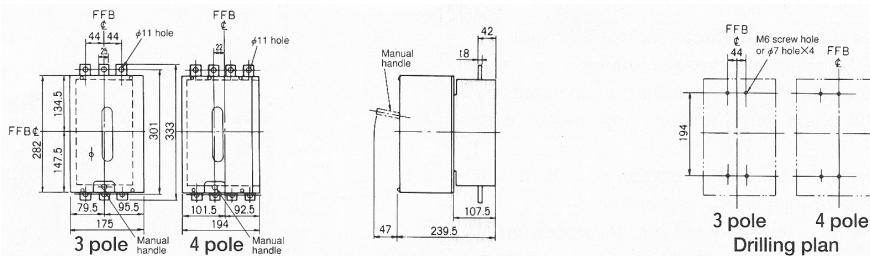
Type		MMK-C			
Type of FFB	F series	F-400R FX400	F-600F FX600	F-800R F-800RH FX800 F-1000C* F-1000K* F-1200C* F-1200K* F-1600CB* F-1600B*	F-1000C (4P) F-1000K (4P) F-1200C (4P) F-1200K (4P) F-1600CB (4P) F-1600B (4P)
	L series	L-225E L-400E	—	L-600E L-800E	—
	S series	S-400S	S-600S	S-800S	—
Max. operational current peak (A)	DC100·110V	3	6.5	8	10
	AC120V	3	6.5	8	10
	AC240V	1.5	3.5	4	5
Operating time (sec)		1.2	1.5	1.5	1.5
Power supply (VA)		100	200	200	400



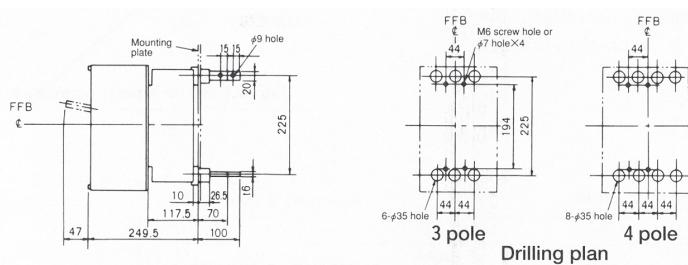
PS	Push-button Switch
X	Auxiliary Electromagnetic Contactor
n	For operating FFB' ON"
f	For operating FFB' OFF"
a	Closed by operation (normally open)
b	Opened by operation (normally closed)
CP	Circuit Protector
2	Timer
Si	Silicon Rectifier
R	Resister
M	Motor
IS S LS	Limit Switch

DIMENSIONS OF MMK-C

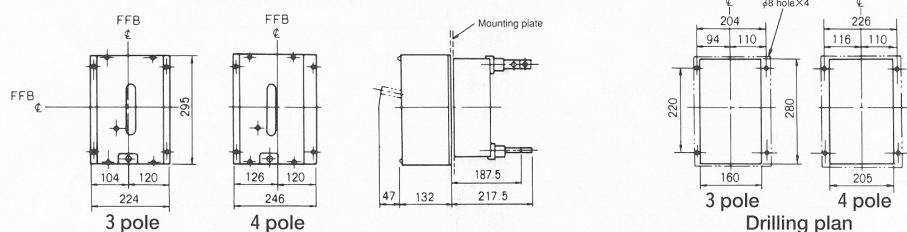
L-225E (Standard Type)



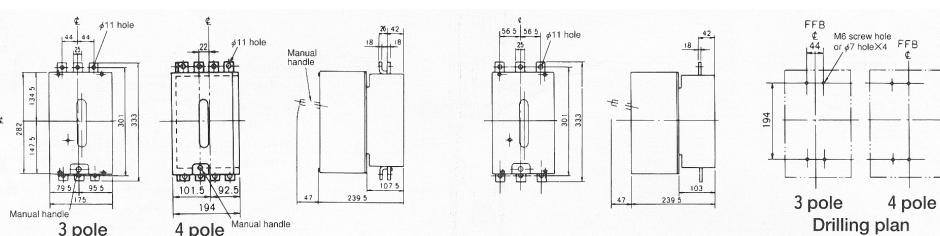
(Rear Connecting Type)



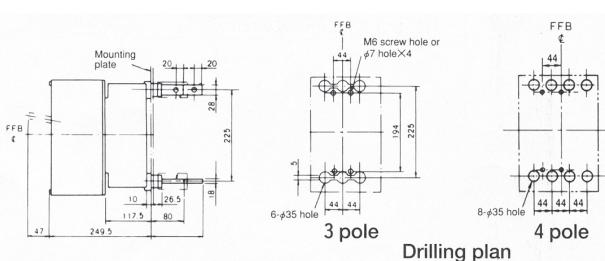
(Built-in Type)



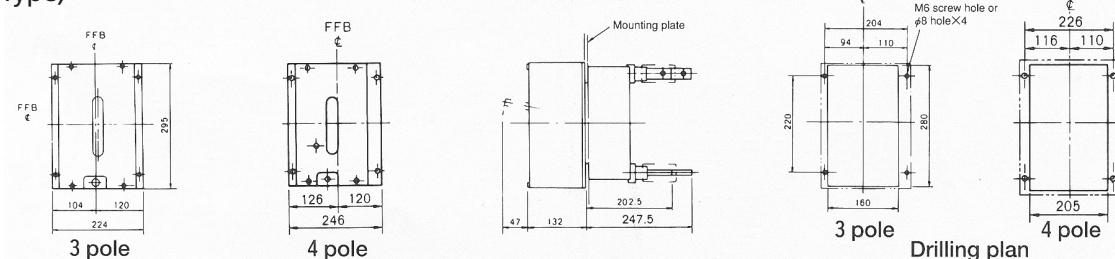
FX400, F-400R SX400, L-400E (Standard Type)



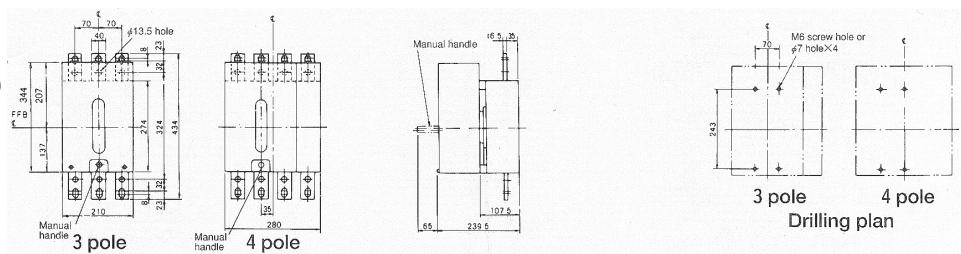
(Rear Connecting Type)



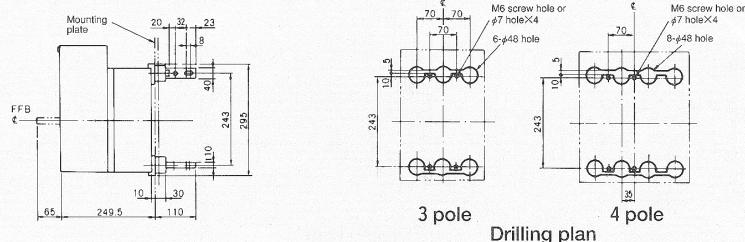
(Built-in Type)



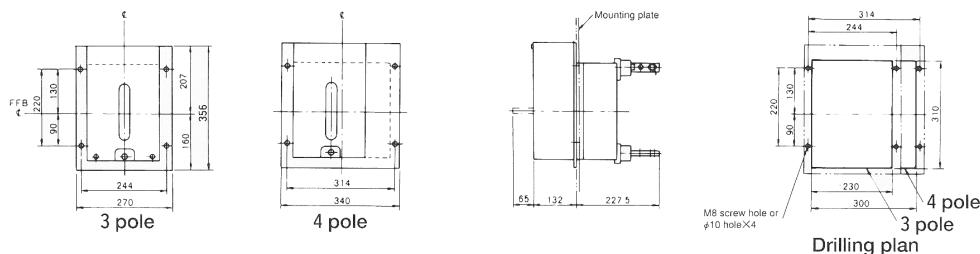
**FX600, F-600F
SX600, L-600E
(Standard Type)**



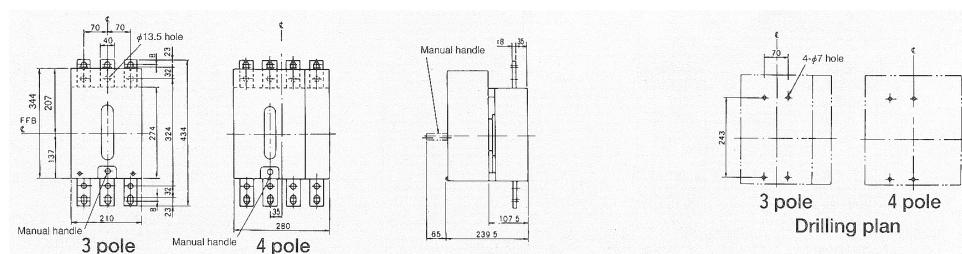
(Rear Connecting Type)



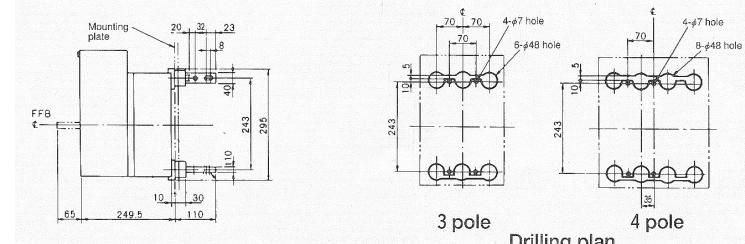
(Built-in Type)



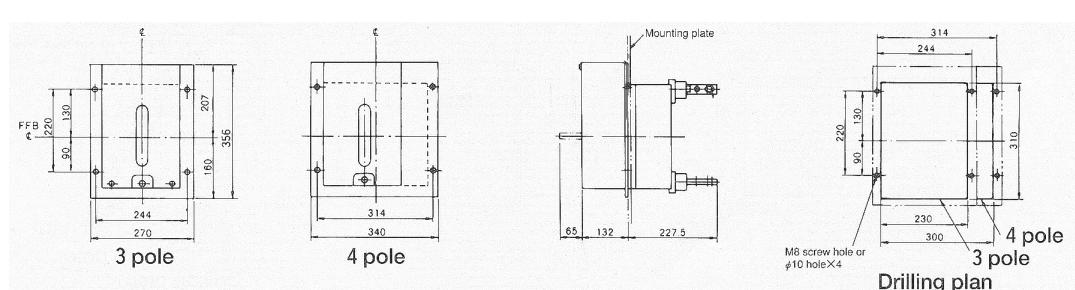
**FX800, F-800R
F-800RH, SX800
L-800E
(Standard Type)**



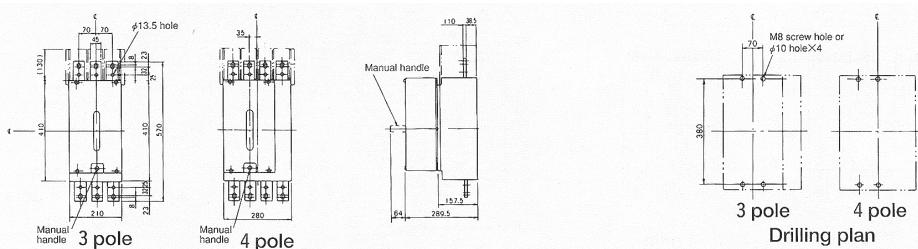
(Rear Connecting Type)



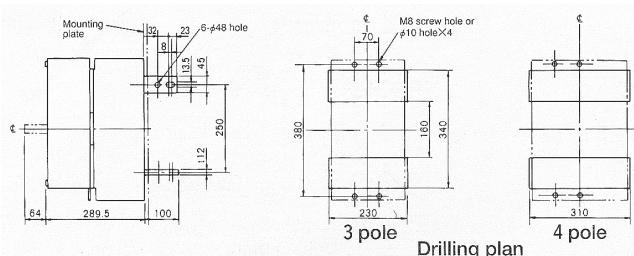
(Built-in Type)



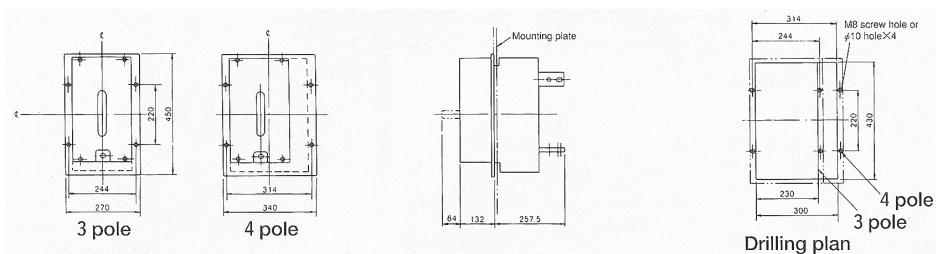
**FX1000, F-1000K
(Standard Type)**



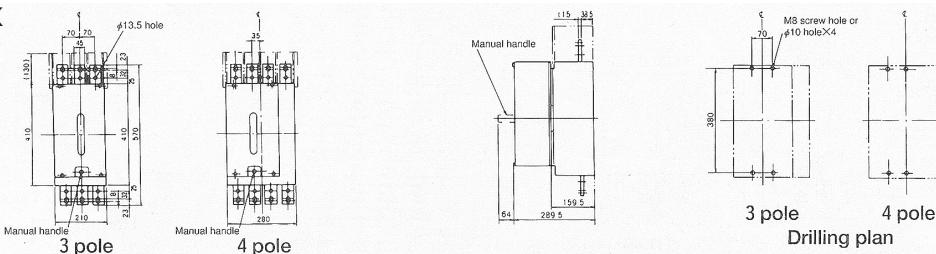
(Rear Connecting Type)



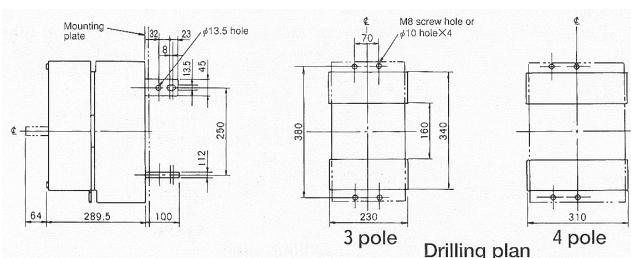
(Built-in Type)



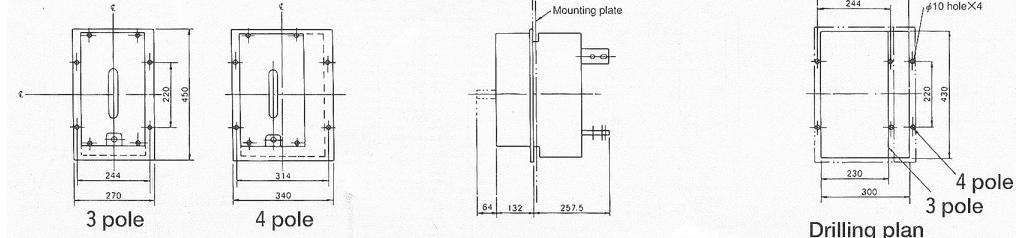
**FX1200, F-1200K
(Standard Type)**



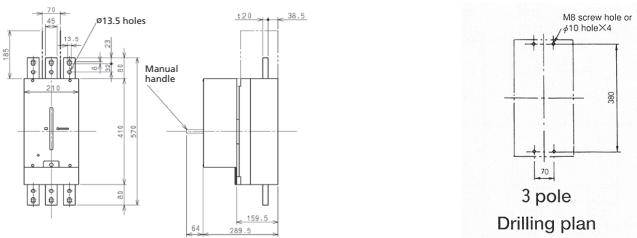
(Rear Connecting Type)



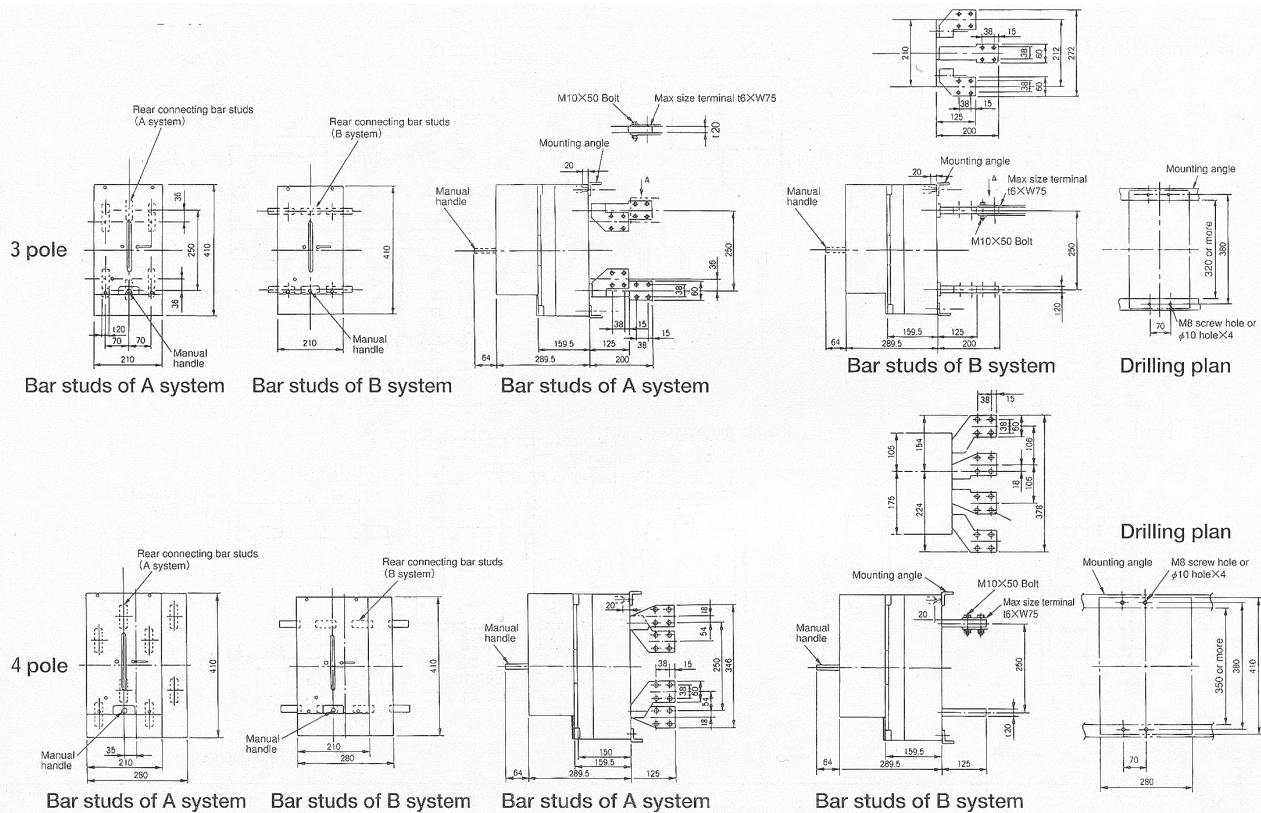
(Built-in Type)



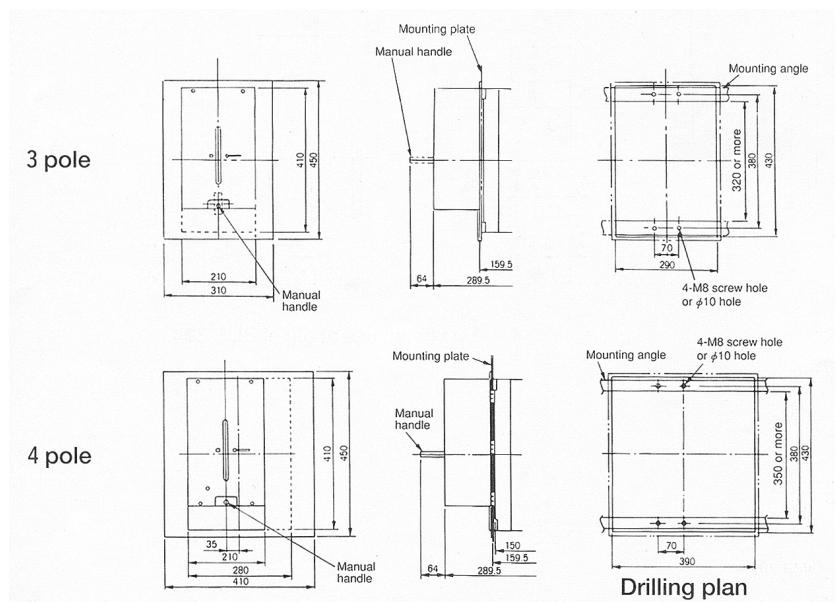
**F-1600B, F-1600CB
(Standard Type)**



(Rear Connecting Type)



(Built-in Type)



8. Terminal Cover (TMC)

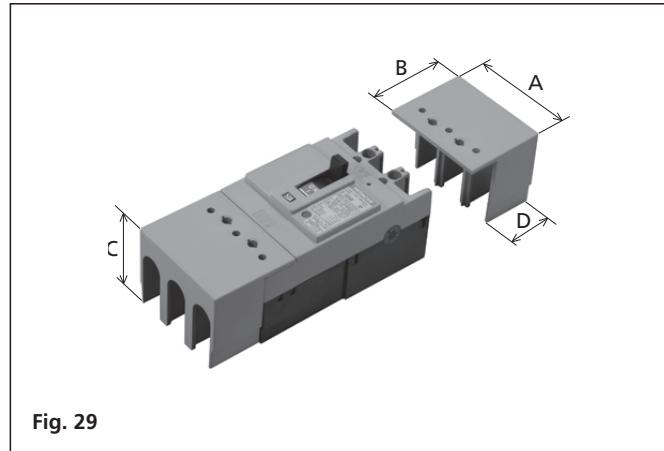


Fig. 29

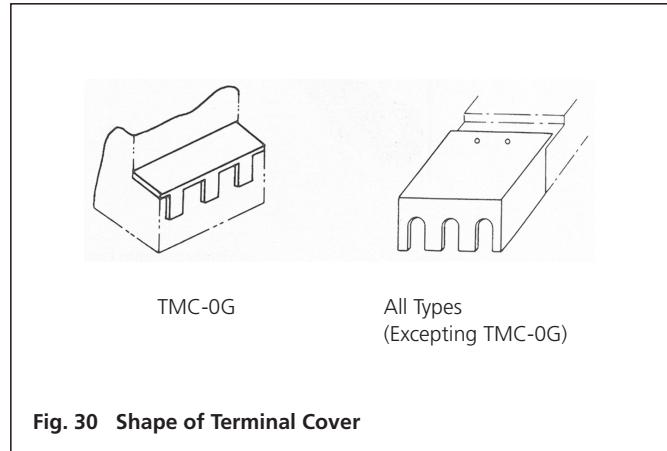


Fig. 30 Shape of Terminal Cover

Types	Applicable breakers	Dimensions				Remarks
		A	B	C	D	
TMC-0G	S-30E, S-50EB	75 (50)	19.5	56	5	
TMC-1		75 (50)	48	59.5	28	
TMC-1S	F-30FB, S-50SB, S-60SB, F-60RB, S-100EB, S-100SB	75 (50)	25	56	5	Short type
TMC-2D		75 (50)	56	59.5	36	Long type
TMC-2C	S-100S, F-100S, FKK125-S, FKK125-H	90 (60)	63	63	36	
TMC-3C	F-100KB, L-50E, L-100E	90 (60)	56	85.5	36	
TMC-4K	S-225SB	105	79	56	50	
TMC-4J	SXK225	105	79	53	50	
TMC-4JS	FKK250-S, FX-250-H	105	28	51	5	Short type
TMC-4H	F-250FB, F-250KC	105	71	99	40	
TMC-5B	L-225E, S-400S, F-400FB, L-400E	147	147	99	110	
TMC-5D	S-600S, F-600F, L-600E, SX600, FX600, S-800S, F-800R, F-800RH, L-800E, SX800, FX800	210	154	91.5	129	
TMC-6	F-1000K, F-1200K	210	159	145	130	
TMC-6B	FX1000, FX1200	210	159	138.5	130	

Remarks Dimensions with () are for 2-pole types

Terminal Cover (BTC)

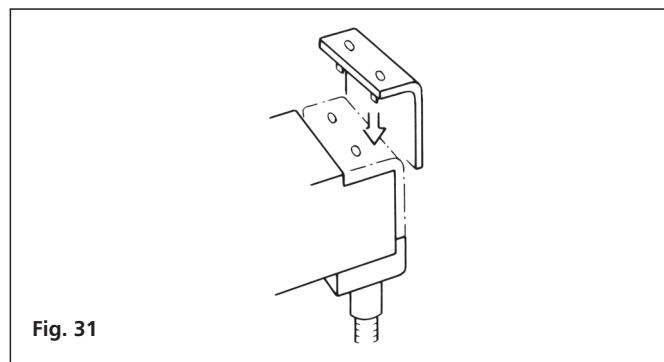


Fig. 31

Types	Applicable FFB Type
BTC-1	F-30FB, S-50SB, S-60RB, F-60RB, S-100EB, S-100SB
BTC-2C	S-100S, F-100S, FKK125-S, FKK125-H
BTC-3C	F-100KB, L-50E, L-100E
BTC-4G	S-225SB, MS-225SB
BTC-4J	SXK225, FKK250-S, FKK250-H
BTC-5B	L-225E, L-400E, S-400S, F-400R, SX400, FX400

9. Handle operating mechanism

This device is mounted on the face or door of a switchboard or a control board, making it possible to open or close a breaker from the outside. Following interlocks are attached as standard.

■ Handle Interlock

This handle interlocks is for preventing unnecessary manipulations of a breaker. Users are requested to provide a padlock for this device.

■ Door Interlock

For a handle mounted on a hinged door, this door interlock allows the door to be opened only when the breaker's operating handle is placed at the OPEN COVER position. When the handle is placed at the ON or OFF position, this device will prevent the door from being opened.

■ Color of Handle and Nameplate

The standard colors of handle and nameplate are as follows:

Handle: No1.5 (Black)

Nameplate: Black letters on silver aventurine

Handle Operating Mechanism

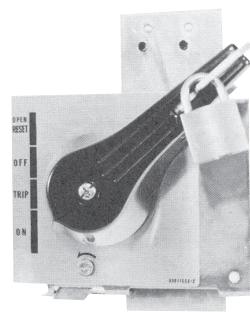
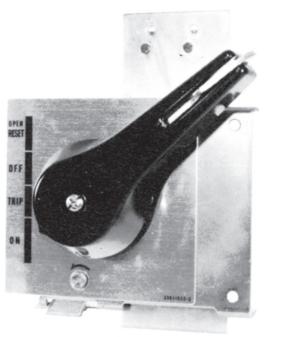


Fig. 32

(with padlock)

■ Dimension of HA Type Handle (3P)

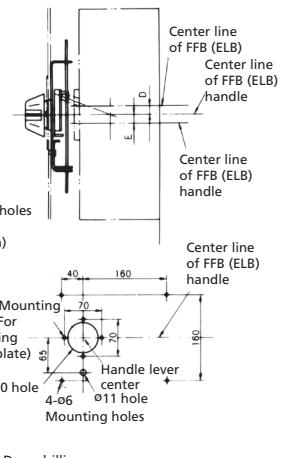
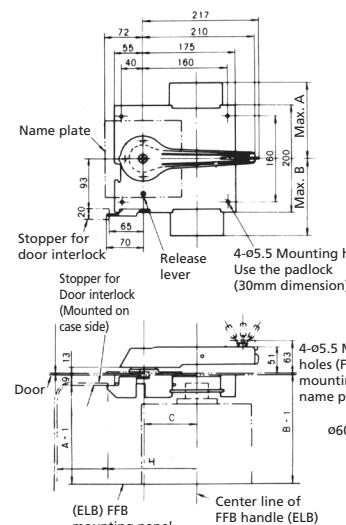
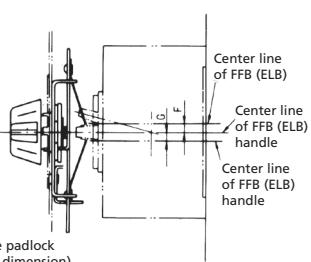
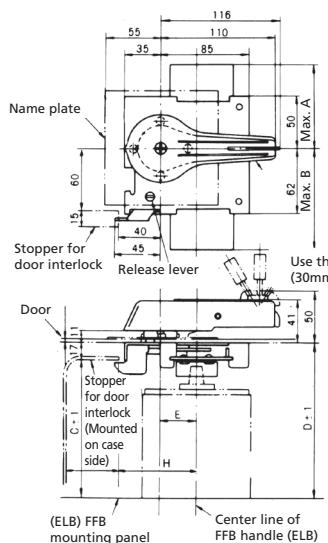
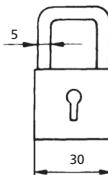


Fig. 33-1

Fig. 33-2

Types	Applicable breakers	Panel cutting Fig.	A	B	C	D	E	F	G	H
HA-104	S-100S, F-100S	Fig.33-1	102	115	91	108	35	—	—	75
HA-108	F-30FB, S-50SB, S-60RB, F-60RB, S-100EB, S-100SB	Fig.33-1	104	114	88	105	35	1.5	—	75
HA-106	F-100KB L-50E, L-100E	Fig.33-1	102	115	110	127	35	—	—	75
HA-206	F-250FB, F-250KC	Fig.33-1	110	118	131	148	35	—	—	75
HA-207	S-225SB	Fig.33-1	100	118	90	107	35	1.5	—	75
HA-209	SXK225	Fig.33-1	106	110	96	115	35	—	—	75
HA-210	FXK250-S, FXK250-H	Fig.33-1	106	110	98	115	35	—	—	75
HA-405	L-225E, S-400S, F-400R, L-400E	Fig.33-1	113	120	140	157	38	—	6	78
HA-406	SX400, FX400	Fig.33-1	113	120	140	157	38	—	6	78
HA-402	S-600S, F-600F, L-600E, SX600, FX600 S-800S, F-800R, F-800RH, L-800E, SX800, FX800	Fig.33-1	113	120	145	162	38	7.5	—	78
HA-801	FX1000, F-1000K, FX1200, F-1200K FX1600CB, F-1600B	Fig.33-2	195	200	187	206	100	—	—	165

■ Padlock



(Padlock is not attached as standard)

Fig. 34

Handle Operating Mechanism

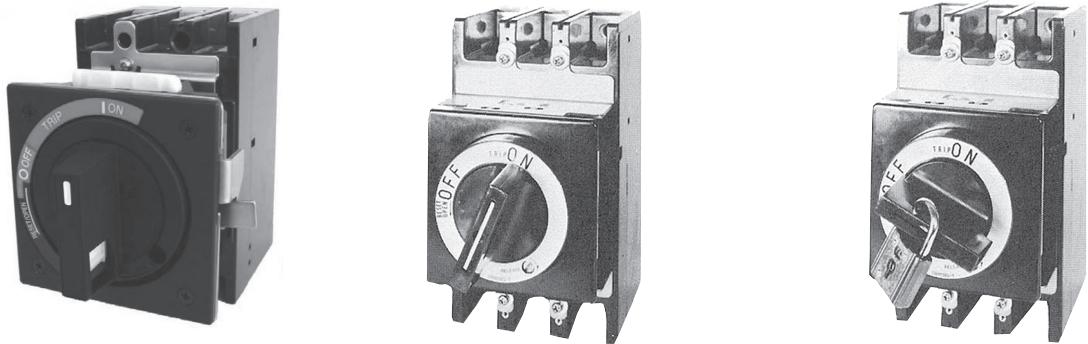


Fig. 35

(with padlock)

■ Dimension of HA Type Handle (3P)

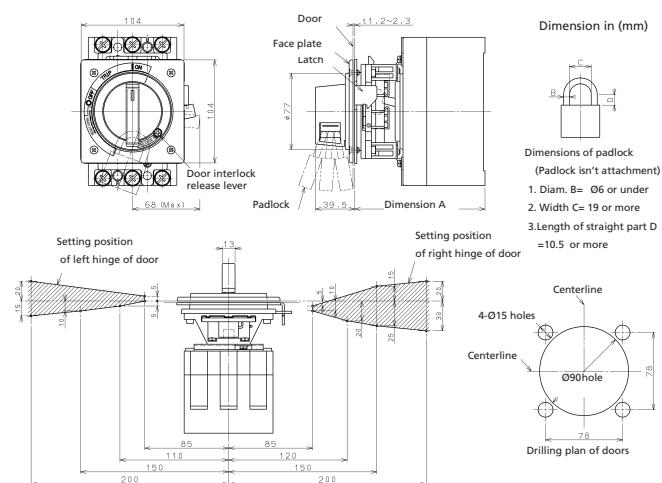


Fig. 36-1

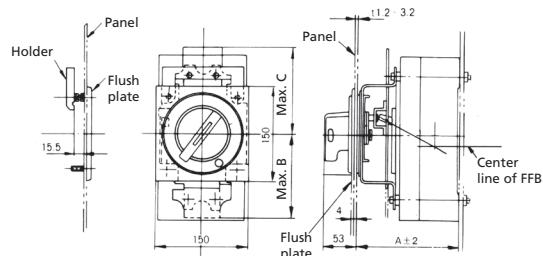


Fig. 36-2

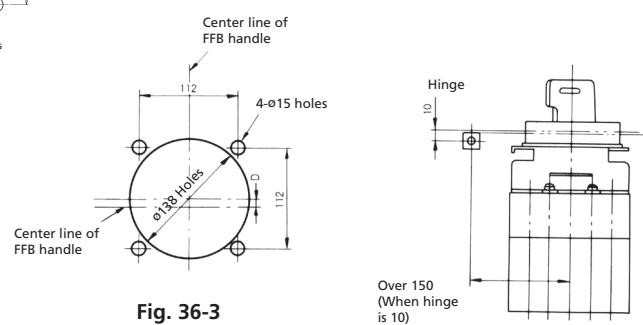
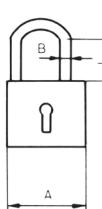


Fig. 36-3

Handle Type	Applicable Breakers	Bolt	Dimension				
			Fig.	A	B	C	D
HM-S11	F-100KB	M4 x 50	Fig.36-1	132	—	—	—
	L-50E, L-100E			149	—	—	—
HM-S12	F-30FB, S-50SB, S-60SB F-60RB, S-100EB, S-100SB	M4 x 65	Fig.36-1	108.5	—	—	—
HM-S13	FXK125-S, FXK125-H	M4 x 70	Fig.36-1	118	—	—	—
HM-S21	F-250FB, F-250KC	M4 x 50	Fig.36-1	150.5	—	—	—
HM-S22	S-225SB	M4 x 45	Fig.36-1	110.5	—	—	—
HM-S23	SXK225	M4 x 45	Fig.36-1	118	—	—	—
HM-S25	FXK250-S, FXK250-H	M4 x 45	Fig.36-1	118	—	—	—
HM-402	S-600S, S-800S, F-600F F-800R, F-800RH, L-600E, L-800E	M6 x 130	Fig.36-2	176	137	137	0
HM-405	L-225E, S-400S, F-400R, L-400E	M6 x 130	Fig.36-2	170	137	140	6
HM-406	SX400, FX400	M6 x 130	Fig.36-2	170	137	140	6
HM-407	SX600, FX600, SX800, FX800	M6 x 130	Fig.36-2	176	137	137	0

■ Padlock



L: Straight length

(Padlock is not attached as standard)

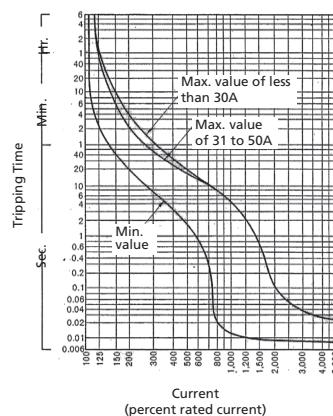
Fig. 37

■ Padlock Dimension

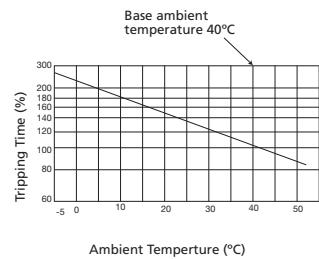
	A	B	L
HM-402, 405, 406, 407	45	6—6.5	Over 16

DIMENSIONS

S-30S/S-50E

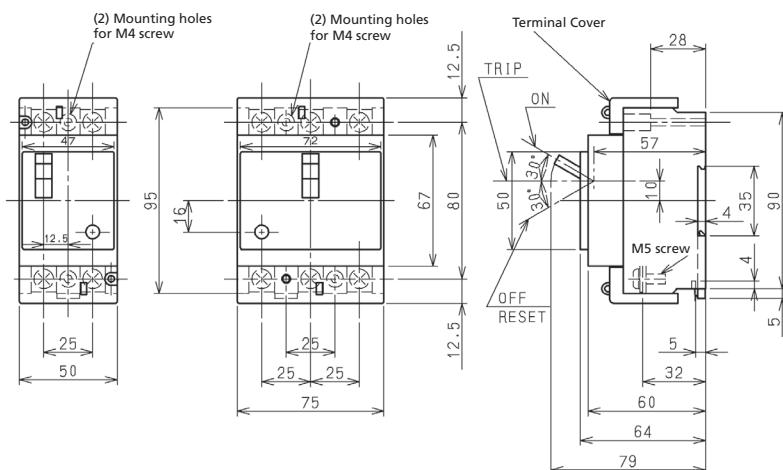


Overcurrent Tripping
Characteristic Curve

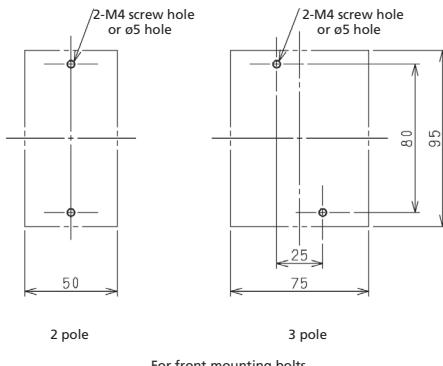


Temperature
Compensation Curve

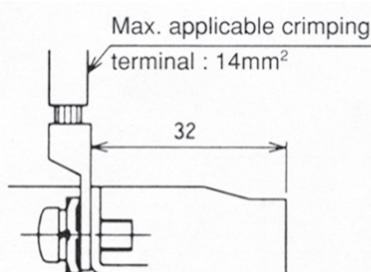
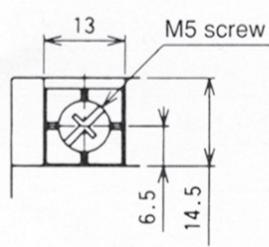
■ Dimensions



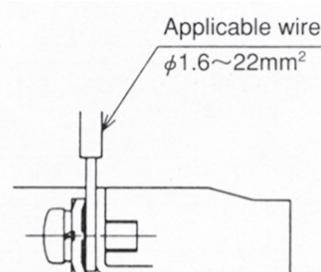
■ Drilling Plan



■ Terminal Arrangement

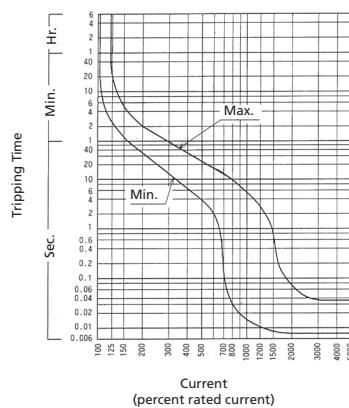


Bus and crimping
terminal connection

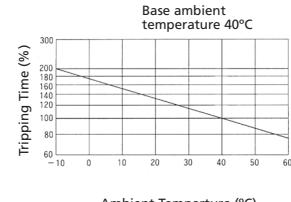


Wire connection

S-30E/S-50EB (MS-30E/MS-50EB)

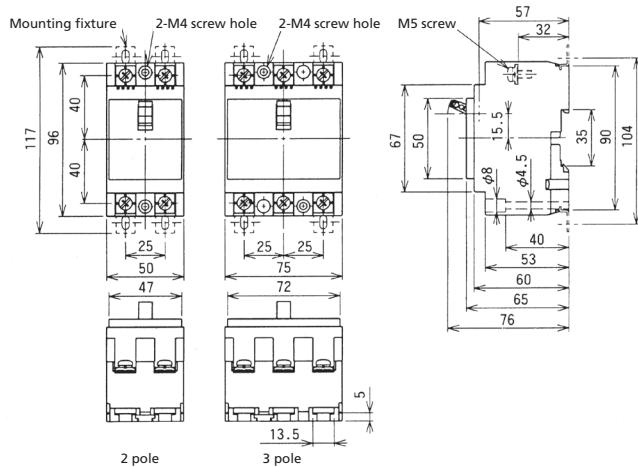


**Overcurrent Tripping
Characteristic Curve**

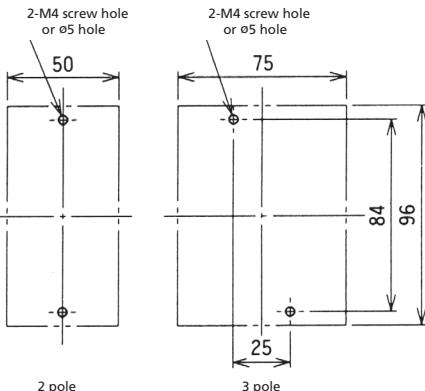


**Temperature
Compensation Curve**

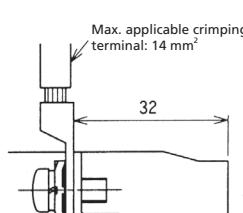
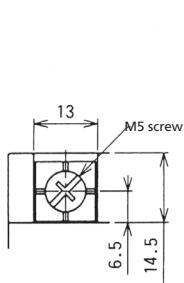
■ Dimensions



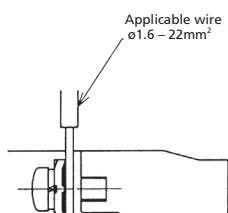
■ Drilling Plan



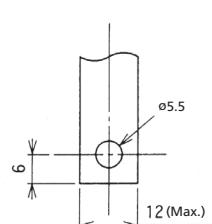
■ Terminal Arrangement



Bus and crimping
terminal connection

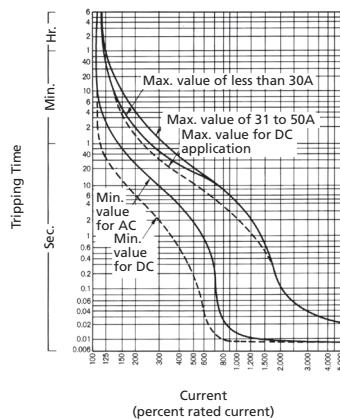


Wire connection

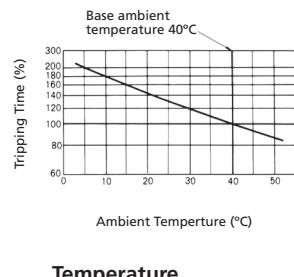


Manufacturing of terminal
(Max. 14)

S-30FB/S-50SB (MS-50SB)

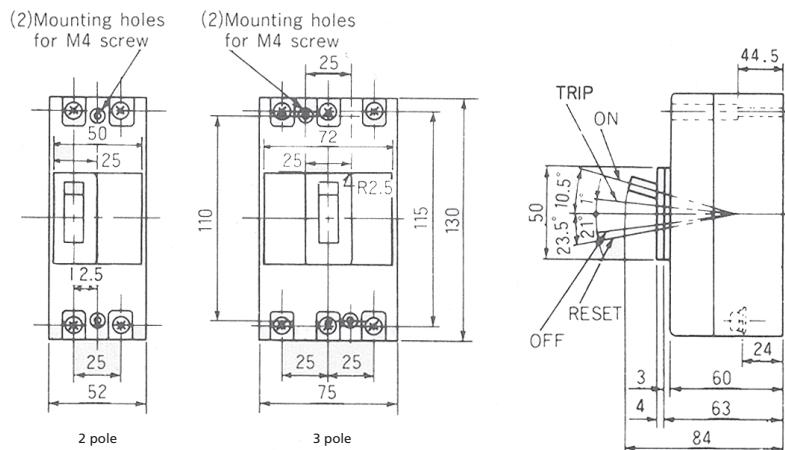


**Overcurrent Tripping
Characteristic Curve**

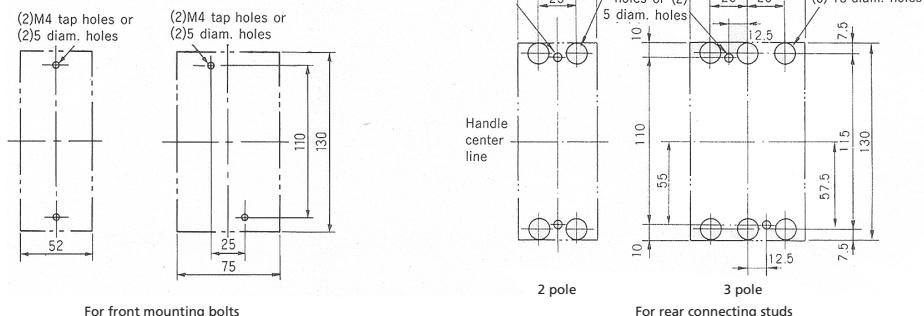


**Temperature
Compensation Curve**

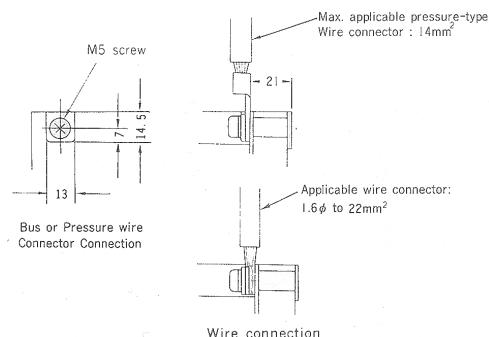
■ Dimensions



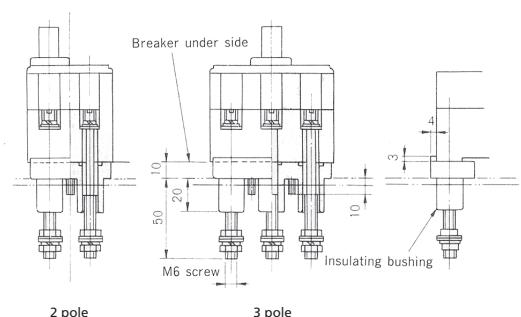
■ Drilling Plan



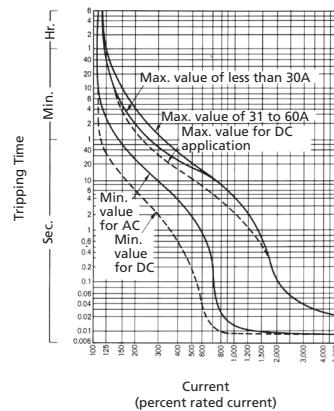
■ Terminal Arrangement



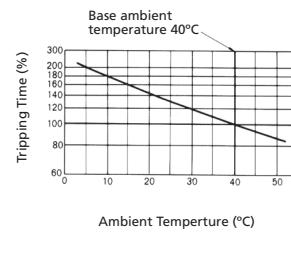
■ For Rear Connecting Studs



F-60RB S-60RB

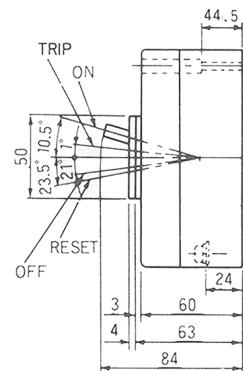
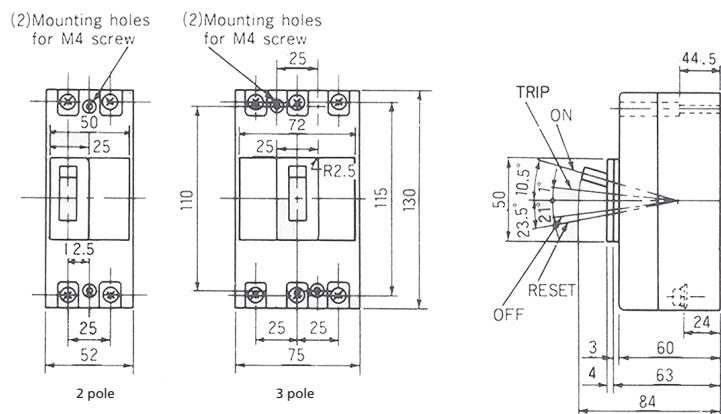


**Overcurrent Tripping
Characteristic Curve**

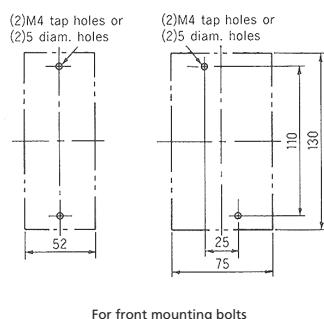


**Temperature
Compensation Curve**

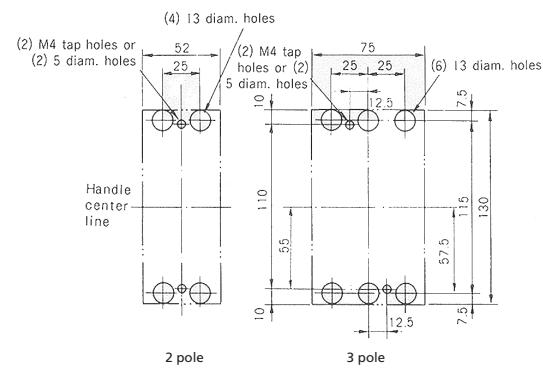
■ Dimensions



■ Drilling Plan

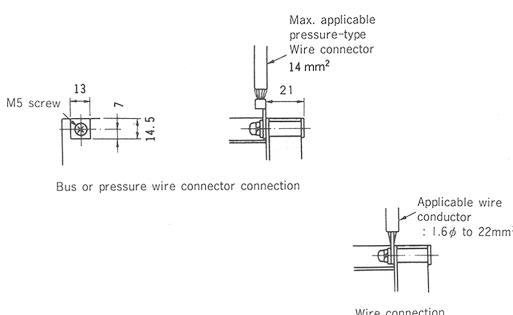


For front mounting bolts

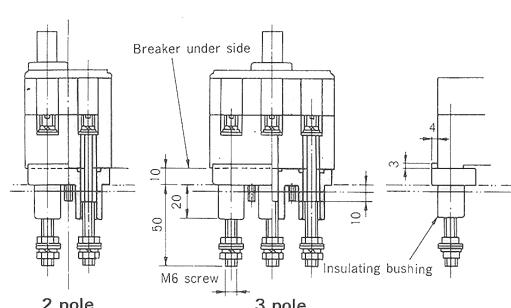


For rear connecting studs

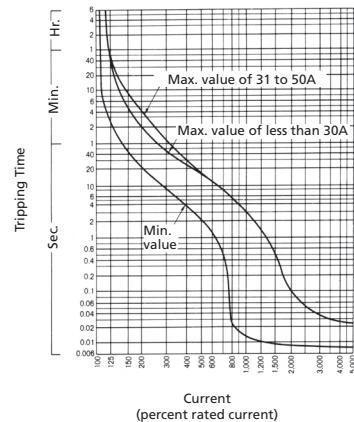
■ Terminal Arrangement



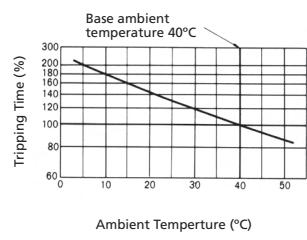
■ For Rear Connecting Studs



L-50E

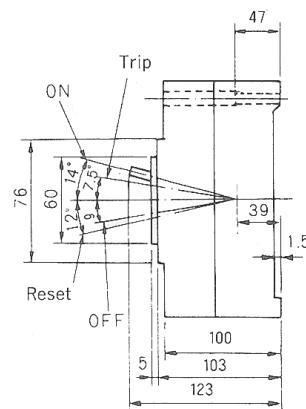
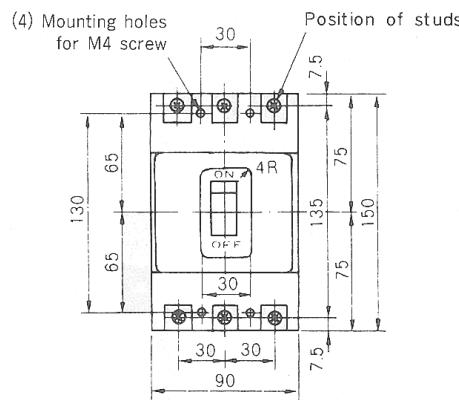


