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Hitachi Circuit Breakers & Miniature Circuit Breakers

HITACHI
Inspire the Next

Hitachi Circuit Breakers & Miniature Circuit Breakers

Hitachi Industrial Equipment Systems Co., Ltd.

Circuit Breakers & Miniature Circuit Breakers

Hitachi Industrial Equipment Systems Co., Ltd.

Applications

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

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

Contents

Fuse-Free Breaker

New Line-ups with Fully Integrated Configuration, Advanced Performance and Simplified Operation

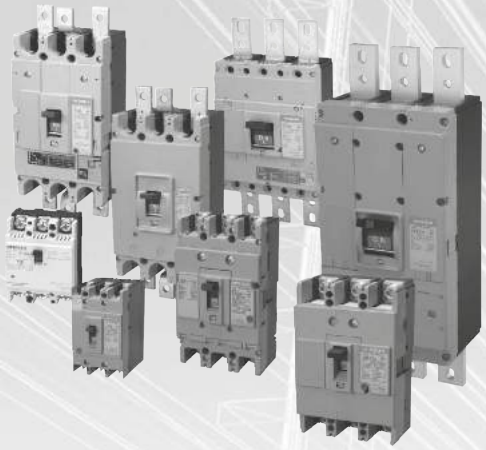
Hitachi Global Series

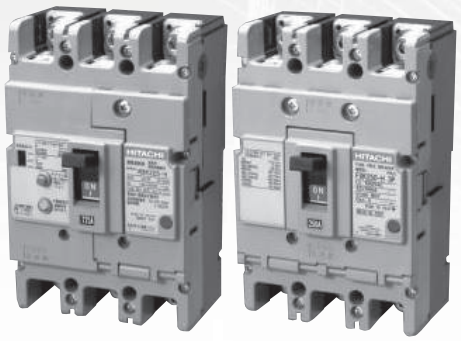
Hitachi has been developing new Molded Case Circuit Breakers and now we have just launched new type circuit breakers and these are innovative high quality breakers, new technology fulfills improving the performance and new design satisfies all application requirements and world customers.
It's a new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





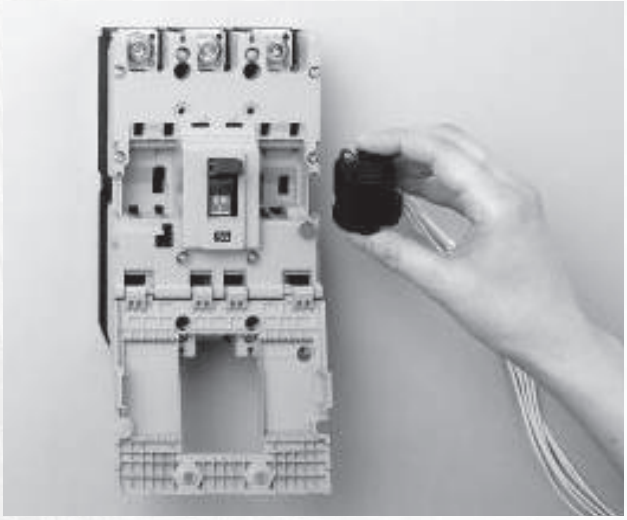
High breaking performance

Breaking performance of standard type (F series) are Ics = 100%Icu 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

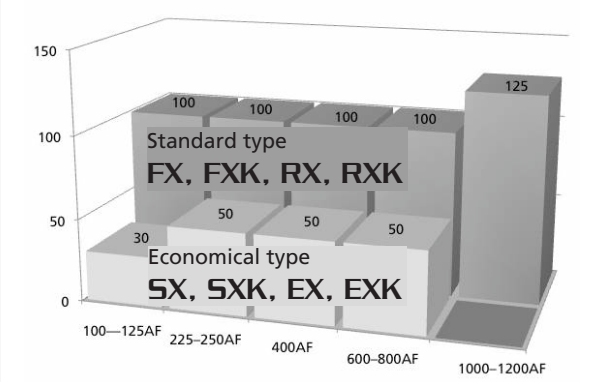


Hitachi Global series provides wide range of the frame and the varieties of accessories for customers. The specifications of breakers can be changed by cassette type internal accessories. They can be installed by users, quickly responding to changing specifications.
Applicable type are stated in table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

Breaking Capacity at 230V



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.

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

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										
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											

Frame (AF)

AC 380V — 440V

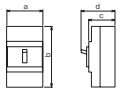
Transformer capacity (kVA)	– 50		75 – 100		200 – 500			750 – 1000			1500 – 2000			2500 – 3500	
Interrupting capacity kA (sym)	1.5	2.5	5	7.5	10	15	18	22	25	30	35	50	85	125	175
30	S-30E	F-30FB													
50	S-50EB	S-50SB													
60	S-60RB			F-60RB											
100 125	S-100S, S-100SB						FXK125-S				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														

Frame (AF)

F Series

S Series

Table 1 F series

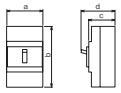
Type				F-30FB		F-60RB	F-60R		F-100S	FXK125-S		FXK125-H		F-100KB
Appearance														
Number of poles				2	3	2	3	4	4	2 (*1)	3	2 (*1)	3	4
Rated Current (A) (Base ambient temperature 40°C)				3 5 10 15 20 30		15 20 30 40 50 60			15 20 30 50 60 75 100	15 20 30 40 50 63 75 100 125		15 20 30 40 50 63 75 100 125		15 20 30 40 50 60 75 100
Rated Insulation Voltage Ui (V)				690		690			690	690		690		
Rated Impulse withstand Voltage Uimp (kV)				6		6			8	8		8		
Rated Breaking Capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	—		—			—	—		—		—
			440V	2.5/1		10/10			10/5	30/30		50/50		
			415V	2.5/1		10/10			10/5	30/30		50/50		
			400V	2.5/1		10/10			10/5	30/30		50/50		
			380V	2.5/1		10/10			10/5	30/30		50/50		
			240V	7.5/2		25/25			35/18	50/50		100/100		85/85
			230V	7.5/2		25/25			35/18	50/50		100/100		85/85
		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		
			c	60		60			60	68		68		86
			d	84		84			85	94		94		106
Net Weight (kg)				0.48	0.6	0.53	0.74	0.96	1.3	1.4	1.4	1.4	1.4	2.3
Standard Connection Type				Front Terminal		Front Terminal			Front Terminal	Front Terminal		Front Terminal		
Phase Separator for Line Side				○		● (*2)			●	● (*2)		● (*2)		
Interior Accessories	Alarm Switch		AL	○		○			○	○ (*3)		○ (*3)		○
	Auxiliary Switch		AUX	○		○			○	○ (*3)		○ (*3)		○
	Shunt Trip		SHT	○		○			○	○ (*3)		○ (*3)		○
	Undervoltage Trip		UVT	—		—			○	—		—		○
	Terminal Block		TB	○		○			○	○		○		
			TB2	○		○			○	○		○		
Exterior Accessories	Rear-connecting Stud		STB	STB-2M		STB-2M		STB-1B	STB-3H (Up to 50A : STB-2D)	STB-2S (Up to 50A) 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

