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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.

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

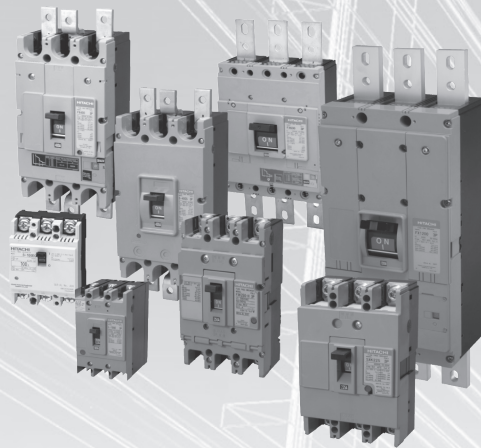
Hitachi has been developing new Molded Case Circuit Breakers and now we have just launched new type circuit breakers and these are innovative high quality breakers, new technology fulfills improving the performance and new design satisfies all application requirements and world customers.

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.

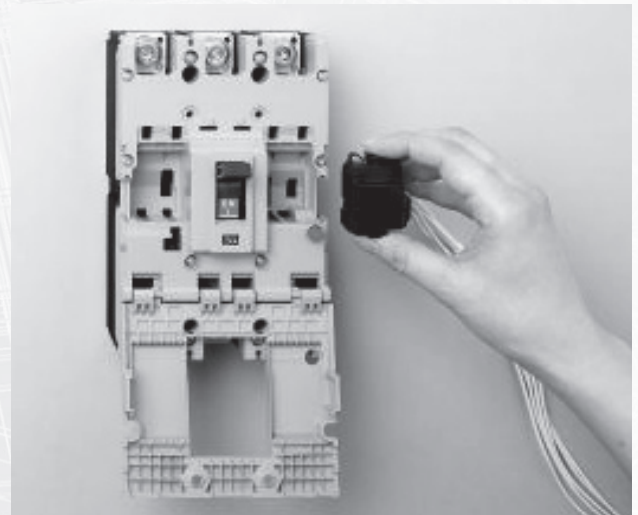
AF	60AF	100AF	250AF	400AF	600AF	800AF	1000AF	1200AF
Types	F-60RB	F-100KB FXK125-S FXK125-H	F-250FB F-250KC FXK250-S FXK250-H	F-400R FX400	F-600F FX600	F-800R FX800	FX1000	FX1200

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.

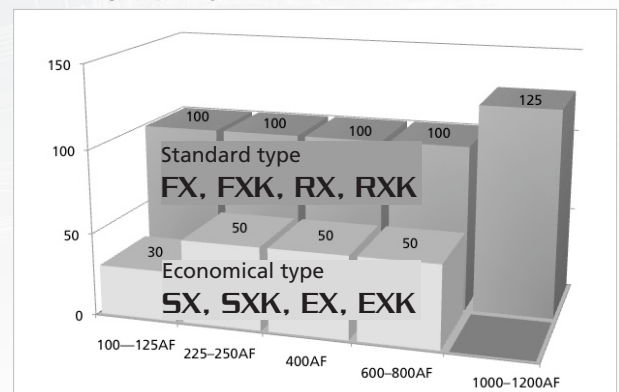


Dimensions are unified

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 Standard Breaker	L Series High Interrupting Capacity Breaker	S Series Economical Breaker
<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

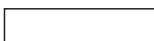
AC 230V — 240V

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	125	175	
	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**

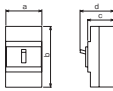
Type			F-30FB		F-60RB		F-60R	F-100S		FXK125-S		FXK125-H		F-100KB							
Appearance																					
Number of poles			2	3	2	3	4	4		2 (*1)	3	2 (*1)	3	4							
Rated Current (A) (Base ambient temperature 40°C)			3	5	10	15	20	30	15	20	30	40	50	15	20	30	40	50	60	75	100
Rated Insulation Voltage Ui (V)			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		50/50		50/50					
			415V	2.5/1		10/10		10/5		30/30		50/50		50/50		50/50					
			400V	2.5/1		10/10		10/5		30/30		50/50		50/50		50/50					
			380V	2.5/1		10/10		10/5		30/30		50/50		50/50		50/50					
			240V	7.5/2		25/25		35/18		50/50		100/100		85/85		85/85					
			230V	7.5/2		25/25		35/18		50/50		100/100		85/85		85/85					
		DC	250V	2.5/1	—	5/2	—	—	—		25/13	—	40/20	—	—		—				
			125V	5/2	—	7.5/2	—	—	—		25/13	—	40/20	—	—		—				
Dimensions (mm)		a	52	75	52	75	100	120		90		90		120							
		b	130		130		150		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		Front Terminal								
Phase Separator for Line Side			○		● (*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	○		○		○		○		○		○		○						
Exterior Accessories	Rear-connecting Stud	STB	STB-2M		STB-2M		STB-1B	STB-3H (Up to 50A:STB-2D)	STB-2S (Up to 50A) BSD-3S (60A or more)		STB-2S (Up to 50A) BSD-3S (60A or more)		STB-3J (Up to 50A:STB-2)								
		BSD	—		—		—		—		—		—								
	Flush Mounting Base Assembly	GKW(STB)	○		○		○		—		—		○								
		GK-GKW(BSD)	—		—		—		○ (Up to 50A)		○ (Up to 50A)		—								
	Plug-in Mounting Base Assembly	PK	○		○		○		○ (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	HL	○		○		○		○		○		○								
	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-S11								
	Terminal Cover	Front Type	TMC	TMC-1		TMC-1		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-3C									
	IEC Rail 35 mm		○		○		—		—		—		—								
Automatic Tripping Device			Full Magnetic		Full Magnetic		Full Magnetic		Thermal-Magnetic		Thermal-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 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	4	2 (*1)	3		2 (*1)	3	4	2 (*1)	3	4	3		
125 150 175 200 225 250			125 150 175 200 225 250			250 300 300 400			200/225/250 300/350/400 adjustable			500 600			300/350/400 500/600 adjustable								
690			690			690			690			690			690			690			690		
8			8			8			8			8			8			8			8		
—			—			—			—			—			—			—			—		
30/30			50/50			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		
30/30			50/50			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		
50/50		85/85	100/100		85/85	100/100		85/85	100/100		85/85	100/100		85/85	100/100		85/85	100/100		85/85	100/100		85/85
50/50		85/85	100/100		85/85	100/100		85/85	100/100		85/85	100/100		85/85	100/100		85/85	100/100		85/85	100/100		85/85
25/13	—	—	40/20	—	—	40/40	—	—	40/40	—	—	—	—	—	40/40	—	—	40/40	—	—	—	—	—
25/13	—	—	40/20	—	—	40/40	—	—	40/40	—	—	—	—	—	40/40	—	—	40/40	—	—	—	—	—
105		140	105		140	140		185	140		185	140		185	210		280	210		280	210		280
165		—	165		—	257		—	257		—	257		—	274		—	274		—	274		—
68		103	68		103	103		—	103		—	103		—	103		—	103		—	103		—
95		127	95		127	133		—	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		—	9.7		—	9.7		—
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)		
○ (*3)	○	—	○ (*3)	○	—	○	○	—	○ (*3)	○	—	○ (*3)	○	—	○ (*3)	○	—	○ (*3)	○	—	○ (*3)	○	—
○ (*3)	○	—	○ (*3)	○	—	○	○	—	○ (*3)	○	—	○ (*3)	○	—	○ (*3)	○	—	○ (*3)	○	—	○ (*3)	○	—
○ (*3)	○	—	○ (*3)	○	—	○	○	—	○ (*3)	○	—	○ (*3)	○	—	○ (*3)	○	—	○ (*3)	○	—	○ (*3)	○	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
○	○	—	○	○	—	○	○	—	○	○	—	○	○	—	○	○	—	○	○	—	○	○	—
○	○	—	○	○	—	○	○	—	○	○	—	○	○	—	○	○	—	○	○	—	○	○	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
○	○	—	○	○	—	○ (GK)	○ (GK)	—	○	○	—	○ (GK)	○ (GK)	—	○ (GK)	○ (GK)	—	○ (GK)	○ (GK)	—	○ (GK)	○ (GK)	—
○	○	—	○	○	—	○	○	—	○	○	—	○	○	—	○	○	—	○	○	—	○	○	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
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-6		—	HL-6		—	HL-6		—	HL-6		—
HA-210		HA-206	HA-210		HA-206	HA-405		—	HA-406		—	HA-402		—	HA-402		—	HA-402		—	HA-402		—
HM-S25		HM-S21	HM-S25		HM-S21	HM-405		—	HM-406		—	HM-402		—	HM-402		—	HM-402		—	HM-402		—
TMC-4J		TMC-4H	TMC-4J		TMC-4H	TMC-5B		—	TMC-5B		—	TMC-5D		—	TMC-5D		—	TMC-5D		—	TMC-5D		—
TMC-4JS		—	TMC-4JS		—	—		—	—		—	—		—	—		—	—		—	—		—
—		—	—		—	—		—	—		—	—		—	—		—	—		—	—		—
BTC-4J		—	BTC-4J		—	BTC-5B		—	BTC-5B		—	—		—	—		—	—		—	—		—
—			—			—			—			—			—			—			—		
Thermal-Magnetic			Thermal-Magnetic			Thermal-Magnetic			Electronic Relay			Thermal-Magnetic			Thermal-Magnetic			Electronic Relay			Electronic Relay		
●			●			●			●			●			●			●			●		

Table 1 **F series**

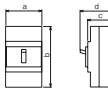
Type				F-800R		FX800		F-800RH		F-1000K		F-1000C	
Appearance													
Number of poles				3	4	3		3	4	3	4	3	4
Rated Current (A) (Base ambient temperature 40°C)				700 800		400/450/500 600/700/800 adjustable		700 800		1000		500/600/700 800/900/1000 adjustable	
Rated Insulation Voltage Ui (V)				690		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	
			415V	50/50		50/50		85/43		85/22		85/22	
			400V	50/50		50/50		85/43		85/22		85/22	
			380V	50/50		50/50		85/43		85/22		85/22	
			240V	100/100		100/100		125/63		125/32		125/32	
			230V	100/100		100/100		125/63		125/32		125/32	
		DC	250V	40/40	—	—		40/40	—	40/10	—	—	
			125V	40/40	—	—		40/40	—	40/10	—	—	
			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		Front Bar Terminal	
Phase Separator for Line Side				● (*2)		● (*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)		
	Plug-in Mounting Base Assembly	PK	○		○		○		○		○		
	Drawout Assembly	PDK	—		—		—		—		—		
	Mechanical Interlock	MIW	MIW-5		MIW-5G		MIW-5		MIW-8		MIW-8		
	Motor-operating Mechanism	MMK-S	—		—		—		—		—		
		MMK-C	○		○		○		○		○		
		MMK	—		—		—		—		—		
	Lock Cover	LC	—		—		—		—		—		
	Handle Lock	HL	HL-6		HL-6		HL-6		○		○		
	Handle Operating Mechanism	HA	HA-402		HA-402		HA-402		HA-801		HA-801		
		HM	HM-402		HM-407		HM-402		—		—		
	Terminal Cover	Front Type	TMC	TMC-5D		TMC-5D		TMC-5D		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	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	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal	Front Bar Terminal
● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)	—
○ (*3)	○	○	○ (*3)	○	○	○
○ (*3)	○	○	○ (*3)	○	○	○
○ (*3)	○	○	○ (*3)	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	○
○	○	○	○	○	○	—
—	—	—	—	—	—	—
○	○	○	○	○	○	○
—	—	—	—	—	—	—
○ (GK)	○ (GK)	○ (GK)	○ (GK)	○ (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**

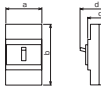
Type				S-30S		S-30E		S-50E		S-50EB		S-50SB		S-60RB		S-100EB		
Appearance																		
Number of poles				2	3	2	3	2	3	2	3	2	3	2	3	2	3	
Rated Current (A) (Base ambient temperature 40°C)				3	5 10 15 20 30	3	5 10 15 20 30	5 10 15 20 30 40 50	5 10 15 20 30 40 50	5 10 15 20 30 40 50	5 10 15 20 30 50	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		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		10/3		
			230V	2.5/1.3		5/2		2.3/1.3		5/2		7.5/2		10/3		10/3		
		DC	250V	—		—		—		—		2.5/1 —		2.5/1 —		2.5/1 —		
			125V	—		—		—		—		5/2 —		5/2 —		5/2 —		
			a	50	75	50	75	50	75	50	75	52	75	52	75	52	75	
			b	95		96		96		96		130		130		130		
			c	60		60		60		60		60		60		60		
			d	79		76		79		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		
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			
	Motor-operating Mechanism	MMK-S	—		—		—		—		—		—		—			
		MMK-C	—		—		—		—		—		—		—			
		MMK	—		—		—		—		—		—		—			
	Lock Cover	LC	LC-0B		LC-03		LC-0B		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-0C	TMC-0A	TMC-0G	TMC-0C	TMC-0A	TMC-0G	TMC-0C	TMC-0A	TMC-0G	TMC-1	TMC-1	TMC-1S	TMC-1S	TMC-1	TMC-1S
			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
- 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	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	—	10/5	10/5	25/13	—	—	—	40/20	—
7.5/2	—	15/8	15/8	25/13	—	—	—	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-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
●	●	●	●	●	●	●	●	●	●

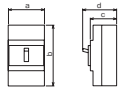
Table 3 **L series**

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		
			415V	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		
			380V	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		
		DC	230V	175/88		175/88		175/88		175/88		175/88		175/88		
			250V	—		—		—		—		—		—		
			125V	—		—		—		—		—		—		
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	○	○	○	○	○	○	○	○	○	○	○		
Exterior Accessories	Rear-connecting Stud		STB	○	○	—		—		—		—		—		
			BSD	—		—		○		○		○		○		
	Flush Mounting Base Assembly		GKW(STB)	○	○	—		—		—		—		—		
			GK·GKW(BSD)	—		—		○ (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		
	Motor-operating Mechanism		MMK-S	○		○		—		—		—		—		
			MMK-C	—		—		○		○		○		○		
			MMK	—		—		—		—		—		—		
	Lock Cover		LC	LC-2C		LC-2C		—		—		—		—		
	Handle Lock		HL	○		○		HL-5		HL-5		HL-6		HL-6		
	Handle Operating Mechanism		HA	HA-106		HA-106		HA-405		HA-405		HA-402		HA-402		
			HM	HM-S11		HM-S11		HM-405		HM-405		HM-402		HM-402		
	Terminal Cover		Front Type	TMC	TMC-3C		TMC-3C		TMC-5B		TMC-5B		TMC-5D		TMC-5D	
				Short Type	—		—		—		—		—		—	
				Long Type	—		—		—		—		—		—	
	Rear Type		BTC	BTC-3C		BTC-3C		BTC-5B		BTC-5B		BTC-5B		BTC-5B		
				BTC-3C		BTC-3C		BTC-5B		BTC-5B		BTC-5B		BTC-5B		
IEC Rail 35 mm			—		—		—		—		—		—			
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	MFXX100-S	MS-225SB	MSXK225	MFXX225-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/Ics)	AC	690V	—	—	—	—	—	—	—	
			500V	—	—	1.5/1	2.5/1	10/10	5/3	5/3	10/5
			440V	—	—	2.5/1	10/3	30/30	15/8	15/8	30/15
			415V	1.5/1	1.5/1	2.5/1	10/3	30/30	15/8	15/8	30/15
			400V	1.5/1	1.5/1	2.5/1	10/3	30/30	15/8	15/8	30/15
			380V	—	—	2.5/1	10/3	30/30	15/8	15/8	30/15
			240V	—	—	7.5/2	35/9	50/50	35/18	35/18	50/25
Dimensions (mm)			a	75	75	75	75	90	105	105	
			b	96	96	130	130	150	165	165	
			c	60	60	60	60	68	60	68	
			d	76	76	84	84	94	85	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	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)	
	Auxiliary Switch		AUX	○	○	○	○	○	○	○(*3)	
	Shunt Trip		SHT	○	○	○	○	○	○	○(*3)	
	Undervoltage Trip		UVT	—	—	—	—	—	—	—	
	Terminal Block		TB	—	—	○	○	○	○	○	
Exterior Accessories			TB2	○	○	○	○	○	○	○	
	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	—	—	—	—	—	—	—	
	Motor-operating Mechanism		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	
			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	
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

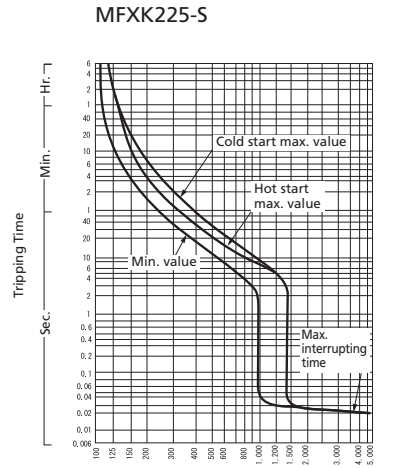
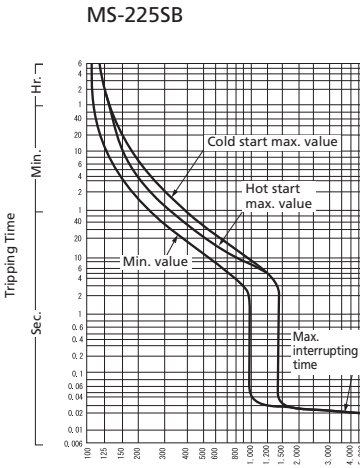
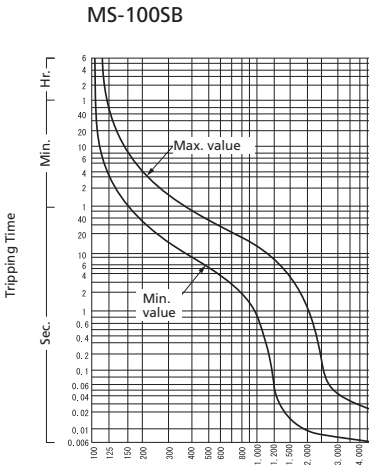
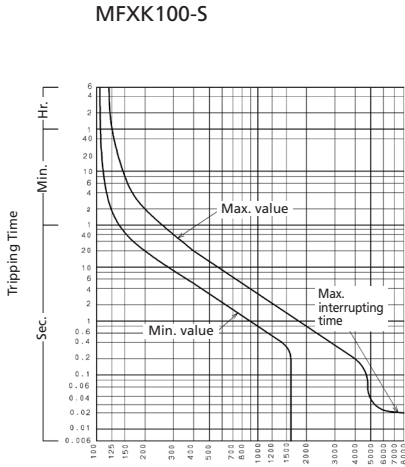
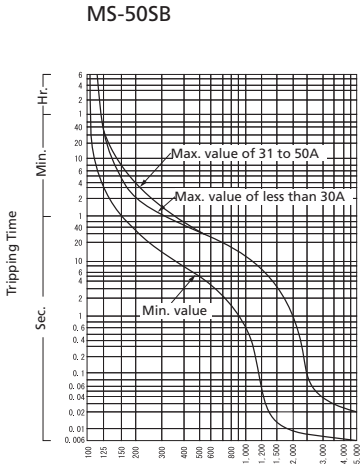
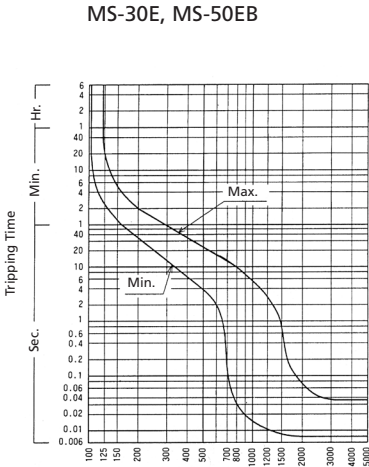
Motor Capacity (kW)	Motor Breaker		Motor Capacity (kW)	Motor Breaker	
	Rated Current (A)	Type		Rated Current (A)	Type
0.2	1.4	MS-30E	11	45	MS-50EB, MS-50SB
0.4	2.5		15	60	MS-100SB, MFXX100-S
0.75	4		18.5	75	
1.5	8		22	90	MS-225SB, MFXX225-S
2.2	10		30	(125)*	
3.7	16		37	(150)*	
5.5	25				
7.5	32				

400 – 440V AC

Motor Capacity (kW)	Motor Breaker		Motor Capacity (kW)	Motor Breaker	
	Rated Current (A)	Type		Rated Current (A)	Type
0.2	0.8	MS-30E	11	25	MS-30E, MS-50EB
0.4	1.4		15	32	
0.75	2.5		18.5	40	MS-50SB
1.5	4		22	45	
2.2	6.3		30	60	MS-100SB, MFXX100-S
3.7	10		37	75	
5.5	16		45	90	
7.5	16		50	(125)*	MS-225SB, MFXX225-S

- 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**



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

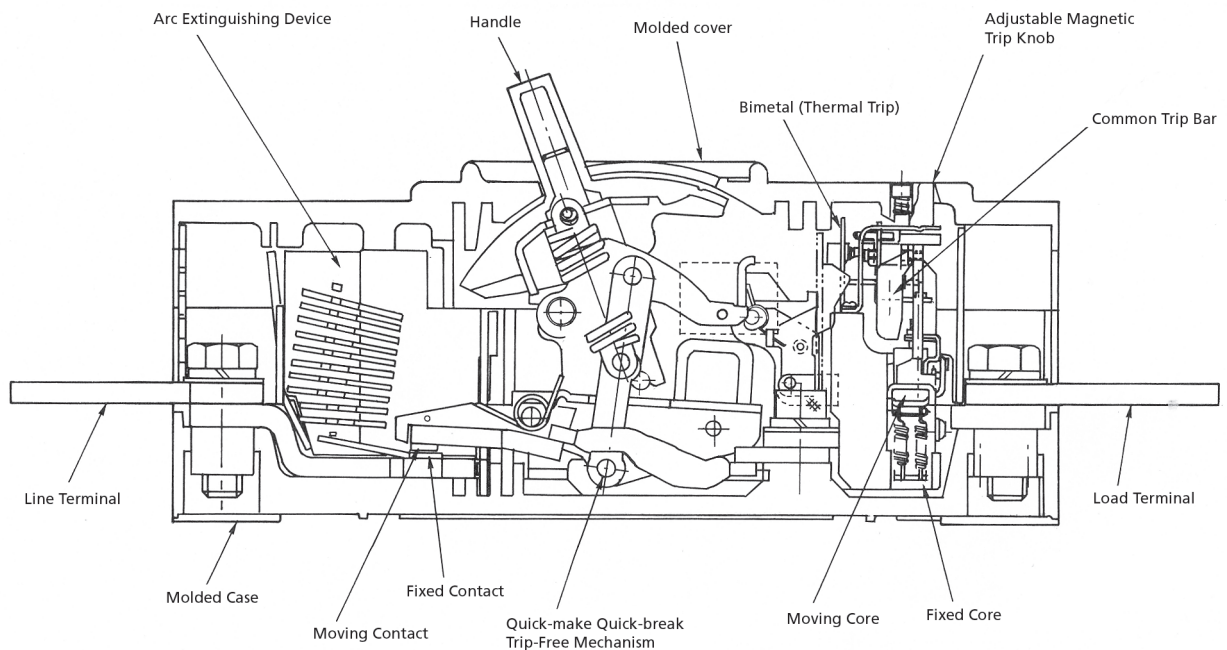
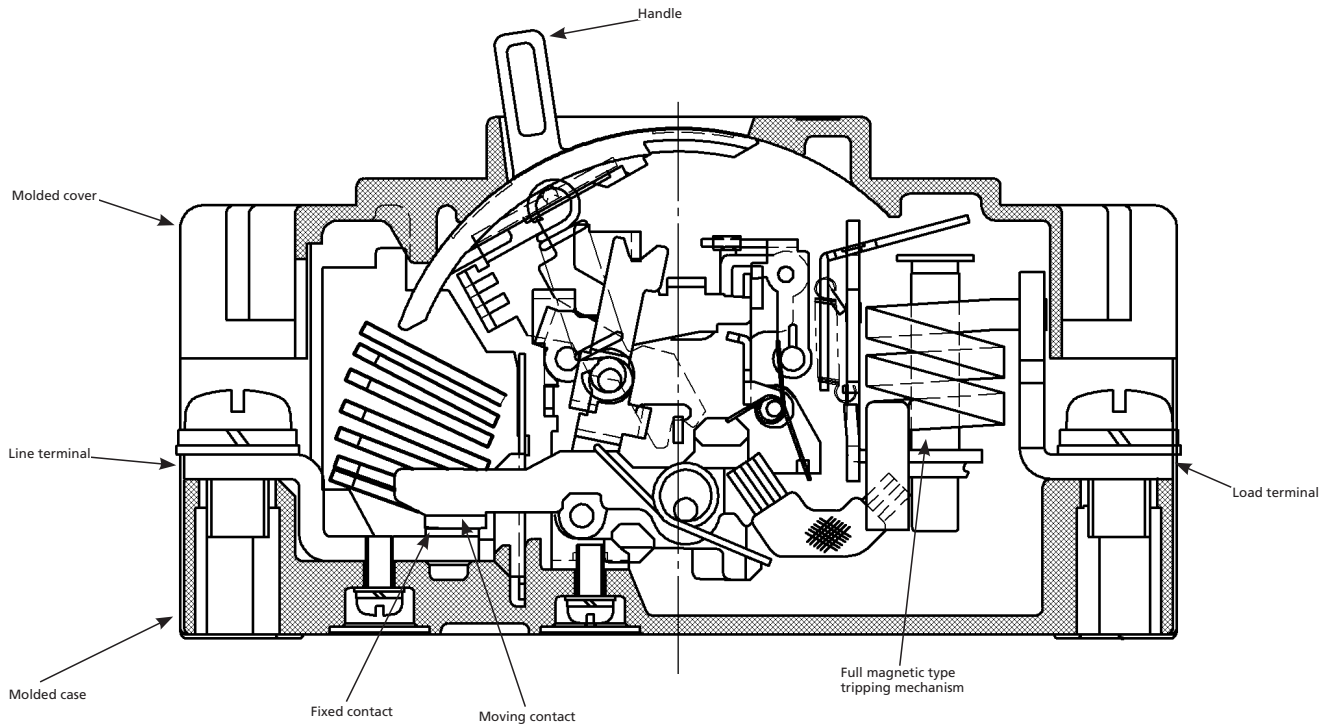
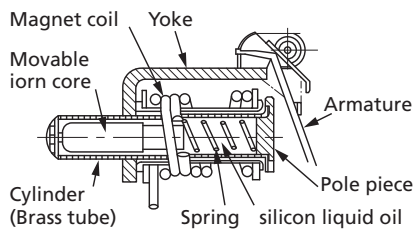


Fig. 2 Full magnetic Type



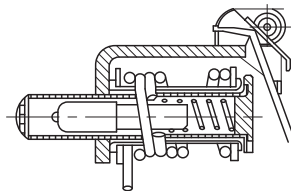
Principle (How the tripping mechanism operates)

Fig. 3 Normality



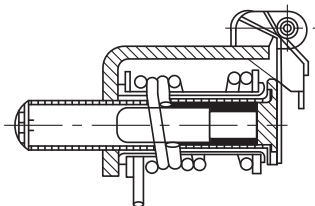
This figure shows that the movable iron core and armature do not move at less than rated current of the breaker.

Fig. 4 Time-Delay Action (1)



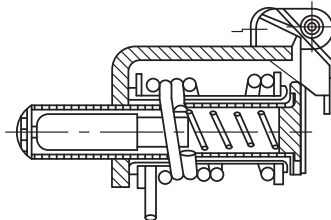
When overcurrent flows through the magnet coil, only the movable iron core moves for the pole piece, overcoming viscosity of the silicon liquid oil.

Fig. 5 Time-Delay Action (2)



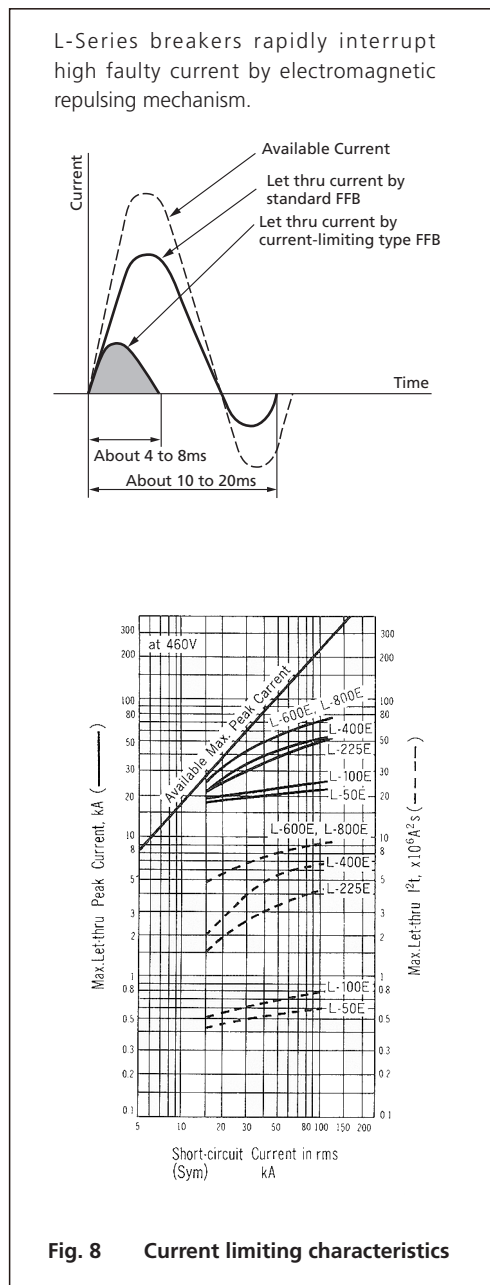
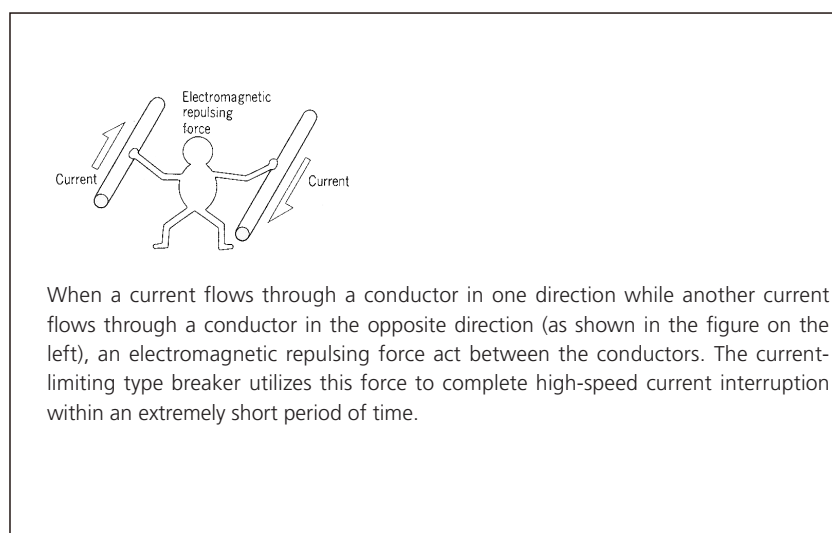
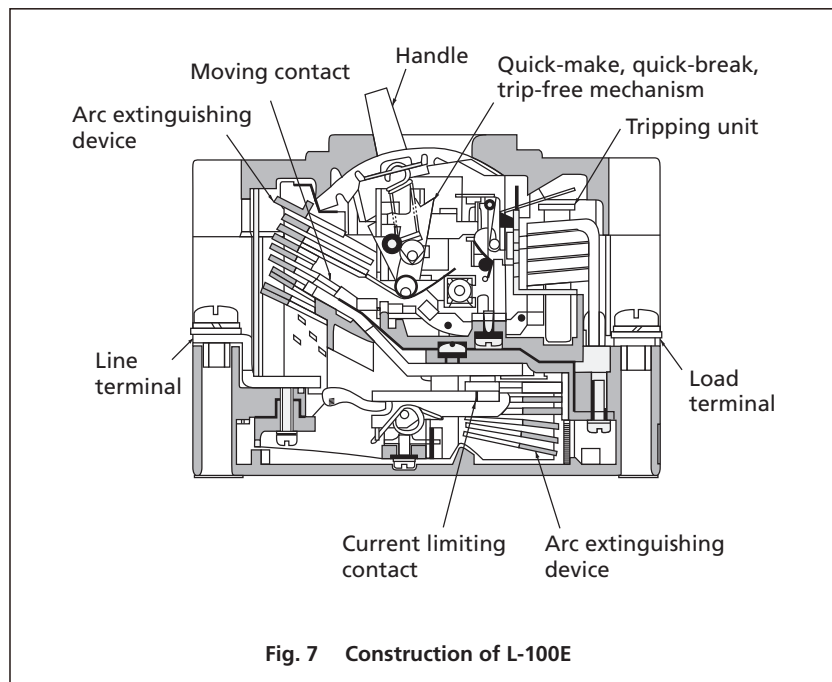
The armature is pulled at the pole piece, overcoming the core spring by increasing of the flux, and the armature operates the tripping mechanism of the breaker.

Fig. 6 Instantaneous Action

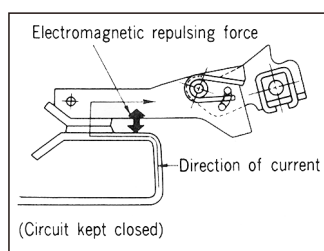


When a large current flows through the magnet coil, take short circuit for instance, armature is pulled at pole piece instantly without moving iron core, and it operates the tripping mechanism of the breaker.

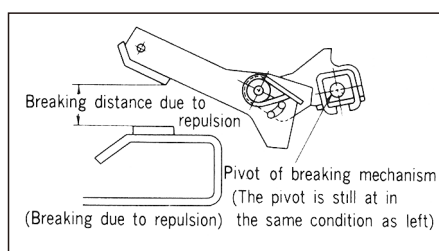
Construction of Current-Limiting Type Breakers (L series)



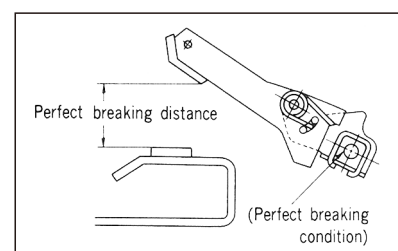
Function of Hitachi Current-Limiting Type Breaker is as follows:



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



The electromagnetic repulsing 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)

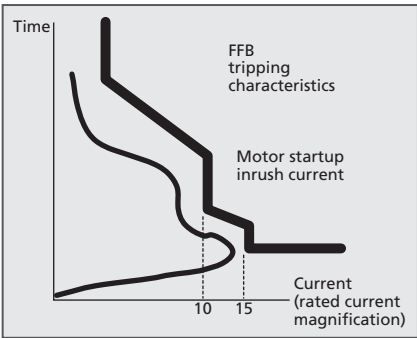
Excellent Current Limiting Function

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



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

(FFB)

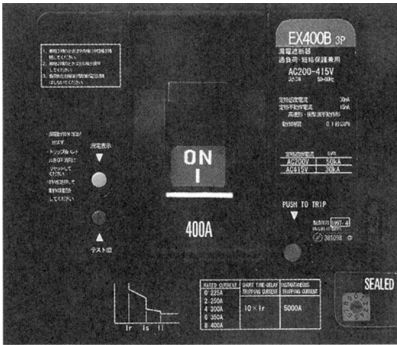
Double Instantaneous Trip*

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



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.

Table 6 Overcurrent Tripping characteristics

All poles loaded		Conventional time (h)
Conventional non-tripping current	Conventional tripping current	
1.05 times current setting	1.3 times current setting	2*
*1 hour when $I_n \leq 63A$		

<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.

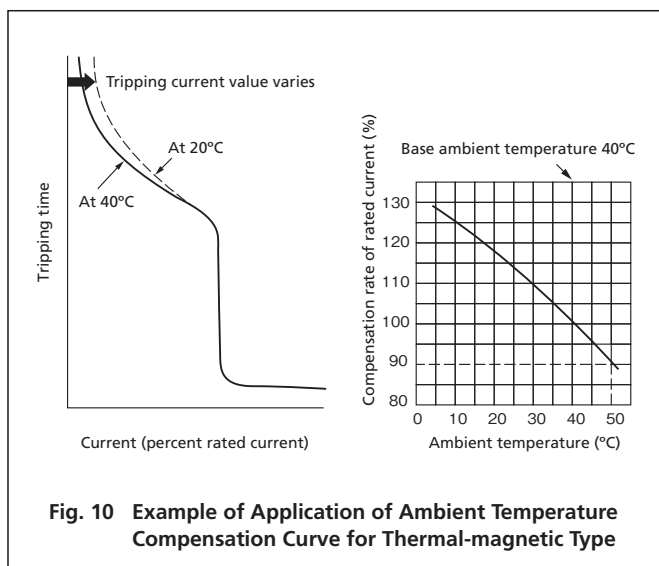
■ Thermal-magnetic type

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:

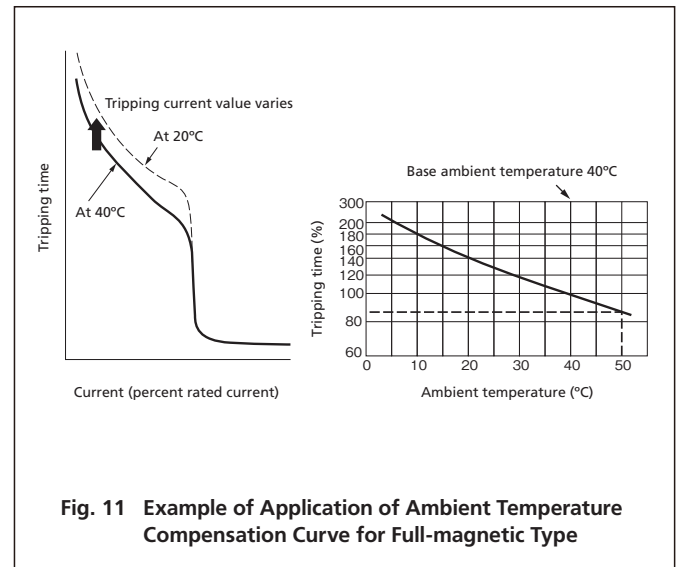
$$I = \frac{I_1 \times 100}{X(\%)}$$

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.



■ Full-magnetic type

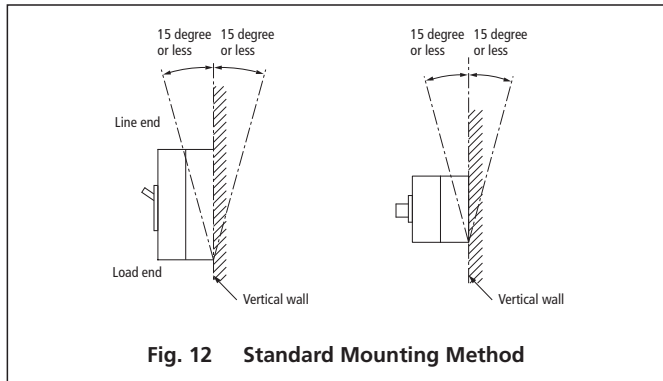
The rated current of a full-magnetic type which has no thermal element will not undergo a change despite variations in ambient temperature. Instead, the viscosity of the oil in its dash pot relay varies with temperature, causing the operating time to change as shown in Fig. 11. The rate of change in 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.



<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.

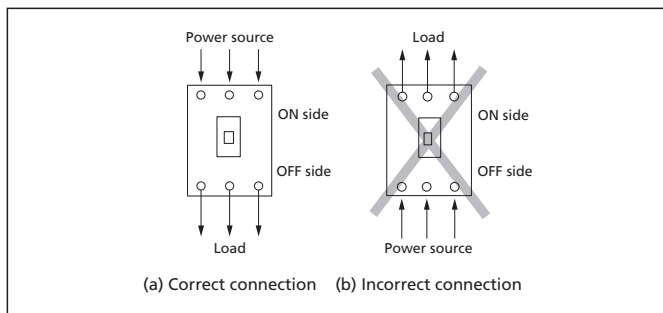
1. Standard mounting is shown in the diagram below.



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	—	AC460V	1. Please state "Reversible connection type" when ordered.
225AF	FXK250-S, FXK250-H	S-225SB, SXX225		
400AF	F-400R	S-400S		2. Installation of phase separators on the load side is required.
600AF	F-600F	S-600S		
800AF	F-800F, F-800RH	S-800S		
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:

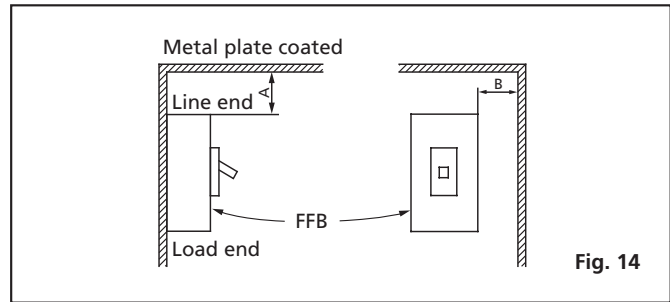


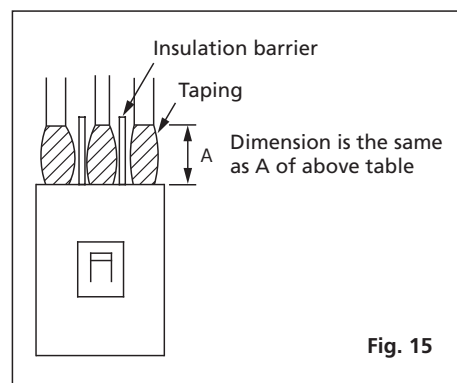
Table 7 Insulation Clearance

() dimension is 400V class

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.



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

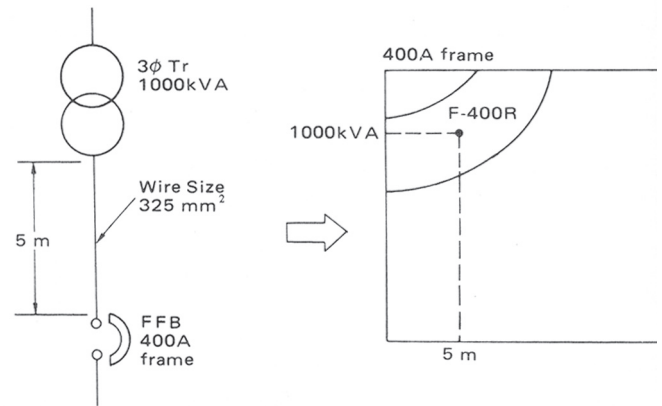
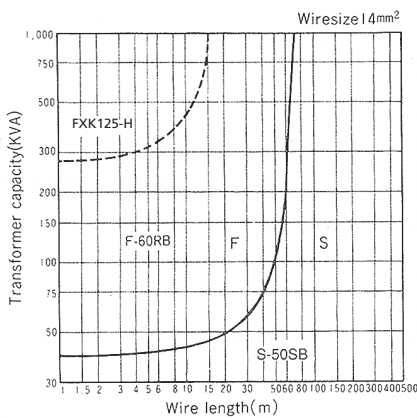


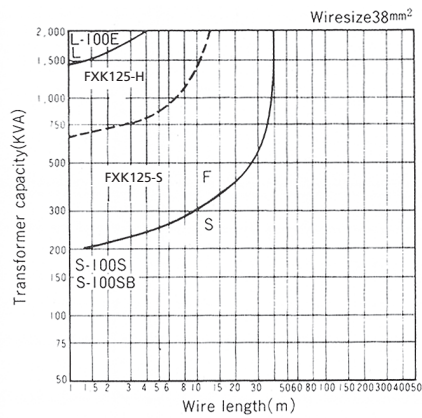
Fig. 16 Example of selection

AC 460V (Transformer voltage: 415V)

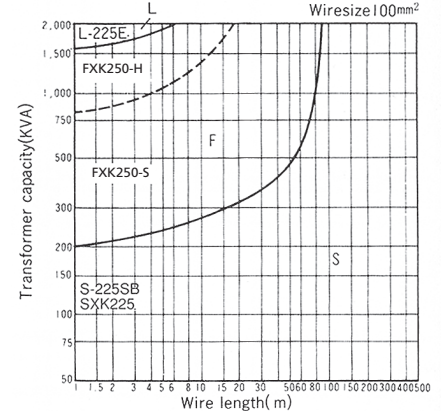
50A 125A frame



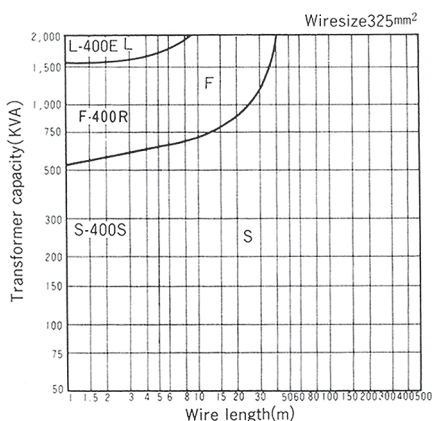
100AF 125A frame



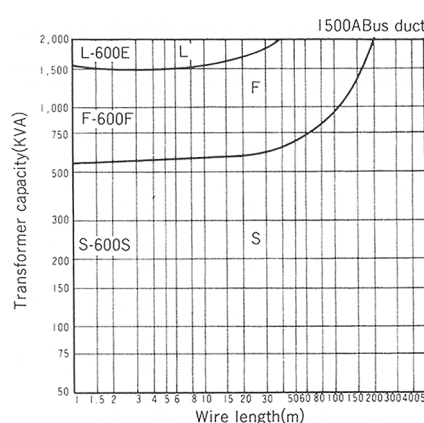
225AF 250AF frame



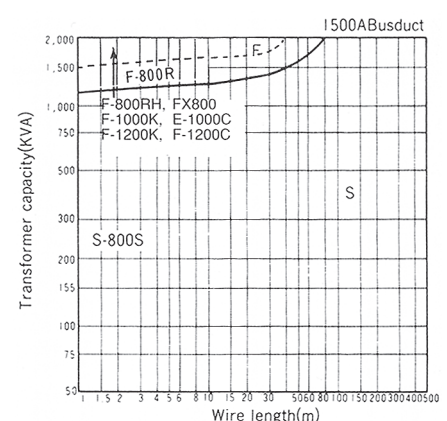
400A frame



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		FFB													
Capacity (kW)	Full-load current (A)	Rated current (A)	Interrupting capacity (kA) Sym												
			2.5	5	7.5	10	15	22	25	30	35	43	50	85	
0.2	0.7	15	F-30FB	S-60RB	F-60RB	FXK125-S				FXK125-H				L-50E	
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	S-50SB	FXK125-S				FXK125-H				L-100E			
15	33	60													
18.5	40	60													
22	45	75	S-100S S-100SB				FXK125-S				FXK125-H				L-100E
30	60	100													
37	75	100													
45	90	150	S-225SB SXX225					FXK250-S			FXK250-H			L-225E	
55	(110)	175													
75	(150)	225													
90	(180)	225													
110	(220)	350	S-400S					SX400			F-400R FX400		L-400E		
150	(300)	500	S-600S					SX600			F-600F FX600		L-600E		
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		FFB												
Capacity (kW)	Full-load current (A)	Rated current (A)	Interrupting capacity (kA) Sym											
			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				FXK125-S				FXK125-H		L-100E	
22	45	75												
30	60	100												
37	75	125	S-225SB SXK225				FXK250-S				FXK250-H		L-225E	
45	90	150												
55	(110)	175												
75	(150)	225												
90	(180)	350	S-400S SX400								F-400R FX400		L-400E	
110	(220)	400												
150	(300)	600	S-600S SX600								F-600F FX600		L-600E	
190	(380)	700	S-800S								FX800		F-800R F-800RH L-800E	

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	
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	S-50EB, S-50SB									
7.5	33	60										
11	45	75										
15	60	100										
18.5	75	100										
22	90	150	S-225SB SXK225						FXK250-S	FXK250-H	L-225E	
30	(120)	200										
37	(150)	225										
45	(180)	225										
55	(220)	350	S-400S SX400						F-400R FX400	L-400E		
60	(240)	400										
75	(300)	500	S-600S SX600						F-600F FX600	L-600E		
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	125	175	
For a capacity of 15 kW or less, select the same breaker among those for direct-starting														
18.5	75	125	S-225SB SXX225					FXK250-S		FXK250-H		L-225E		
22	90	150												
30	(120)	200												
37	(150)	225												
45	(180)	350	S-400S, SX400							F-400R FX400		L-400E		
55	(220)	400												
60	(240)	500	S-600S, SX600							F-600F FX600		L-600E		
75	(300)	600												
90	(360)	700	S-800S, F-800R, SX800									F-800RH FX800	L-800E	

<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.