Overcurrent Tripping Characteristic Curve

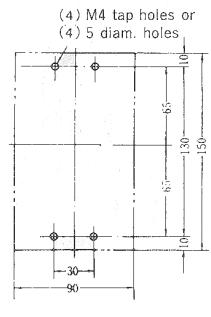


Temperature Compensation Curve

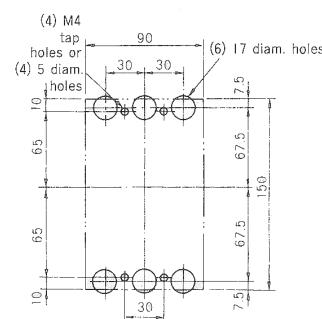
■ Dimensions



■ Drilling Plan

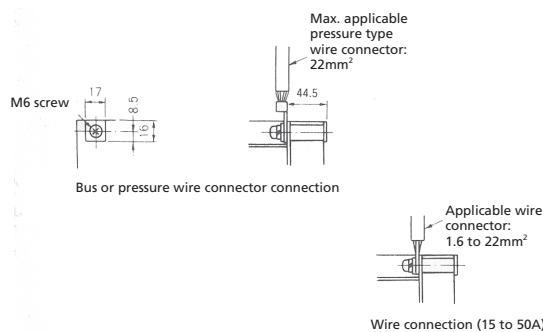


3 pole
For front mounting bolts

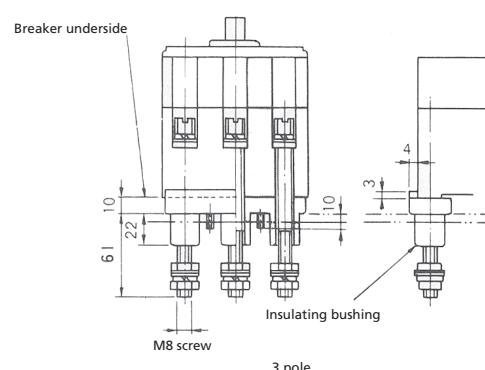


3 pole
For rear connecting studs

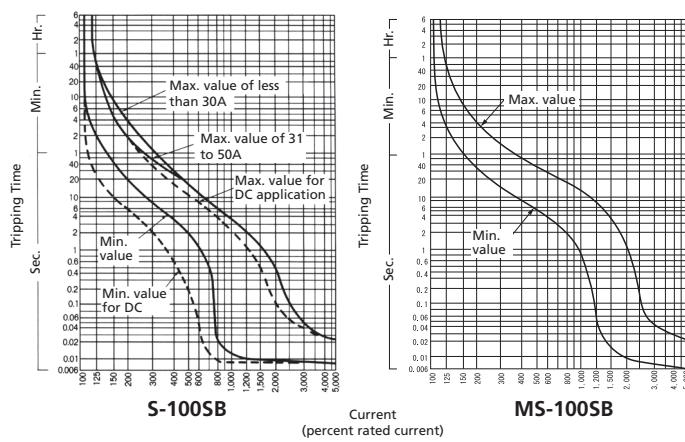
■ Terminal Arrangement



■ For Rear Connecting Studs

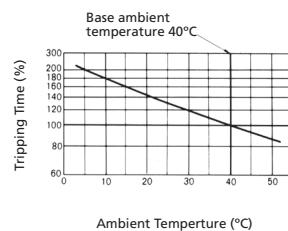
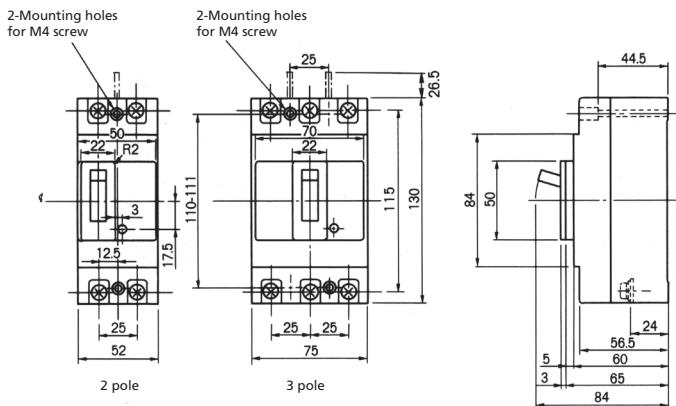


S-100EB/S-100SB (MS-100SB)



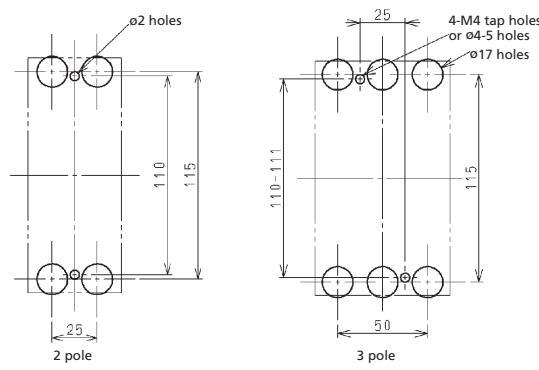
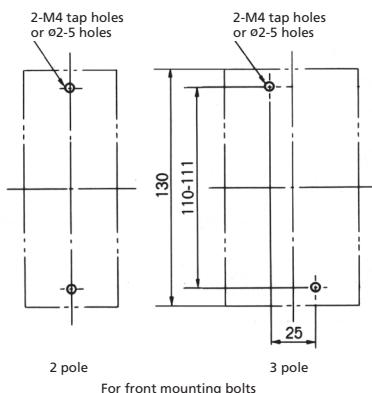
Overcurrent Tripping
Characteristic Curve

Dimensions

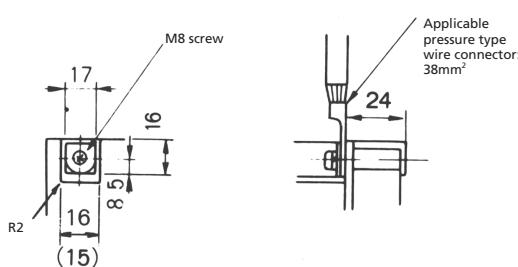


Temperature
Compensation Curve

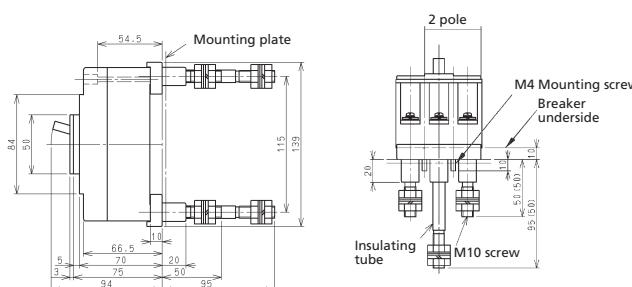
Drilling Plan



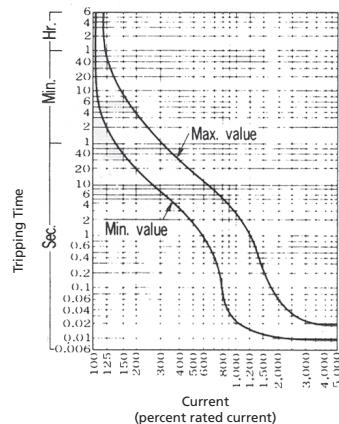
Terminal Arrangement



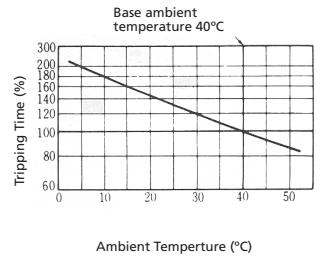
For Rear Connecting Studs



S-100S

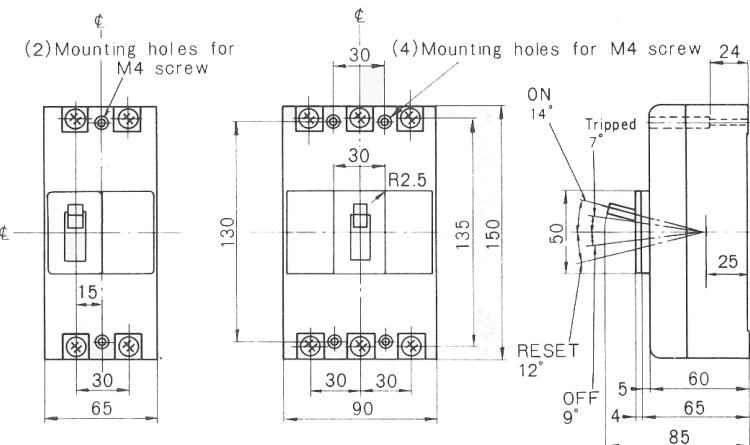


Overcurrent Tripping Characteristic Curve

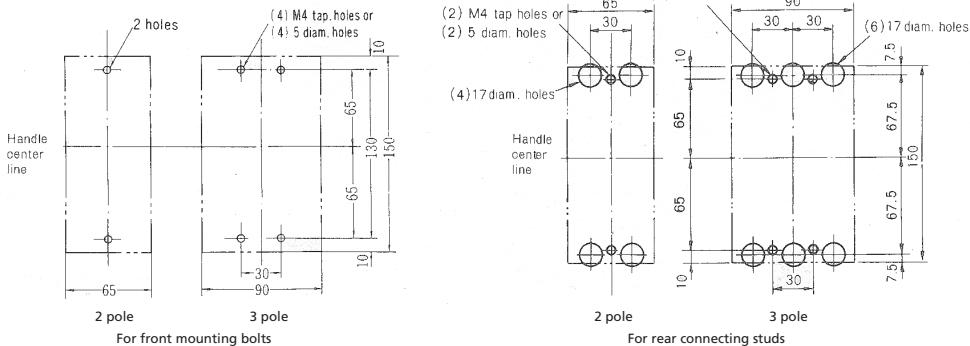


Temperature Compensation Curve

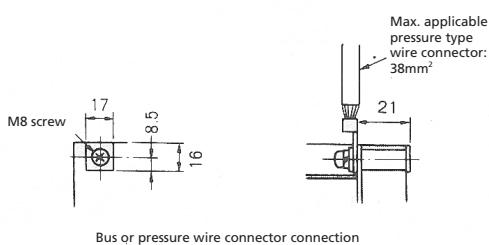
■ Dimensions



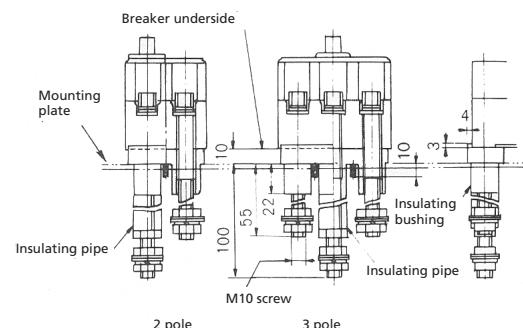
■ Drilling Plan



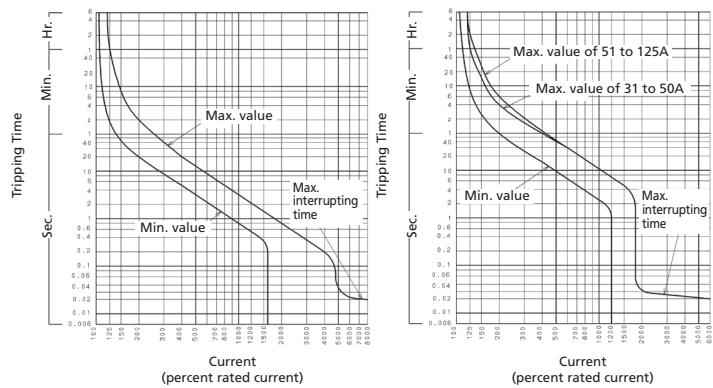
■ Terminal Arrangement



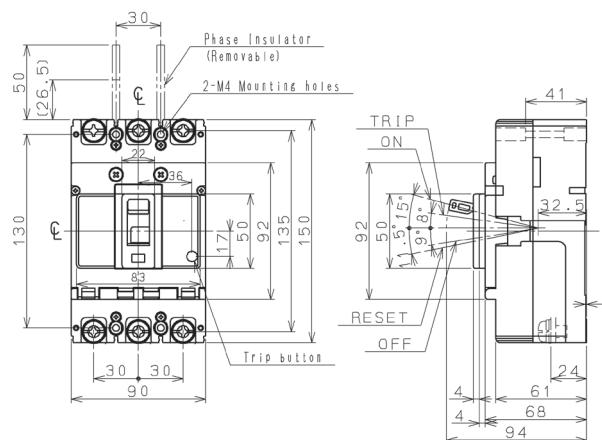
■ For Rear Connecting Studs



FXK125-S/FXK125-H (MFHK100-S)



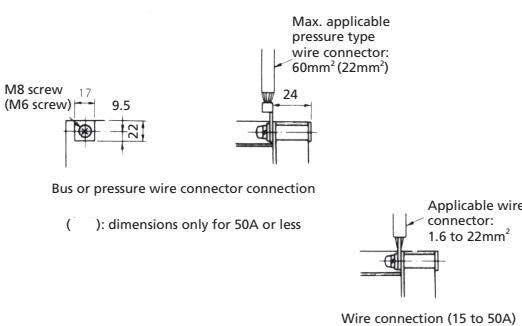
■ Dimensions



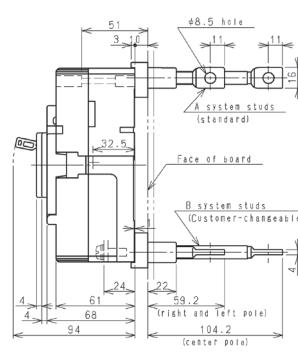
■ Drilling Plan



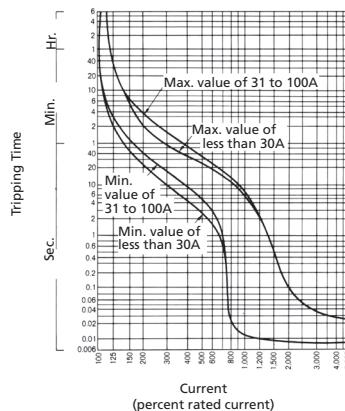
■ Terminal Arrangement



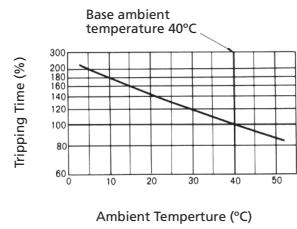
■ For Rear Connecting Studs



L-100E

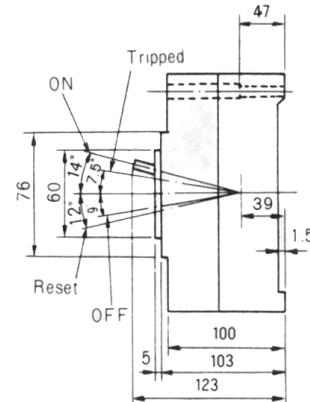
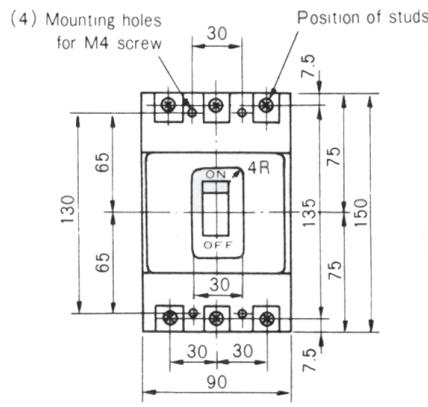


**Overcurrent Tripping
Characteristic Curve**

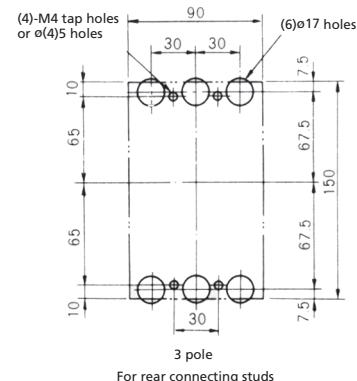
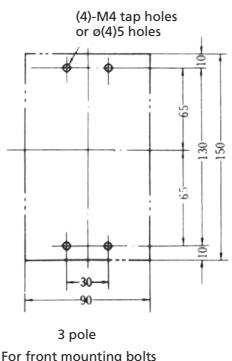


**Temperature
Compensation Curve**

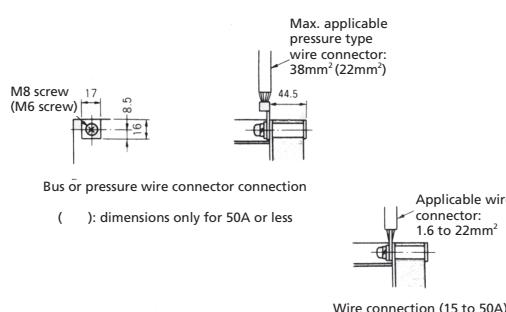
■ Dimensions



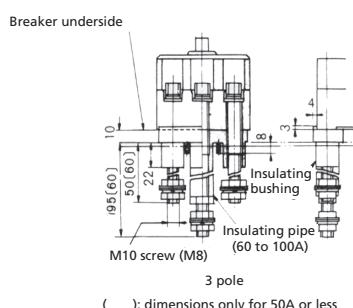
■ Drilling Plan



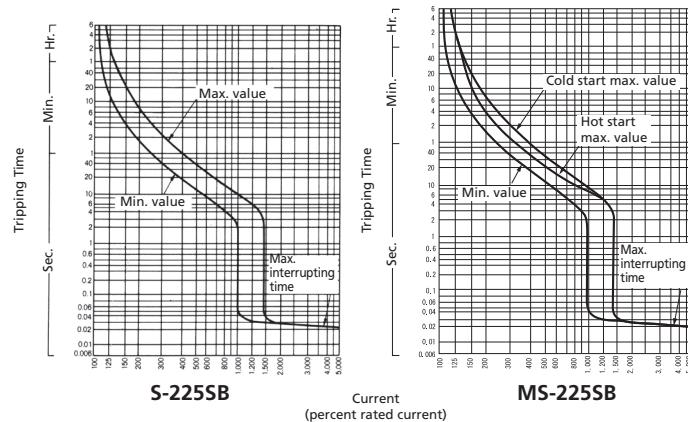
■ Terminal Arrangement



■ For Rear Connecting Studs

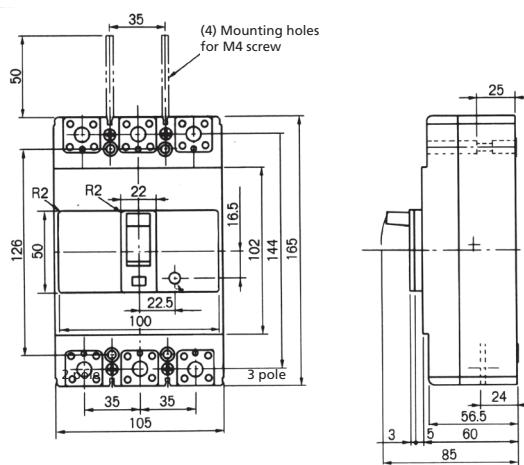


S-225SB (MS-225SB)

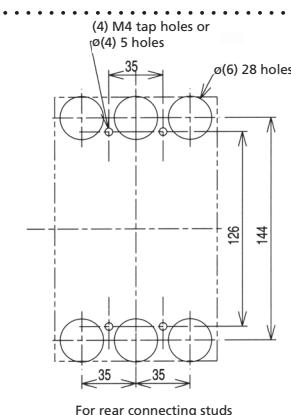
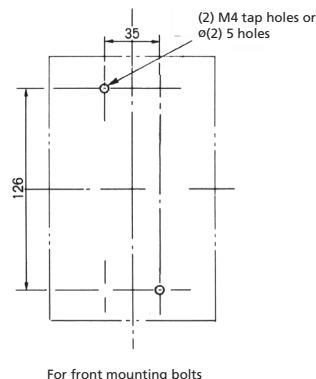


Overcurrent Tripping Characteristic Curve

Dimensions



Drilling Plan

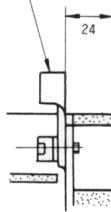


For front mounting bolts

For rear connecting studs

Terminal Arrangement

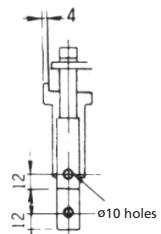
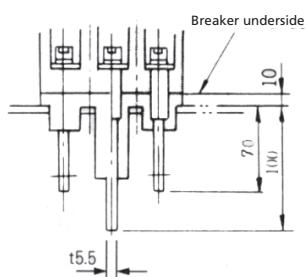
Maximum applicable pressure type-wire connector = 60mm²
Special pressure type wire connector is attached for 175 – 225A as shown on the right table



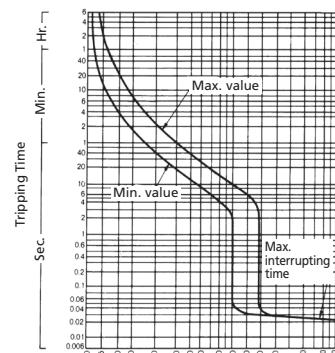
Rated current (A)	Applicable wire size of pressure type wire connector (mm ²)
175 – 225	Pressure type wire connector 80, 100, 125 (mm)

Pressure type wire connector directly connected

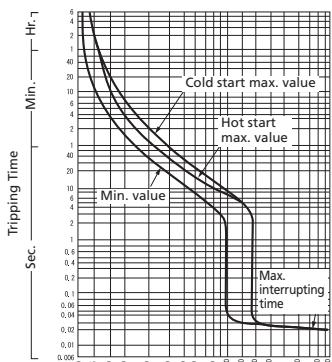
For Rear Connecting Studs



SXK225
(MSKX225)

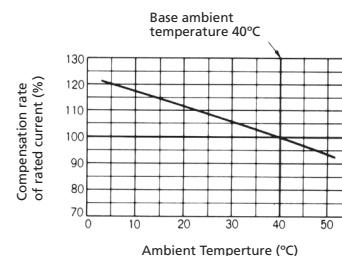
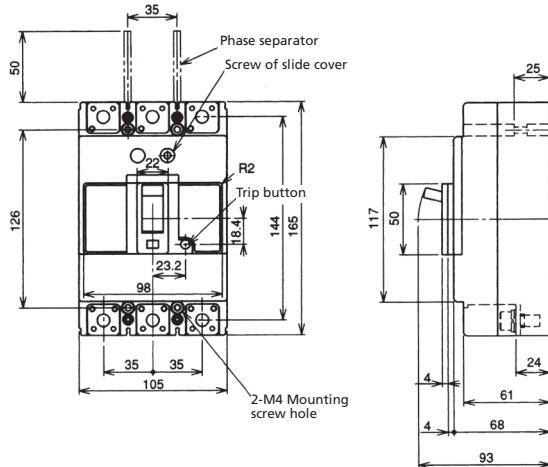


SXK225



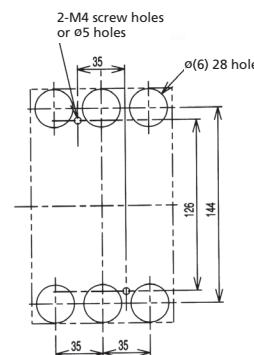
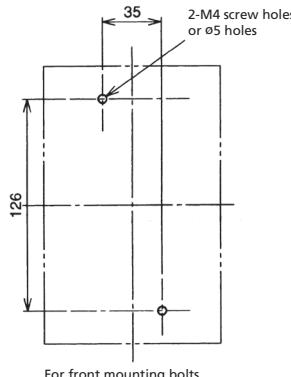
Overcurrent Tripping Characteristic Curve

■ Dimensions

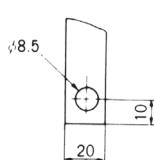


Temperature Compensation Curve

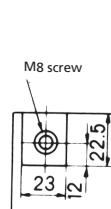
■ Drilling Plan



■ Terminal Arrangement

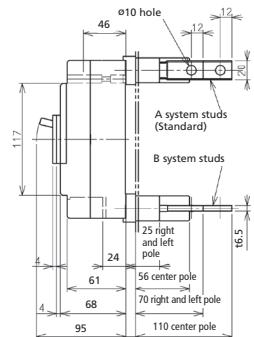


Manufacturing of terminal

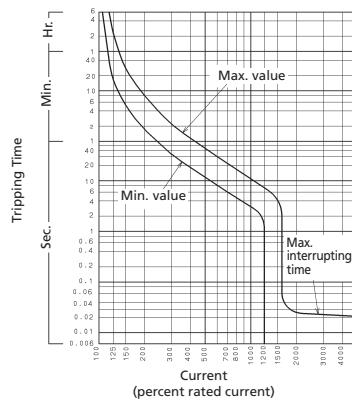


Crimping terminal
directly connected

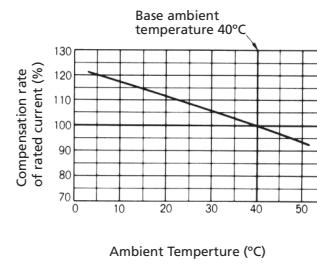
■ For Rear Connecting Studs



FXK250-S/FXK250-H (MFHK225-S)

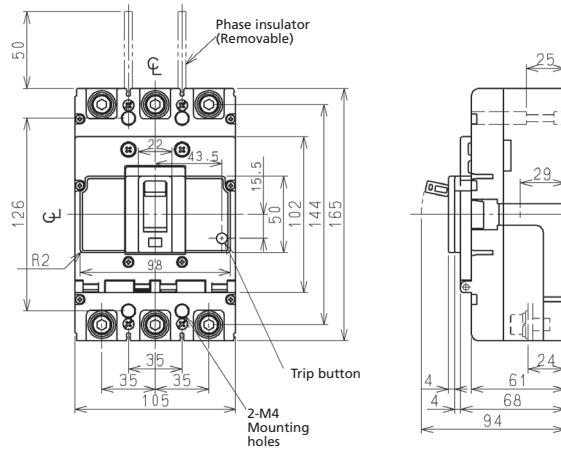


Overcurrent Tripping Characteristic Curve

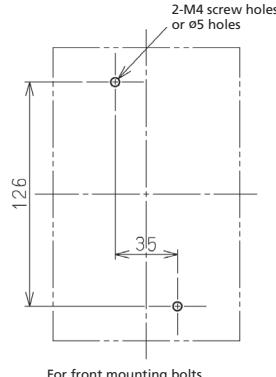


Temperature Compensation Curve

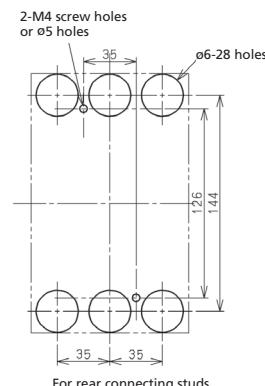
■ Dimensions



■ Drilling Plan



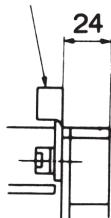
For front mounting bolts



For rear connecting studs

■ Terminal Arrangement

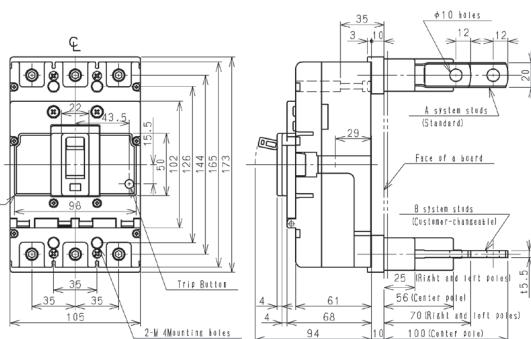
Maximum applicable pressure type-wire connector = 60mm²
Special pressure type wire connector is attached for 175 - 225A as shown on the right table



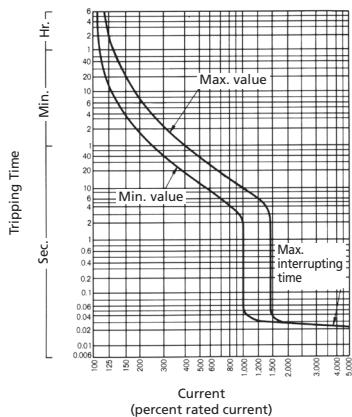
Pressure type wire connector
directly connected

Rated current (A)	Applicable wire size of pressure type wire connector (mm ²)
175 – 225	Pressure type wire connector 80, 100, 125 (mm)

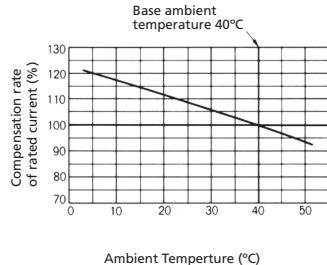
■ For Rear Connecting Studs



L-225E

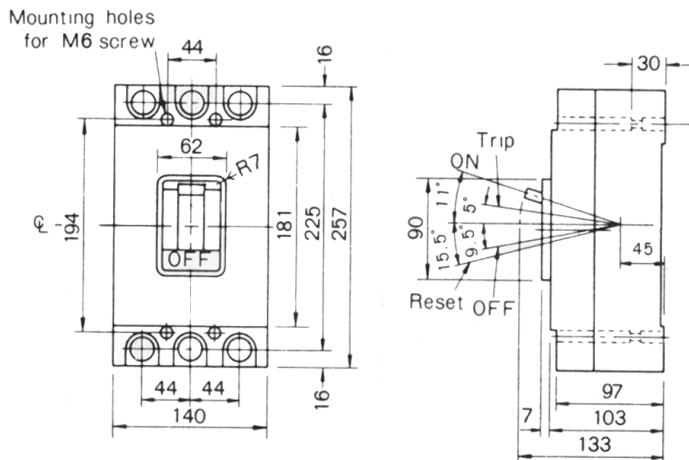


Overcurrent Tripping Characteristic Curve

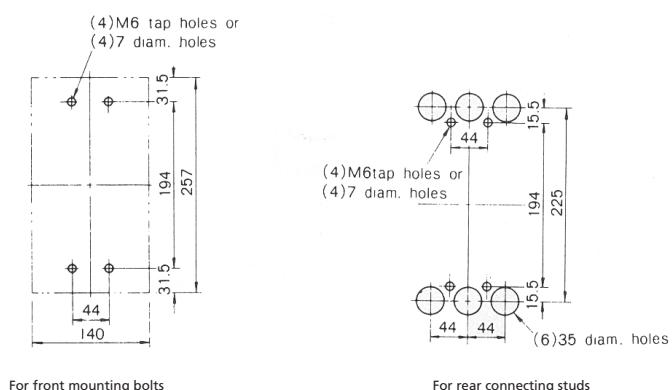


Temperature Compensation Curve

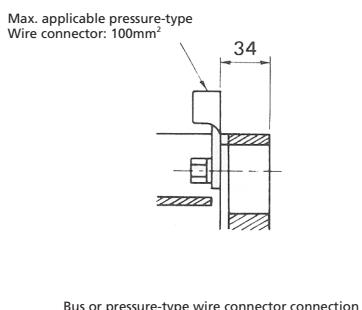
■ Dimensions



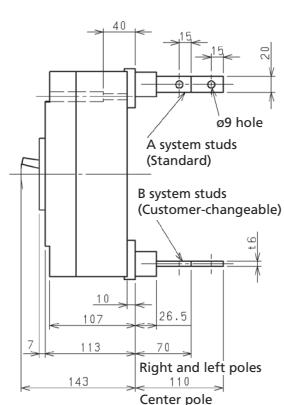
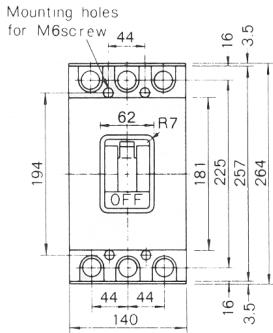
■ Drilling Plan



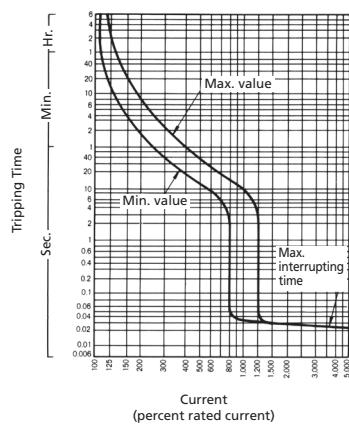
■ Terminal Arrangement



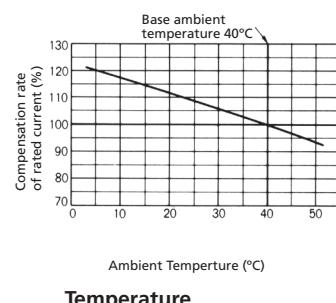
■ For Rear Connecting Studs



S-400S/F-400R/L-400E

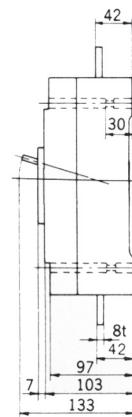
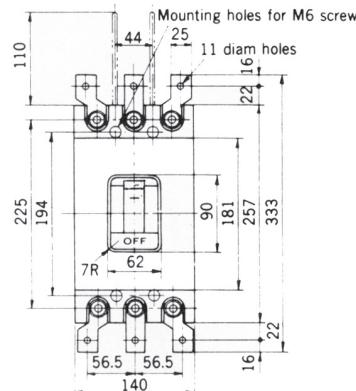
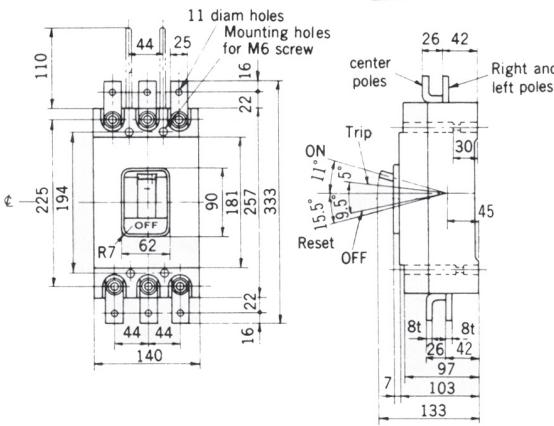


Overcurrent Tripping Characteristic Curve

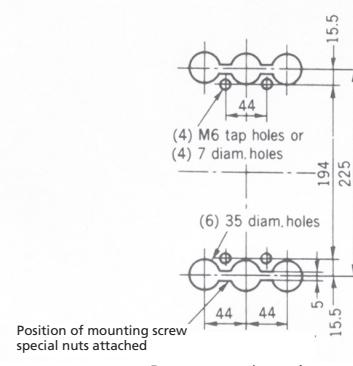
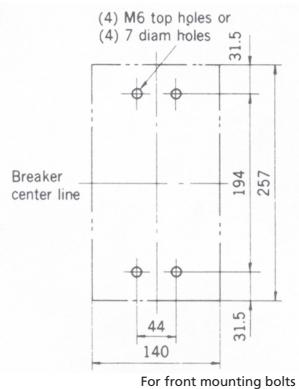


Temperature Compensation Curve

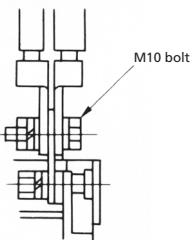
■ Dimensions



■ Drilling Plan

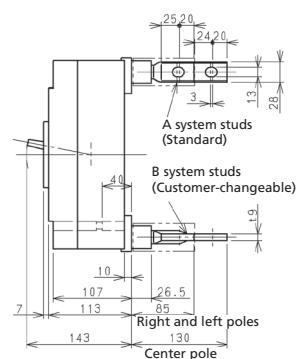
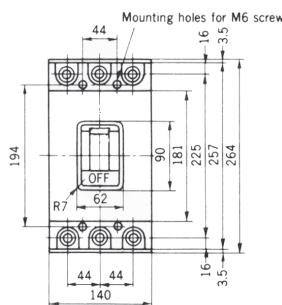


■ For front connection

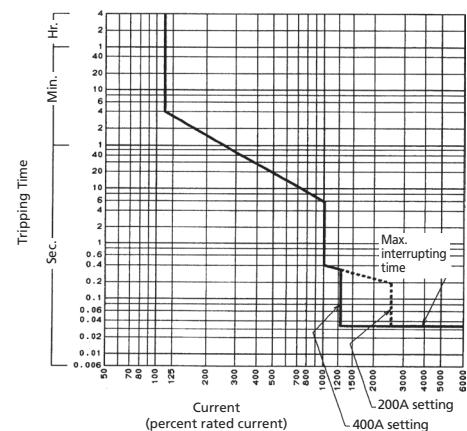


Pressure-type wire connector connection

■ For Rear Connecting Studs

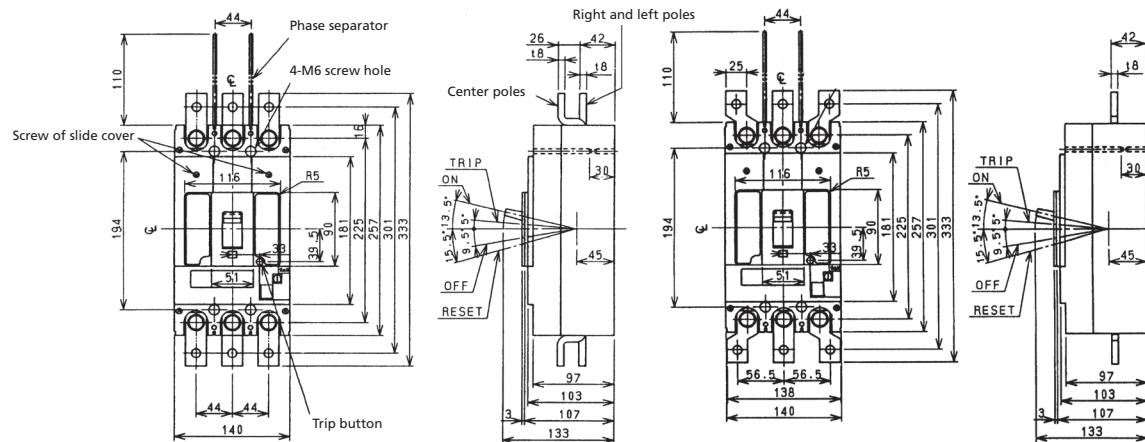


SX400/FX400



Overcurrent Tripping Characteristic Curve

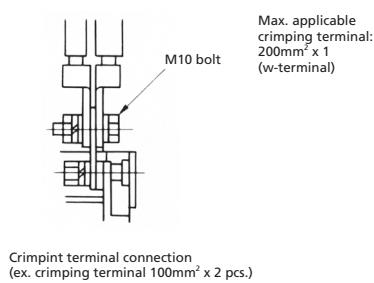
■ Dimensions



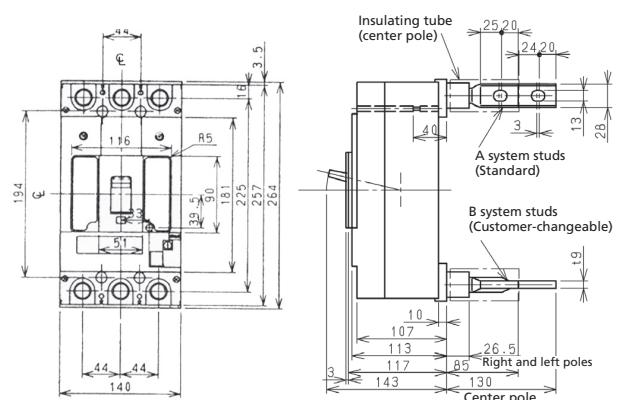
■ Drilling Plan



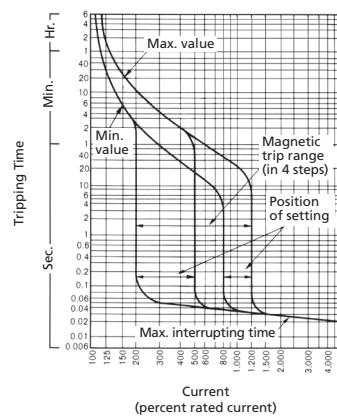
■ Terminal Arrangement



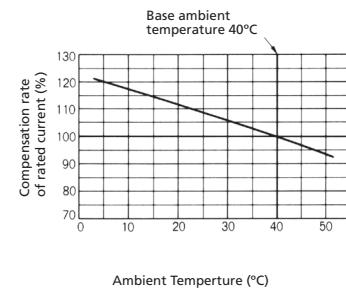
■ For Rear Connecting Studs



S-600S/F-600F/L-600E

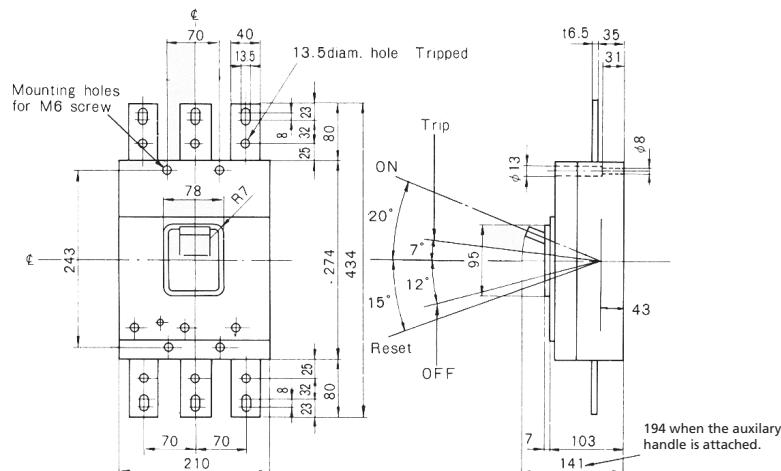


**Overcurrent Tripping
Characteristic Curve**

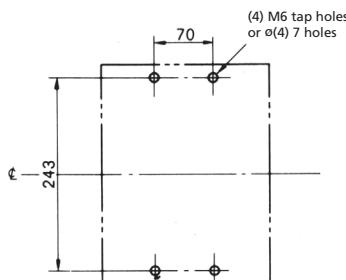


**Temperature
Compensation Curve**

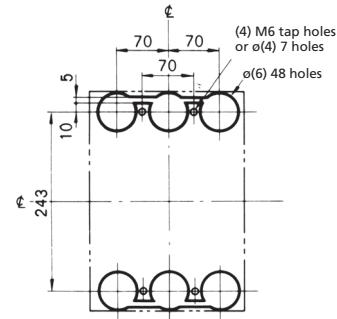
■ Dimensions



■ Drilling Plan

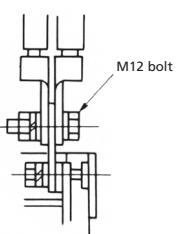


For front mounting bolts



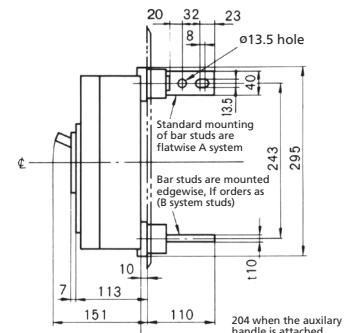
For rear connecting studs

■ For front connection

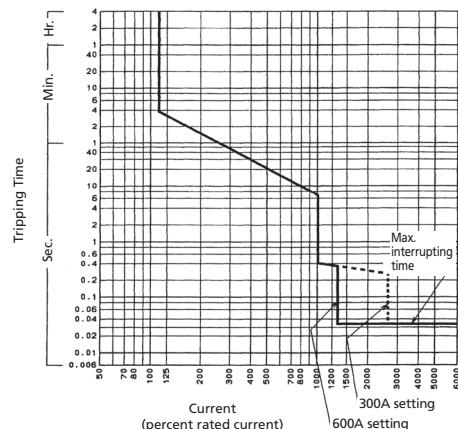


Pressure-type wire connector connection

■ For Rear Connecting Studs

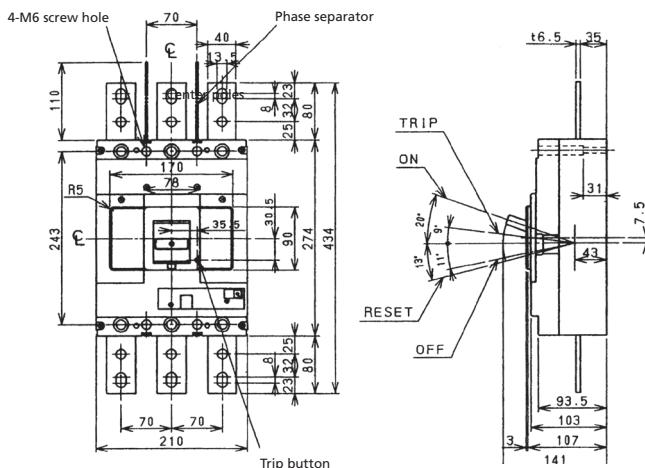


SX600/FX600

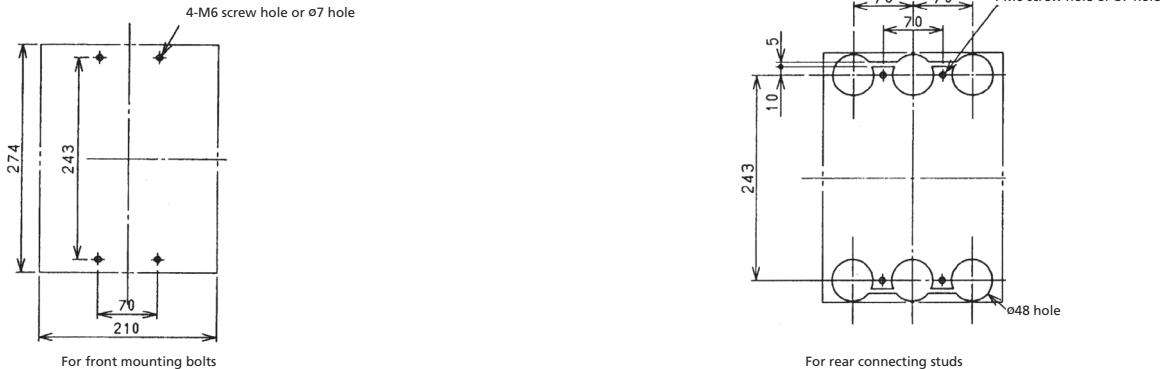


Overcurrent Tripping Characteristic Curve

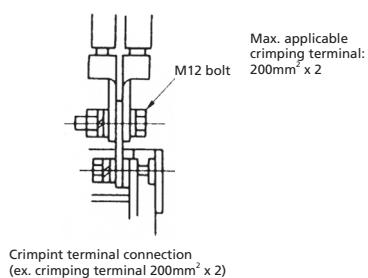
■ Dimensions



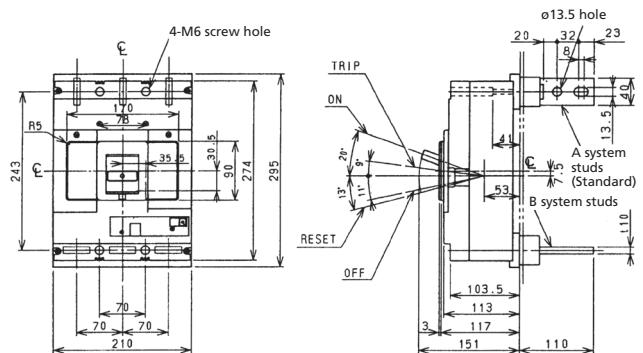
■ Drilling Plan



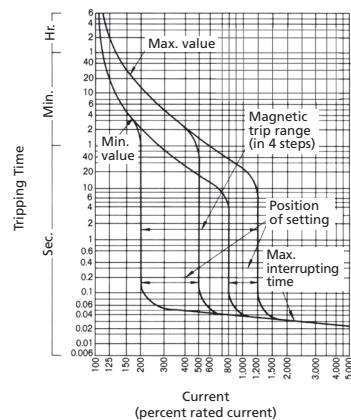
■ Terminal Arrangement



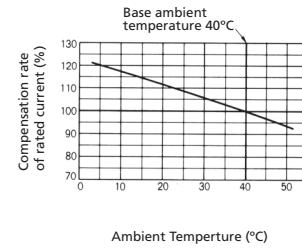
■ For Rear Connecting Studs



S-800S/F-800R/ F-800RH/L-800E

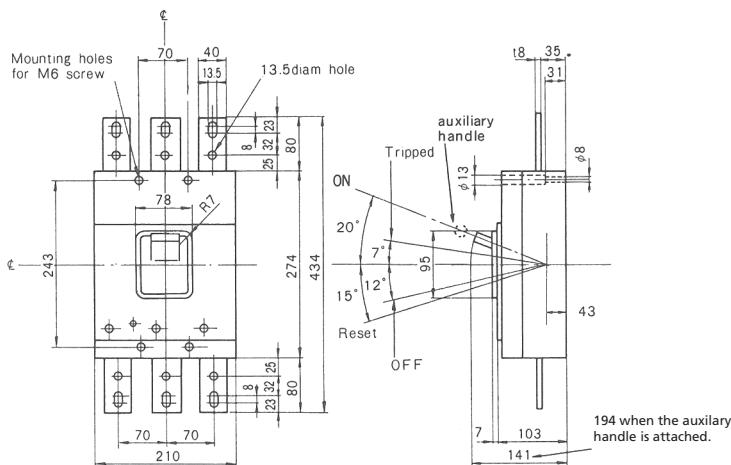


**Overcurrent Tripping
Characteristic Curve**

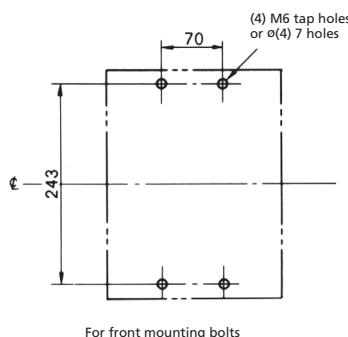


**Temperature
Compensation Curve**

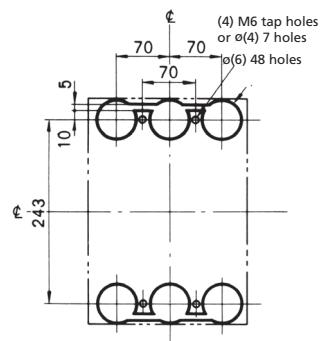
■ Dimensions



■ Drilling Plan

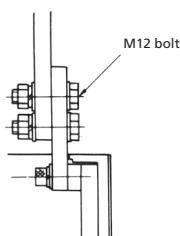


For front mounting bolts

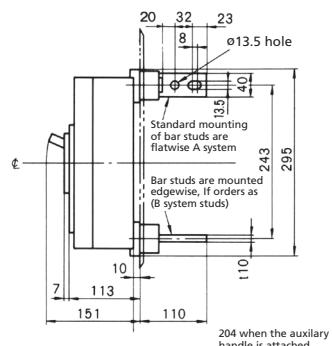


For rear connecting studs

■ For front connection

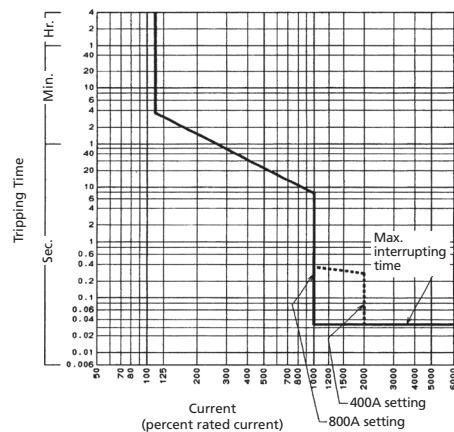


■ For Rear Connecting Studs



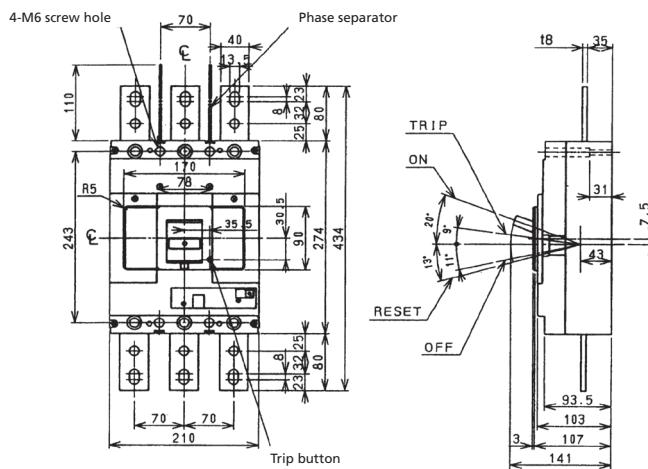
204 when the auxiliary handle is attached.