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

FXK250-S		F-250FB	FXK250-H		F-250KC	F-400R			FX400		F-600F			FX600
														
2 (*1)	3	4	2 (*1)	3	4	2 (*1)	3	4	2 (*1)	3	2 (*1)	3	4	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
8			8			8			8		8			8
—			—		—	—			—		—			—
30/30			50/50			50/50			50/50		50/50			50/50
30/30			50/50			50/50			50/50		50/50			50/50
30/30			50/50			50/50			50/50		50/50			50/50
30/30			50/50			50/50			50/50		50/50			50/50
50/50		85/85	100/100		85/85	100/100			100/100		100/100			100/100
50/50		85/85	100/100		85/85	100/100			100/100		100/100			100/100
25/13	—	—	40/20	—	—	40/40	—	—	—		40/40	—	—	—
25/13	—	—	40/20	—	—	40/40	—	—	—		40/40	—	—	—
105		140	105		140	140		185	140		210		280	210
165			165			257			257		274			274
68		103	68		103	103			103		103			103
95		127	95		127	133			133		141			141
1.6		3.1	1.6		3.1	5.3	6.1	8.2	5.1	5.9	10		13	9.7
Front Terminal			Front Terminal			Front Bar Terminal			Front Bar Terminal		Front Bar Terminal			Front Bar Terminal
● (*2)			● (*2)			● (*2)			● (*2)		● (*2)			● (*2)
○ (*3)		○	○ (*3)		○	○			○ (*3)		○			○ (*3)
○ (*3)		○	○ (*3)		○	○			○ (*3)		○			○ (*3)
○ (*3)		○	○ (*3)		○	○			○ (*3)		○			○ (*3)
—			—			○			○		○			○
○			○			○			○		○			○
○			○			○			○		○			○
—			—			—			—		—			—
○			○			○			○		○			○
—						—			—		—			—
○			○			○ (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
HA-210		HA-206	HA-210		HA-206	HA-405			HA-406		HA-402			HA-402
HM-S25		HM-S21	HM-S25		HM-S21	HM-405			HM-406		HM-402			HM-407
TMC-4J		TMC-4H	TMC-4J		TMC-4H	TMC-5B			TMC-5B		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			Electronic Relay
●			●			●			●		●			●

Table 1 F series

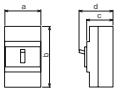
Type				F-800R		FX800	F-800RH		F-1000K		F-1000C	
Appearance												
Number of poles				3	4	3	3	4	3	4	3	4
Rated Current (A) (Base ambient temperature 40°C)				700 800		400/450/500 600/700/800 adjustable	700 800		1000		500/600/700 800/900/1000 adjustable	
Rated Insulation Voltage Ui (V)				690		690	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	—	—	
Dimensions (mm)			a	210	280	210	210	280	210	280	210	280
			b	274		274	274		410		410	
			c	103		103	103		150		150	
			d	141		141	141		190		190	
Net Weight (kg)				10.5	13.5	11	10.5	13.5	26	33	26	33
Standard Connection Type				Front Bar Terminal		Front Bar Terminal	Front Bar Terminal		Front Bar Terminal		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

1. ● : Standard ○ : Option
2. 2-pole types marked with (*1) are supplied in 3-pole type.
3. 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.
4. Flush Mounting Base Assembly, GKW are standard in case of up to 250AF and FX400.
5. Please state that number of poles of breakers when order MIW.
6. Installation of phase separators is required in case of types marked (*2).
7. Tripping system of F-1000K and F-1200K are induction heat system, please state frequency when ordering.
8. For DC use, the tripping character is only instantaneous trip in case of F-1000K and F-1200K.
9. 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

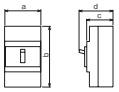
Type				S-30S		S-30E		S-50E		S-50EB		S-50SB		S-60RB		S-100EB	
Appearance																	
Number of poles				2	3	2	3	2	3	2	3	2	3	2	3	2	3
Rated Current (A) (Base ambient temperature 40°C)				3 5 10 15 20 30		3 5 10 15 20 30		5 10 15 20 30 40 50		5 10 15 20 30 40 50		5 10 15 20 30 50		5 10 15 20 30 50 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	—
Dimensions (mm)			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-1		TMC-1		TMC-1	
			Short Type	—		—		—		—		TMC-1S		TMC-1S		TMC-1S	
			Long Type	—		—		—		—		TMC-2D		TMC-2D		TMC-2D	
		Rear Type	BTC	—		—		—		—		BTC-1		BTC-1		BTC-1	
	IEC Rail 35 mm			●		●		●		●		○		○		○	
Automatic Tripping Device				Full Magnetic		Full Magnetic		Full Magnetic		Full Magnetic		Full Magnetic		Full Magnetic		Full Magnetic	
Trip Button				●		—		●		—		●		●		●	