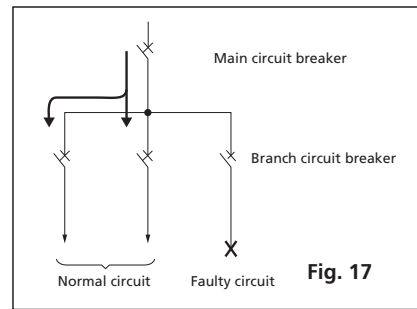


Table 13 Discrimination between standard FFBs and ELECTRONICS TYPE FFBs

230V class

FFB for branch circuit Type	FFB for main circuit Interrupting Capacity(kA)	Type Capacity(kA)	FX400	FX600	FX800	FX1000	FX1200	F-1600CB
F-30FB	5	5	5	5	5	5	5	5
F-50FC	10	5	5	7.5	7.5	10	10	10
F-60RB	25	5	5	10	10	25	25	25
F-50HB	35	5	5	10	10	35	35	35
FXK125-H	100	5	5	14	14	85	85	85
FXK125-S	50	5	5	10	10	50	50	50
FXK125-H	100	5	5	14	14	85	85	85
FXK250-S, FXK250-H, F-250FB, F-250KC	85/100	4	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	4	5	5	5	5	5
S-100EB, S-60RB	10	4	4	7.5	7.5	10	10	10
S-100SB	35	5	5	14	14	25	25	25
S-225SB, SXK225	35	4	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	5	14	14	125	125	125
L-100E	175	5	5	14	14	125	125	125
L-225E	175	4	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 Interrupting Capacity(kA)	Type 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	2.5
F-50FC	7.5	4	4	7.5	7.5	7.5	7.5	7.5
F-60RB	10	4	4	7.5	7.5	10	10	10
FXK125-H	50	4	4	7.5	7.5	50	50	50
FXK125-S	30	4	4	7.5	7.5	25	25	25
FXK125-H	50	4	4	7.5	7.5	35	50	50
FXK250-S, F-250FB	30	4	4	7.5	7.5	22	22	30
FXK250-H, F-250KC	50	4	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	2.5
S-60RB	5	4	4	5	5	5	5	5
S-100S, S-100SB	10	4	4	7.5	7.5	10	10	10
S-225SB, SXK225	15	4	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	4	10	10	30	30	85
L-100E	125	4	4	10	10	30	30	85
L-225E	125	4	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

Interior Accessories

■ Available accessories inside of FFB are as follows:

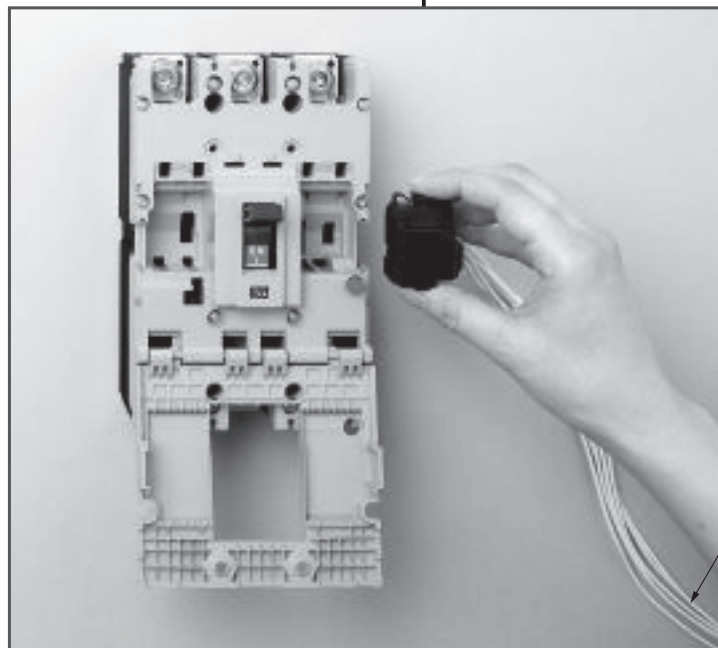
Undervoltage Trip (UVT)

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.

Shunt Trip (SHT)

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.



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

Alarm Switch (AL)

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.

■ Terminal Symbols and Connection Condition of AL Switch

Condition of Breaker	Connection condition of AL switch
ON and OFF	
Tripped	

(): for 2C contacts

Auxiliary Switch (AUX)

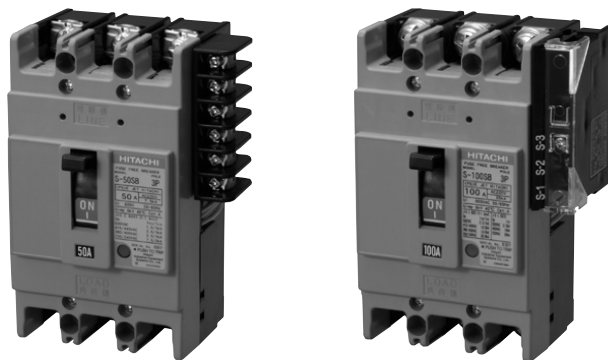
The auxiliary switch, a device interlocked with opening and closing operation of a breaker, is used to open or close control circuits as the breaker operates. It employs a microswitch equipped with a C-contact.

■ Terminal Symbols and Connection Condition of AUX Switch

Condition of Breaker	Connection condition of AUX switch
ON and OFF	
OFF or Tripped	

(): for 2C contacts

Terminal Block for Interior Accessories



TB

TB2

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

TB

TB2

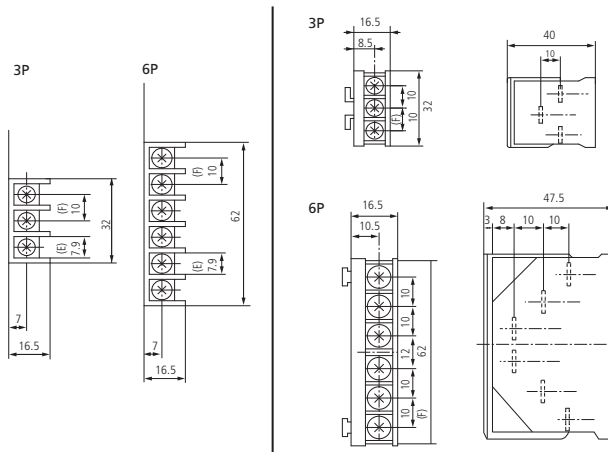
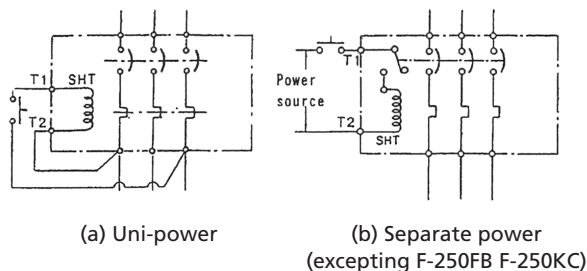


Fig. 19 Dimensions of FFB with Terminal Block for Interior Accessory



(a) Uni-power

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

Fig. 20 Wiring Diagram of Shunt Trip

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	

Table 15 Coil rating of SHT and UVT

Type	SHT		UVT	
	Voltage	Input (VA)	Voltage	Input (VA)
S-30E, S-50EB, S-225SB, SXK225		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	AC 100-110V AC 200-220V AC 230-240V AC 380V AC 400-440V AC 480V	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	(Common use for 50 and 60 Hz)		50Hz AC 100V 200V 230V 240V 400V 415V	60Hz AC 100V 110V 200V 220V 400V 440V
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	DC 100V DC 110V			20 30

Table 16 **Applicability of interior accessories**

Type	Number of poles	Accessories	F		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		S-30E S-50EB		S-50SB, S-100EB, S-100SB, S-60RB		S-100S		S-225SB ★SXX225		★SX400 S-400S		★SX600 S-600S ★SX800 S-600S			
			L				L-50E L-100E				L-225E L-400E		L-600E L-800E					
			M		MS-30E MS-50EB		MS-50SB MS-100SB				★MFXK100-S ★MFXK225-S MS-225SB MF-250FB							
					2	3	2	3	2	3, 4	2, 3	2, 3, 4	2, 3, 4	2, 3, 4	3, 4			
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:

- 2C means that it can be mounted 1C, if required.
- *: Terminal block (TB) for UVT wiring is equipped.
- The accessories of marked ★types can be installed by customers.
- 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.

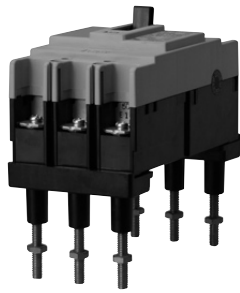


Fig. 21 FFB with Rear Connecting Studs

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.

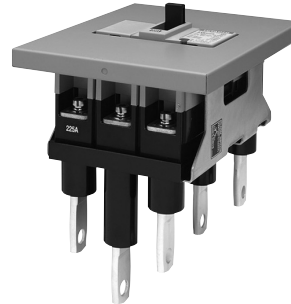


Fig. 23 FFB with Flush-mounting Base Assembly

4. Mechanical Interlock (MIW)

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

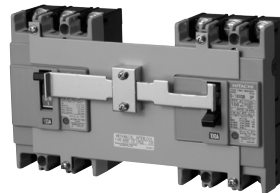


Fig. 24 FFB with Mechanical Interlock

5. Drawout Mechanism (PDK)

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

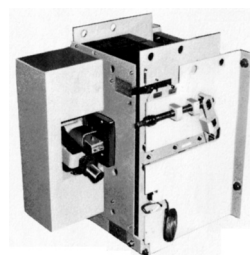


Fig. 25 FFB with Drawout Mechanism

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-50E L-100E	L-225E L-400E	L-50E L-100E	L-225E L-400E
	S series	S-225SB SXX225	SX400 S-400S	—	—
Max. operational current peak (A)	DC100	—			
	DC110	—			
	AC100	0.2	0.3	0.2	0.3
	AC110	(0.6)	(0.9)	(0.6)	(0.9)
	AC200	0.1	0.15	0.1	0.15
Power supply (VA)	AC220	(0.3)	(0.45)	(0.3)	(0.45)
	Power supply (VA)	500	100	50	100

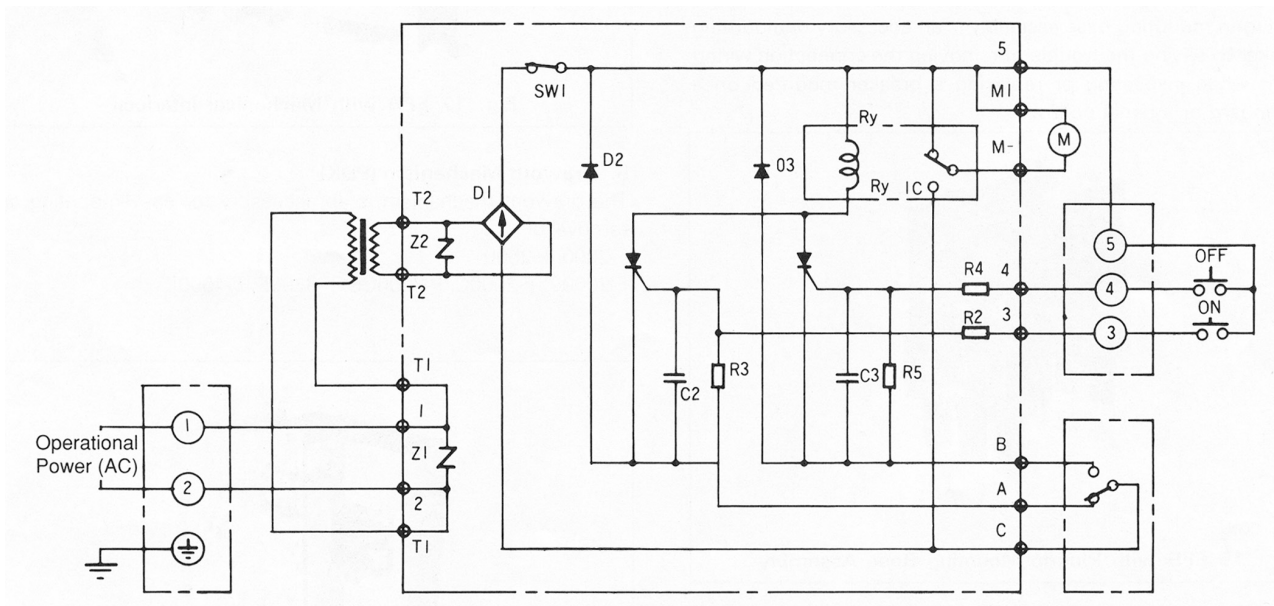


Fig. 27 Control Circuit of Motor Operating Mechanism

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.

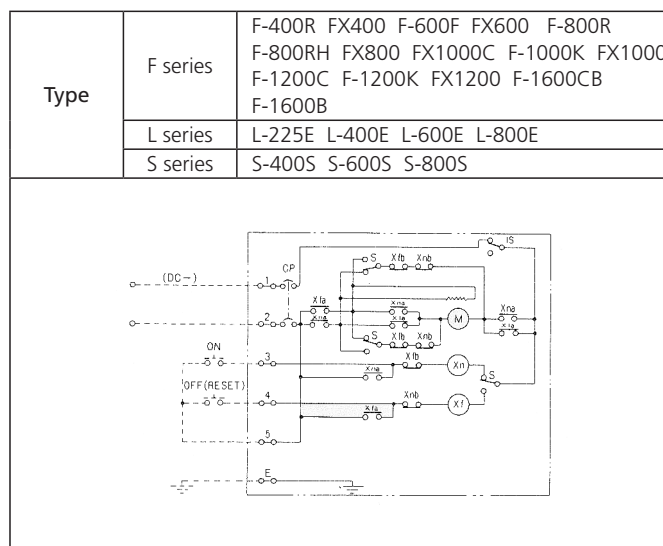


Fig. 28 Motor Operating Mechanism

*excepting 4 poles FFB

Table 18 Standard Ratings of Motor Operated Mechanism

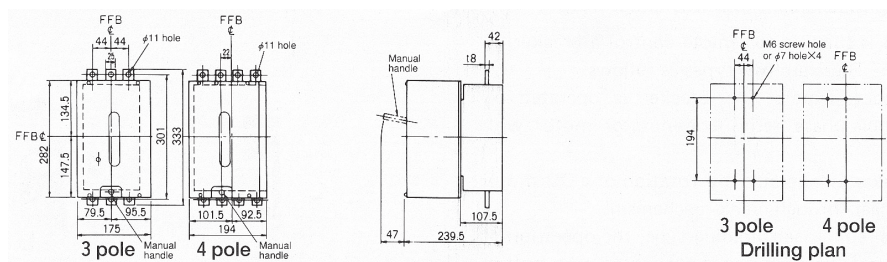
Type		MMK-C			
Type of FFB	F series	F-400R FX400	F-600F FX600	F-800R F-800RH FX800 F-1000C* F-1000K* F-1200C* F-1200K* F-1600CB* F-1600B*	F-1000C (4P) F-1000K (4P) F-1200C (4P) F-1200K (4P) F-1600CB (4P) F-1600B (4P)
	L series	L-225E L-400E	—	L-600E L-800E	—
	S series	S-400S	S-600S	S-800S	—
Max. operational 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



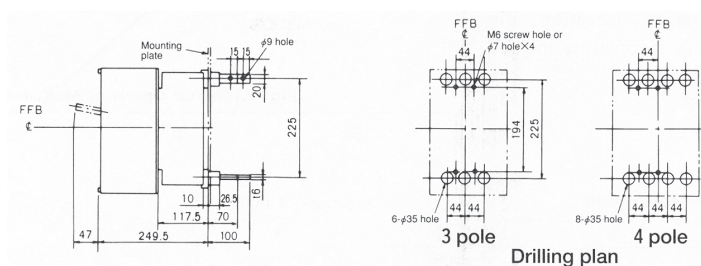
PS	Push-button Switch
X	Auxiliary Electromagnetic Contactor
n	For operating FFB" ON"
f	For operating FFB" OFF"
a	Closed by operation (normally open)
b	Opened by operation (normally closed)
CP	Circuit Protector
Z	Timer
Si	Silicon Rectifier
R	Resister
M	Motor
IS S LS	Limit Switch

DIMENSIONS OF MMK-C

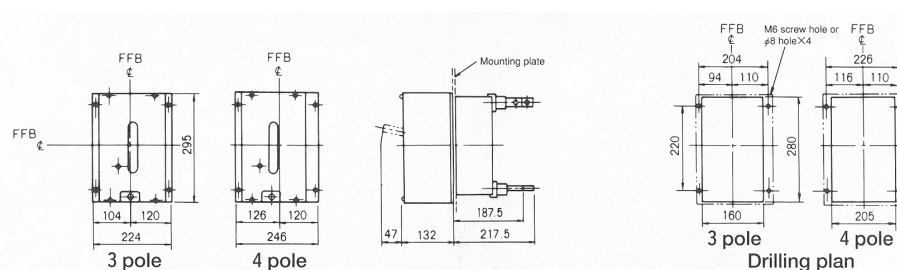
L-225E
(Standard Type)



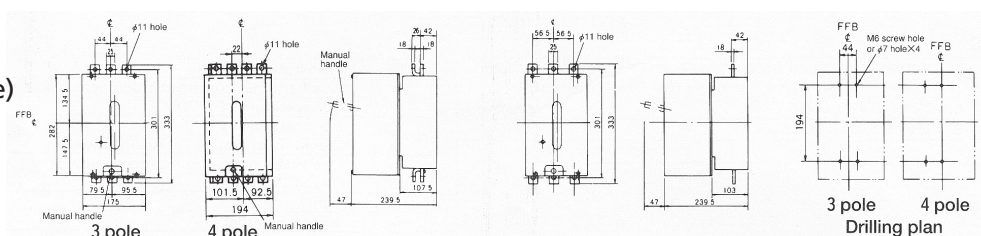
(Rear Connecting Type)



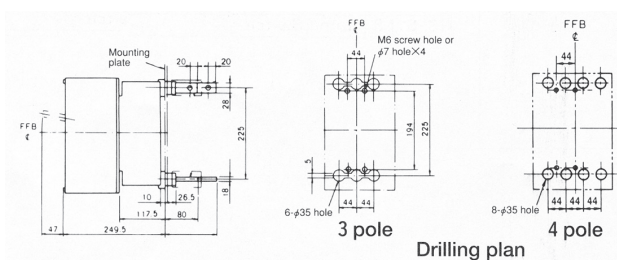
(Built-in Type)



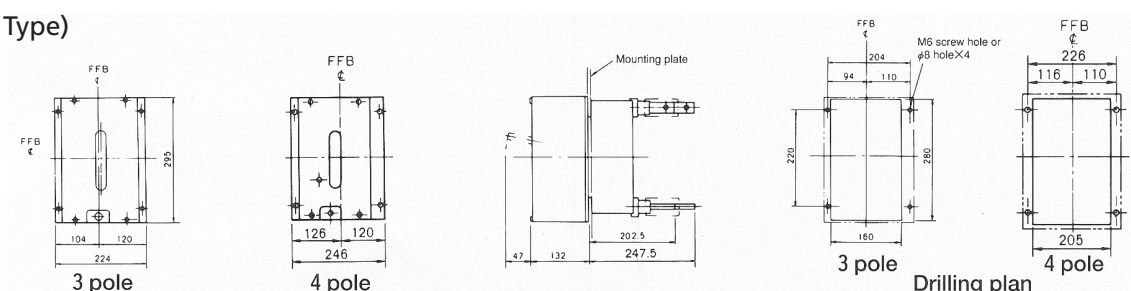
FX400, F-400R
SX400, L-400E
(Standard Type)



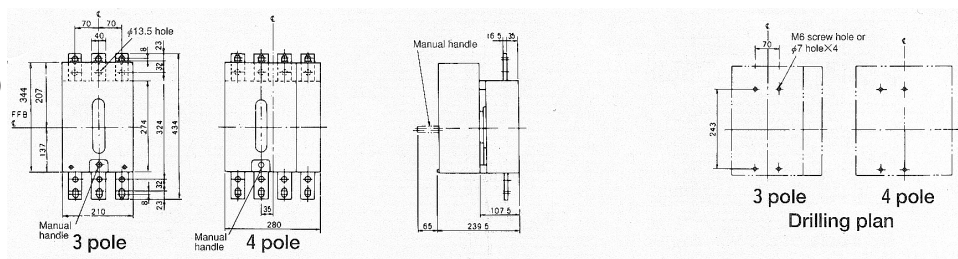
(Rear Connecting Type)



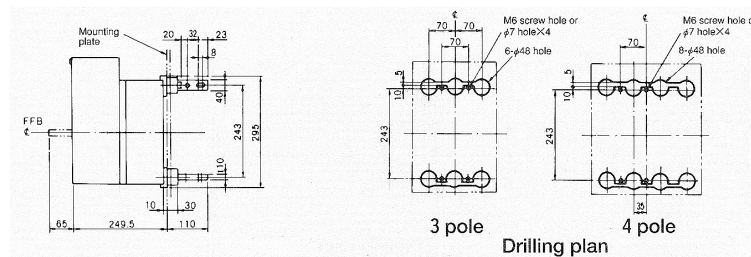
(Built-in Type)



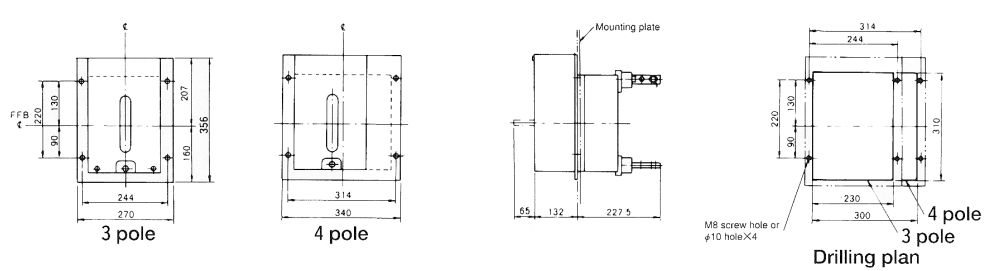
**FX600, F-600F
SX600, L-600E
(Standard Type)**



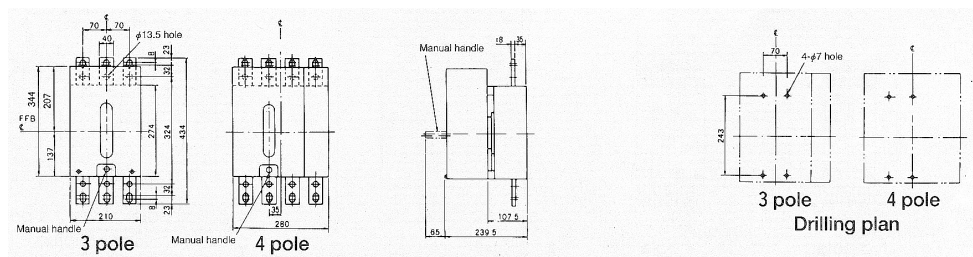
(Rear Connecting Type)



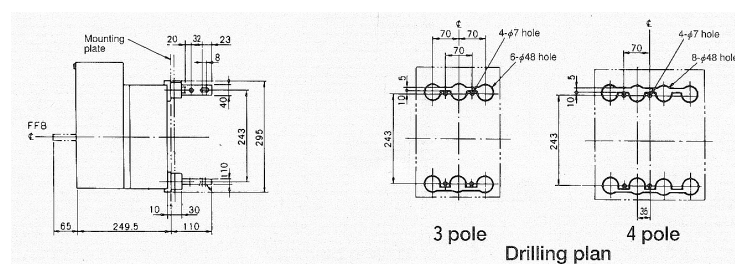
(Built-in Type)



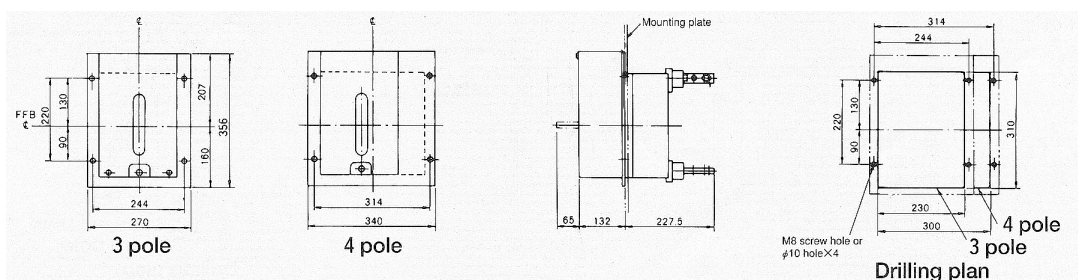
**FX800, F-800R
F-800RH, SX800
L-800E
(Standard Type)**



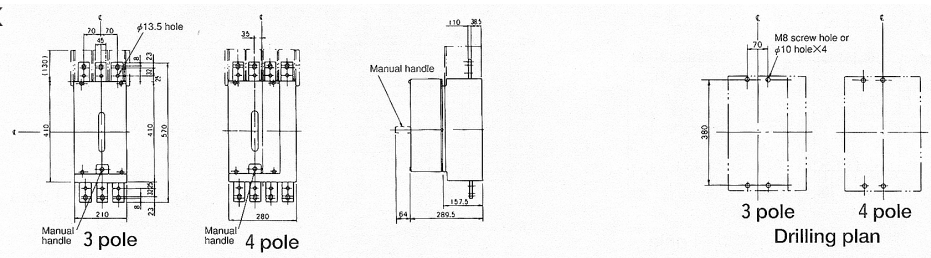
(Rear Connecting Type)



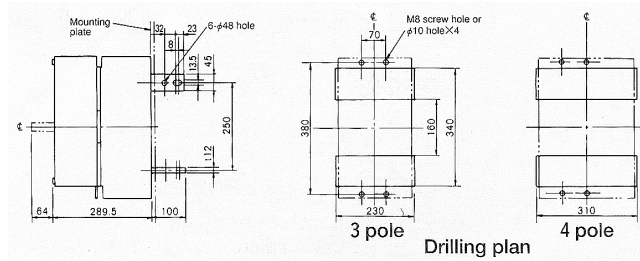
(Built-in Type)



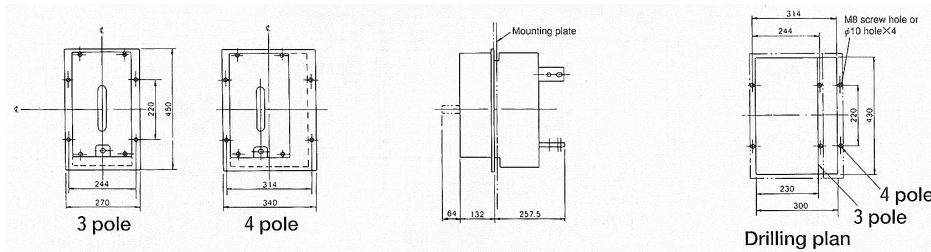
FX1000, F-1000K (Standard Type)



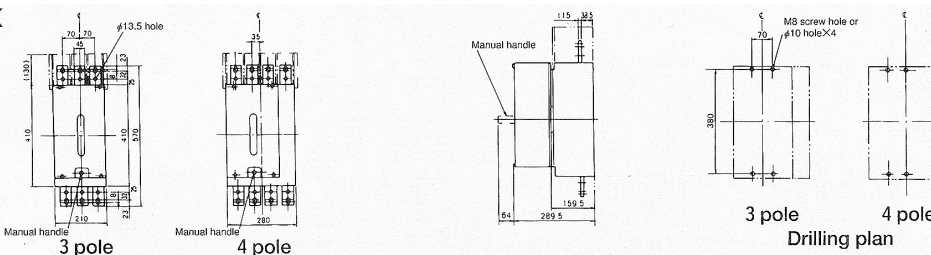
(Rear Connecting Type)



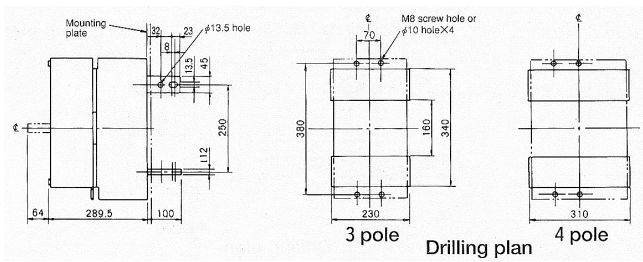
(Built-in Type)



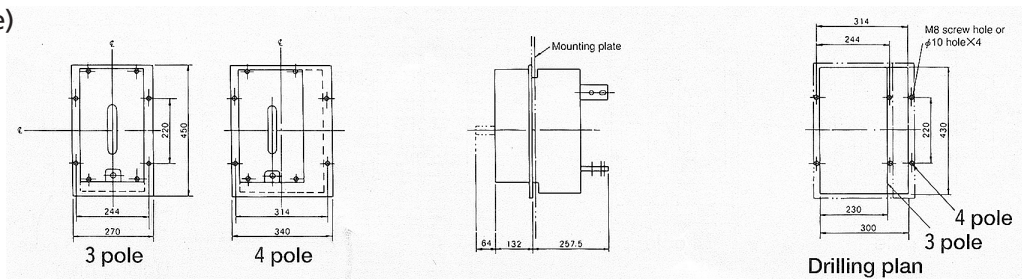
FX1200, F-1200K (Standard Type)



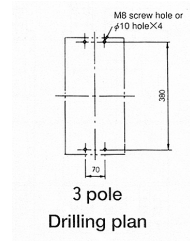
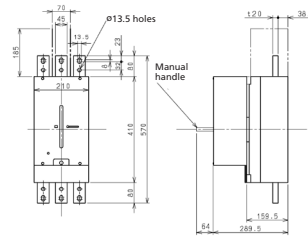
(Rear Connecting Type)



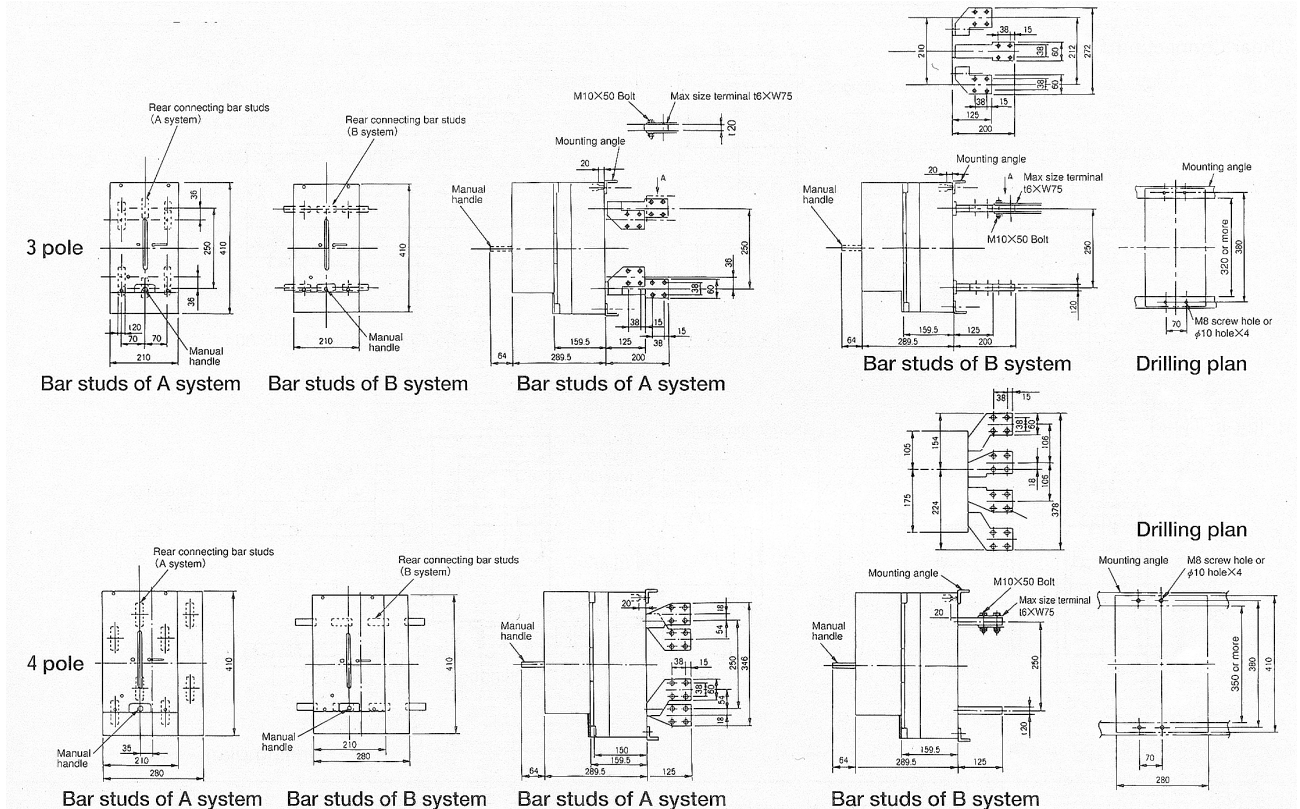
(Built-in Type)



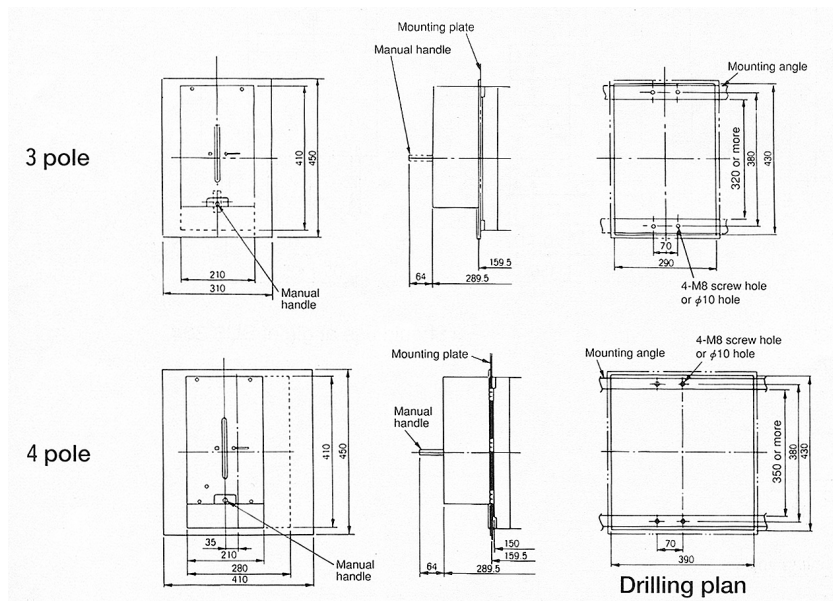
F-1600B, F-1600CB
(Standard Type)



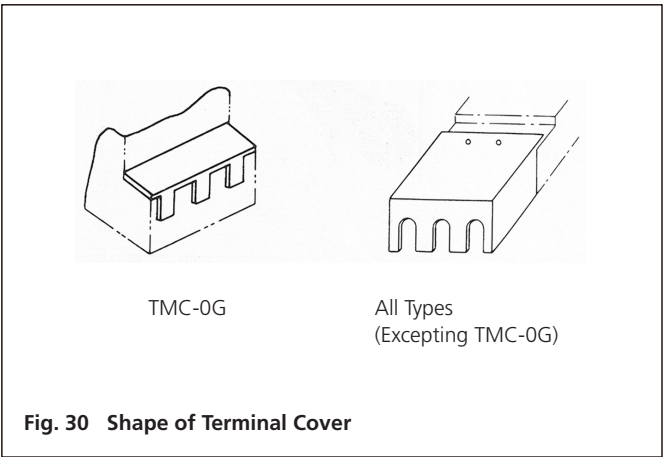
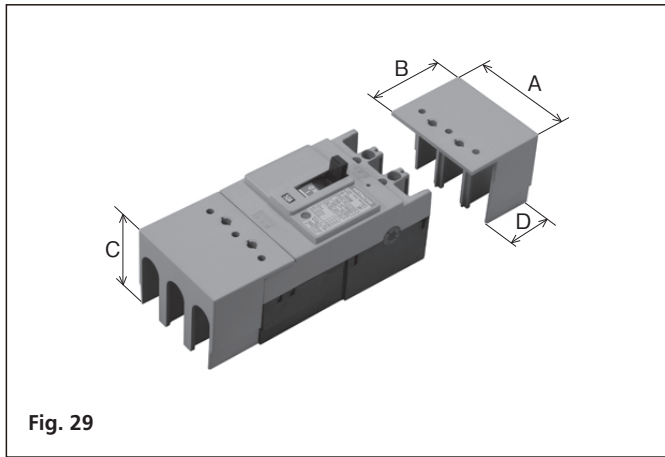
(Rear Connecting Type)



(Built-in Type)



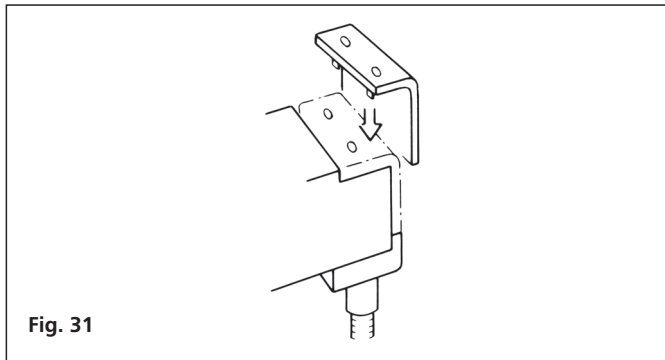
8. Terminal Cover (TMC)



Types	Applicable breakers	Dimensions				Remarks
		A	B	C	D	
TMC-0G	S-30E, S-50EB	75 (50)	19.5	56	5	
TMC-1	F-30FB, S-50SB, S-60SB, F-60RB, S-100EB, S-100SB	75 (50)	48	59.5	28	
TMC-1S		75 (50)	25	56	5	Short type
TMC-2D		75 (50)	56	59.5	36	Long type
TMC-2C	S-100S, F-100S, FXK125-S, FXK125-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	FXK250-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)



Types	Applicable FFB Type
BTC-1	F-30FB, S-50SB, S-60RB, F-60RB, S-100EB, S-100SB
BTC-2C	S-100S, F-100S, FXK125-S, FXK125-H
BTC-3C	F-100KB, L-50E, L-100E
BTC-4G	S-225SB, MS-225SB
BTC-4J	SXK225, FXK250-S, FXK250-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

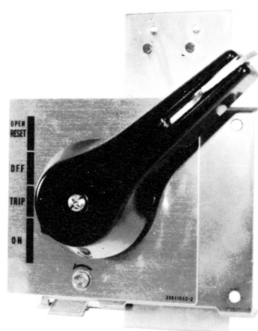
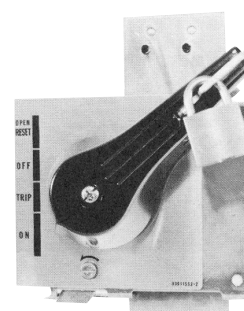


Fig. 32



(with padlock)

■ Dimension of HA Type Handle (3P)

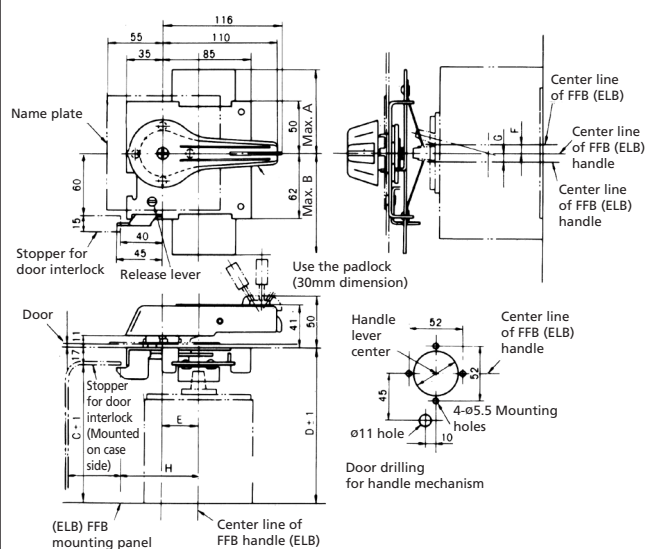


Fig. 33-1

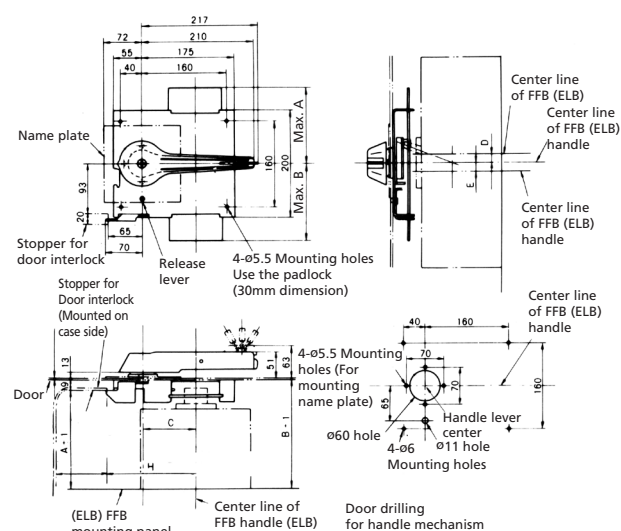
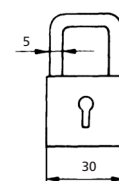


Fig. 33-2

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
			102	115	127	144	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)

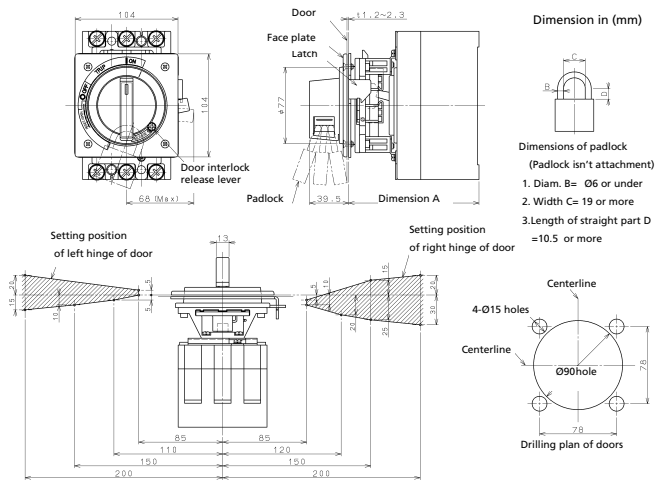


Fig. 36-1

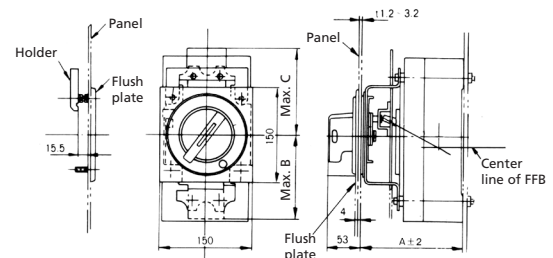


Fig. 36-2

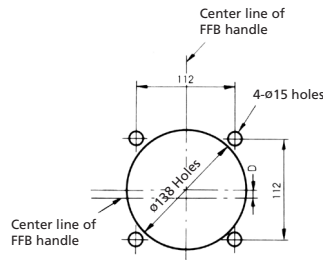
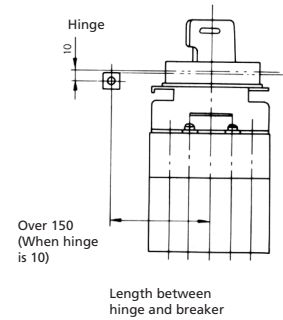
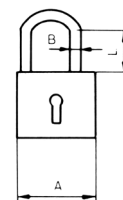


Fig. 36-3



Handle Type	Applicable Breakers	Bolt	Dimension				
			Fig.	A	B	C	D
HM-S11	F-100KB L-50E, L-100E	M4 x 50	Fig.36-1	132	—	—	—
				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

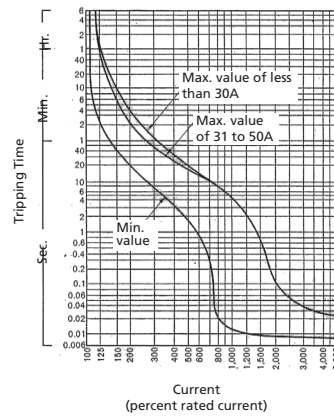
(Padlock is not attached as standard)

Fig. 37

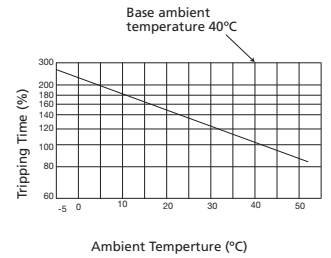
■ Padlock Dimension

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

S-30S/S-50E

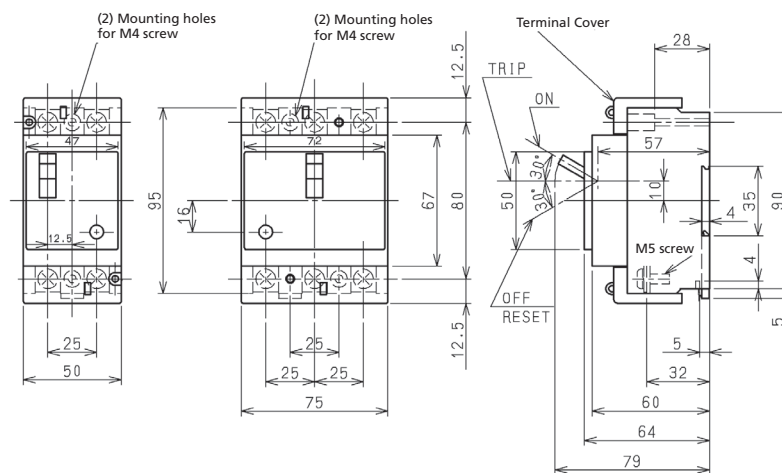


Overcurrent Tripping Characteristic Curve

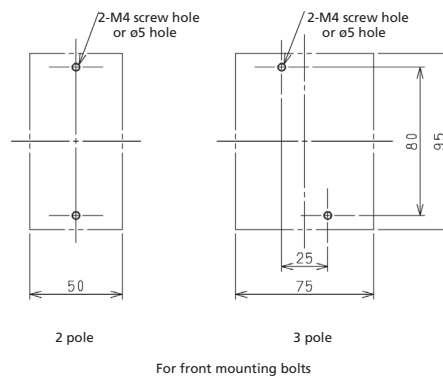


Temperature Compensation Curve

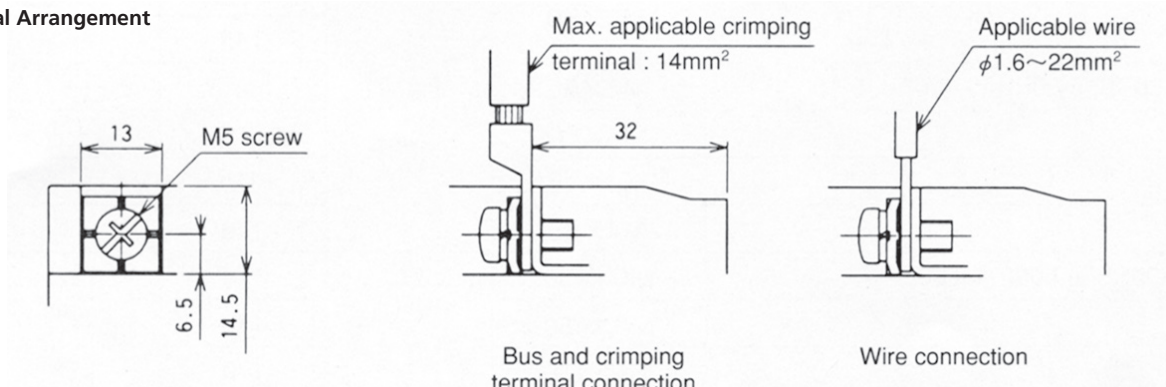
■ Dimensions



■ Drilling Plan



■ Terminal Arrangement

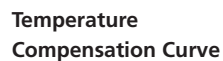


S-30E / S-50EB

(MS-30E / MS-50EB)



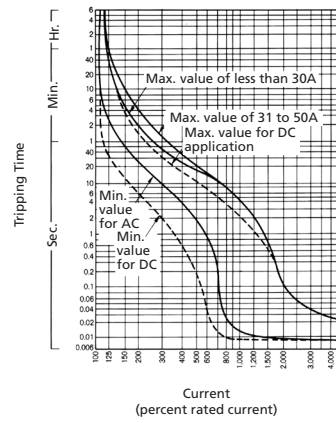
The image shows two Hitachi circuit breakers side-by-side. The one on the left is labeled 'S-30E' and the one on the right is labeled 'S-50EB'. Both are white with black terminals and handles. They have a similar design with a handle on the right side of the front panel. The labels on the front of each unit provide technical specifications and model information.