SX800/FX800

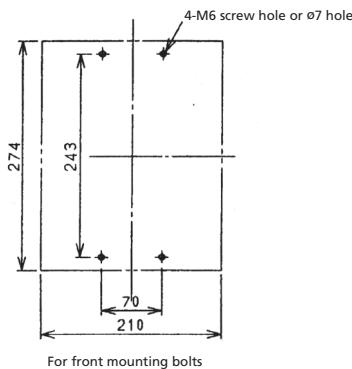


Overcurrent Tripping Characteristic Curve

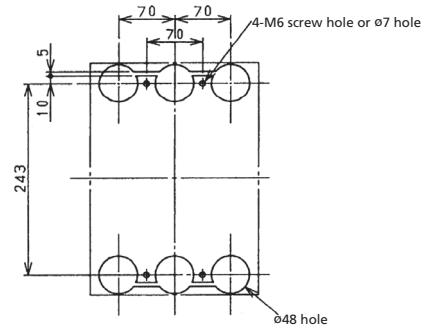
■ Dimensions



■ Drilling Plan

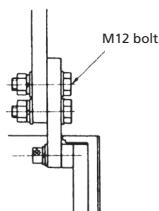


For front mounting bolts

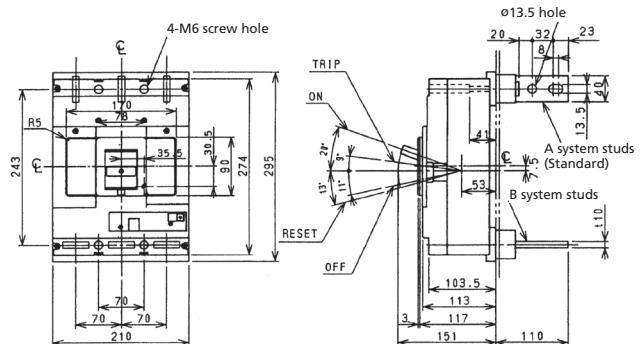


For rear connecting studs

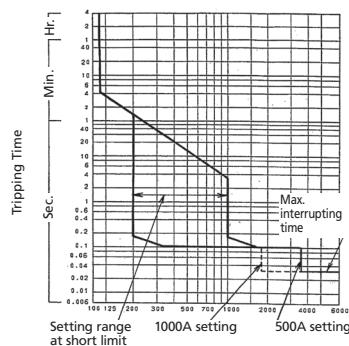
■ Terminal Arrangement



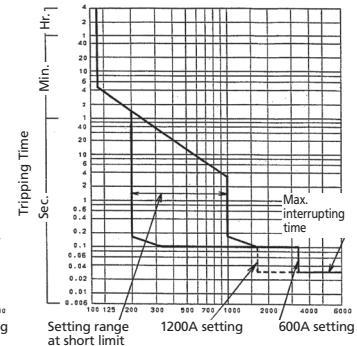
■ For Rear Connecting Studs



F-1000C/F-1200C



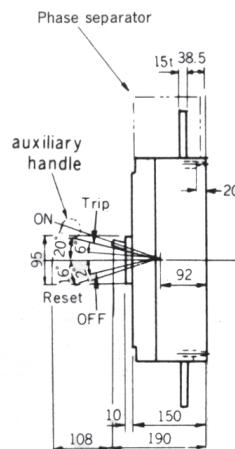
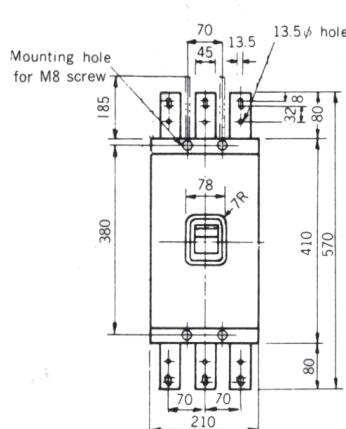
F-1000C



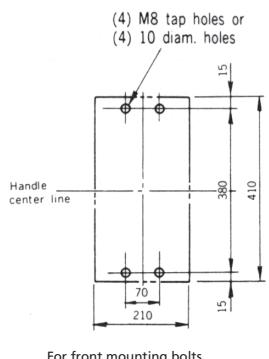
F-1200C

Overcurrent Tripping Characteristic Curve

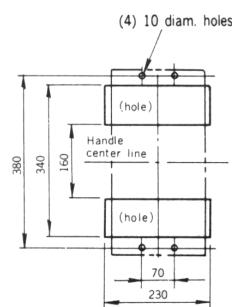
■ Dimensions



■ Drilling Plan

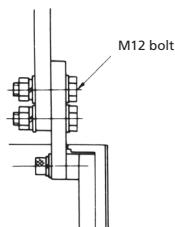


For front mounting bolts

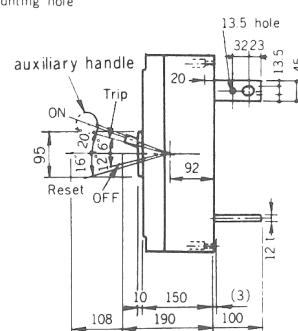
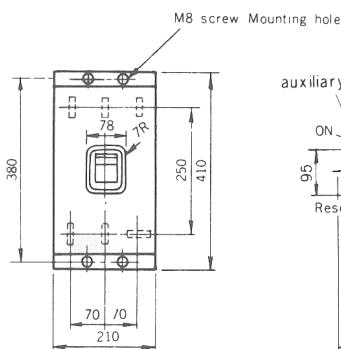


For rear connecting studs

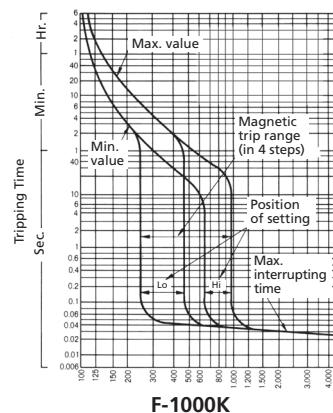
■ For front connection



■ For Rear Connecting Studs

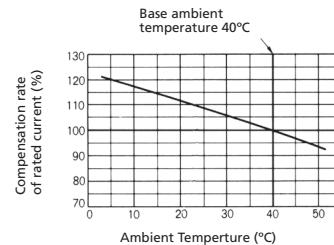
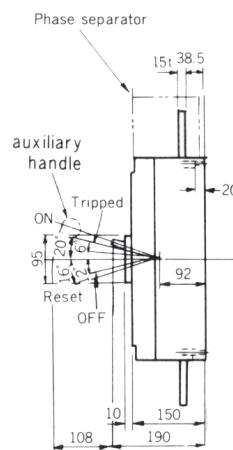
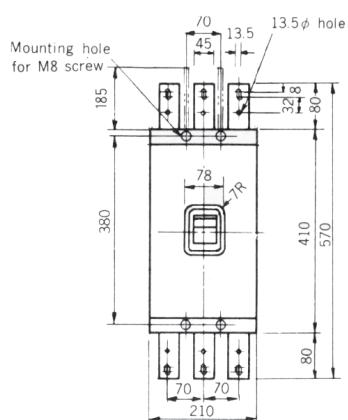


F-1000K / F-1200K



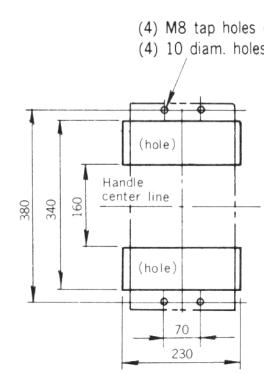
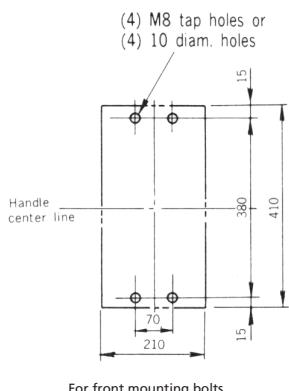
Overcurrent Tripping Characteristic Curve

■ Dimensions

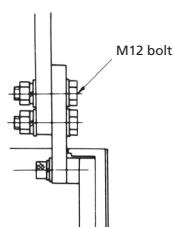


Temperature Compensation Curve

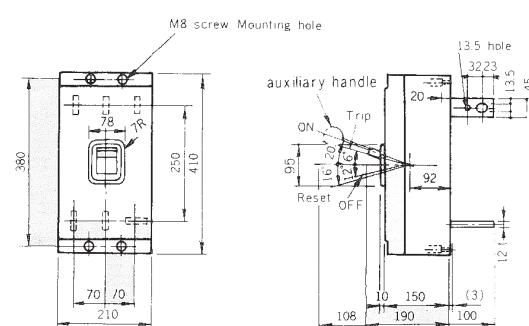
■ Drilling Plan



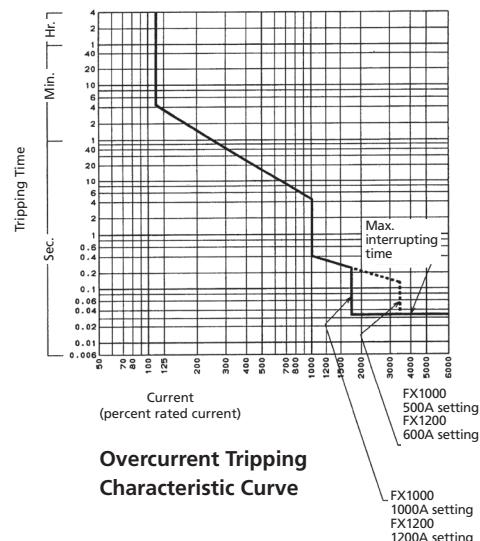
■ For front connection



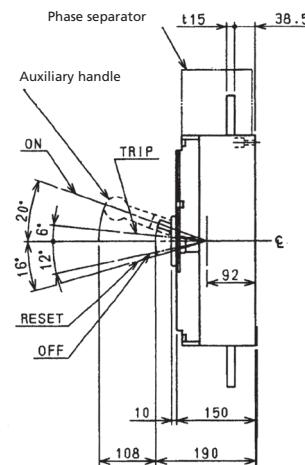
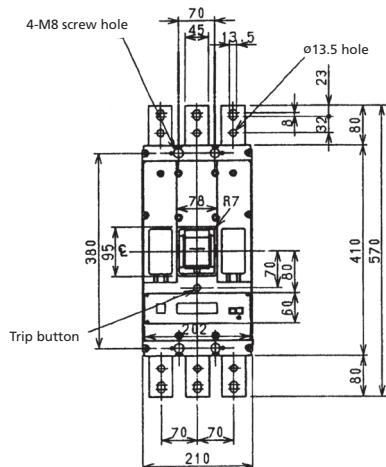
■ For Rear Connecting Studs



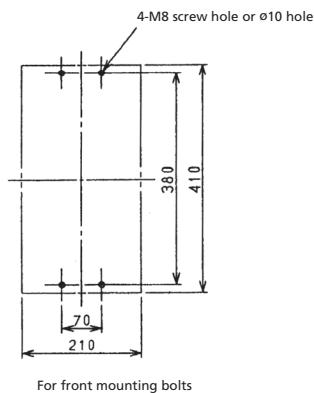
FX1000/FX1200



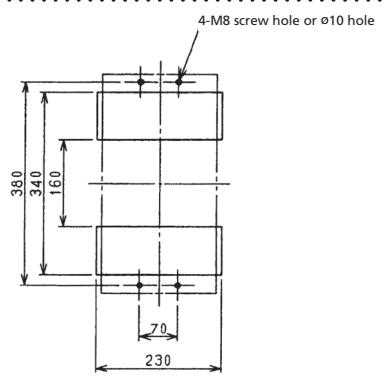
■ Dimensions



■ Drilling Plan

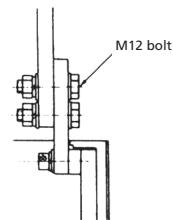


For front mounting bolts

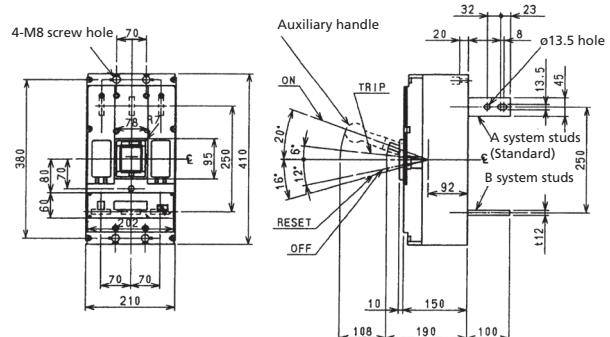


For rear connecting studs

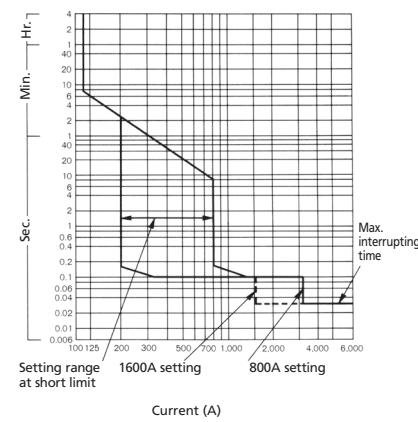
■ Terminal Arrangement



■ For Rear Connecting Studs

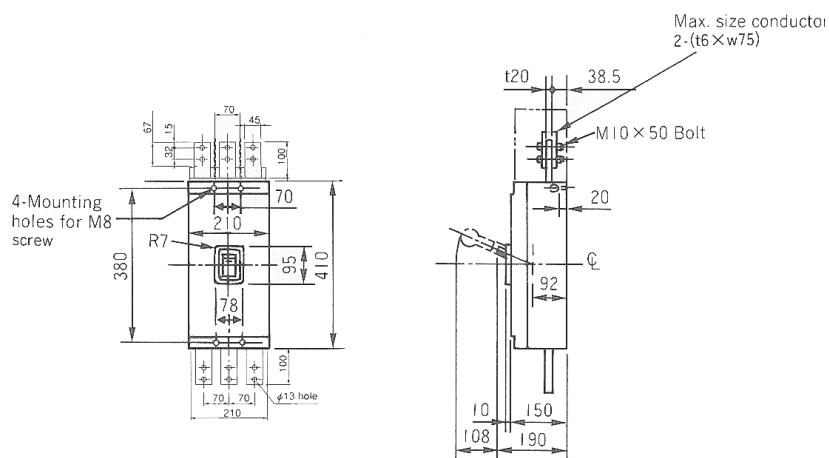


F-1600CB

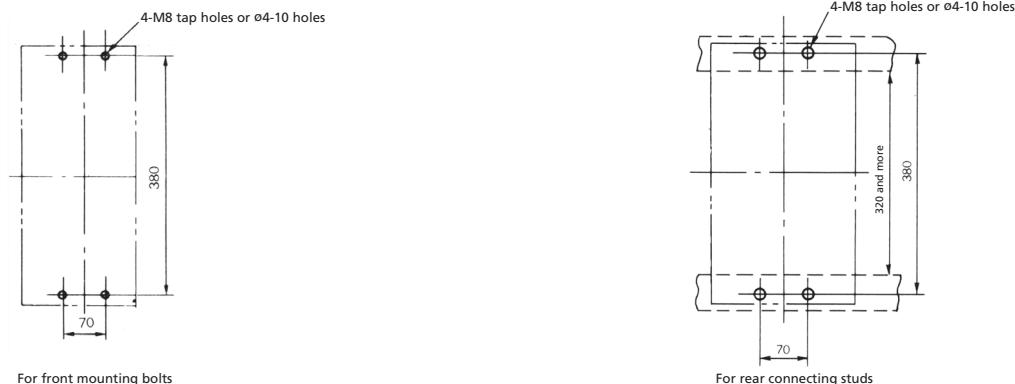


Overcurrent Tripping Characteristic Curve

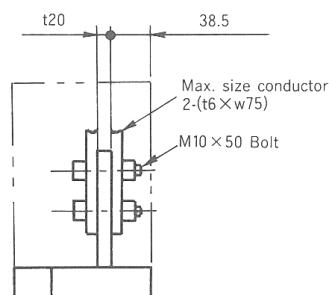
■ Dimensions



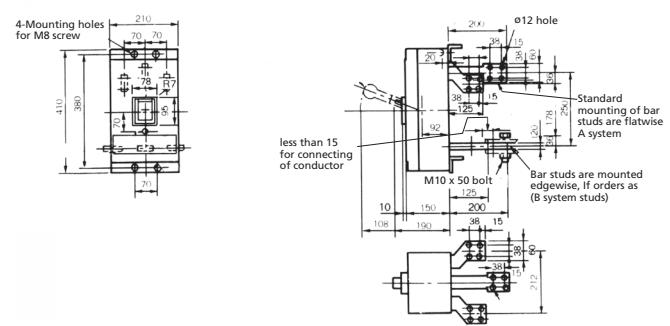
■ Drilling Plan



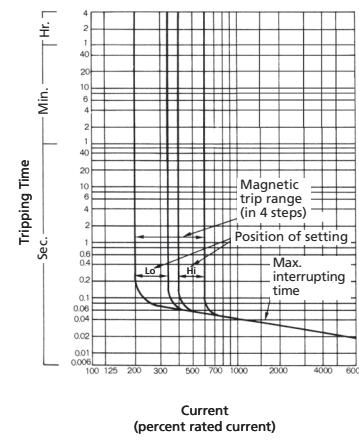
■ Terminal Arrangement



■ For Rear Connecting Studs

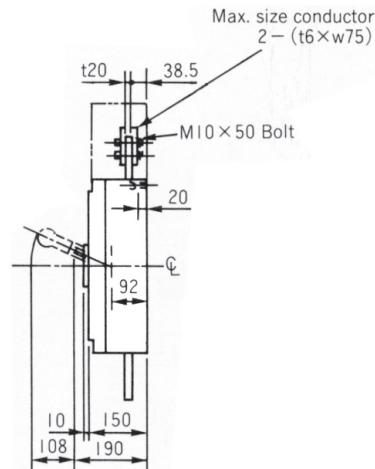
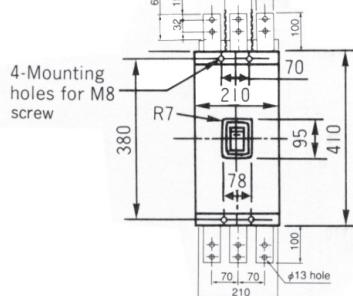


F-1600B

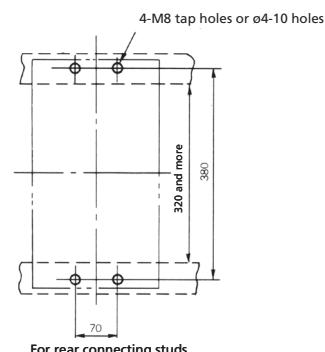
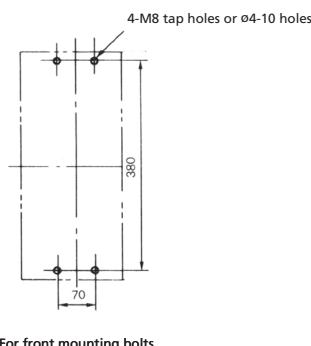


Overcurrent Tripping Characteristic Curve

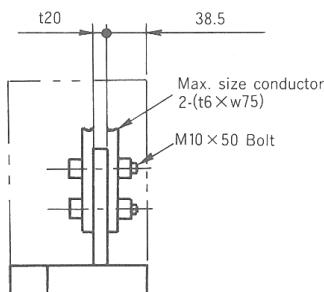
■ Dimensions



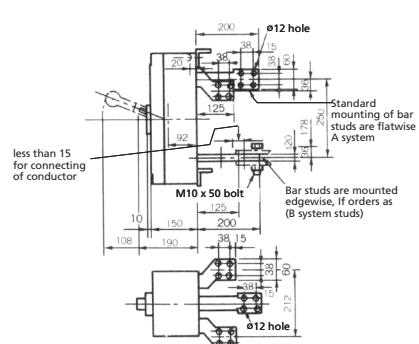
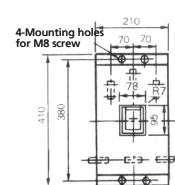
■ Drilling Plan



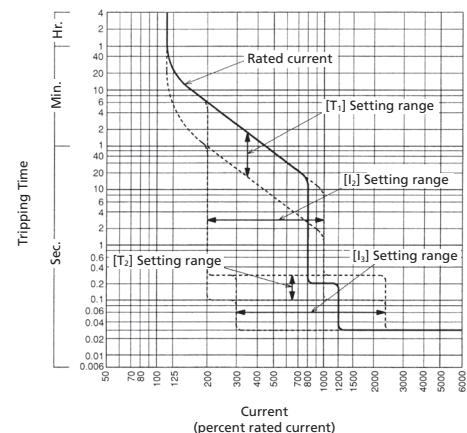
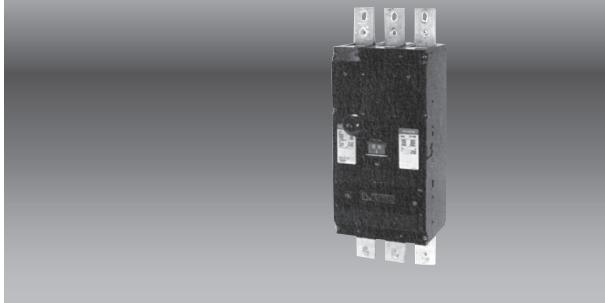
■ Terminal Arrangement



■ For Rear Connecting Studs

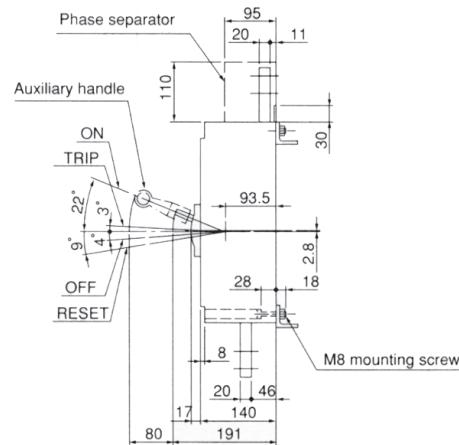
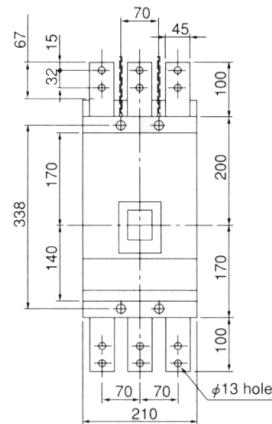


F-1600E

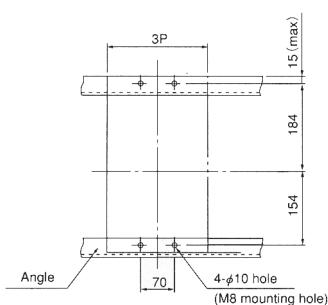


Overcurrent Tripping Characteristic Curve

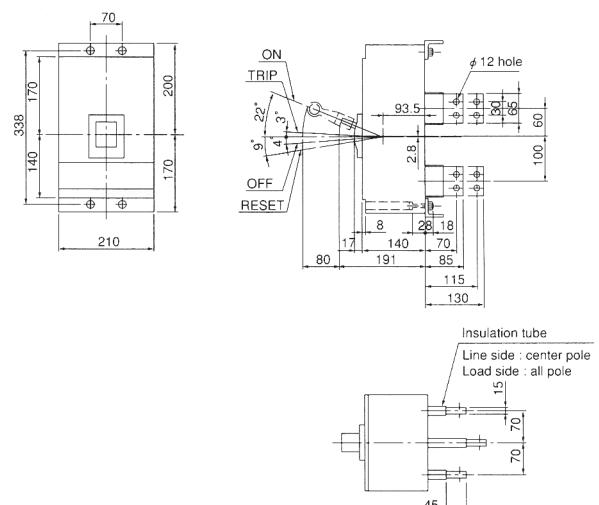
■ Dimensions



■ Drilling Plan

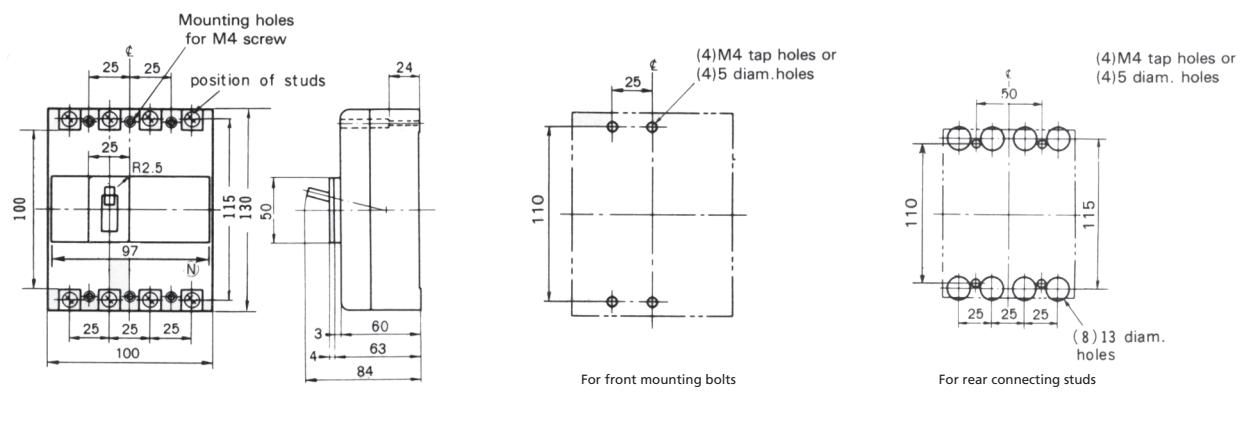


■ For Rear Connecting Studs



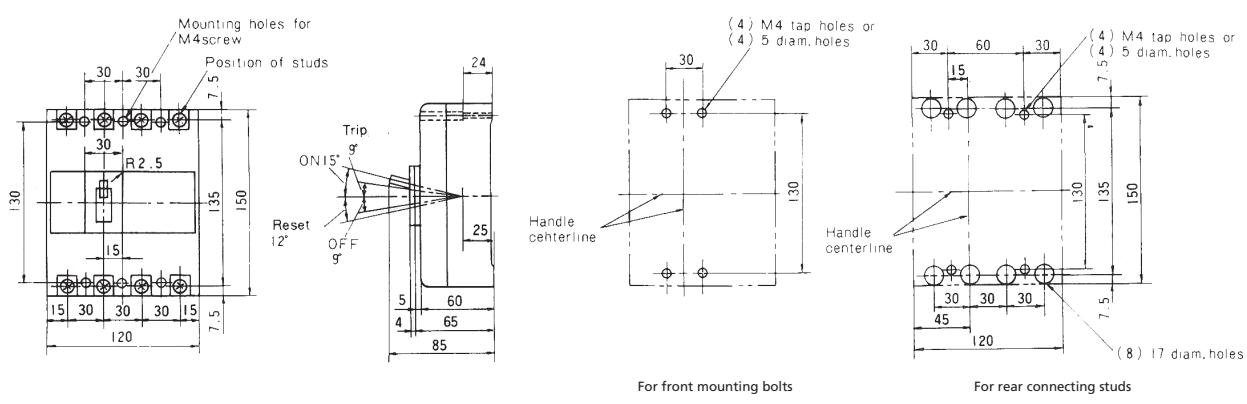
DIMENSIONS OF 4 POLE BREAKERS

F-60R 4 pole



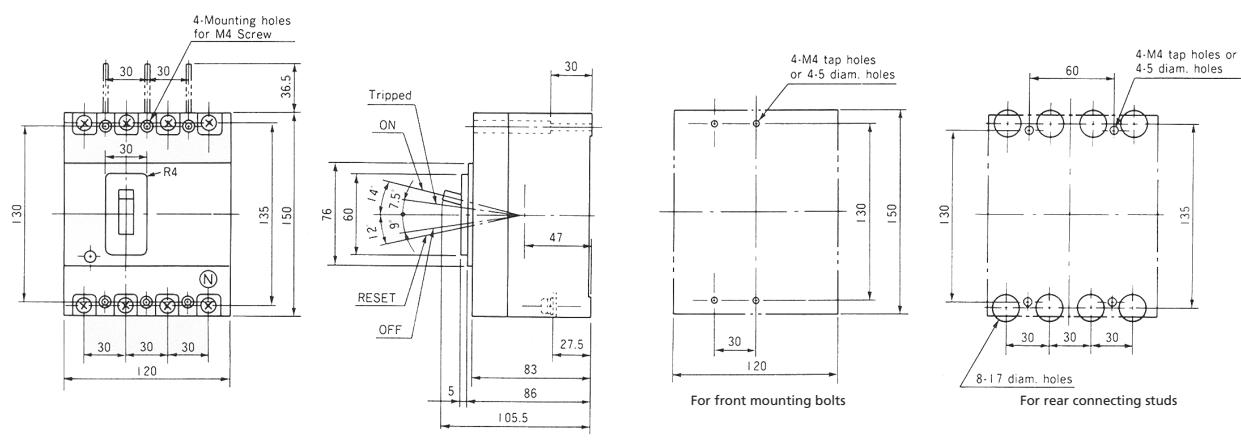
Drilling plan

F-100S 4 pole



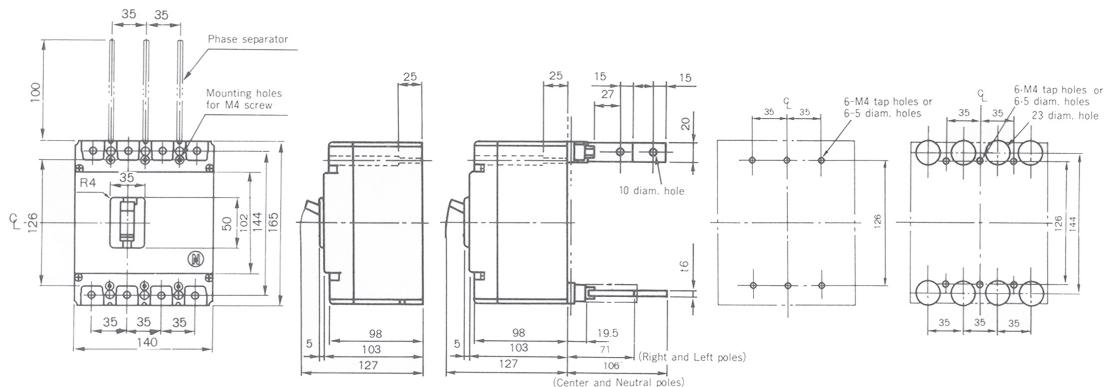
Drilling plan

F-100KB 4 pole

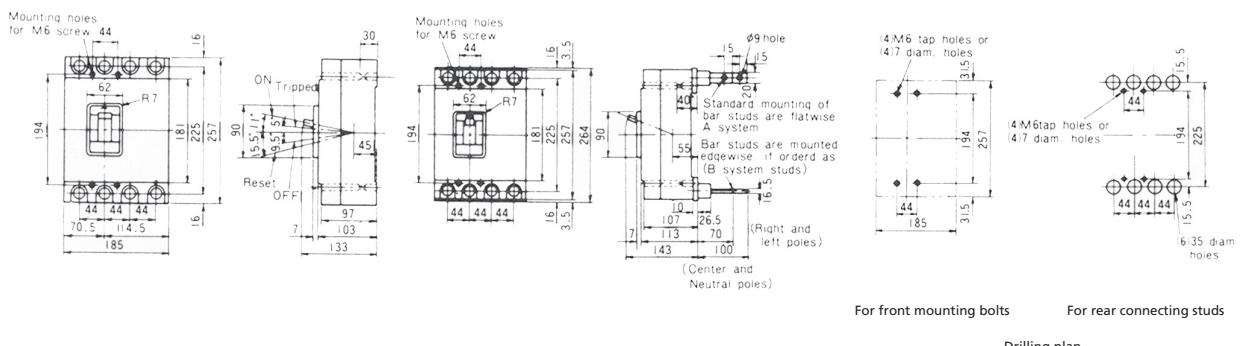


Drilling plan

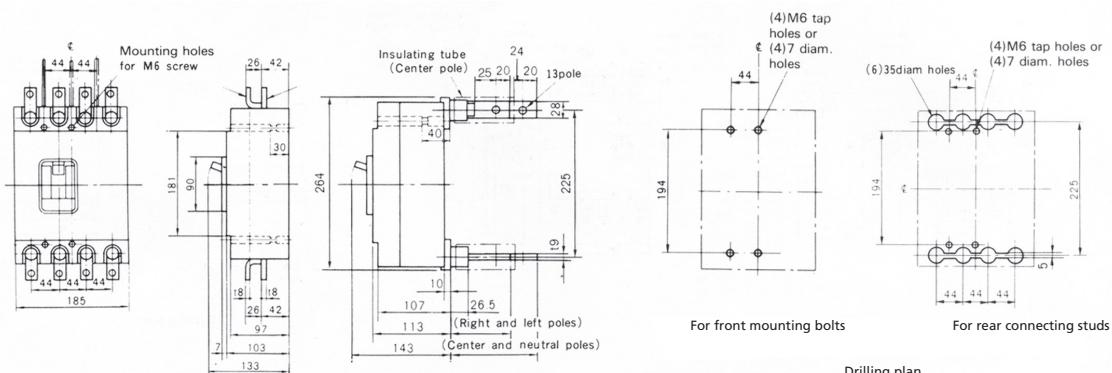
F-250FB / F-250KC 4 pole



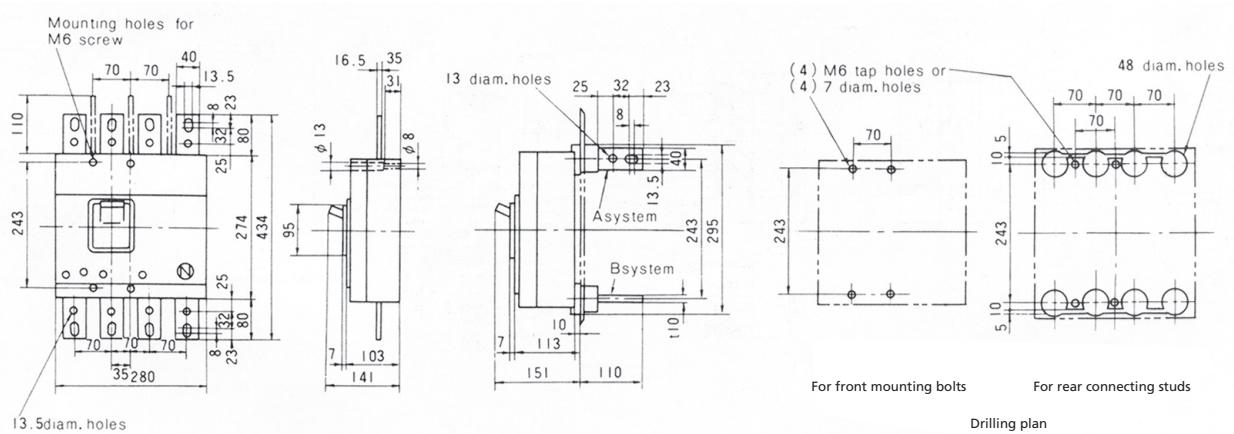
L-225E 4 pole



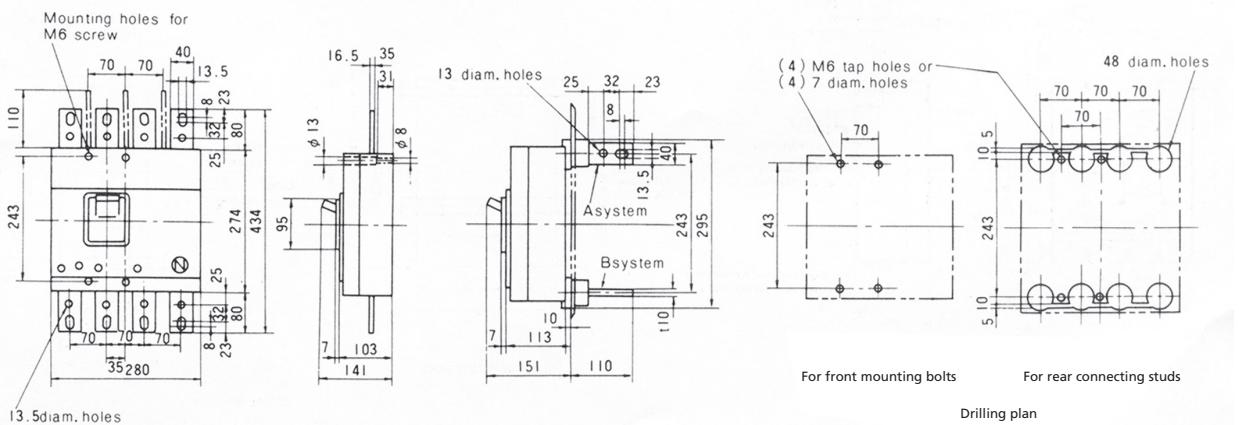
F-400R / L-400E 4 pole



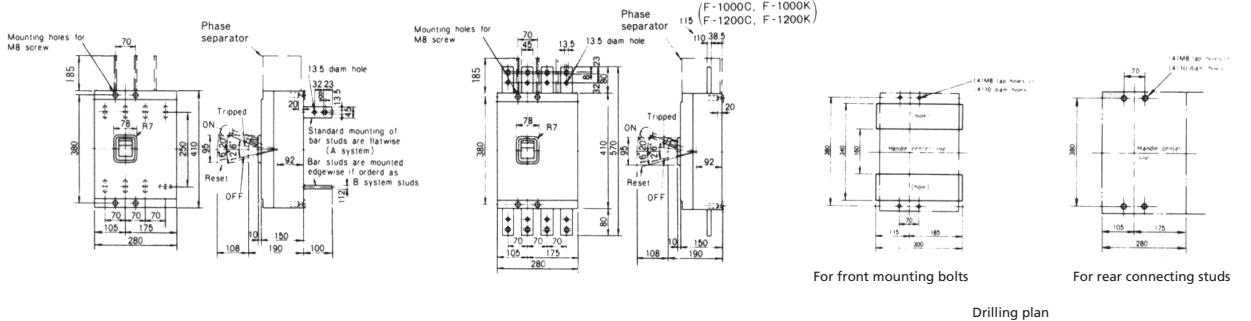
F-600F / L-600E 4 pole



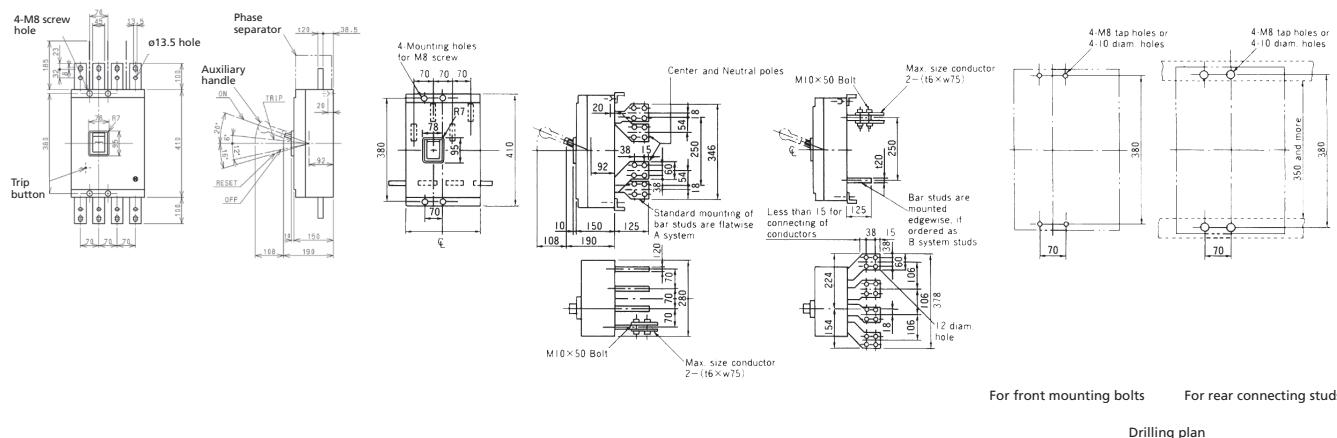
F-800R / L-800RH 4 pole



F-1000K, F-1200K 4 pole
F-1000C, F-1200C 4 pole



**F-1600CB 4 pole
F-1600B 4 pole**



EARTH LEAKAGE BREAKERS AND EARTH LEAKAGE RELAYS

This is a combination of a Fuse-Free Breaker and a leakage current detector for preventing fire or electric shock due to deterioration of electric insulation. It will provide perfect protection of a circuit against overload, short-circuit, or earth leakage.

■ Principle of operation

This device is composed of a zero phase current transformer for detecting leakage current, a control circuit, and a Fuse-Free Breaker with a shunt trip.

As shown in Fig. 37, magnetic fluxes cancel out each other, inducing no output voltage in the secondary coil while no leakage is present in the load circuit.

$$i_1 + i_2 + i_3 = 0$$

If leakage current (i_g) occurs in the load circuit, magnetic flux ϕ_g is induced, producing a certain voltage across the secondary coil.

$$i_1 + i_2 + i_3 = i_g$$

The induced voltage is supplied to the shunt trip coil of the Fuse-Free Breaker, through a control circuit composed of diodes and semiconductor control elements, to break the circuit.

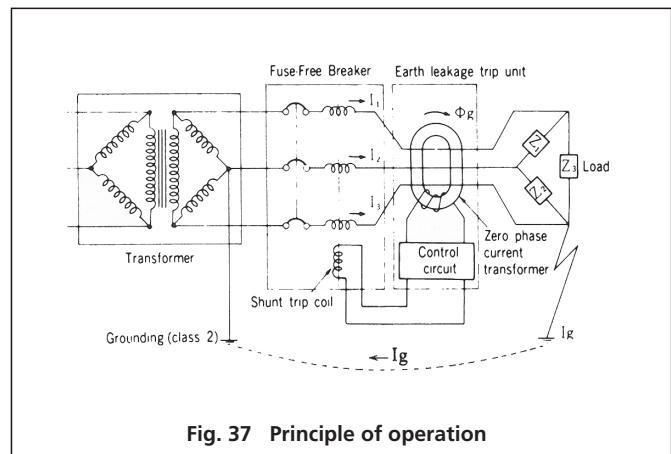


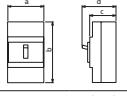
Fig. 37 Principle of operation

CLASSIFICATION AND COMPOSITION

E Series	Standard Breaker	R Series	High Interrupting Breaker	Earth Leakage Relay Series
				
30A – 800A frame		100A – 1200A frame		–

RATINGS AND SPECIFICATIONS

Table 19 E series

Type	EB-50E	EB-100E	EX30	EX50	EX50B	EX50C	
Appearance							
Phase- wiring Sysytem	1ø2W 3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	
Number of poles	2	3	3	3	3	3	
Rated Voltage (AC V)	100 – 200	100 – 200	200 – 440	200 – 440	100 – 200	200 – 440	
Rated Current (A) (Base ambient temperature 40°C)	5 10 15 20 30 40 50	60 75 100	5 10 15 20 30	5 10 15 20 30 40 50	5 10 15 20 30 40 50	5 10 15 20 30 40 50	
Rated Impulse withstand Voltage Uimp (kV)	4	4	6	6	6	6	
High Speed Type	Rated Sensitivity Current (mA)	(15) 30 (100)	30 100	30 100 200·500	30 100 200·500	30 100 (200)	
Operating time (sec. or less)	0.1	0.1	0.1	0.1	0.1	0.1	
Time Delay Type	Rated Sensitivity Current (mA)	—	—	—	—	(100·200·500)	
Operating time (sec. or less)	—	—	—	—	—	(0.3)	
Limiting non-actuating time (sec. or more)	—	—	—	—	—	(0.1)	
Indication of Earth Leakage	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	
Rated Breaking Capacity (kA)	JIS C 8201-2-2 Ann2 (Icu/Ics)	AC	440V	—	2.5/1	—	10/3
			415V	—	2.5/1	—	10/3
			400V	—	2.5/1	—	10/3
			240V	—	5/2	5/2	35/9
			200V	5/2	5/2	5/2	10/3
			100V	5/2	5/2	—	10/3
Dimensions (mm)		a	50 75	75	75	75	75
		b	96	97.5	130	130	130
		c	60	60	60	60	60
		d	76	76	84	84	84
Net Weight (kg)	0.3	0.4	0.6	0.7	0.7	0.7	0.7
Standard Connection Type	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal
Phase Separator for Line Side	—	—	○	○	○	○	● (*2)
Interior Accessories	Test Button Lead Wire	TBL	○	○	○	○	○
	Alarm Switch	AL	○	○	○	○	○
	Auxiliary Switch	AUX	○	○	○	○	○
	Earth Leakage Alarm Sw.	EAL	—	—	—	—	—
	Terminal Block	TB	—	○	○	○	○
Exterior Accessories	Rear-connecting Stud	STB	—	—	STB-2M	STB-2M	STB-2M
		BSD	—	—	—	—	—
	Flush Mounting Base Assembly	GKW (STB)	—	—	○	○	○
		GK-GKW (BSD)	—	—	—	—	—
	Plug-in Mounting Base Assembly	PK	—	—	—	—	—
	Mechanical Interlock	MIW	—	—	MIW-2E	MIW-2E	MIW-2E
	Motor-operating Mechanism	MMK-S	—	—	—	—	—
		MMK-C	—	—	—	—	—
	Lock Cover	LC	LC-03	LC-03	LC-2G	LC-2G	LC-2G
	Handle Lock	HL	—	—	HL-2G	HL-2G	HL-2G
	Handle Operating Mechanism	HA	—	—	HA-108	HA-108	HA-108
		HM	—	—	HM-S12	HM-S12	HM-S12
Terminal Cover	Front Type	TMC	TMC-0G	TMC-0H	TMC-1	TMC-1	TMC-1
		Short type	—	—	TMC-1S	TMC-1S	TMC-1S
		Long type	—	—	TMC-2D	TMC-2D	TMC-2D
		Rear Type	BTC	—	BTC-1	BTC-1	BTC-1
	IEC Rail 35 mm	●	●	○	○	○	○
Automatic Tripping Device	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic
Trip Button	—	—	—	—	—	—	—

Attention

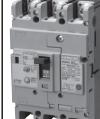
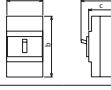
- : Standard ○ : Option
- Please use right and left poles in case of using ELBs of 3 poles 200V to 1ø2W 200V wiring sysytem.
- Please connect neutral line to middle pole of ELBs incase of using ELBs of 3 poles 200V to 1ø3W100/200V distribution system.
- Standard flush mounting base assembly of up to 400AF are GKW and GK is standard in case of 600AF or more.
- Installation of phase separators is required in case of types marked (*2)
- IEC rail is standard installation in case of EB-50E and EB-100E, so installation screws and metal fittings are not attached.
- The accessories marked (*3) can be installed by customers
- Please state frequency 50 or 60Hz in case of RF-800KN, RF-1000KN, RF-1200KN.