Attention

1. ● : Standard ○ : Option
2. 2-pole types marked with (*1) are supplied in 3-pole type.
3. 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.
4. Please state that number of poles of breakers when order MIW.
5. Installation of phase separators is required in case of types marked (*2).
6. 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	—	5/2	—	10/5	—	10/5	—	25/13	—	—	—	40/20	—	—	—	40/20	—
7.5/2	—	7.5/2	—	15/8	—	15/8	—	25/13	—	—	—	40/20	—	—	—	40/20	—
52	75	65	90	105		105		140		140		210		210		210	210
130		150		165		165		257		257		274		274		274	274
60		60		60		68		103		103		103		103		103	103
84		85		85		95		133		133		141		141		141	141
0.53	0.74	0.7	1	1.6		1.6		5.3	6.1	5.1	5.9	10		9.7		10.5	11
Front Terminal		Front Terminal		Front Terminal		Front Terminal		Front Bar Terminal		Front Bar Terminal		Front Bar Terminal		Front Bar Terminal		Front Bar Terminal	Front Bar Terminal
● (*2)		○		● (*2)		● (*2)		● (*2)		● (*2)		● (*2)		● (*2)		● (*2)	● (*2)
○		○		○		○ (*3)		○		○ (*3)		○		○ (*3)		○	○ (*3)
○		○		○		○ (*3)		○		○ (*3)		○		○ (*3)		○	○ (*3)
○		○		○		○ (*3)		○		○ (*3)		○		○ (*3)		○	○ (*3)
—		—	○	—		—		○		○		○		○		○	○
○		○		○		○		○		○		○		○		○	○
○		○		○		○		○		○		○		○		○	○
STB-3K (Up to 50A : STB-2M)		STB-3H (Up to 50A : STB-2D)		—		—		—		—		—		—		—	—
—		—		○		○		○		○		○		○		○	○
○		○		—		—		—		—		—		—		—	—
—		—		○		○		○ (GK)		○		○ (GK)		○ (GK)		○ (GK)	○ (GK)
○		○		—		—		○		○		○		○		○	○
—		—		—		—		—		—		—		—		—	—
MIW-2E		MIW-2C		MIW-4F		MIW-4L		MIW-5D		MIW-5F		MIW-5		MIW-5G		MIW-5	MIW-5G
—		—		○		—		—		—		—		—		—	—
—		—		—		—		○		○		○		○		○	○
—		—		—		—		—		—		—		—		—	—
LC-2G		LC-2C		LC-4E		LC-2F		—		—		—		—		—	—
HL-2G		○		HL-4E		HL-2F		HL-5		HL-5		HL-6		HL-6		HL-6	HL-6
HA-108		HA-104		HA-207		HA-209		HA-405		HA-406		HA-402		HA-402		HA-402	HA-402
—	HM-S12	—		HM-S22		HM-S23		HM-405		HM-406		HM-402		HM-407		HM-402	HM-407
TMC-1		TMC-2C		TMC-4K		TMC-4J		TMC-5B		TMC-5B		TMC-5D		TMC-5D		TMC-5D	TMC-5D
TMC-1S		—		TMC-4JS		TMC-4JS		—		—		—		—		—	—
TMC-2D		—		—		—		—		—		—		—		—	—
BTC-1		BTC-2C		BTC-4G		BTC-4J		BTC-5B		BTC-5B		—		—		—	—
○		—		—		—		—		—		—		—		—	—
Full Magnetic		Full Magnetic		Thermal-Magnetic		Thermal-Magnetic		Thermal-Magnetic		Electronic Relay		Thermal-Magnetic		Electronic Relay		Thermal-Magnetic	Electronic Relay
●		●		●		●		●		●		●		●		●	●

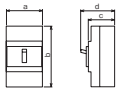
Table 3 **L series**

Type				L-50E	L-100E	L-225E	L-400E	L-600E	L-800E
Appearance									
Number of poles				3 4	3 4	3 4	3 4	3 4	3 4
Rated Current (A) (Base ambient temperature 40°C)				5 10 15 20 30 50	15 20 30 50 60 75 100	125 150 175 200 225	250 300 350 400	500 600	700 800
Rated Insulation Voltage Ui (V)				690	690	690	690	690	690
Rated Impulse withstand Voltage Uimp (kV)				8	8	8	8	8	8
Rated Breaking Capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	—	—	—	—	—	—
			440V	125/32	125/32	125/32	125/32	125/32	125/32
			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
			230V	175/88	175/88	175/88	175/88	175/88	175/88
		DC	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	○	○	○	○	○	○
			TB2	○	○	○	○	○	○
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 —	—	—
	IEC Rail 35 mm			—	—	—	—	—	—
Automatic Tripping Device				Full Magnetic	Full Magnetic	Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic
Trip Button				●	●	●	●	●	●

Attention

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

Table 4 M series

Type				MS-30E	MS-50EB	MS-50SB	MS-100SB	MFXK100-S	MS-225SB	MSXK225	MFXK225-S
Appearance											
Number of poles				3	3	3	3	3	3	3	3
Rated Current (A) (Base ambient temperature 40°C)				0.8 1.2 1.4 2 2.5 4 5 6.3 7.1 8 10 12 16 25 32	10 12 16 25 32 40 45	0.7 1.4 2.3 2.6 4.2 5.6 7.4 9 10 14 16 25 33 40 45	60 75 90	60 75 90	125 150 175 225	125 150 175 225	125 150 175 225
Rated Insulation Voltage Ui (V)				500	500	690	690	690	690	690	690
Rated Impulse withstand Voltage Uimp (kV)				4	4	6	6	8	6	6	8
Rated Breaking Capacity (kA)	IEC 60947-2 (Icu/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
			230V	5/2	5/2	7.5/2	35/9	50/50	35/18	35/18	50/25
Dimensions (mm)			a	75	75	75	75	90	105	105	105
			b	96	96	130	130	150	165	165	165
			c	60	60	60	60	68	60	68	68
			d	76	76	84	84	94	85	95	95
Net Weight (kg)				0.37	0.37	0.6	0.74	1.6	1.6	1.6	1.6
Standard Connection Type				Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal	Front Terminal
Phase Separator for Line Side (*2)				—	—	○	● (*2)	● (*2)	● (*2)	● (*2)	● (*2)
Interior Accessories	Alarm Switch		AL	○	○	○	○	○	○	○ (*3)	○ (*3)
	Auxiliary Switch		AUX	○	○	○	○	○	○	○ (*3)	○ (*3)
	Shunt Trip		SHT	○	○	○	○	○	○	○ (*3)	○ (*3)
	Undervoltage Trip		UVT	—	—	—	—	—	—	—	—
	Terminal Block		TB	—	—	○	○	○	○	○	○
			TB2	○	○	○	○	○	○	○	○
Exterior Accessories	Rear-connecting Stud		STB	—	—	STB-2M	STB-3K	—	—	—	—
			BSD	—	—	—	—		○	○	○
	Flush Mounting Base Assembly		GKW(STB)	—	—	○	○	—	—	—	—
			GK·GKW(BSD)	—	—	—	—		○	○	○
	Plug-in Mounting Base Assembly		PK	—	—	○	○	○	—	—	○
	Drawout Assembly		PDK	—	—	—	—	—	—	—	—
	Mechanical Interlock		MIW	—	—	MIW-2E	MIW-2E		MIW-4F	MIW-4L	MIW-4M
	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	TMC-4J
			Short Type	—	—	TMC-1S	TMC-1S	—	TMC-4JS	TMC-4JS	TMC-4JS
			Long Type	—	—	TMC-2D	TMC-2D	—	—	—	—
		Rear Type	BTC	—	—	BTC-1	BTC-1	BTC-2C	BTC-4G	BTC-4J	BTC-4J
	IEC Rail 35 mm			●	●	○	○	—	—	—	—
Automatic Tripping Device				Full Magnetic	Full Magnetic	Full Magnetic	Full Magnetic	Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic	Thermal-Magnetic
Trip Button				—	—	●	●	●	●	●	●