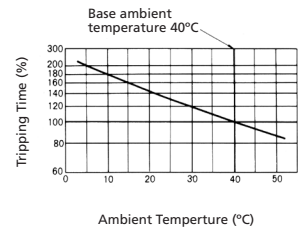
■ Dimensions



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

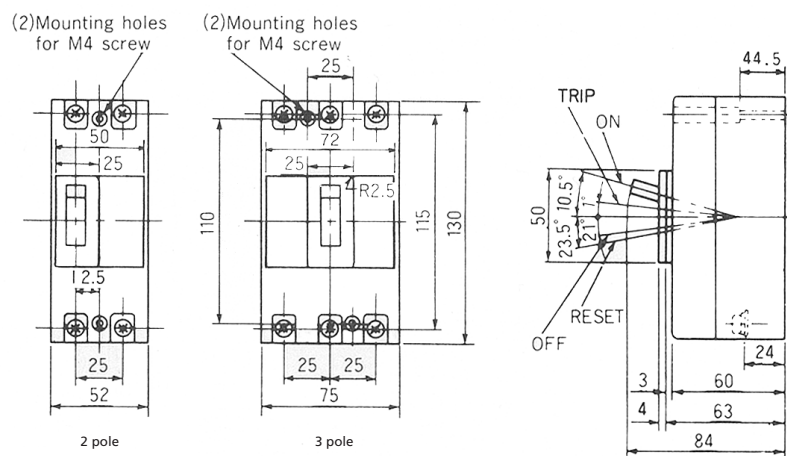


**Overcurrent Tripping
Characteristic Curve**

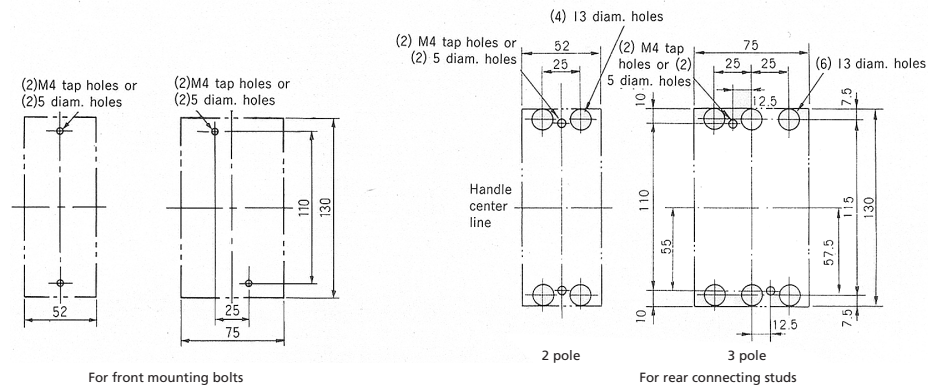


**Temperature
Compensation Curve**

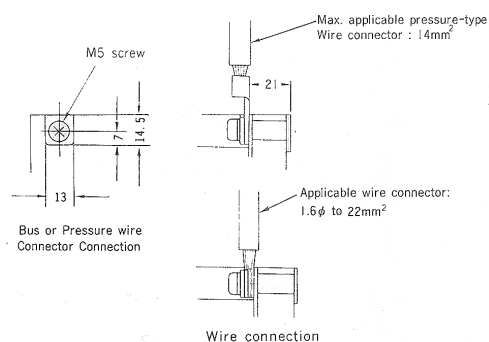
■ Dimensions



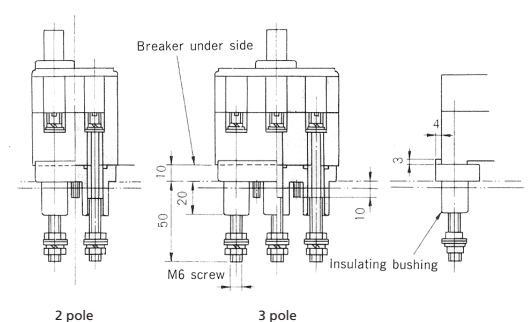
■ Drilling Plan



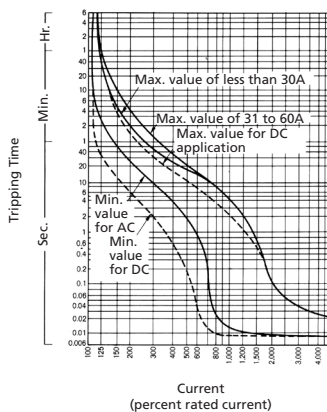
■ Terminal Arrangement



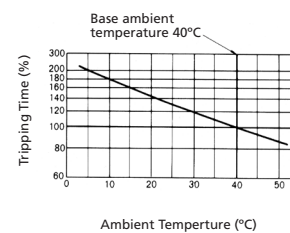
■ For Rear Connecting Studs



F-60RB S-60RB

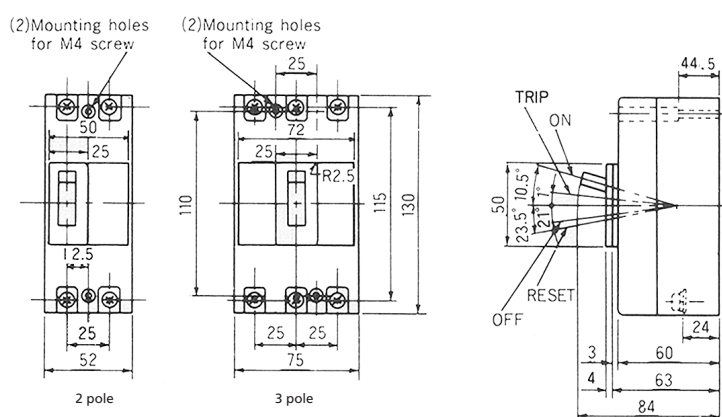


**Overcurrent Tripping
Characteristic Curve**

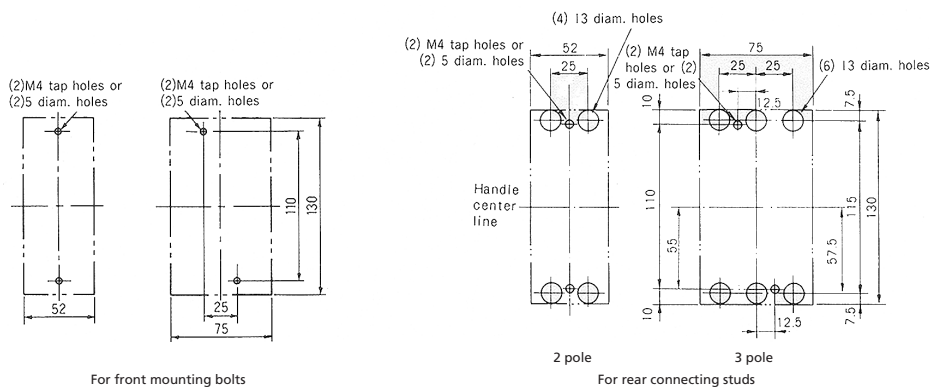


**Temperature
Compensation Curve**

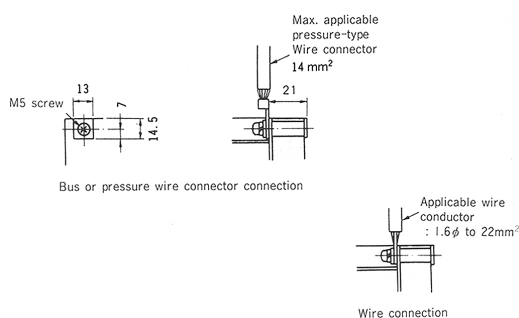
■ Dimensions



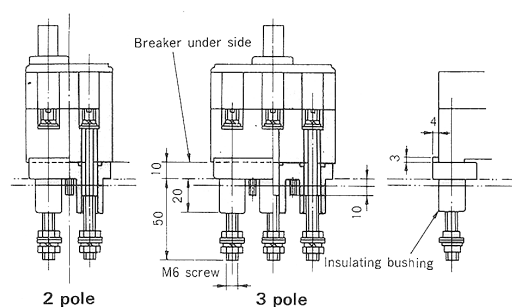
■ Drilling Plan



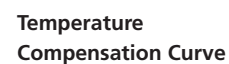
■ Terminal Arrangement



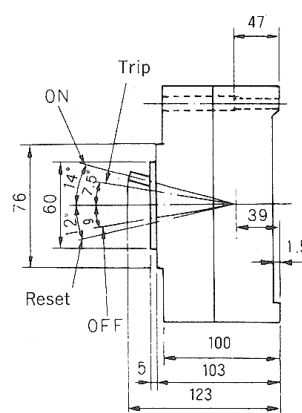
■ For Rear Connecting Studs



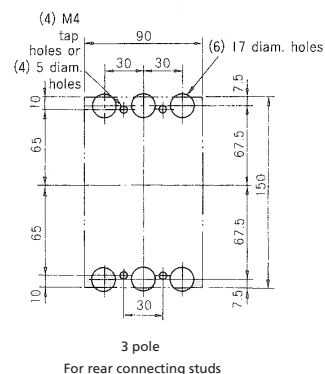
L-50E



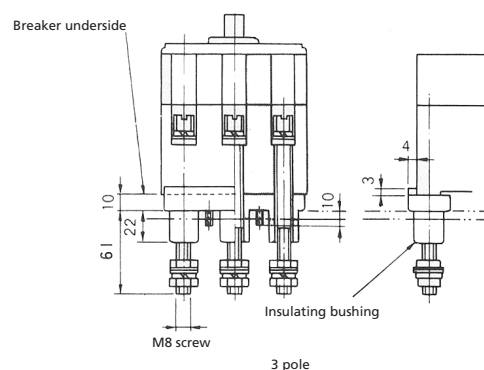
■ Dimensions



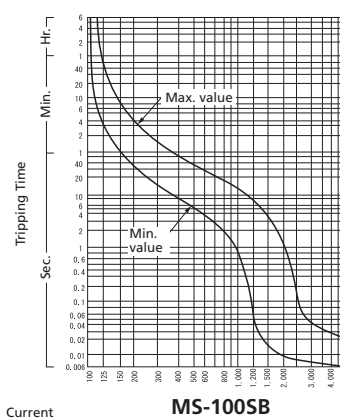
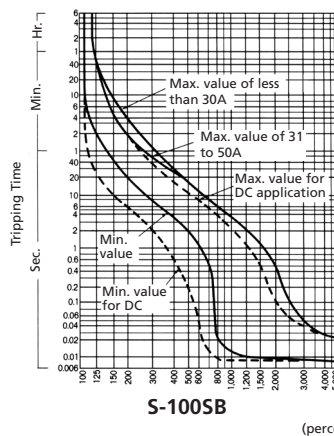
■ Drilling Plan



■ Terminal Arrangement

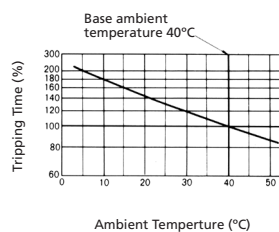
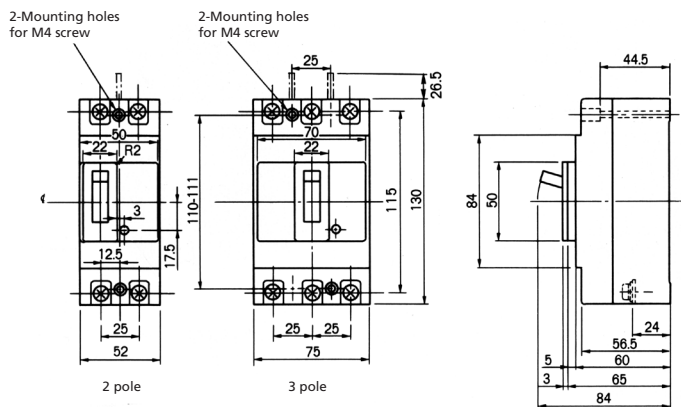


S-100EB/S-100SB (MS-100SB)

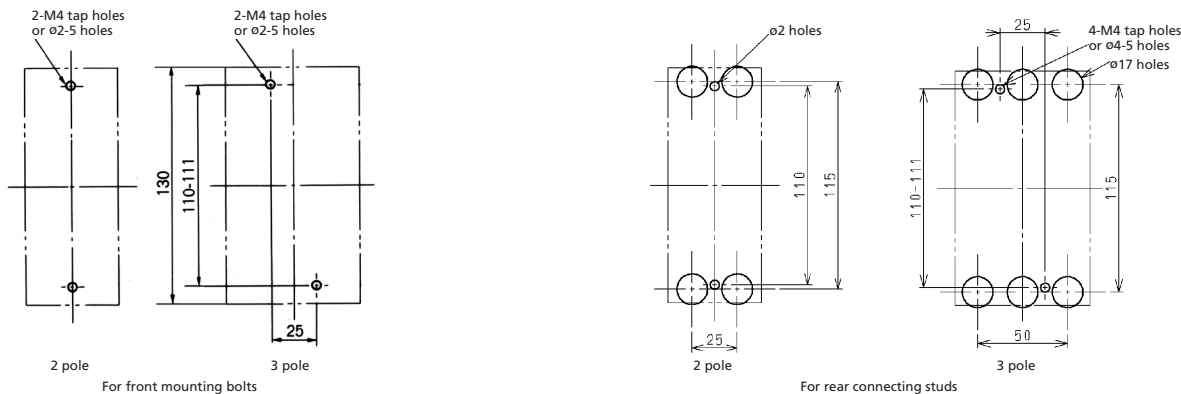


**Overcurrent Tripping
Characteristic Curve**

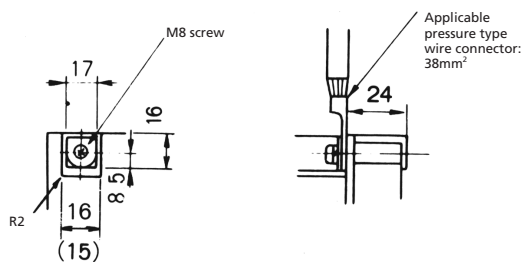
■ Dimensions



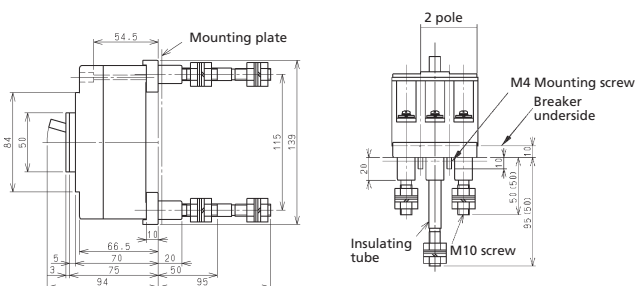
■ Drilling Plan



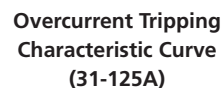
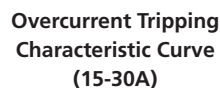
■ Terminal Arrangement



■ For Rear Connecting Studs



A detailed photograph of a Hitachi FKH-100 circuit breaker. The device is a light-colored metal enclosure with three main terminals at the top and three at the bottom. A central handle is labeled "ON" and "OFF". To the right of the handle is a label with technical specifications: "HITACHI", "FKH-100", "100A", "1P+N+PE", "6kV", "50/60Hz", "Icu=15kA@1s", "Ics=7.5kA@1s", "UL Type R", "UL 489B", "UL 1000", "UL 1000A", "UL 1000B", "UL 1000C", "UL 1000D", "UL 1000E", "UL 1000F", "UL 1000G", "UL 1000H", "UL 1000I", "UL 1000J", "UL 1000K", "UL 1000L", "UL 1000M", "UL 1000N", "UL 1000O", "UL 1000P", "UL 1000Q", "UL 1000R", "UL 1000S", "UL 1000T", "UL 1000U", "UL 1000V", "UL 1000W", "UL 1000X", "UL 1000Y", "UL 1000Z".

[illegible]

The left drawing shows the front mounting bracket. It is 90mm wide and 150mm high. It features four mounting holes arranged in a 2x2 grid. The vertical distance between the centerlines of the top and bottom holes is 130mm. The horizontal distance between the centerlines of the left and right holes is 90mm. A note indicates that the holes are for 2-M4 screws or 45 holes.

The right drawing shows the rear connecting studs. It is 90mm wide and 150mm high. It features six mounting holes arranged in two rows of three. The vertical distance between the centerlines of the top and bottom rows is 135mm. The horizontal distance between the centerlines of the left and right holes in each row is 90mm. A note indicates that the holes are for 2-M4 screws or 45 holes. The distance between the centerlines of the middle and right holes in each row is 30mm.

M8 screw
 (M6 screw)

17
 9.5
 24

Max. applicable
 pressure type
 wire connector:
 60mm² (22mm²)

Bus or pressure wire connector connection

(): dimensions only for 50A or less

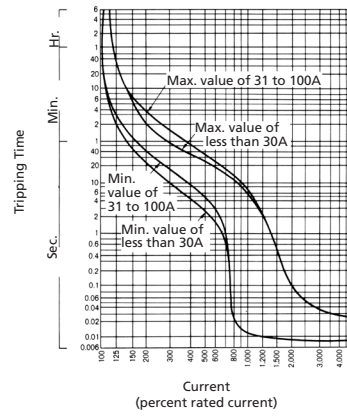
Applicable wire
 connector:
 1.6 to 22mm²

Wire connection (15 to 50A)

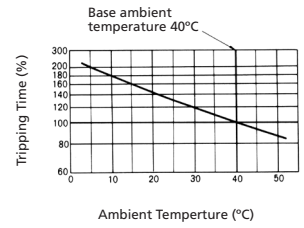
Technical drawing of the rear view of a 60A to 125A terminal block. The drawing shows a cross-section of the terminal block with various dimensions and labels. Key dimensions include: 51 (total width), 3 (distance from left edge to center of A system studs), 6 (distance from center of A system studs to center of B system studs), 1 (distance from center of B system studs to right edge), 11 (distance from center of B system studs to right edge), 40 (distance from center of B system studs to right edge), 32.5 (distance from left edge to center of A system studs), 61 (distance from left edge to center of B system studs), 24 (distance from center of B system studs to right edge), 22 (distance from center of B system studs to right edge), 59.2 (distance from left edge to center of B system studs), 68 (distance from left edge to center of B system studs), 94 (distance from left edge to center of B system studs), 104.2 (distance from left edge to center of B system studs). Labels include: 'A system studs (standard)', 'Face of board', 'B system studs (Customer-changeable)', '48.5 hole', '4', '61', '24', '22', '59.2', '68', '94', '104.2', '(right and left pole)', '(center pole)'.

Dimensions are only for 60A to 125A

L-100E

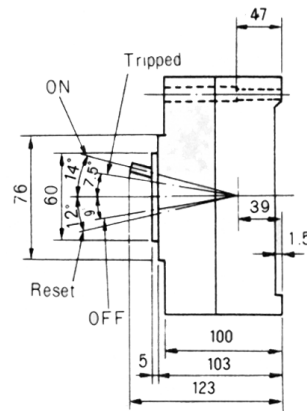
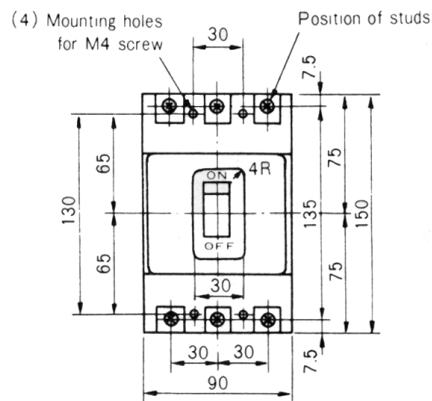


Overcurrent Tripping Characteristic Curve

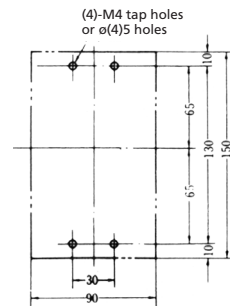


Temperature Compensation Curve

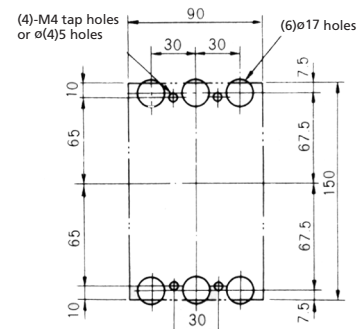
■ Dimensions



■ Drilling Plan

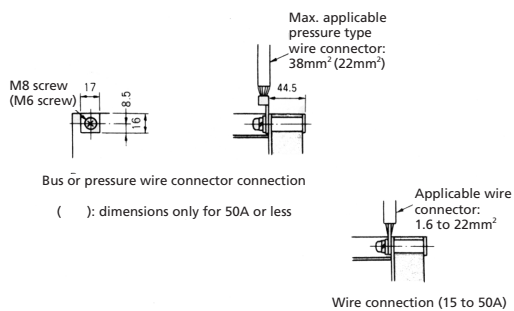


3 pole
For front mounting bolts

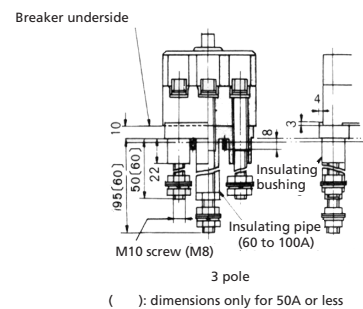


3 pole
For rear connecting studs

■ Terminal Arrangement

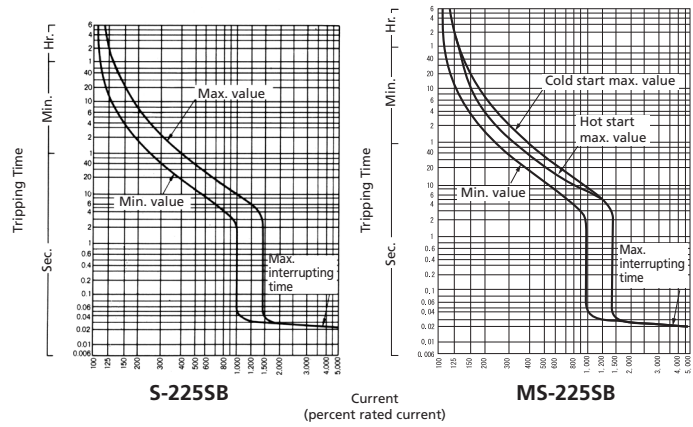


■ For Rear Connecting Studs



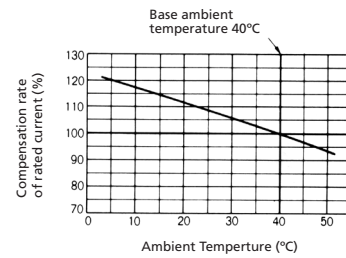
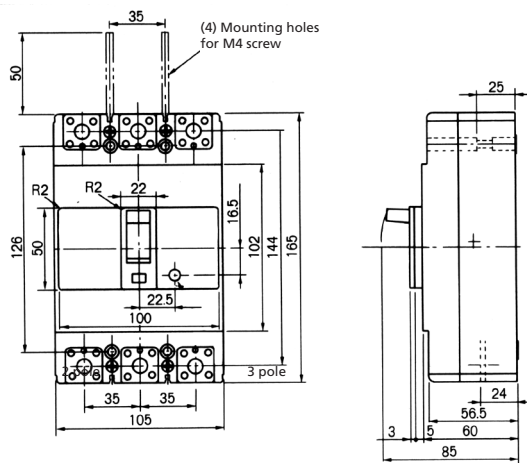
S-225SB

(MS-225SB)



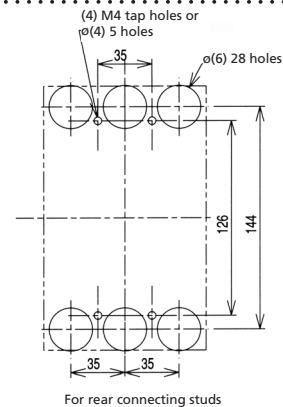
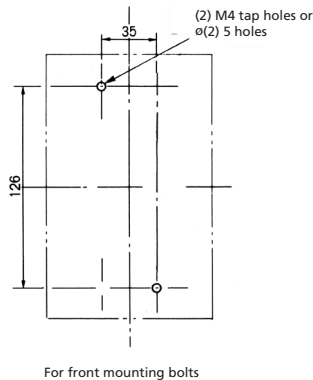
Overcurrent Tripping Characteristic Curve

■ Dimensions



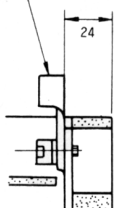
Temperature Compensation Curve

■ Drilling Plan



■ Terminal Arrangement

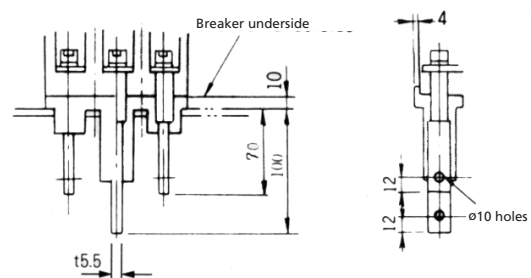
Maximum applicable pressure type-wire connector = 60mm²
Special pressure type wire connector is attached for 175 – 225A as shown on the right table

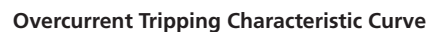


Pressure type wire connector directly connected

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





Technical drawing of the Phase separator assembly, showing front and side views with dimensions and labels.

Front View Dimensions:

- Overall width: 105
- Overall height: 165
- Top section height: 50
- Top section width (between mounting holes): 35
- Mounting hole diameter: 2
- Distance between mounting holes: 35
- Distance between mounting holes (center-to-center): 105
- Distance between mounting holes (center-to-center): 98
- Distance between mounting holes (center-to-center): 23.2
- Distance between mounting holes (center-to-center): 18.4
- Distance between mounting holes (center-to-center): 144
- Distance between mounting holes (center-to-center): 165
- Distance between mounting holes (center-to-center): 144
- Distance between mounting holes (center-to-center): 165

Side View Dimensions:

- Overall height: 117
- Top section height: 50
- Top section width: 25
- Distance between mounting holes (center-to-center): 61
- Distance between mounting holes (center-to-center): 68
- Distance between mounting holes (center-to-center): 93
- Distance between mounting holes (center-to-center): 24
- Distance between mounting holes (center-to-center): 4
- Distance between mounting holes (center-to-center): 4

Labels:

- Phase separator
- Screw of slide cover
- R2
- Trip button
- 2-M4 Mounting screw hole

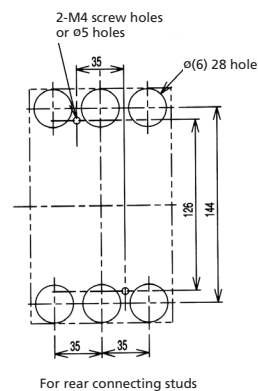


35

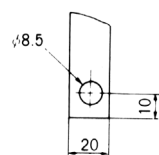
126

2-M4 screw holes
or ø5 holes

For front mounting bolts

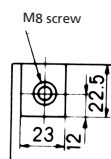


Terminal Arrangement



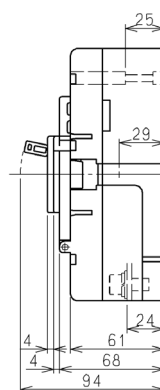
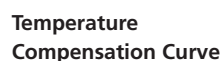
Manufacturing of terminal

Max. applicable crimping
terminal: 150mm²



Crimping terminal
directly connected

Technical drawing of a standard pole assembly. The drawing shows a cross-section of the pole with various dimensions and components labeled. Key dimensions include a total height of 117, a top section width of 46, a hole diameter of $\phi 10$, a hole offset of 12, a base width of 12, a base offset of 12, a base width of 24, a base offset of 61, a base width of 68, a base offset of 95, a base width of 110, and a base offset of 125. Components labeled include 'A system studs (Standard)' and 'B system studs'. The pole is divided into sections: '25 right and left pole', '56 center pole', '70 right and left pole', and '110 center pole'.

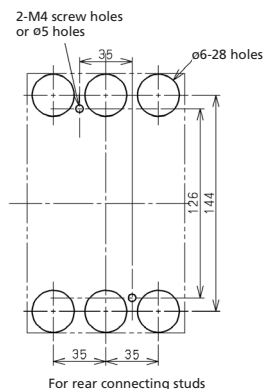


126

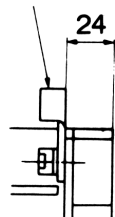
35

2-M4 screw holes
or Ø5 holes

For front mounting bolts

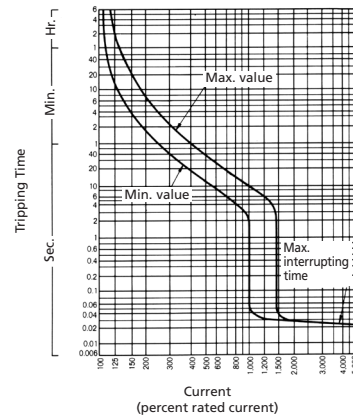


Maximum applicable pressure
type-wire connector = 60mm²
Special pressure type wire
connector is attached for
175 – 225A as shown on the
right table

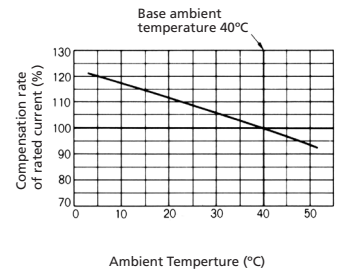


Rated current (A)	Applicable wire size of pressure type wire connector (mm ²)
175 – 225	Pressure type wire connector 80, 100, 125 (mm)

L-225E

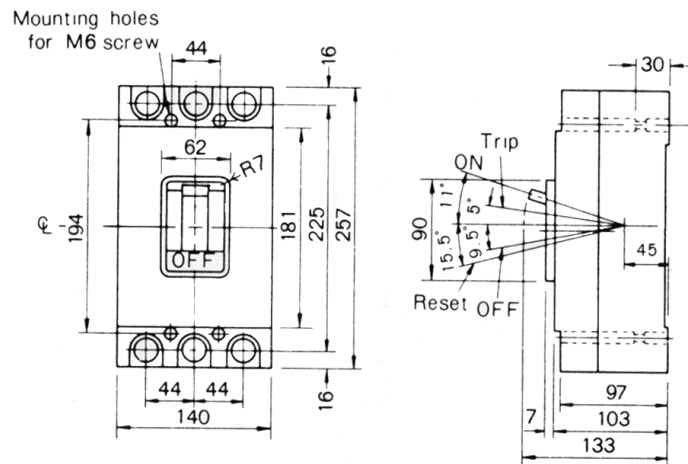


Overcurrent Tripping Characteristic Curve

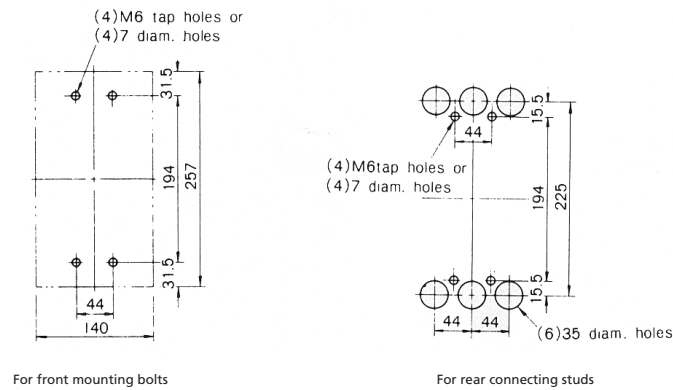


Temperature Compensation Curve

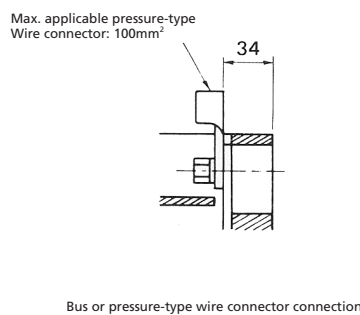
■ Dimensions



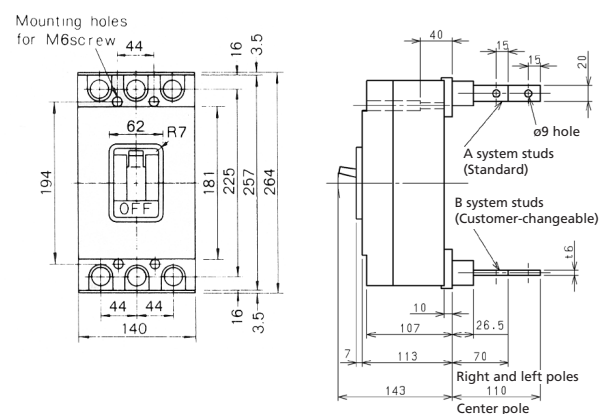
■ Drilling Plan



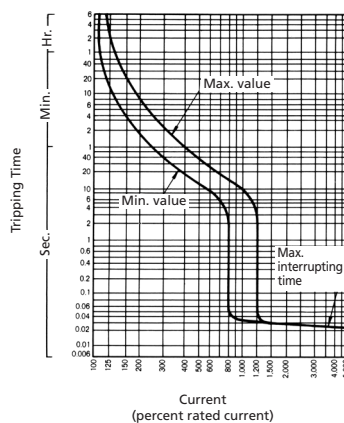
■ Terminal Arrangement



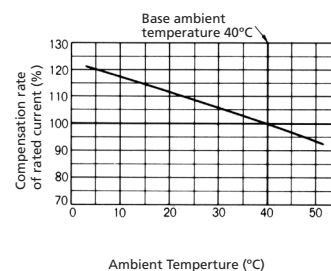
■ For Rear Connecting Studs



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

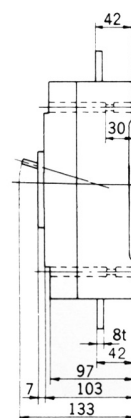
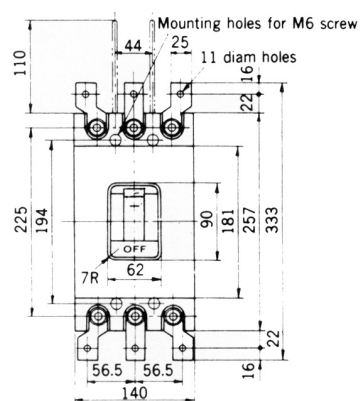
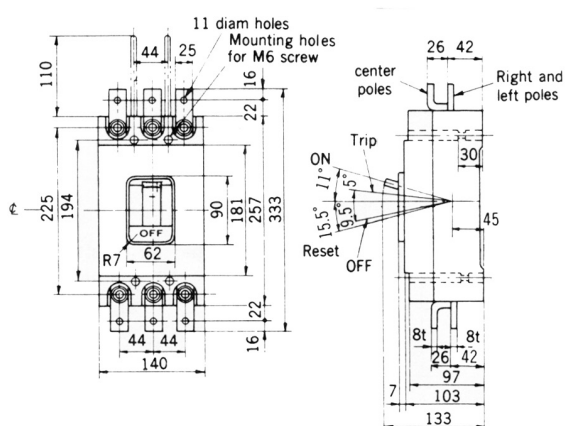


Overcurrent Tripping Characteristic Curve

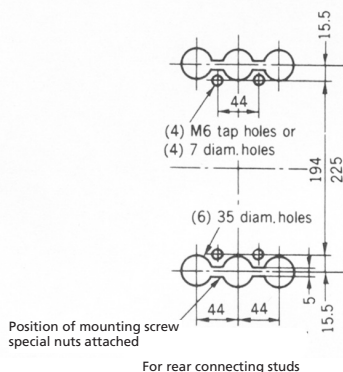
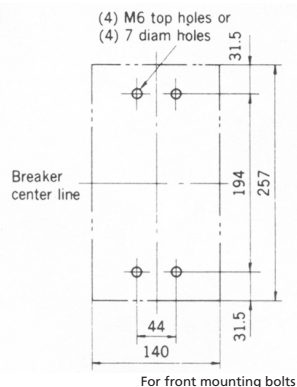


Temperature Compensation Curve

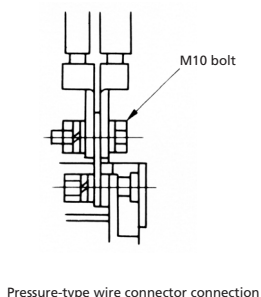
■ Dimensions



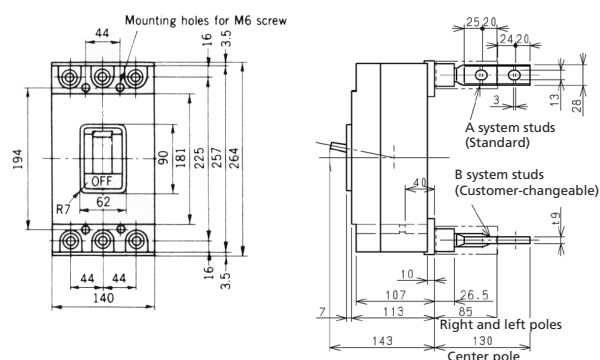
■ Drilling Plan



■ For front connection



■ For Rear Connecting Studs



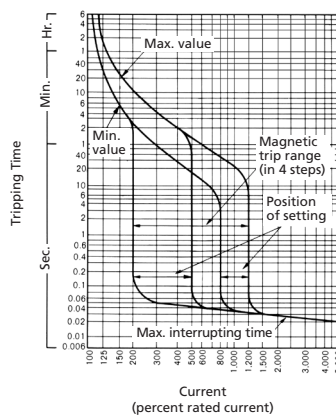
SX400 / FX400



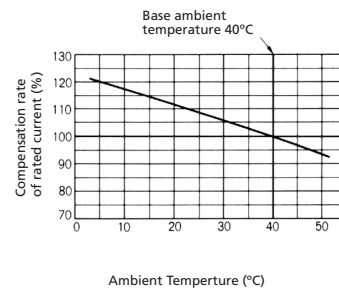
■ Dimensions



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

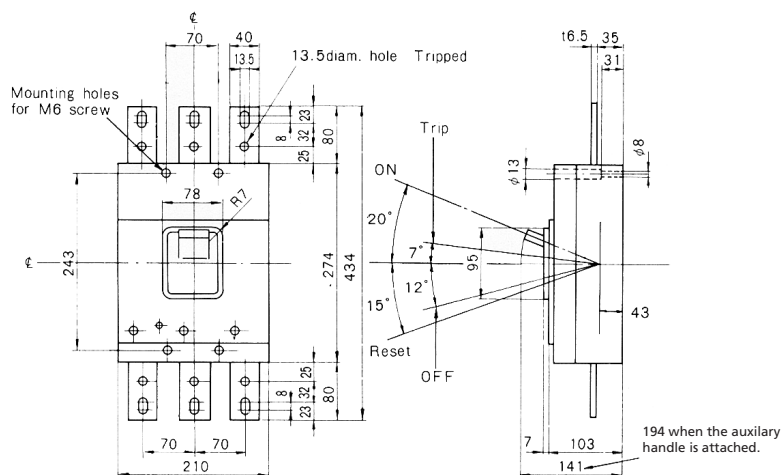


Overcurrent Tripping Characteristic Curve

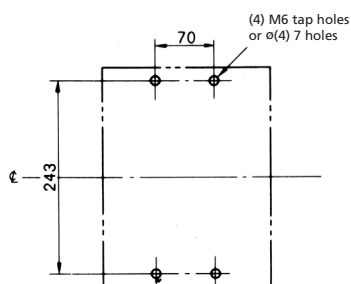


Temperature Compensation Curve

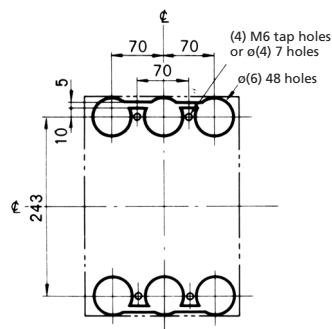
■ Dimensions



■ Drilling Plan

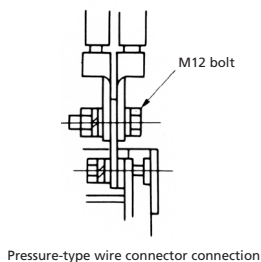


For front mounting bolts



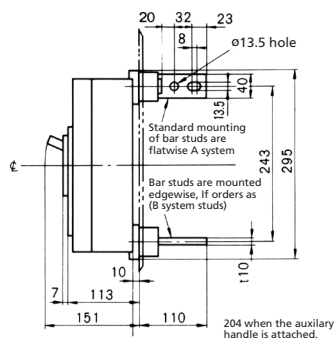
For rear connecting studs

■ For front connection

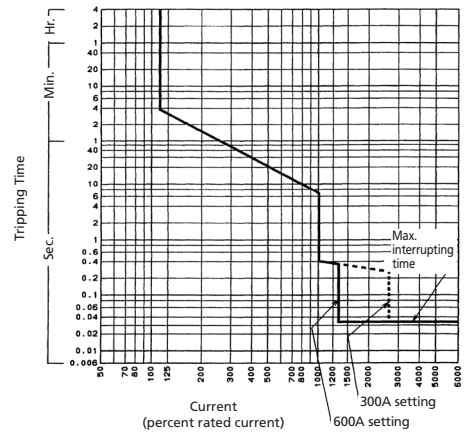


Pressure-type wire connector connection

■ For Rear Connecting Studs

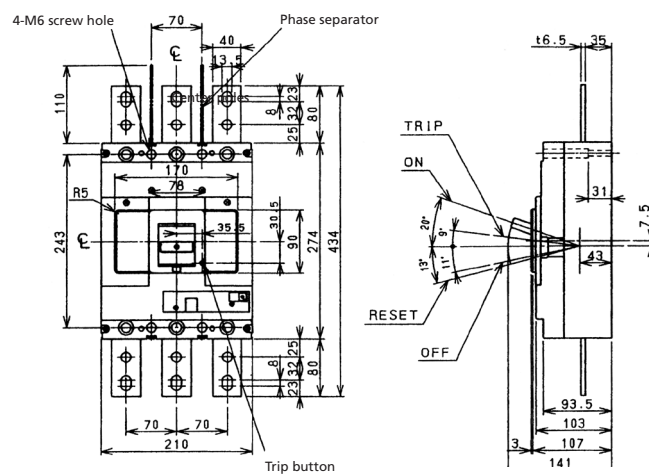


SX600/FX600

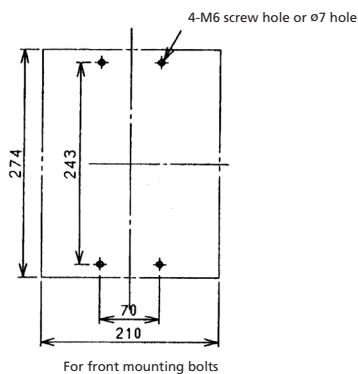


Overcurrent Tripping Characteristic Curve

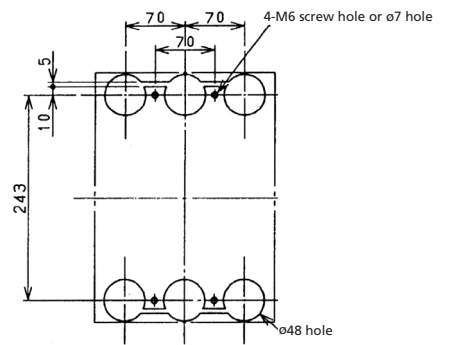
■ Dimensions



■ Drilling Plan

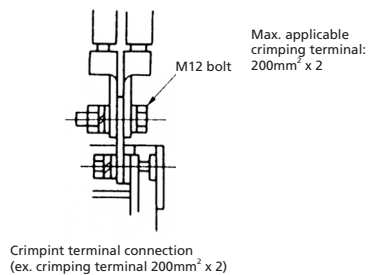


For front mounting bolts



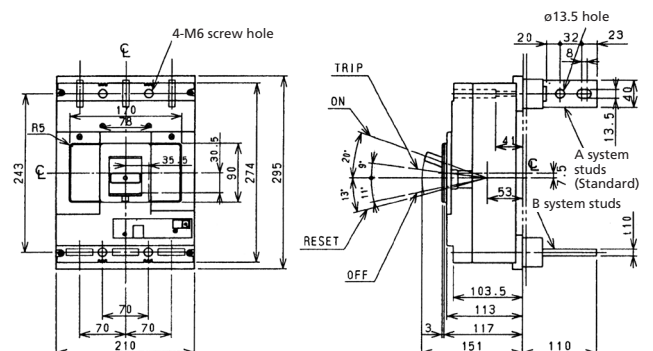
For rear connecting studs

■ Terminal Arrangement

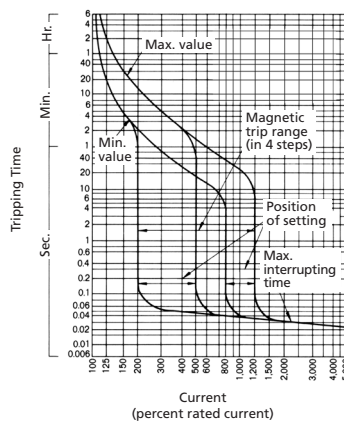


Crimp terminal connection
(ex. crimping terminal 200mm² x 2)

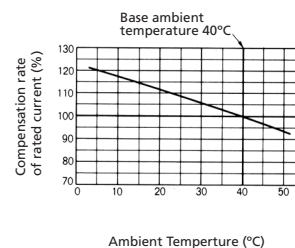
■ For Rear Connecting Studs



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

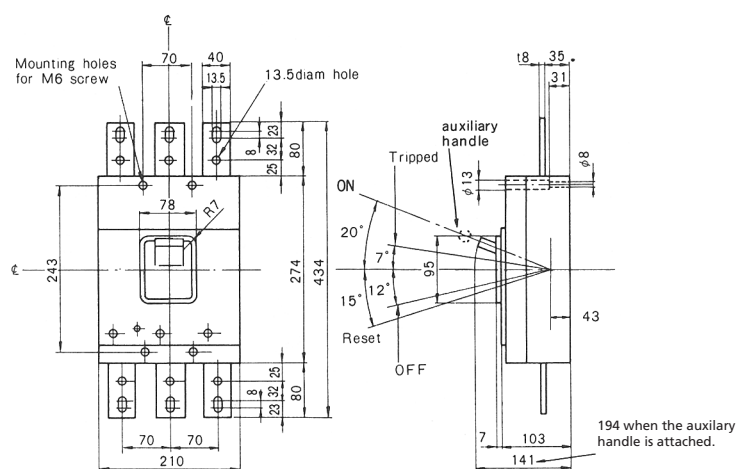


**Overcurrent Tripping
Characteristic Curve**

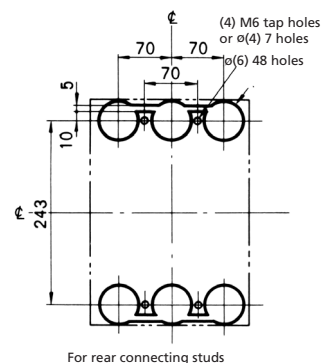
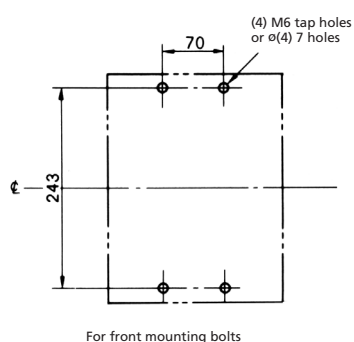


**Temperature
Compensation Curve**

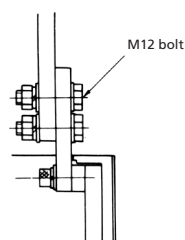
■ Dimensions



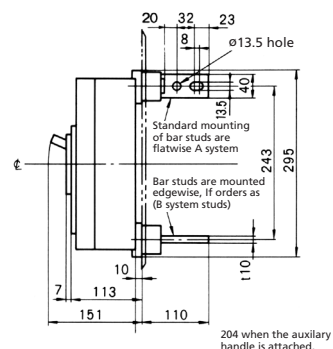
■ Drilling Plan



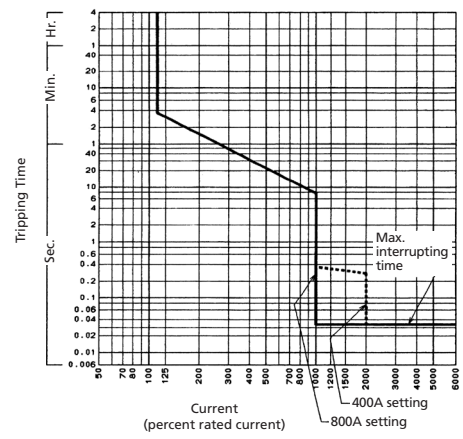
■ For front connection



■ For Rear Connecting Studs

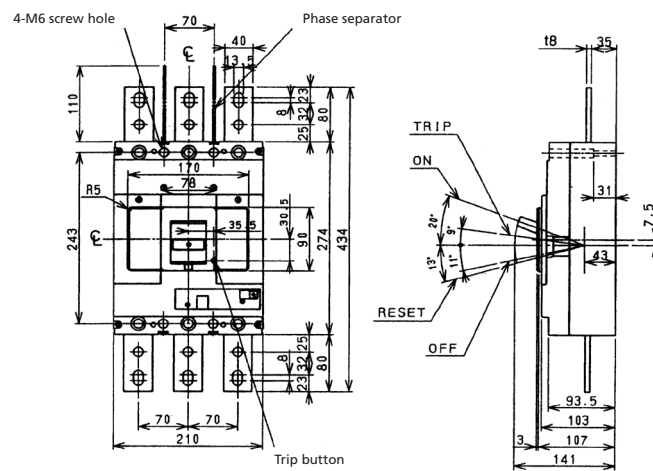


SX800/FX800

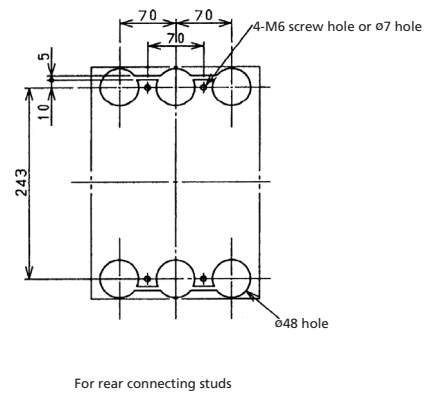
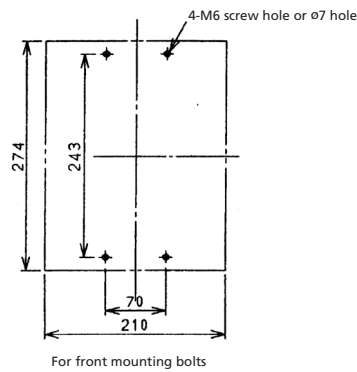


Overcurrent Tripping Characteristic Curve

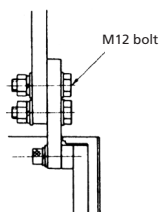
■ Dimensions



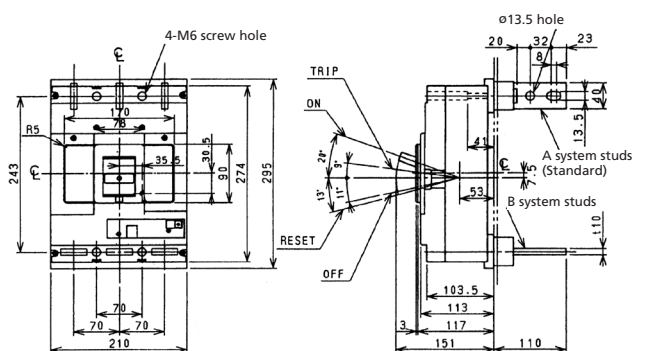
■ Drilling Plan



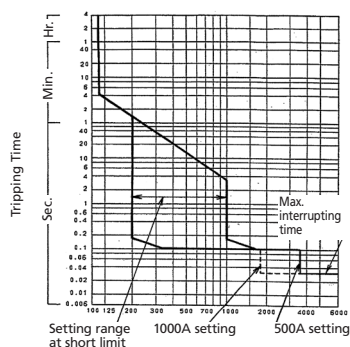
■ Terminal Arrangement



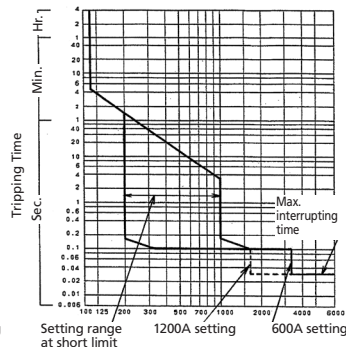
■ For Rear Connecting Studs



F-1000C/F-1200C



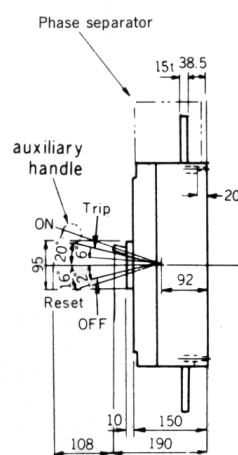
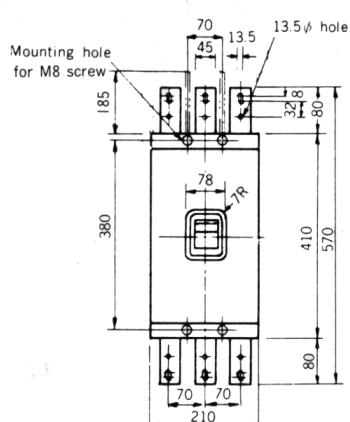
F-1000C



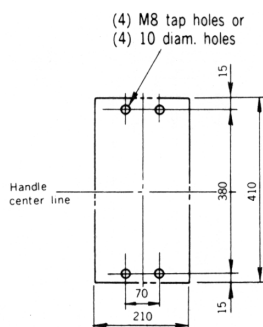
F-1200C

Overcurrent Tripping Characteristic Curve

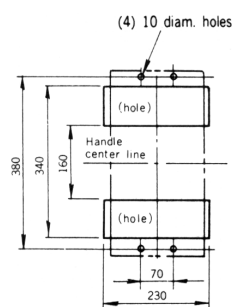
■ Dimensions



■ Drilling Plan

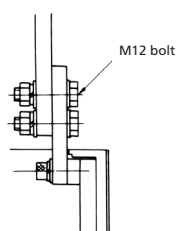


For front mounting bolts

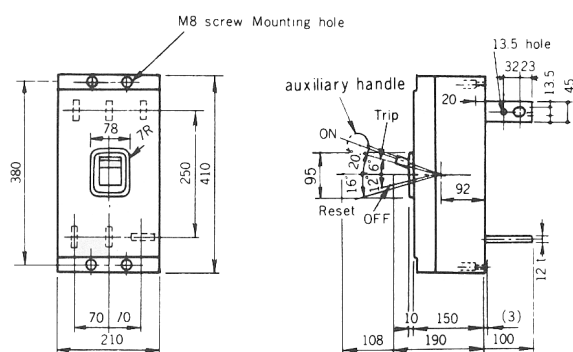


For rear connecting studs

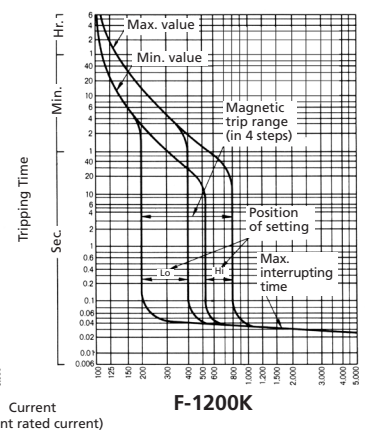
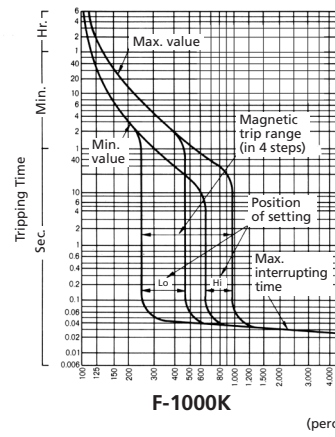
■ For front connection



■ For Rear Connecting Studs

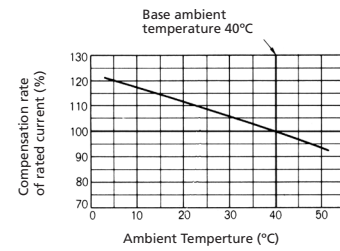
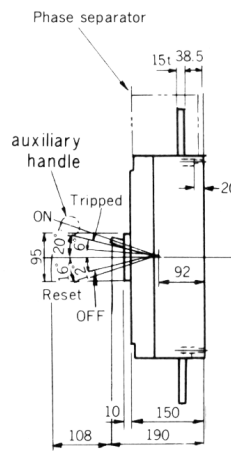
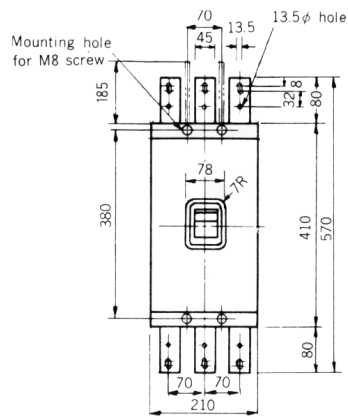


F-1000K/F-1200K



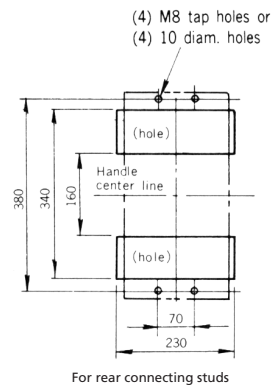
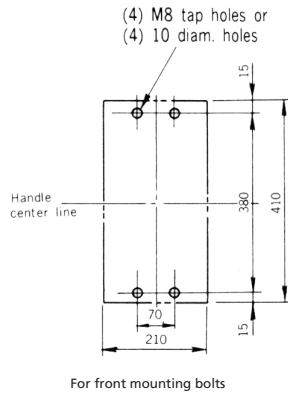
Overcurrent Tripping Characteristic Curve

■ Dimensions

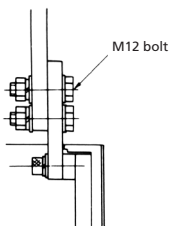


Temperature Compensation Curve

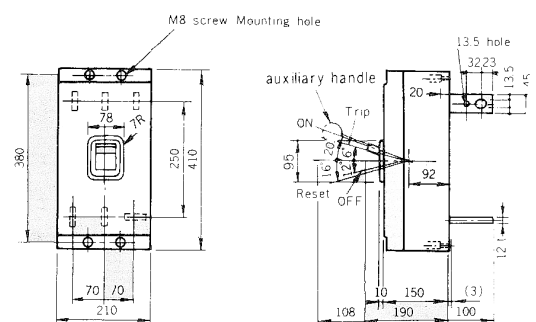
■ Drilling Plan



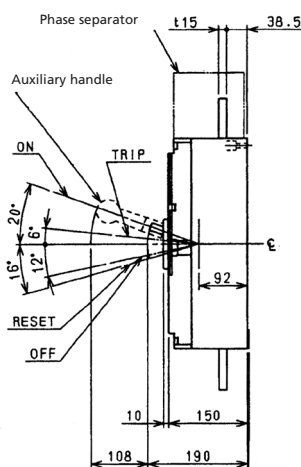
■ For front connection



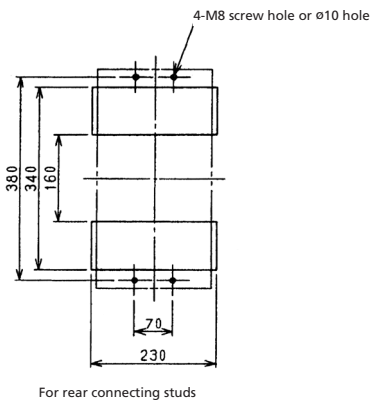
■ For Rear Connecting Studs



FX1000/FX1200



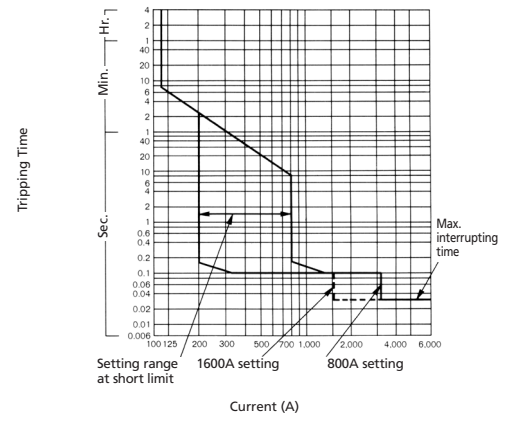
.....