EX100	EX100B	EX225	EXK225	EX400	EX400B	EX600B	EX800B
							
3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W
3	3	3	3	3	3	3	3
100 - 200	200 - 440	200 - 440 (100 - 200)	200 - 440 (100 - 200)	200 - 440 (100 - 200)	200 - 440	200 - 440	200 - 440
50 60 75 100	50 60 75 100	125 150 175 200 225	125 150 175 200 225	250 300 350 400	200/225/250 300/350/400 adjustable	300/350/400 500/600 adjustable	400/450/500 600/700/800 adjustable
6	6	6	6	8	8	8	8
(15) 30 100 (200)	30 100 200 · 500	30 100 200 · 500	30 100 200 · 500	(30) 100 · 200 · 500	(30) 100 · 200 · 500	100 · 200 · 500	100 · 200 · 500
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
—	(100 · 200 · 500)	(100 · 200 · 500)	(100 · 200 · 500)	(100 · 200 · 500)	(100 · 200 · 500)	(100 · 200 · 500)	(100 · 200 · 500)
—	(0.3)	(0.3 0.6 1.2)	(0.3 0.6 1.2)	(0.3 0.6 1.2)	(0.3 0.6 1.2)	(0.3 0.6 1.2)	(0.3 0.6 1.2)
—	(0.1)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	(0.1 0.2 0.5)
Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)
—	10/3	15/8	15/8	36/18	36/18	36/18	36/18
—	10/3	15/8	15/8	36/18	36/18	36/18	36/18
—	10/3	15/8	15/8	36/18	36/18	36/18	36/18
—	35/9	35/18	35/18	50/25	50/25	50/25	50/25
10/3	35/9	35/18	35/18	50/25	50/25	50/25	50/25
10/3	—	—	—	—	—	—	—
75	75	105	105	140	140	210	210
130	130	165	165	257	257	274	274
60	60	60	68	103	103	103	103
84	84	85	93	133	133	141	141
0.8	0.9	2.2	2.2	6.6	6.5	10.6	12.9
Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal
○	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)
○	○	○	○	○	○	○	○
○	○	○	○ (*3)	○	○ (*3)	○ (*3)	○ (*3)
○	○	○	○ (*3)	○	○ (*3)	○ (*3)	○ (*3)
—	—	—	—	—	—	—	—
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
STB-3K (50A:STB-2M)	STB-3K (50A:STB-2M)	—	—	—	—	—	—
—	—	○	○	○	○	○	○
○	○	—	—	—	—	—	—
—	—	○	○	○	○	○ (GK)	○ (GK)
—	—	—	—	—	—	—	—
MIW-2E	MIW-2E	MIW-4F	MIW-4L	○	MIW-5F	MIW-5G	MIW-5G
—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—
LC-2G	LC-2G	LC-4E	LC-2F	—	—	—	—
HL-2G	HL-2G	HL-4E	HL-2F	HL-5	HL-5	HL-6	HL-6
HA-108	HA-108	HA-207	HA-209	HA-405	HA-406	HA-402	HA-402
HM-S12	HM-S12	HM-S22	HM-S23	—	—	—	—
TMC-1	TMC-1	TMC-4K	TMC-4J	TMC-5B	TMC-5B	TMC-5D	TMC-5D
TMC-1S	TMC-1S	TMC-4JS	TMC-4JS	—	—	—	—
TMC-2D	TMC-2D	—	—	—	—	—	—
BTC-1	BTC-1	BTC-4G	BTC-4J	BTC-5B	BTC-5B	—	—
○	○	—	—	—	—	—	—
Full Magnetic	Full Magnetic	Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic	Electric Relay	Electric Relay	Electric Relay
—	—	—	●	—	●	●	●

9. Applicable voltage range

Rated voltage	Applicable circuit voltage	Permissible range of voltage
100 - 200V	100 · 110 · 200 · 220V	80 - 242V
440V	400 · 415 · 440V	320 - 484V
200 - 440V	200 · 220 · 240 380 · 400 · 415 · 440V	160 - 484V

Table 20 R series

Type	RXK125-S	RXK125-H	RX100	RXK250-S	RXK250-H	RG-225BN	RG-225BH	RX400	RX400B	
Appearance										
Phase-wiring Sysytem	3Ø3W 1Ø3W 1Ø2W	3Ø3W 1Ø3W 1Ø2W	3Ø4W	3Ø3W 1Ø3W 1Ø2W	3Ø3W 1Ø3W 1Ø2W	3Ø4W	3Ø3W 1Ø3W 1Ø2W	3Ø3W 1Ø3W 1Ø2W	3Ø3W 1Ø3W 1Ø2W	
Number of poles	3	3	4	3	3	4	3	3	3	
Rated Voltage (AC V)	200 - 440	200 - 440	200 - 440	200 - 440	200 - 440	200 - 440	200 - 440 (100 - 200)	200 - 440	200 - 440	
Rated Current (A) (Base ambient temperature 40°C)	15 20 30 40 50 63 75 100 125	16 20 30 40 50 63 75 100 125	5 10 15 20 30 40 50 60 75 100	125 150 175 200 225 250	125 150 175 200 225 250	125 150 175 200 225	250 300 350 400	200/225/250 300/350/400 adjustable	200/225/250 300/350/400 adjustable	
Rated Impulse withstand Voltage Uimp (kV)	8	8	8	8	8	8	8	8	8	
High Speed Type	Rated Sensitivity Current (mA) 100·200·500	30 100·200·500	30 100·200·500	30 100·200·500	30 100·200·500	100·200·500	30 100·200·500	(30) 100·200·500	(30) 100·200·500	
Time Delay Type	Operating time (sec. or less) (100·200·500)	0.1 (0.3·0.6·1.2)	0.1 (0.3·0.6·1.2)	0.1 (0.3·0.6·1.2)	0.1 (0.3·0.6·1.2)	0.1 (0.3·0.6·1.2)	0.1 (0.3·0.6·1.2)	0.1 (0.3·0.6·1.2)	0.1 (0.3·0.6·1.2)	
	Limiting non-actuating time (sec. or more)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	(0.1 0.2 0.5)	
Indication of Earth Leakage	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	
Rated Breaking Capacity (kA)	JIS C 8201-2-2 Ann2 (lcu/lcs)	AC	440V	30/15	50/25	30/15	50/25	42/21	50/50	
			415V	30/15	50/25	30/15	50/25	42/21	50/50	
			400V	30/15	50/25	30/15	50/25	42/21	50/50	
			240V	50/25	100/50	85/43	50/25	100/50	85/43	
			200V	50/25	100/50	85/43	50/25	100/50	85/43	
			100V	—	—	—	—	—	—	
Dimensions (mm)		a	90	90	120	105	105	185	140	
		b	150	150	150	165	165	345	275	
		c	68	68	103	68	68	103	103	
		d	94	94	123	95	95	133	133	
Net Weight (kg)			2.1	2.1	2.8	2.0	2.0	9.3	6.6	
Standard Connection Type			Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Bar Terminal	Front Bar Terminal	
Phase Separator for Line Side			● (*2)	● (*2)	○	● (*2)	● (*2)	● (*2)	● (*2)	
Interior Accessories	Test Button Lead Wire	TBL	○	○	○	○	○	○	○	
	Alarm Switch	AL	○ (*3)	○ (*3)	○	○ (*3)	○ (*3)	○	○ (*3)	
	Auxiliary Switch	AUX	○ (*3)	○ (*3)	○	○ (*3)	○ (*3)	○	○ (*3)	
	Earth Leakage Alarm Sw.	EAL	—	—	—	—	—	—	—	
	Terminal Block	TB	○	○	○	○	○	○	○	
		TB2	○	○	○	○	—	○	○	
Exterior Accessories	Rear-connecting Stud	STB	STB-2S (Up to 50A)	STB-2S (Up to 50A)	○	—	—	—	—	
		BSD	BSD-3S (60A or more)	BSD-3S (60A or more)	—	○	○	○	○	
	Flush Mounting Base Assembly	GKW (STB)	○ (Up to 50A)	○ (Up to 50A)	○	—	—	—	—	
		GK·GKW (BSD)	○ (60A or more)	○ (60A or more)	—	○	○	○ (GK)	○	
	Plug-in Mounting Base Assembly	PK	○	○	—	—	—	—	—	
	Mechanical Interlock	MIW	MIW-3H	MIW-3H	MIW-3F	MIW-4M	MIW-4M	MIW-5DE	○ MIW-5F	
	Motor-operating Mechanism	MMK-S	—	—	—	—	—	—	—	
		MMK-C	—	—	—	—	—	—	—	
	Lock Cover	LC	○	○	LC-2C	LC-4J	LC-4J	—	—	
	Handle Lock	HL	○	○	○	HL-4J	HL-4J	HL-5	HL-5	
	Handle Operating Mechanism	HA	—	—	HA-106	HA-210	HA-210	HA-405	HA-405	
		HM	HM-S13	HM-S13	HM-S11	HM-S25	HM-S25	—	—	
	Terminal Cover	TMC	TMC-2C	TMC-2C	TMC-3C	TMC-4J	TMC-4J	TMC-5B	TMC-5B	
		Short type	—	—	—	TMC-4JS	TMC-4JS	—	—	
		Long type	—	—	—	—	—	—	—	
		Rear Type	BTC	BTC-2C	BTC-2C	BTC-3C	BTC-4J	BTC-5B	BTC-5B	
IEC Rail 35 mm			—	—	—	—	—	—	—	
Automatic Tripping Device			Thermal-Magnetic	Thermal-Magnetic	Full Magnetic	Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic	Electronic Relay	
Trip Button			●	●	—	●	—	—	●	

Attention

- : Standard ○ : Option
- Please use right and left poles in case of using ELBs of 3 poles 200V to 1Ø2W 200V wiring sysytem.
- Please connect neutral line to middle pole of ELBs incase of using ELBs of 3 poles 200V to 1Ø3W100/200V distribution system.
- Standard flush mounting base assembly of up to 400AF are GKW and GK is standard in case of 600AF or more.
- Installation of phase separators is required in case of types marked (*2)
- IEC rail is standard installation in case of EB-50E and EB-100E, so installation screws and metal fittings are not attached.
- The accessories marked (*3) can be installed by customers
- Please state frequency 50 or 60Hz in case of RF-800KN, RF-1000KN, RF-1200KN.

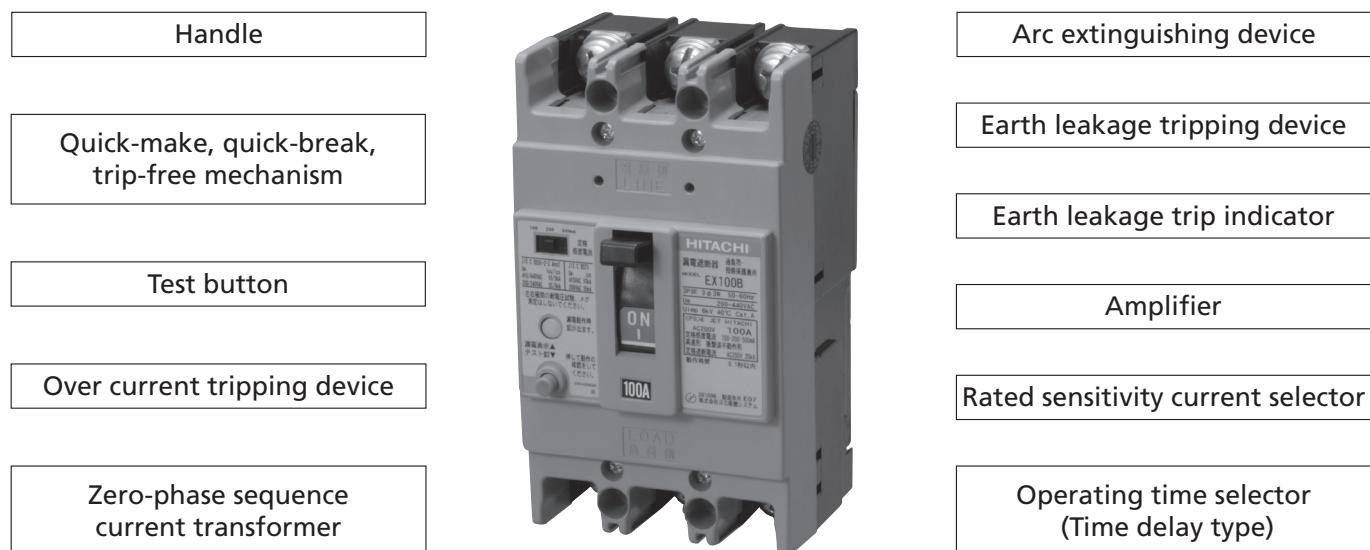
RG-400BN	RG-400BH	RX600B	RF-600FN	RX800B	RF-800KN	RF-1000KN	RF-1000CBN	RF-1200KN	RF-1200CBN
3ø4W	3ø3W 1ø3W 1ø2W	3ø4W	3ø3W 1ø3W 1ø2W	3ø4W	3ø3W 1ø3W 1ø2W	3ø4W	3ø3W 1ø3W 1ø2W	3ø4W	3ø3W 1ø3W 1ø2W
4	3	4	3	4	3	4	3	3	4
200 - 440	200 - 440	440 (200)	200 - 440	440 (200)	440 (200)	440 (200)	440 (200)	440 (200)	440 (200)
250 300 350 400	300/350/400 500/600 adjustable	500 600	400/450/500 600/700/800 adjustable	700 800	1000	500/600/700 800/900/1000 adjustable	1200	600/700/800 1000/1200 adjustable	
8	8	8	8	8	8	8	8	8	8
100·200·500	30	100·200·500	50·100·200 500·1000	100·200·500	50·100·200 500·1000	50·100·200 500·1000	50·100·200 500·1000	50·100·200 500·1000	50·100·200 500·1000
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
(100·200·500)	—	(100·200·500)	(100·200·500)	(100·200·500)	(100·200·500)	(100·200·500)	(100·200·500)	(100·200·500)	(100·200·500)
(0.3 0.6 1.2)	—	(0.3 0.6 1.2)	(0.3 1.2)	(0.3 0.6 1.2)	(0.3 1.2)	(0.3 1.2)	(0.5 1.2)	(0.3 1.2)	(0.5 1.2)
(0.1 0.2 0.5)	—	(0.1 0.2 0.5)	(0.1 0.5)	(0.1 0.2 0.5)	(0.1 0.5)	(0.1 0.5)	(0.2 0.5)	(0.1 0.5)	(0.2 0.5)
Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)	Mechanical (button)
42/21	50/50	42/21	50/50	85/22	85/22	85/22	85/22	85/22	85/22
42/21	50/50	42/21	50/50	85/22	85/22	85/22	85/22	85/22	85/22
42/21	50/50	42/21	50/50	85/22	85/22	85/22	85/22	85/22	85/22
85/43	100/100	85/43	100/100	125/32	125/32	125/32	125/32	125/32	125/32
85/43	100/100	85/43	100/100	125/32	125/32	125/32	125/32	125/32	125/32
—	—	—	—	—	—	—	—	—	—
185	210	280	210	280	210 280	210	210 280	210	210
345	274	580	274	800	800	800	800	800	800
103	103	141	103	185	185	185	185	185	185
133	141	179	141	225	225	225	225	225	225
10.2	10.6	23.0	12.9	50.0	41.0 60.0	41.0	41.0 60.0	41.0	41.0
Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal
● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)
○	○	○	○	○	○	○	○	○	○
○	○ (*3)	○	○ (*3)	○	○	○	○ (*3)	○	○ (*3)
○	○ (*3)	○	○ (*3)	○	○	○	○ (*3)	○	○ (*3)
—	—	●	—	●	●	●	●	●	●
○	○	○	○	○	○	○	○	○	○
—	○	○	○	○	○	○	○	○	○
—	—	—	—	—	—	—	—	—	—
○	○	○	○	○	○	○	○	○	○
—	—	—	—	—	—	—	—	—	—
○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (GK)
—	—	—	—	—	—	—	—	—	—
MIW-5DE	MIW-5G	○	MIW-5G	○	○	○	○	○	○
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
HL-5	HL-6	HL-6	HL-6	○	○	○	○	○	○
HA-405	HA-402	HA-402	HA-402	HA-801	HA-801	HA-801	HA-801	HA-801	HA-801
—	—	—	—	—	—	—	—	—	—
TMC-5B	TMC-5D	TMC-5D	TMC-5D	TMC-6	TMC-6	TMC-6B	TMC-6	TMC-6B	TMC-6B
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
BTC-5B	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Thermal-Magnetic	Electronic Relay	Thermal-Magnetic	Electronic Relay	Thermal-Magnetic	Thermal-Magnetic	Electronic Relay	Thermal-Magnetic	Electronic Relay	Electronic Relay
—	—	●	●	●	●	●	●	●	●

9. Applicable voltage range

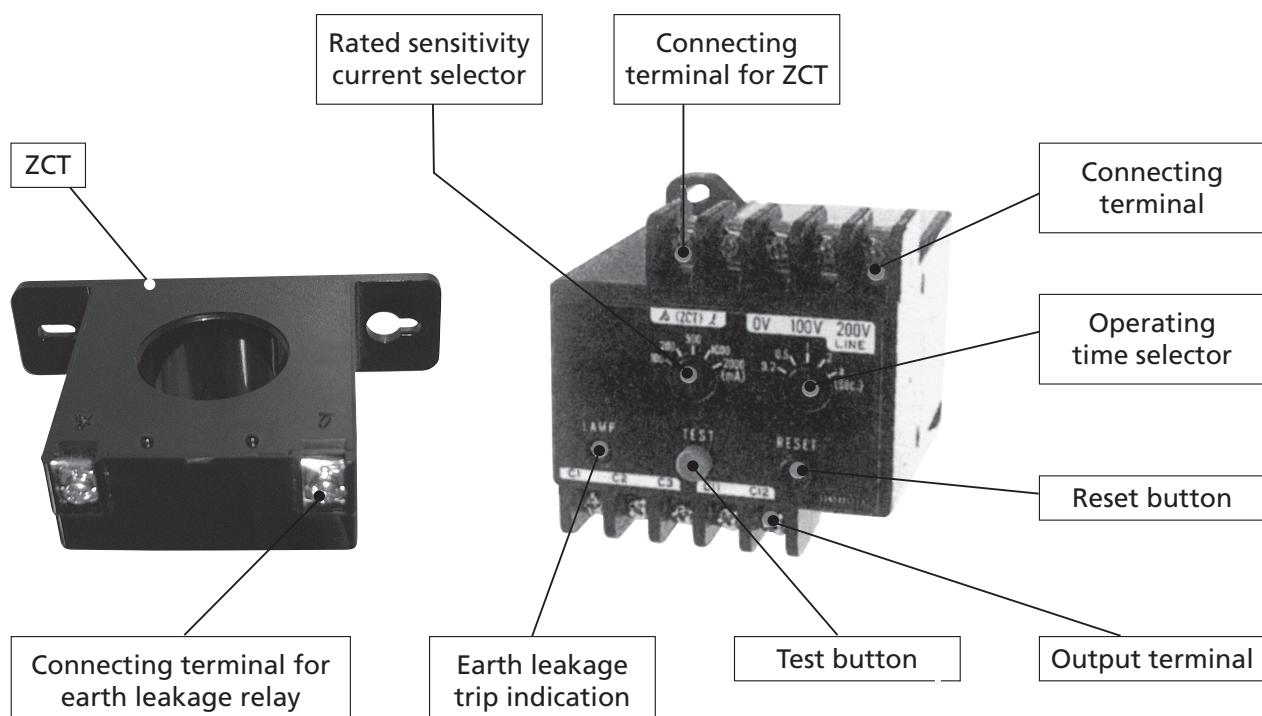
Rated voltage	Applicable circuit voltage	Permissible range of voltage
100 – 200V	100 · 110 · 200 · 220V	80 – 242V
200V	200 · 220V	160 – 220V
440V	400 · 415 · 440V	320 – 484V
200 – 440V	200 · 220 · 240 380 · 400 · 415 · 440V	160 – 484V

CONSTRUCTION

The Earth Leakage Circuit Breakers (ELB) consists of circuit breaker unit composed by a switching mechanism, arc extinguishers, an over-current tripping device, etc., zero-phase sequence current transformer, amplifier and others for detecting earth leakage current. These components are accommodated in a heat-proof and arc-proof molded case and cover. A typical example of its construction is shown in the diagram below.



Typical construction of Earth leakage breaker for power supply



Typical construction of Earth leakage relays

Table 21 Applicability of interior accessories

Frame		EB-50E	EB-50E EB-100E	EX30 EX50 EX50B EX50C EX100 EX100B	EX225 ★EXK225 ★RXK125-S ★RXK125-H ★RXK250-S ★RXK250-H	RG-225B(N) ★EX400B ★RX400B	★EX600B ★RX600B ★EX800B ★RX800B	RF-800KN RF-1000KN RF-1200KN ★RF1000CBN ★RF1200CBN	RF-600FN
Poles									
Accessories		2	3		3	3, 4	3	3, 4	3
Alarm Switch	AL								
Auxiliary Switch	AUX								
Alarm + Auxiliary	AL + AUX	—							
Earth Leakage Alarm Switch	EAL	—	—	—	—	—	—		
Alarm + Auxiliary + EAL Switch	AL + AUX + EAL	—	—	—	—	—	—		
Test Button Lead Wire	TBL								

Remarks: (1) Handle of breaker

(2) 2C: 1C is also available



● EAL

□ AUX

◀ TBL

Table 22 Earth Leakage Relays

Function	Standard type				
	High Speed Type	Time Delay Type	Automatic Reset Type	Latched Type	Relay: Automatic Reset Lamp: Latched
Type-Form	R-NZB	R-NZBT	R-NZBK	R-NZBL	R-NZBR
Appearance					
Rated Voltage (AC V)			100, 200, 240, 380, 415		
Frequency (Hz)			50, 60		
Rated Sensitivity Current (mA)	50/100/200/ 500/1000 (1) (30)	100/200/500/ 1000/2000(1)	50/100/200/ 500/1000 (1) (30)	100/200/500/ 1000/2000(1)	
Operating Time (sec.)	0.1 or less	0.3 (0.2/0.5/2/4 (1))	0.1 or less 0.3	0.1 or less 0.3	0.3 (0.2/0.5/2/4 (1))
Alarm Contact			1c + 1a		
Dimensions (mm)		a	80		
		b	80		
		c	115		
Weight (kg)			0.45		

Notes: (1) Interchangeable by manual operation.

(2) Rating with () are manufactured by customer's order.

(3)

Rated Voltage	Applicable Circuit Voltage	Remarks
100V	100·110V	Interchangeable by tap changing
200V	200·220V	
240V	230·240V	
380V	380V	
415V	400·415·440·460V (60Hz)	

Table 23 Contact Specifications

Load		Resistive Load $\cos\phi = 1$		Inductive Load $\cos\phi = 0.3$, $L/R = 7\text{ms}$	
Rated Thermal Current (A)		3			
Rated Current (A)	AC 120V	3		2	
	AC 240V	3		1.5	
	AC 415V	1		0.5	
	DC 24V	3		1.5	
	DC 100V	0.2		0.2	

Table 24 Zero-phase-sequence Current Transformer

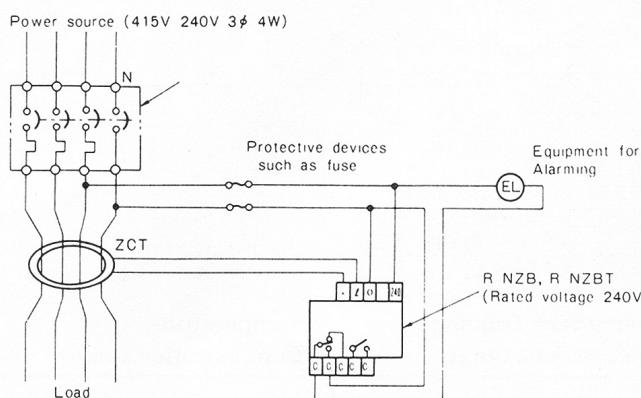
Type	Aperture Diameter	Maximum Available Wire Size					
		Vinyl-insulated 600V Wire (IV)			Polyethylene-Insulated 600V Wire (CV)		
		2-wire	3-wire	4-wire	2-wire	3-wire	4-wire
ZR-15	ø15	14mm ² (88A)	8mm ² (61A)	8mm ² (61A)	2mm ² (33A)	2mm ² (33A)	—
ZR-30B	ø30	60mm ² (217A)	50mm ² (190A)	38mm ² (162A)	38mm ² (190A)	22mm ² (135A)	14mm ² (105A)
ZR-58B	ø58	250mm ² (556A)	200mm ² (469A)	150mm ² (395A)	200mm ² (560A)	150mm ² (480A)	100mm ² (365A)
ZR-65	ø65	325mm ² (650A)	250mm ² (556A)	200mm ² (469A)	250mm ² (655A)	200mm ² (560A)	150mm ² (480A)
ZR-80	ø80	500mm ² (842A)	500mm ² (842A)	325mm ² (650A)	400mm ² (870A)	325mm ² (760A)	250mm ² (655A)
ZR-100	ø100	500mm ² x 4 (1,684A)	400mm ² x 6 (1,490A)	500mm ² (842A)	600mm ² (1,140A)	600mm ² (1,140A)	400mm ² (870A)
ZR-120	ø120	—	350mm ² x 9 (1,950A)	400mm ² x 8 (1,490A)	1000mm ² (1,600A)	800mm ² (1,370A)	600mm ² (1,140A)

Table 25 ZCT with Primary Conductors

Type	Z-400B	Z-600B	Z-800B	Z-1000B	Z-1200B	Z-2000B						
Appearance												
Number of Poles	3 4	3 4	3 4	3 4	3 4	3 4						
Continuous Thermal Current (A)	400	600	800	1000	1200	2000						
Rated Voltage (AC V)			600									
Frequency (Hz)			50, 60									
Rated withstand Current (kA)			100 (peak value)			150 (peak value)						
Rated Sensitivity Current			Refer to Earth Leakage Relays									
Operating Time (sec.)			Ditto									
Dimensions (mm)		A	220	315	220	315	240	320	240	320	310	380
		B	348	348	348	348	380	380	380	380	380	300
		B ₁	400	400	460	460	480	480	480	480	480	600
		C	187	214	187	214	214	239	214	239	214	242
Weight (kg)			11	15	11.2	16	12.3	17	12.3	17	13	18
												30
												42

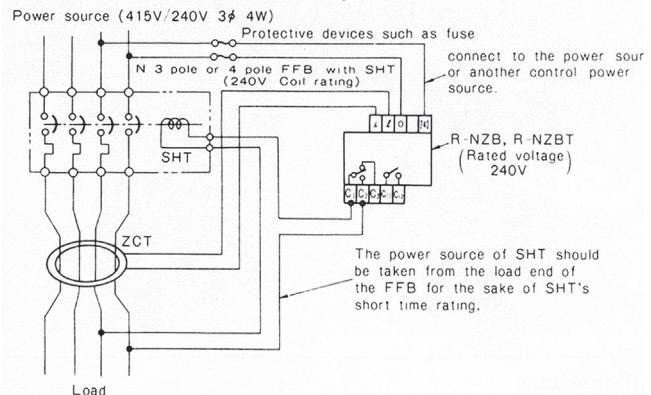
APPLICATION OF EARTH LEAKAGE RELAYS

Alarming

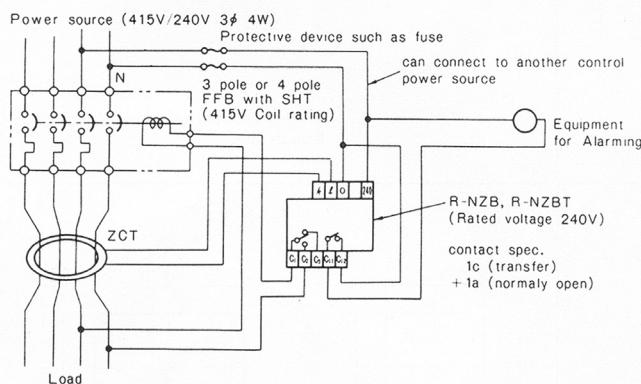


Circuit Interruption

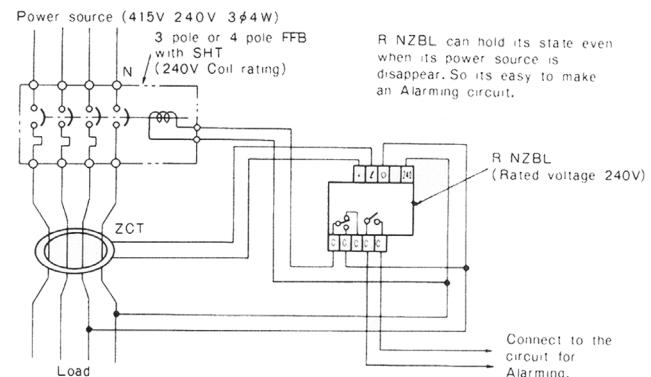
(Trip indicator lamp indicate the tripping state)



Circuit Interruption + Alarming

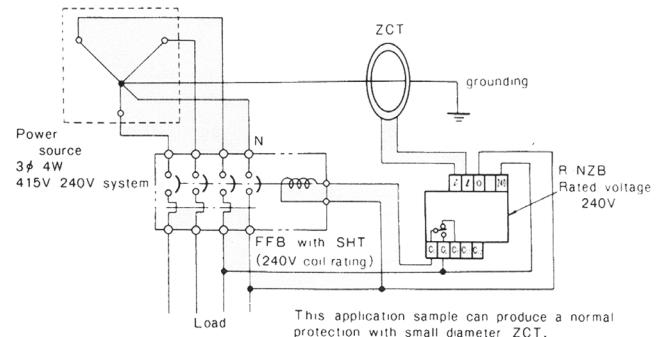
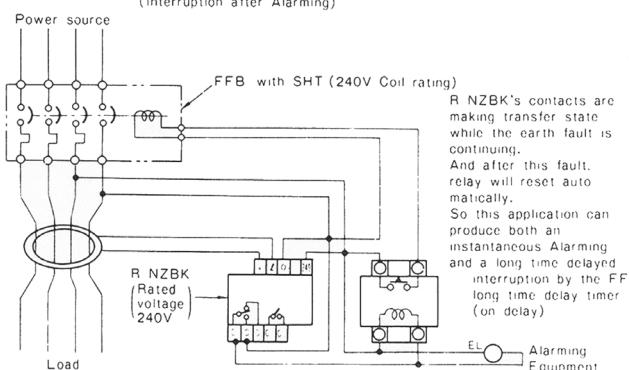


Circuit Interruption - Alarming



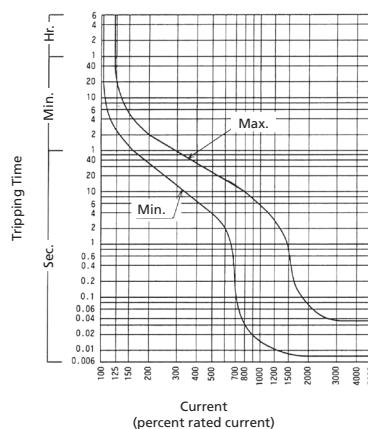
Long time monitor

(Interruption after Alarming)

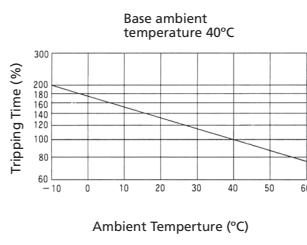


DIMENSIONS

EB-50E

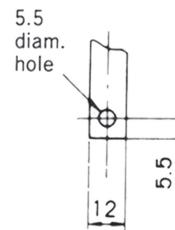
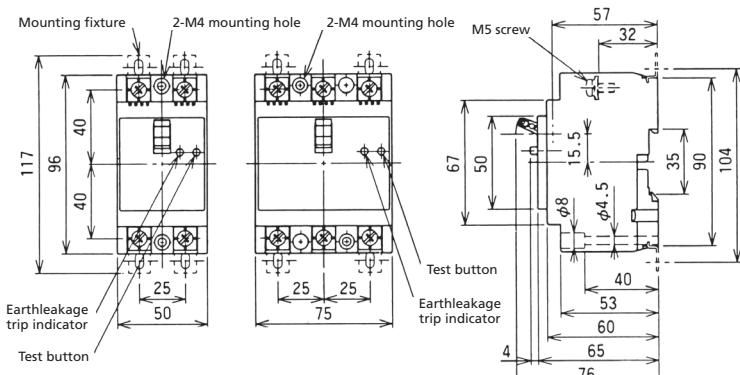


Overcurrent Tripping
Characteristic Curve



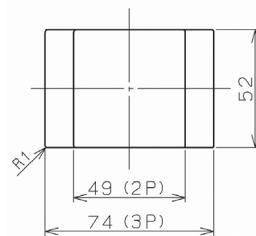
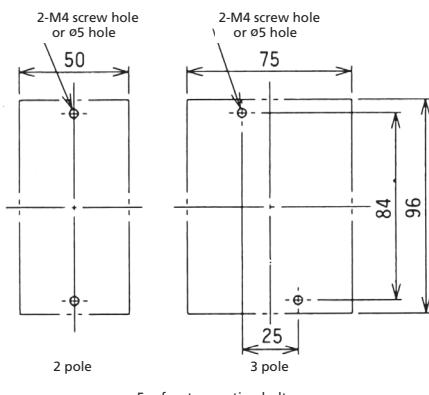
Temperature
Compensation Curve

Dimensions



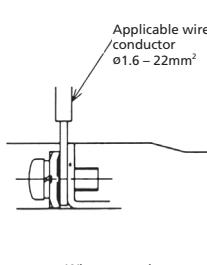
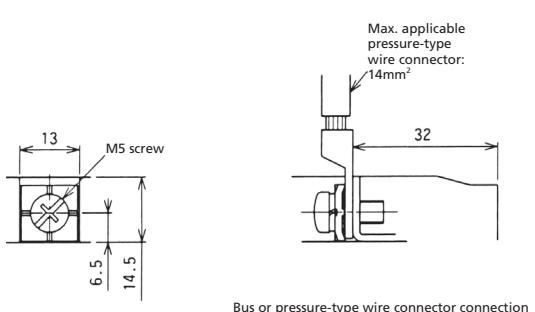
Direct-connected bus drilling

Drilling Plan

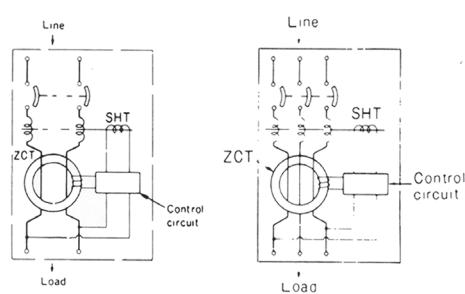


1mm clearance on each side of handle

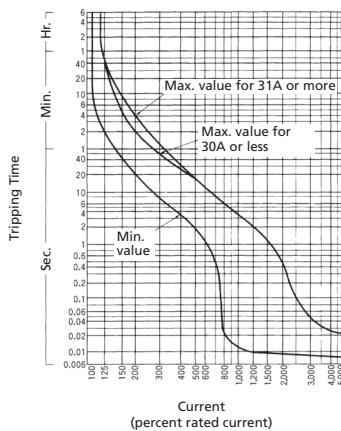
Terminal Arrangement



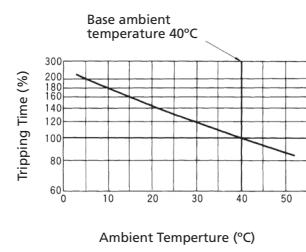
Internal Diagram Connection



EX30/EX50/EX50B

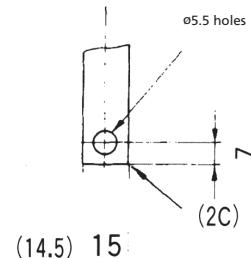
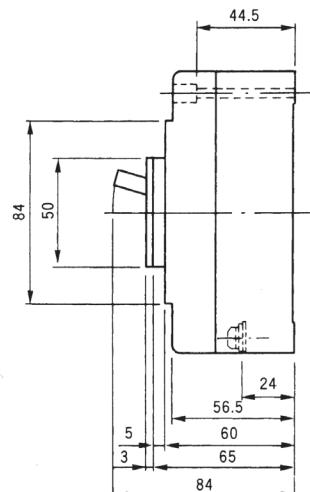
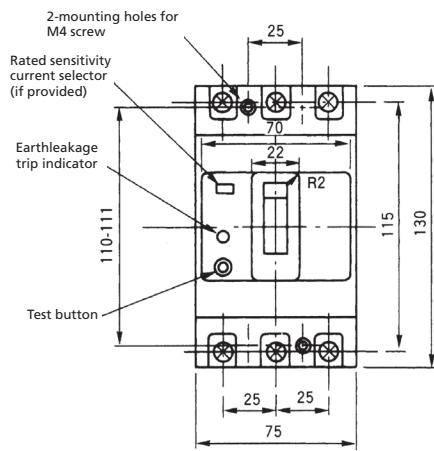


**Overcurrent Tripping
Characteristic Curve**



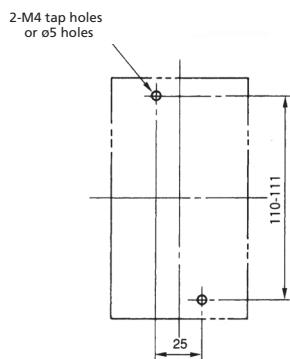
**Temperature
Compensation Curve**

■ Dimensions

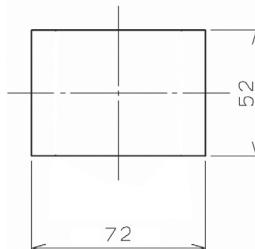


Direct-connected bus drilling

■ Drilling Plan



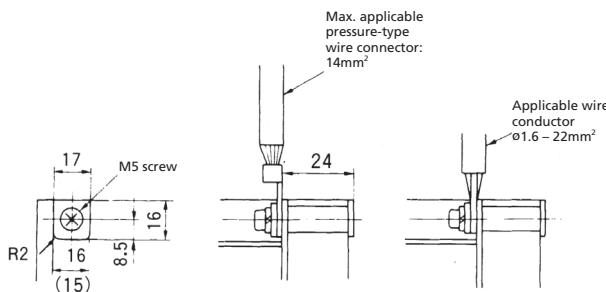
For front mounting bolts



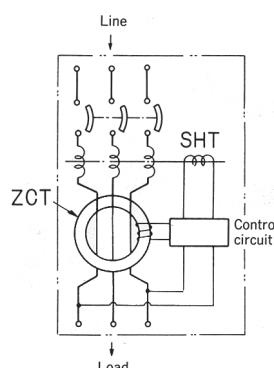
1mm clearance on each side of handle

Frontplate cutout

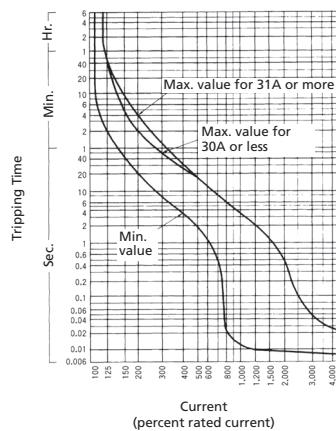
■ Terminal Arrangement



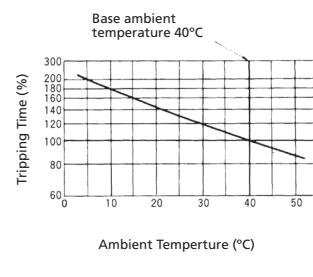
■ Internal Diagram Connection



EX50C

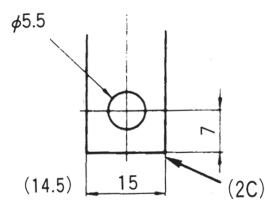
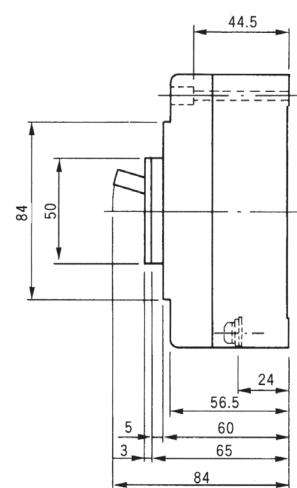
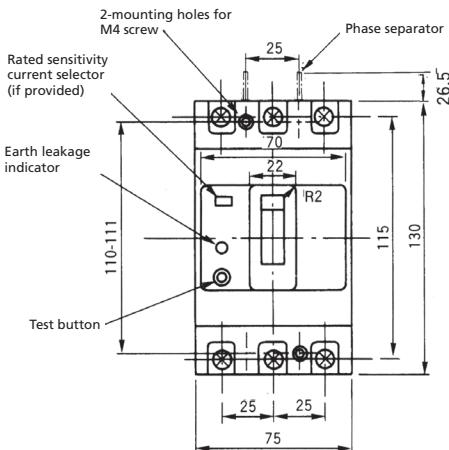


**Overcurrent Tripping
Characteristic Curve**



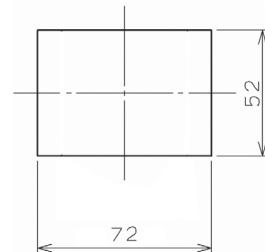
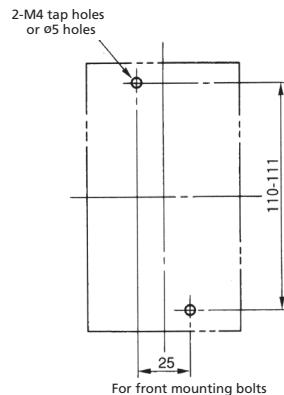
**Temperature
Compensation Curve**

Dimensions



Direct-connected bus drilling

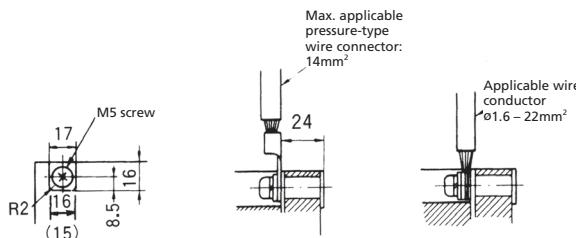
Drilling Plan



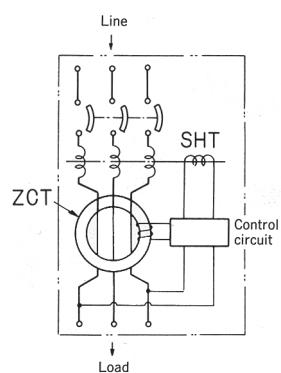
1mm clearance on each side of handle

Frontplate cutout

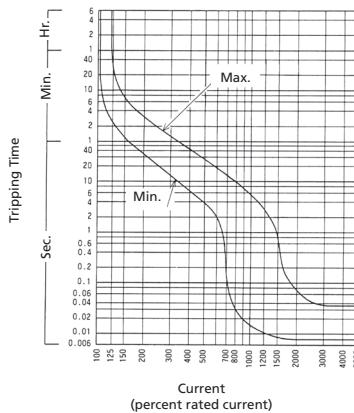
Terminal Arrangement



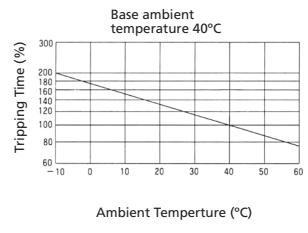
Internal Diagram Connection



EB-100E

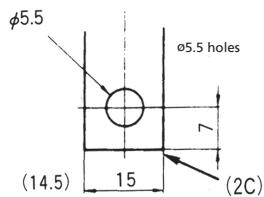
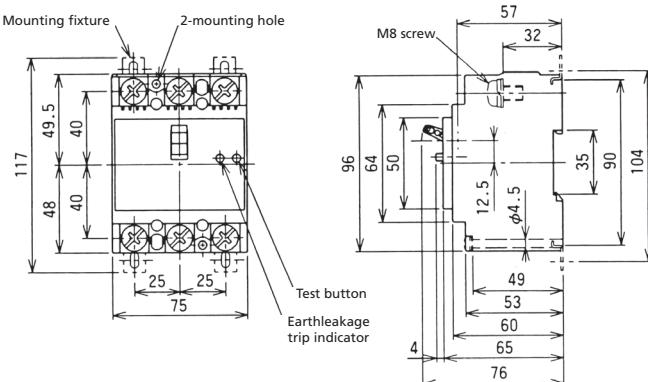


Overcurrent Tripping Characteristic Curve



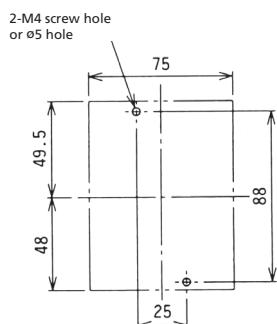
Temperature Compensation Curve

■ Dimensions

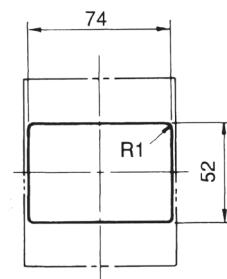


Direct-connected bus drilling

■ Drilling Plan

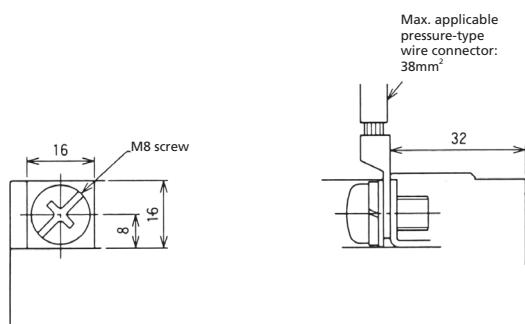


For front mounting bolts

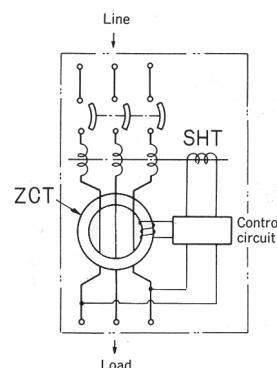


Frontplate cutout

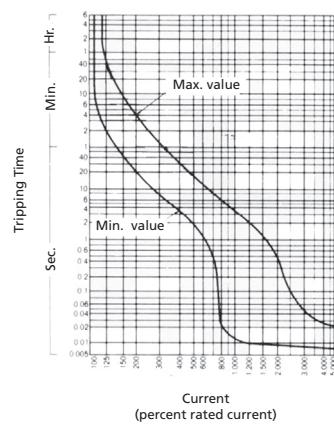
■ Terminal Arrangement



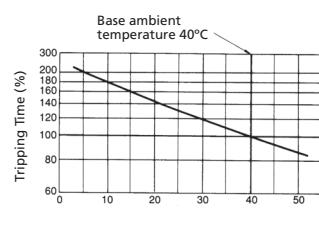
■ Internal Diagram Connection



EX100

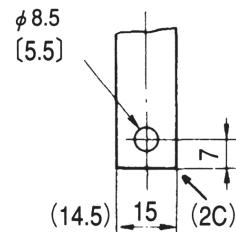
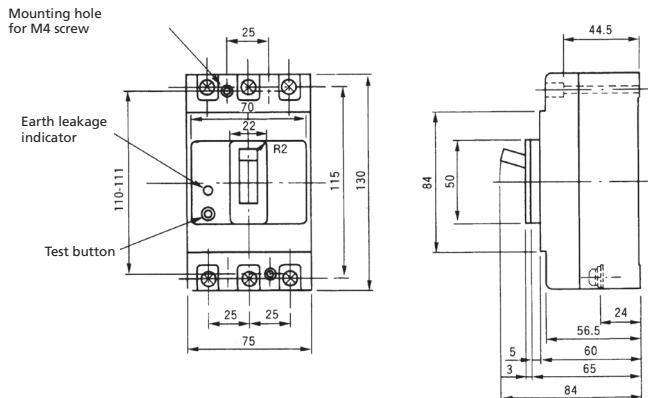


Overcurrent Tripping
Characteristic Curve



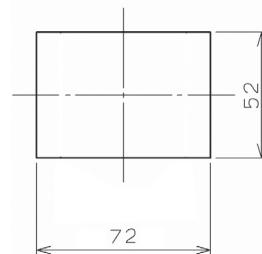
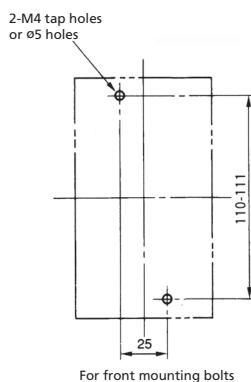
Temperature
Compensation Curve

Dimensions



Direct-connected bus drilling

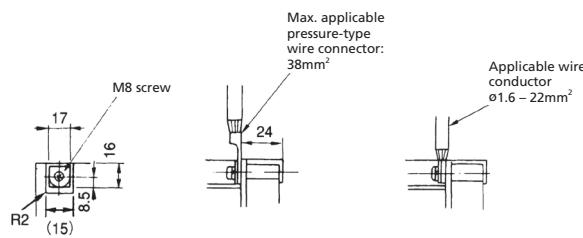
Drilling Plan



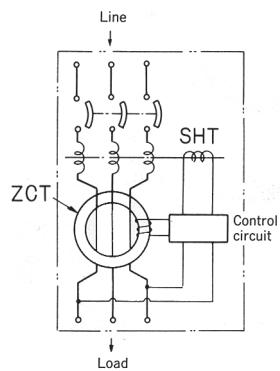
1mm clearance on each side of handle

Frontplate cutout

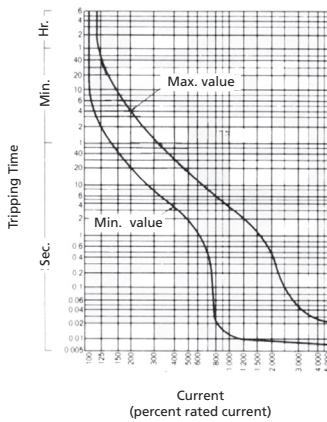
Terminal Arrangement



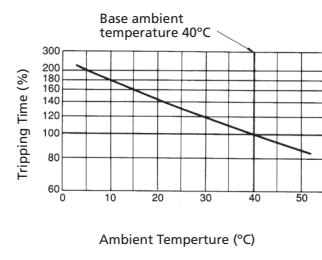
Internal Diagram Connection



EX100B

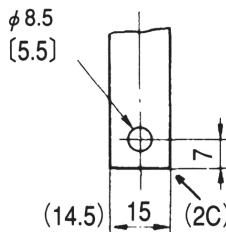
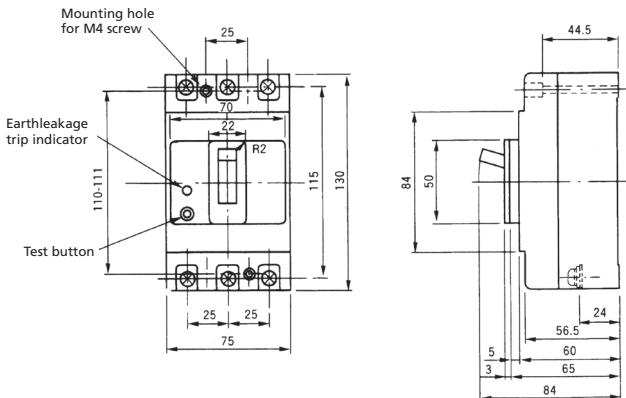