Attention

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

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

200 – 220V AC

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

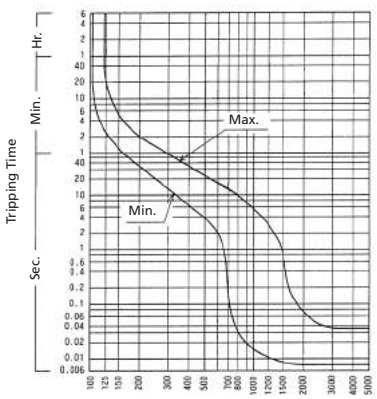
400 – 440V AC

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, MFXK100-S
3.7	10		37	75	
5.5	16		45	90	
7.5	16		50	(125)*	MS-225SB, MFXK225-S

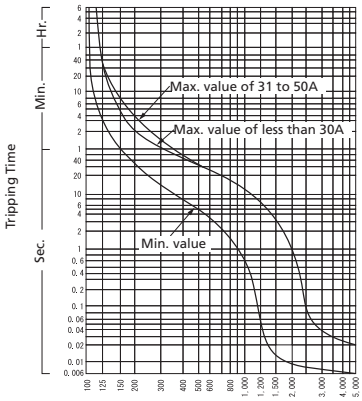
Note:
1. Starting conditions are set within 3 seconds at 500% (2 seconds at 600%) of full load current for types MS-30E, MS-50EB, MS-50SB and within 8 seconds at 500% (5 seconds at 600%) of full load current for other types.
2. Specify the rated current since the figures with asterisks are the mere reference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