.....

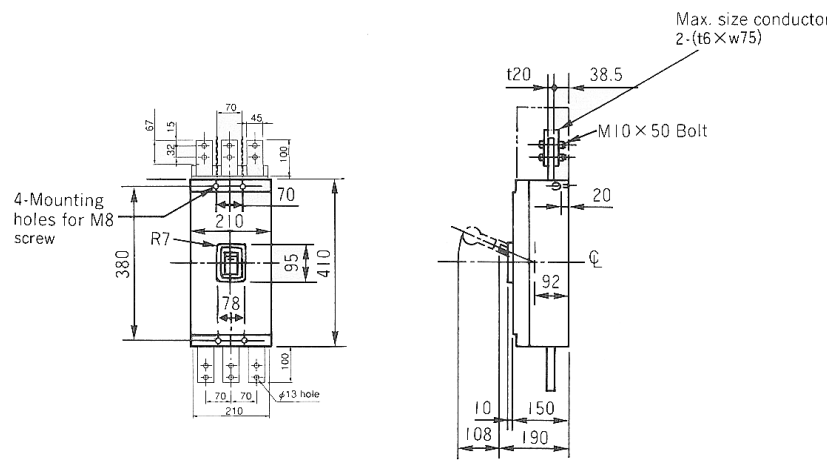


F-1600CB

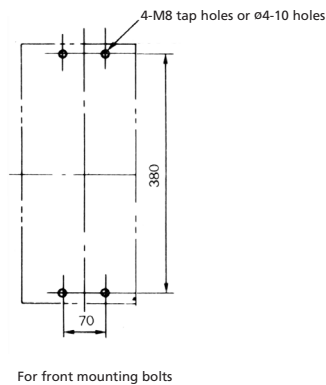


Overcurrent Tripping Characteristic Curve

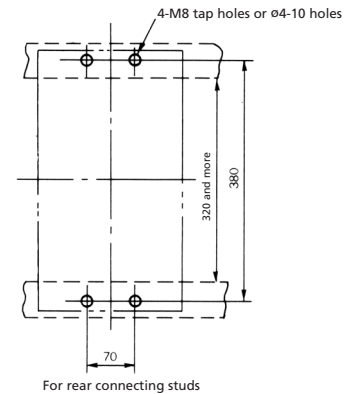
■ Dimensions



■ Drilling Plan

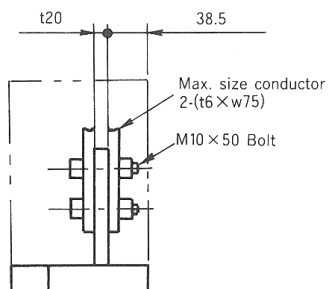


For front mounting bolts

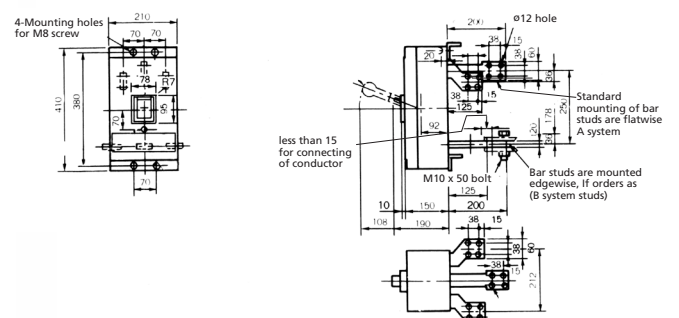


For rear connecting studs

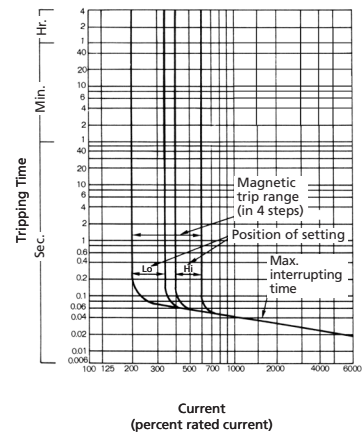
■ Terminal Arrangement



■ For Rear Connecting Studs

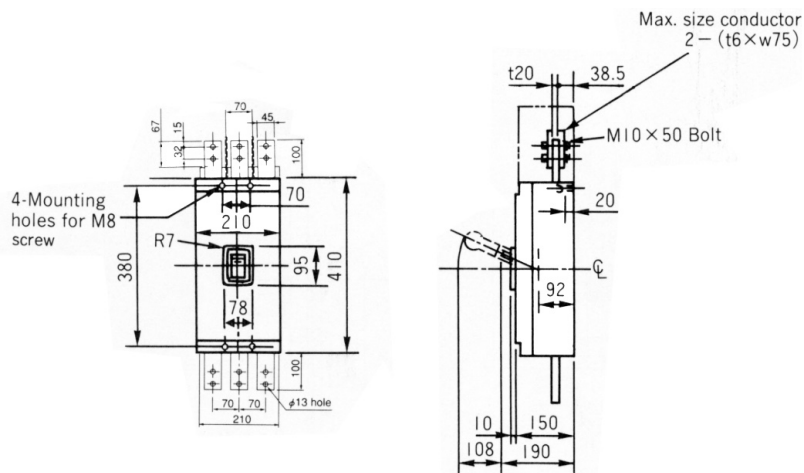


F-1600B



Overcurrent Tripping Characteristic Curve

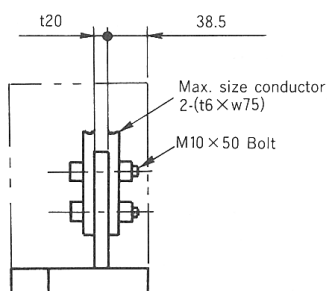
■ Dimensions



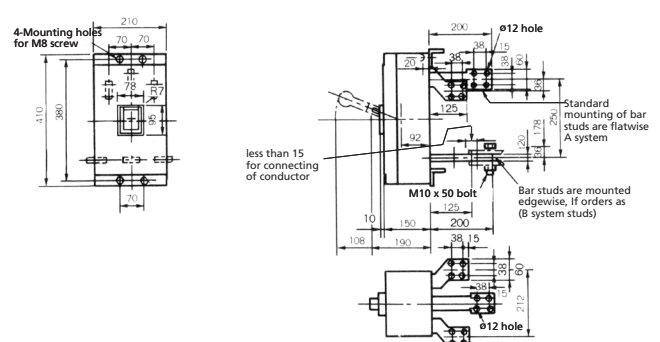
■ Drilling Plan



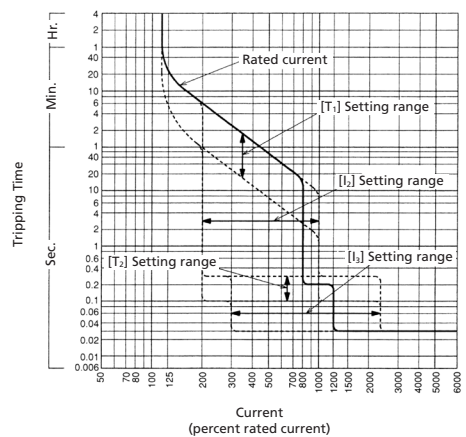
■ Terminal Arrangement



■ For Rear Connecting Studs

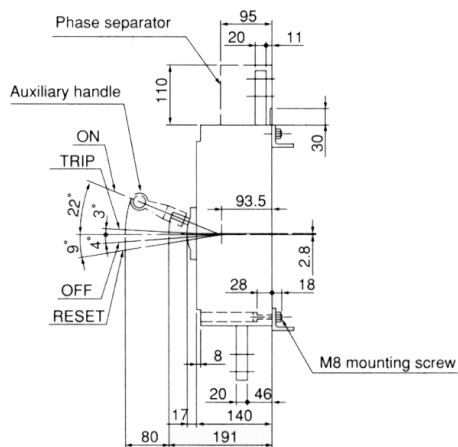
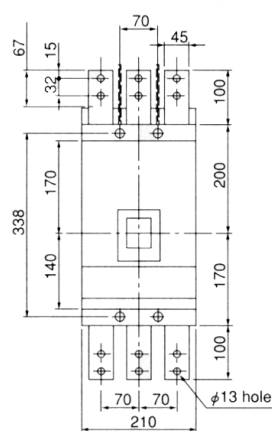


F-1600E

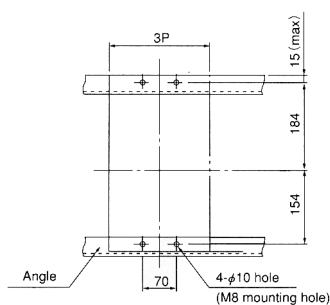


Overcurrent Tripping Characteristic Curve

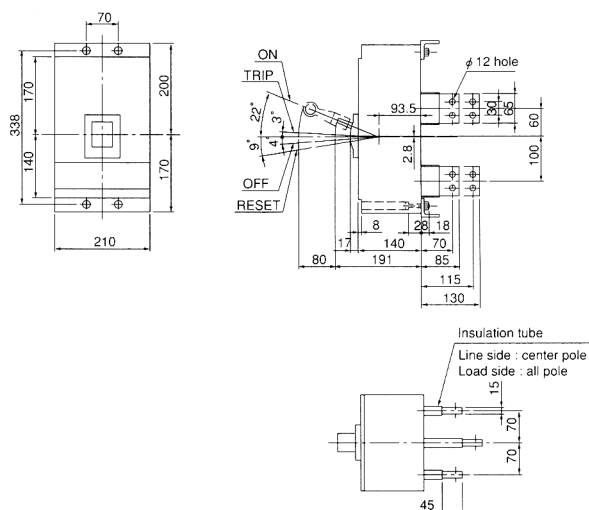
■ Dimensions



■ Drilling Plan

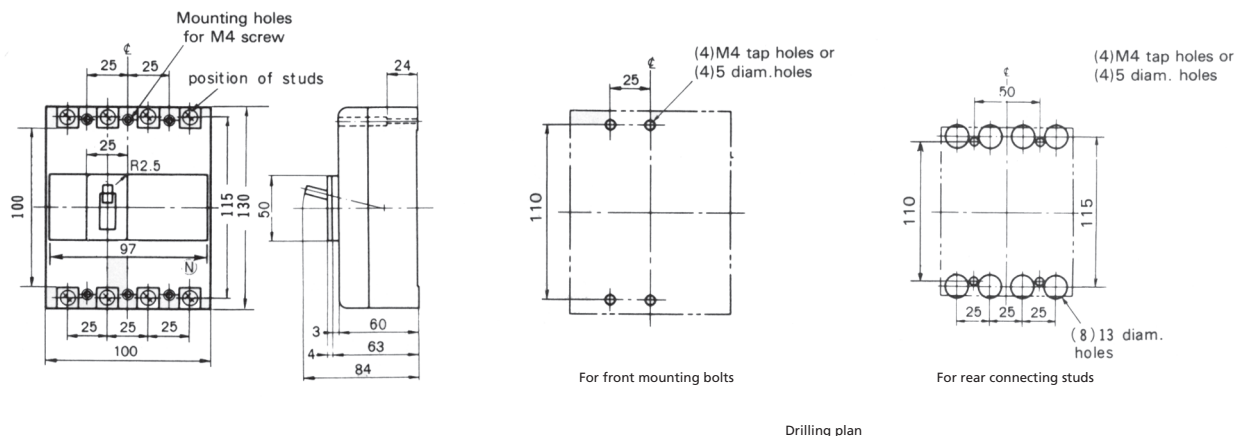


■ For Rear Connecting Studs

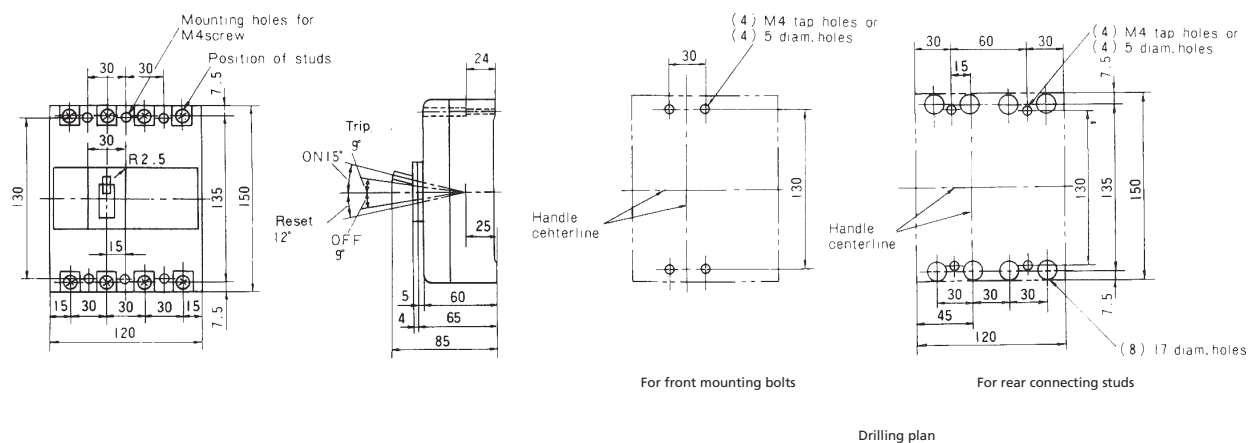


DIMENSIONS OF 4 POLE BREAKERS

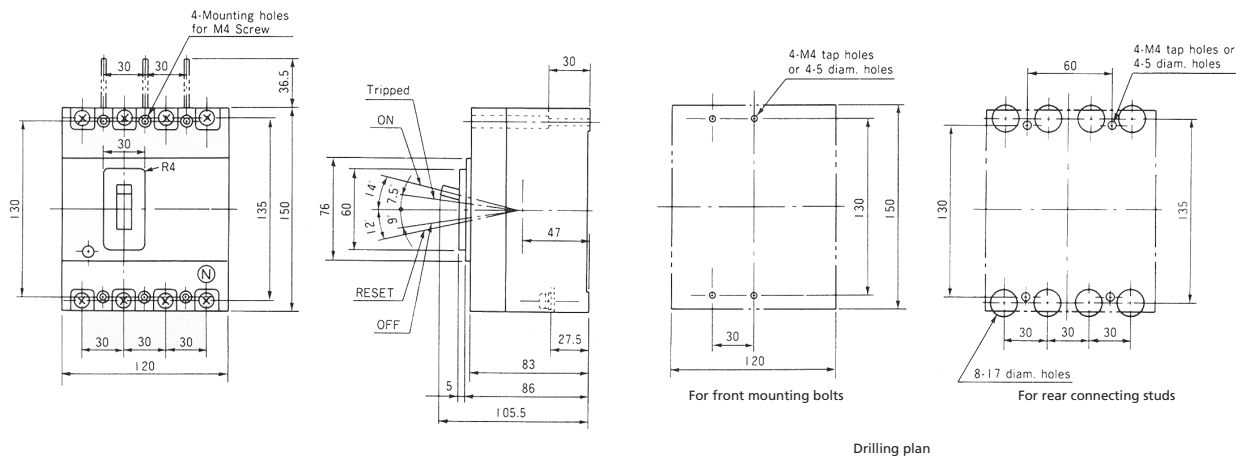
F-60R 4 pole



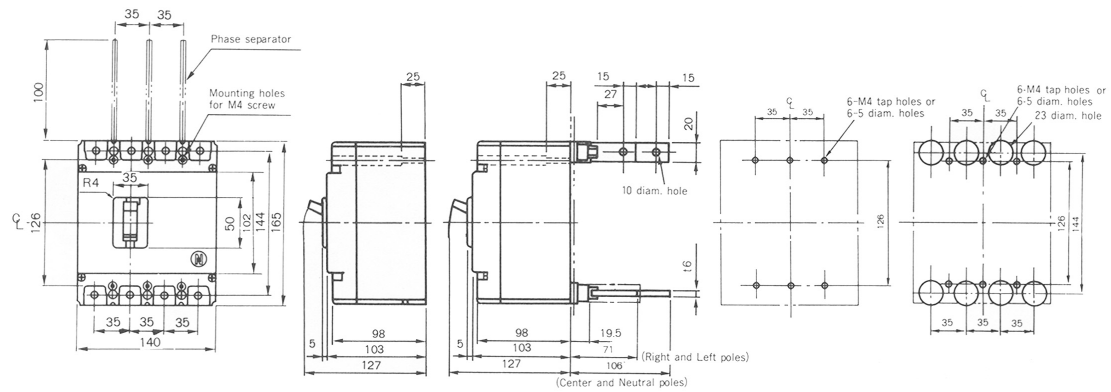
F-100S 4 pole



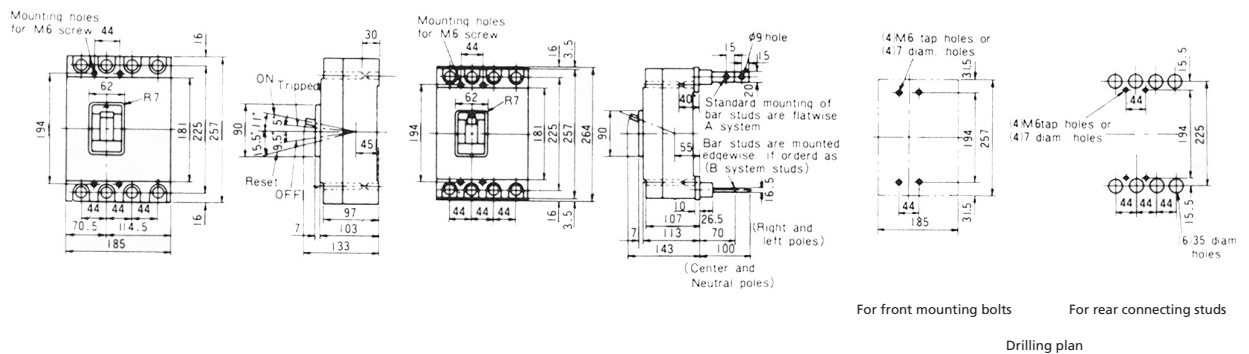
F-100KB 4 pole



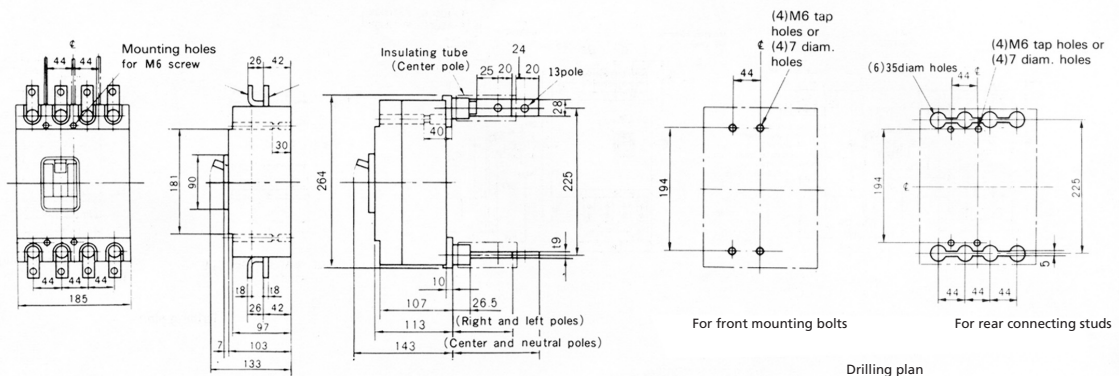
F-250FB / F-250KC 4 pole



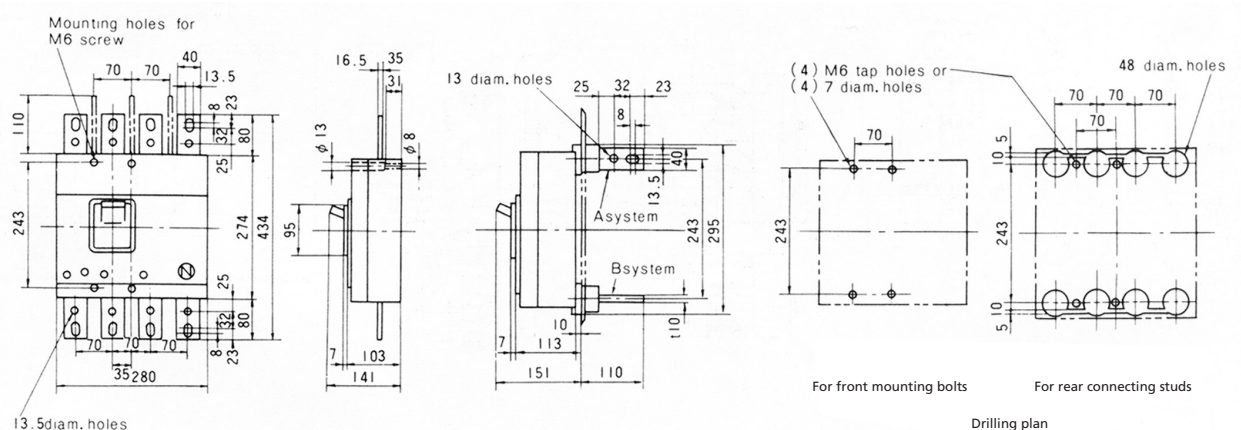
L-225E 4 pole



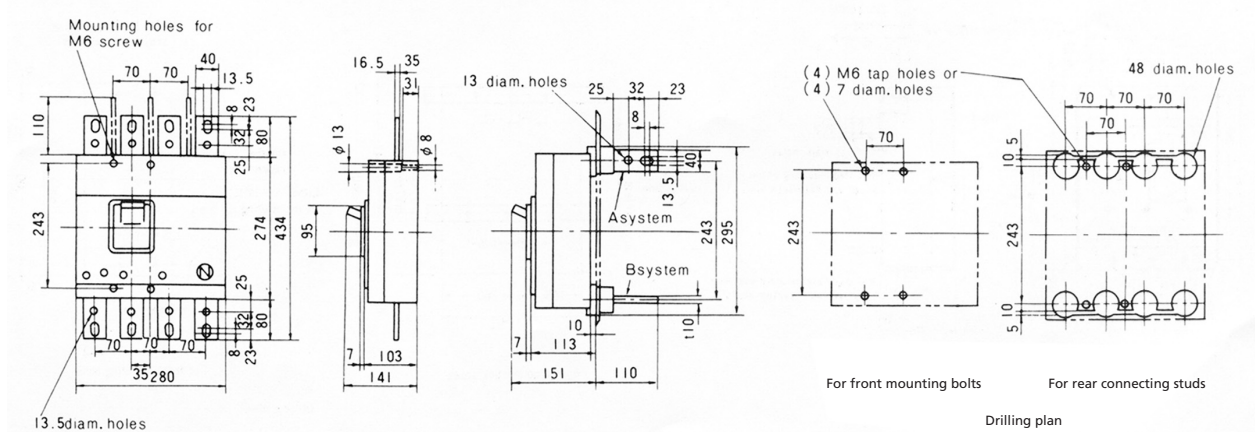
F-400R / L-400E 4 pole



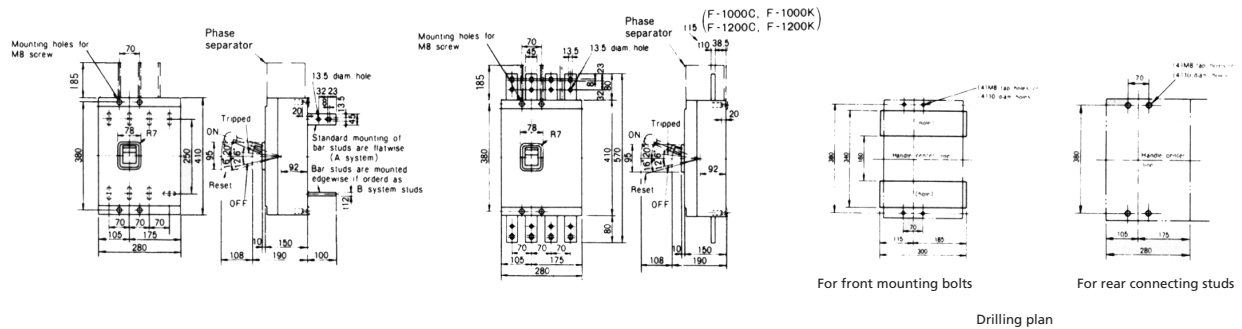
F-600F / L-600E 4 pole



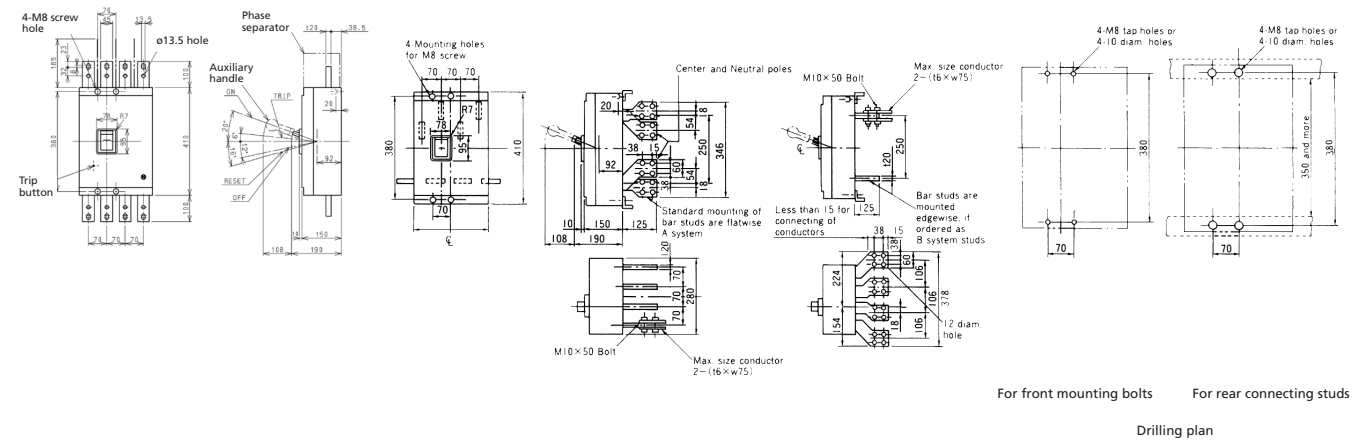
F-800R/L-800RH 4 pole



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.

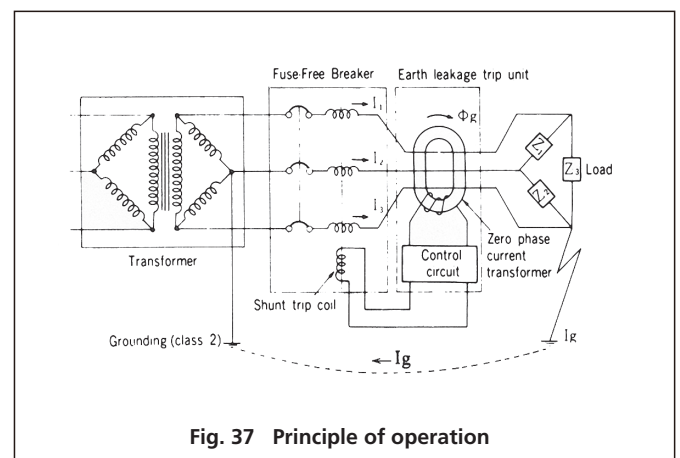
As shown in Fig. 37, magnetic fluxes cancel out each other, inducing no output voltage in the secondary coil while no leakage is present in the load circuit.

$$i_1 + i_2 + i_3 = 0$$

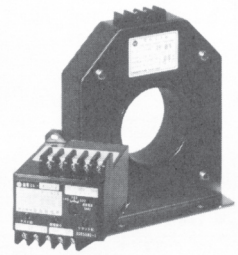
If leakage current (I_g) occurs in the load circuit, magnetic flux Φ_g is induced, producing a certain voltage across the secondary coil.

$$i_1 + i_2 + i_3 = I_g$$

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.

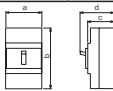


CLASSIFICATION AND COMPOSITION

E series Standard Breaker	R series High Interrupting Breaker	Earth Leakage Relay Series
		
30A – 800A frame	30A – 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		(15) 30 100 (200)		30 100-200-500		
	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		2.5/1		—		10/3		
			415V	—		—		2.5/1		2.5/1		—		10/3		
			400V	—		—		2.5/1		2.5/1		—		10/3		
			240V	—		—		5/2		5/2		—		35/9		
			200V	5/2		5/2		5/2		5/2		10/3		35/9		
			100V	5/2		5/2		—		—		10/3		—		
Dimensions (mm)			a	50	75	75		75		75		75		75		
			b	96		97.5		130		130		130		130		
			c	60		60		60		60		60		60		
			d	76		76		84		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		
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	—		—		○		○		○		○		
			TB2	○		○		○		○		○		○		
Exterior Accessories	Rear-connecting Stud		STB	—		—		STB-2M		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		MIW-2E		
			MMK-S	—		—		—		—		—		—		
	Motor-operating Mechanism		MMK-C	—		—		—		—		—		—		
			LC	LC-03		LC-03		LC-2G		LC-2G		LC-2G		LC-2G		
	Handle Lock		HL	—		—		HL-2G		HL-2G		HL-2G		HL-2G		
			HA	—		—		HA-108		HA-108		HA-108		HA-108		
	Handle Operating Mechanism		HM	—		—		HM-S12		HM-S12		HM-S12		HM-S12		
			TMC	TMC-0G		TMC-0H		TMC-1		TMC-1		TMC-1		TMC-1		
	Terminal Cover		Front Type	Short type	—		—		TMC-1S		TMC-1S		TMC-1S		TMC-1S	
				Long type	—		—		TMC-2D		TMC-2D		TMC-2D		TMC-2D	
				Rear Type	BTC		—		BTC-1		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		
Trip Button				—		—		—		—		—		—		

Attention

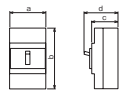
- : Standard ○ : Option
- Please use right and left poles in case of using ELBs of 3 poles 200V to 1ø2W 200V wiring sysytem.
- Please connect neutral line to middle pole of ELBs incase of using ELBs of 3 poles 200V to 1ø3W100/200V distribution system.
- Standard flush mounting base assembly of up to 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

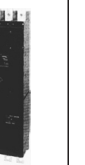
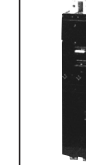
Rated voltage	Applicable circuit voltage	Permissible range of voltage
100 – 200V	100 · 110 · 200 · 220V	80 – 242V
440V	400 · 415 · 440V	320 – 484V
200 – 440V	200 · 220 · 240 380 · 400 · 415 · 440V	160 – 484V

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
Number of poles				3	3	4	3	3	4		3	3
Rated Voltage (AC V)				200 – 440	200 – 440	200 – 440	200 – 440	200 – 440	200 – 440		200 – 440 (100 – 200)	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
Rated Impulse withstand Voltage Uimp (kV)				8	8	8	8	8	8		8	8
High Speed Type	Rated Sensitivity Current (mA)			30 100-200-500	30 100-200-500	30 100-200-500	30 100-200-500	30 100-200-500	100-200-500	30	(30) 100-200-500	(30) 100-200-500
	Operating time (sec. or less)			0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1
Time Delay Type	Rated Sensitivity Current (mA)			(100-200-500)	(100-200-500)	(100-200-500)	(100-200-500)	(100-200-500)	(100-200-500)	—	(100-200-500)	(100-200-500)
	Operating time (sec. or less)			(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)	—	(0.3-0.6-1.2)	(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)
Rated Breaking Capacity (kA)	JIS C 8201-2-2 Ann2 (Icu/Ics)	AC	440V	30/15	50/25	50/25	30/15	50/25	42/21		50/50	50/50
			415V	30/15	50/25	50/25	30/15	50/25	42/21		50/50	50/50
			400V	30/15	50/25	50/25	30/15	50/25	42/21		50/50	50/50
			240V	50/25	100/50	85/43	50/25	100/50	85/43		100/100	100/100
			200V	50/25	100/50	85/43	50/25	100/50	85/43		100/100	100/100
			100V	—	—	—	—	—	—		—	—
Dimensions (mm)		a	90	90	120	105	105	185		140	140	
		b	150	150	150	165	165	345		275	275	
		c	68	68	103	68	68	103		103	103	
		d	94	94	123	95	95	133		133	133	
Net Weight (kg)				2.1	2.1	2.8	2.0	2.0	9.3		6.6	6.6
Standard Connection Type				Front Terminal	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)	●(*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	○	○	○	○	○	○		○	○
Exterior Accessories			TB2	○	○	○	○	○	—		○	○
	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	HL-5
	Handle Operating Mechanism		HA	—	—	HA-106	HA-210	HA-210	HA-405		HA-405	HA-406
	Terminal Cover			HM	HM-S13	HM-S13	HM-S11	HM-S25	HM-S25	—		—
Front Type		TMC	TMC-2C	TMC-2C	TMC-3C	TMC-4J	TMC-4J	TMC-5B		TMC-5B	TMC-5B	
		Short type	—	—	—	TMC-4JS	TMC-4JS	—		—	—	
		Long type	—	—	—	—	—	—		—	—	
Rear Type		BTC	BTC-2C	BTC-2C	BTC-3C	BTC-4J	BTC-4J	BTC-5B		BTC-5B	BTC-5B	
IEC Rail 35 mm				—	—	—	—	—	—		—	—
Automatic Tripping Device				Thermal-Magnetic	Thermal-Magnetic	Full Magnetic	Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic		Thermal-Magnetic	Electronic Relay
Trip Button				●	●	—	●	●	—		—	●

Attention

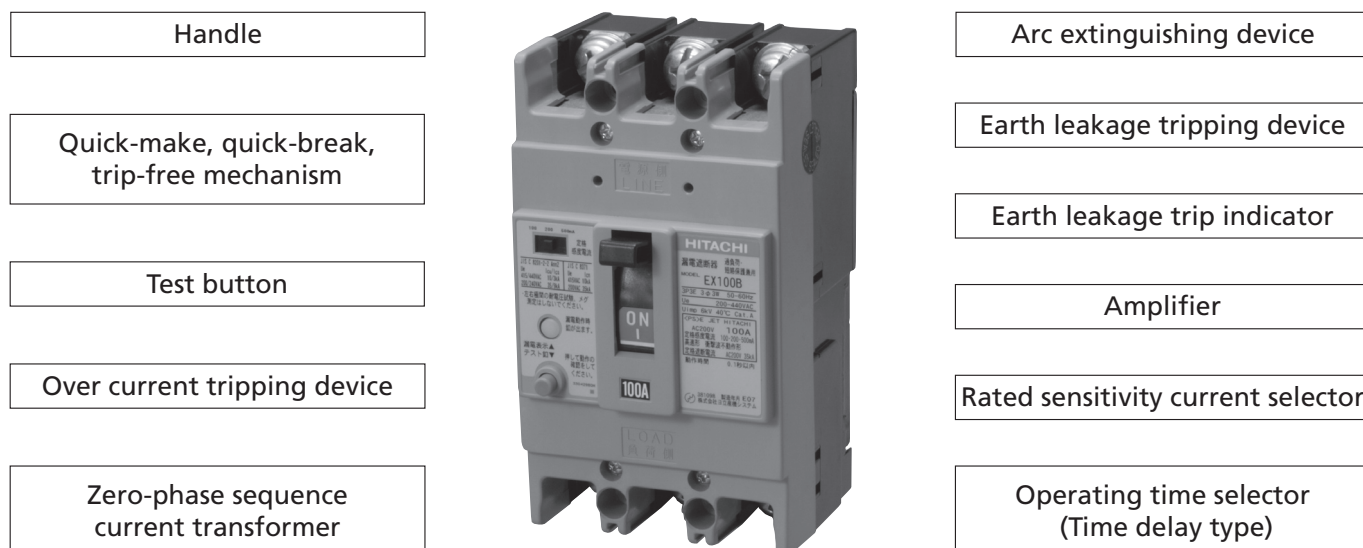
- : Standard ○: Option
- Please use right and left poles in case of using ELBs of 3 poles 200V to 1ø2W 200V wiring sysytem.
- Please connect neutral line to middle pole of ELBs incase of using ELBs of 3 poles 200V to 1ø3W100/200V distribution system.
- Standard flush mounting base assembly of up to 400AF 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	3ø3W 1ø3W 1ø2W	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	600/700/800 1000/1200 adjustable
8	8	8	8	8	8	8	8	8	8
100-200-500	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	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)	(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)	(0.3 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)	(0.1 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
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
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-6	TMC-6B
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
BTC-5B	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Thermal-Magnetic	Electronic Relay	Thermal-Magnetic	Electronic Relay	Thermal-Magnetic	Thermal-Magnetic	Electronic Relay	Thermal-Magnetic	Electronic Relay	Electronic Relay
—	—	●	●	●	●	●	●	●	●

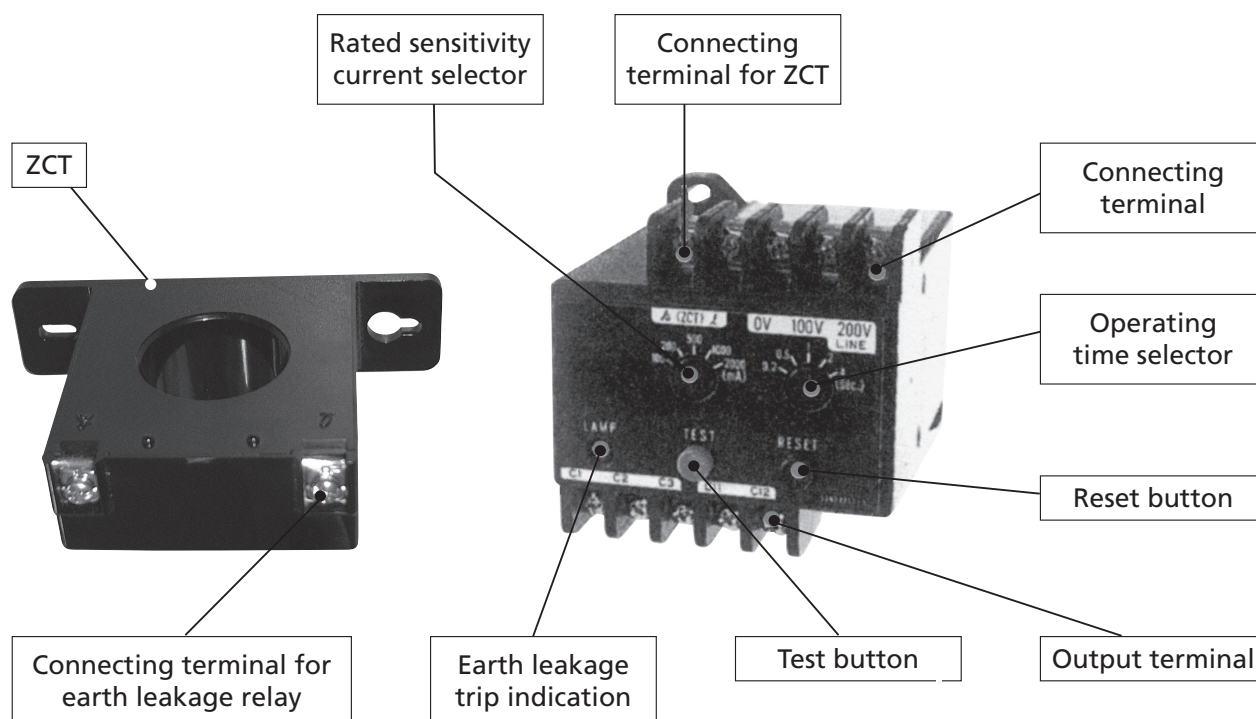
9. Applicable voltage range

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

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	—	—	—		—	—	 ● Equipped normally	 ● Equipped normally
Alarm + Auxiliary + EAL Switch	AL + AUX + EAL	—	—	—		—	—	 ● Equipped normally	 ● Equipped normally
Test Button Lead Wire	TBL								

Remarks: (1) Handle of breaker
(2) 2C: 1C is also available



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	0.3 (0.2/0.5/2/4 (1))
Alarm Contact	1c + 1a				
Dimensions (mm) 	a	80			
	b	80			
	c	115			
Weight (ka)	0.45				

Notes: (1) Interchangeable by manual operation.
(2) Rating with () are manufactured by customer's order.