**Overcurrent Tripping
Characteristic Curve**



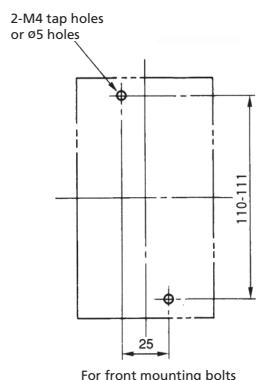
**Temperature
Compensation Curve**

■ Dimensions

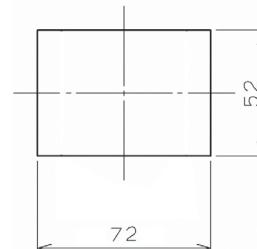


Direct-connected bus drilling

■ Drilling Plan



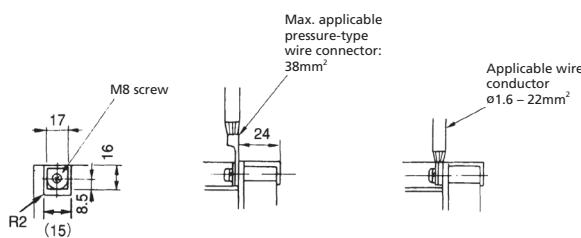
For front mounting bolts



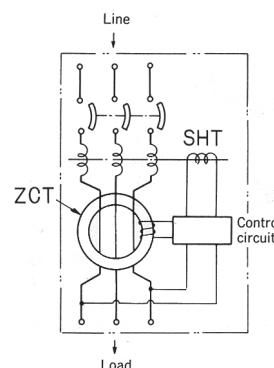
1mm clearance on each side of handle

Frontplate cutout

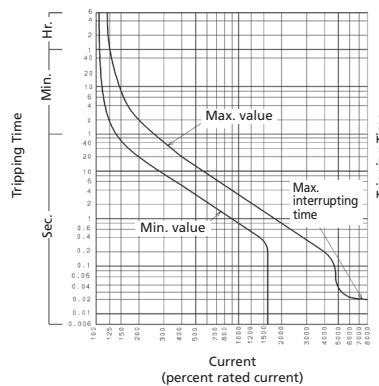
■ Terminal Arrangement



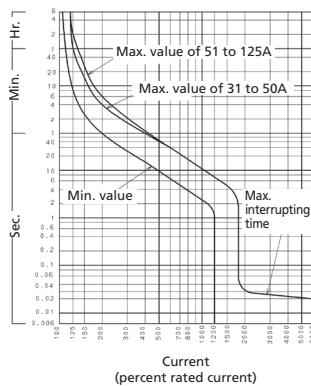
■ Internal Diagram Connection



RXK125-S/RXK125-H

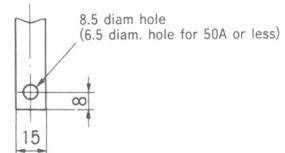
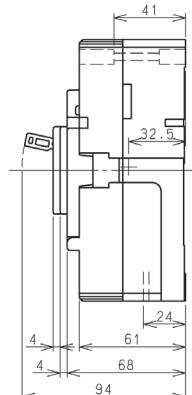
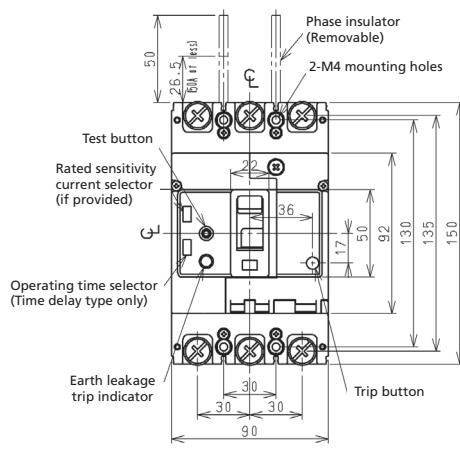


**Overcurrent Tripping
Characteristic Curve
(15-30A)**



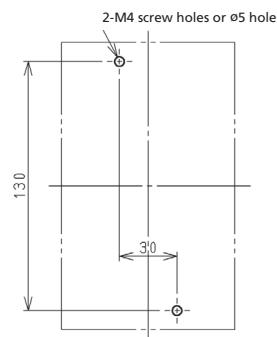
**Overcurrent Tripping
Characteristic Curve
(31-125A)**

■ Dimensions

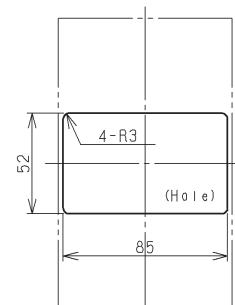


Direct-connected bus drilling

■ Drilling Plan

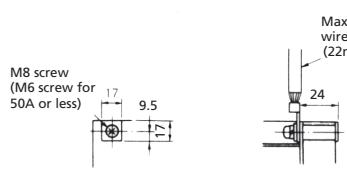


For front mounting bolts

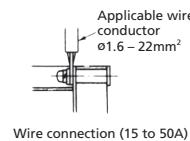


Frontplate cutout

■ Terminal Arrangement

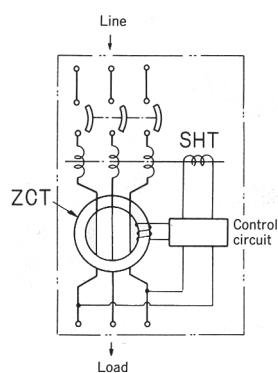


Bus or pressure wire conductor connection
(): dimensions only for 50A or less

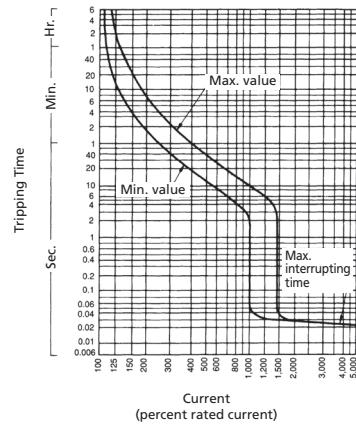


Wire connection (15 to 50A)

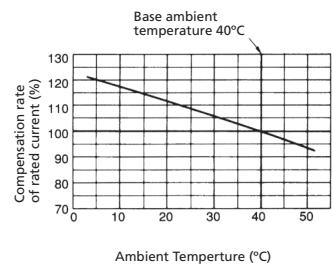
■ Internal Diagram Connection



EX225

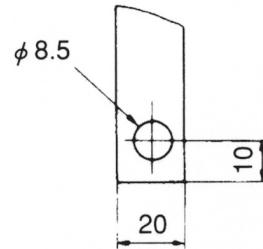
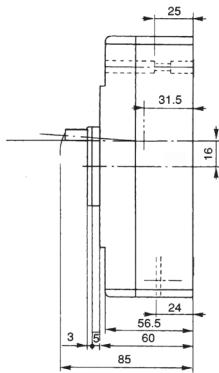
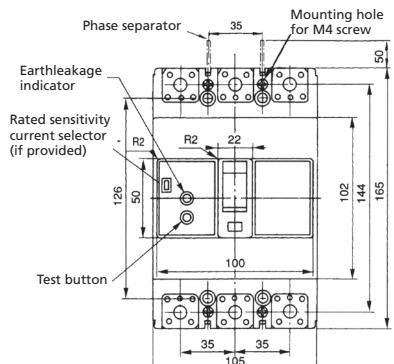


**Overcurrent Tripping
Characteristic Curve**



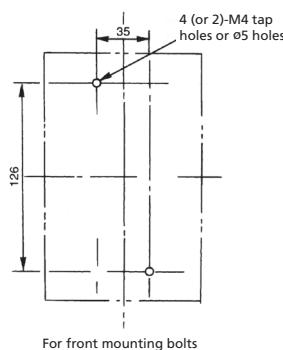
**Temperature
Compensation Curve**

■ Dimensions

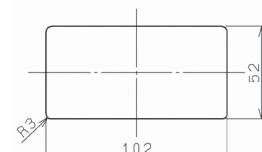


Direct-connected bus drilling

■ Drilling Plan



For front mounting bolts

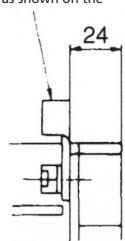


1mm clearance on each side of handle

Frontplate cutout

■ Terminal Arrangement

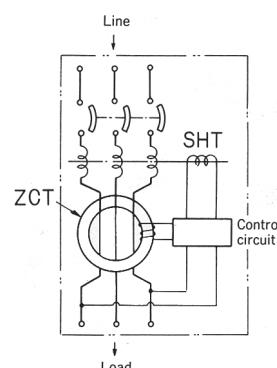
Maximum applicable pressure-type wire connector = 60mm²
Special pressure type wire connector is attached for 175 – 225A as shown on the right table



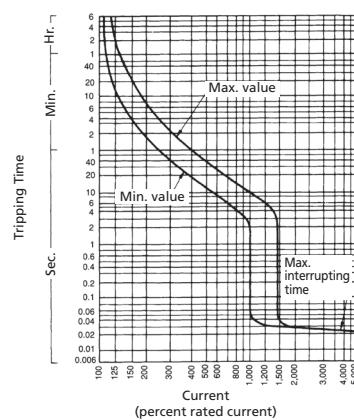
Pressure-type wire connector
directly connected

Rated current (A)	Applicable wire size of pressure-type wire connector (mm ²)
175 – 225	Pressure-type wire connector 80, 100, 125 (mm)

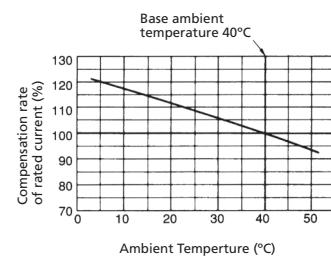
■ Internal Diagram Connection



EXK225

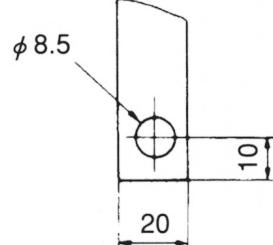
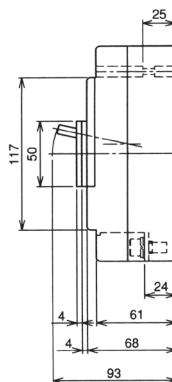
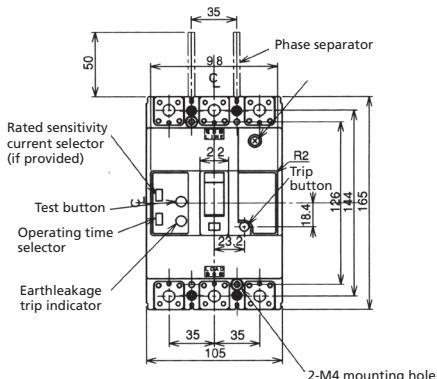


**Overcurrent Tripping
Characteristic Curve**



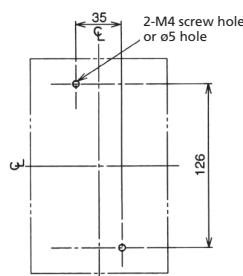
**Temperature
Compensation Curve**

■ Dimensions

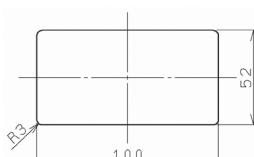


Direct-connected bus drilling

■ Drilling Plan

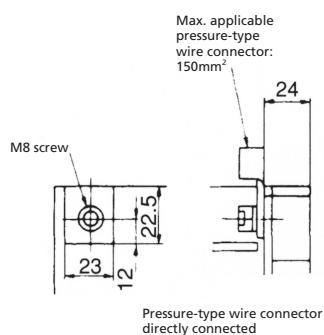


For front mounting bolts

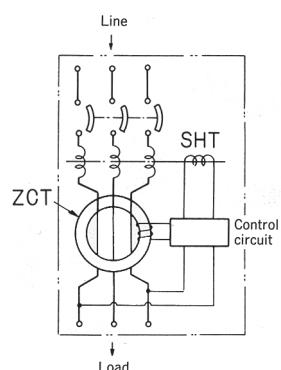


1mm clearance on each side of handle

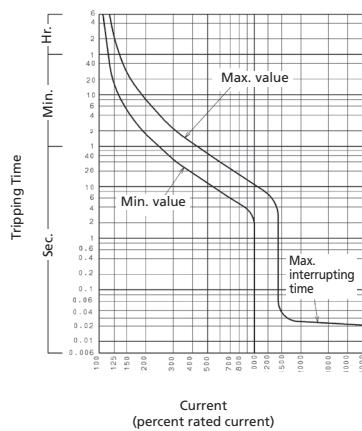
■ Terminal Arrangement



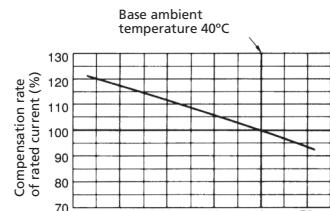
■ Internal Diagram Connection



RXK250-S/RXK250-H

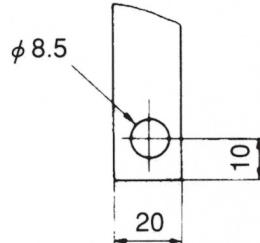
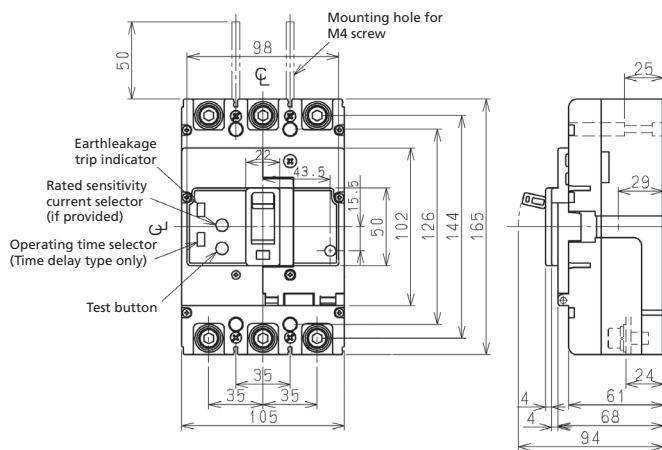


**Overcurrent Tripping
Characteristic Curve**



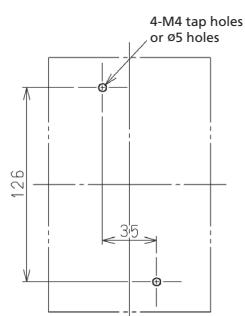
**Temperature
Compensation Curve**

■ Dimensions

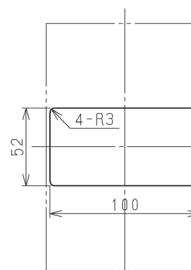


Direct-connected bus drilling

■ Drilling Plan



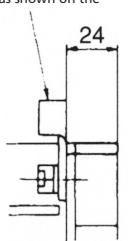
For front mounting bolts



Frontplate cutout

■ Terminal Arrangement

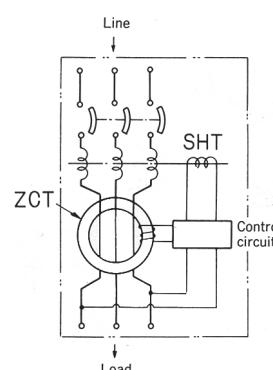
Maximum applicable pressure t-type wire connector = 60mm². Special pressure type wire connector is attached for 175 – 225A as shown on the right table.



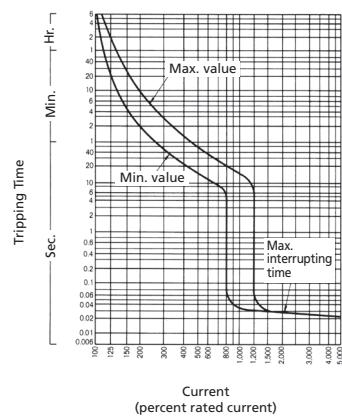
Pressure type wire connector directly connected

Rated current (A)	Applicable wire size of pressure-type wire connector (mm ²)
175 – 225	Pressure-type wire connector 80, 100, 125 (mm)

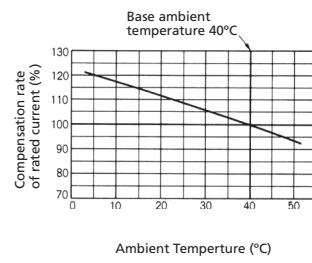
■ Internal Diagram Connection



EX400/RX400

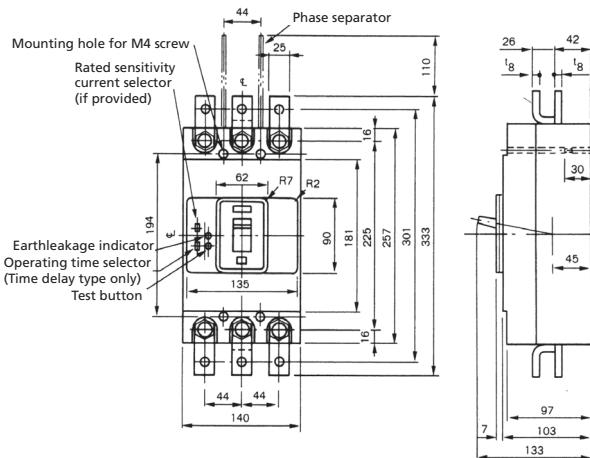


Overcurrent Tripping
Characteristic Curve

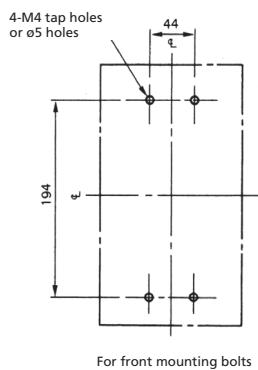


Temperature
Compensation Curve

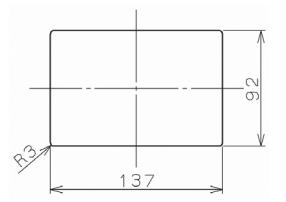
Dimensions



Drilling Plan

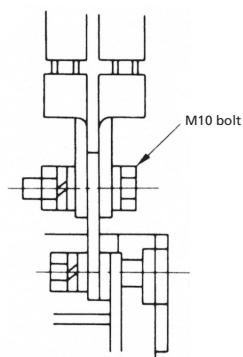


For front mounting bolts

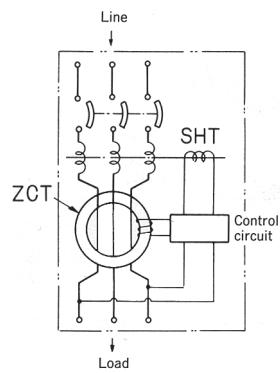


1mm clearance on each side of handle

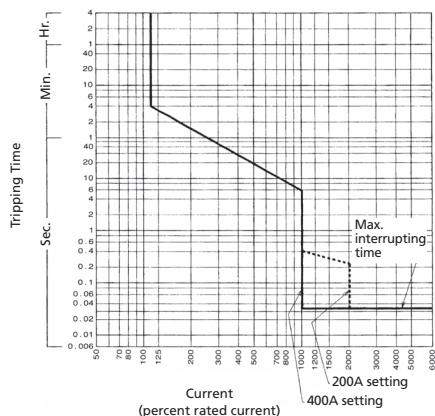
Terminal Arrangement



Internal Diagram Connection

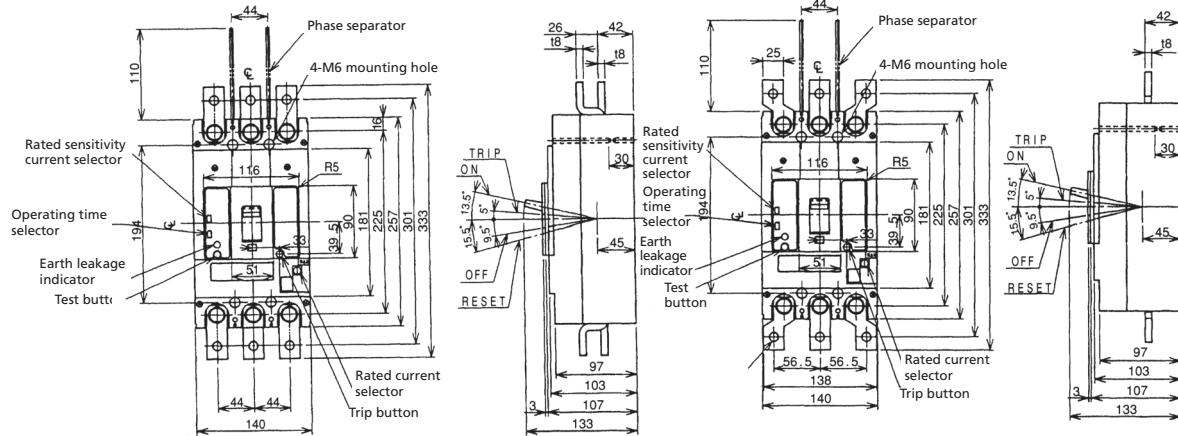


EX400B/RX400B

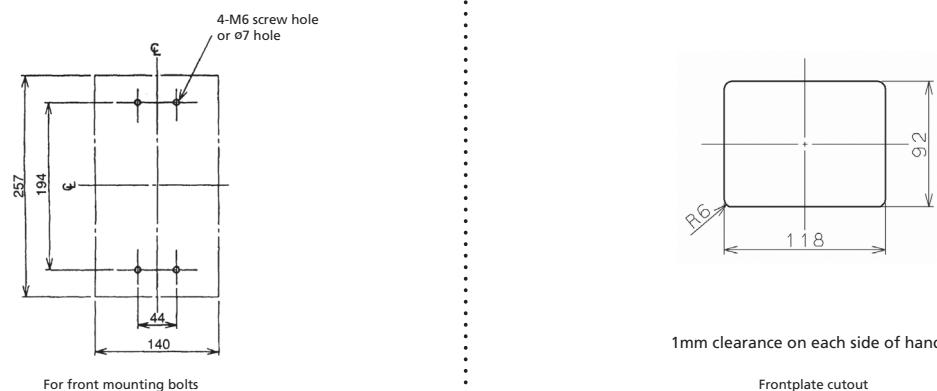


Overcurrent Tripping Characteristic Curve

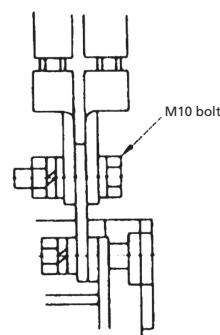
■ Dimensions



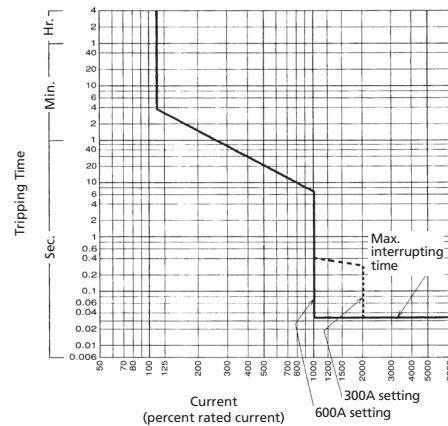
■ Drilling Plan



■ Terminal Arrangement

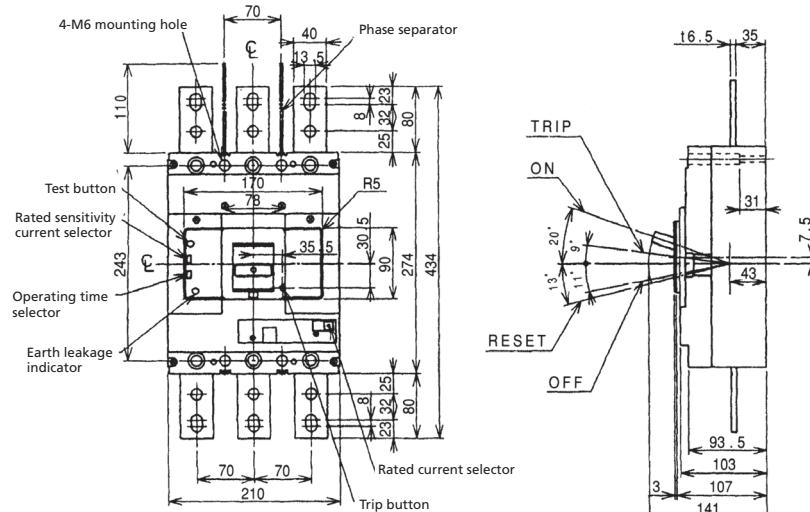


EX600B/RX600B

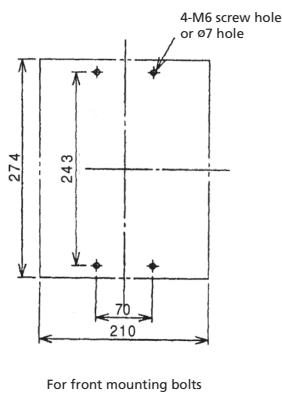


**Overcurrent Tripping
Characteristic Curve**

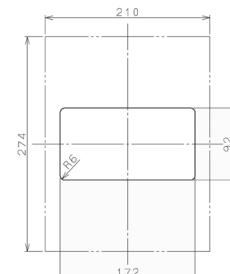
■ Dimensions



■ Drilling Plan

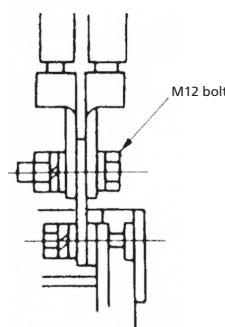


For front mounting bolts

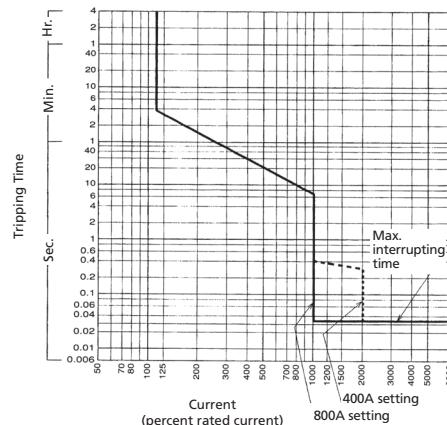


1mm clearance on each side of handle

■ Terminal Arrangement

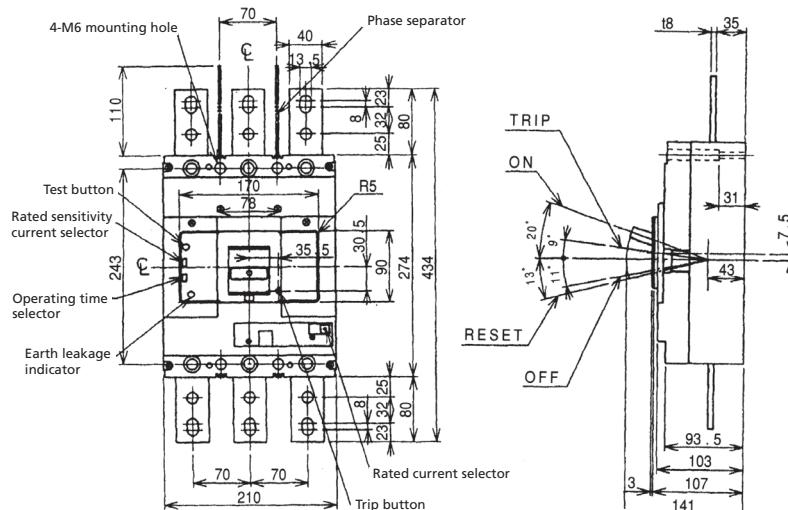


EX800B/RX800B

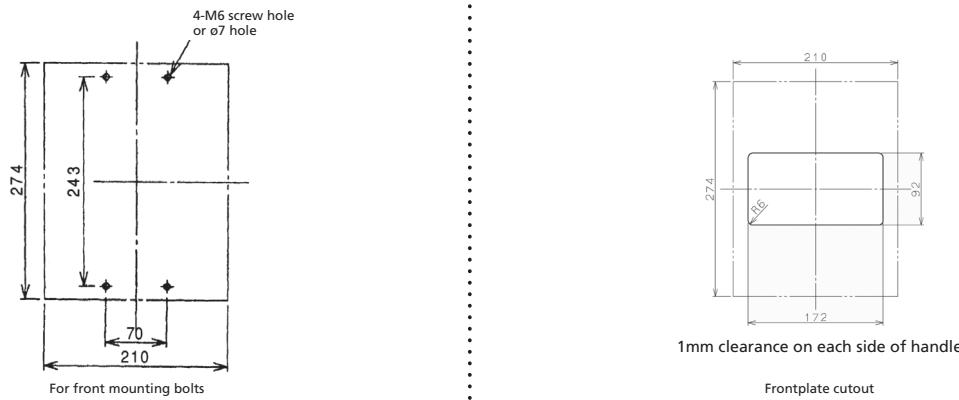


Overcurrent Tripping Characteristic Curve

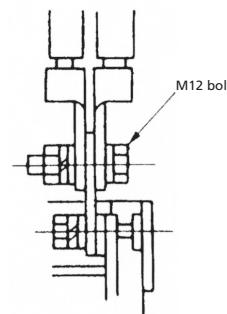
■ Dimensions



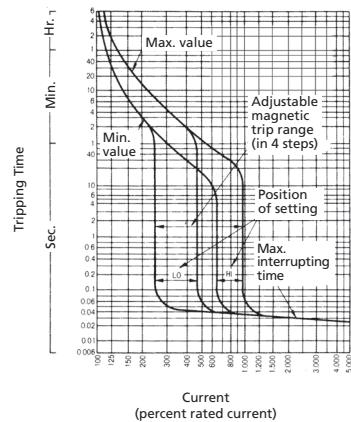
■ Drilling Plan



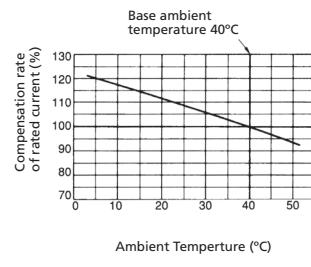
■ Terminal Arrangement



RF-1000KN

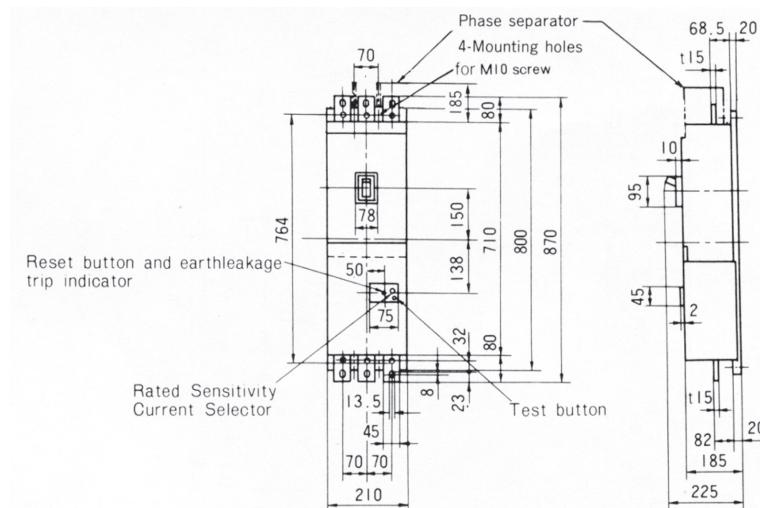


Overcurrent Tripping Characteristic Curve

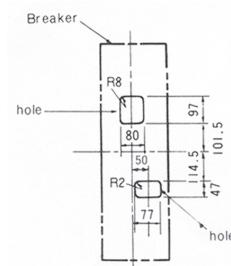
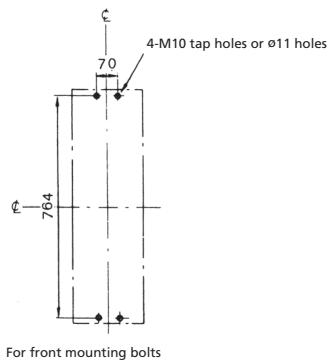


Temperature Compensation Curve

■ Dimensions

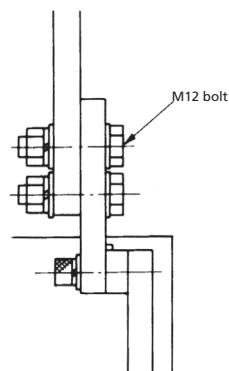


■ Drilling Plan

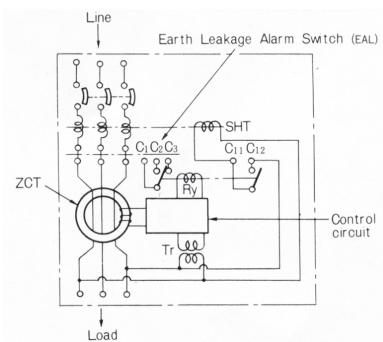


1mm clearance on each side of handle

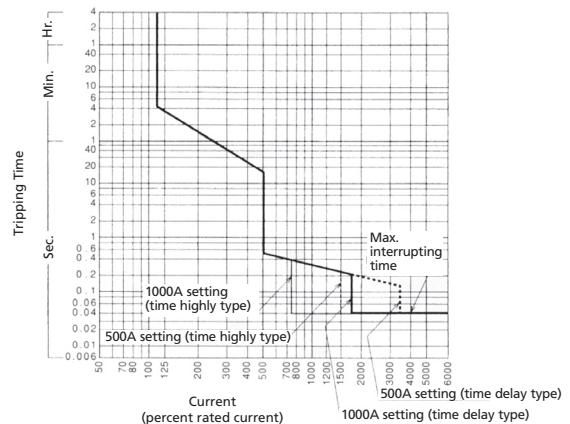
■ Terminal Arrangement



■ Internal Diagram Connection

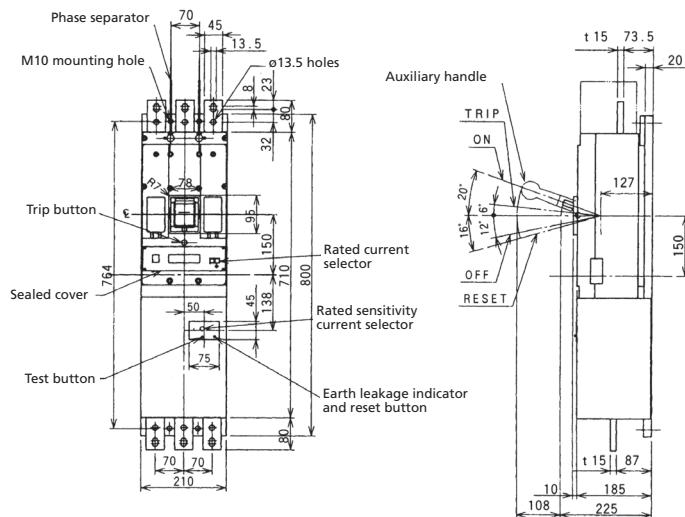


RF-1000CBN

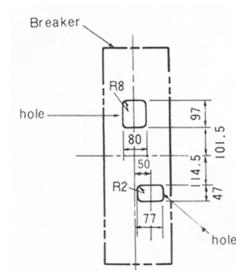
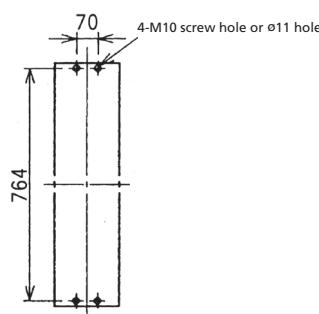


**Overcurrent Tripping
Characteristic Curve**

■ Dimensions

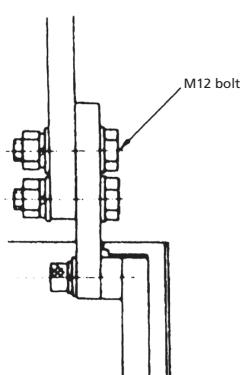


■ Drilling Plan

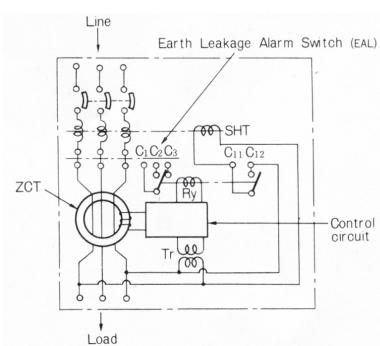


Frontplate cutout

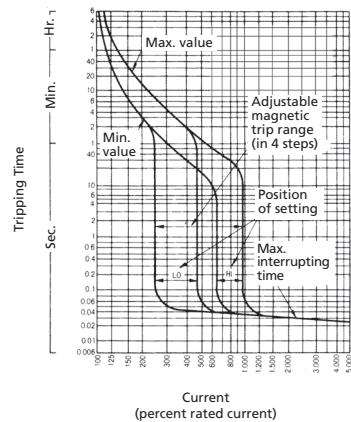
■ Terminal Arrangement



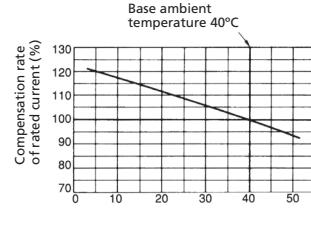
■ Internal Diagram Connection



RF-1200KN

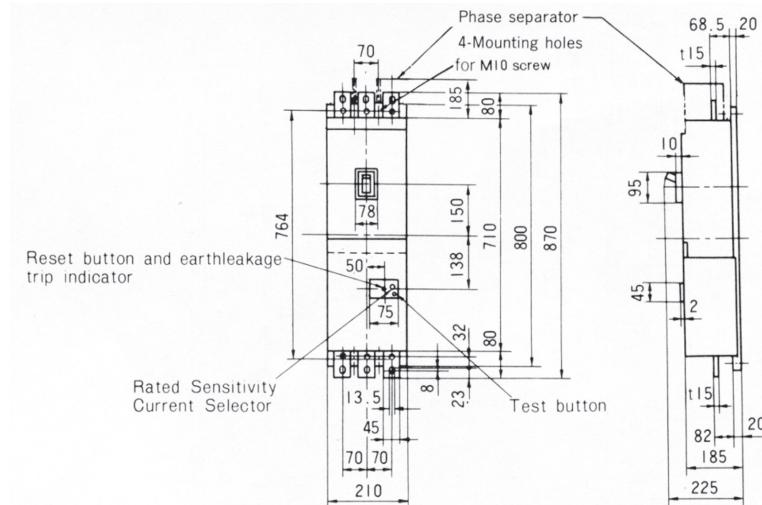


**Overcurrent Tripping
Characteristic Curve**

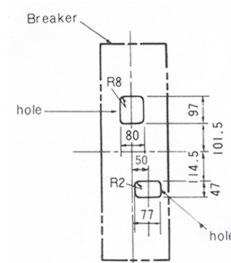
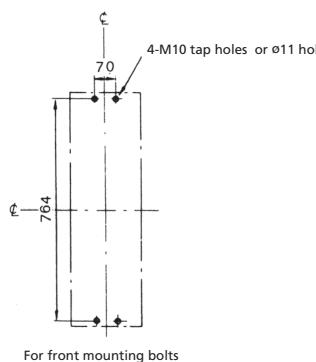


**Temperature
Compensation Curve**

■ Dimensions



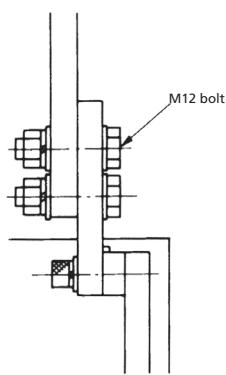
■ Drilling Plan



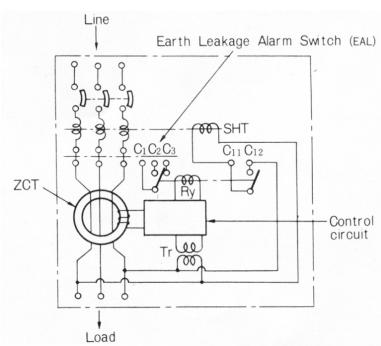
1mm clearance on each side of handle

Frontplate cutout

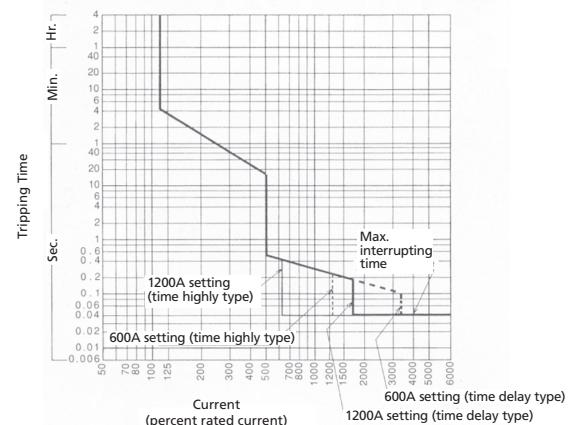
■ Terminal Arrangement



■ Internal Diagram Connection

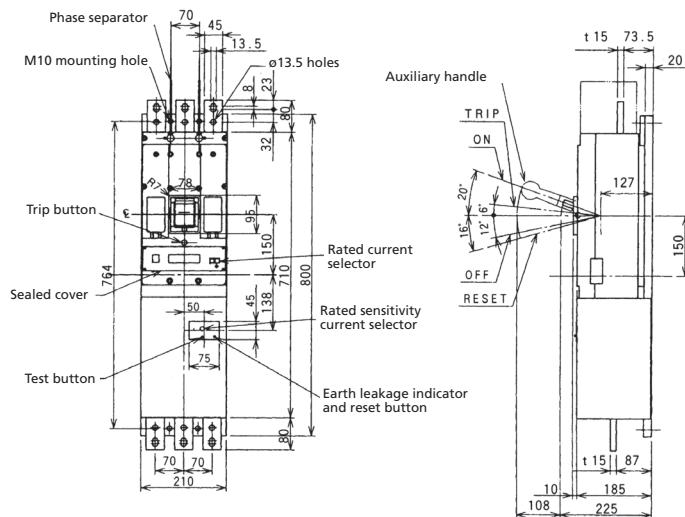


RF-1200CBN

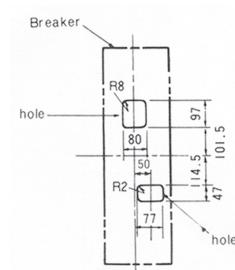
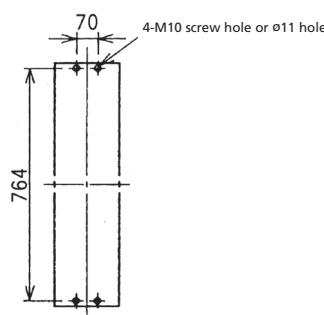


**Overcurrent Tripping
Characteristic Curve**

■ Dimensions



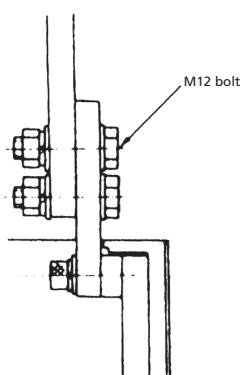
■ Drilling Plan



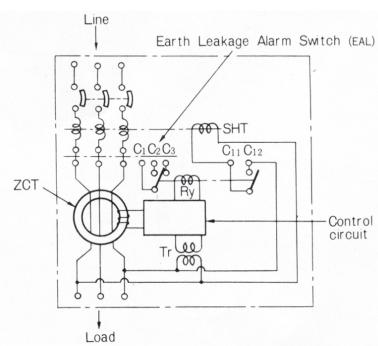
1mm clearance on each side of handle

Frontplate cutout

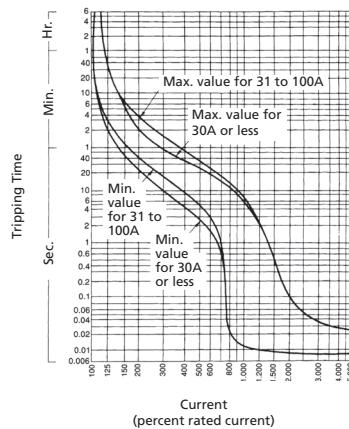
■ Terminal Arrangement



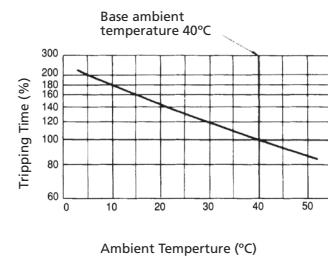
■ Internal Diagram Connection



RX100 4P

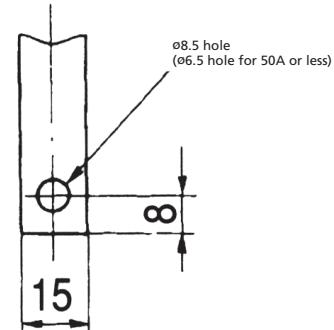
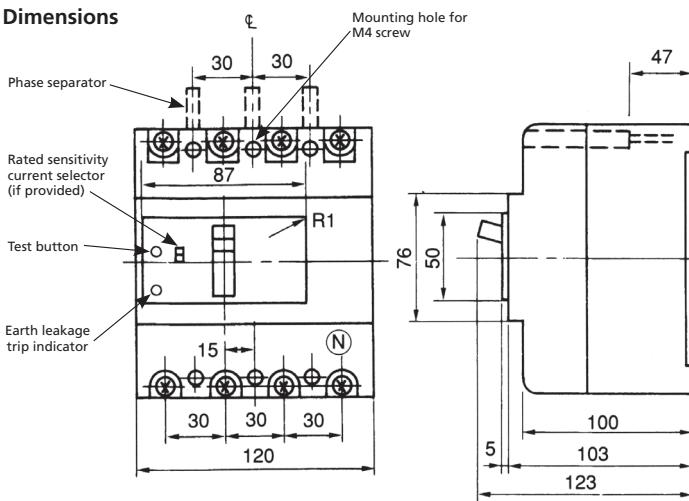


**Overcurrent Tripping
Characteristic Curve**



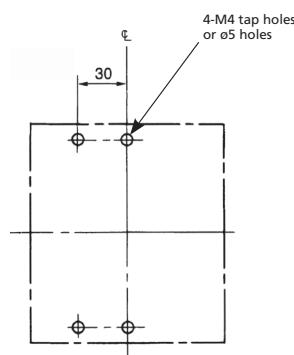
**Temperature
Compensation Curve**

■ Dimensions

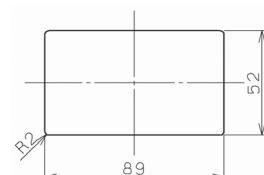


Direct-connected bus drilling

■ Drilling Plan

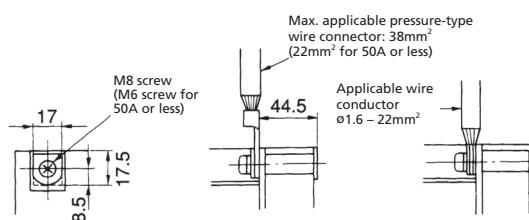


For front mounting bolts

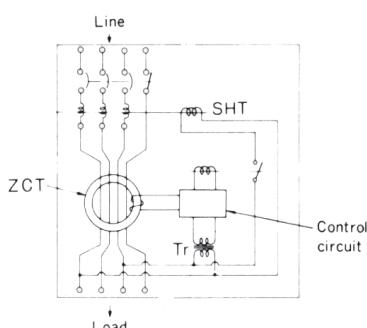


Center of handle

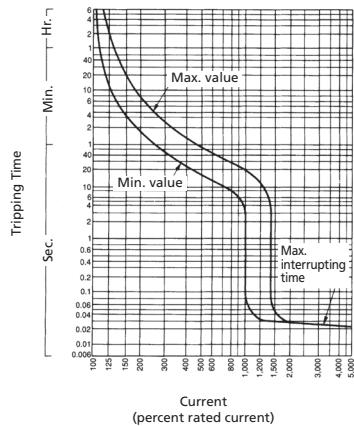
■ Terminal Arrangement



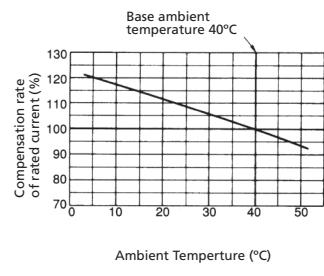
■ Internal Diagram Connection



RG-225BH 4P RG-225BN 4P

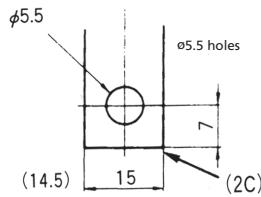
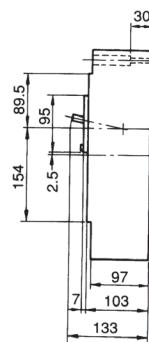
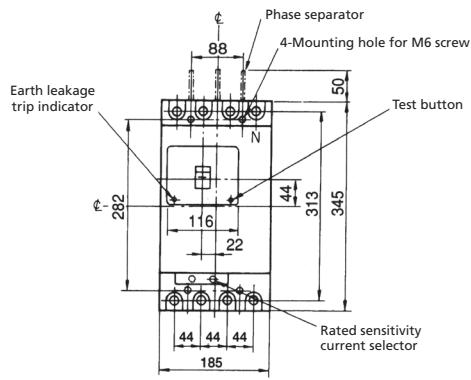


**Overcurrent Tripping
Characteristic Curve**



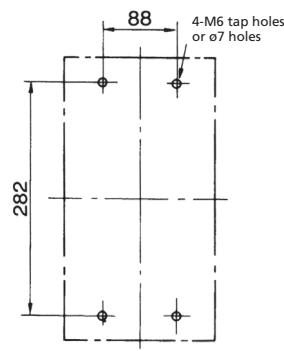
**Temperature
Compensation Curve**

■ Dimensions

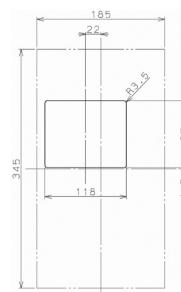


Direct-connected bus drilling

■ Drilling Plan



For front mounting bolts

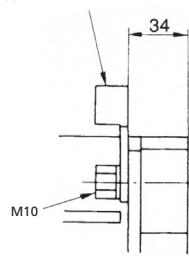


1mm clearance on each side of handle

Frontplate cutout

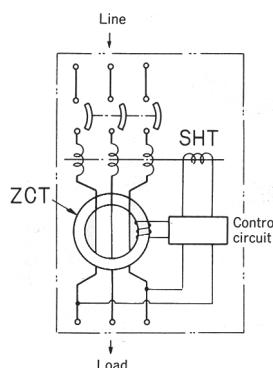
■ Terminal Arrangement

Max. applicable
pressure-type
wire connector:
100mm²



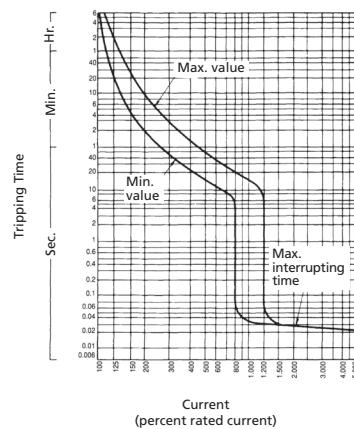
Bus or pressure-type wire connector connection