● Overcurrent Tripping Characteristics

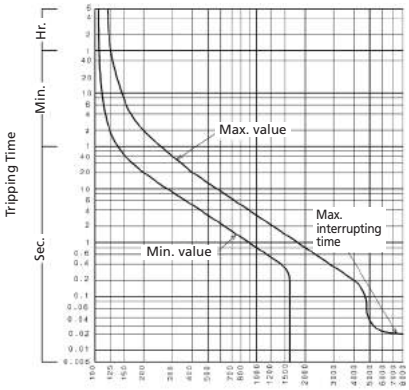
MS-30E, MS-50EB



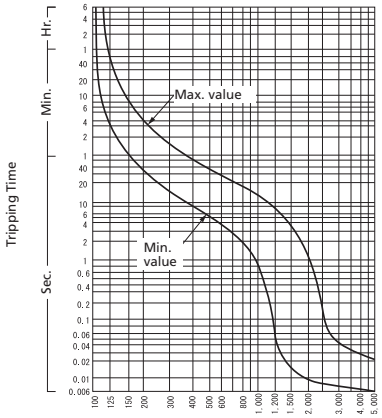
MS-50SB



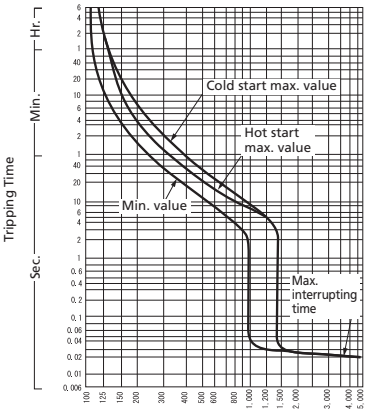
MFXK100-S



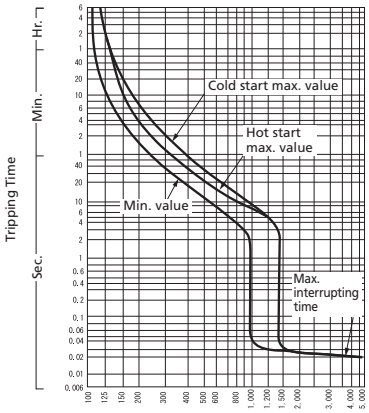
MS-100SB



MS-225SB



MFXK225-S



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

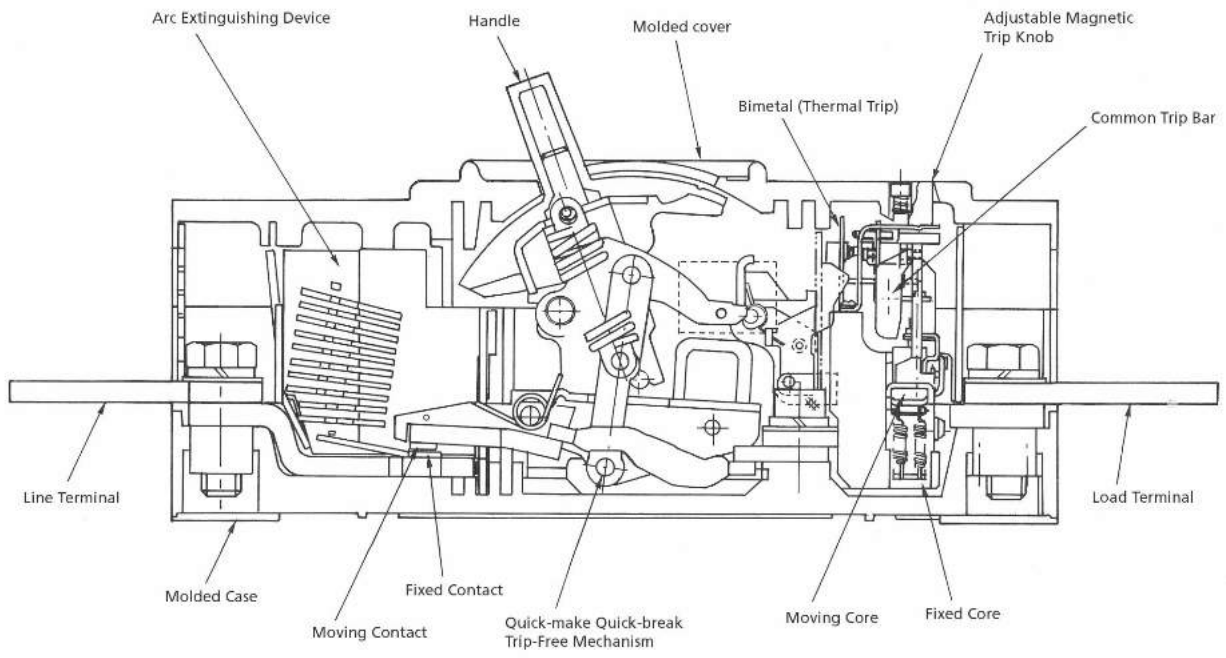
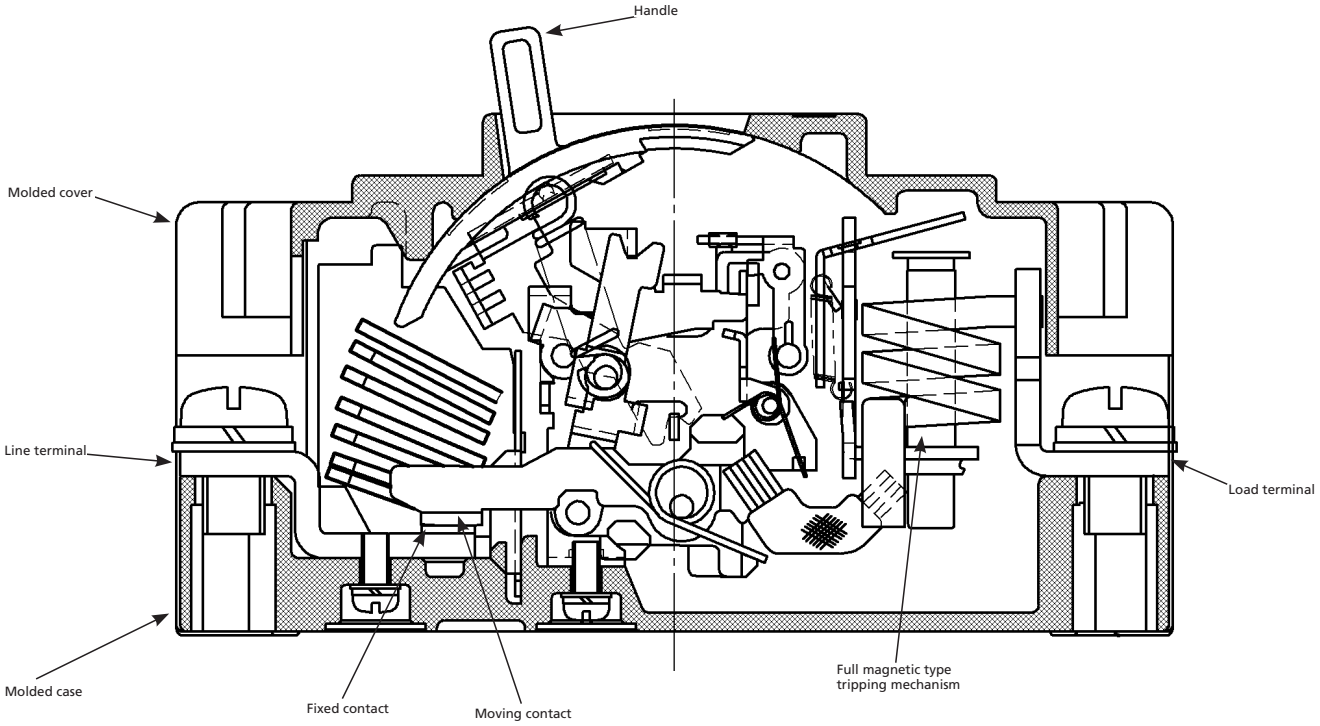
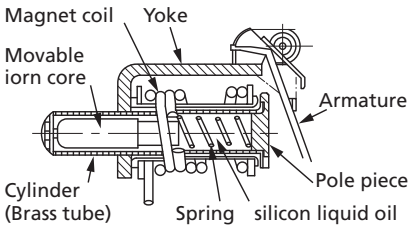


Fig. 2 Full magnetic Type



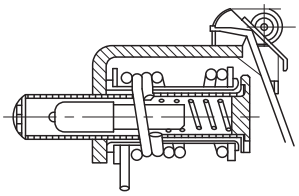
Principle (How the tripping mechanism operates)

Fig. 3 Normality



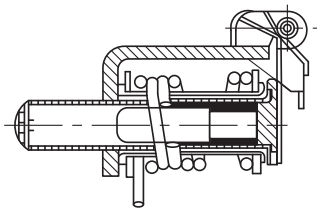
This figure shows that the movable iron core and armature do not move at less than rated current of the breaker.

Fig. 4 Time-Delay Action (1)



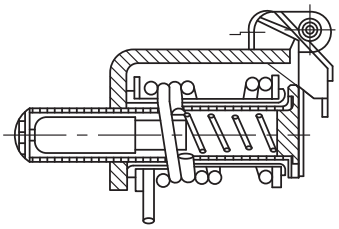
When overcurrent flows through the magnet coil, only the movable iron core moves for the pole piece, overcoming viscosity of the silicon liquid oil.