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)	

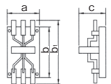
Table 23 Contact Specifications

Load		Resistive Load cosφ = 1	Inductive Load cosφ = 0.3, L/R = 7ms
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

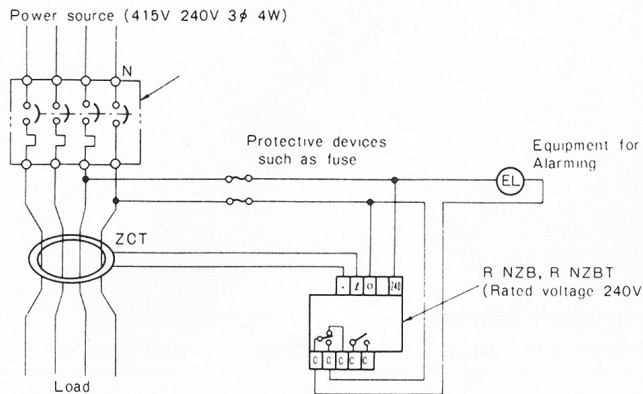
Type	Aperture Diameter	Maximum Available Wire Size					
		Vinyl-insulated 600V Wire (IV)			Polyethylene-Insulated 600V Wire (CV)		
		2-wire	3-wire	4-wire	2-wire	3-wire	4-wire
ZR-15	ø15	14mm ² (88A)	8mm ² (61A)	8mm ² (61A)	2mm ² (33A)	2mm ² (33A)	—
ZR-30B	ø30	60mm ² (217A)	50mm ² (190A)	38mm ² (162A)	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	240	320	310	380
	B	348	348	348	348	380	380	380	380	380	380	300	300
	B ₁	400	400	460	460	480	480	480	480	480	480	600	600
	C	187	214	187	214	214	239	214	239	214	239	242	284
Weight (kg)	11	15	11.2	16	12.3	17	12.3	17	13	18	30	42	

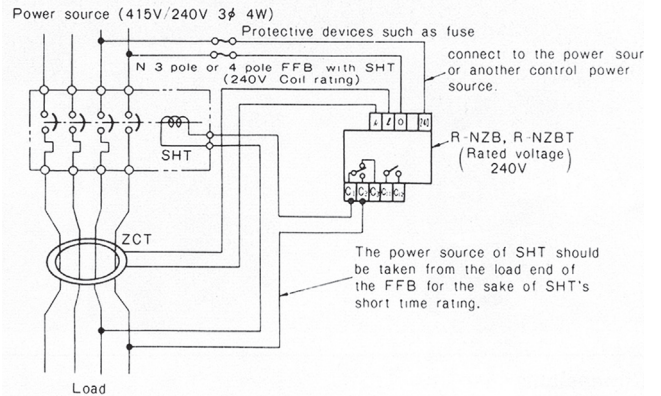
APPLICATION OF EARTH LEAKAGE RELAYS

Alarming

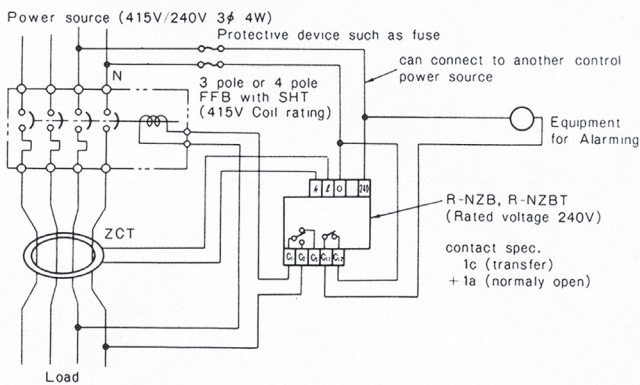


Circuit Interruption

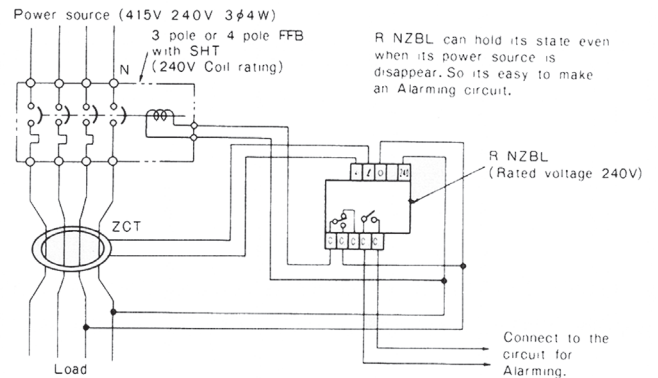
(Trip indicator lamp indicate the tripping state)



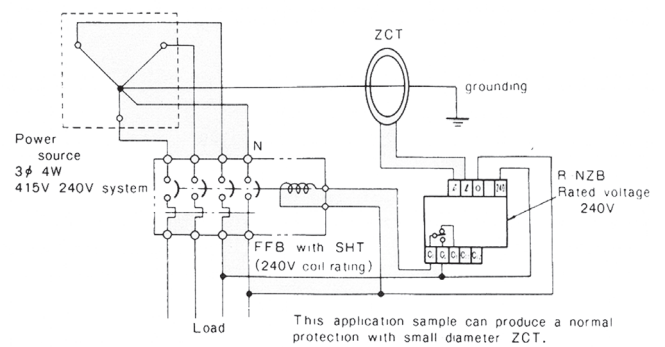
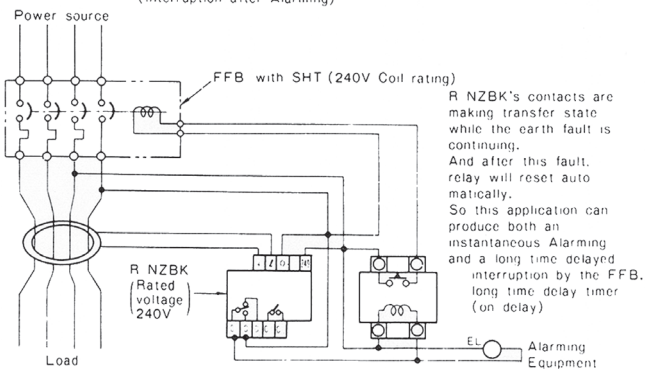
Circuit Interruption + Alarming



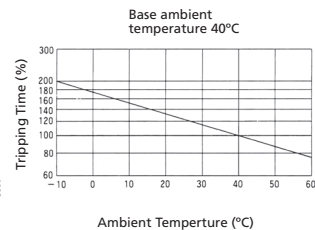
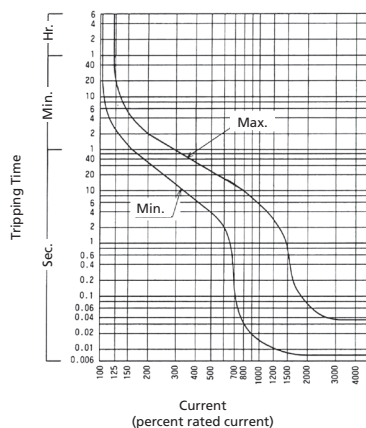
Circuit Interruption - Alarming



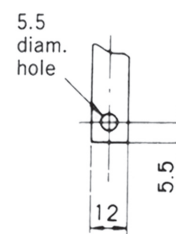
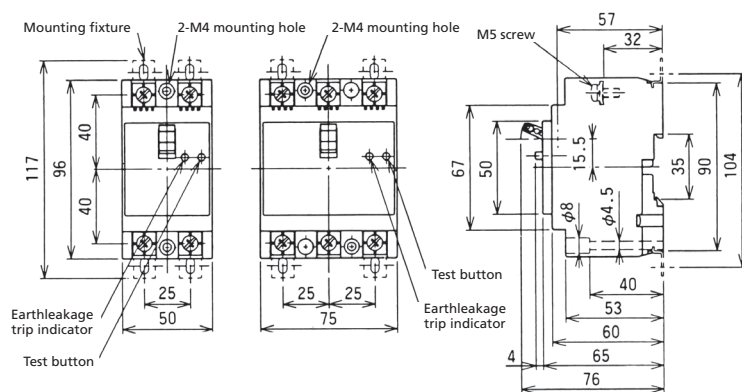
Long time monitor (Interruption after Alarming)



EB-50E

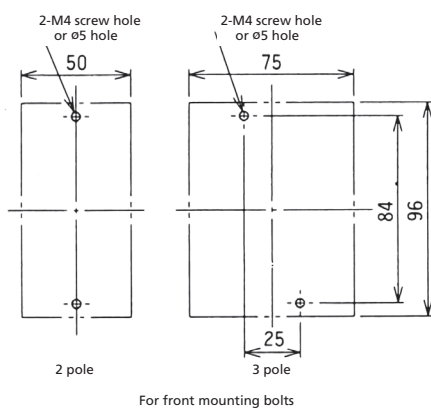


■ Dimensions

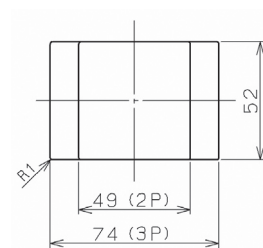


Direct-connected bus drilling

■ Drilling Plan



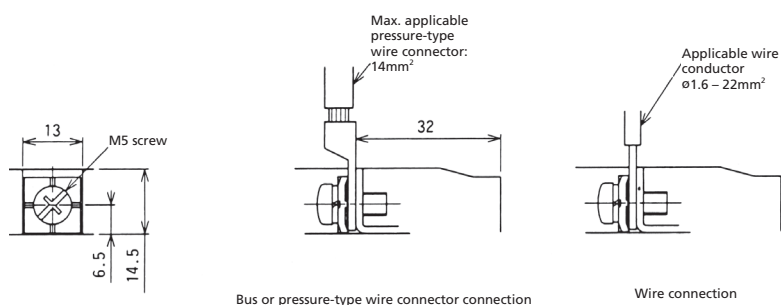
For front mounting bolts



1mm clearance on each side of handle

Frontplate cutout

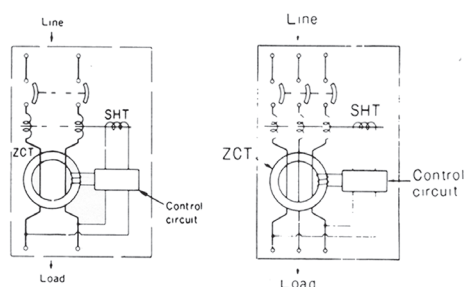
■ Terminal Arrangement



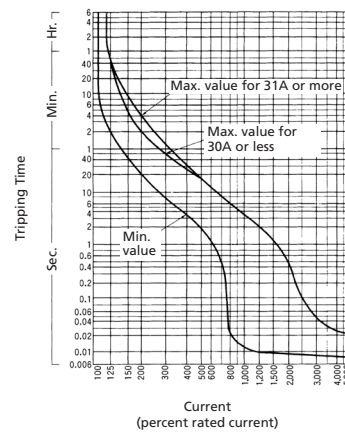
Bus or pressure-type wire connector connection

Wire connection

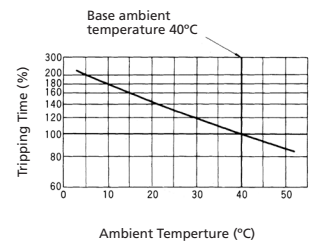
■ Internal Diagram Connection



EX30/EX50/EX50B

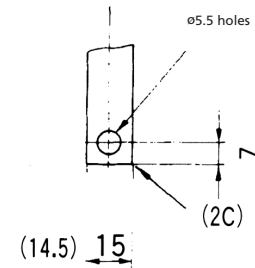
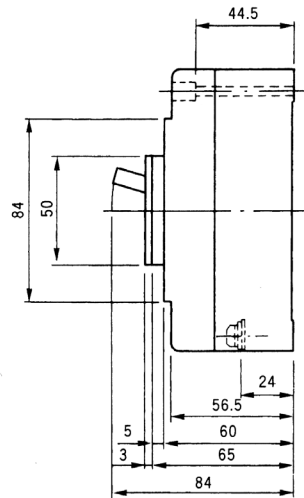
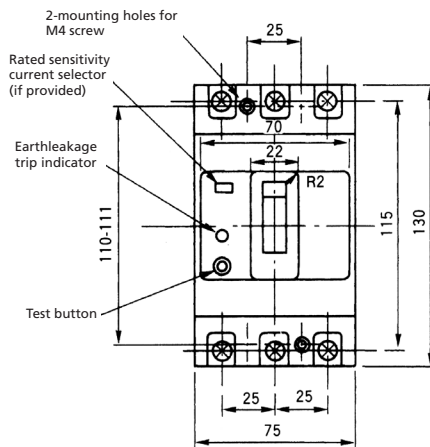


Overcurrent Tripping Characteristic Curve



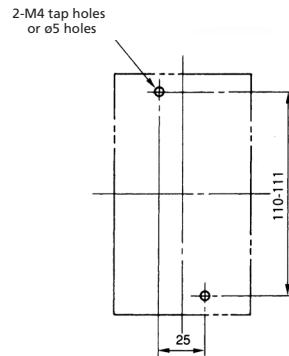
Temperature Compensation Curve

■ Dimensions

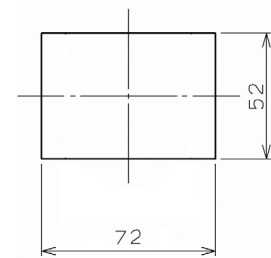


Direct-connected bus drilling

■ Drilling Plan



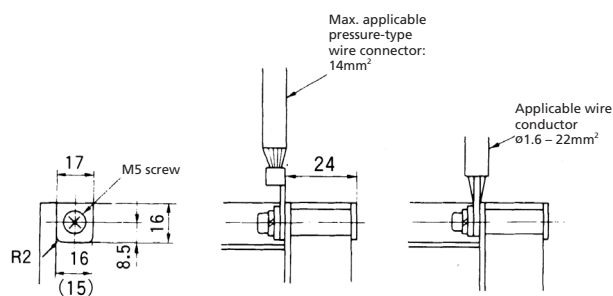
For front mounting bolts



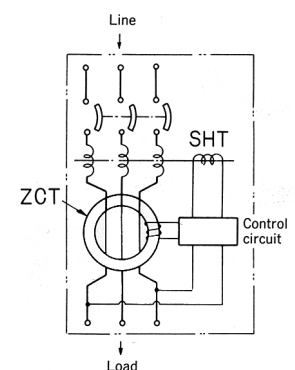
1mm clearance on each side of handle

Frontplate cutout

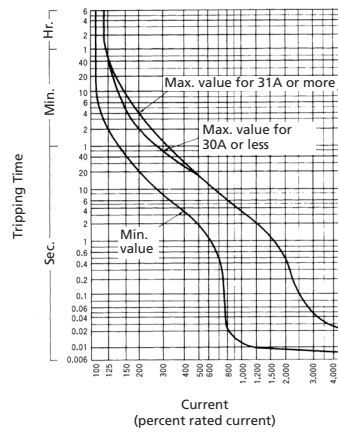
■ Terminal Arrangement



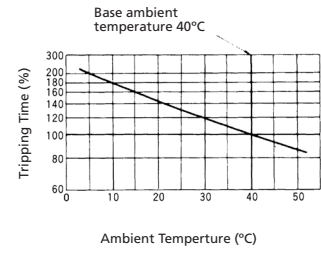
■ Internal Diagram Connection



EX50C

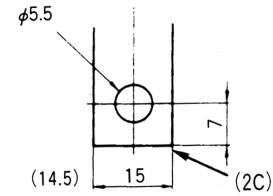
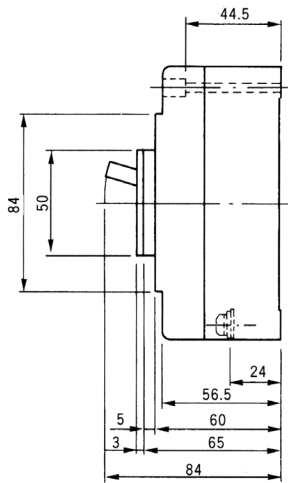
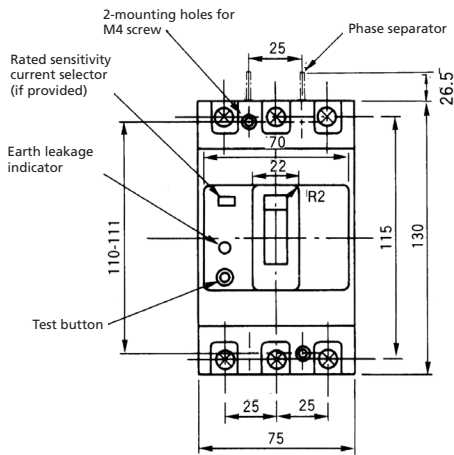


**Overcurrent Tripping
Characteristic Curve**



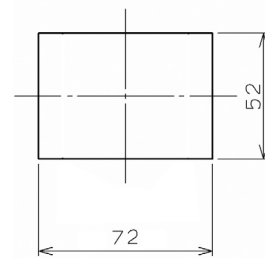
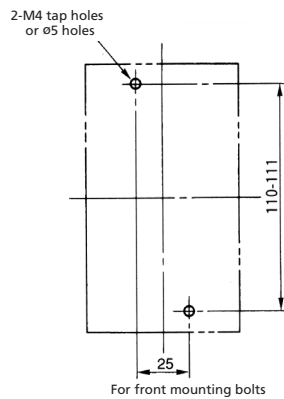
**Temperature
Compensation Curve**

■ Dimensions



Direct-connected bus drilling

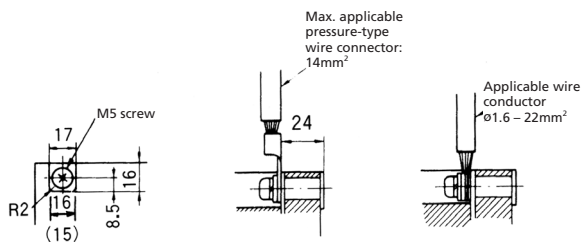
■ Drilling Plan



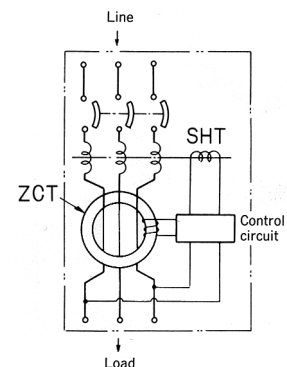
1mm clearance on each side of handle

Frontplate cutout

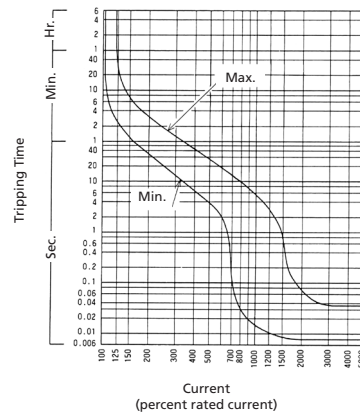
■ Terminal Arrangement



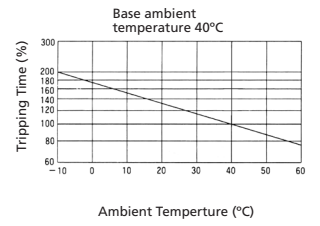
■ Internal Diagram Connection



EB-100E

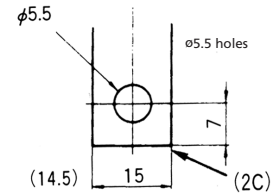
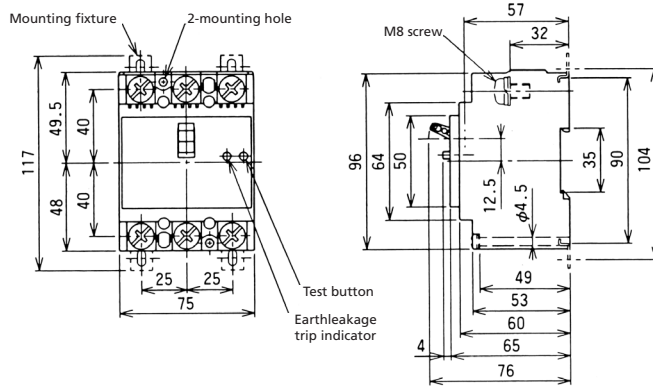


Overcurrent Tripping Characteristic Curve



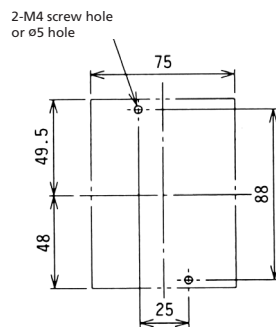
Temperature Compensation Curve

■ Dimensions

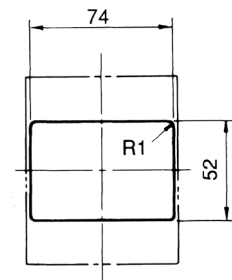


Direct-connected bus drilling

■ Drilling Plan

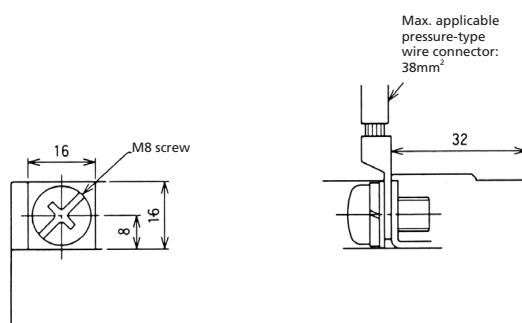


For front mounting bolts

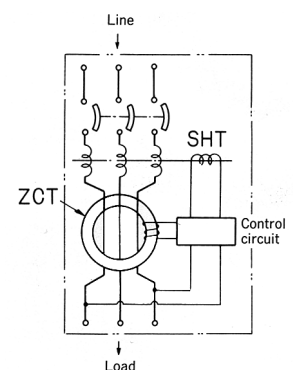


Frontplate cutout

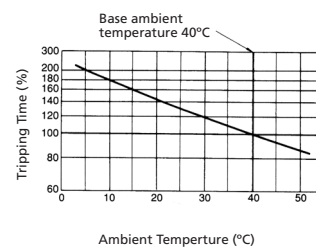
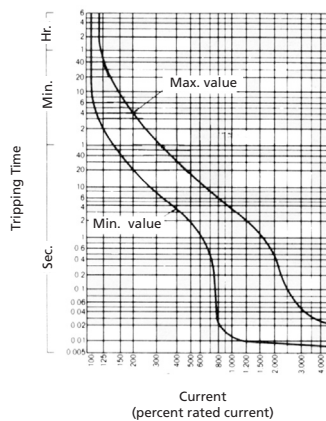
■ Terminal Arrangement



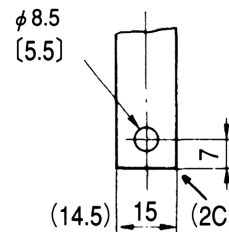
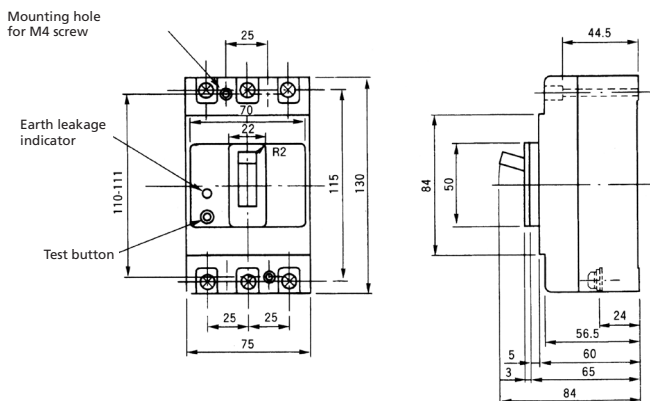
■ Internal Diagram Connection



EX100

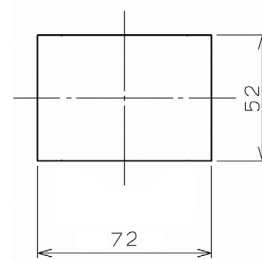
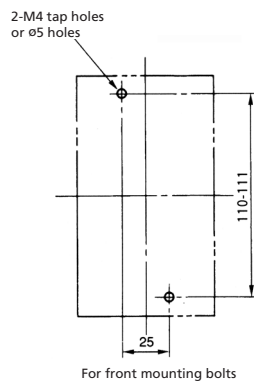


■ Dimensions



Direct-connected bus drilling

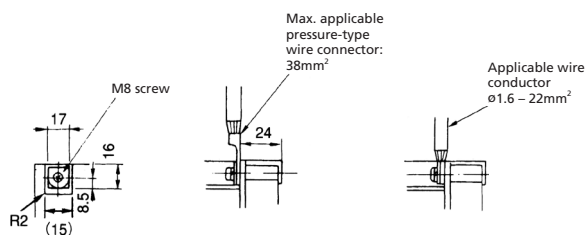
■ Drilling Plan



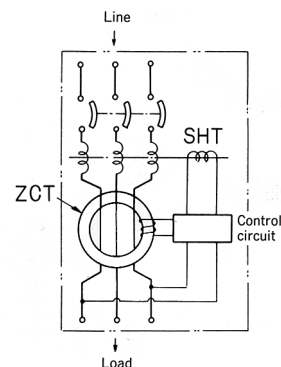
1mm clearance on each side of handle

Frontplate cutout

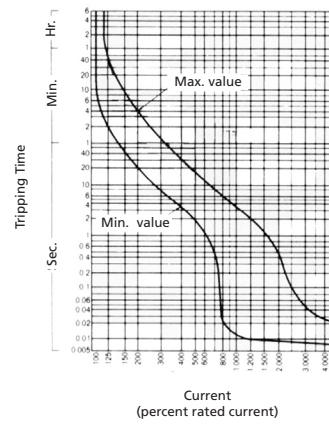
■ Terminal Arrangement



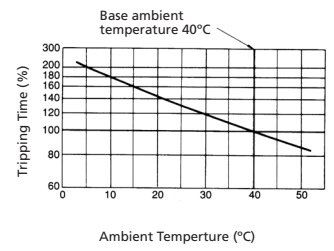
■ Internal Diagram Connection



EX100B

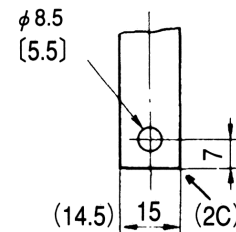
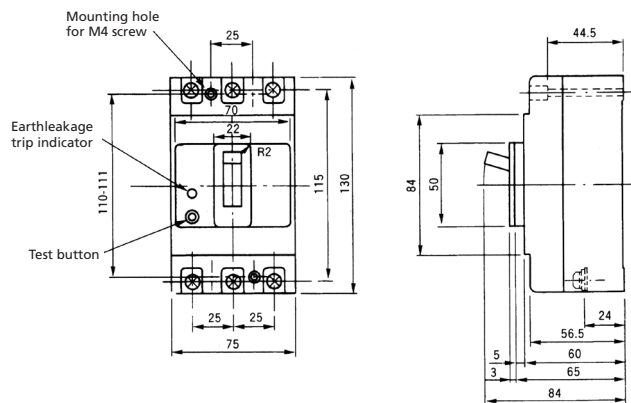


Overcurrent Tripping Characteristic Curve



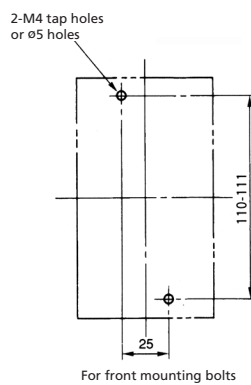
Temperature Compensation Curve

■ Dimensions

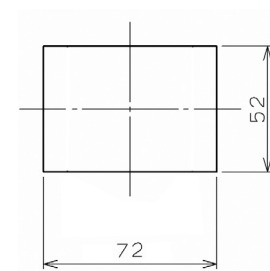


Direct-connected bus drilling

■ Drilling Plan



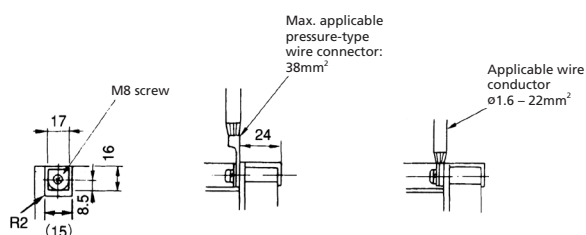
For front mounting bolts



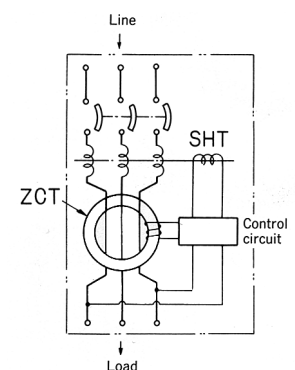
1mm clearance on each side of handle

Frontplate cutout

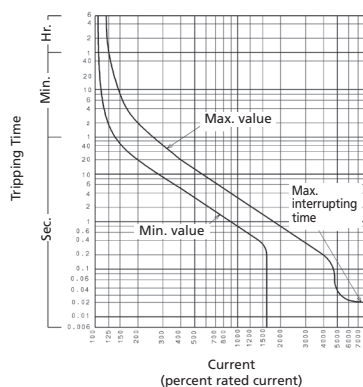
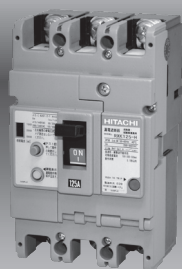
■ Terminal Arrangement



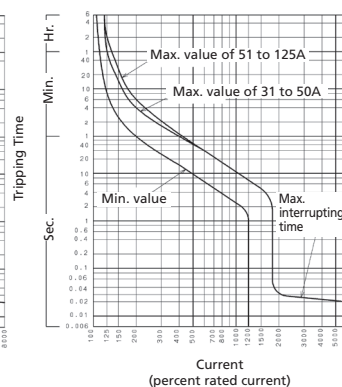
■ Internal Diagram Connection



RXK125-S/RXK125-H

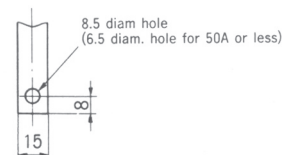
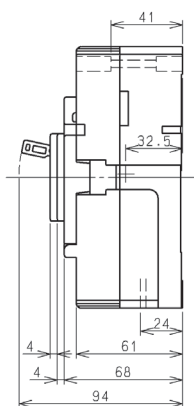
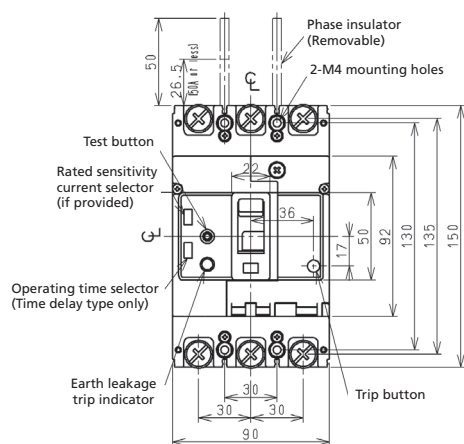


**Overcurrent Tripping
Characteristic Curve
(15-30A)**



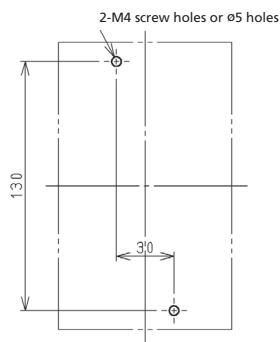
**Overcurrent Tripping
Characteristic Curve
(31-125A)**

■ Dimensions

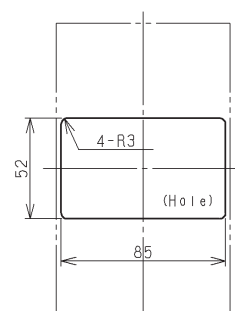


Direct-connected bus drilling

■ Drilling Plan

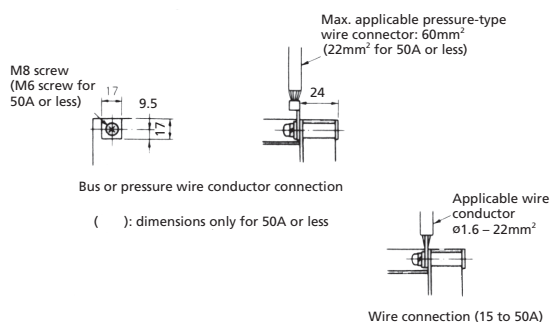


For front mounting bolts

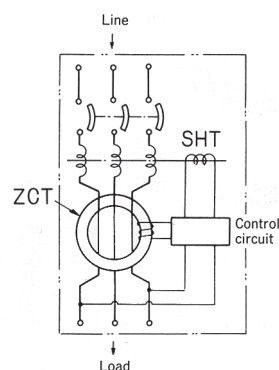


Frontplate cutout

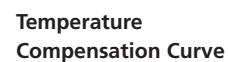
■ Terminal Arrangement



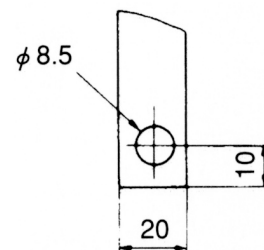
■ Internal Diagram Connection



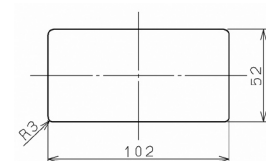
EX225



■ Dimensions



■ Drilling Plan



Frontplate cutout

■ Terminal Arrangement

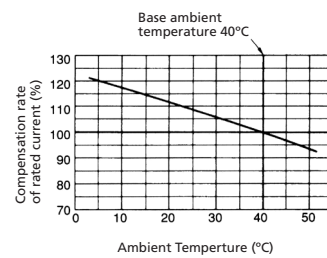
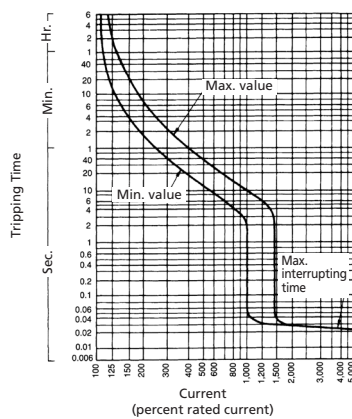
Technical drawing of a mechanical part, showing a cross-section with a dimension of 24.

Pressure-type wire connector
directly connected

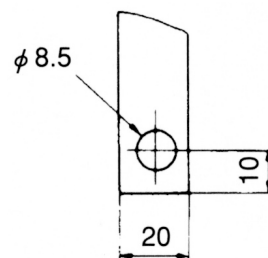
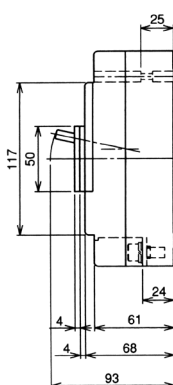
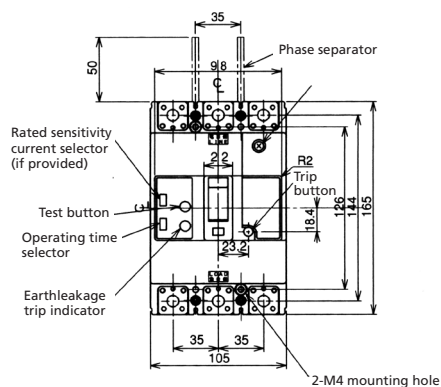
■ Internal Diagram Connection



EXK225

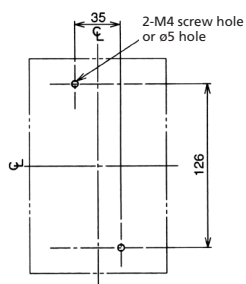


■ Dimensions



Direct-connected bus drilling

■ Drilling Plan



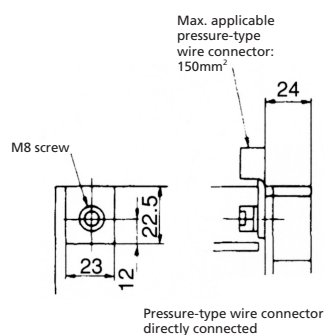
For front mounting bolts



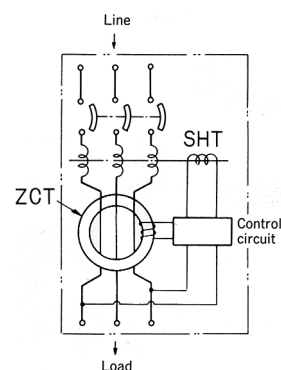
1mm clearance on each side of handle

Frontplate cutout

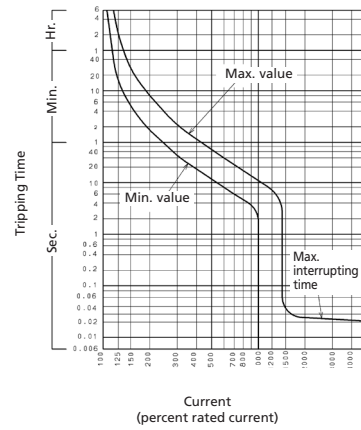
■ Terminal Arrangement



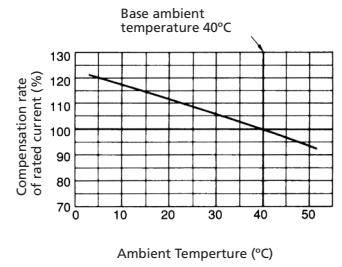
■ Internal Diagram Connection



RXK250-S/RXK250-H

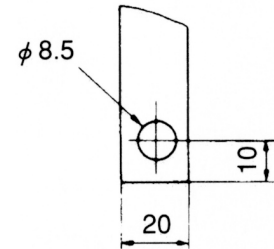
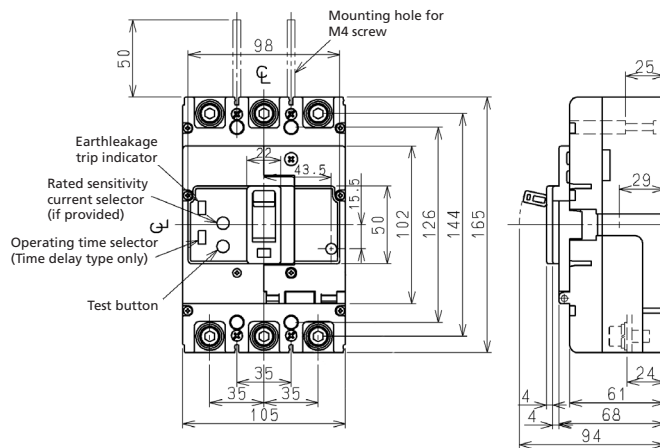


Overcurrent Tripping Characteristic Curve



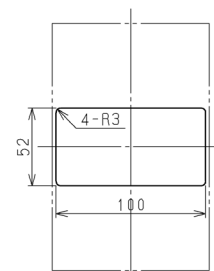
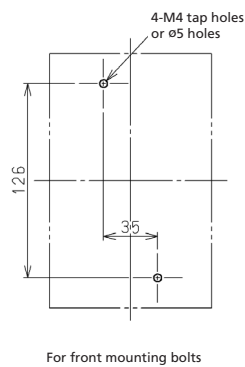
Temperature Compensation Curve

■ Dimensions



Direct-connected bus drilling

■ Drilling Plan

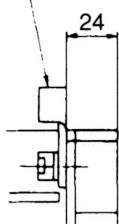


1mm clearance on each side of handle

Frontplate cutout

■ Terminal Arrangement

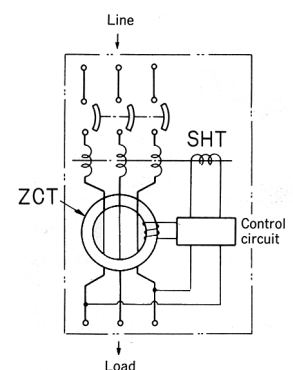
Maximum applicable pressure t-type wire connector = 60mm²
Special pressure type wire connector is attached for 175 – 225A as shown on the right table



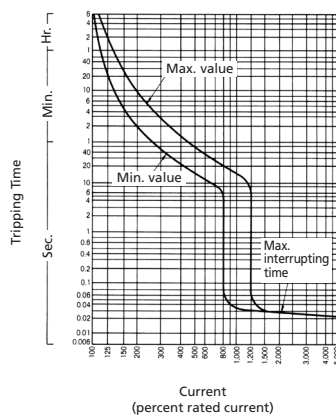
Pressure type wire connector directly connected

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

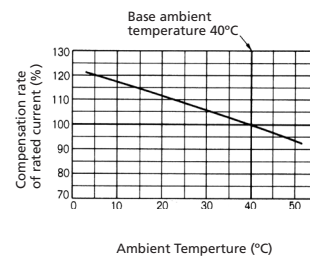
■ Internal Diagram Connection



EX400/RX400

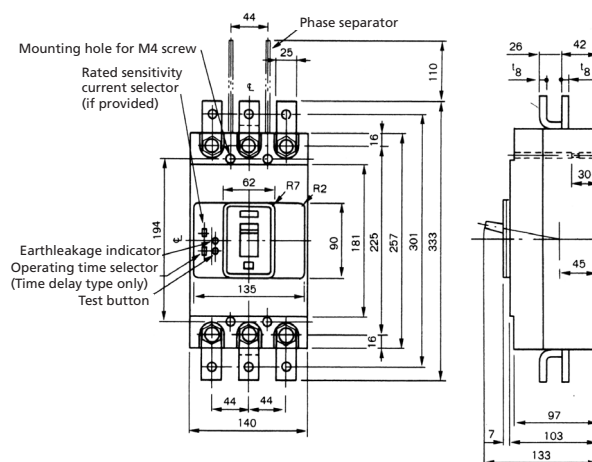


**Overcurrent Tripping
Characteristic Curve**

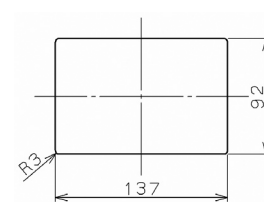
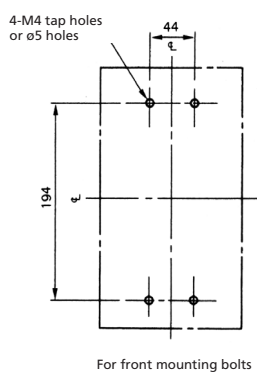


**Temperature
Compensation Curve**

■ Dimensions



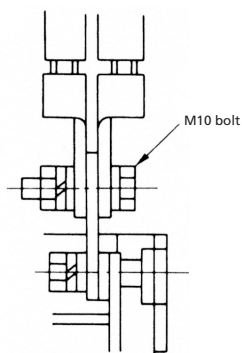
■ Drilling Plan



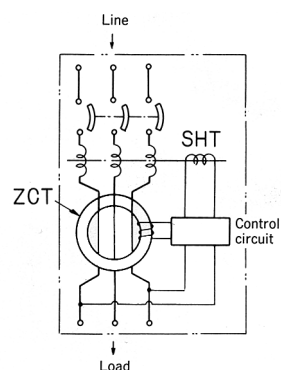
1mm clearance on each side of handle

Frontplate cutout

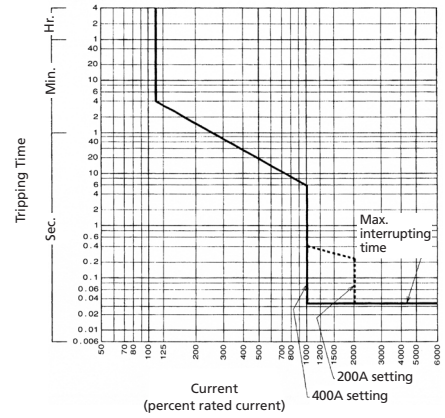
■ Terminal Arrangement



■ Internal Diagram Connection

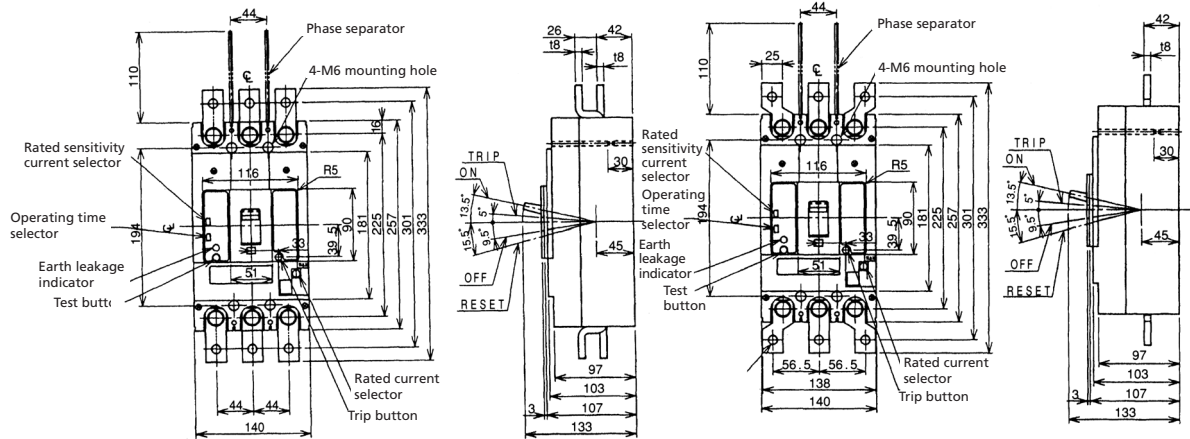


EX400B/RX400B

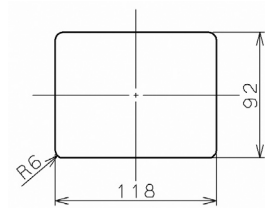
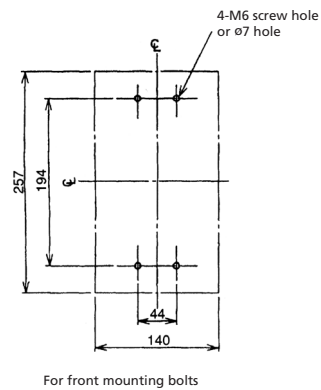


Overcurrent Tripping Characteristic Curve

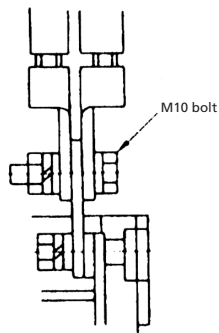
■ Dimensions



■ Drilling Plan



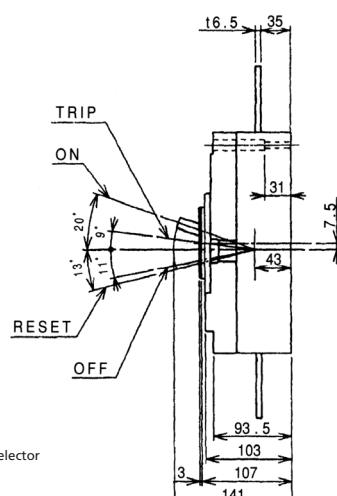
■ Terminal Arrangement



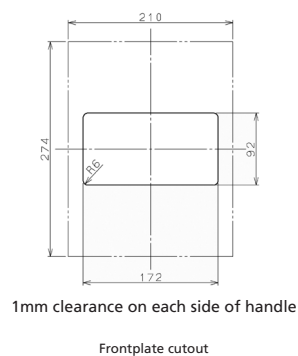
EX600B / RX600B



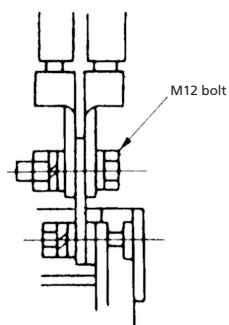
■ Dimensions



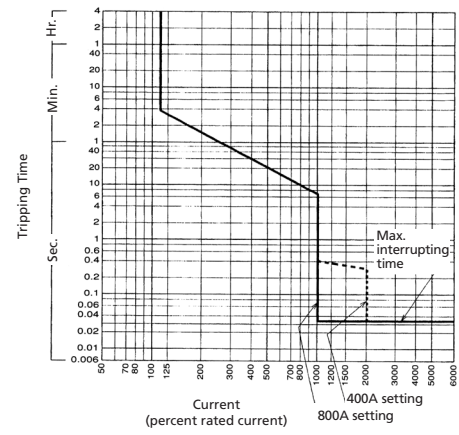
■ Drilling Plan



■ Terminal Arrangement

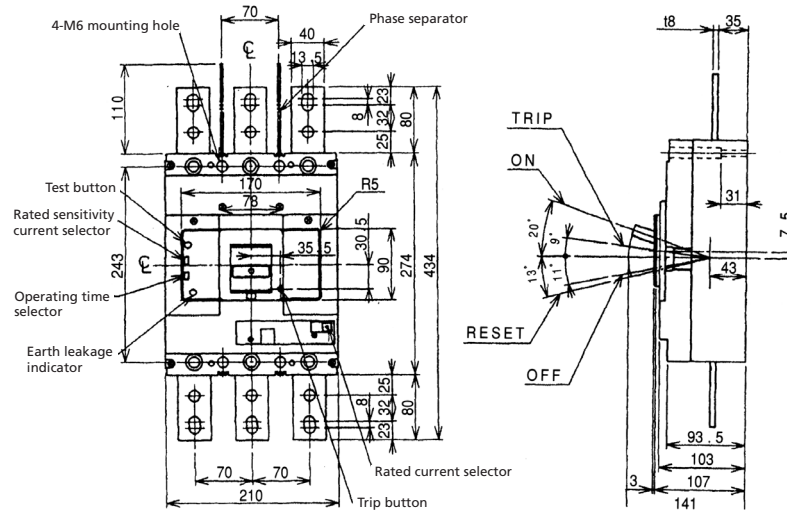


EX800B/RX800B

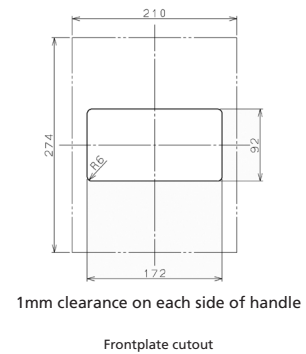
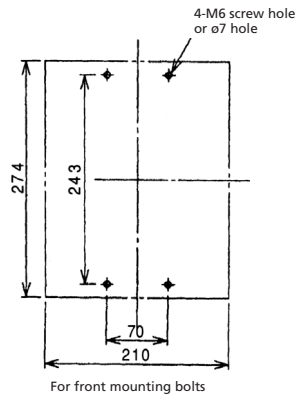


Overcurrent Tripping Characteristic Curve

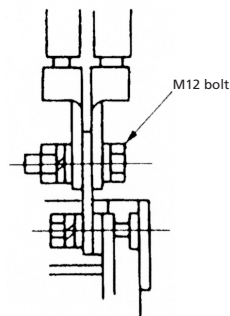
■ Dimensions



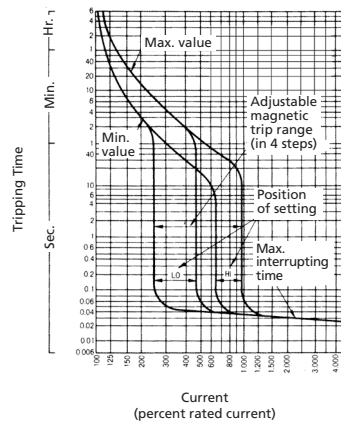
■ Drilling Plan



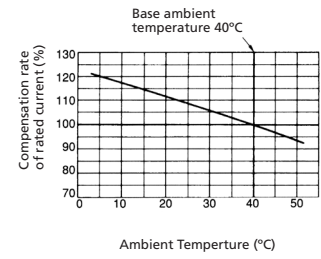
■ Terminal Arrangement



RF-1000KN

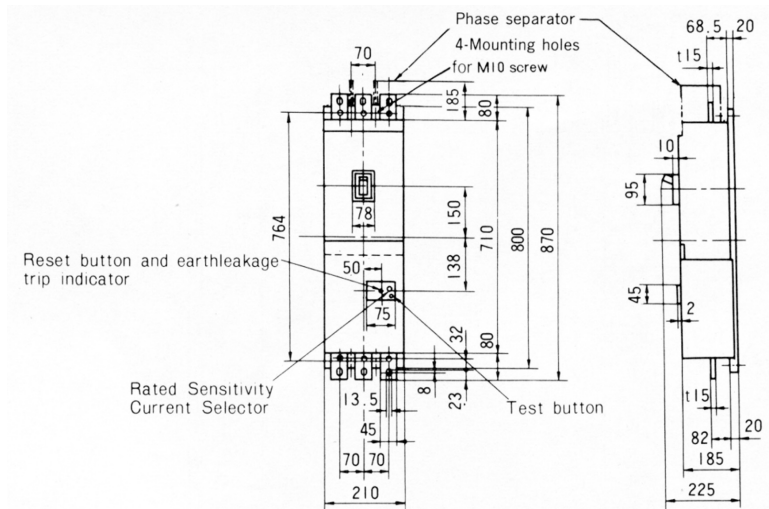


**Overcurrent Tripping
Characteristic Curve**

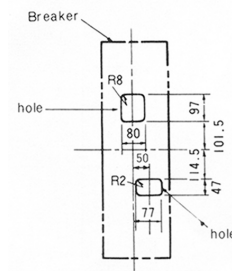
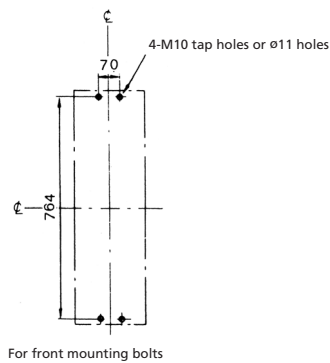