■ Internal Diagram Connection

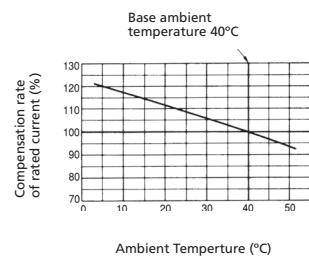


RG-400BN 4P

RG-400BH 4P

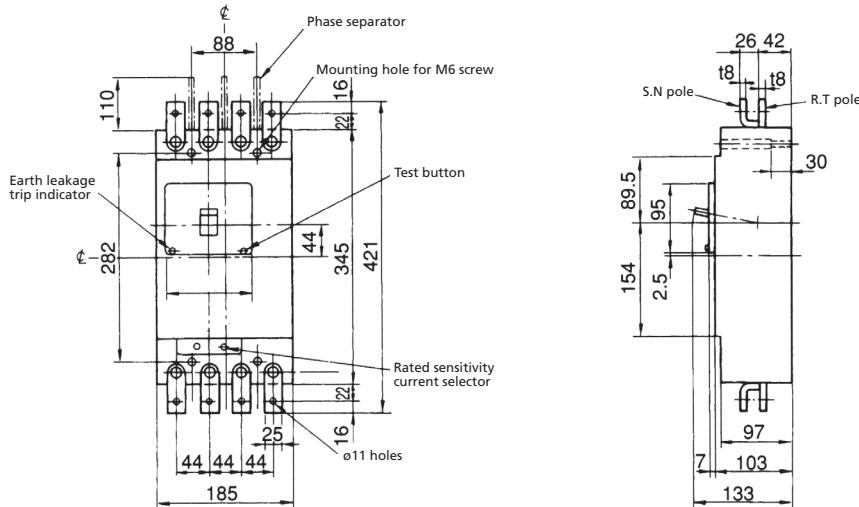


Overcurrent Tripping Characteristic Curve

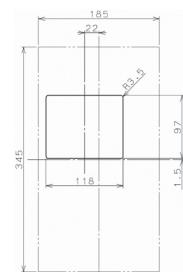
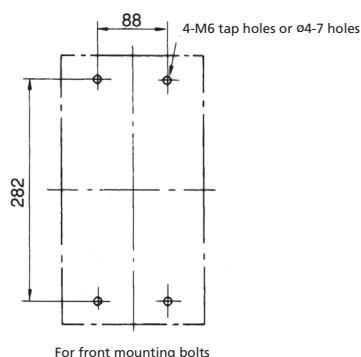


Temperature Compensation Curve

■ Dimensions



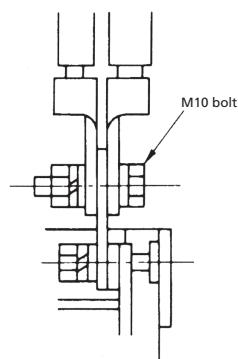
■ Drilling Plan



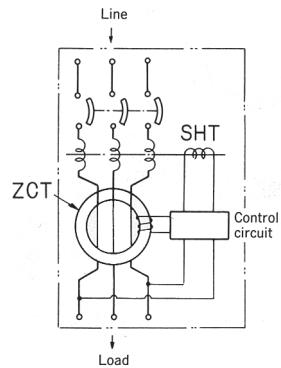
1mm clearance on each side of handle

Frontplate cutout

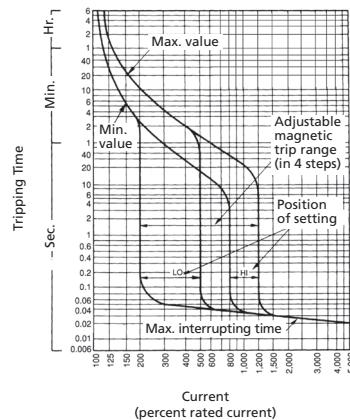
■ Terminal Arrangement



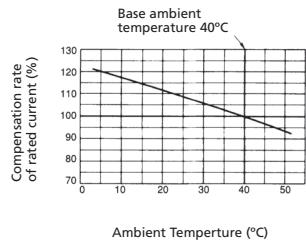
■ Internal Diagram Connection



RF-600FN 4P

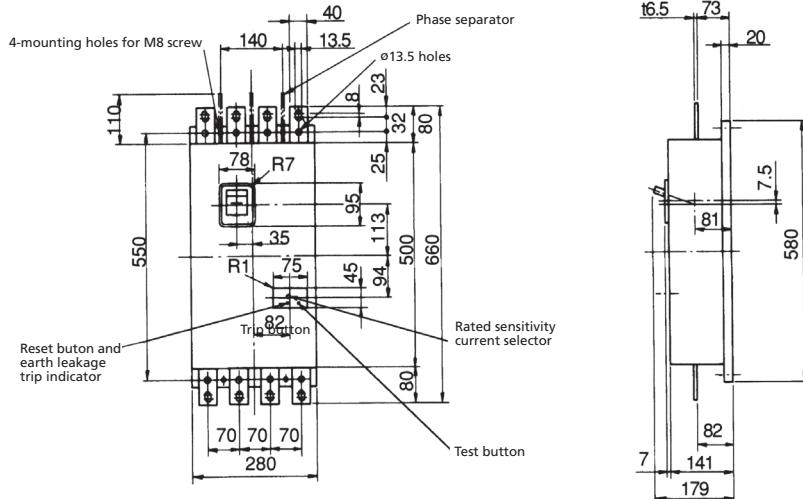


Overcurrent Tripping Characteristic Curve

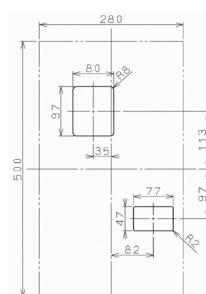
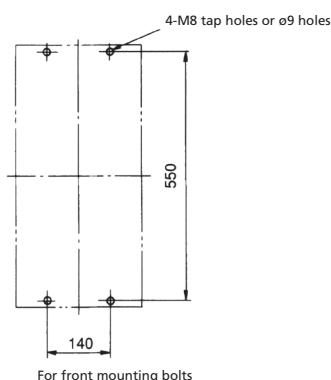


Temperature Compensation Curve

■ Dimensions



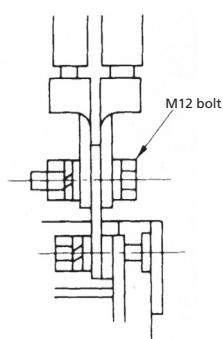
■ Drilling Plan



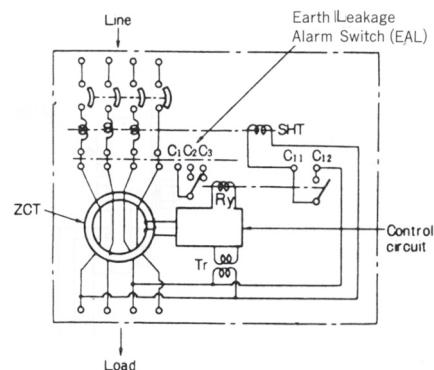
1mm clearance on each side of handle

Frontplate cutout

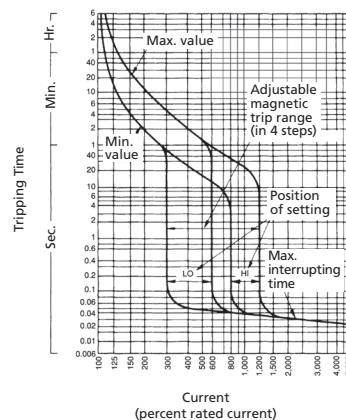
■ Terminal Arrangement



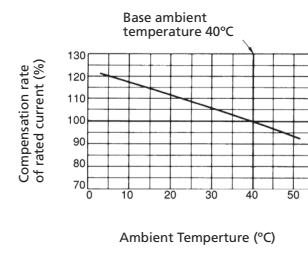
■ Internal Diagram Connection



RF-800KN 4P

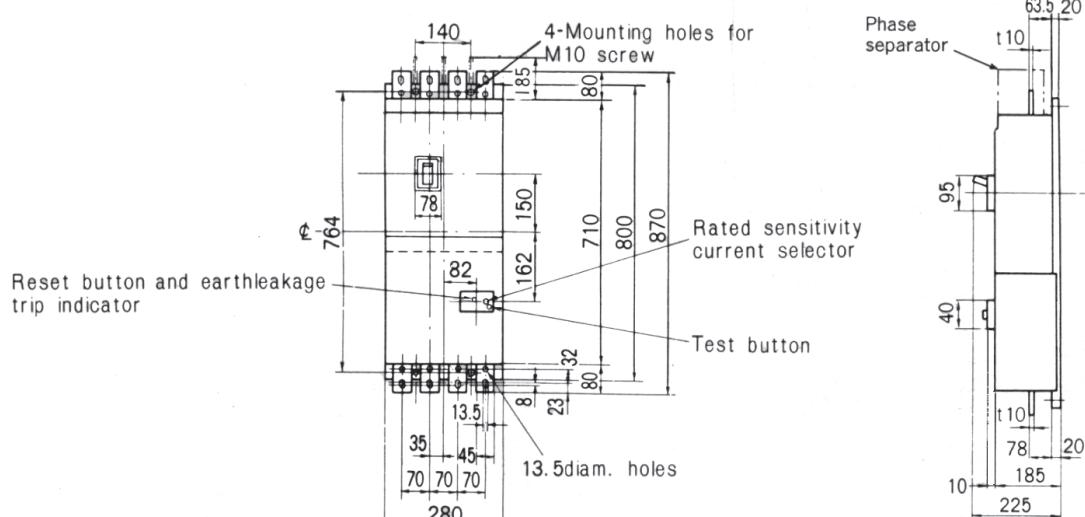


**Overcurrent Tripping
Characteristic Curve**

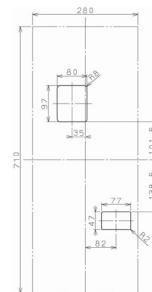
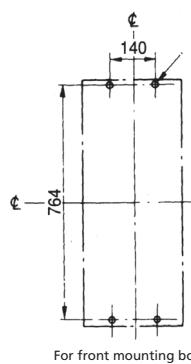


**Temperature
Compensation Curve**

■ Dimensions

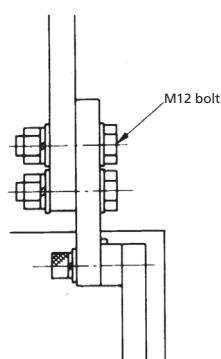


■ Drilling Plan

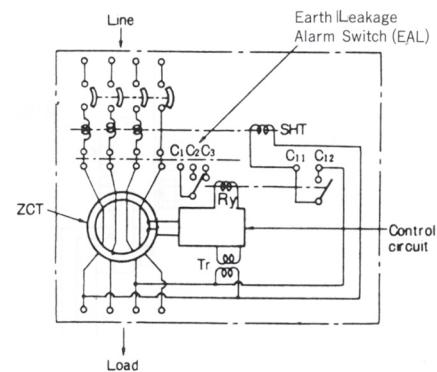


1mm clearance on each side of handle
Frontplate cutout

■ Terminal Arrangement

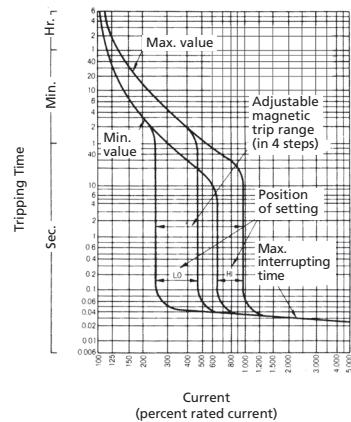


■ Internal Diagram Connection

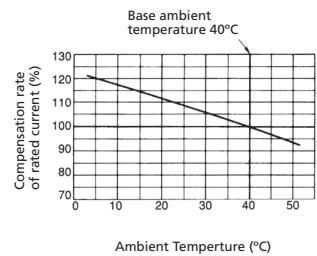


RF-1000KN 4P

RF-1200KN 4P

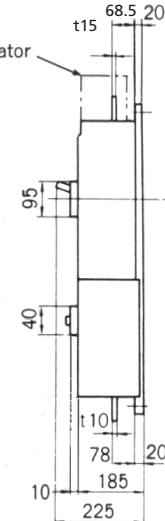
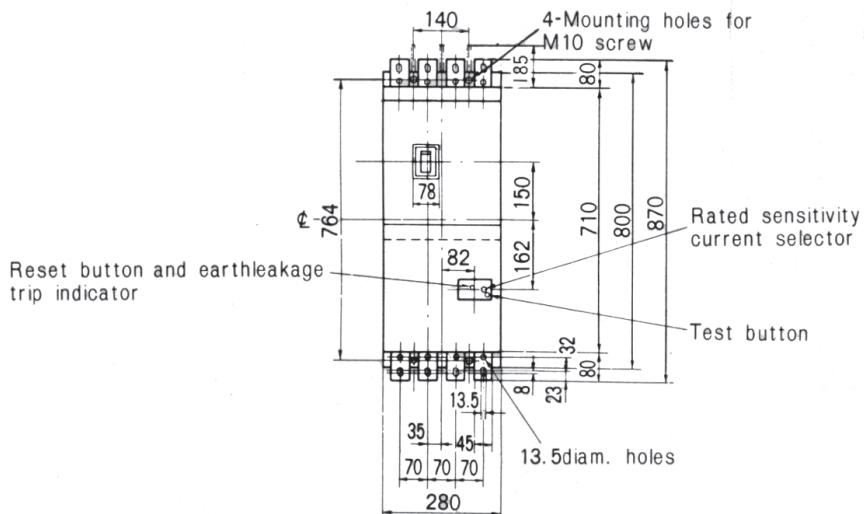


Overcurrent Tripping Characteristic Curve

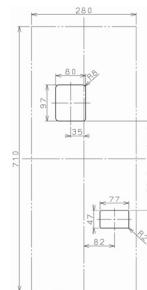
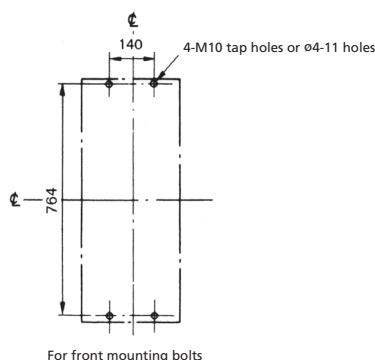


Temperature Compensation Curve

■ Dimensions

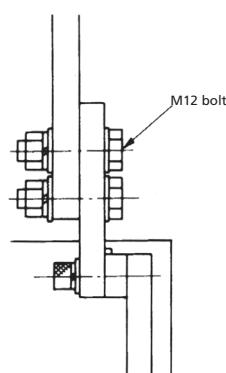


■ Drilling Plan

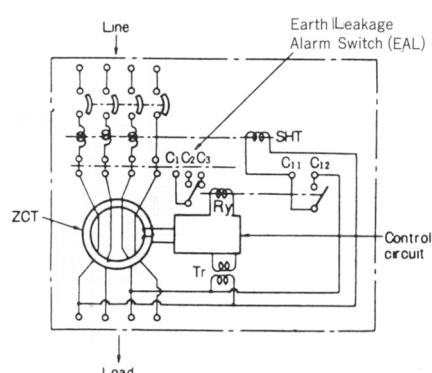


1mm clearance on each side of handle

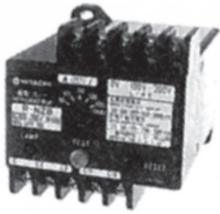
■ Terminal Arrangement



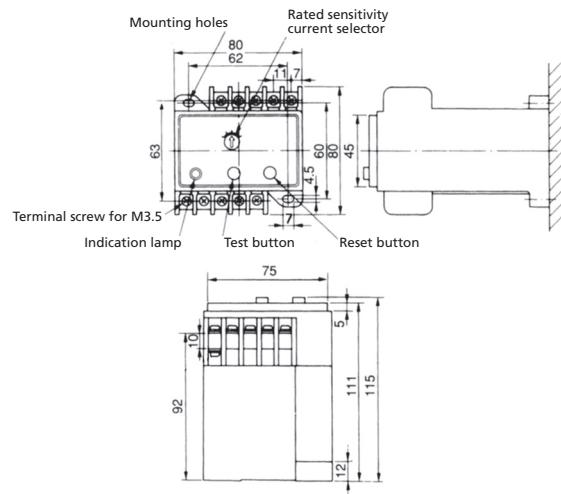
■ Internal Diagram Connection



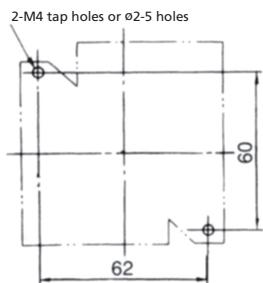
R-NZB



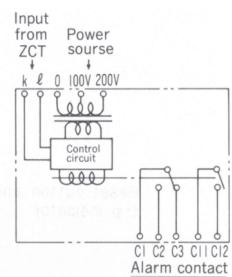
■ Dimensions



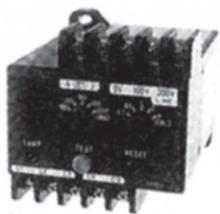
■ Drilling Plan



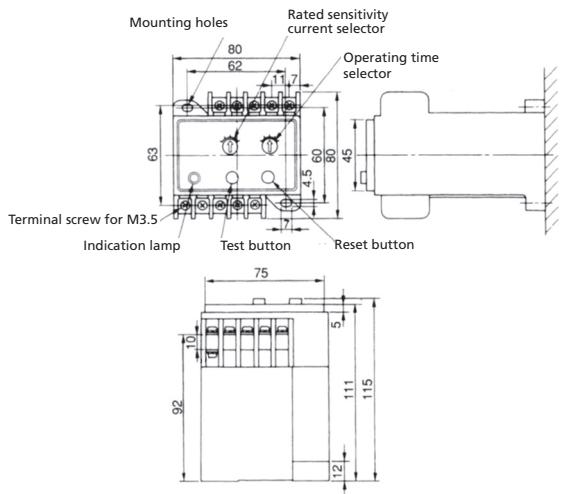
■ Internal Diagram Connection



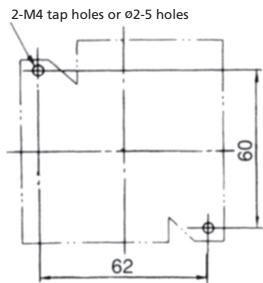
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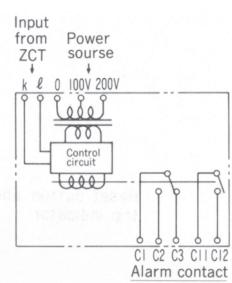
■ Dimensions



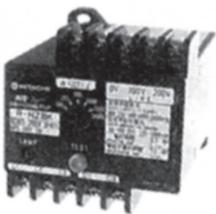
■ Drilling Plan



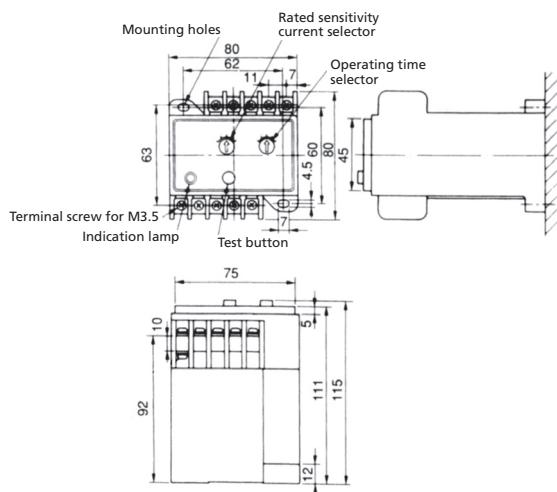
■ Internal Diagram Connection



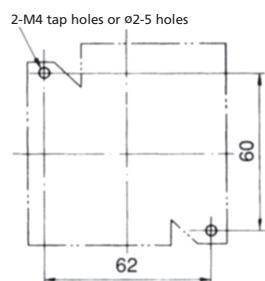
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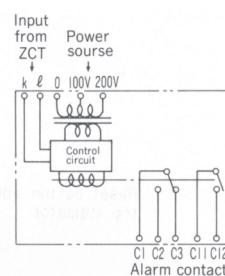
Dimensions



Drilling Plan



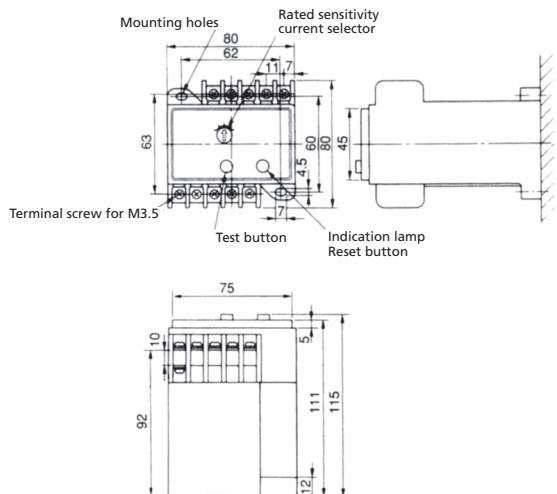
Internal Diagram Connection



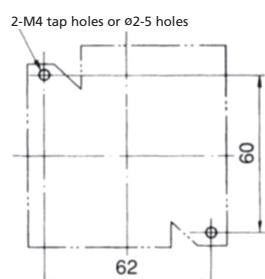
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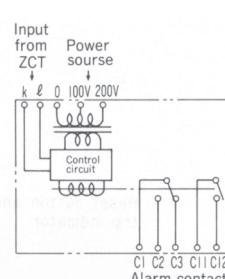
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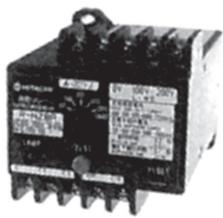
Drilling Plan



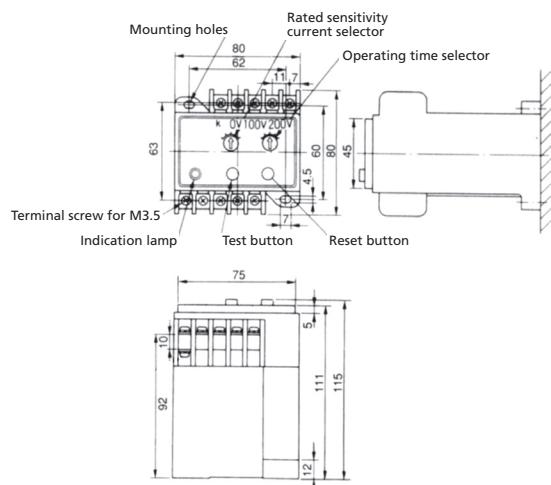
Internal Diagram Connection



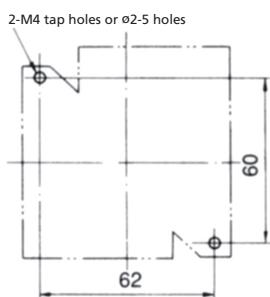
R-NZBR



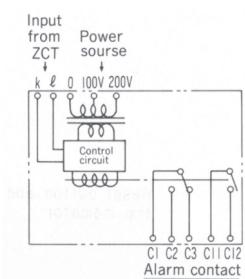
■ Dimensions



■ Drilling Plan



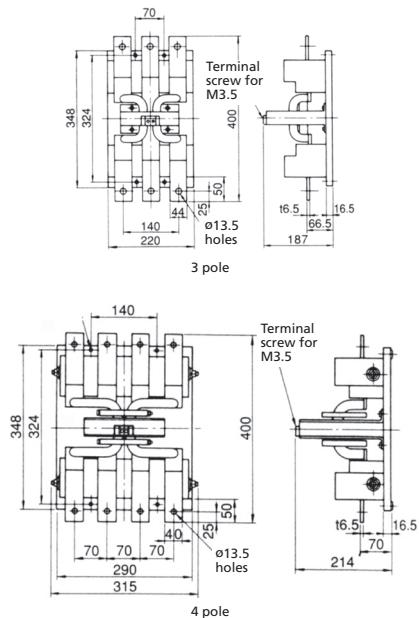
■ Internal Diagram Connection



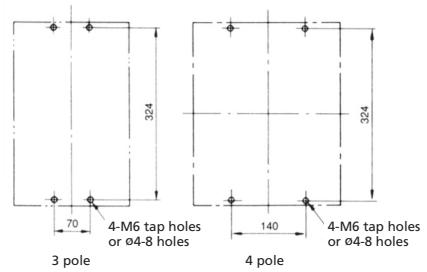
Z-400B



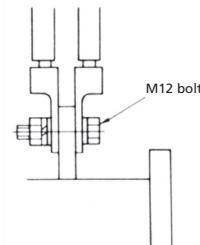
■ Dimensions



■ Drilling Plan



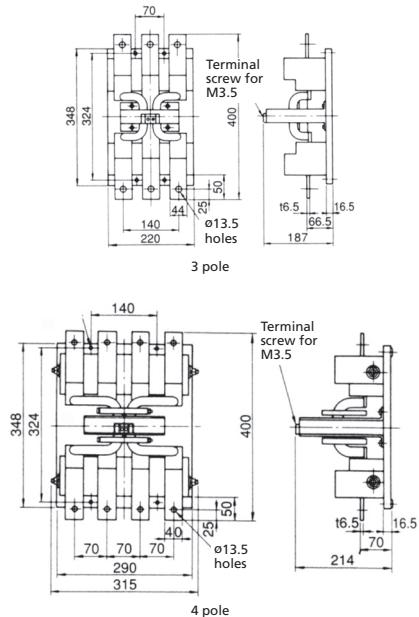
■ Terminal Arrangement



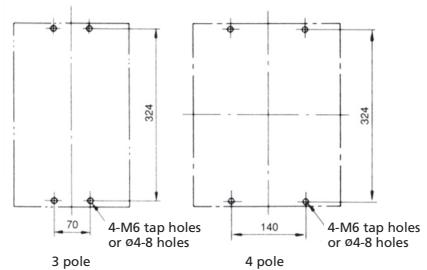
Z-600B



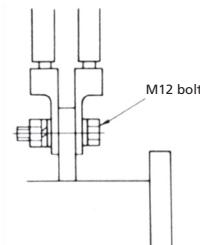
■ Dimensions



■ Drilling Plan



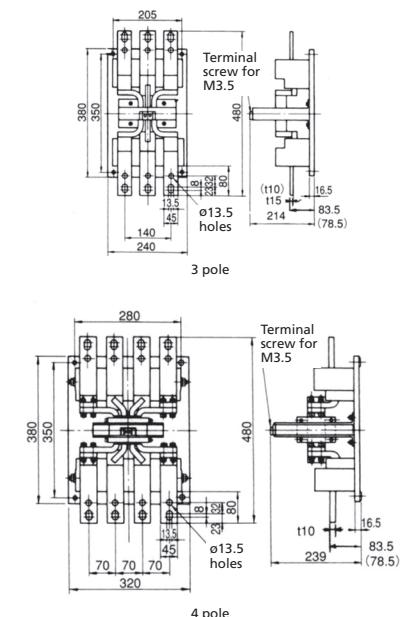
■ Terminal Arrangement



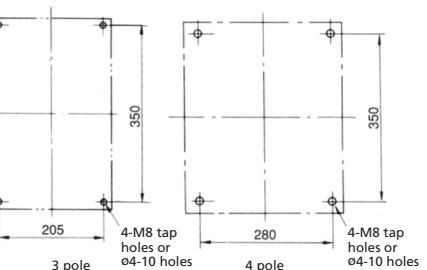
Z-800B



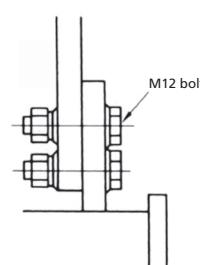
■ Dimensions



■ Drilling Plan



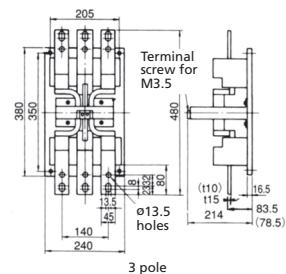
■ Terminal Arrangement



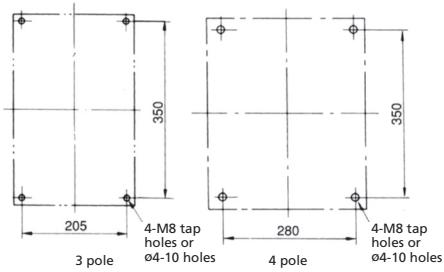
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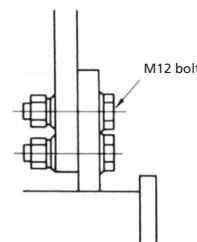
Dimensions



Drilling Plan



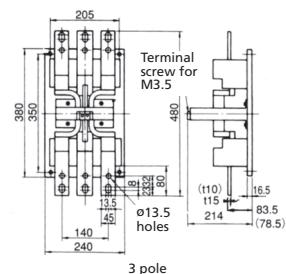
Terminal Arrangement



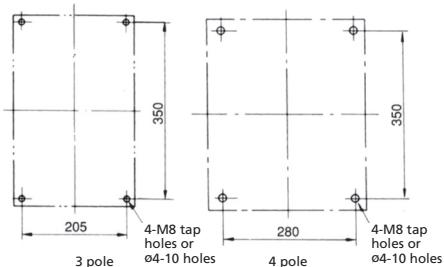
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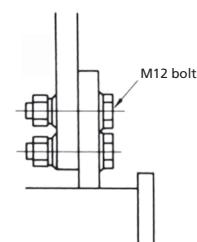
Dimensions



Drilling Plan



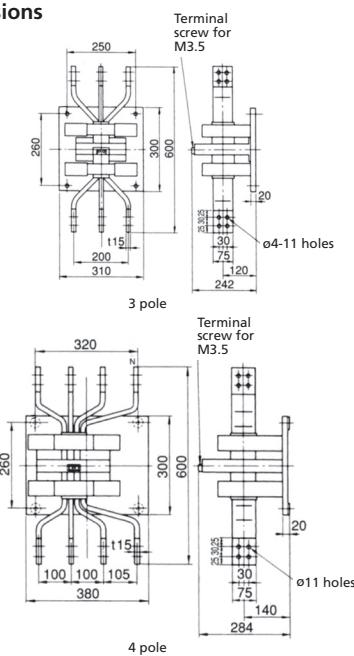
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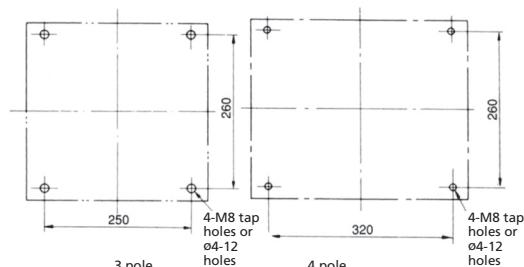
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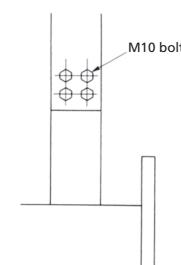
Dimensions



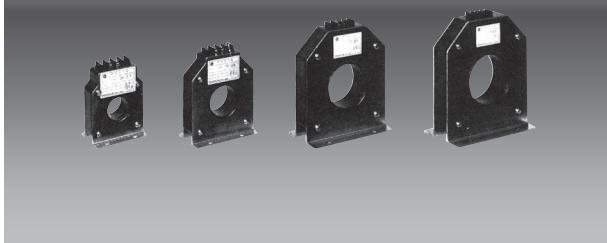
Drilling Plan



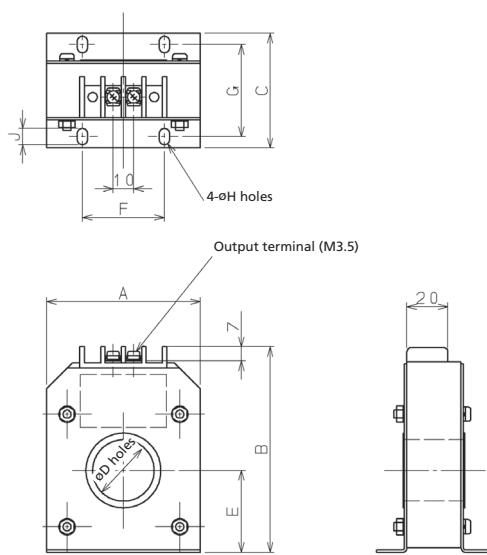
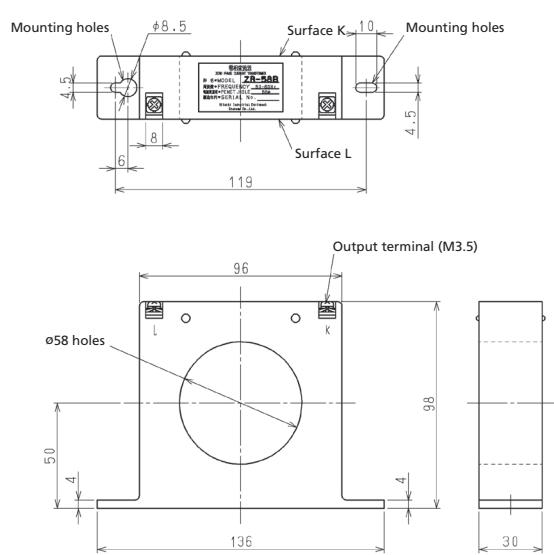
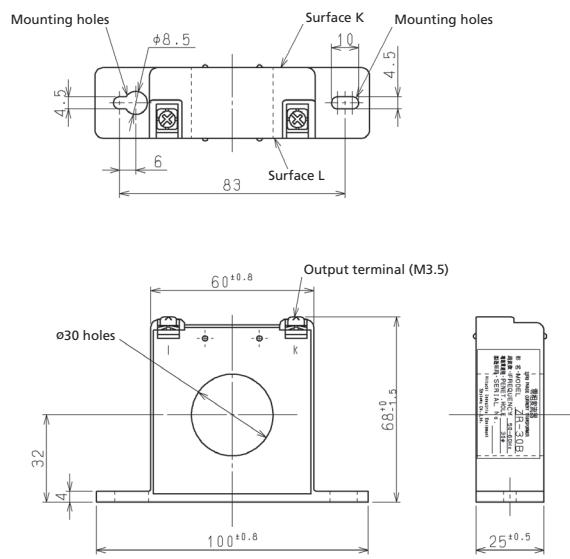
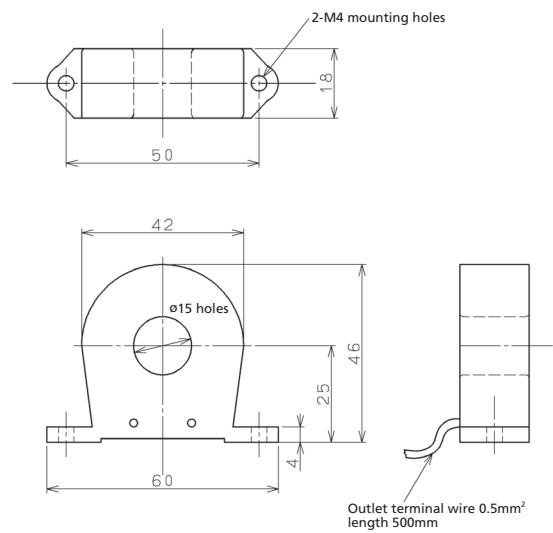
Terminal Arrangement



ZR-15 — 120

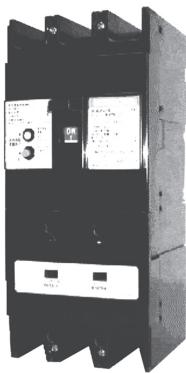


■ Dimensions

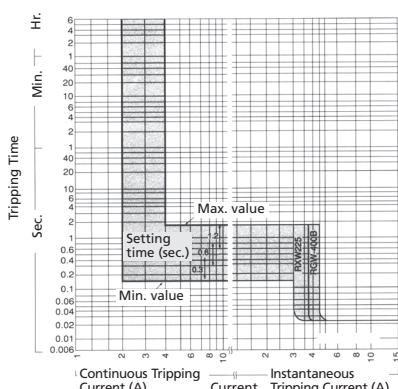


Type	A	B	C	D	E	F×G	H	J	(kg)
ZR-65	145	170	79	Ø65	75	80×60	Ø6	6	1.6
ZR-80	172	198	89	Ø80	90	100×65	Ø6	6	2.0
ZR-100	185	222	90	Ø100	100	110×65	Ø8	8	2.5
ZR-120	226	264	95	Ø120	120	140×70	Ø9.5	9.5	3.0

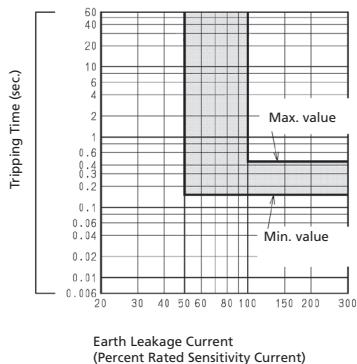
EARTH LEAKAGE BREAKERS FOR WELDERS



RXW225



**Overcurrent Tripping
Characteristic Curve**



**Earth Leakage Tripping
Characteristic Curve (at 0.3 sec.)**

■ Ratings and Specifications

Type	RXW225		RGW-400B
Number of Poles	2		
Rated Voltage (AC V)	200, 415		
Rated Sensitivity Current (mA)	100·200·500*		
Operating Time (sec.)	**0.3·0.6·1.2* (0.1·0.2)*		
Rated Current (kA)	225		400
Instantaneous Tripping Current (kA)	3 — 4		3.6 — 4.4
Interrupting Capacity (kA) sym.	AC200V	85	
	AC415V	42	
Continuous Current Protection	Setting Current (A)	3±1	
	Setting Time (sec.)	**0.3·0.6·1.2(3)*	
	Release Time (sec.)	0.1	
Terminal	For pressure-type wire connector terminal		Front bar terminal
Net Weight (kg)	7.4		8.3

Note:

* Interchangeable by manual operation.

** Earth leakage tripping time and continuous current tripping time are interlocked.

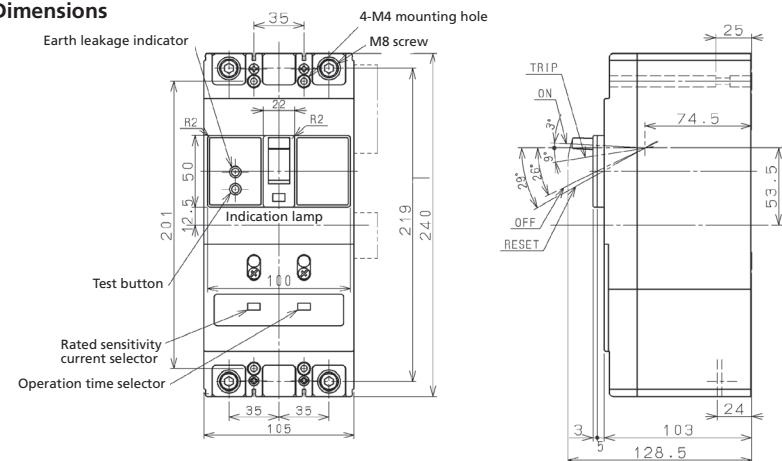
■ Selection

Specifications of Welder			Rated Current of ELCB (A)	Setting Current of Instantaneous Tripping Current (A)
Rated Voltage (AC V)	Rated Capacity (kVA)	Maximum Input (typ.)(kVA)		
200	35	111	225	1200
	50	106	225	1200
	75	219	400	2250
	100	330	400	3500
415	35	111	225	600
	50	106	225	600
	75	219	225	1200
	100	330	225	1700
	125	(395)	400	2250
	150	(475)	400	2500
	200	(630)	400	3500

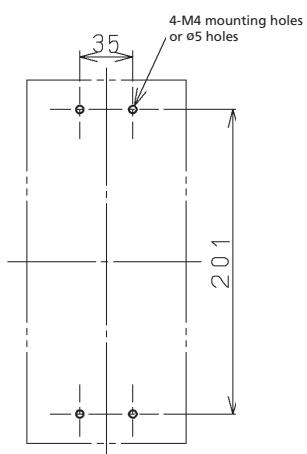
() : for reference value

RXW225

■ Dimensions

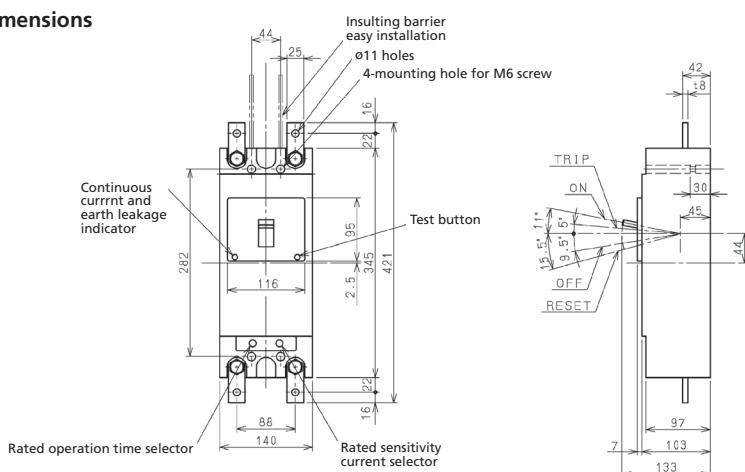


■ Drilling Plan

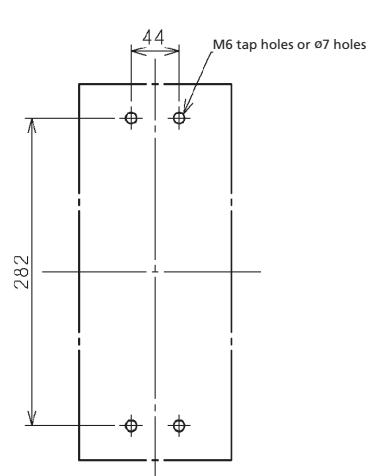


RGW-400B

■ Dimensions



■ Drilling Plan



MINIATURE CIRCUIT BREAKERS

MCB is applicable to electric circuit with rated voltage 230/400V, 240/415V AC, frequency 50/60Hz and rated current is up to 63A.

The product provides against overload and short circuit and equipments in household and commercial installations.

MCB is also used as non-frequent changeover of electric circuit.

BK63 series	BTK63 series	Alarm switch (for BK63)	Auxiliary switch
			

TRIPPING CHARACTERISTICS

■ Type B

Instant tripping characteristics : 3–5In
Application : computers and electronic equipments

■ Type C

Instant tripping characteristics : 5–10In
Application : general load such as bulbs , motors

■ Type D

Instant tripping characteristics : 10–20In
Application : high current surge device such as transformers, motors with heavy load

COLORED HANDLES

Easy to distinguish the rated current of the MCB by means of colored handle.

1A	Black
2A	Pink
3A	Pink
4A	Brown
6A	Green
10A	Red
16A	Grey
20A	Blue
25A	Yellow
32A	Purple
40A	Black
50A	White
63A	Copper-colored

APPROVAL

■ CE marking

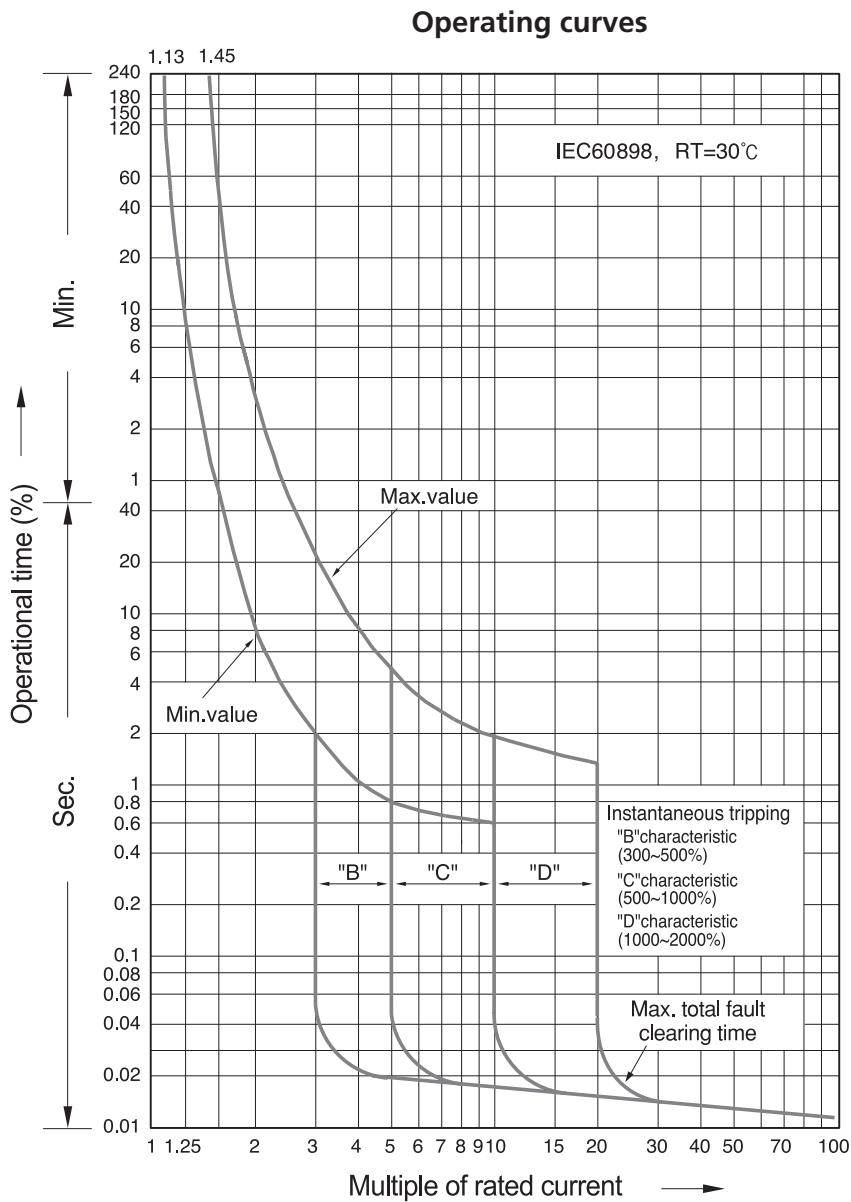
■ CB Certificate

SPECIFICATIONS

Type	BK63		BTK63			
Protection	Overload and short circuit					
Rated current	1, 2, 3, 4, 6, 10, 16, 20, 25, 32, 40, 50, 63A					
Characteristics	B, C, D curve					
Number of poles	1P, 1P+N, 2P, 3P, 3P+N, 4P					
Breaking capacity	1P 6kA at 230/400VAC	2, 3, 4P 6kA at 400VAC	1P 10kA at 240/415VAC	2, 3, 4P 10kA at 415VAC		
Standards	IEC60898					
Approval	SEMKO CB scheme		KEMA CB scheme			
Type of trip	Thermal magnetic release					
Electrical endurance	6,000 operations		8,000 operations			
Installation	35mm DIN rail					
Width	17.8mm per pole					
Type of terminal	Lug type (Cable up to 25mm ²)					
Alarm switch (Optional)	 <p>1changeover contact 6A at 230VAC, 3A at 415VAC(AX) 6A at 230VAC, 3A at 415VAC(AL) 2A at 48VAC, 1A at 125VAC Lug terminal Cable capacity 2.5mm² 9mm wide</p>		Not applicable			
Dimension	<p>(mm)</p>		<p>(mm)</p>			

CHARACTERISTIC CURVE AND COMPENSATION CURVE

■ Characteristic curve For type BK63, BTK63



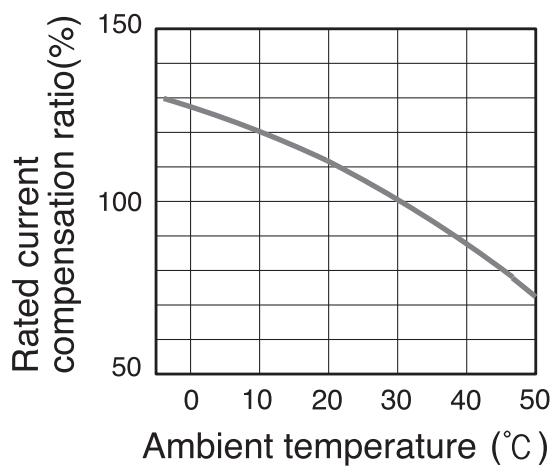
■ Compensation table

[Temperature compensation table](IEC60898-1)

In(A)	20°C	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C
1	1.05	1.02	1.0	0.98	0.95	0.93	0.9	0.89	0.85
2	2.03	2.04	2.0	1.96	1.92	1.88	1.84	1.8	1.74
3	3.18	3.09	3.0	2.91	2.82	2.7	2.61	2.49	2.37
4	4.24	4.12	4.0	3.88	3.75	3.64	3.52	3.36	3.24
6	5.24	6.12	6.0	5.88	5.76	5.64	5.52	5.4	5.3
10	10.6	10.3	10.0	9.7	9.3	9.0	8.6	8.2	7.8
16	16.8	16.5	16.0	15.5	15.2	14.7	14.2	13.8	13.3
20	21.0	20.6	20.0	19.4	19.0	18.4	17.8	17.4	16.8
25	26.2	25.7	25.0	24.2	23.7	23.0	22.2	21.5	20.7
32	33.5	32.9	32.0	31.4	30.4	29.8	28.4	28.2	27.5
40	42.0	41.2	40.0	38.8	38.0	36.8	35.6	34.4	33.2
50	52.5	51.5	50.0	48.5	47.4	45.5	44.0	42.5	40.5
63	66.2	64.9	63.0	61.0	58.0	56.7	54.2	51.7	49.2

[1:113% In 12:145% In according to IEC60898-1]

■ Compensation curve



RESIDUAL CURRENT CIRCUIT BREAKERS

RCCB is applicable to electric circuits with rated voltage 240/415VAC, frequency 50/60Hz and rated current up to 63A. The RCCBs provides indirect protection to the operator's body under such condition that the exposed live parts should be connected to a proper earthing pole. The RCCB also provides protection against the fire danger caused by earth fault current due to function failure of over current protection device.

RK63 series



FEATURES

- RCCBs with rated sensitivity up to 30mA can be used as supplementary protecting device in case other protecting device fails its protection against electric shock.
- RCCBs designed for household installation and other similar application, is for non-professional operation, and no maintenance is required.
- RCCBs provides no protection against electric shock resulted from direct contacts of both protected lines, or leakage current between these two lines.
- Particular devices such as surge protective devices, surge arresters etc are recommended to installation at upstream line to RCCBs as precaution against potential surge voltage and current occurring at its power input side.
- Satisfying conditions and applications as mentioned above, RCCBs with ON-OFF indicating device is considered suitable for isolation function.

APPROVAL

- CE marking
- CB Certificate

COLORED HANDLES

- Black only.