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)

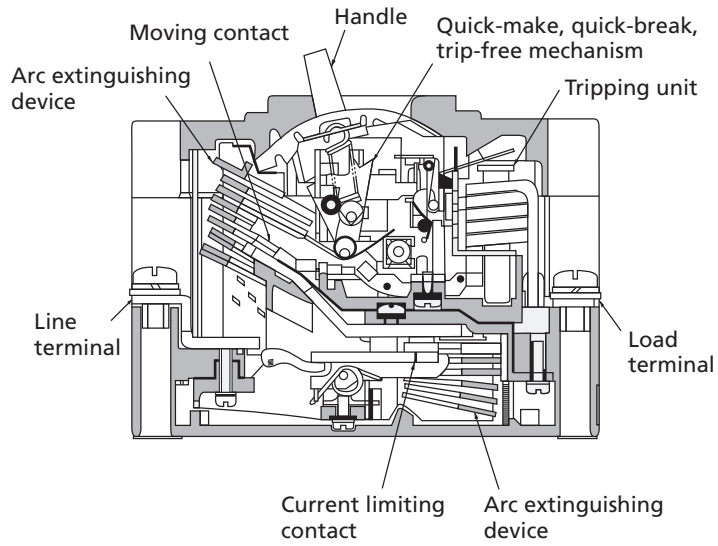
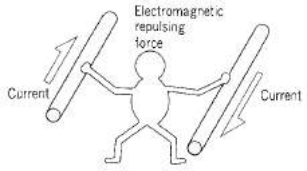
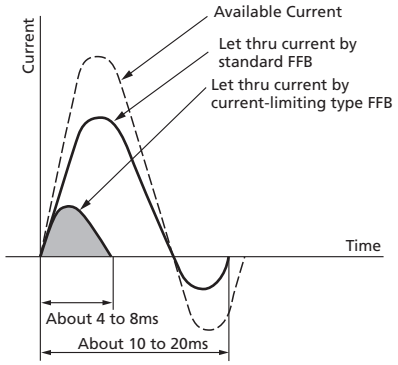


Fig. 7 Construction of L-100E



When a current flows through a conductor in one direction while another current flows through a conductor in the opposite direction (as shown in the figure on the left), an electromagnetic repulsing force act between the conductors. The current-limiting type breaker utilizes this force to complete high-speed current interruption within an extremely short period of time.

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



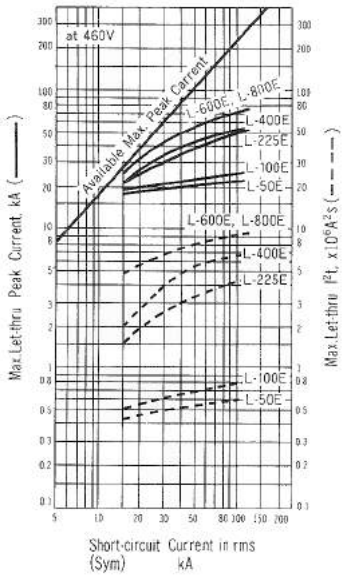


Fig. 8 Current limiting characteristics

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

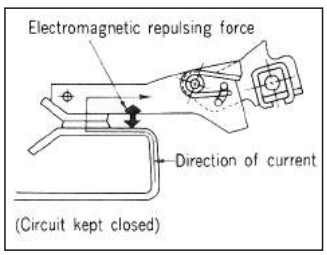


Fig. 9-1

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

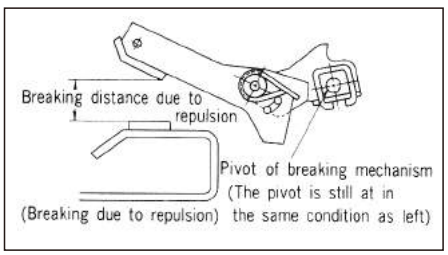


Fig. 9-2

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

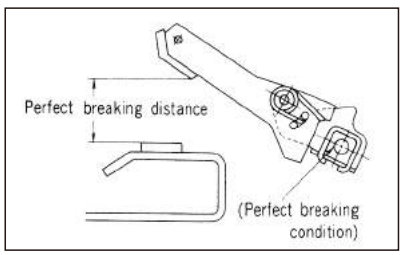


Fig. 9-3

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.

Double Instantaneous Trip*

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

Higher MT current Reduces Miss trip by motors rush Current

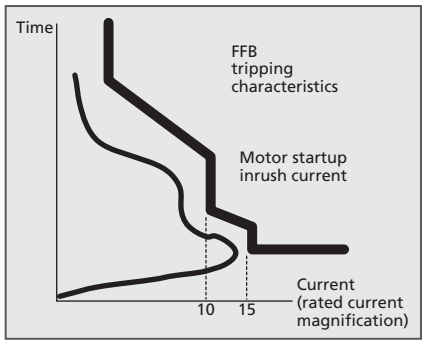
Instantaneous tripping current is now greater *than conventional models. Reduces probability of miss trip at high inrush current. Improvement of the voltage equilibrium characteristic of the earth leakage breaker.

*In-house comparison

Easy Coordination*

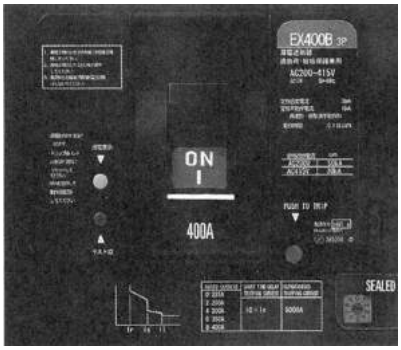
Tripping characteristics include adjustable long time delay & short time delay in proportion to long time delay (setting current x 1,000%) are contribute to easier coordination with other electric appliance such as down stream circuit breakers, transformers and wires.

*over 400A frame



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

(FFB)



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 In ≤ 63A		

<Base ambient temperature>

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

■ Thermal-magnetic type

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

The compensation current I is represented by:

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

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

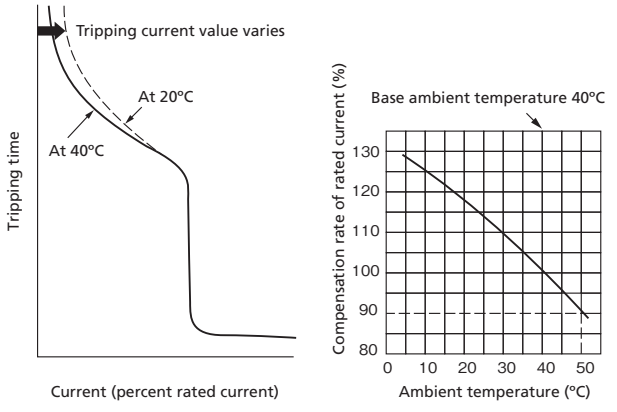


Fig. 10 Example of Application of Ambient Temperature Compensation Curve for Thermal-magnetic Type

■ 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.