**Temperature
Compensation Curve**

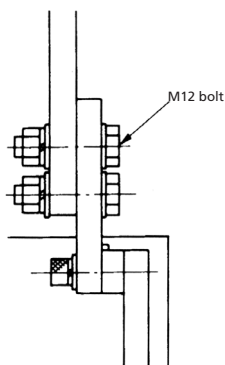
■ Dimensions



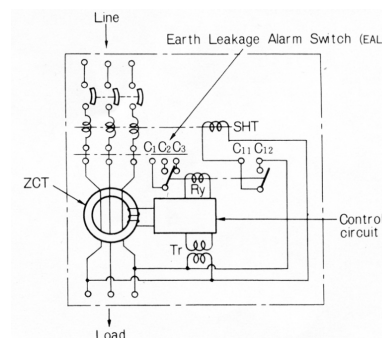
■ Drilling Plan



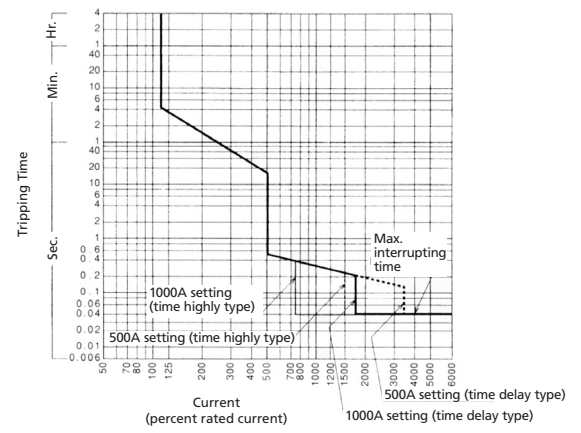
■ Terminal Arrangement



■ Internal Diagram Connection

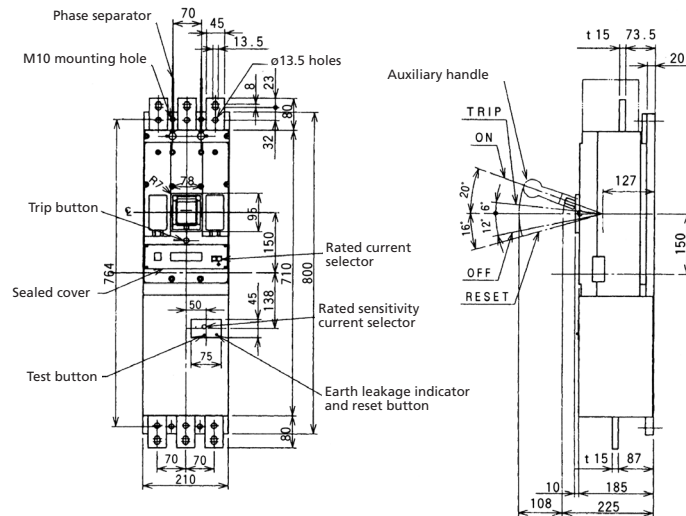


RF-1000CBN

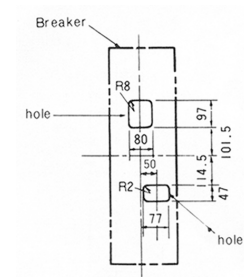
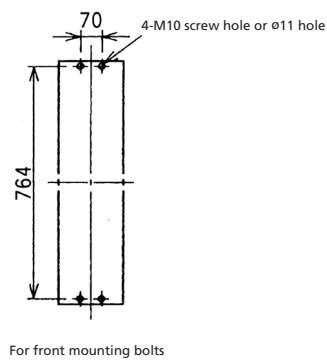


**Overcurrent Tripping
Characteristic Curve**

■ Dimensions



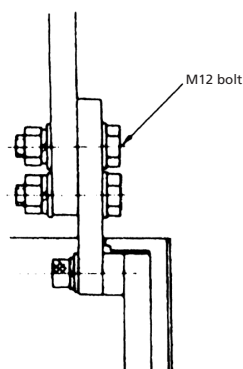
■ Drilling Plan



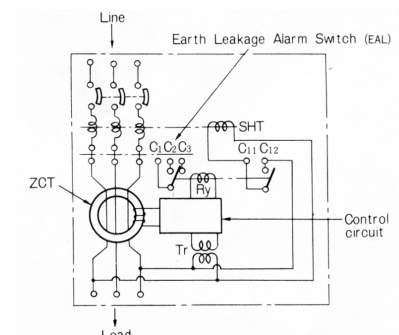
1mm clearance on each side of handle

Frontplate cutout

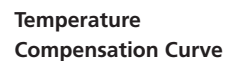
■ Terminal Arrangement



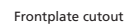
■ Internal Diagram Connection



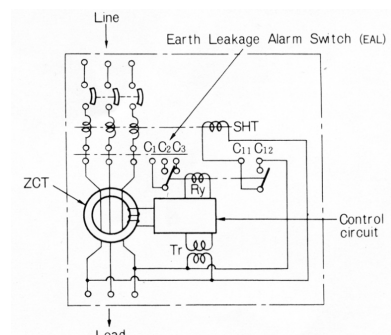
RF-1200KN



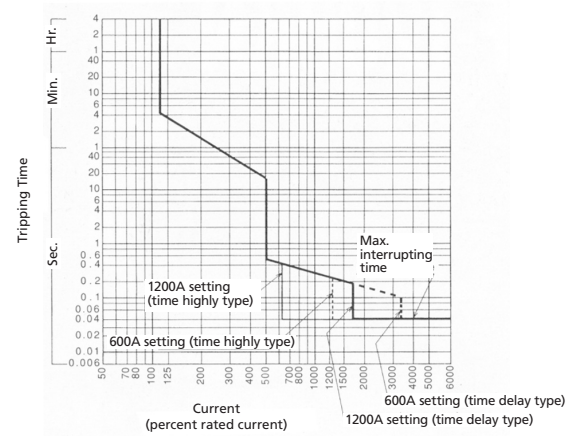
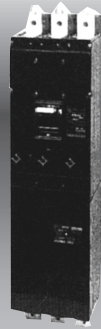
■ Dimensions



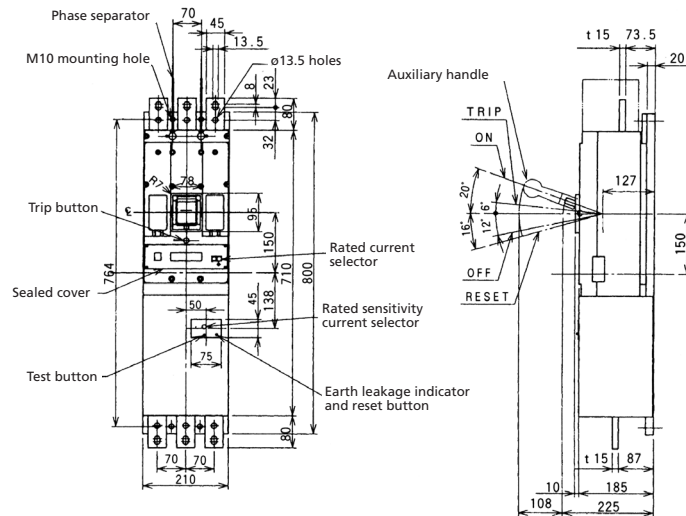
■ Terminal Arrangement



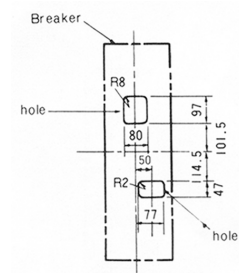
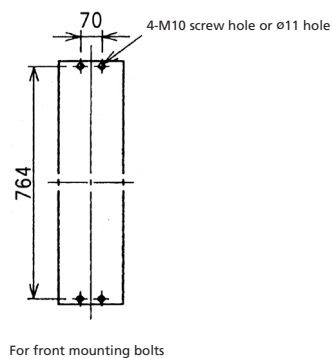
RF-1200CBN



■ Dimensions



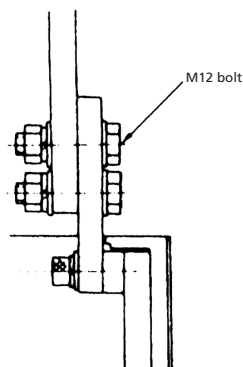
■ Drilling Plan



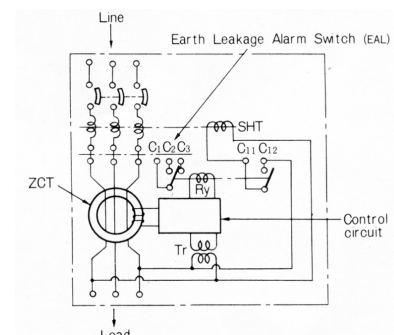
1mm clearance on each side of handle

Frontplate cutout

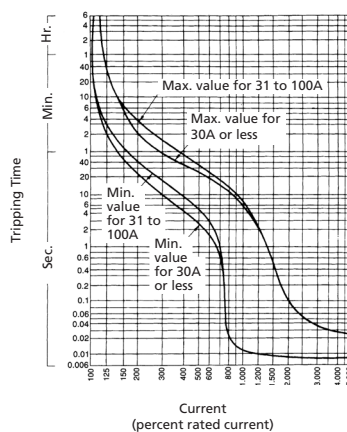
■ Terminal Arrangement



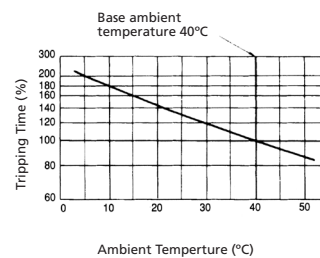
■ Internal Diagram Connection



RX100 4P

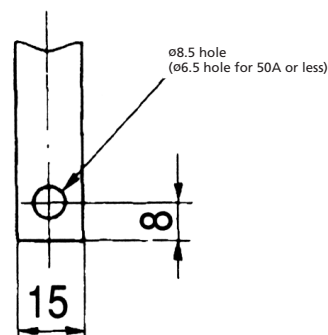
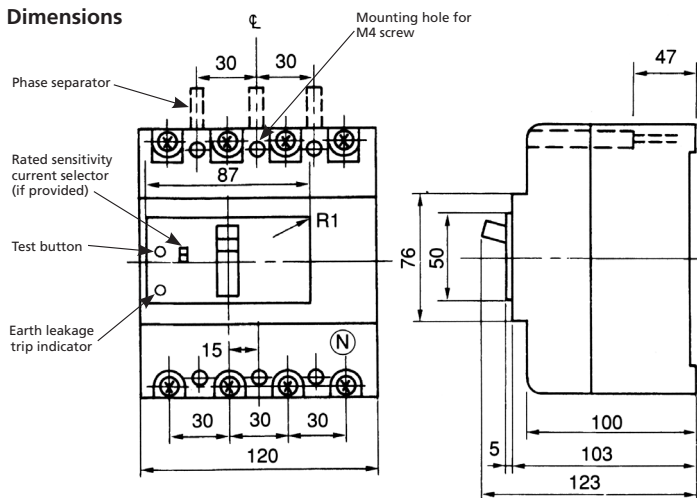


Overcurrent Tripping Characteristic Curve



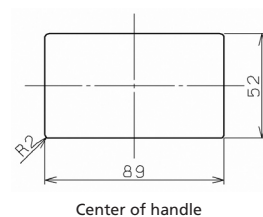
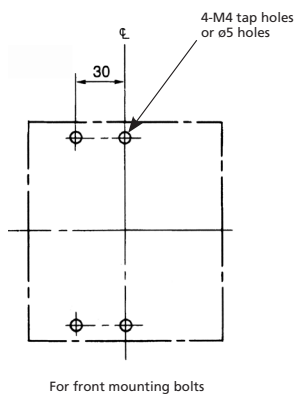
Temperature Compensation Curve

■ Dimensions



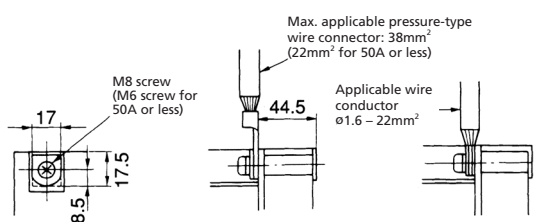
Direct-connected bus drilling

■ Drilling Plan

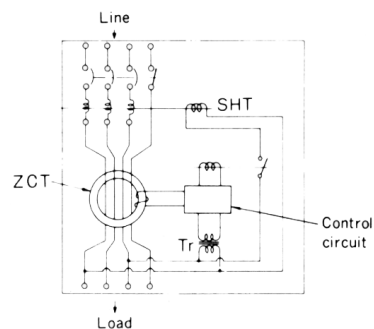


Frontplate cutout

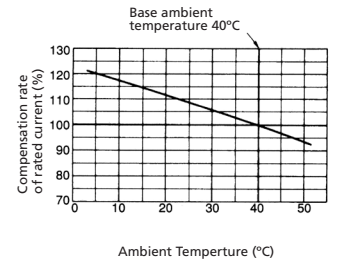
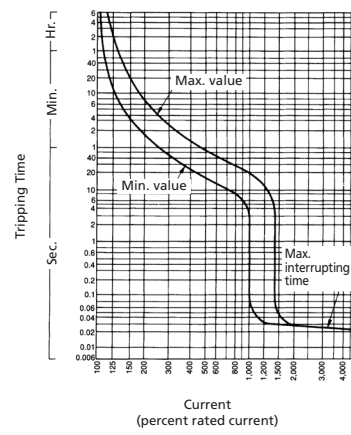
■ Terminal Arrangement



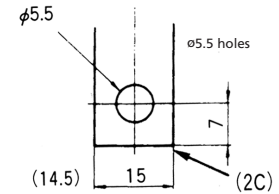
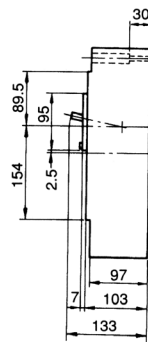
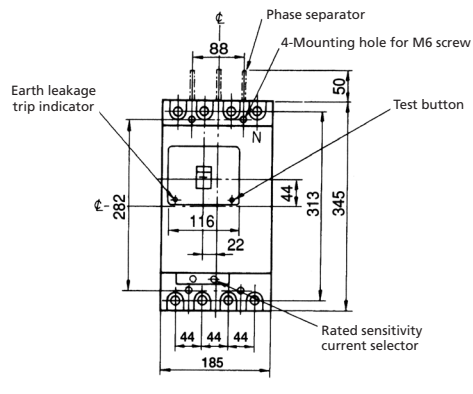
■ Internal Diagram Connection



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

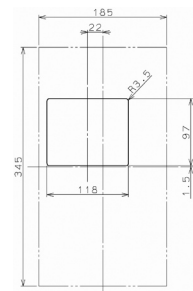
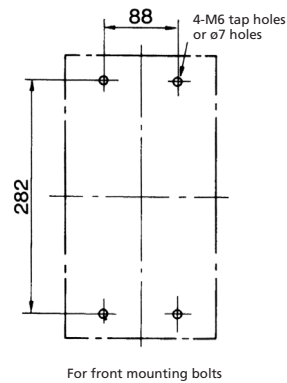


■ Dimensions



Direct-connected bus drilling

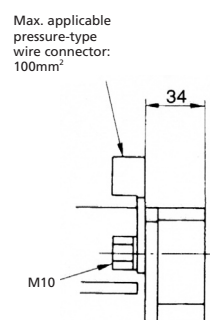
■ Drilling Plan



1mm clearance on each side of handle

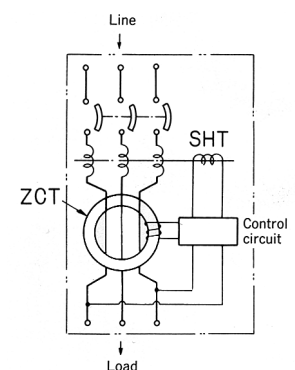
Frontplate cutout

■ Terminal Arrangement

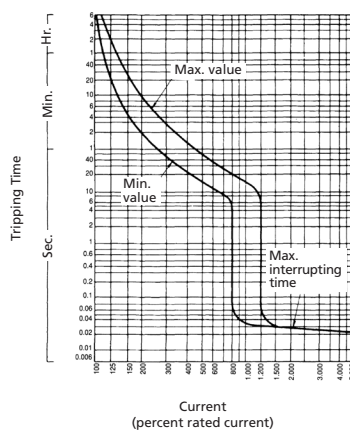


Bus or pressure-type wire connector connection

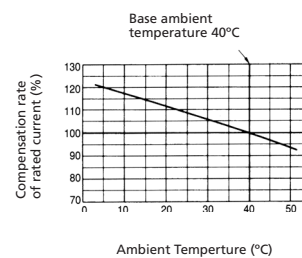
■ Internal Diagram Connection



RG-400BN 4P RG-400BH 4P

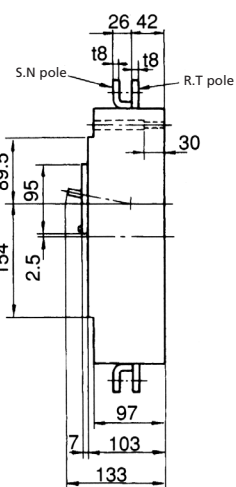
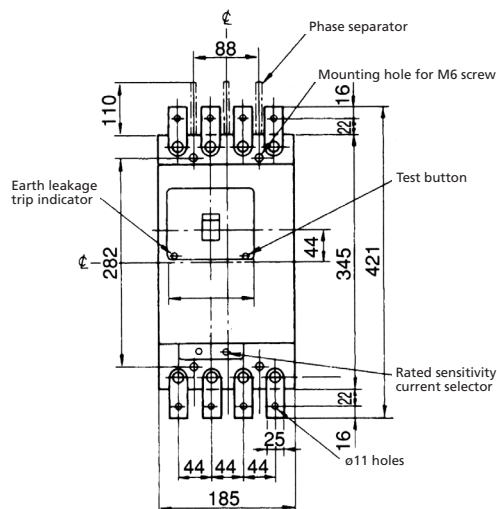


**Overcurrent Tripping
Characteristic Curve**

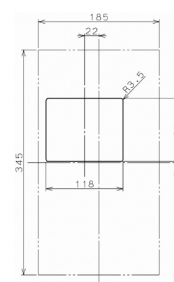
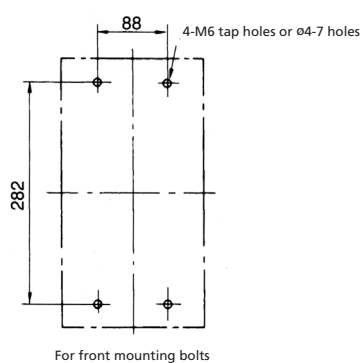


**Temperature
Compensation Curve**

■ Dimensions



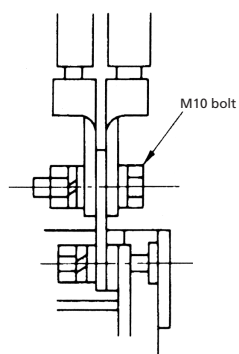
■ Drilling Plan



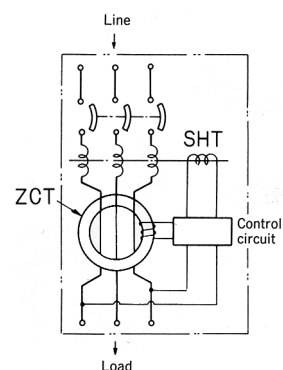
1mm clearance on each side of handle

Frontplate cutout

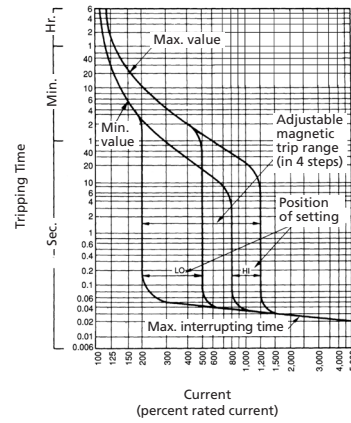
■ Terminal Arrangement



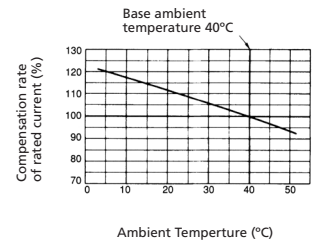
■ Internal Diagram Connection



RF-600FN 4P

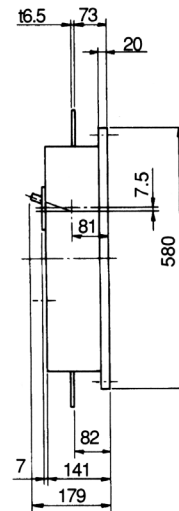
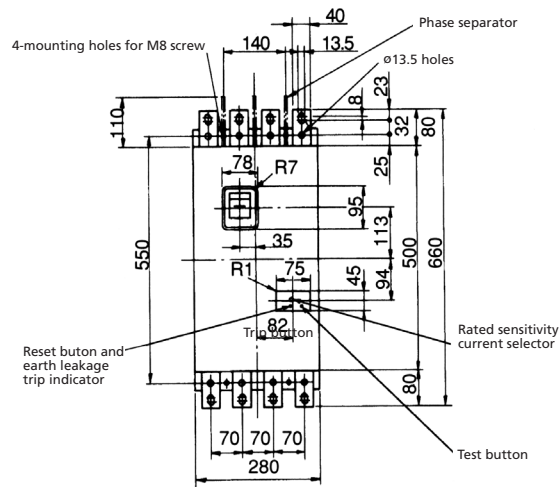


Overcurrent Tripping Characteristic Curve

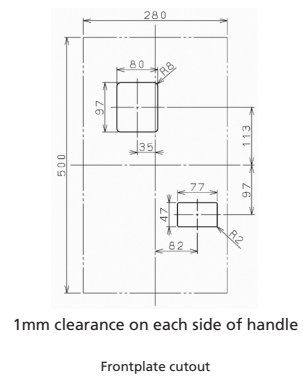
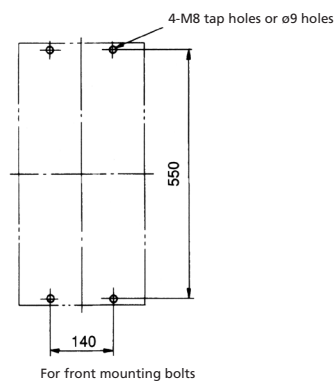


Temperature Compensation Curve

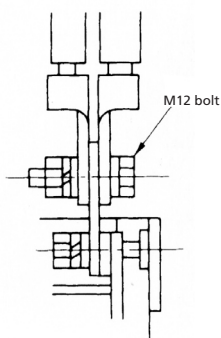
■ Dimensions



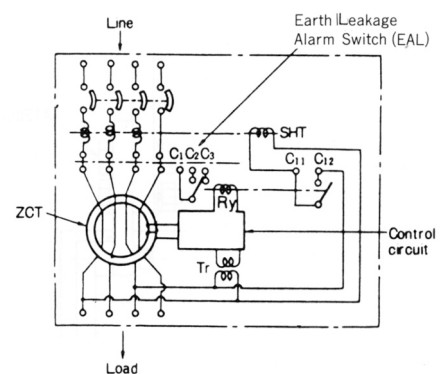
■ Drilling Plan



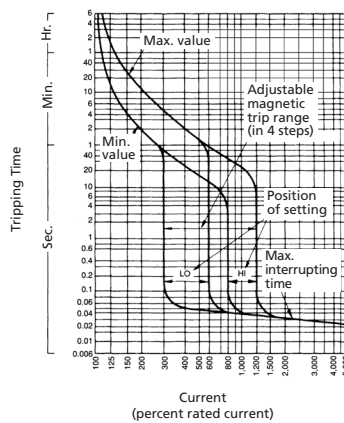
■ Terminal Arrangement



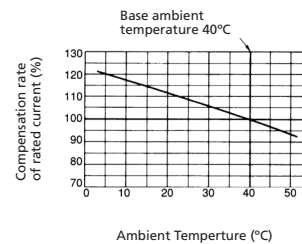
■ Internal Diagram Connection



RF-800KN 4P

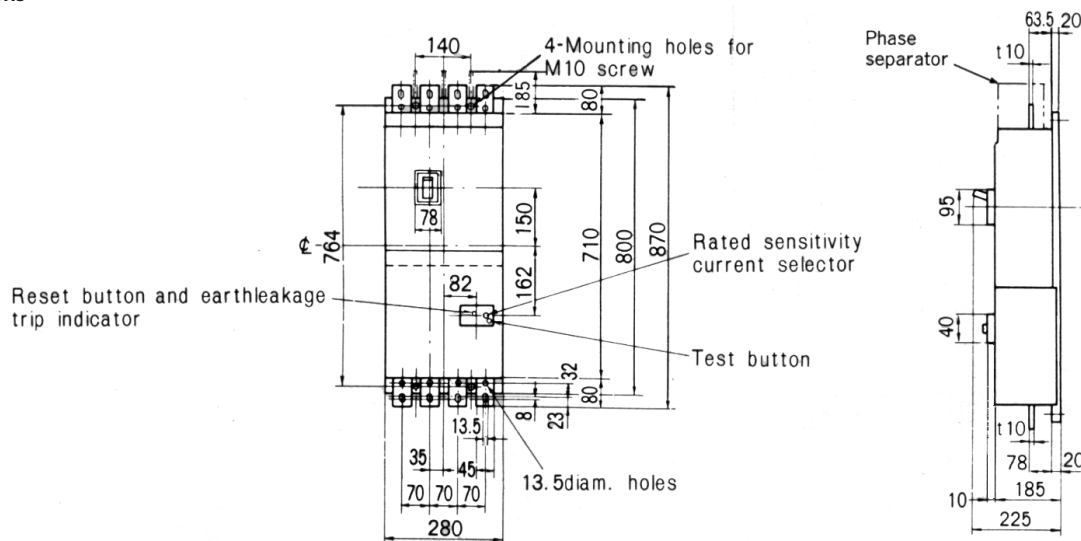


Overcurrent Tripping Characteristic Curve

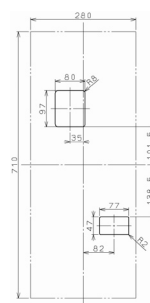
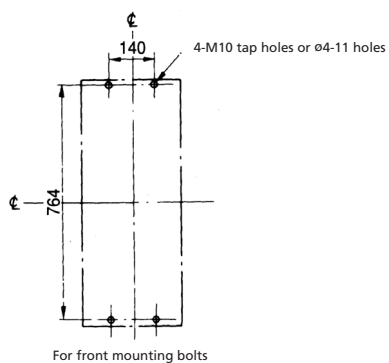


Temperature Compensation Curve

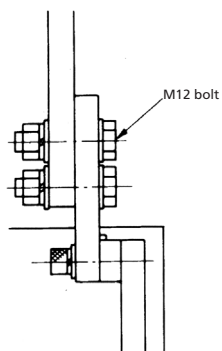
■ Dimensions



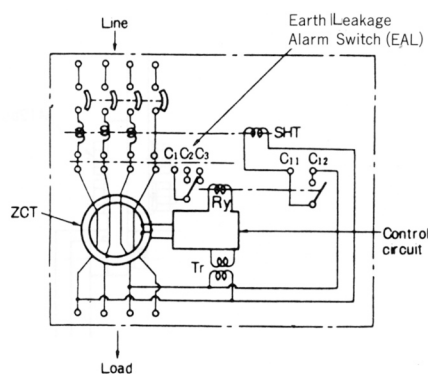
■ Drilling Plan



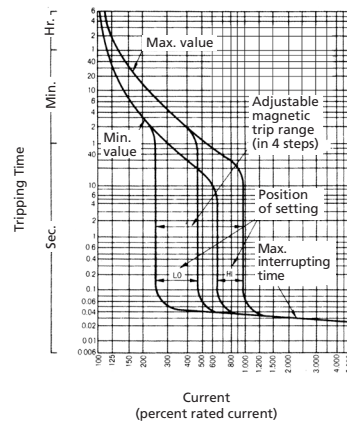
■ Terminal Arrangement



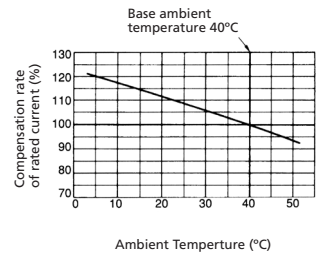
■ Internal Diagram Connection



RF-1000KN 4P RF-1200KN 4P

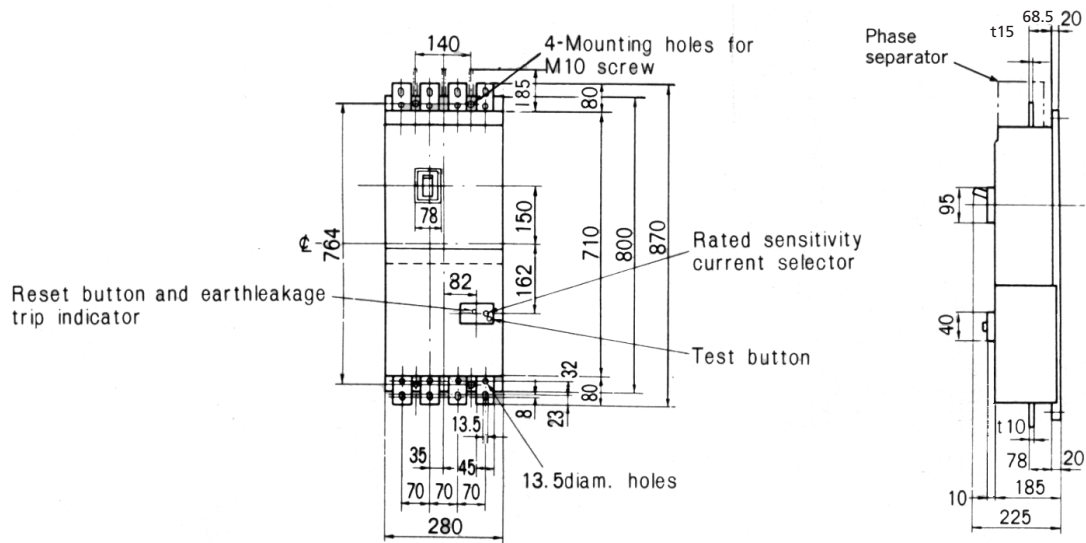


**Overcurrent Tripping
Characteristic Curve**

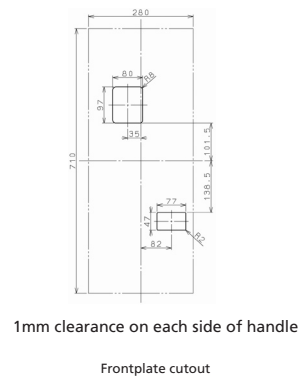
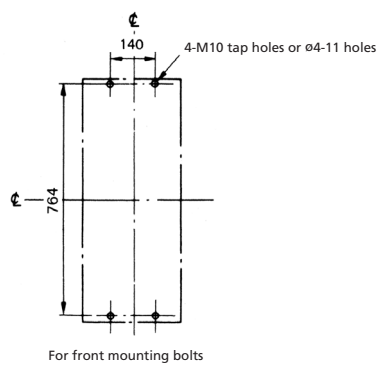


**Temperature
Compensation Curve**

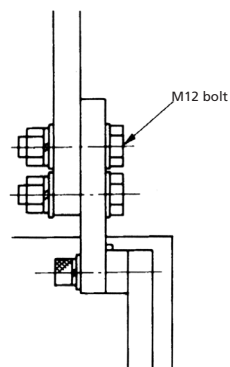
■ Dimensions



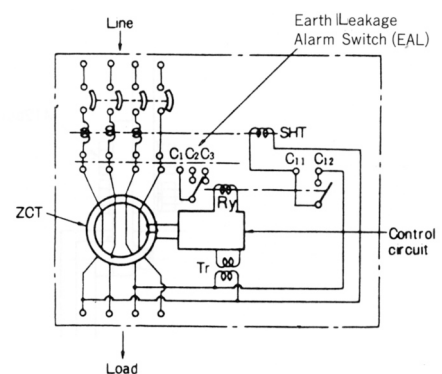
■ Drilling Plan



■ Terminal Arrangement



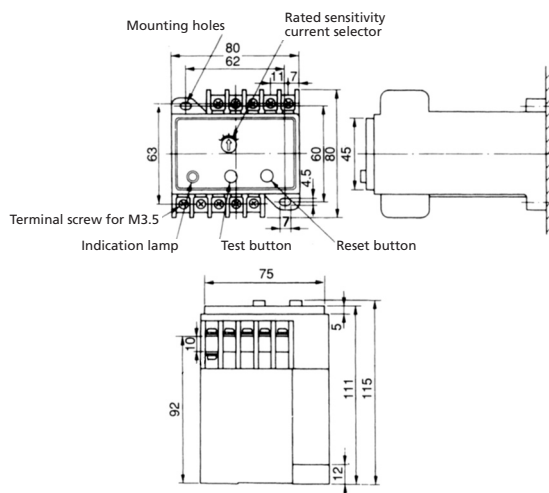
■ Internal Diagram Connection



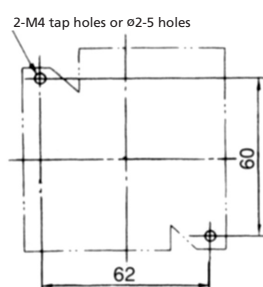
R-NZB



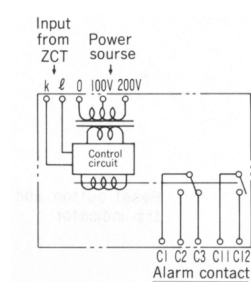
■ Dimensions



■ Drilling Plan



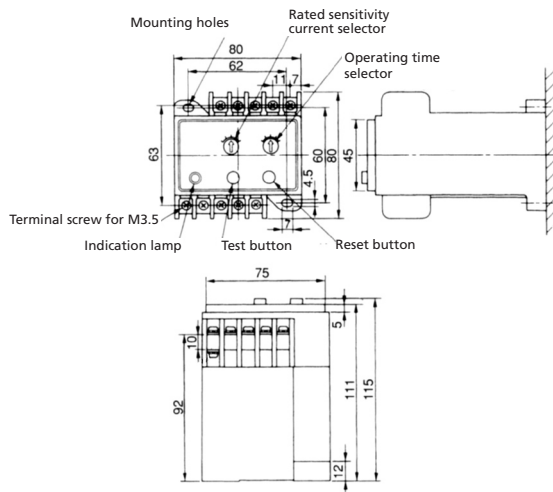
■ Internal Diagram Connection



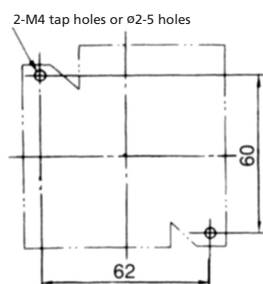
R-NZBT



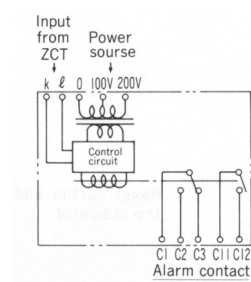
■ Dimensions



■ Drilling Plan



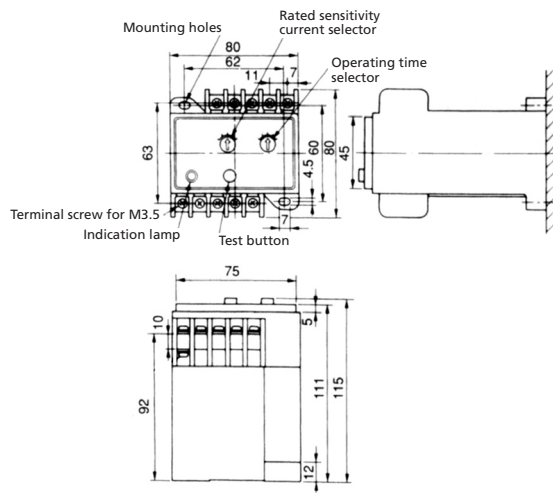
■ Internal Diagram Connection



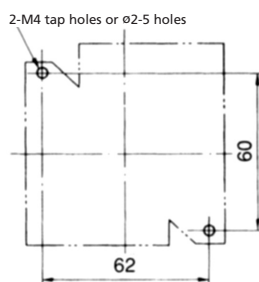
R-NZBK



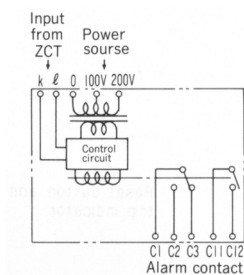
■ Dimensions



■ Drilling Plan



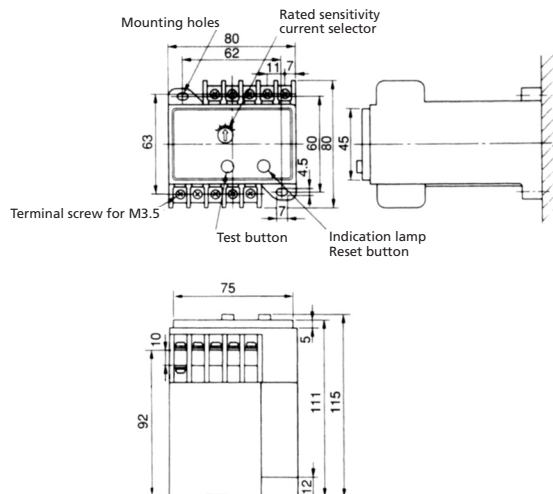
■ Internal Diagram Connection



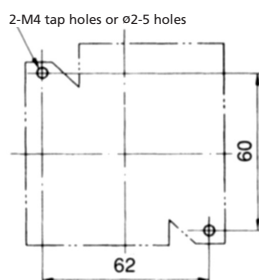
R-NZBL



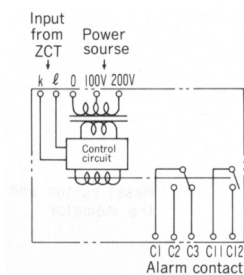
■ Dimensions



■ Drilling Plan



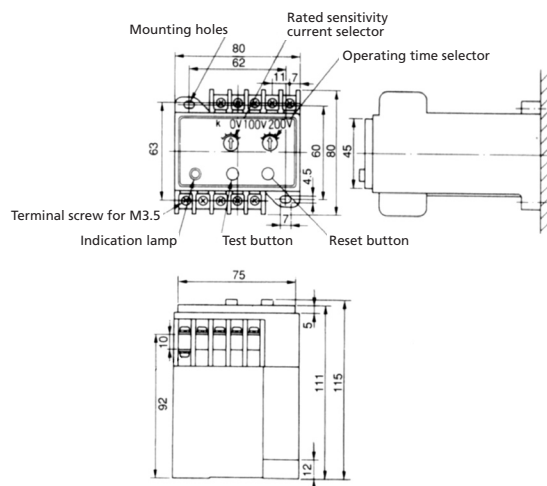
■ Internal Diagram Connection



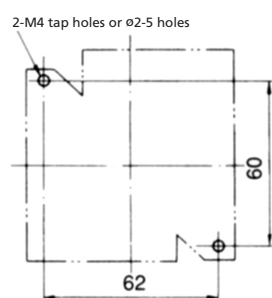
R-NZBR



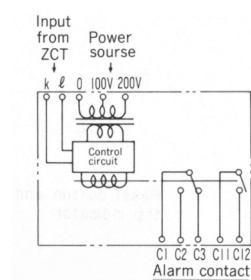
■ Dimensions



■ Drilling Plan



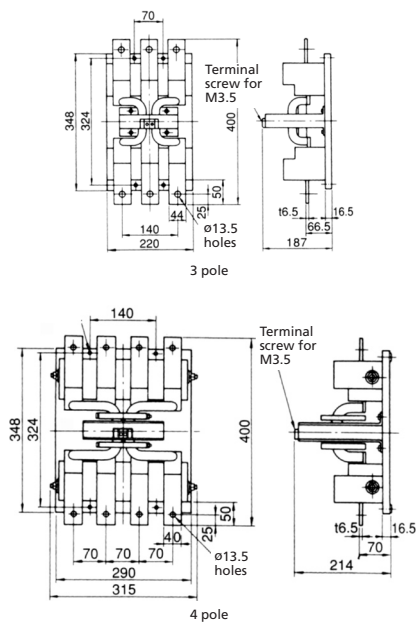
■ Internal Diagram Connection



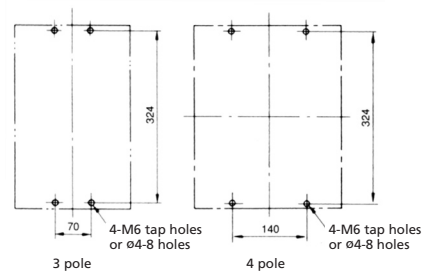
Z-400B



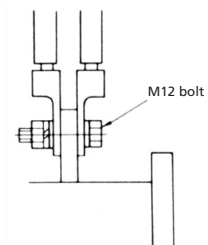
■ Dimensions



■ Drilling Plan



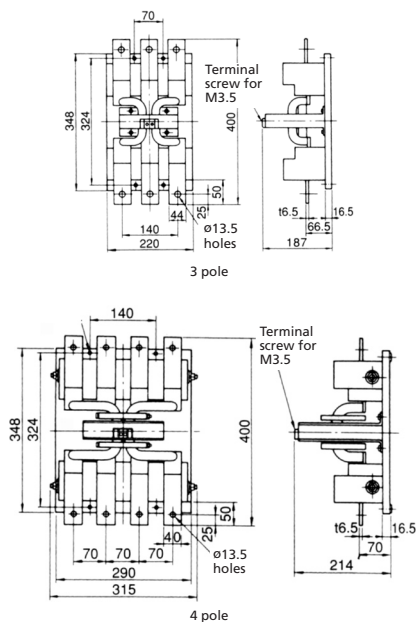
■ Terminal Arrangement



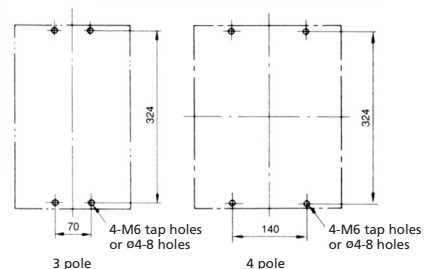
Z-600B



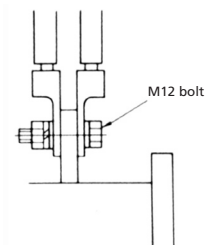
■ Dimensions



■ Drilling Plan



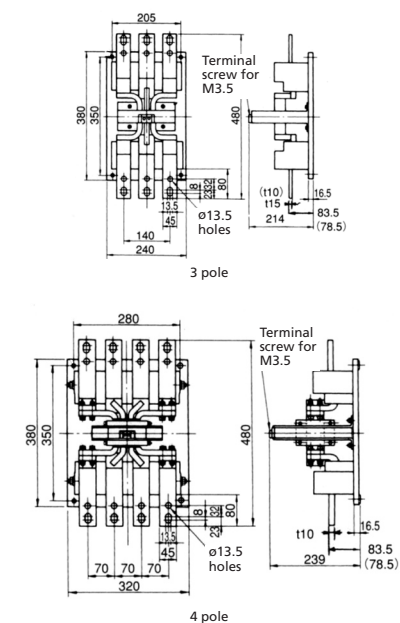
■ Terminal Arrangement



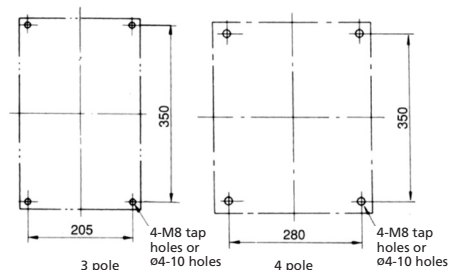
Z-800B



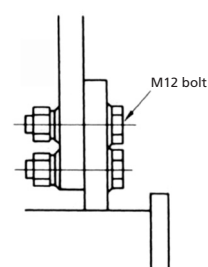
■ Dimensions



■ Drilling Plan



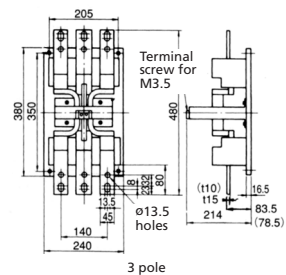
■ Terminal Arrangement



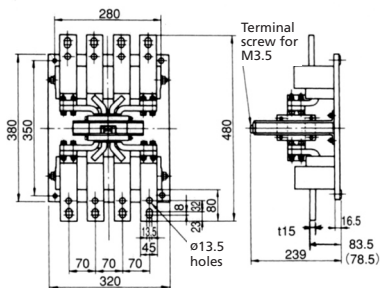
Z-1000B



■ Dimensions

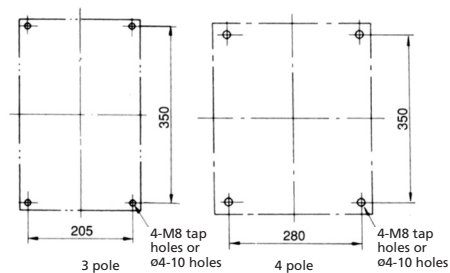


3 pole

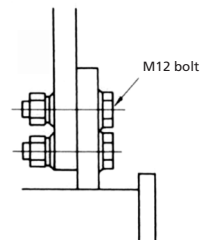


4 pole

■ Drilling Plan



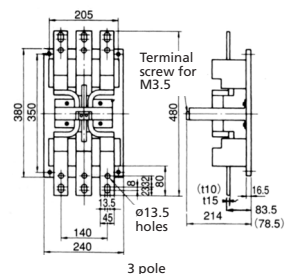
■ Terminal Arrangement



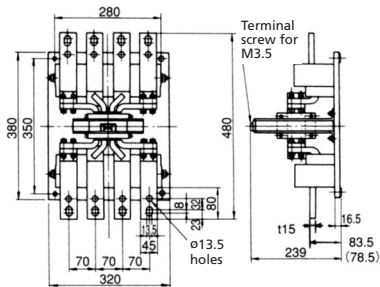
Z-1200B



■ Dimensions

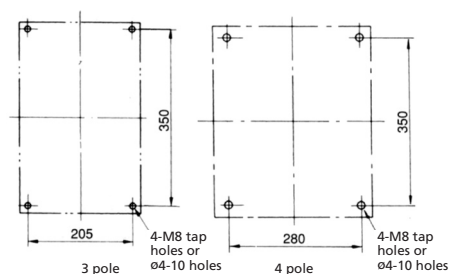


3 pole

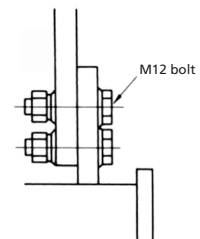


4 pole

■ Drilling Plan



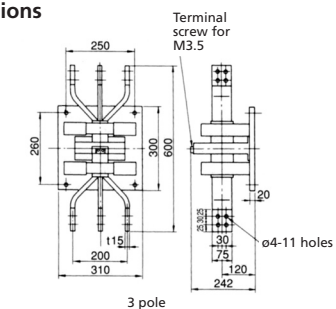
■ Terminal Arrangement



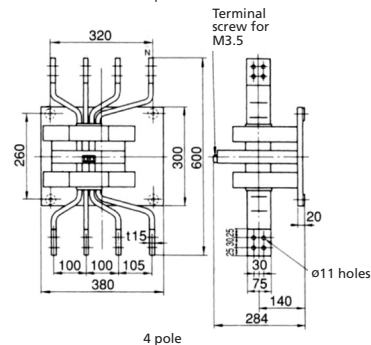
Z-2000B



■ Dimensions

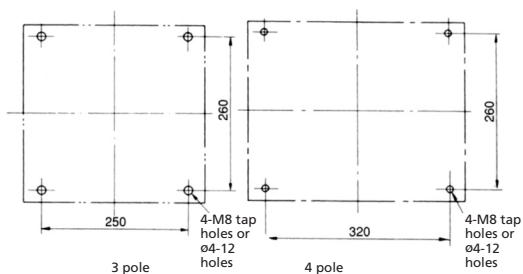


3 pole

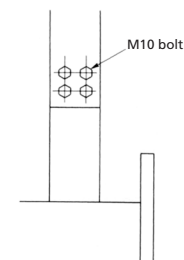


4 pole

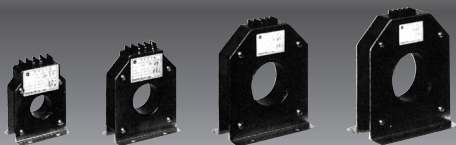
■ Drilling Plan



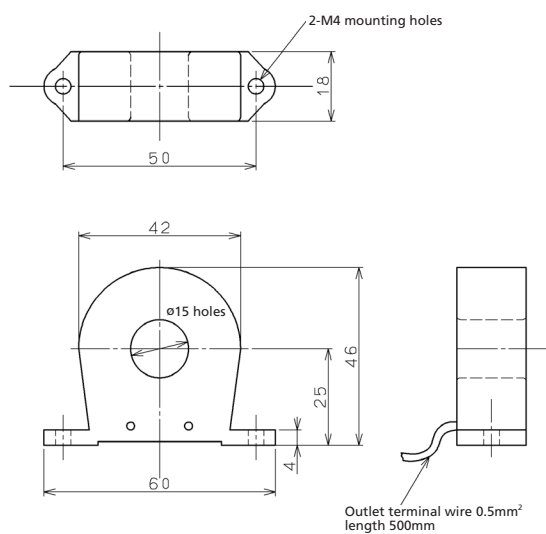
■ Terminal Arrangement



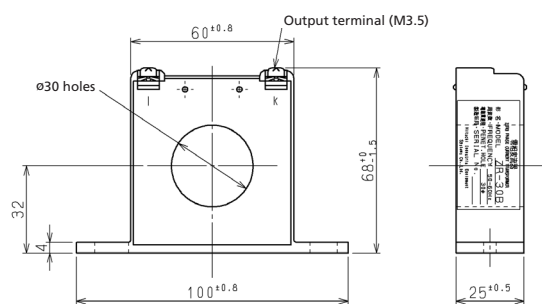
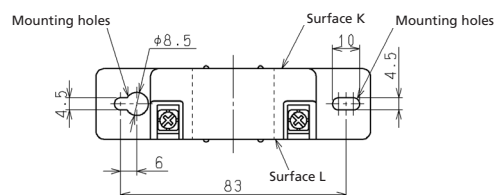
ZR-15 — 120



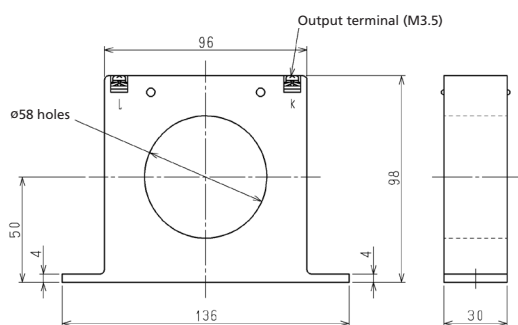
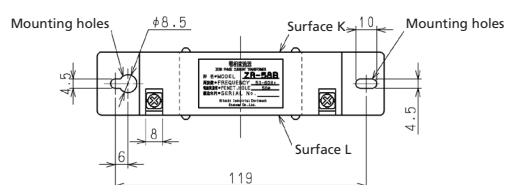
■ Dimensions



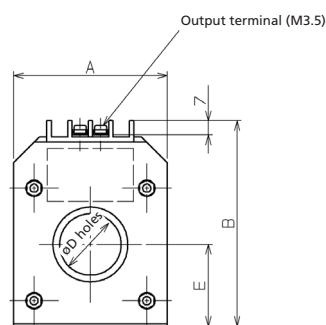
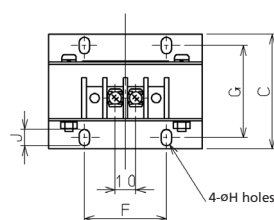
ZR-15



ZR-30B



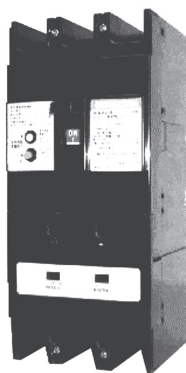
ZR-58B



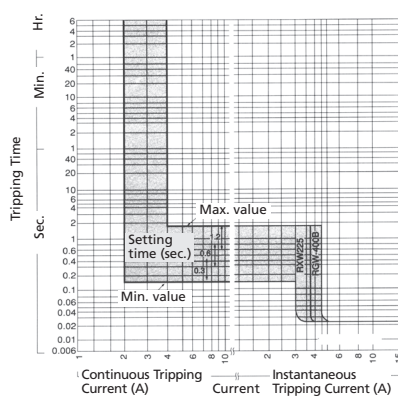
ZR-65 — 120

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

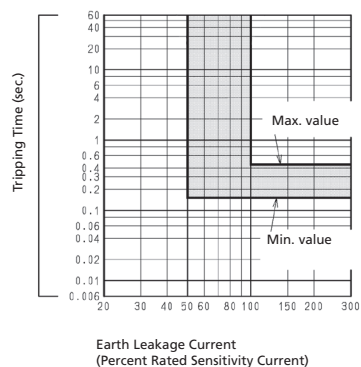
EARTH LEAKAGE BREAKERS FOR WELDERS



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.