SPECIFICATIONS

Type	RK63
Protection	Ground fault
Rated current	25, 32, 40, 63A
Operating $I\Delta n$	30, 100, 300mA (non-adjustable)
Non operating $I\Delta n$	$0.5I\Delta n$
Number of poles	2, 4 pole
Rated voltage	240VAC (2P), 240/415VAC(4P)
Residual current off time	≤ 0.1 sec.
Standards	IEC61008
Approval	SEMKO CB scheme
Type of trip of grand fault	Electro-magnetic (No over current relay)
Conditional short circuit capacity (Inc)	6kA
Rated making capacity (Im)	500A for $I_n=25,32,40A$ 630A for $I_n=63A$
Electrical endurance	6,000 times
Installation	35mm DIN rail
Width	17.8mm per pole
Type of terminal	Lug type (Cable up to 35mm ²)
Dimension	(mm) <div style="display: flex; justify-content: space-around;"> </div>

MIN. SALES LOT

■ MCBs

Type	Min. sales lot (pcs.)
BK63 1P	120
BK63 2P	60
BK63 3P	40
BK63 4P	30

■ RCCBs

Type	Min. sales lot (pcs.)
RK63 2P	60
RK63 4P	30

AIR CIRCUIT BREAKERS

ORDERING ACB & Accessories

AKH	10		D	3	10		J
Type	Ampere frame		Frame size & phase array	No. of pole	Rated current (CT Spec.)		Connections
AKH	-	-	D 3P/4P Standard type RST (N)	3 3P (D)	00	Without OCR & CT	Draw-out type
AKS	06	630AF	W 4P Reverse phase type NRST	4 4P (D, W)	02	200A	J Manual connection
AKN	08	830AF			04	400A	
	10	1000AF			06	630A	A Automatic connection
	13	1250AF			04	400A	
	16	1600AF			06	630A	Fixed type
	20	2000AF			08	800A	H Horizontal type
					10	1000A	V Vertical type
					13	1250A	M Mixed type
					16	1600A	Line: Horizontal Load: Vertical
					20	2000A	N Mixed type Line: Vertical Load: Horizontal
							P Front type
					06	630A	
					08	800A	
					10	1000A	
					13	1250A	
					16	1600A	
					20	2000A	
					25	2500A	
					32	3200A	
					40	4000A	
					3	3P (E)	
					4	4P (E, X)	
					3	3P (F)	40 4000A
					4	4P (F, Y)	50 5000A
					3	3P (G)	40 4000A
					4	4P (G, Z)	50 5000A
					40	4000A	
					50	5000A	
					63	6300A	

M1	D1	D1	AX	NGO	U1	AL
Motor rated voltage		Shunt coil rated voltage		Trip relay		
MA Without Motor		D0 Without Shunt coil				
M1 AC/DC 100 – 130V		D1 AC/DC 100 – 130V				
M2 AC/DC 200 – 250V		D2 AC/DC 200 – 250V				
M3 DC 125V		D3 DC 125V				
M4 DC 24 – 30V		D4 DC 24 – 30V				
M5 DC 48 – 60V		D5 DC 48 – 60V				
M6 AC 380 – 415V		D6 AC 380 – 480V				
M7 AC 440 – 480V		D7 AC 48V				
M8 AC 48V						
Closing coil rated voltage		Closing coil rated voltage		UVT coil rated voltage		
D0 Without Closing coil		AX Standard OFF-Charge 3a3b		U0 Without UVT coil		
D1 AC/DC 100 – 130V		AC Standard ON-Charge 3a3b		U1 AC/DC 100 – 130V		
D2 AC/DC 200 – 250V		BX Standard OFF-Charge 5a5b		U2 AC/DC 200 – 250V		
D3 DC 125V		BC Standard ON-Charge 5a5b		U3 DC 125V		
D4 DC 24 – 30V		HX High capacity OFF-Charge 5a5b		U4 DC 24 – 30V		
D5 DC 48 – 60V		HC High capacity ON-Charge 5a5b		U5 DC 48 – 60V		
D6 AC 380 – 480V		CC Standard ON-Charge 6a6b		U6 AC 380 – 480V		
D7 AC 48V		JC High capacity ON-Charge 6a6b		U7 AC 48V		
*UVT Delay module is available over AC/DC 48V						

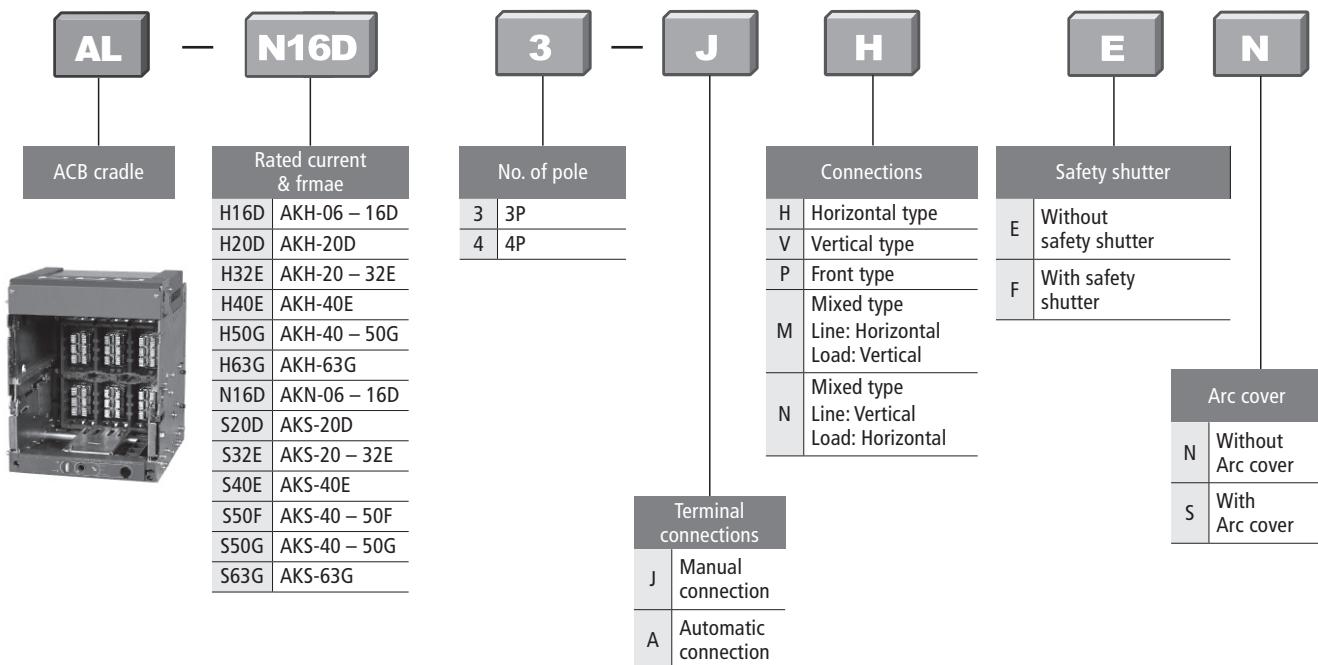
Accessories		
AL	AL1 + MRB	Trip alarm contact 1a + Manual reset button
A2	AL1 + AL2 + MRB	Trip alarm contact 2a + Manual reset button
A3	AL1 + MRB + RES (AC/DC 100 – 130V)	Trip alarm contact 1a + Manual reset button + Remote reset switch
A4	AL1 + MRB + RES (AC/DC 200 – 250V)	Trip alarm contact 1a + Manual reset button + Remote reset switch
A5	AL1 + MRB + Auto reset	AL + Auto reset type
A6	AL1 + AL2 + MRB + Auto reset	A2+ Auto reset type
A7	AL1 + MRB + RES (AC/DC 100 – 130V) + Auto reset	A3 + Auto reset type
A8	AL1 + MRB + RES (AC/DC 200 – 250V) + Auto reset	A4 + Auto reset type
C	C	Counter
S	CS2	Charge switch communication
B	B	ON/OFF button lock
M	MI	Mechanical Interlock
D	DI or MOC	Door Interlock or Mechanical Operated Cell Switch
K	K1	Key Lock
K2	K2	Key Interlock set
K3	K3	Key Lock double
R	RCS	Ready to close switch
T	TM	Temperature Alarm
H 1)	SHT2	Double Shut Coil

Note) 1. UVT and SHT2 are alternative.

2. Other accessories should be ordered separately.

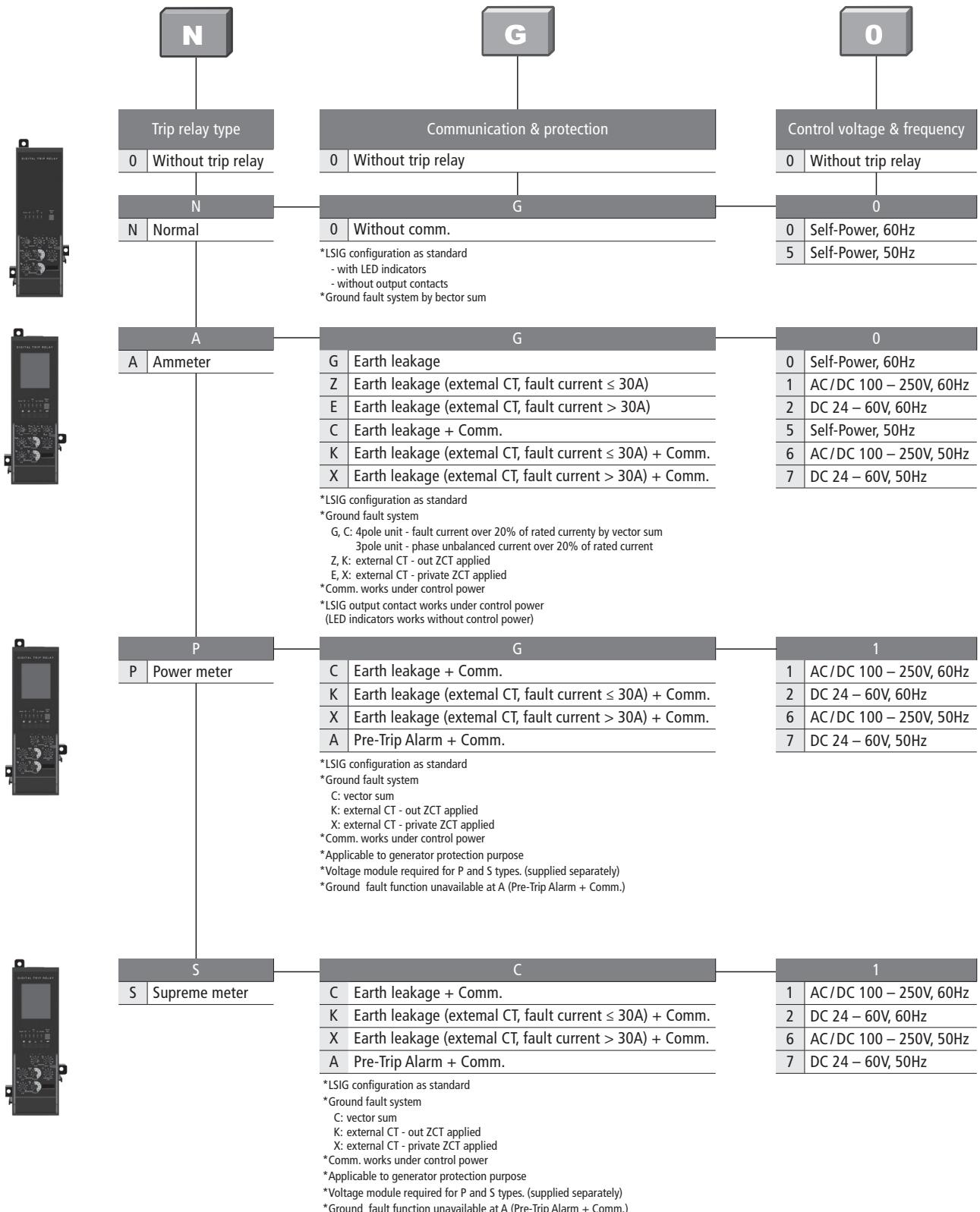
ORDERING

Cradle



ORDERING

Trip relay



**AKH
series**


Type			AKH-06D	AKH-08D	AKH-10D	AKH-13D	AKH-16D	AKH-20D
Ampere frame	(AF)		630	800	1000	1250	1600	2000
Rated current (A)	(in max)	at 40°C	200	400				
			400	630	1000	1250	1600	2000
Setting current (A)*	Control trip relay (... x in max)		(0.4 – 1.0) x in max					
Rated current of neutral pole (A)			400	400				
			630	630	1000	1250	1600	2000
				800				
Rated insulation voltage (V)	(Ui)				1,000			
Rated operating voltage (V)	(Ue)				690			
Rated impulse withstand voltage (kV)	(Uimp)				12			
Frequency (Hz)					50/60			
Number of poles (P)					3, 4			
Rated breaking capacity (kA sym)		IEC 60947-2	220V/230V/380V/415V		85			
AC 50/60Hz	(Icu)	JISC 8201-2-1	460V/480V/500V		85			
			550V/600V/690V		65			
Rated service breaking capacity (kA)	(Ics)		...% x Icu		100%			
Rated making capacity (kA peak)		IEC 60947-2	220V/230V/380V/415V		187			
AC 50/60Hz	(Icm)	JISC 8201-2-1	460V/480V/500V		187			
			550V/600V/690V		143			
Rated shot-time			1 sec		65			
withstand current (kA)	(Icw)		2 sec		60			
			3 sec		50			
Operating time (ms)			Maximum total breaking time		40			
			Maximum closing time		80			
Life cycle (time)	Mechanical		Without maintenance		20,000			
			With maintenance		30,000			
	Electrical		Without maintenance		5,000			
			With maintenance		10,000			
Connections**	Draw-out / Fixed		Horizontal connection	●		-		
			Vertical connection	○		●		
			Front connection	○		-		
			Mixed connection	○		-		
Weight (kg)	Draw-out type	Main body	Motor charging type		63/74			
(3P/4P)		(With cradle)	Manual charging type		61/72			
		Cradle only			29/32			
	Fixed type		Motor charging type		34/44			
			Manual charging type		32/42			
External dimensions (mm)	Draw-out type	3P			430 x 334 x 375			
(H x W x D)		4P			430 x 419 x 375			
	Fixed type	3P			300 x 300 x 295			
		4P			300 x 385 x 295			
Trip relay					N, A, P, S type			
Certificate & Approval					KEMA			

*Refer to trip relay specification. **●: Standard, ○: Option





AKH-06E	AKH-08E	AKH-10E	AKH-13E	AKH-16E	AKH-20E	AKH-25E	AKH-32E	AKH-40E
630	800	1000	1250	1600	2000	2500	3200	4000
630	800	1000	1250	1600	2000	2500	3200	4000
(0.4 – 1.0) x In max								
630	800	1000	1250	1600	2000	2500	3200	4000
1,000								
				690				
				12				
				50/60				
				3, 4				
				100				
				100				
				85				
				100%				
				220				
				220				
				187				
				85				
				75				
				65				
				40				
				80				
				15,000				
				20,000				
				5,000				
				10,000				
			●		○			
		○			●			
		○			-			
		○			-			
			87/103		104/147			
			85/101		102/145			
			44/55		58/70			
			44/55		63/100			
			42/53		61/98			
			430 x 412 x 375					
			430 x 527 x 375					
			300 x 378 x 295					
			300 x 493 x 295					
			N, A, P, S type					
			KEMA					

AKH-40G	AKH-50G	AKH-63G
4000	5000	6300
4000	5000	6300
(0.4 – 1.0) x In max		
4000	5000	6300
1,000		
	690	
	12	
	50/60	
	3, 4	
	150	
	150	
	100	
	100%	
	330	
	330	
	220	
	100	
	100	
	40	
	80	
	10,000	
	15,000	
	2,000	
	5,000	
	○	
	●	
	-	
	-	
181/223	186/230	
179/221	184/228	
97/117	102/124	
98/123	103/130	
96/121	101/128	
460 x 785 x 375		
460 x 1,015 x 375		
300 x 751 x 295		
300 x 981 x 295		
N, A, P, S type		
KEMA		

RATINGS

AKN·AKS series



Type			AKN-06D	AKN-08D	AKN-10D	AKN-13D	AKN-16D	AKS-20D
Ampere frame	(AF)		630	800	1000	1250	1600	2000
Rated current (A)	(in max)	at 40°C	200	400				
			400	630	1000	1250	1600	2000
Setting current (A)*	Control trip relay (... x in max)		(0.4 – 1.0) x in max					
Rated current of neutral pole (A)			400	400				
			630	630	1000	1250	1600	2000
				800				
Rated insulation voltage (V)	(Ui)				1,000			
Rated operating voltage (V)	(Ue)				690			
Rated impulse withstand voltage (kV)	(Uimp)				12			
Frequency (Hz)					50/60			
Number of poles (P)					3, 4			
Rated breaking capacity (kA sym)		IEC 60947-2	220V/230V/380V/415V		65		70	
AC 50/60Hz	(Icu)	JISC 8201-2-1	460V/480V/500V		65		70	
			550V/600V/690V		50		65	
Rated service breaking capacity (kA)	(Ics)		... % x Icu		100%		100%	
Rated making capacity (kA peak)		IEC 60947-2	220V/230V/380V/415V		143		154	
AC 50/60Hz	(Icm)	JISC 8201-2-1	460V/480V/500V		143		154	
			550V/600V/690V		105		143	
Rated shot-time			1 sec		50		65	
withstand current (kA)	(Icw)		2 sec		42		55	
			3 sec		36		50	
Operating time (ms)			Maximum total breaking time		40			
			Maximum closing time		80			
Life cycle (time)	Mechanical		Without maintenance		20,000			
			With maintenance		30,000			
	Electrical		Without maintenance		5,000			
			With maintenance		10,000			
Connections**	Draw-out / Fixed		Horizontal connection	●		-		
			Vertical connection	○		●		
			Front connection	○		-		
			Mixed connection	○		-		
Weight (kg)	Draw-out type	Main body	Motor charging type		63/74		70/85	
(3P/4P)		(With cradle)	Manual charging type		61/72		68/83	
		Cradle only			29/32		33/40	
	Fixed type		Motor charging type		34/44		38/47	
			Manual charging type		32/42		36/45	
External dimensions (mm)		Draw-out type	3P		430 x 334 x 375			
(H x W x D)			4P		430 x 419 x 375			
		Fixed type	3P		300 x 300 x 295			
			4P		300 x 385 x 295			
Trip relay					N, A, P type			
Certificate & Approval					KEMA			

*Refer to trip relay specification. **●: Standard, ○: Option



AKS-20E	AKS-25E	AKS-32E	AKS-40E
2000	2500	3200	4000
630, 800			
1000, 1250	2500	3200	4000
1600, 2000			
(0.4 – 1.0) x ln max			
630, 800			
1000, 1250	2500	3200	4000
1600, 2000			
1,000			
690			
12			
50/60			
3, 4			
85			
85			
85			
100%			
187			
187			
187			
85			
75			
65			
40			
80			
15,000			
20,000			
5,000			
10,000			
●	○		
○	●		
○	-		
○	-		
87/103	104/147		
85/101	102/145		
44/50	58/70		
44/55	63/100		
42/53	61/98		
430 x 412 x 375			
430 x 527 x 375			
300 x 378 x 295			
300 x 493 x 295			
N, A, P type			
KEMA			

AKS-50F	
4000	5000
4000	5000
(0.4 – 1.0) x ln max	
4000	5000
1,000	
690	
12	
50/60	
3, 4	
100	
100	
85	
100%	
220	
220	
187	
85	
75	
65	
40	
80	
10,000	
15,000	
2,000	
5,000	
○	
●	
-	
-	
145/173	
143/171	
78/90	
76/94	
74/92	
460 x 629 x 375	
460 x 799 x 375	
300 x 597 x 295	
300 x 767 x 295	
N, A, P type	
KEMA	

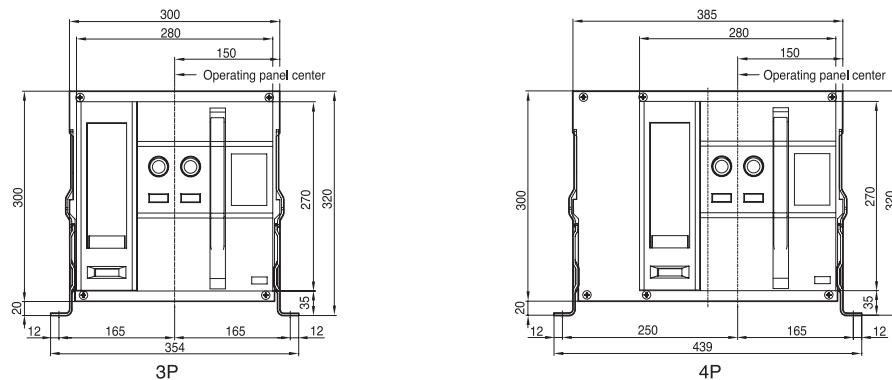
AKS-40G	AKS-50G	AKS-63G
4000	5000	6300
4000	5000	6300
(0.4 – 1.0) x ln max		
4000	5000	6300
1,000		
690		
12		
50/60		
3, 4		
120		
120		
100		
100%		
264		
264		
220		
100		
90		
85		
40		
80		
10,000		
15,000		
2,000		
5,000		
○		
●		
-		
-		
181/223	186/230	
179/221	184/228	
97/117	102/124	
98/123	103/130	
96/121	101/128	
460 x 785 x 375		
460 x 1,015 x 375		
300 x 751 x 295		
300 x 981 x 295		
N, A, P type		
KEMA		

DIMENSIONS

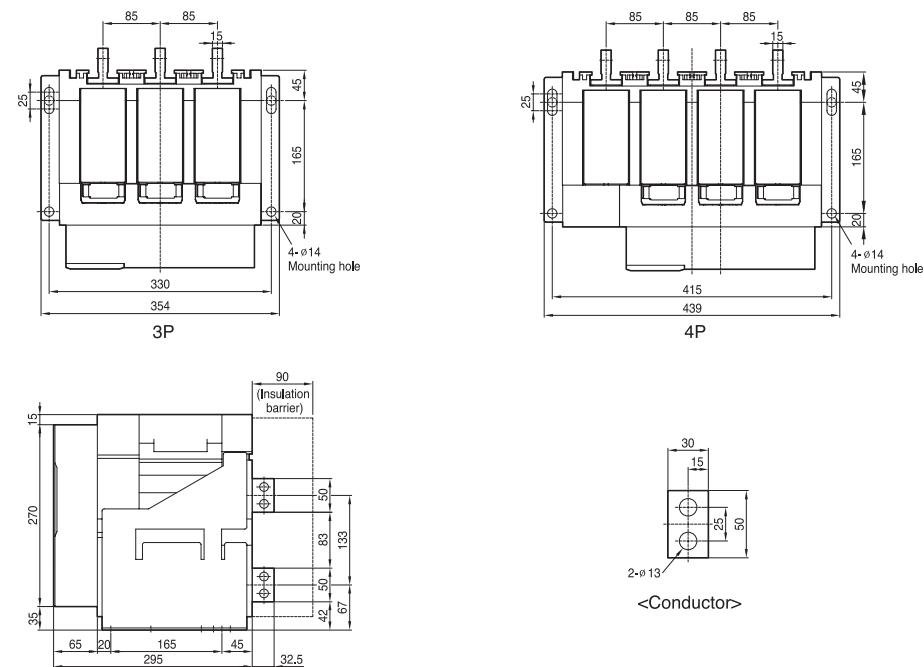
Fixed type 2000AF

630 – 1600A:
AKH / AKN / AKS-06 – 16D

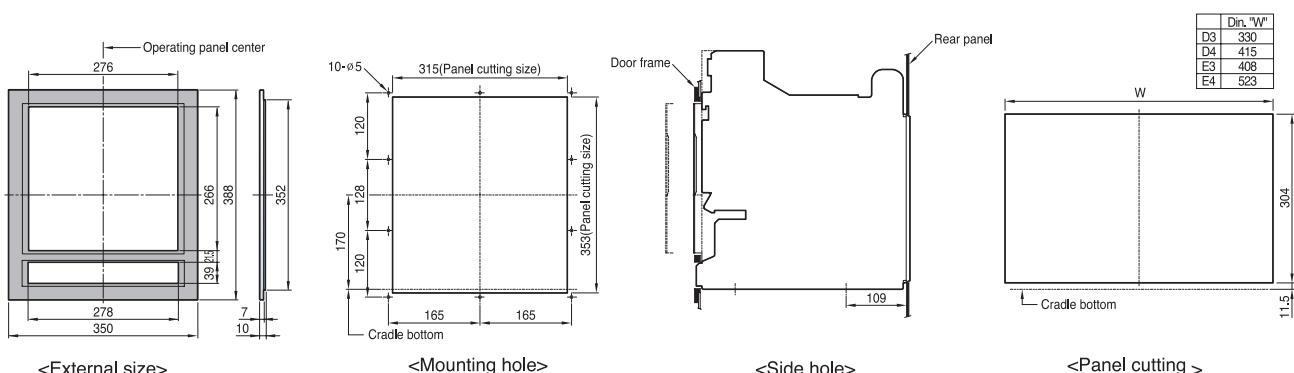
Front view



Vertical type

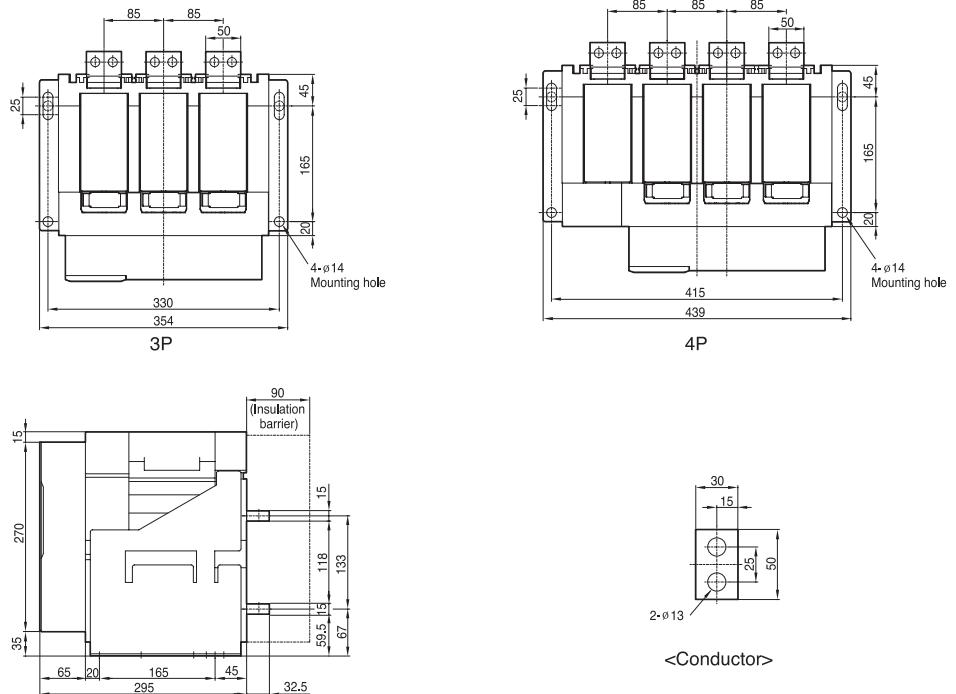


Door Frame: DF (AKH / AKN / AKS-D / E)

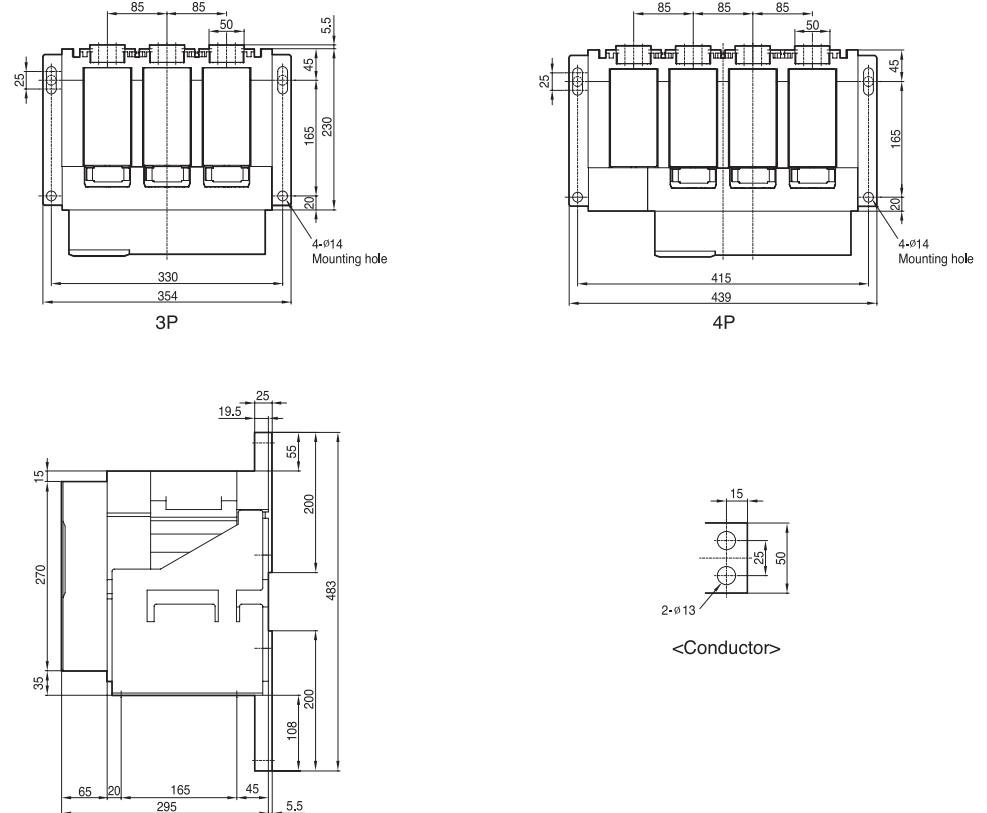


Note) The dimensions are for drawout type.

Horizontal type



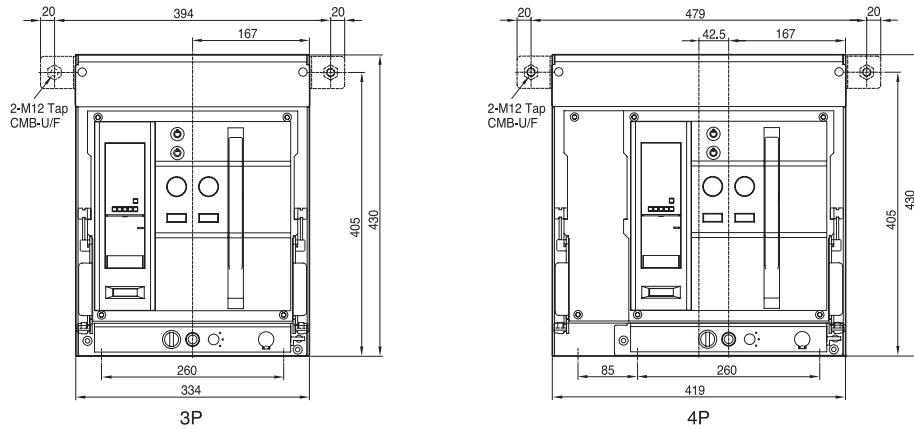
Front connection type



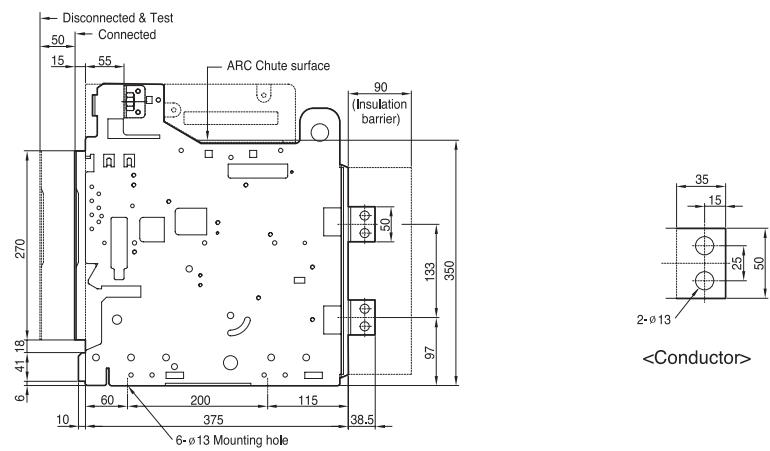
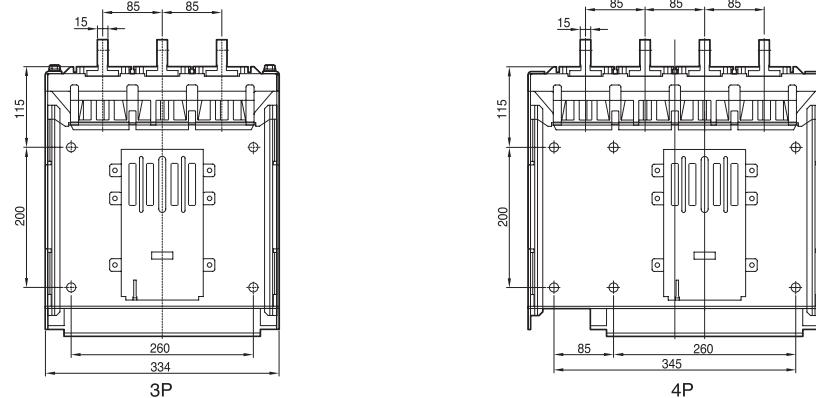
Draw-out type 2000AF

**630 – 1600A:
AKH/AKN/AKS-06 – 16D**

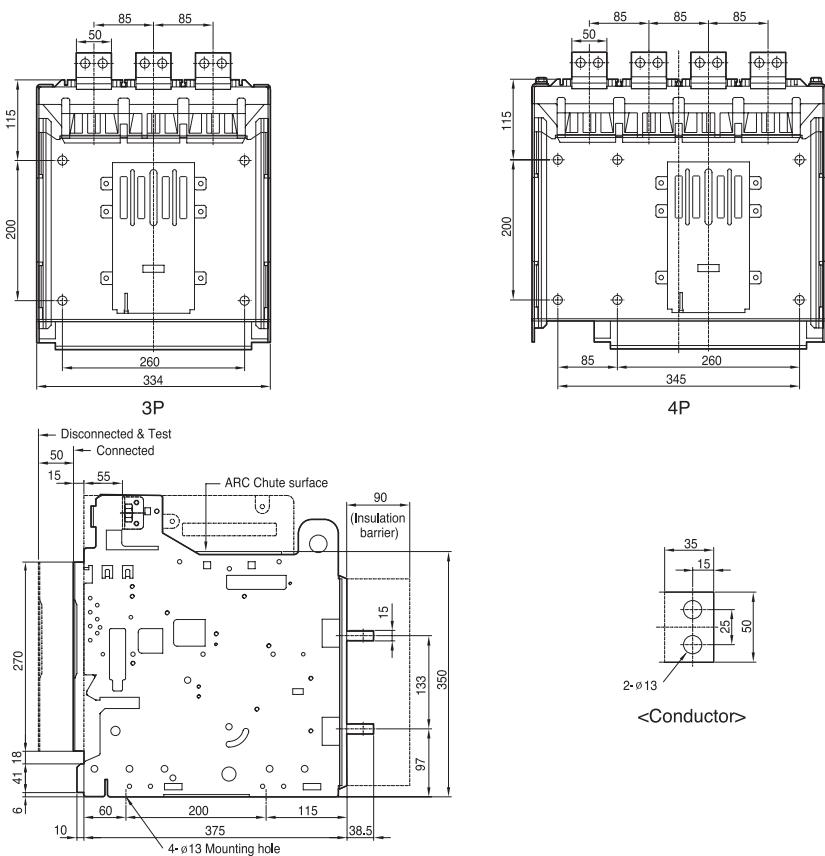
Front view



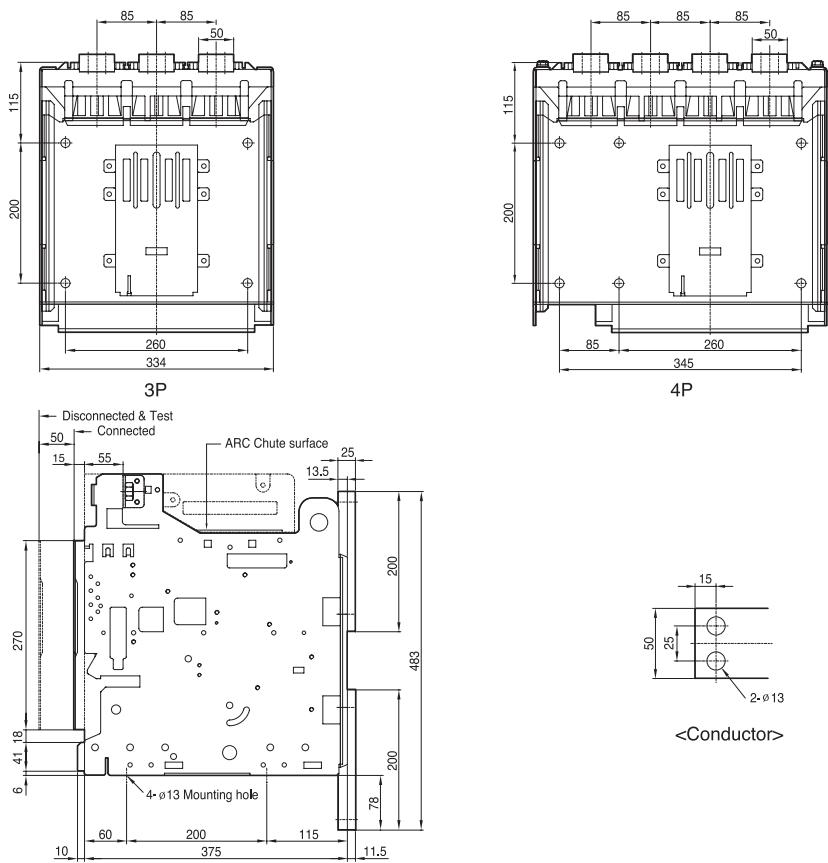
Vertical type



Horizontal type



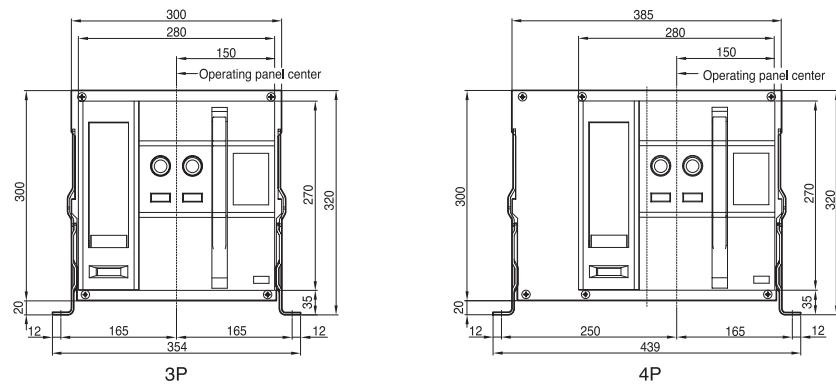
Front connection type



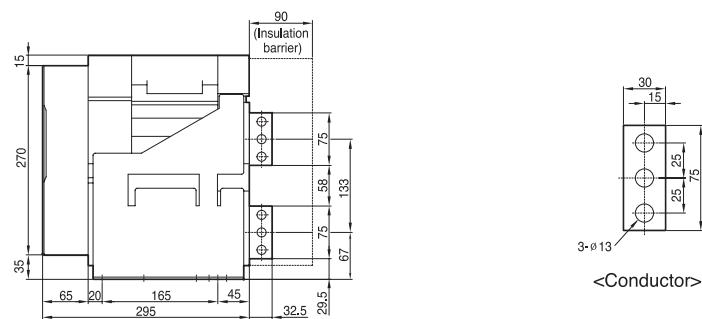
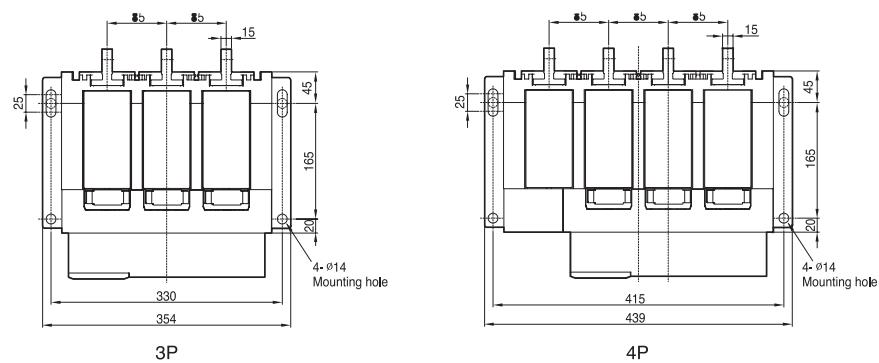
Fixed type 2000AF

2000A:
AKH/AKS-20D

Front view



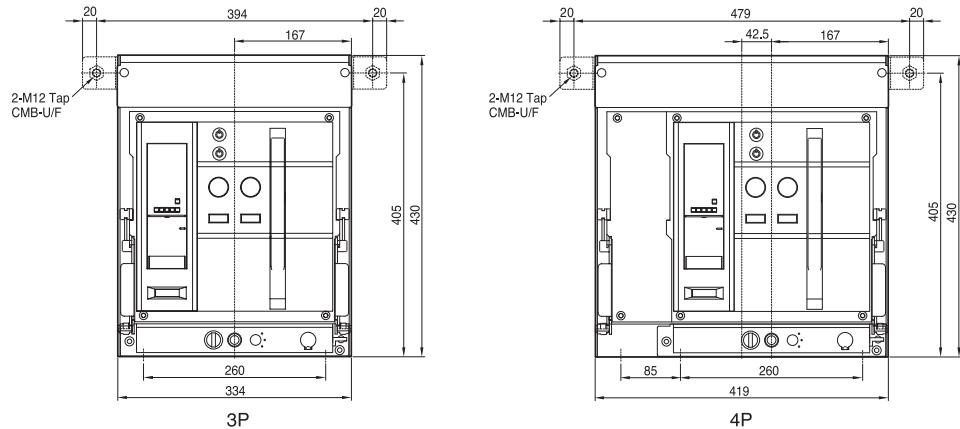
Vertical type



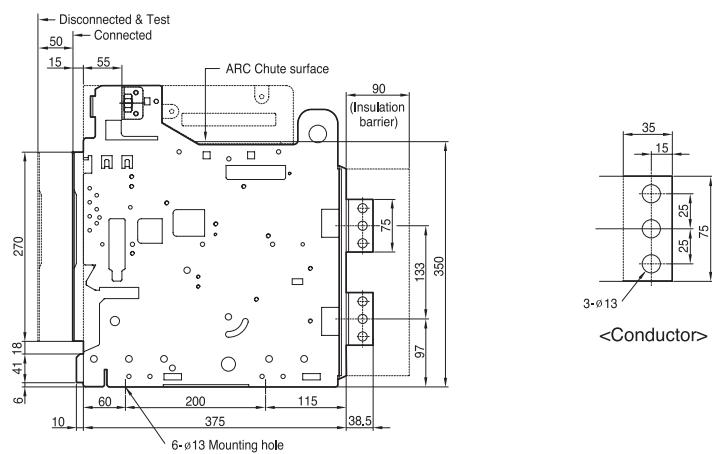
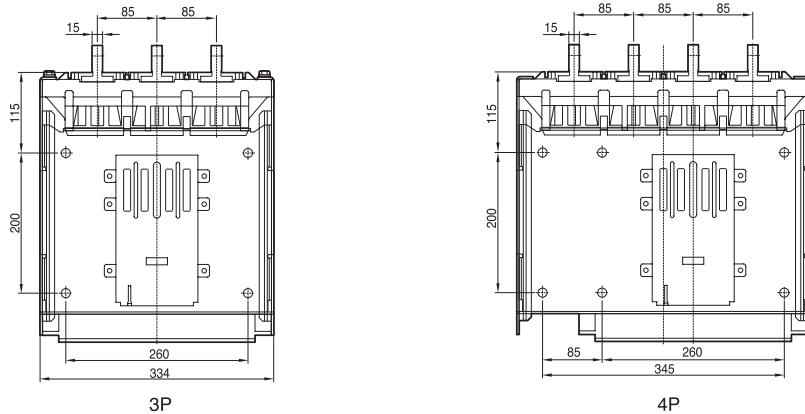
Draw-out type 2000AF

2000A:
AKH / AKS-20D

Front view



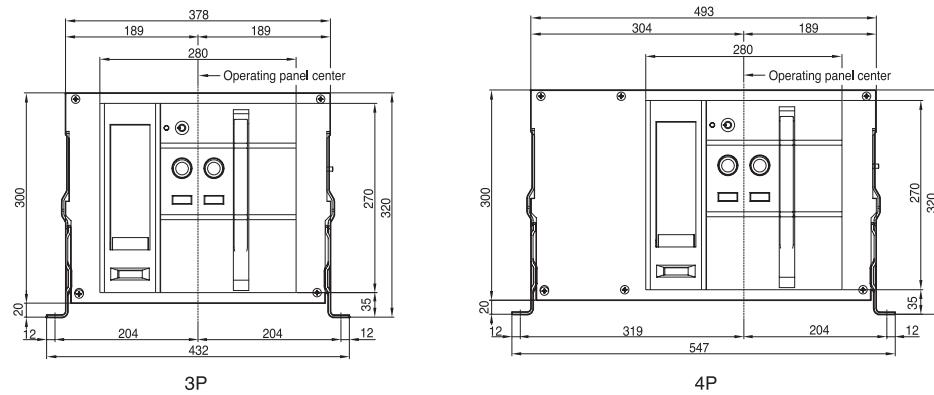
Vertical type



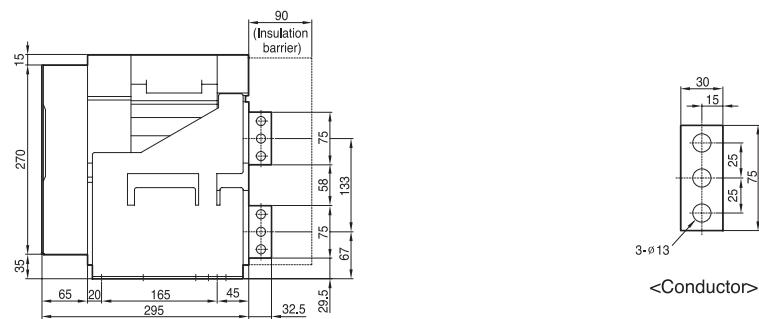
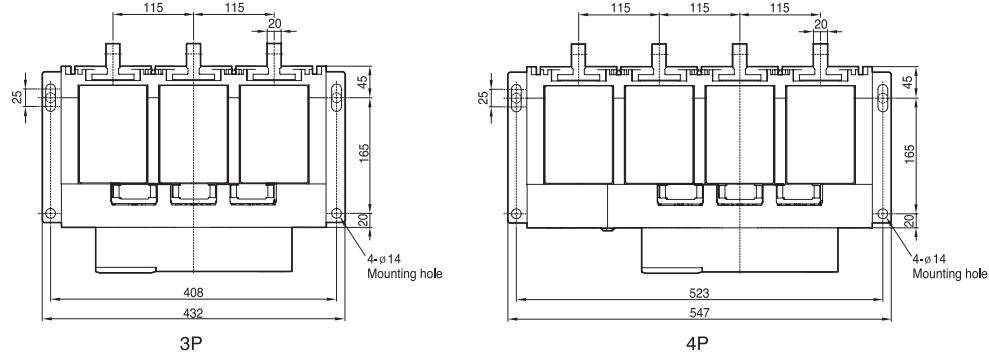
Fixed type 4000AF