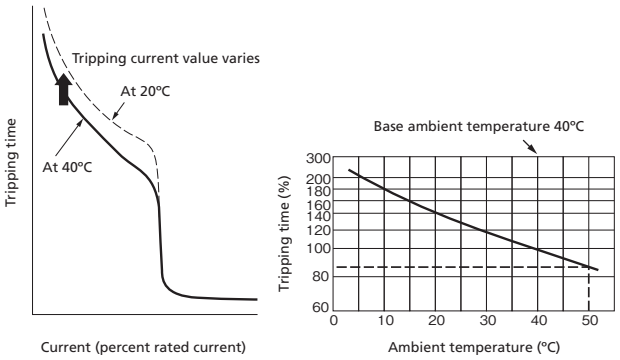


Fig. 11 Example of Application of Ambient Temperature Compensation Curve for Full-magnetic Type

<Maximum applicable temperature>

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

1. Standard mounting is shown in the diagram below.

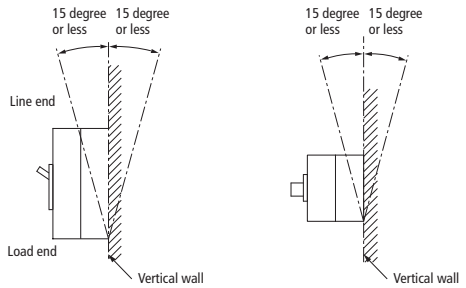
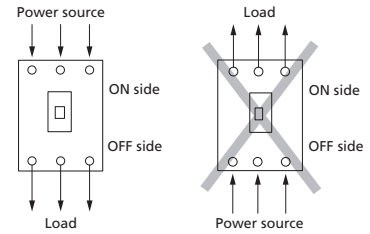


Fig. 12 Standard Mounting Method

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))



(a) Correct connection (b) Incorrect connection

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, SXK225		
400AF	F-400R	S-400S		
600AF	F-600F	S-600S		2. Installation of phase separators on the load side is required.
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:

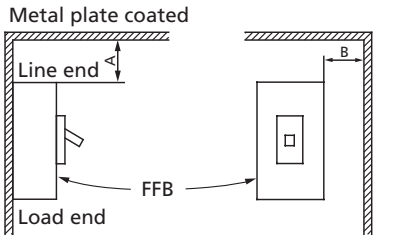


Fig. 14

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.

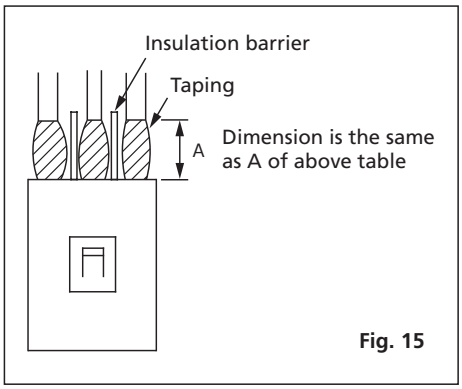


Fig. 15

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

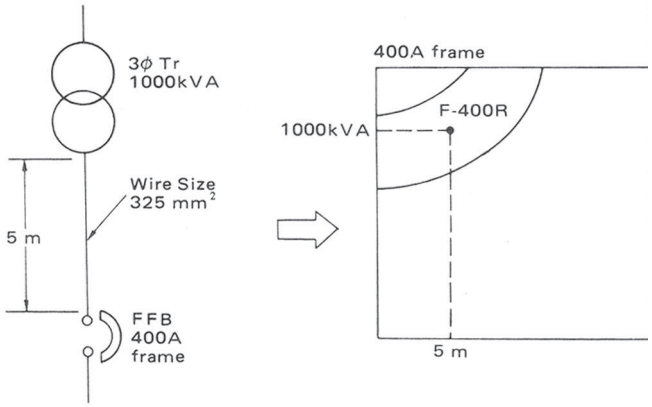
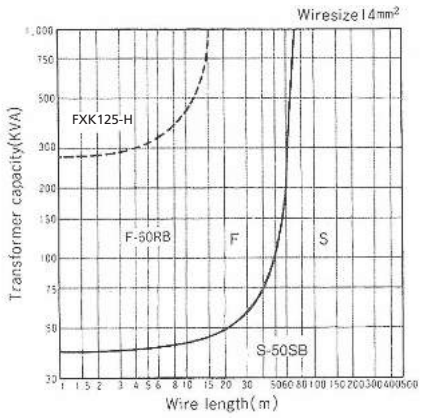


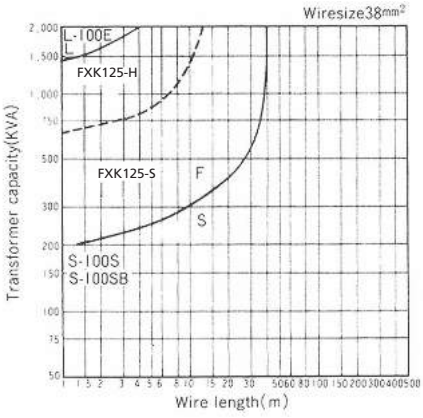
Fig. 16 Example of selection

AC 460V (Transformer voltage: 415V)