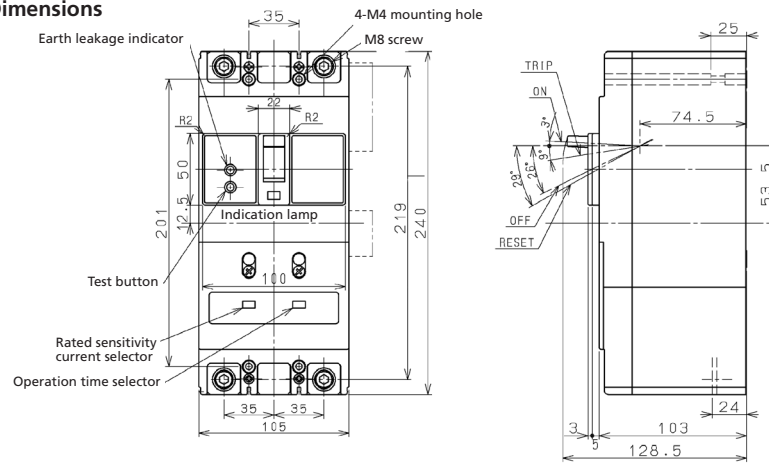
■ Selection

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

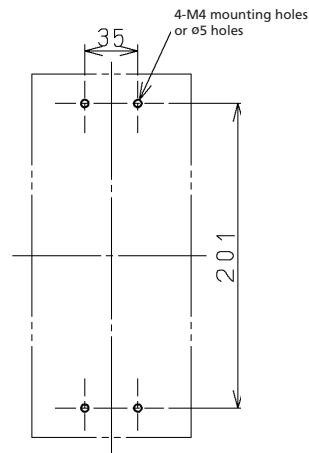
(): for reference value

RXW225

■ Dimensions

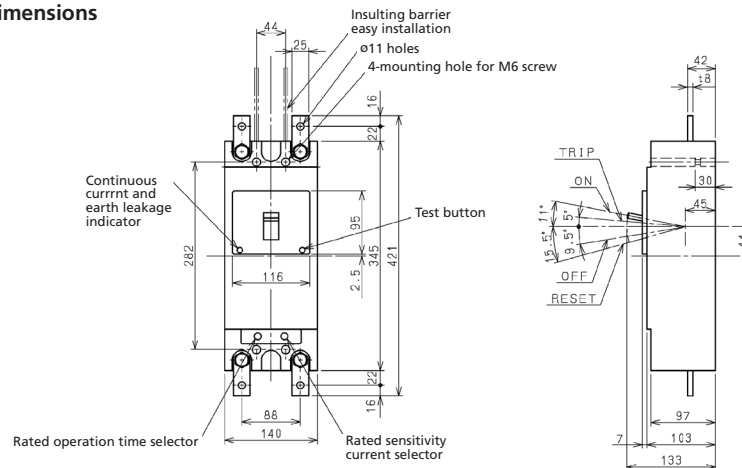


■ Drilling Plan

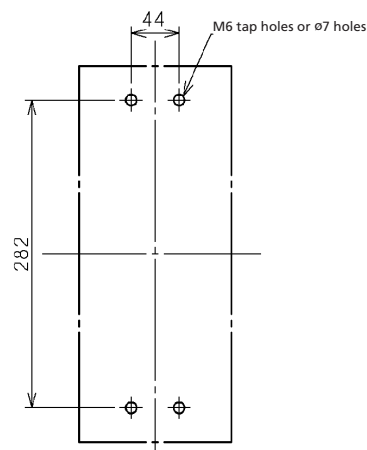


RGW-400B

■ Dimensions



■ Drilling Plan

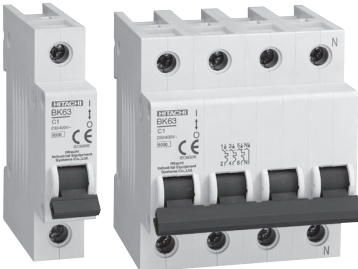
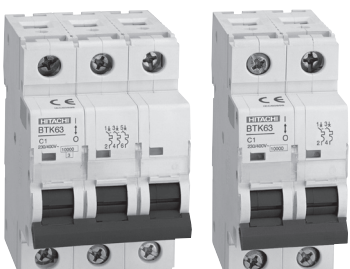


MINIATURE CIRCUIT BREAKERS

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 : 3–5I_n
Application : computers and electronic equipments
- **Type C**
Instant tripping characteristics : 5–10I_n
Application : general load such as bulbs , motors
- **Type D**
Instant tripping characteristics : 10–20I_n
Application : high current surge device such as transformers, motors with heavy load

COLORED HANDLES

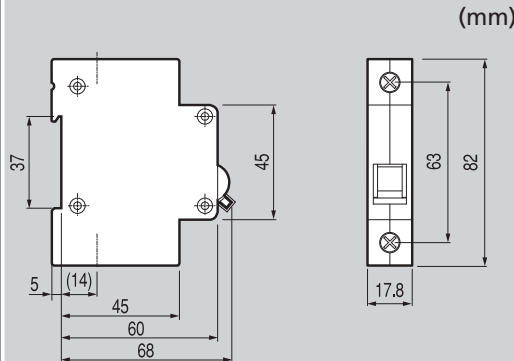
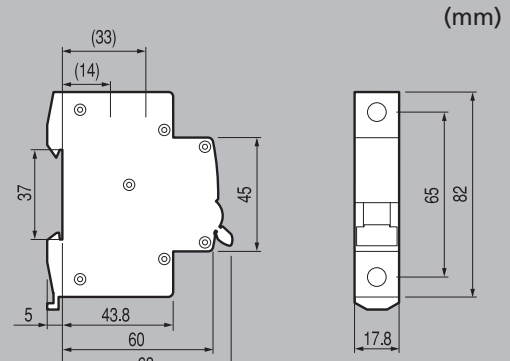
Easy to distinguish the rated current of the MCB by means of colored handle.

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

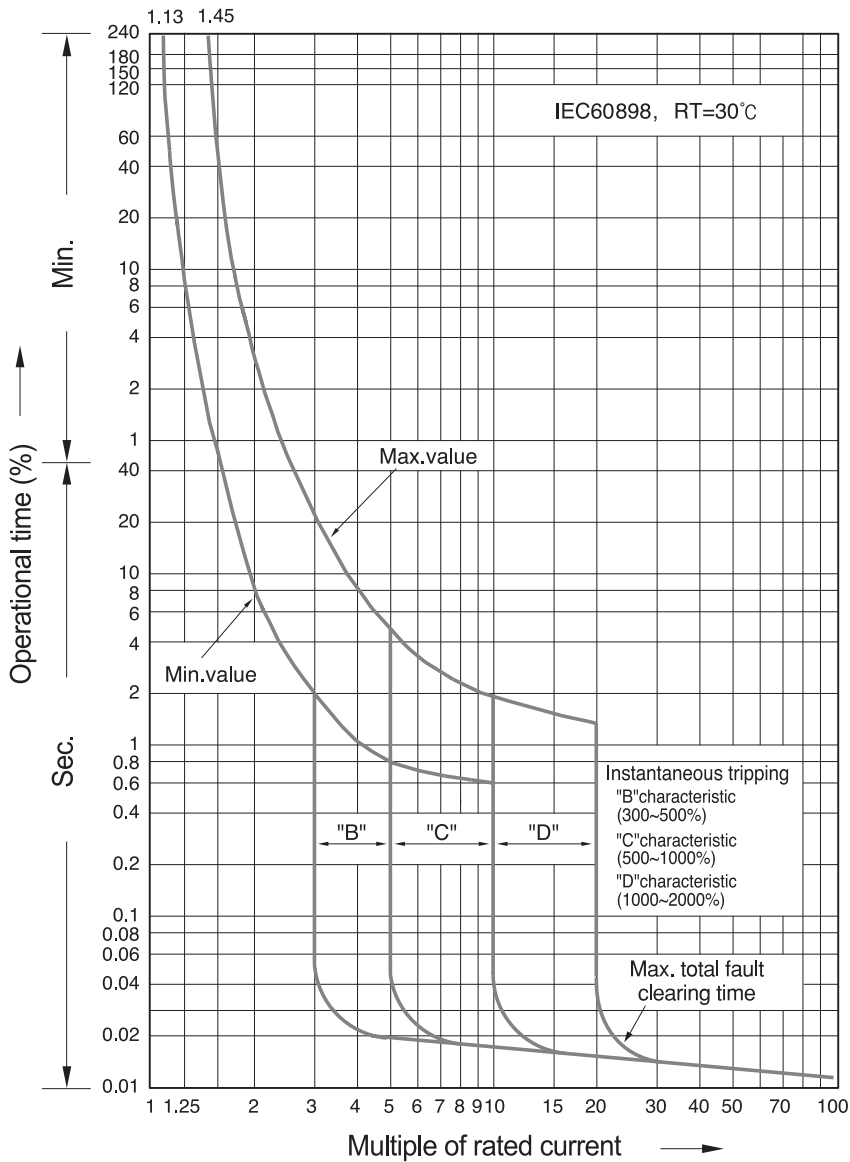
SPECIFICATIONS

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	2, 3, 4P	1P	2, 3, 4P
	6kA at 230/400VAC	6kA at 400VAC	10kA at 240/415VAC	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)	 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		Not applicable	
Dimension	 (mm)		 (mm)	

CHARACTERISTIC CURVE AND COMPENSATION CURVE

■ Characteristic curve For type BK63, BTK63

Operating curves

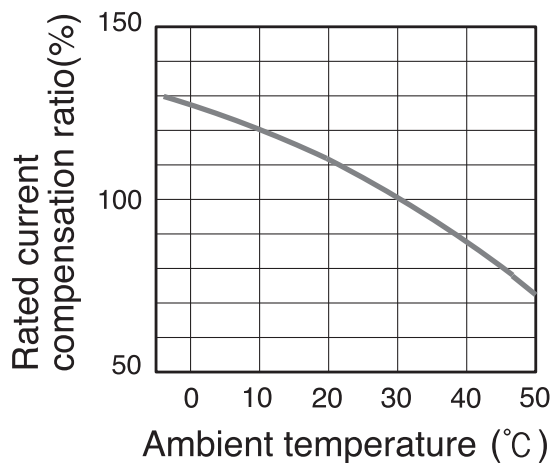


■ Compensation table

[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

■ Compensation curve



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

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.

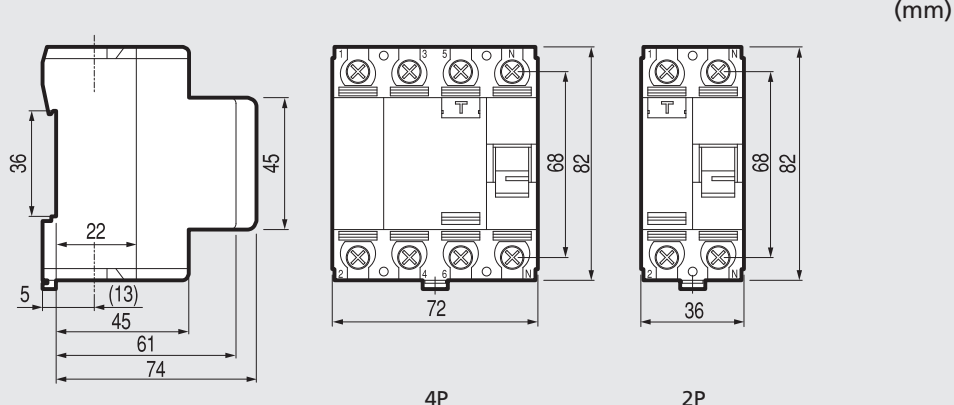
APPROVAL

- 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 $I\Delta n$	0.5 $I\Delta n$
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 In=25,32,40A 630A for In=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	

MIN. SALES LOT

■ MCBs

Type		Min. sales lot (pcs.)
BK63 1P	BTK63 1P	120
BK63 2P	BTK63 2P	60
BK63 3P	BTK63 3P	40
BK63 4P	BTK63 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
AKH
AKS
AKN



Ampere frame
-
06 630AF
08 830AF
10 1000AF
13 1250AF
16 1600AF
20 2000AF

Frame size & phase array
D 3P/4P Standard type RST (N)
W 4P Reverse phase type NRST

No. of pole
3 3P (D)
4 4P (D, W)

Rated current (CT Spec.)
00 Without OCR & CT
02 200A
04 400A
06 630A
04 400A
06 630A
08 800A
10 1000A
13 1250A
16 1600A
20 2000A

Connections
Draw-out type
J Manual connection
A Automatic connection
Fixed type
H Horizontal type
V Vertical type
M Mixed type Line: Horizontal Load: Vertical
N Mixed type Line: Vertical Load: Horizontal
P Front type



Ampere frame
20 2000AF
25 2500AF
32 3200AF
40 4000AF

Frame size & phase array
D 3P/4P Standard type RST (N)
W 4P Reverse phase type NRST

No. of pole
3 3P (E)
4 4P (E, X)

Rated current (CT Spec.)
06 630A
08 800A
10 1000A
13 1250A
16 1600A
20 2000A
25 2500A
32 3200A
40 4000A



Ampere frame
40 4000AF
50 5000AF

Frame size & phase array
D 3P/4P Standard type RST(N)
W 4P Reverse phase type NRST

No. of pole
3 3P (F)
4 4P (F, Y)

Rated current (CT Spec.)
40 4000A
50 5000A

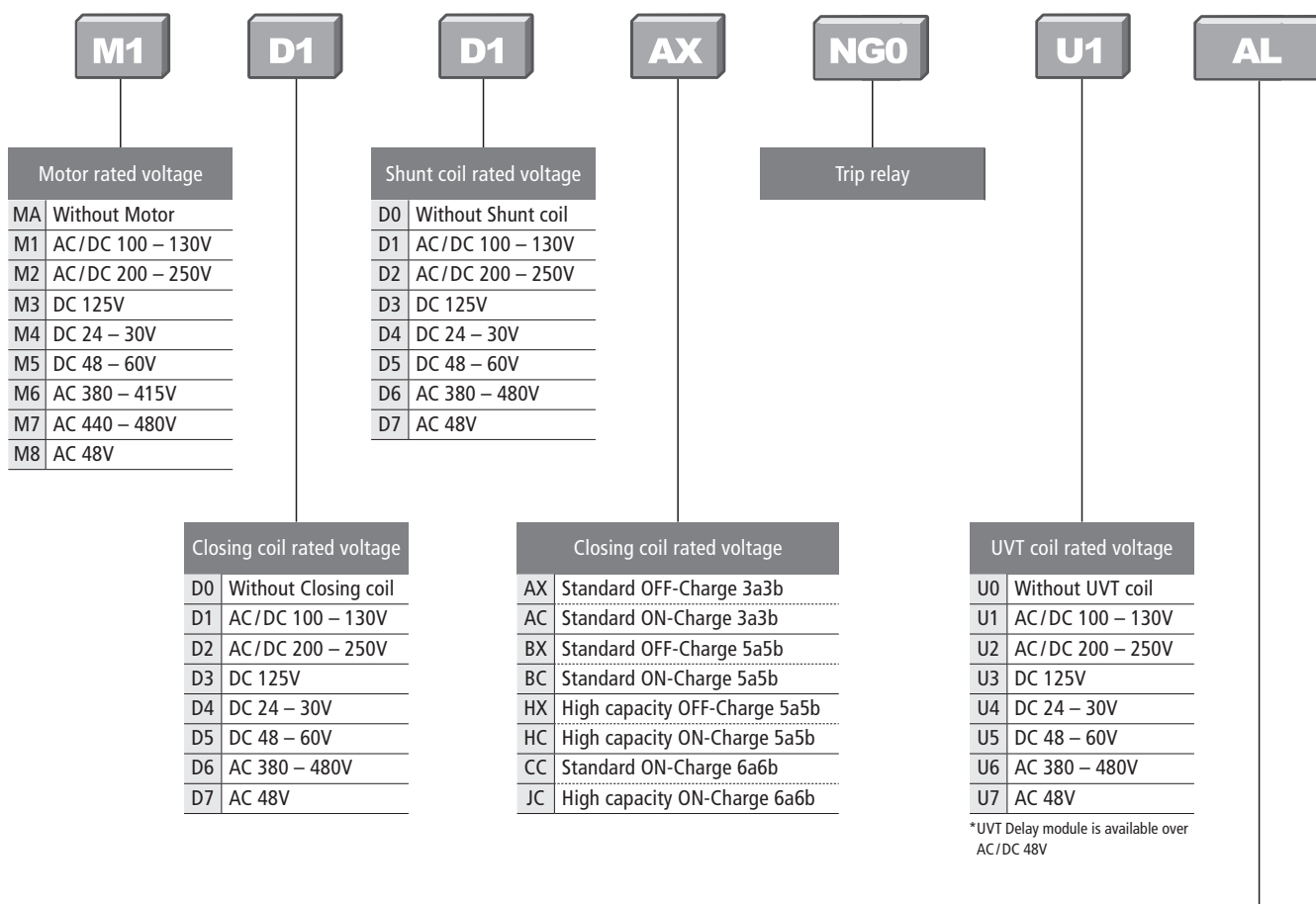


Ampere frame
40 4000AF
50 5000AF
63 6300AF

Frame size & phase array
D 3P/4P Standard type RST(N)
W 4P Reverse phase type NRST

No. of pole
3 3P (G)
4 4P (G, Z)

Rated current (CT Spec.)
40 4000A
50 5000A
63 6300A



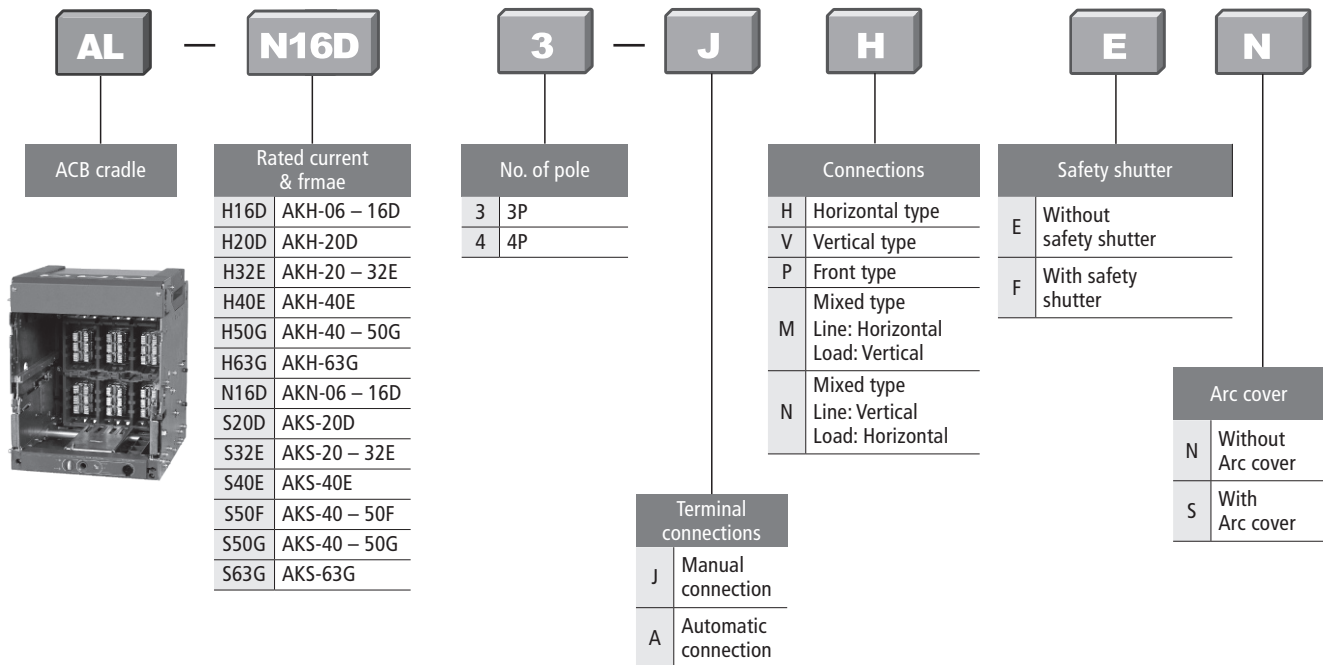
Accessories		
AL	AL1 + MRB	Trip alarm contact 1a + Manual reset button
A2	AL1 + AL2 + MRB	Trip alarm contact 2a + Manual reset button
A3	AL1 + MRB + RES (AC/DC 100 – 130V)	Trip alarm contact 1a + Manual reset button + Remote reset switch
A4	AL1 + MRB + RES (AC/DC 200 – 250V)	Trip alarm contact 1a + Manual 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

	N	G	0
	Trip relay type	Communication & protection	Control voltage & frequency
	0 Without trip relay	0 Without trip relay	0 Without trip relay
	N Normal	0 Without comm.	0 Self-Power, 60Hz 5 Self-Power, 50Hz
	A Ammeter	G Earth leakage Z Earth leakage (external CT, fault current $\leq 30A$) E Earth leakage (external CT, fault current $> 30A$) C Earth leakage + Comm. K Earth leakage (external CT, fault current $\leq 30A$) + Comm. X Earth leakage (external CT, fault current $> 30A$) + Comm.	0 Self-Power, 60Hz 1 AC/DC 100 – 250V, 60Hz 2 DC 24 – 60V, 60Hz 5 Self-Power, 50Hz 6 AC/DC 100 – 250V, 50Hz 7 DC 24 – 60V, 50Hz
	P Power meter	G Earth leakage + Comm. K Earth leakage (external CT, fault current $\leq 30A$) + Comm. X Earth leakage (external CT, fault current $> 30A$) + Comm. A Pre-Trip Alarm + Comm.	1 AC/DC 100 – 250V, 60Hz 2 DC 24 – 60V, 60Hz 6 AC/DC 100 – 250V, 50Hz 7 DC 24 – 60V, 50Hz
	S Supreme meter	C Earth leakage + Comm. K Earth leakage (external CT, fault current $\leq 30A$) + Comm. X Earth leakage (external CT, fault current $> 30A$) + Comm. A Pre-Trip Alarm + Comm.	1 AC/DC 100 – 250V, 60Hz 2 DC 24 – 60V, 60Hz 6 AC/DC 100 – 250V, 50Hz 7 DC 24 – 60V, 50Hz

*LSIG configuration as standard
 - with LED indicators
 - without output contacts
 *Ground fault system by vector sum

*LSIG configuration as standard
 *Ground fault system
 G, C: 4pole unit - fault current over 20% of rated current by vector sum
 3pole unit - phase unbalanced current over 20% of rated current
 Z, K: external CT - out ZCT applied
 E, X: external CT - private ZCT applied
 *Comm. works under control power
 *LSIG output contact works under control power (LED indicators works without control power)

*LSIG configuration as standard
 *Ground fault system
 C: vector sum
 K: external CT - out ZCT applied
 X: external CT - private ZCT applied
 *Comm. works under control power
 *Applicable to generator protection purpose
 *Voltage module required for P and S types. (supplied separately)
 *Ground fault function unavailable at A (Pre-Trip Alarm + Comm.)

*LSIG configuration as standard
 *Ground fault system
 C: vector sum
 K: external CT - out ZCT applied
 X: external CT - private ZCT applied
 *Comm. works under control power
 *Applicable to generator protection purpose
 *Voltage module required for P and S types. (supplied separately)
 *Ground fault function unavailable at A (Pre-Trip Alarm + Comm.)

Note) The function like Metering, Communication, ZSI, Remote Reset and DO control are not available only under Self-Power condition.

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				200 400 630	400 630 800	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)				400 630	400 630 800	1000	1250	1600	2000
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 JISC 8201-2-1	220V/230V/380V/415V	85					
AC 50/60Hz (Icu)			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 JISC 8201-2-1	220V/230V/380V/415V	187					
AC 50/60Hz (Icm)			460V/480V/500V	187					
			550V/600V/690V	143					
Rated short-time withstand current (kA) (Icw)			1 sec	65					
			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) (3P/4P)		Draw-out type Main body (With cradle) Cradle only	Motor charging type	63/74					70/85
			Manual charging type	61/72					68/83
				29/32					33/40
		Fixed type	Motor charging type	34/44					38/47
			Manual charging type	32/42					36/45
External dimensions (mm) (H x W x D)			Draw-out type 3P	430 x 334 x 375					
			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



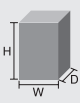
AKH-06E	AKH-08E	AKH-10E	AKH-13E	AKH-16E	AKH-20E	AKH-25E	AKH-32E	AKH-40E
630	800	1000	1250	1600	2000	2500	3200	4000
630	800	1000	1250	1600	2000	2500	3200	4000
(0.4 – 1.0) x In max								
630	800	1000	1250	1600	2000	2500	3200	4000
1,000								
690								
12								
50/60								
3, 4								
100								
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		
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	1000	1250	1600	2000	
				400	630					
				630	800					
Setting current (A)*			Control trip relay (... x in max)		(0.4 – 1.0) x in max					
Rated current of neutral pole (A)			400	400	1000	1250	1600	2000		
	630		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)			(Icu)	IEC 60947-2	220V/230V/380V/415V		65			
AC 50/60Hz		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)		(Icm)	IEC 60947-2	220V/230V/380V/415V		143				154
AC 50/60Hz			JISC 8201-2-1	460V/480V/500V		143				154
				550V/600V/690V		105				143
Rated short-time withstand current (kA)		(Icw)	1 sec		50				65	
			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) (3P/4P)	Draw-out type	Main body (With cradle)	Motor charging type		63/74					70/85
			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) (H x W x D)			Draw-out type	3P	430 x 334 x 375					
			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 1600, 2000	2500	3200	4000
(0.4 – 1.0) x ln max			
630, 800 1000, 1250 1600, 2000	2500	3200	4000
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 In 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	

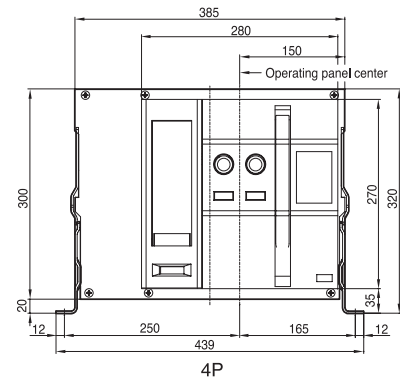
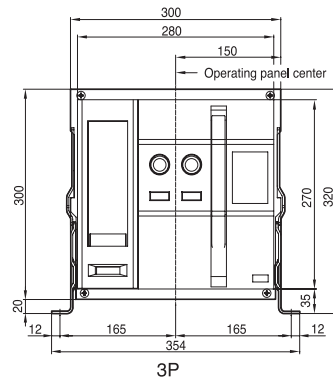
AKS-40G	AKS-50G	AKS-63G
4000	5000	6300
4000	5000	6300
(0.4 – 1.0) x ln max		
4000	5000	6300
1,000		
690		
12		
50/60		
3, 4		
120		
120		
100		
100%		
264		
264		
220		
100		
90		
85		
40		
80		
10,000		
15,000		
2,000		
5,000		
○		
●		
-		
-		
181/223		186/230
179/221		184/228
97/117		102/124
98/123		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		

Fixed type 2000AF

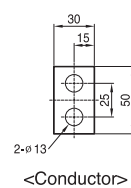
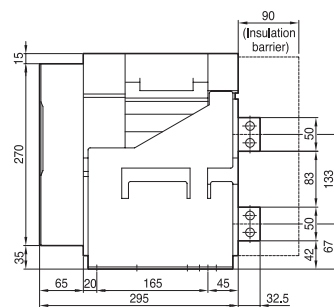
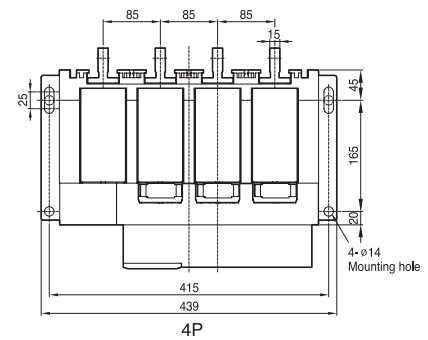
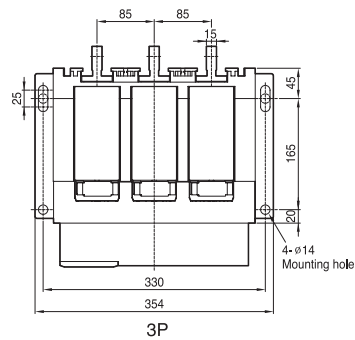
630 – 1600A:

AKH/AKN/AKS-06 – 16D

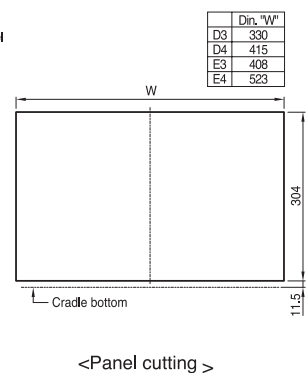
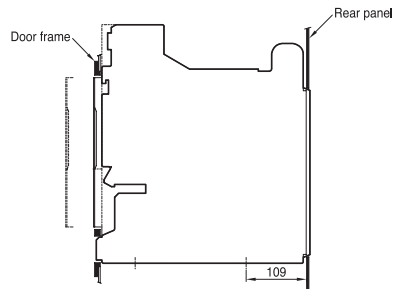
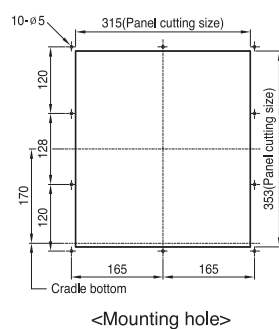
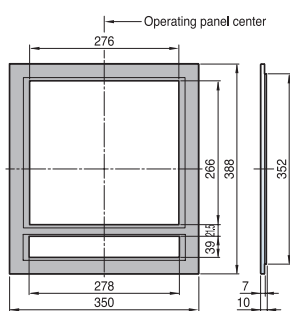
Front view



Vertical type



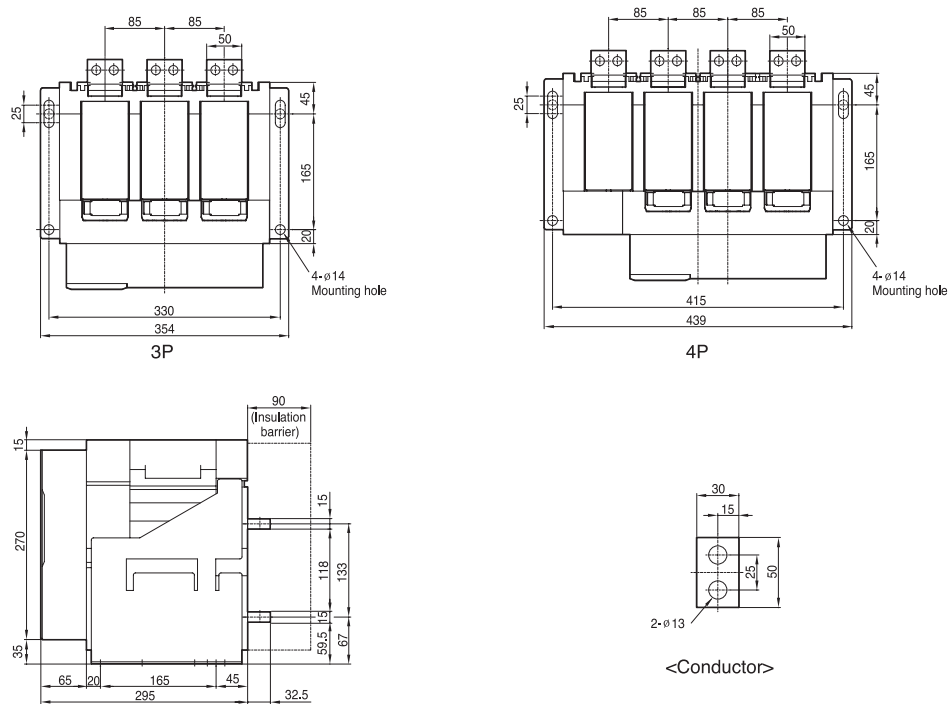
Door Frame: DF (AKH/AKN/AKS-D/E)



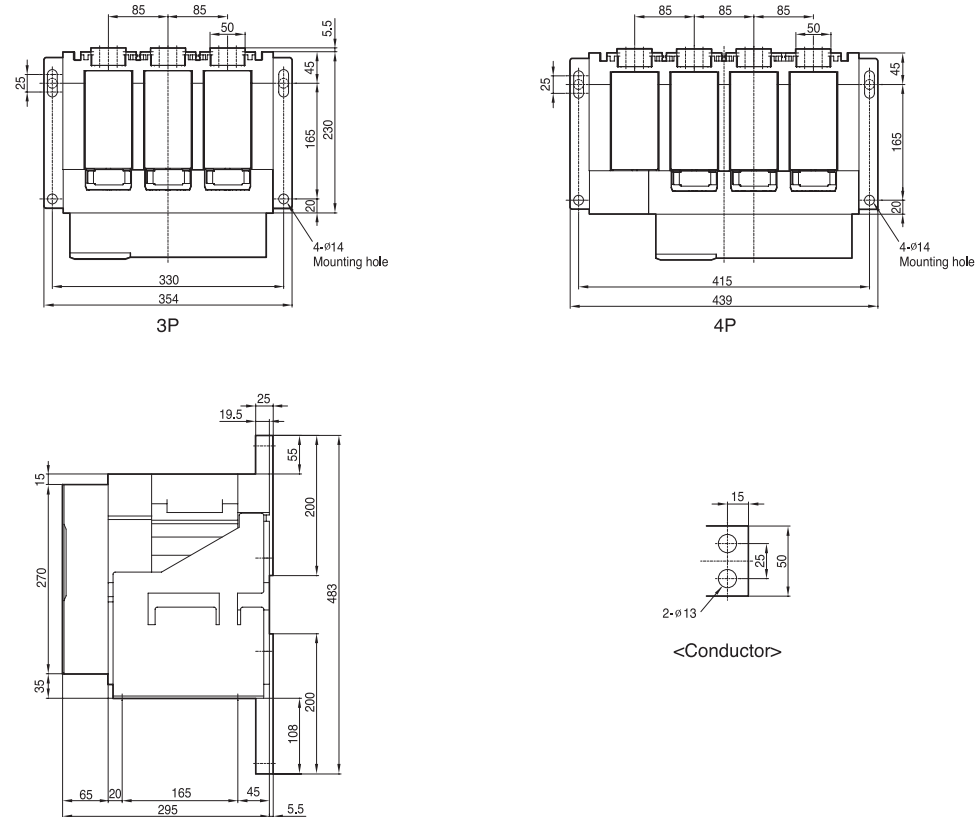
	Din. "W"
D3	330
D4	415
E3	408
E4	523

Note) The dimensions are for drawout type.

Horizontal type



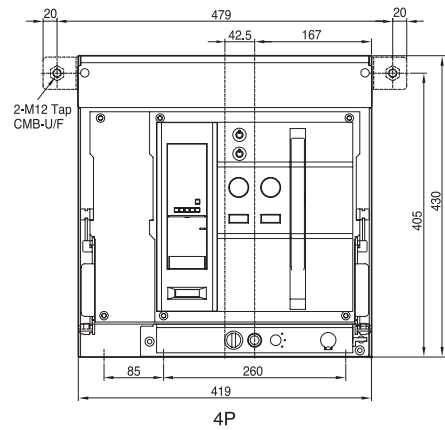
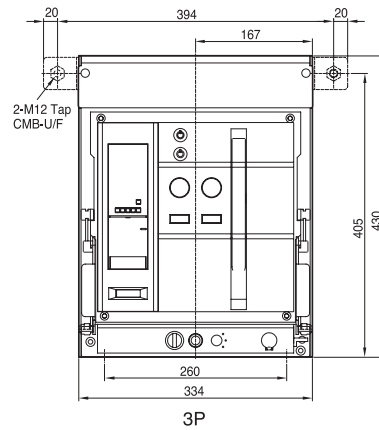
Front connection type



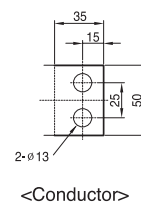
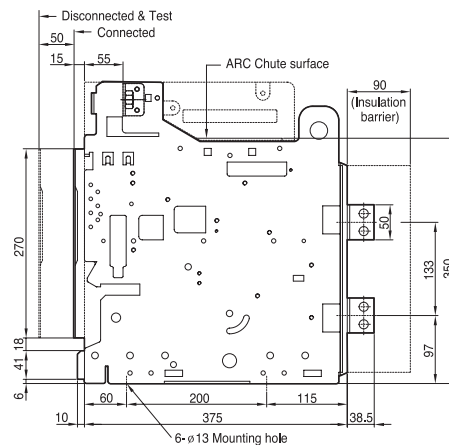
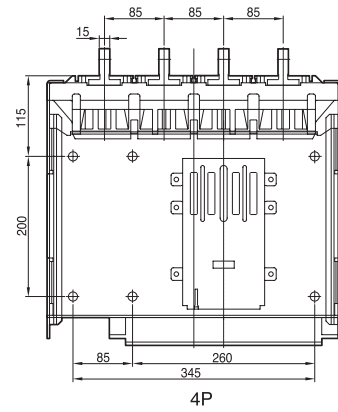
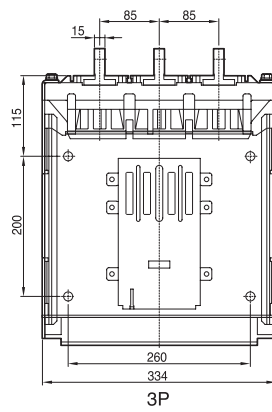
Draw-out type 2000AF

630 – 1600A:
AKH / AKN / AKS-06 – 16D

Front view

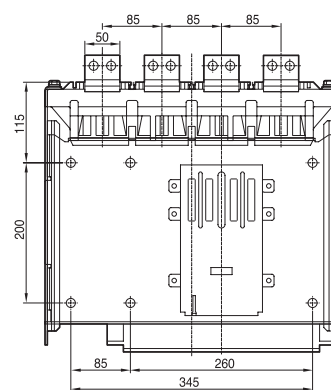


Vertical type



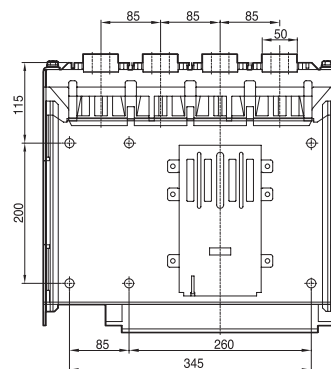
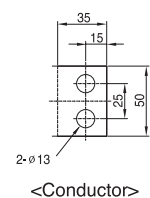
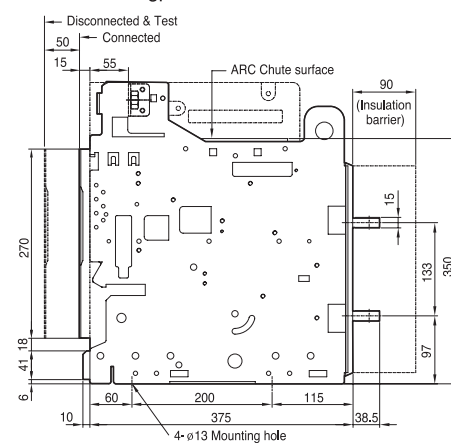
<Conductor>

Front connection type



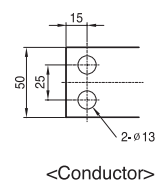
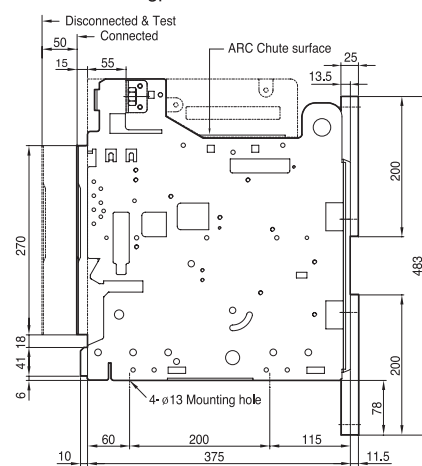
3P

4P



3P

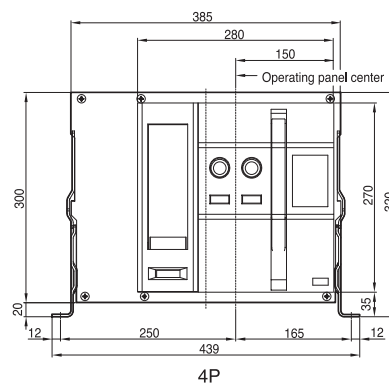
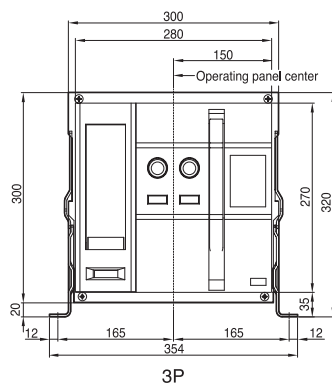
4P



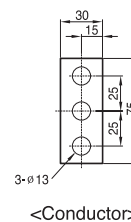
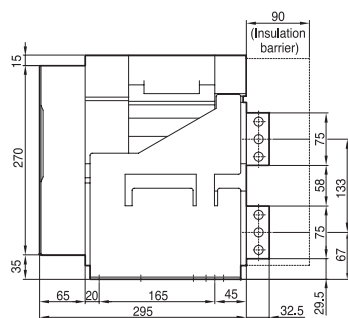
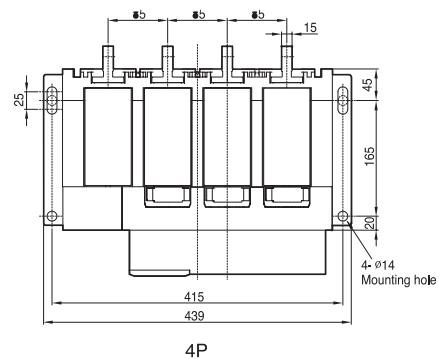
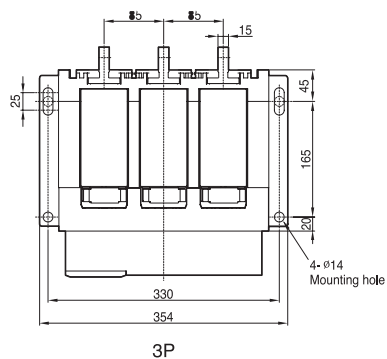
Fixed type 2000AF

2000A:
AKH / AKS-20D

Front view



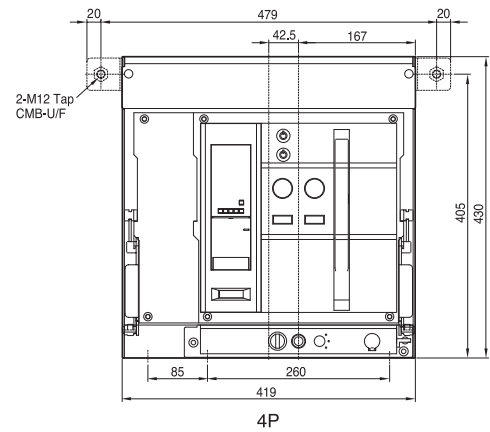
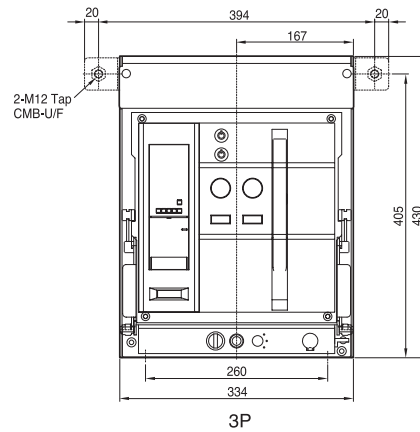
Vertical type



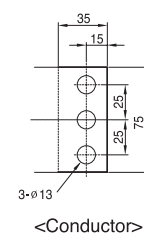
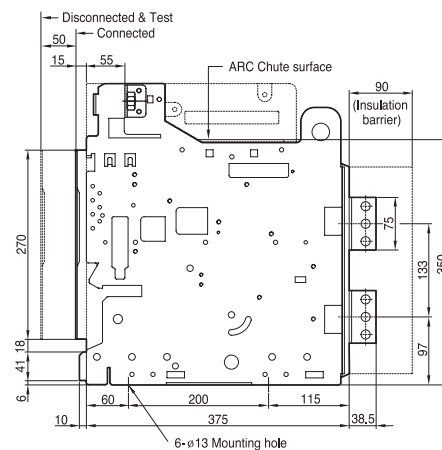
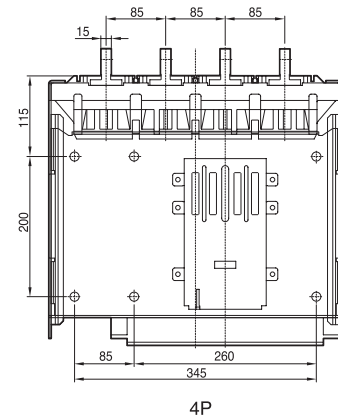
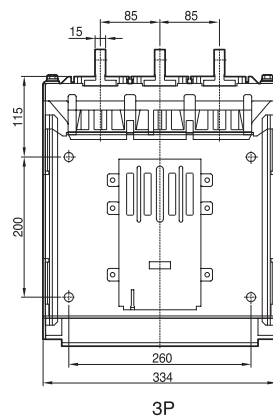
Draw-out type 2000AF

2000A:
AKH / AKS-20D

Front view



Vertical type

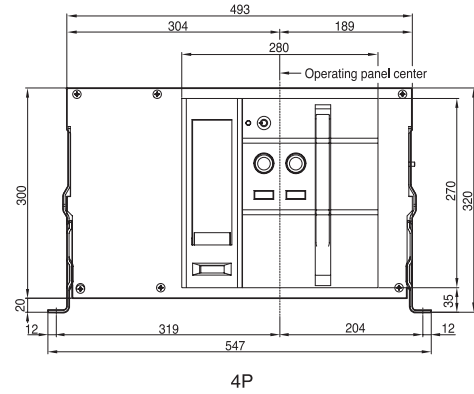
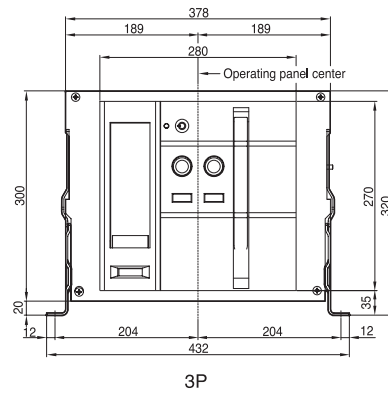


Fixed type 4000AF

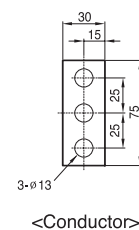
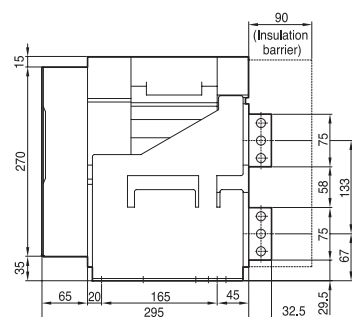
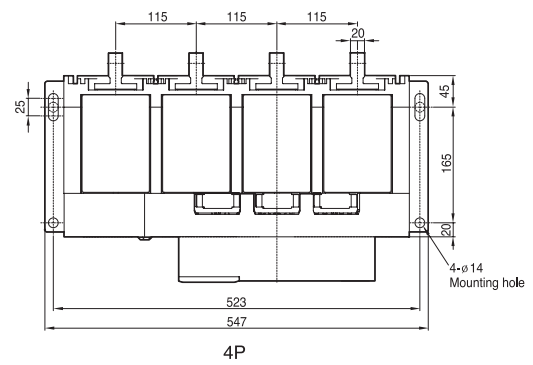
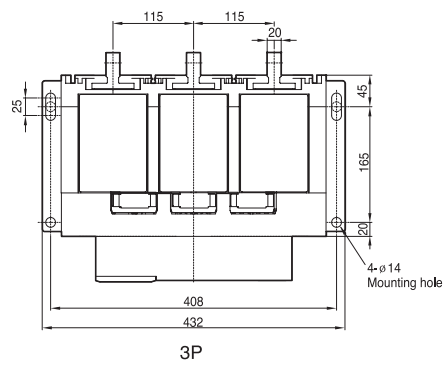
2000 – 3200A:

AKH / AKN / AKS-20 – 32E

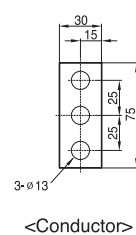
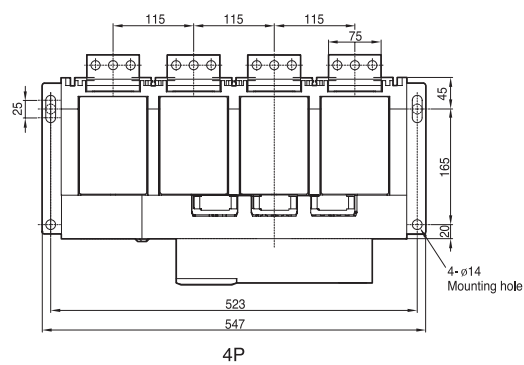
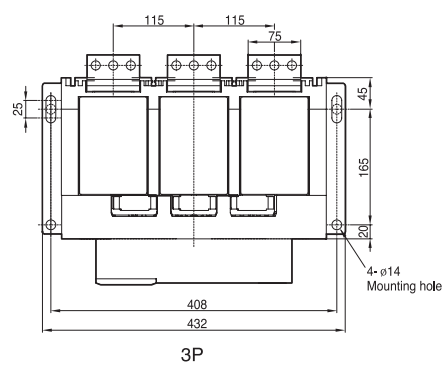
Front view



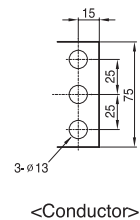
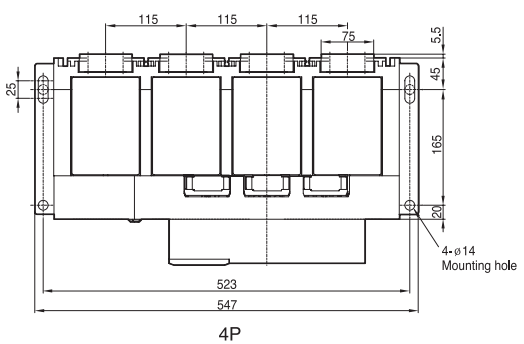
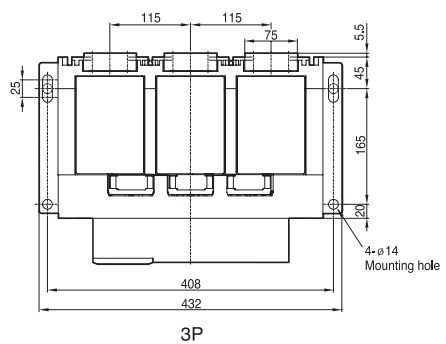
Vertical type



Horizontal type



Front connection type

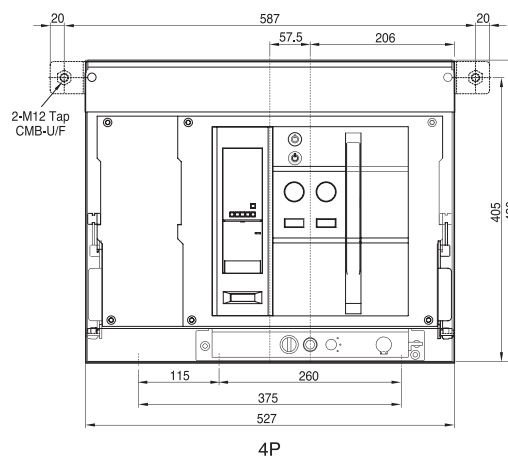
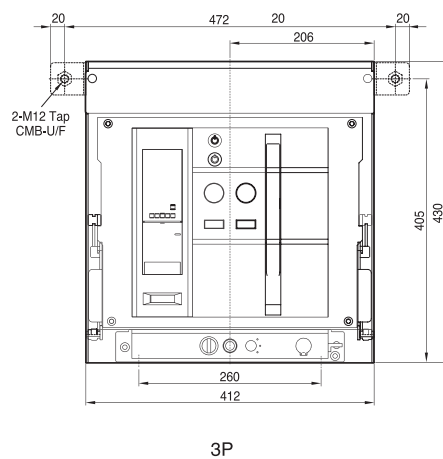


Draw-out type 4000AF

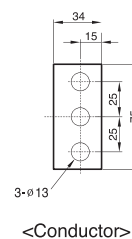
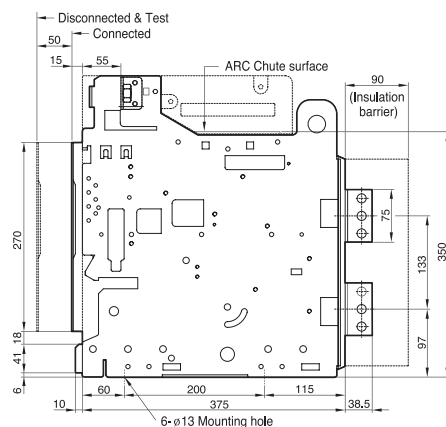
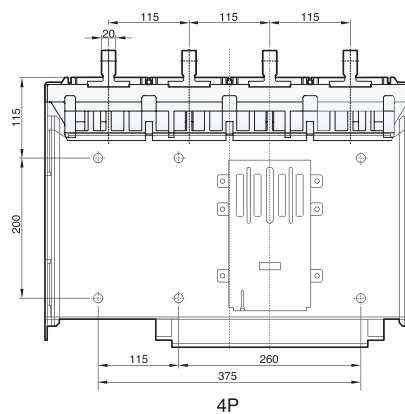
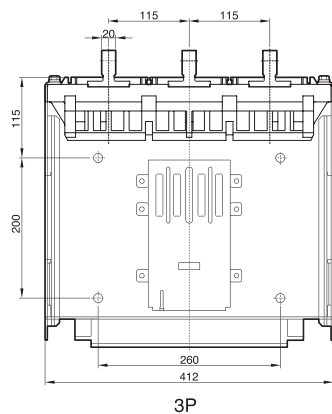
2000 – 3200A:

AKH / AKN / AKS-20 – 32E

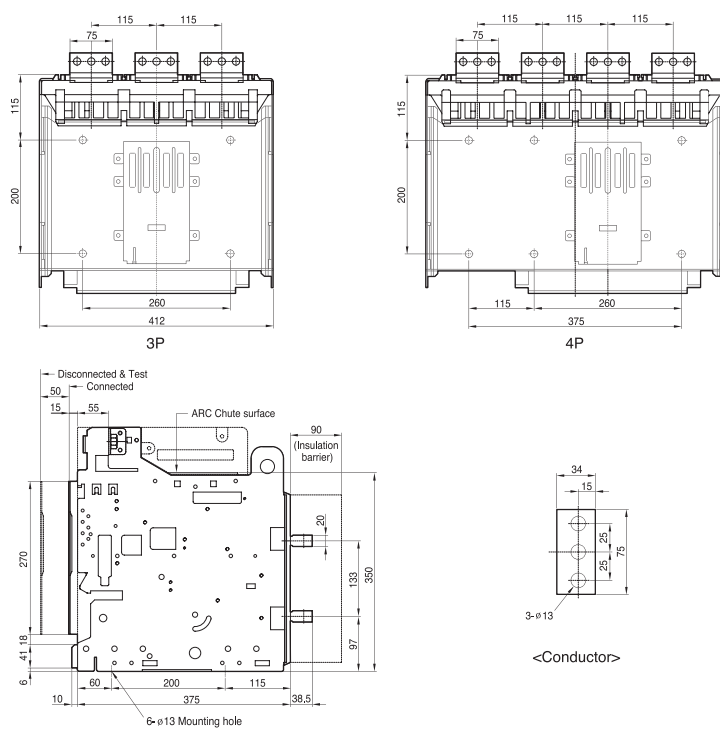
Front view



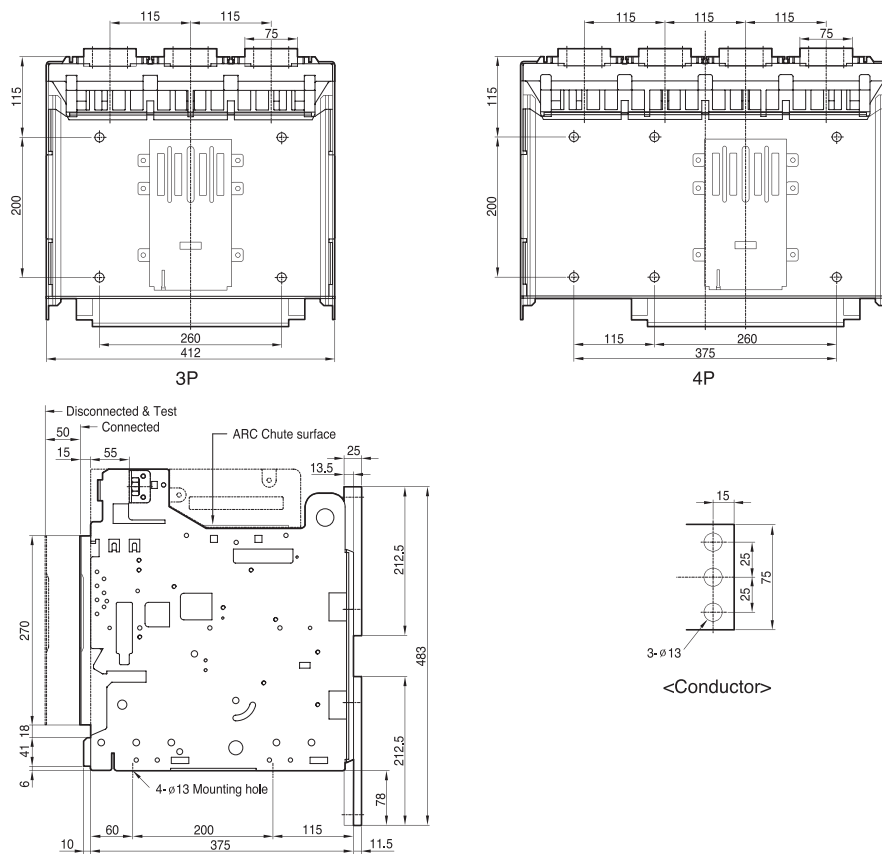
Vertical type



Horizontal type



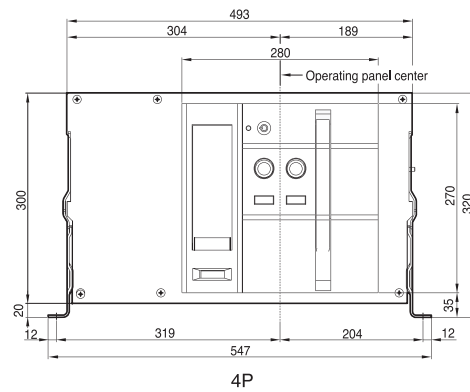
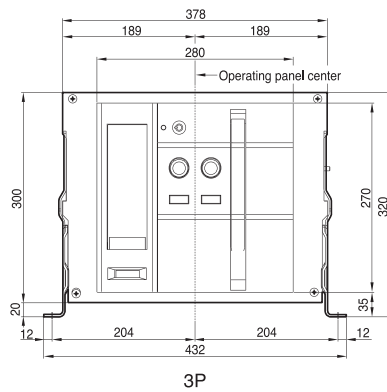
Front connection type



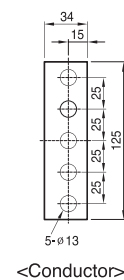
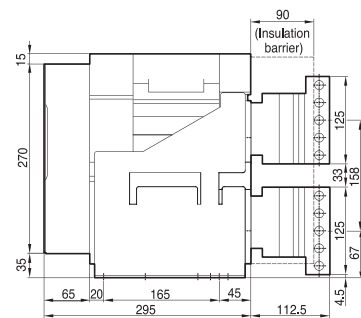
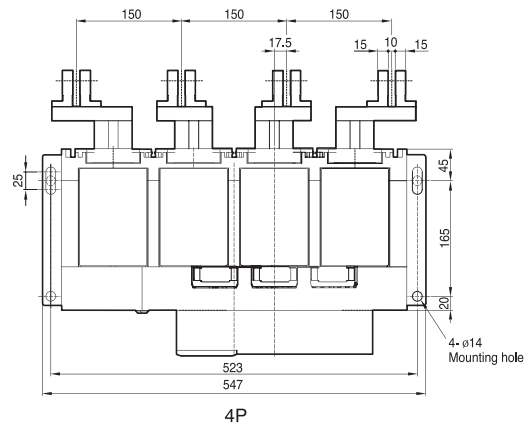
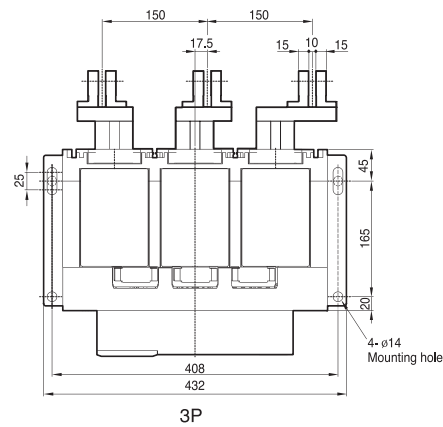
Fixed type 4000AF

4000A:
AKH / AKS-40E

Front view

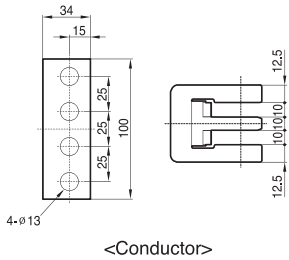
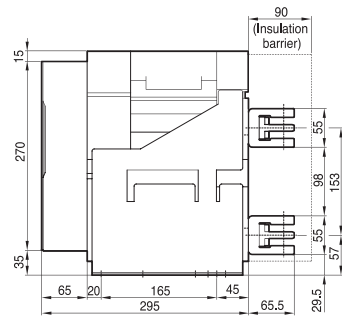
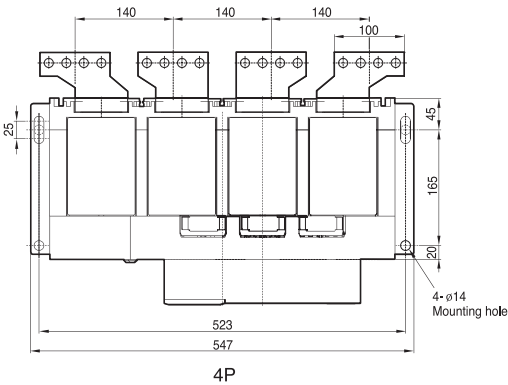
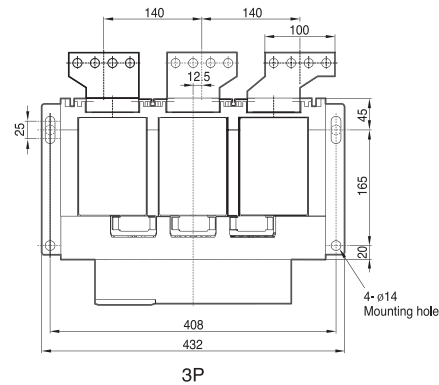


Vertical type



<Conductor>

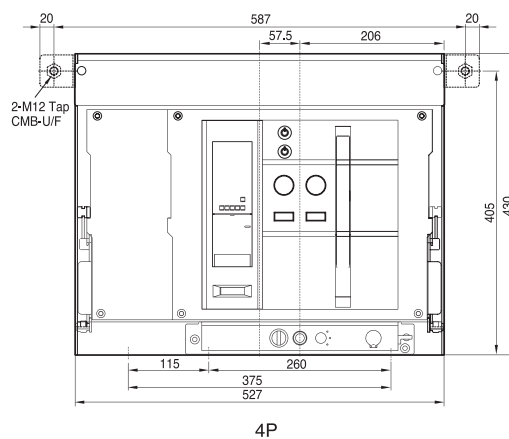
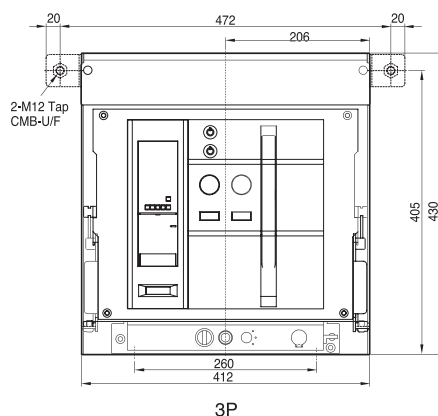
Horizontal type



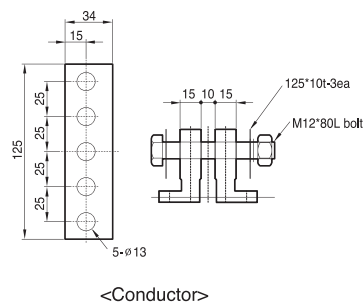
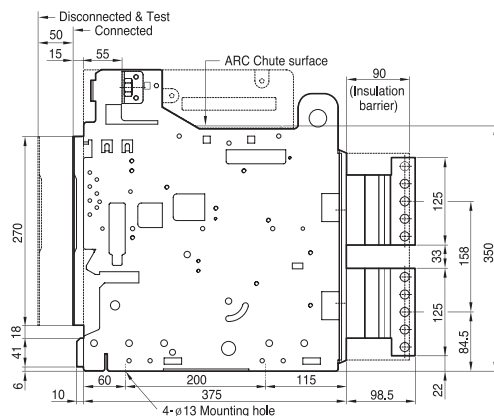
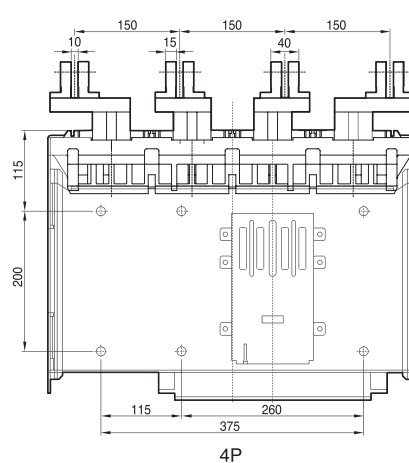
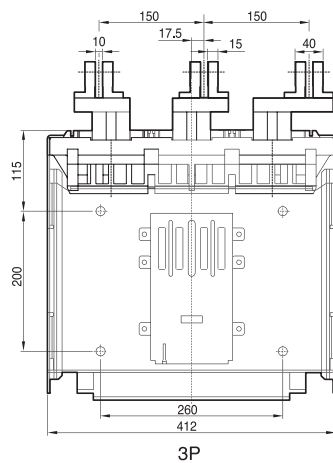
Draw-out type 4000AF

4000A:
AKH / AKS-40E

Front view

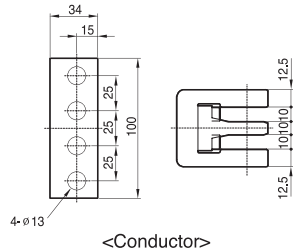
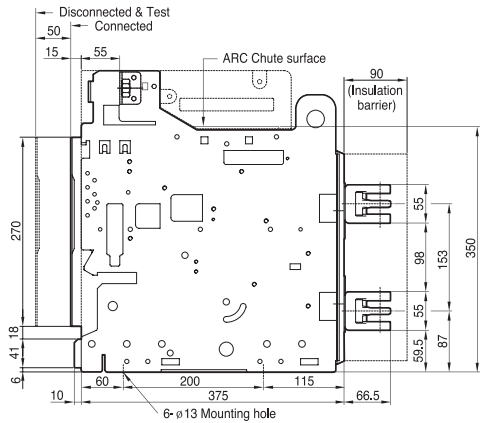
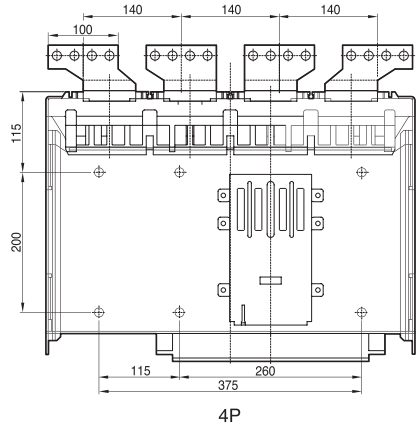
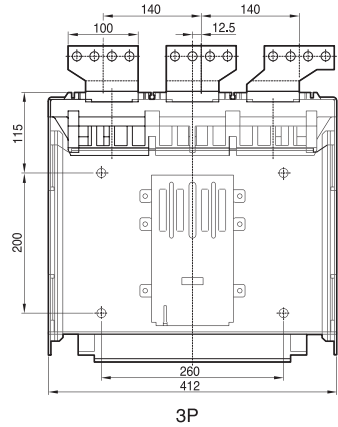


Vertical type



<Conductor>

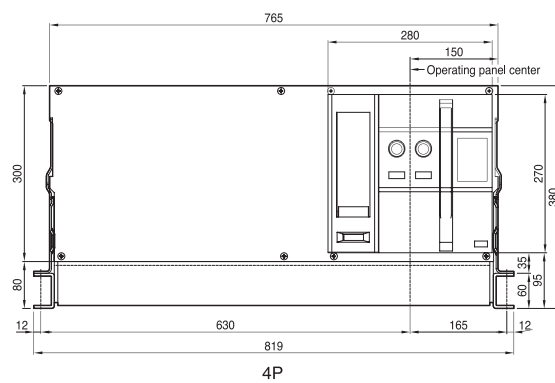
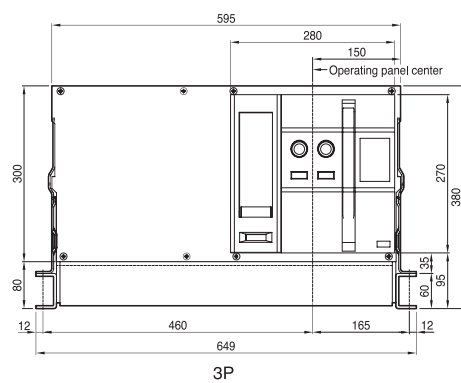
Horizontal type



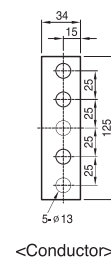
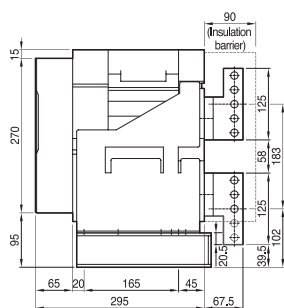
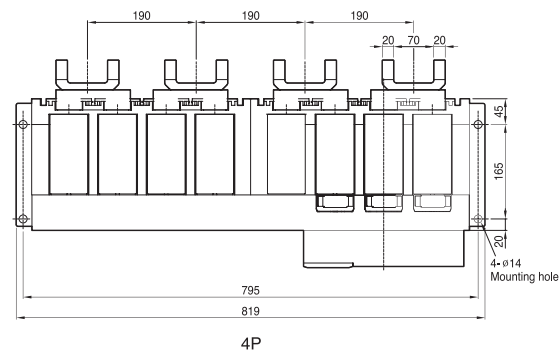
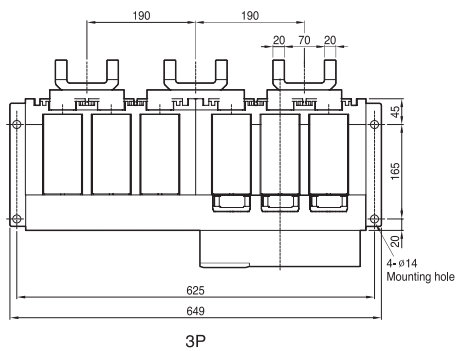
Fixed type 5000AF

4000 – 5000A:
AKS-40 – 50F

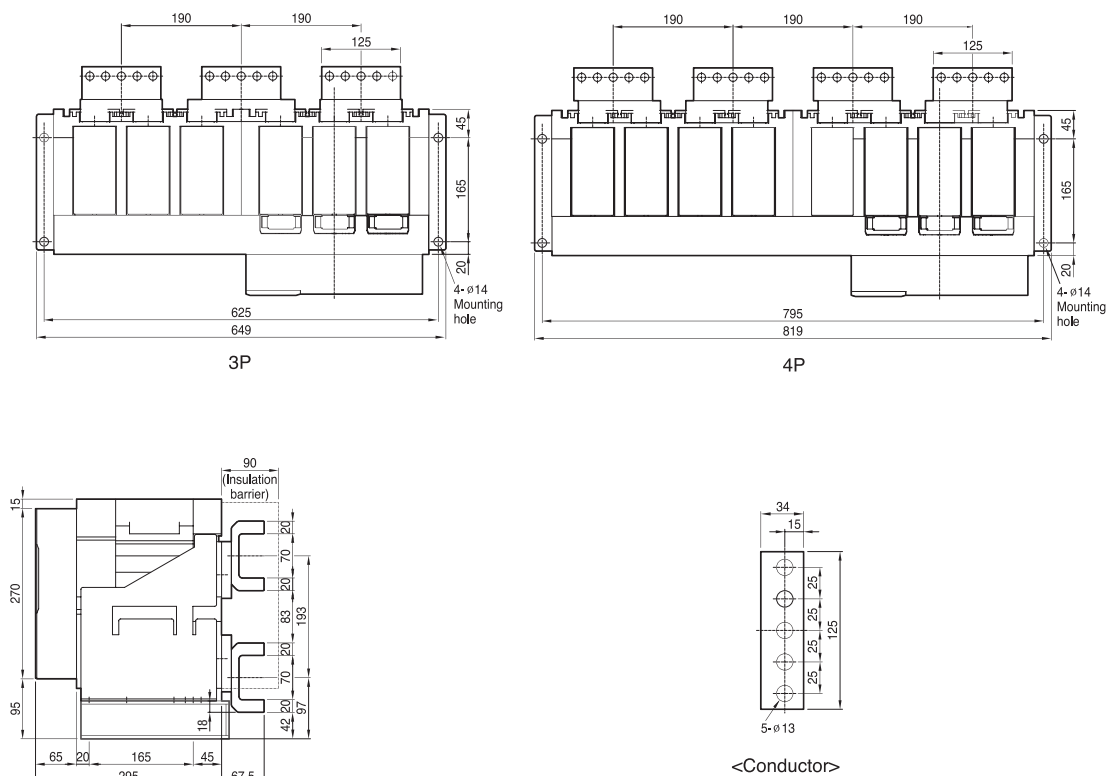
Front view



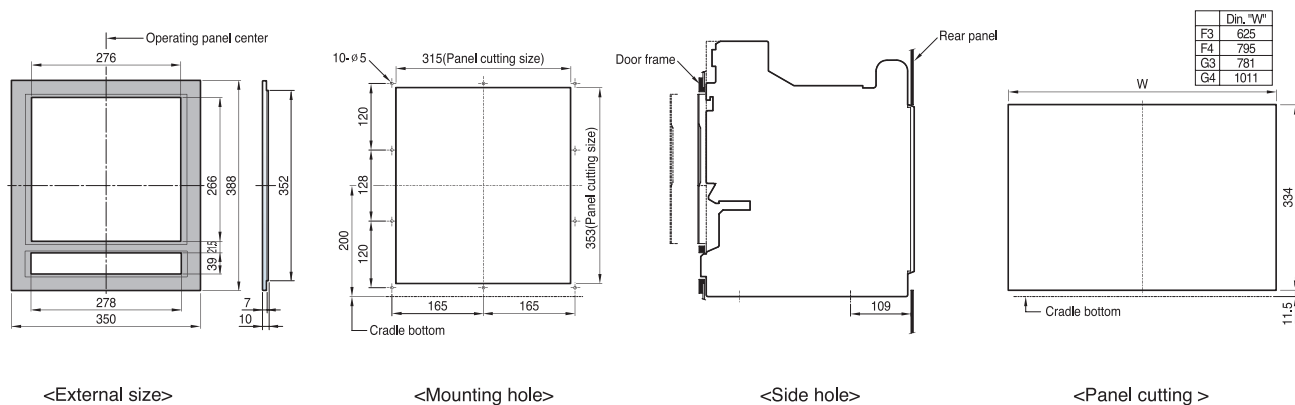
Vertical type



Horizontal type



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



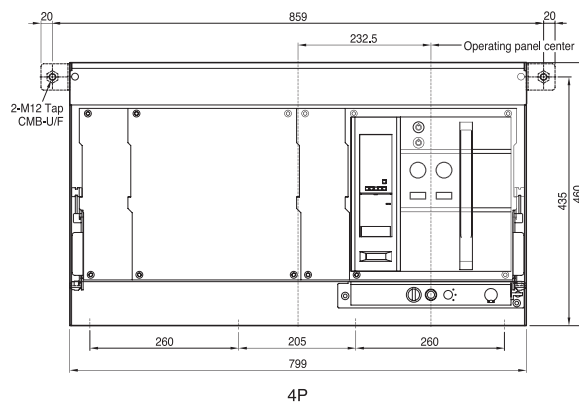
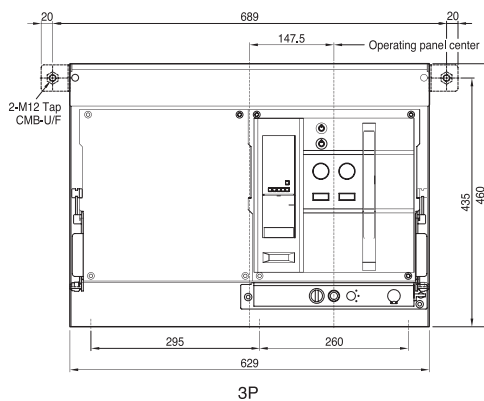
Note) The dimensions are for drawout type.

Draw-out type 5000AF

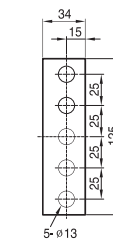
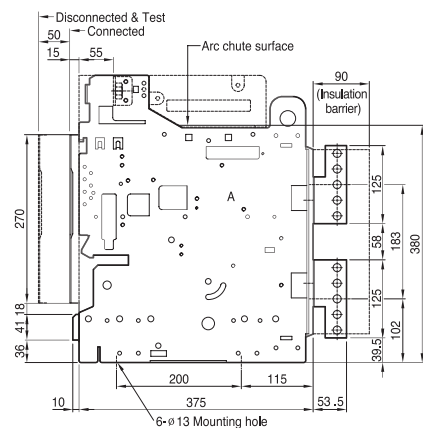
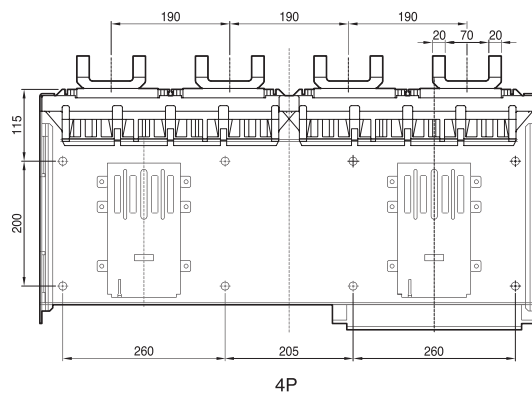
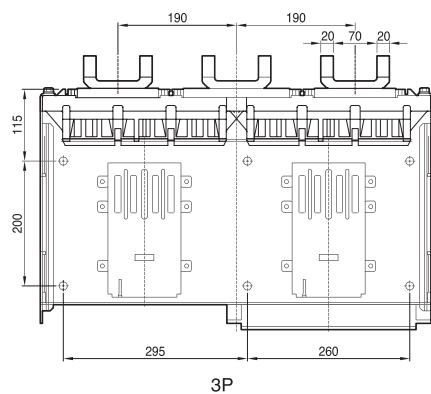
4000 – 5000A:

AKS-40 – 50F

Front view

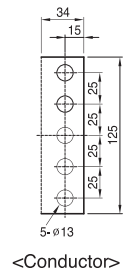
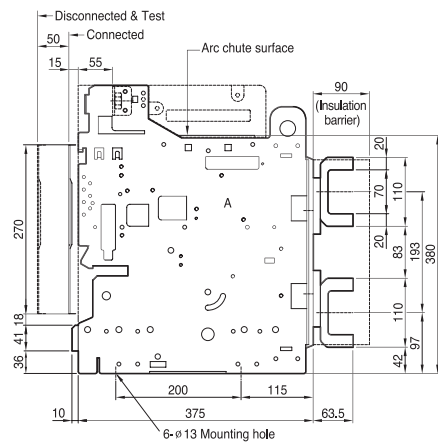
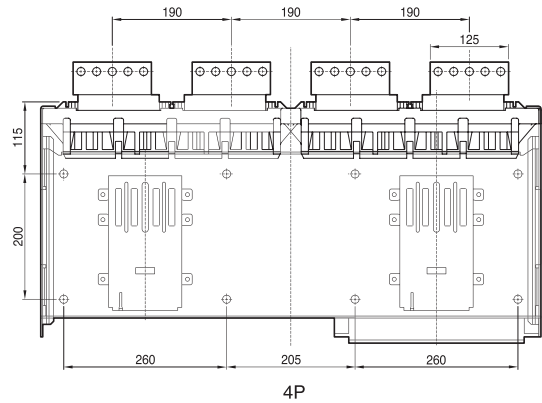
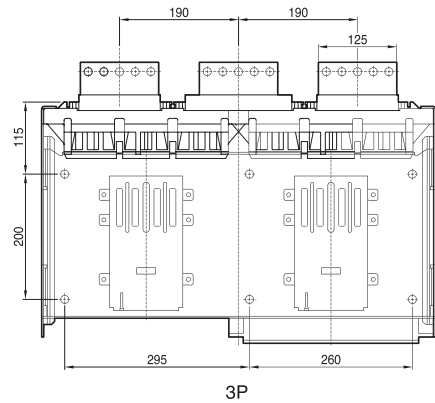


Vertical type



<Conductor>

Horizontal type



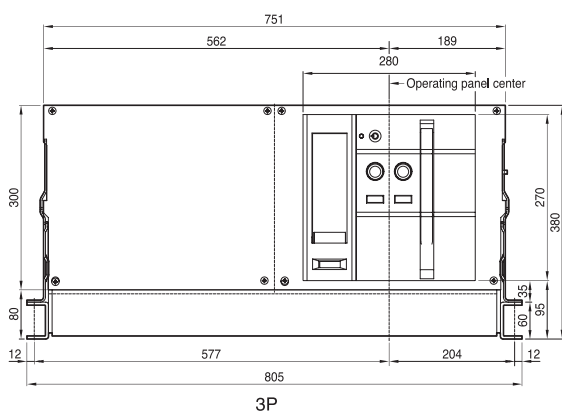
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Fixed type 6300AF

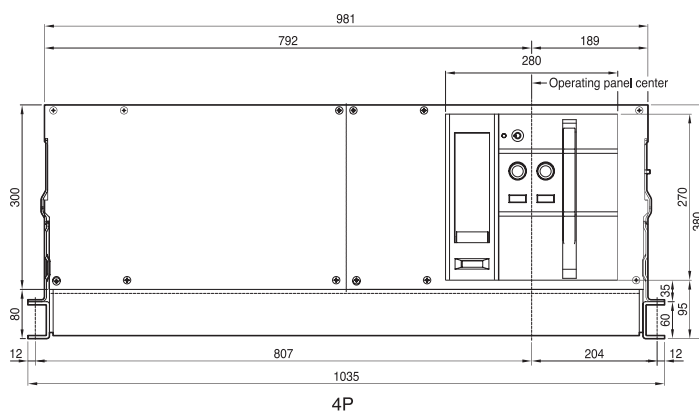
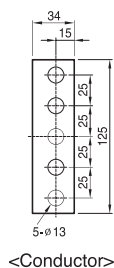
4000 – 6300A:

AKH / AKS-40 – 50G

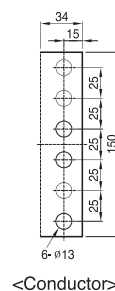
Front view



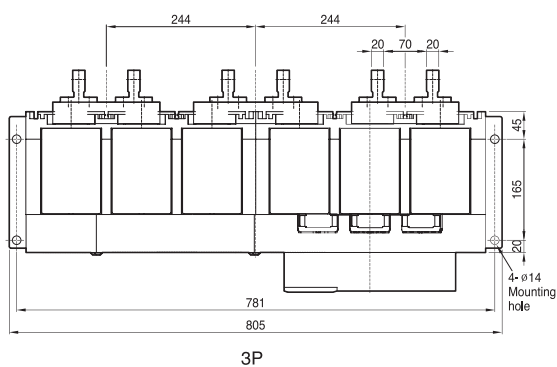
4000A – 5000A



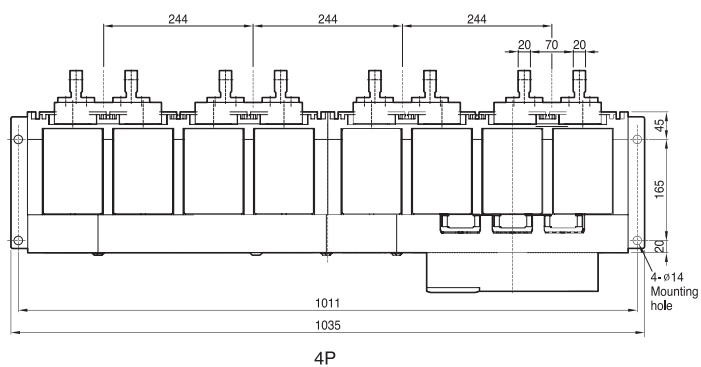
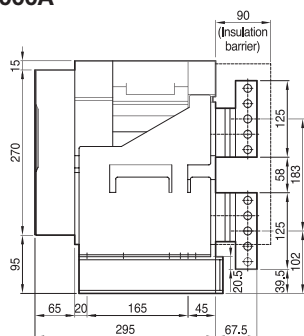
6300A



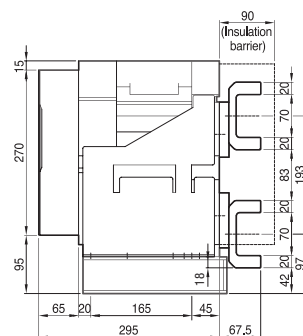
Vertical type



4000A – 5000A

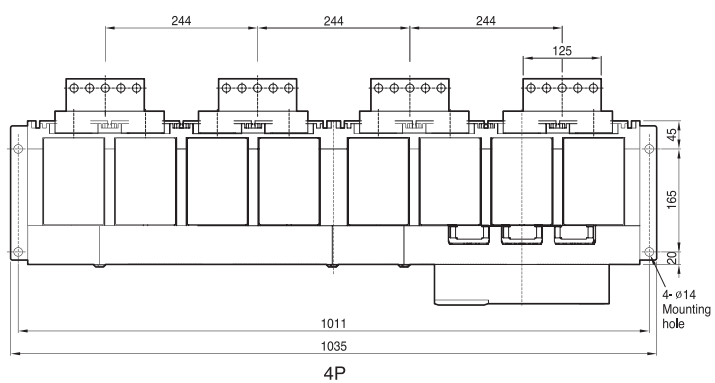
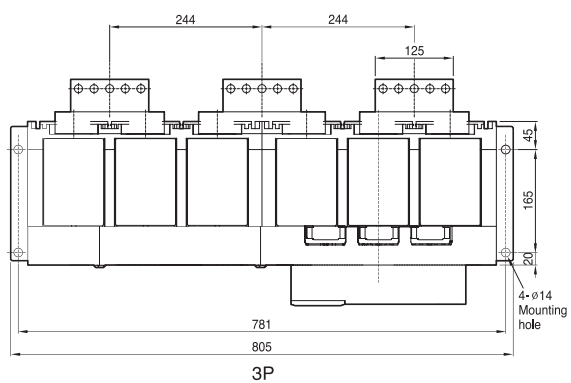


6300A

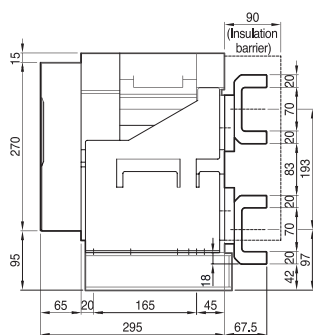
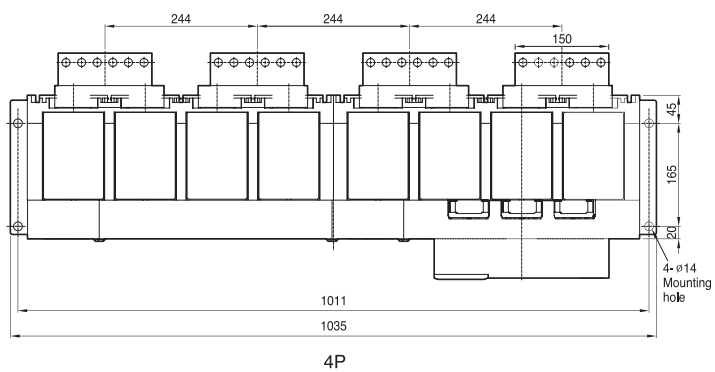
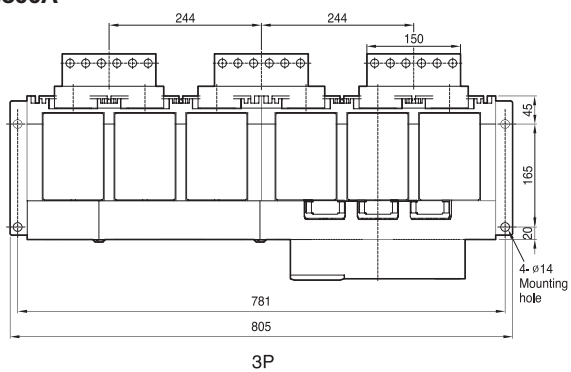


Horizontal type

4000A – 5000A



6300A

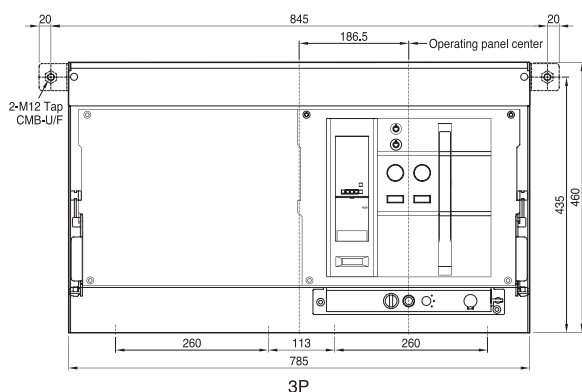


Draw-out type 6300AF

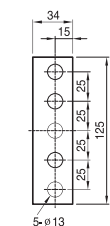
4000 – 6300A:

AKH / AKS-40 – 50G

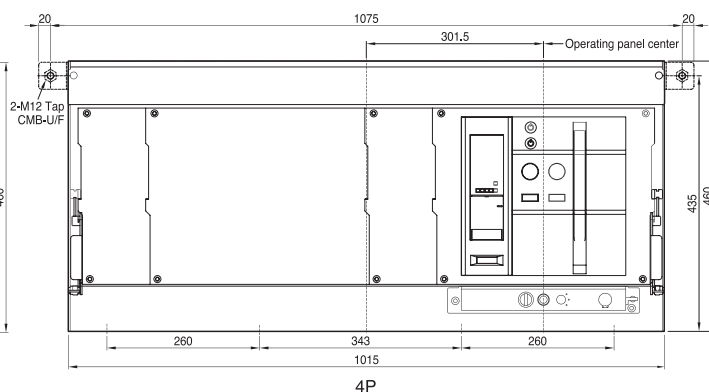
Front view



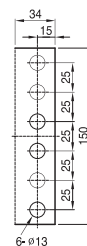
4000A – 5000A



<Conductor>

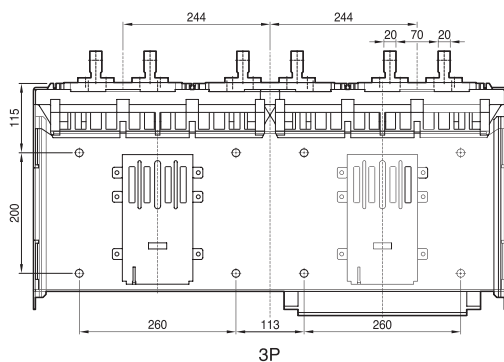


6300A

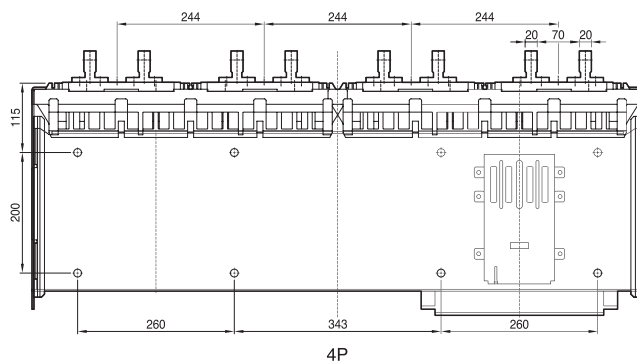
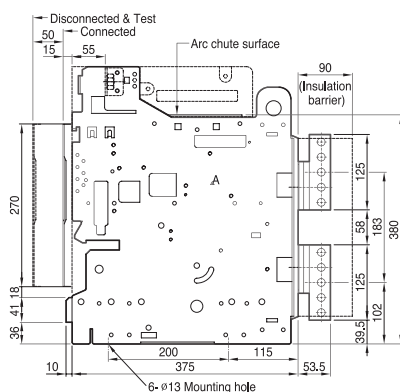


<Conductor>

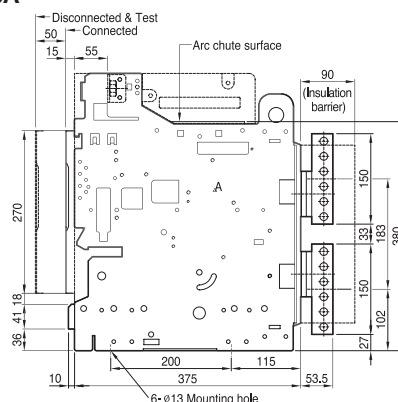
Vertical type



4000A – 5000A

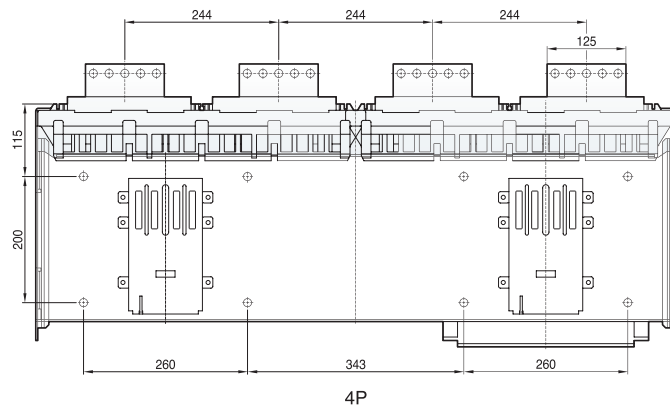
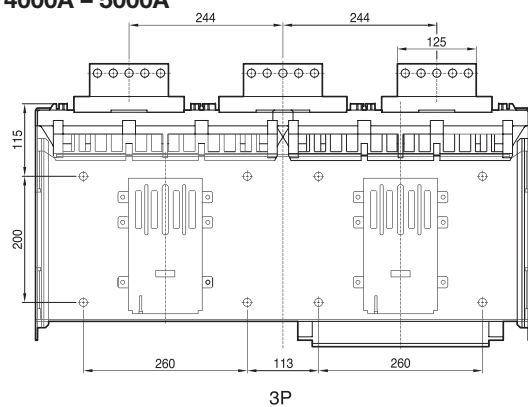


6300A

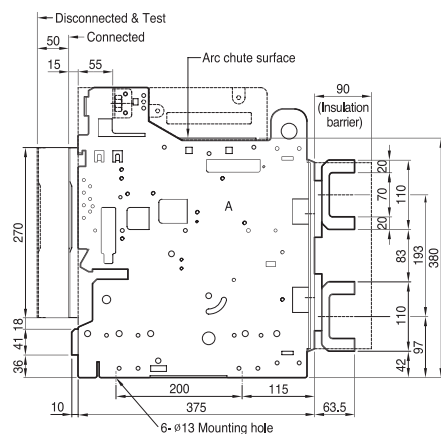
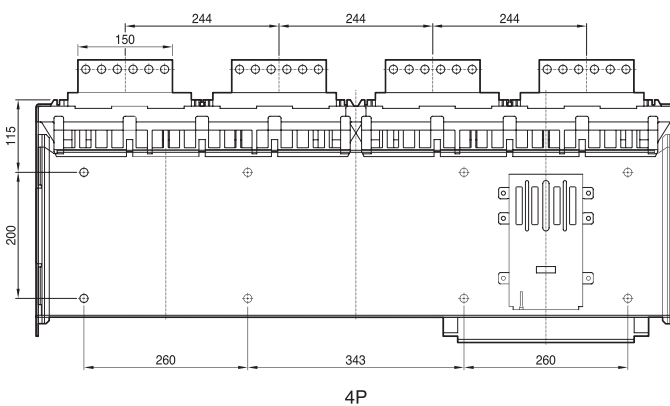
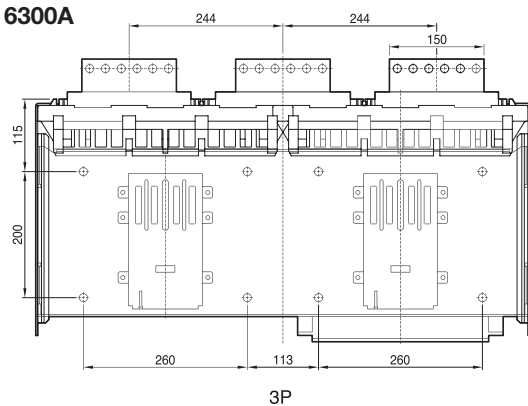


Horizontal type

4000A – 5000A



6300A



memo

[illegible]