2000 – 3200A:
AKH / AKN / AKS-20 – 32E

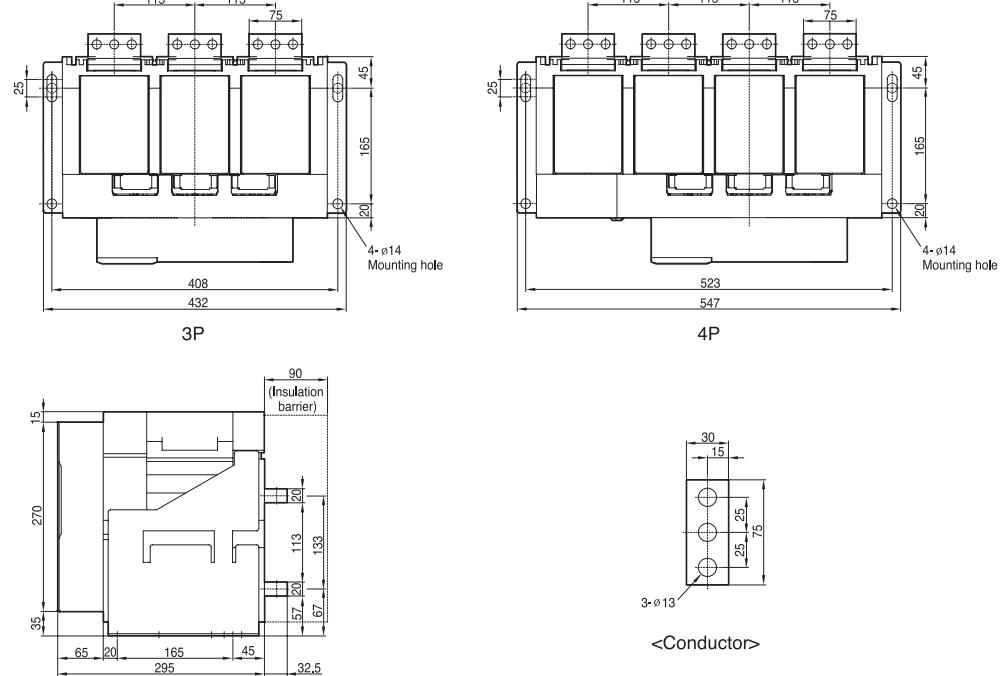
Front view



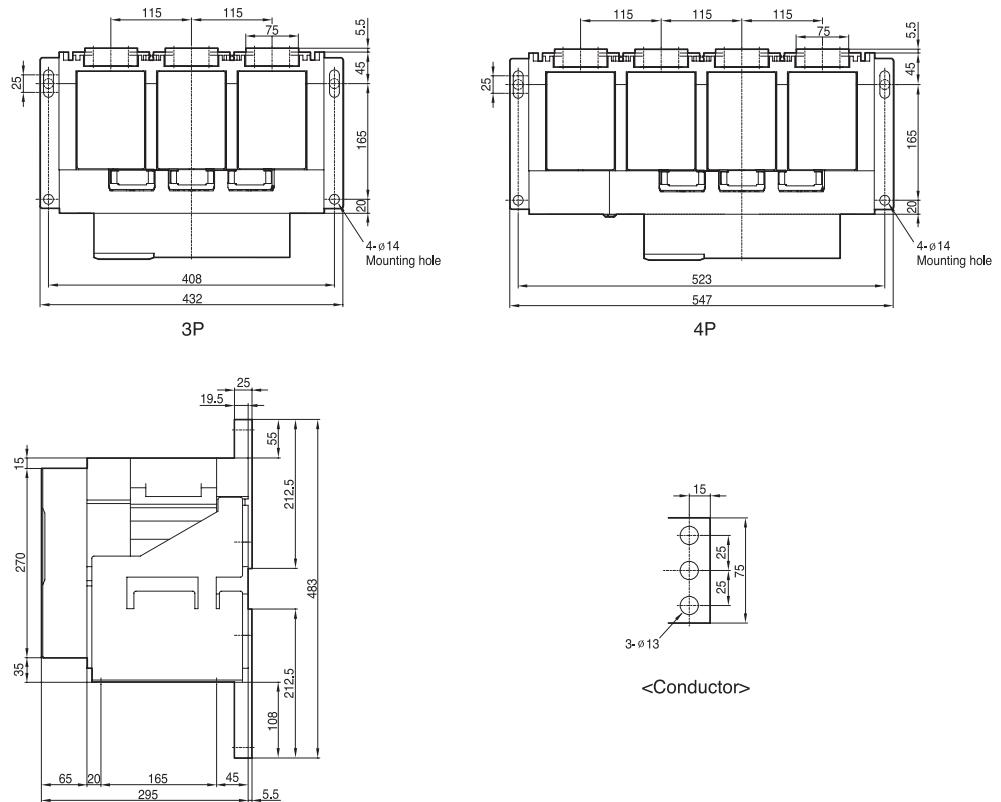
Vertical type



Horizontal type



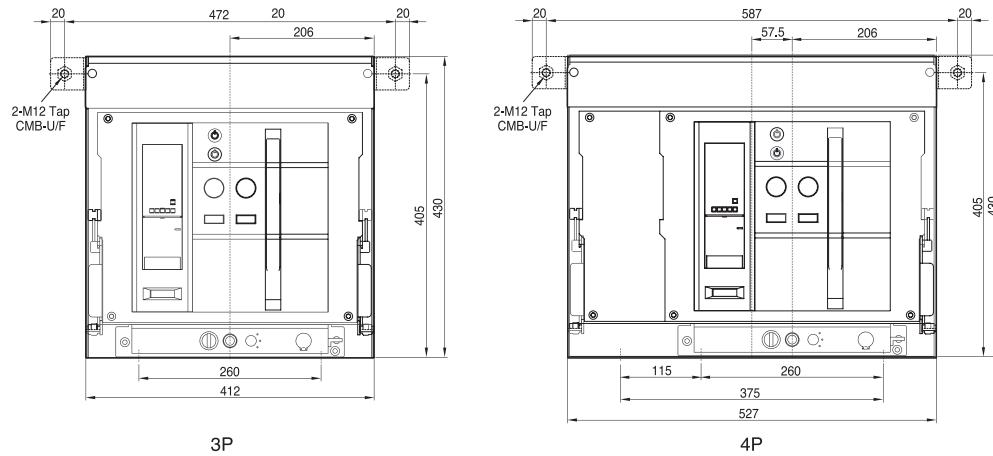
Front connection type



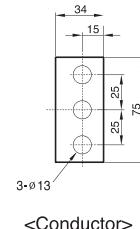
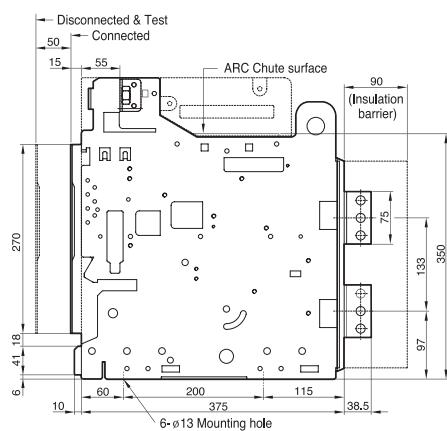
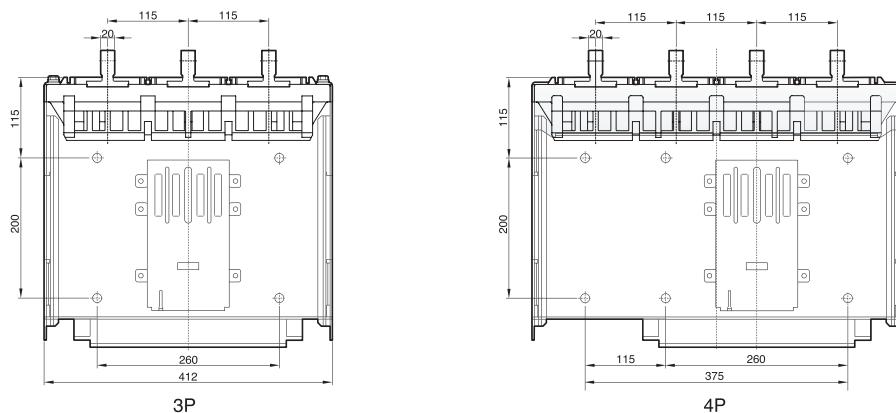
Draw-out type 4000AF

**2000 – 3200A:
AKH / AKN / AKS-20 – 32E**

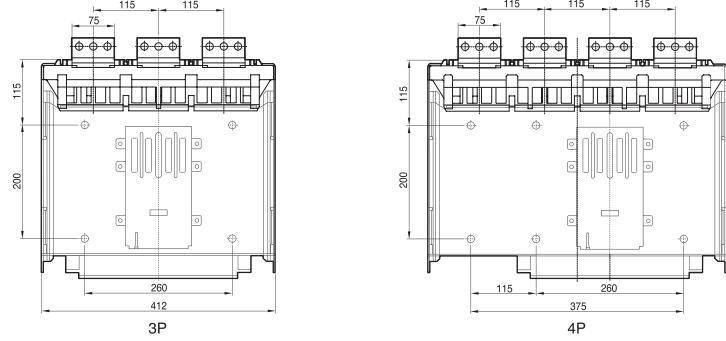
Front view



Vertical type



Horizontal type



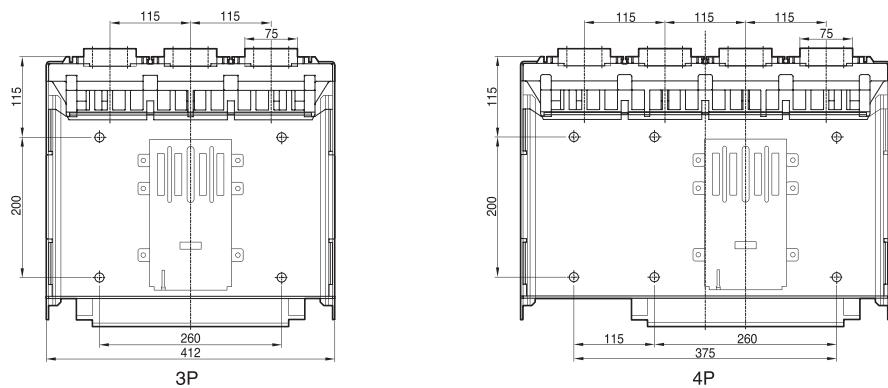
Legend:

- Disconnected & Test
- Connected

Dimensions (mm):

- 270, 4118, 6, 10, 55, 200, 375, 115, 38.5, 97, 133, 20, 90, 50
- ARC Chute surface
- (Insulation barrier)
- $\varnothing 13$ Mounting hole

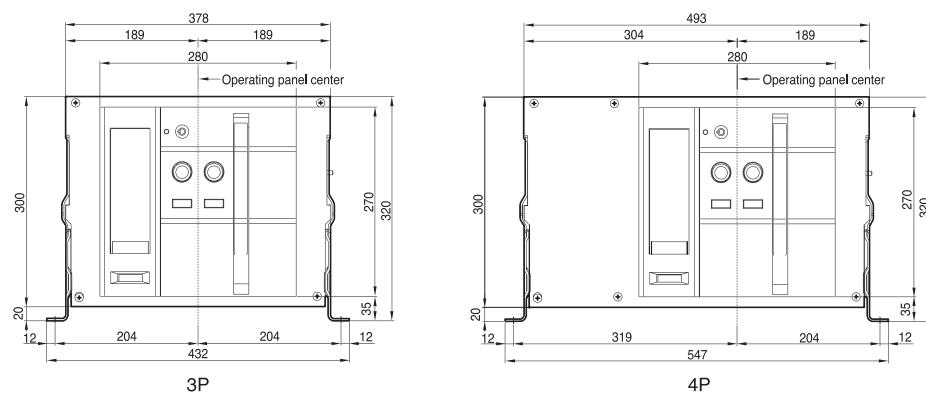
Front connection type



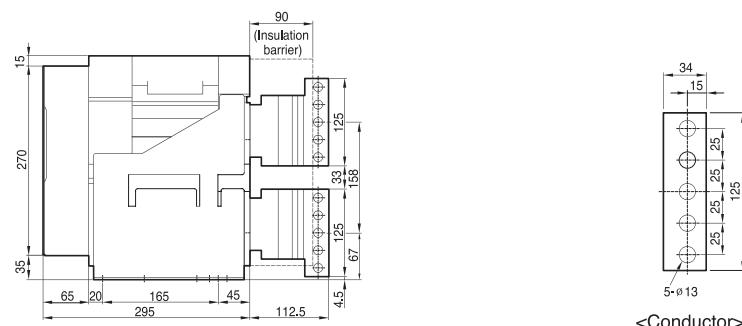
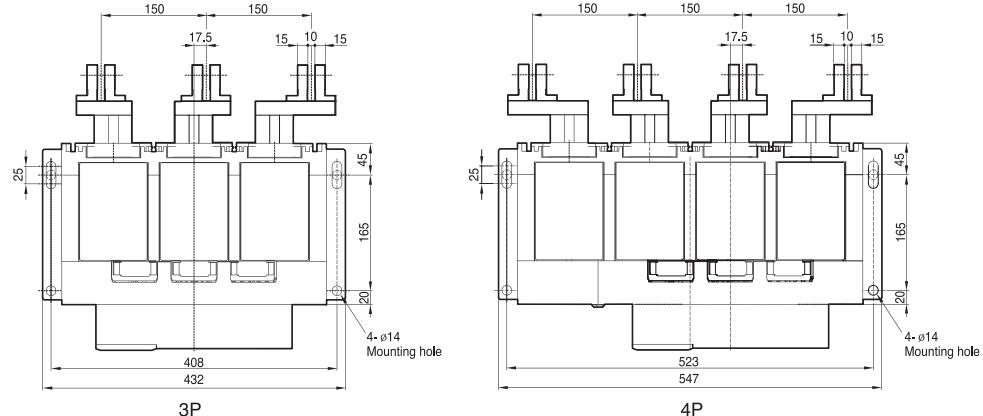
Fixed type 4000AF

4000A:
AKH/AKS-40E

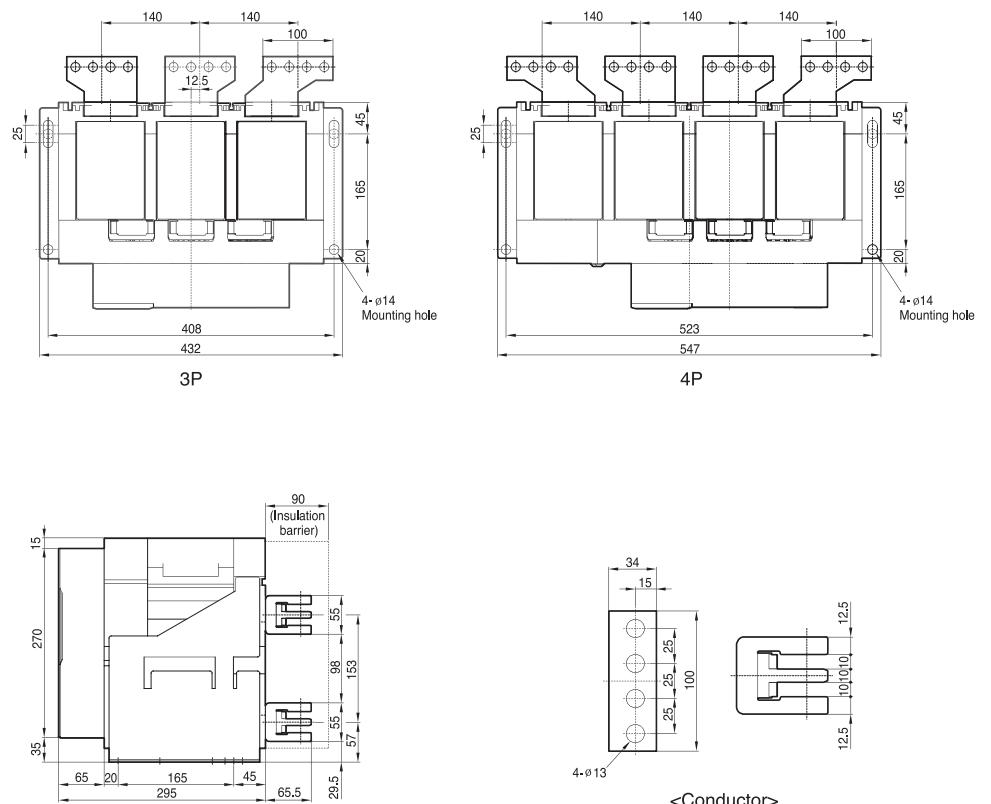
Front view



Vertical type



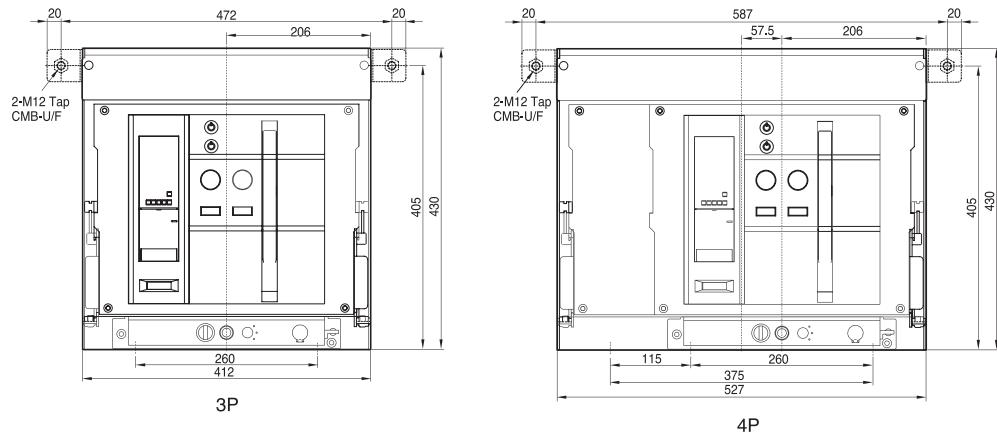
Horizontal type



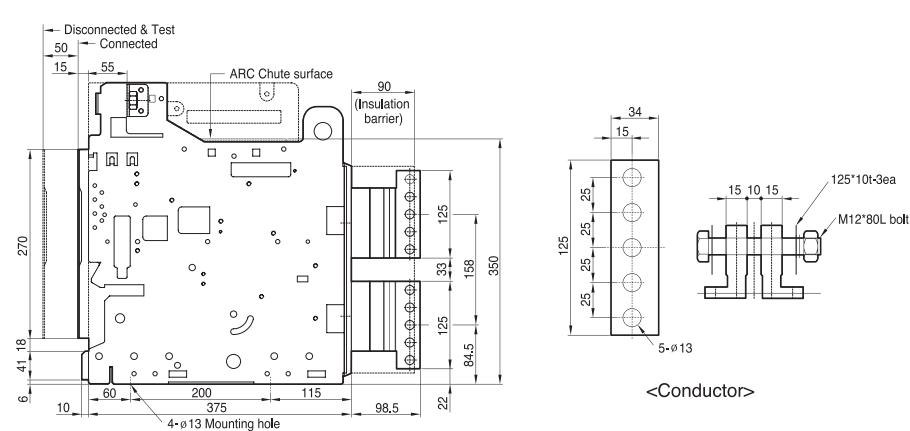
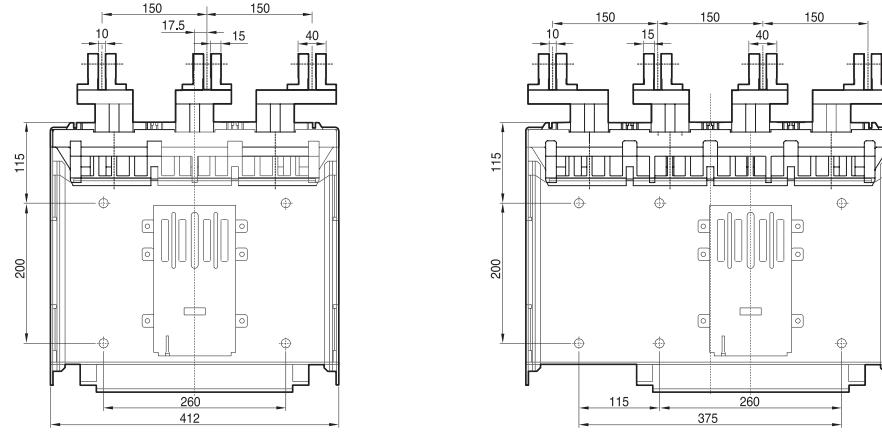
Draw-out type 4000AF

4000A:
AKH/AKS-40E

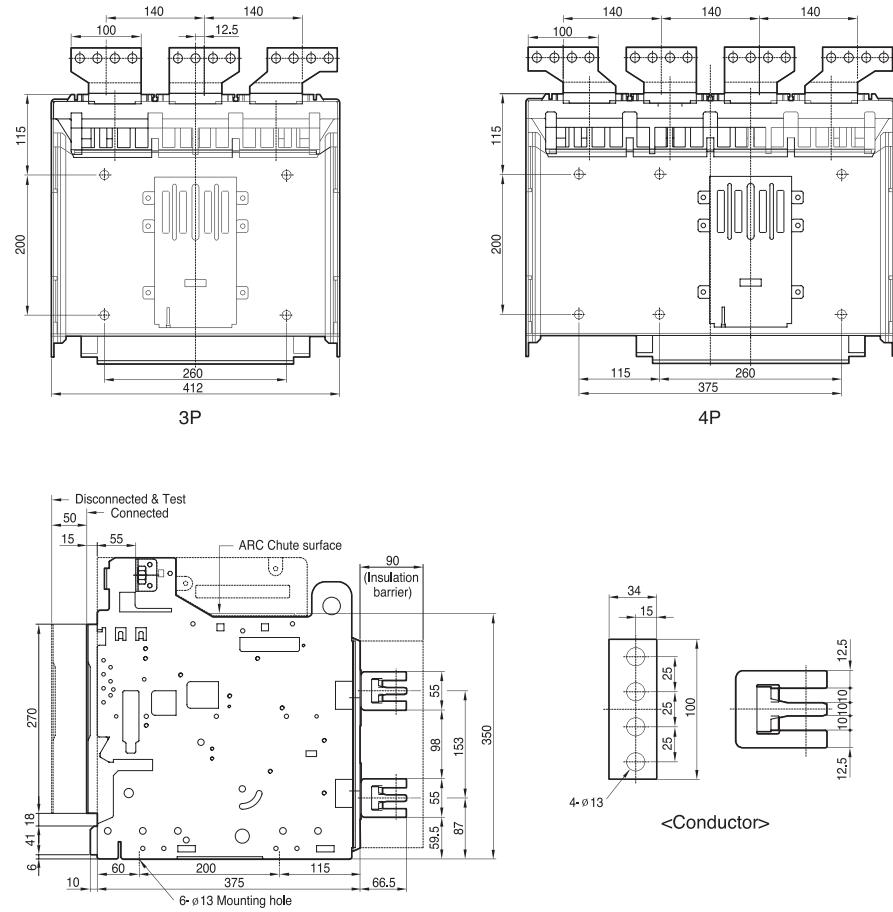
Front view



Vertical type



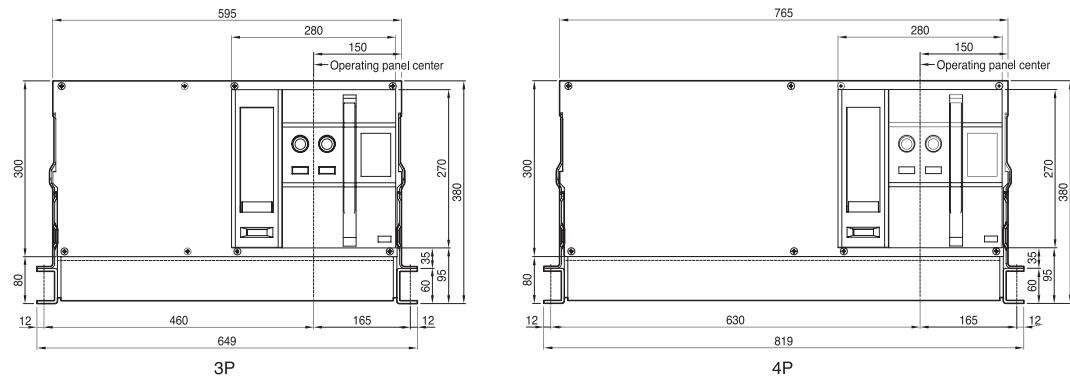
Horizontal type



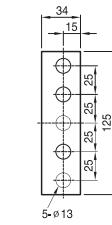
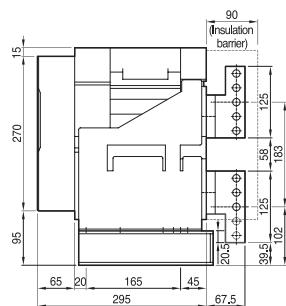
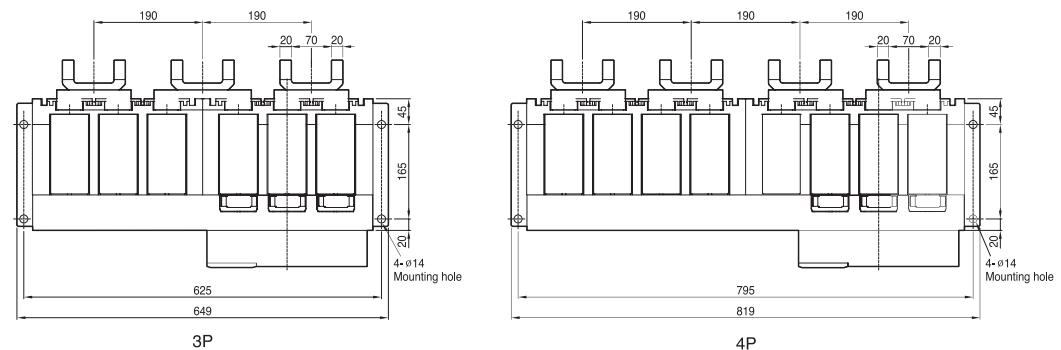
Fixed type 5000AF

4000 – 5000A:
AKS-40 – 50F

Front view

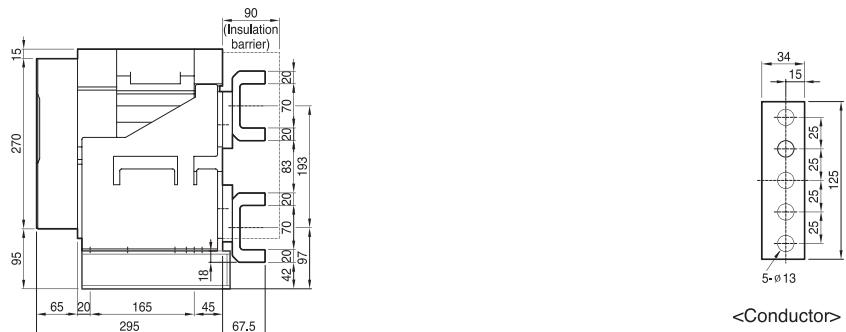
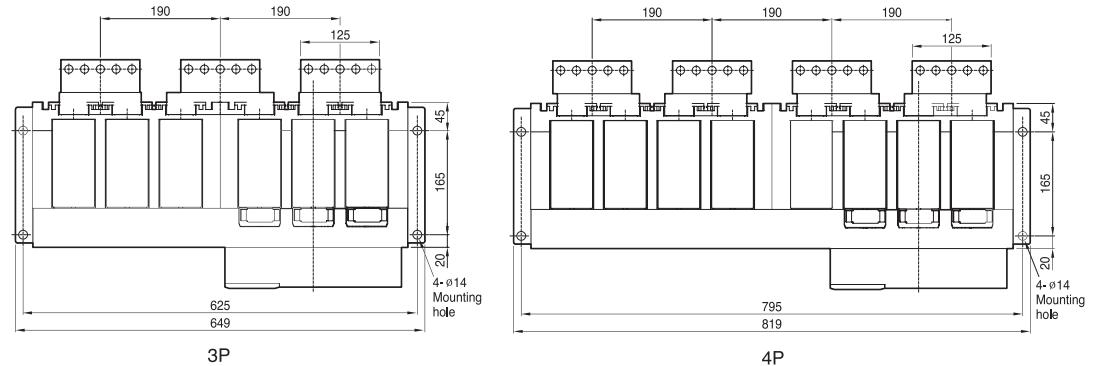


Vertical type

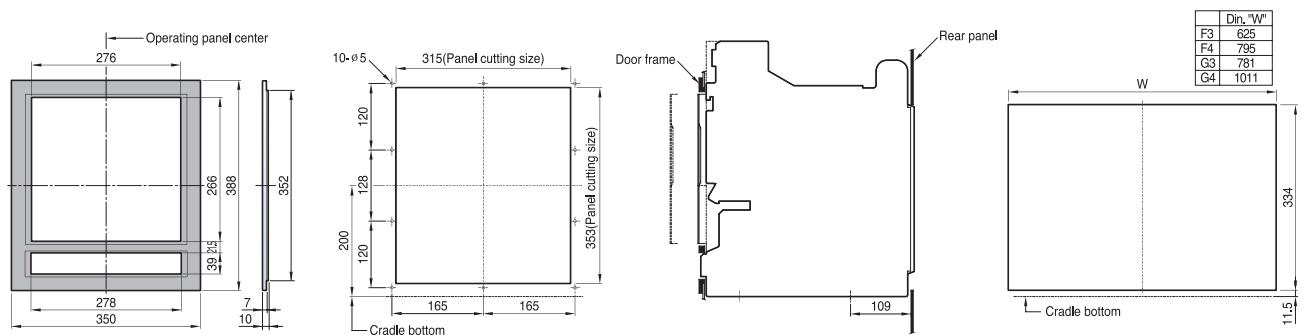


<Conductor>

Horizontal type



Door Frame: DF (AKH-G, AKS-F)



<External size>

<Mounting hole>

<Side hole>

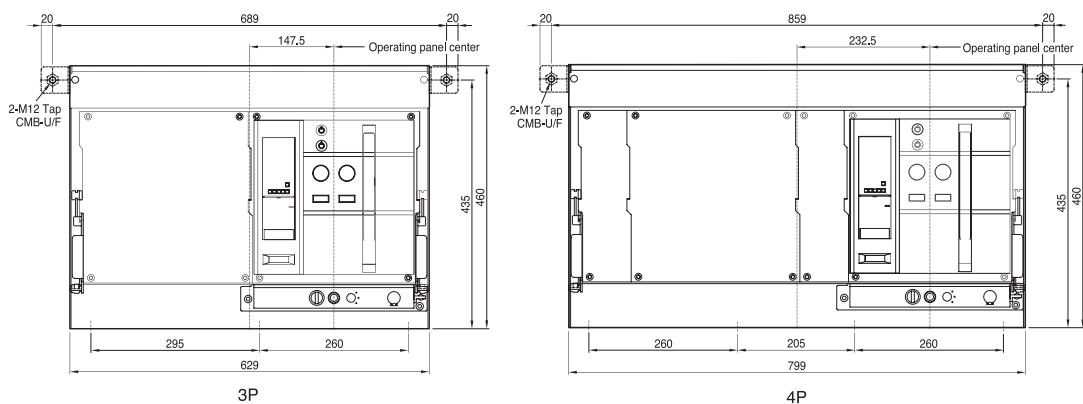
<Panel cutting >

Note) The dimensions are for drawout type.

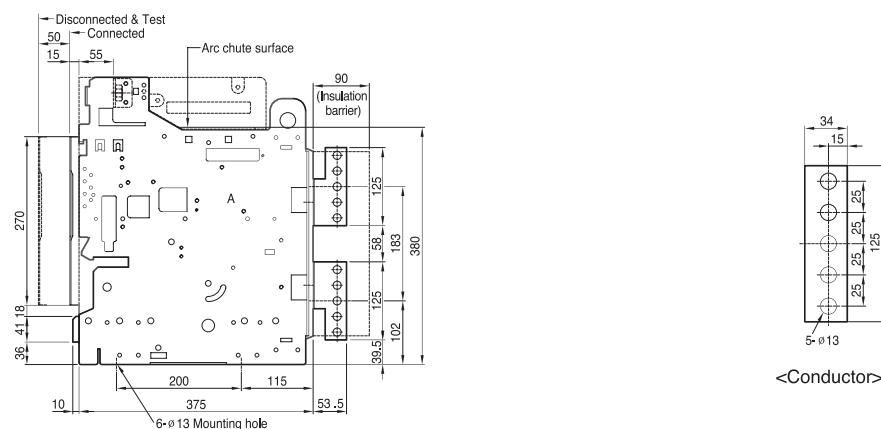
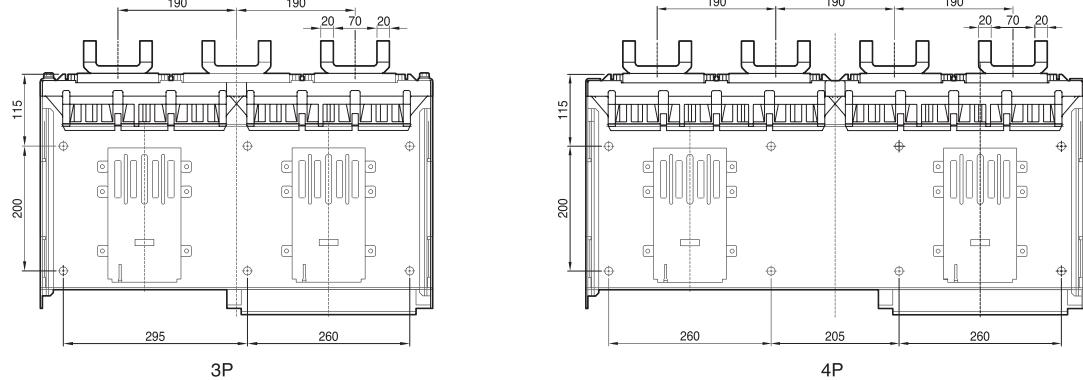
Draw-out type 5000AF

4000 – 5000A:
AKS-40 – 50F

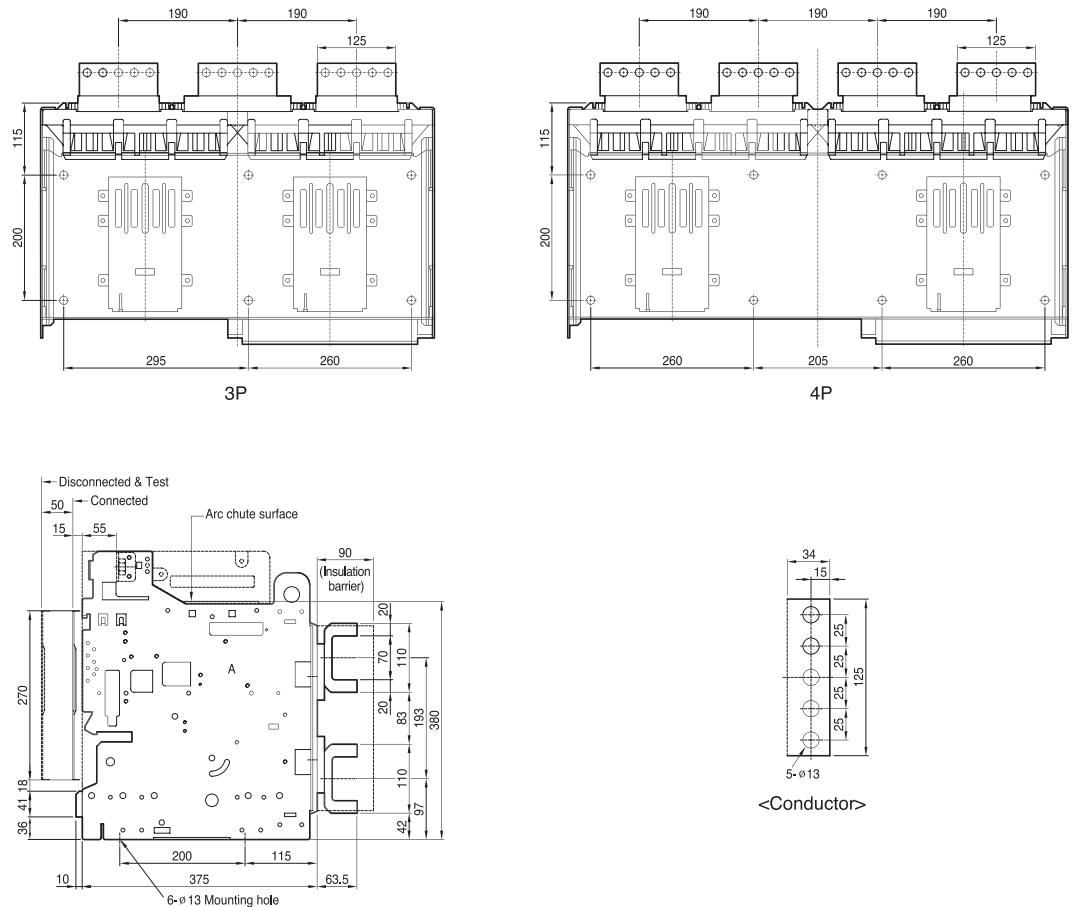
Front view



Vertical type



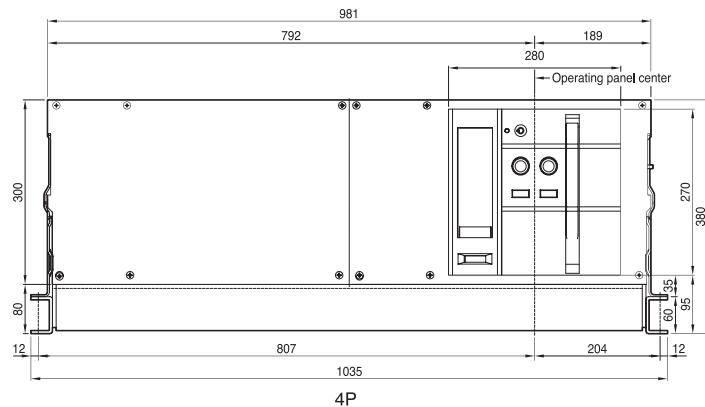
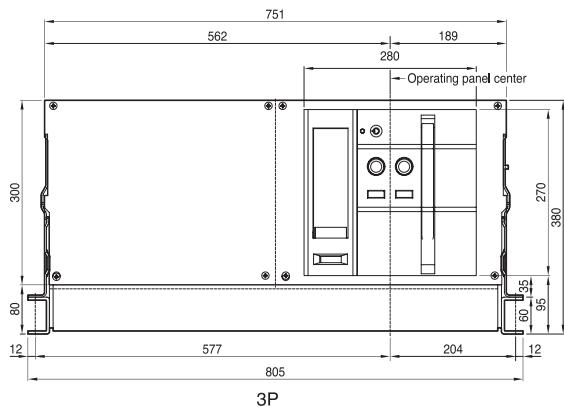
Horizontal type



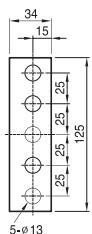
Fixed type 6300AF

4000 – 6300A:
AKH / AKS-40 – 50G

Front view

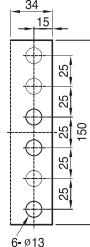


4000A – 5000A



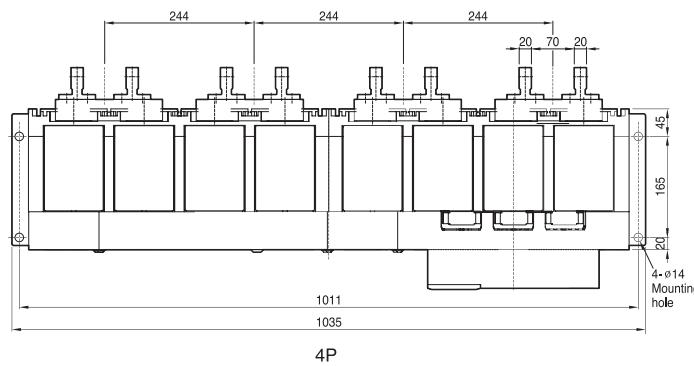
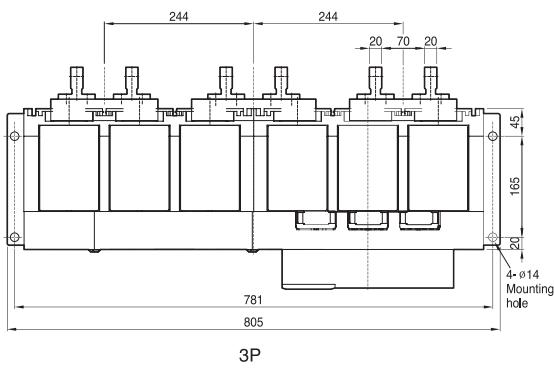
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6300A

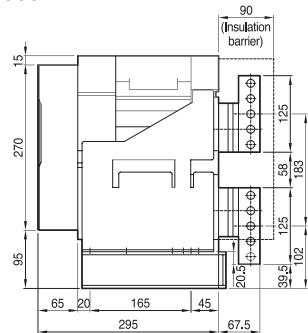


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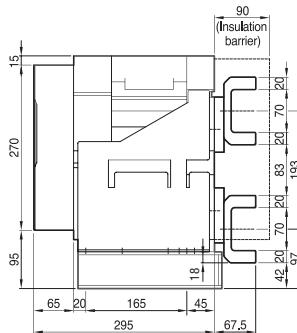
Vertical type



4000A – 5000A

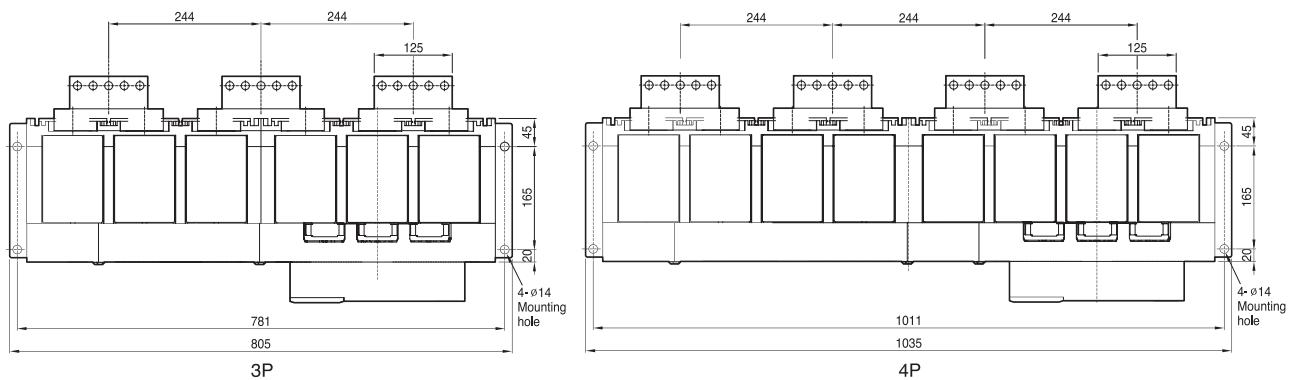


6300A

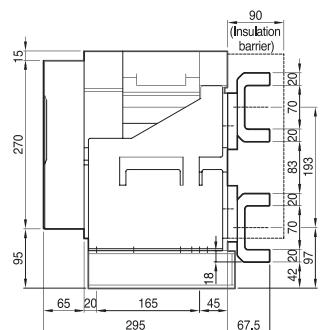
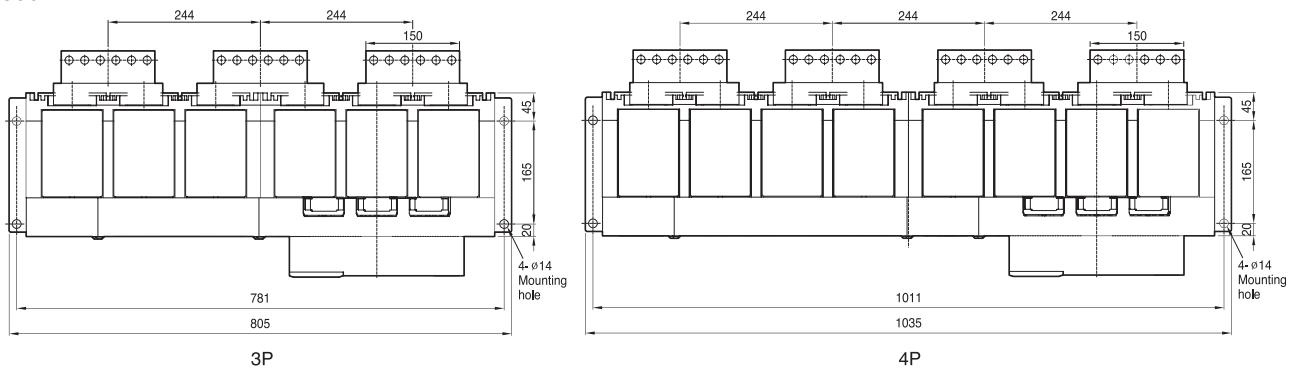


Horizontal type

4000A - 5000A



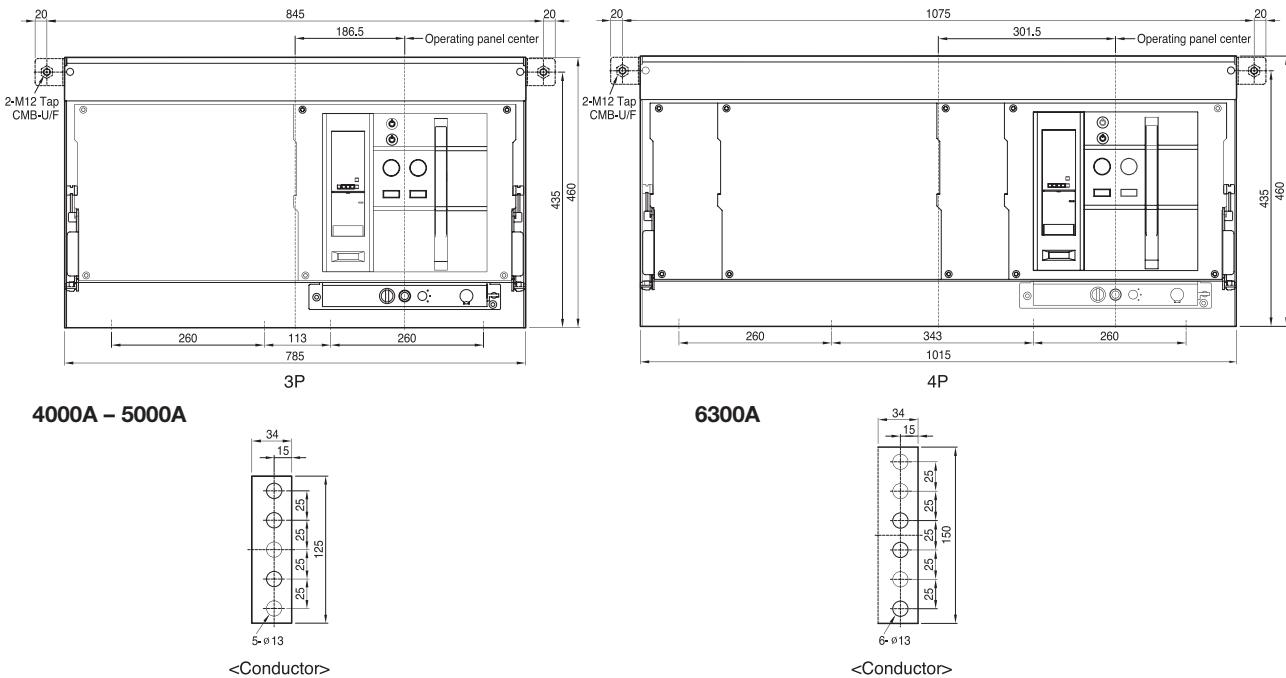
6300A



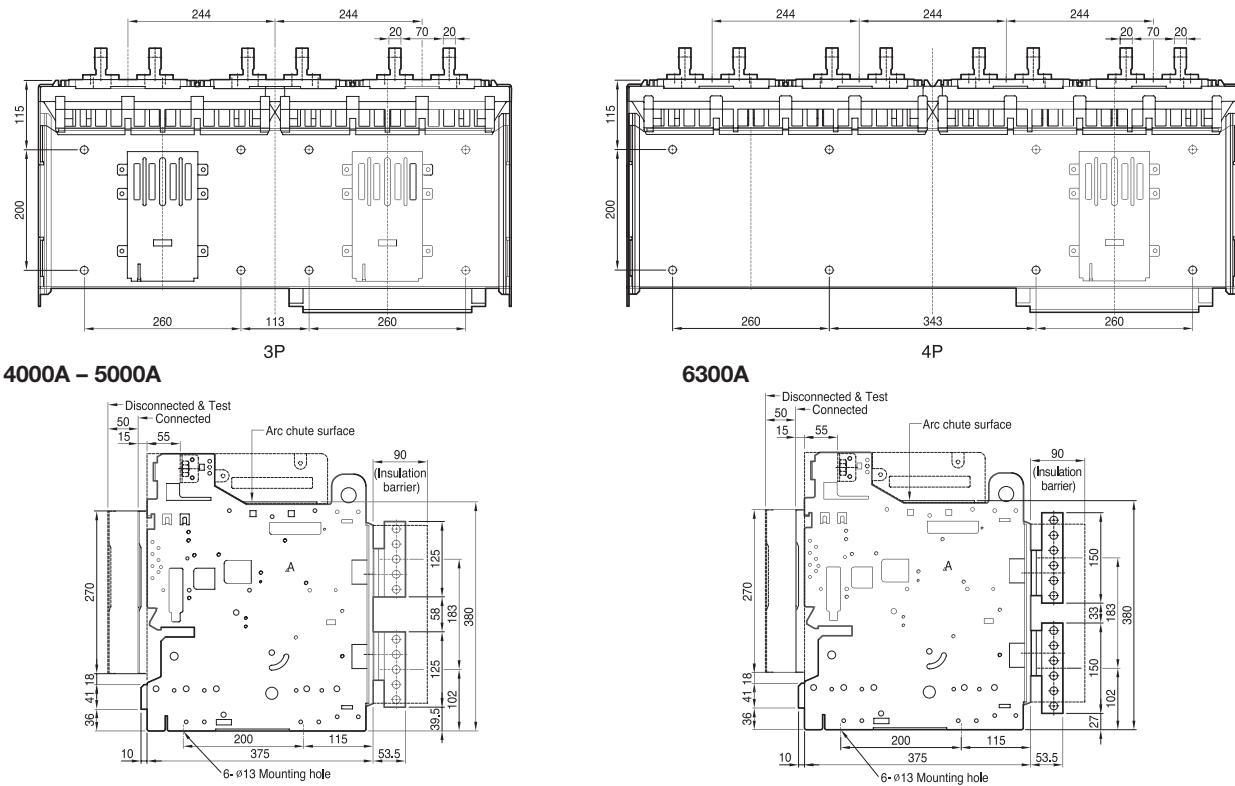
Draw-out type 6300AF

**4000 – 6300A:
AKH / AKS-40 – 50G**

Front view

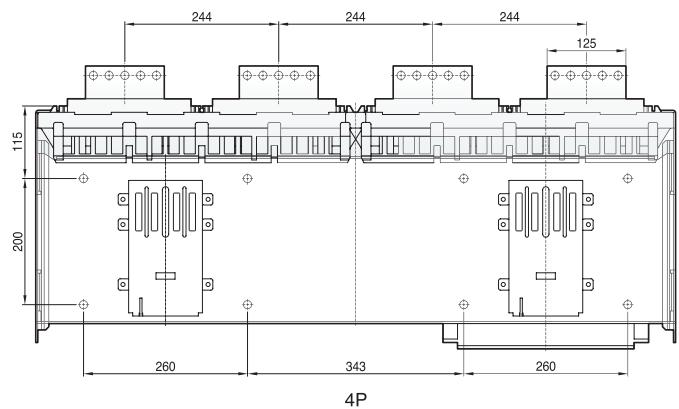
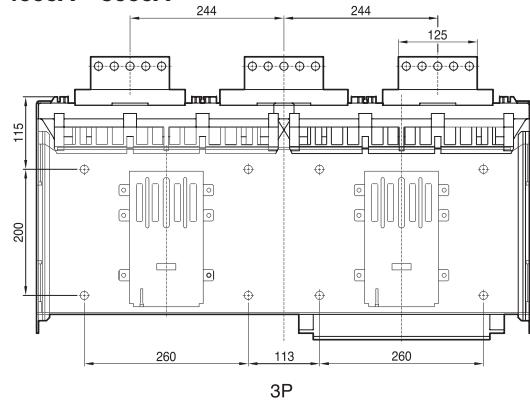


Vertical type

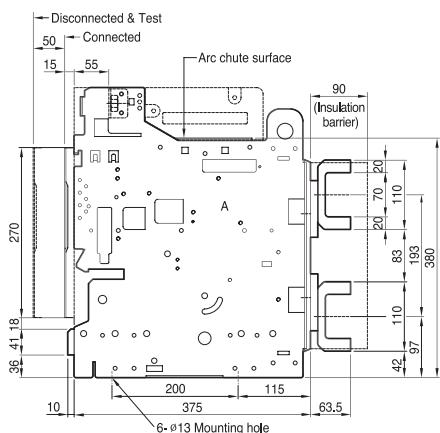
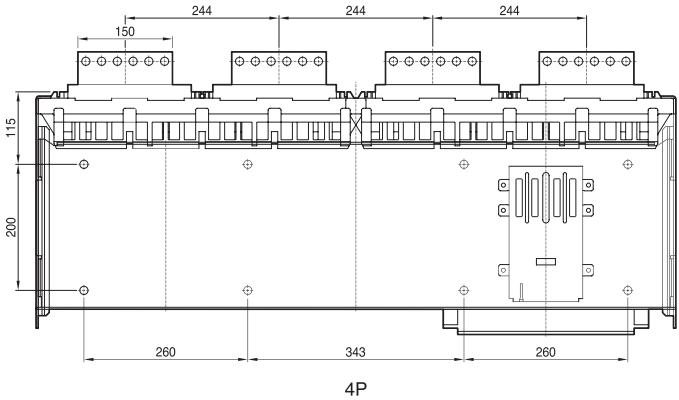
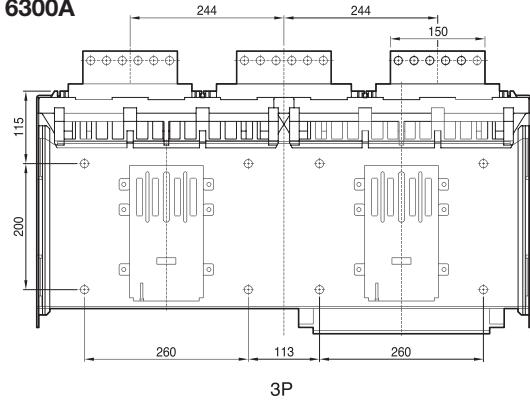


Horizontal type

4000A - 5000A



6300A



memo