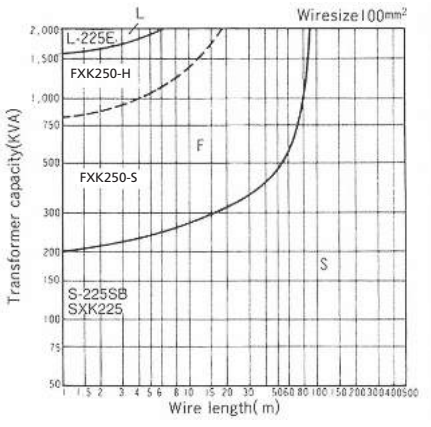
50A 125A frame



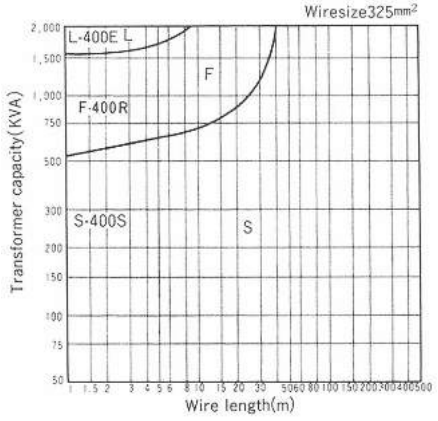
100AF 125A frame



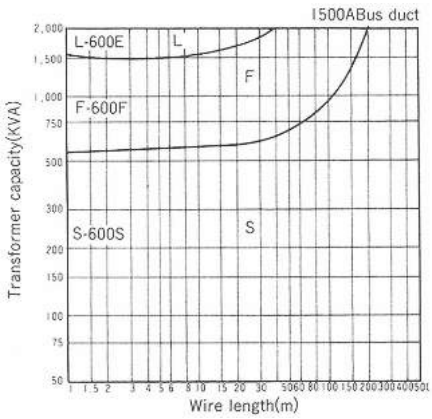
225AF 250AF frame



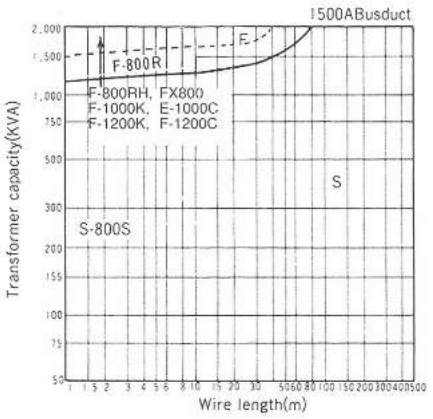
400A frame



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)**

<table>
<tr><td colspan="2">Motor</td><td colspan="13">FFB</td></tr>
<tr><td rowspan="2">Capacity (kW)</td><td rowspan="2">Full-load current (A)</td><td rowspan="2">Rated current (A)</td><td colspan="13">Interrupting capacity (kA) Sym</td></tr>
<tr><td>2.5</td><td>5</td><td>7.5</td><td>10</td><td>15</td><td>22</td><td>25</td><td>30</td><td>35</td><td>43</td><td>50</td><td>85</td></tr>
<tr><td>0.2</td><td>0.7</td><td>15</td><td rowspan="9">F-30FB</td><td rowspan="10">S-60RB</td><td rowspan="10">F-60RB</td><td colspan="4" rowspan="9">FXK125-S</td><td colspan="3" rowspan="9">FXK125-H</td><td rowspan="9">L-50E</td></tr>
<tr><td>0.4</td><td>1.4</td><td>15</td></tr>
<tr><td>0.75</td><td>2.3</td><td>15</td></tr>
<tr><td>1.5</td><td>4.2</td><td>15</td></tr>
<tr><td>2.2</td><td>5.6</td><td>15</td></tr>
<tr><td>3.7</td><td>9.0</td><td>20</td></tr>
<tr><td>5.5</td><td>14</td><td>30</td></tr>
<tr><td>7.5</td><td>16</td><td>30</td></tr>
<tr><td>11</td><td>25</td><td>50</td><td>S-50SB</td></tr>
<tr><td>15</td><td>33</td><td>60</td><td colspan="4" rowspan="2"></td><td colspan="4" rowspan="3">FXK125-S</td><td colspan="3" rowspan="3">FXK125-H</td><td rowspan="3">L-100E</td></tr>
<tr><td>18.5</td><td>40</td><td>60</td></tr>
<tr><td>22</td><td>45</td><td>75</td><td colspan="5" rowspan="3">S-100S
S-100SB</td></tr>
<tr><td>30</td><td>60</td><td>100</td><td colspan="4" rowspan="2">FXK125-S</td><td colspan="3" rowspan="2">FXK125-H</td><td rowspan="2">L-100E</td></tr>
<tr><td>37</td><td>75</td><td>100</td></tr>
<tr><td>45</td><td>90</td><td>150</td><td colspan="6" rowspan="4">S-225SB
SXK225</td><td colspan="3" rowspan="4">FXK250-S</td><td colspan="3" rowspan="4">FXK250-H</td><td rowspan="4">L-225E</td></tr>
<tr><td>55</td><td>(110)</td><td>175</td></tr>
<tr><td>75</td><td>(150)</td><td>225</td></tr>
<tr><td>90</td><td>(180)</td><td>225</td></tr>
<tr><td>110</td><td>(220)</td><td>350</td><td colspan="8">S-400S</td><td colspan="3">SX400</td><td colspan="2">F-400R
FX400</td><td>L-400E</td></tr>
<tr><td>150</td><td>(300)</td><td>500</td><td colspan="8" rowspan="2">S-600S</td><td colspan="3" rowspan="2">SX600</td><td colspan="2" rowspan="2">F-600F
FX600</td><td rowspan="2">L-600E</td></tr>
<tr><td>190</td><td>(380)</td><td>600</td></tr>
</table>

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)**

<table>
<tr><td colspan="2">Motor</td><td colspan="13">FFB</td></tr>
<tr><td rowspan="2">Capacity (kW)</td><td rowspan="2">Full-load current (A)</td><td rowspan="2">Rated current (A)</td><td colspan="13">Interrupting capacity (kA) Sym</td></tr>
<tr><td>2.5</td><td>5</td><td>7.5</td><td>10</td><td>15</td><td>22</td><td>25</td><td>30</td><td>35</td><td>43</td><td>50</td><td>85</td></tr>
<tr><td colspan="15">For a capacity of 15 kW or less, select the same breaker among those for direct-starting</td></tr>
<tr><td>18.5</td><td>40</td><td>75</td><td colspan="5" rowspan="3">S-100S
S-100SB</td><td colspan="4" rowspan="3">FXK125-S</td><td colspan="3" rowspan="3">FXK125-H</td><td rowspan="3">L-100E</td></tr>
<tr><td>22</td><td>45</td><td>75</td></tr>
<tr><td>30</td><td>60</td><td>100</td></tr>
<tr><td>37</td><td>75</td><td>125</td><td colspan="6" rowspan="4">S-225SB
SXK225</td><td colspan="3" rowspan="4">FXK250-S</td><td colspan="3" rowspan="4">FXK250-H</td><td rowspan="4">L-225E</td></tr>
<tr><td>45</td><td>90</td><td>150</td></tr>
<tr><td>55</td><td>(110)</td><td>175</td></tr>
<tr><td>75</td><td>(150)</td><td>225</td></tr>
<tr><td>90</td><td>(180)</td><td>350</td><td colspan="11" rowspan="2">S-400S
SX400</td><td colspan="2" rowspan="2">F-400R
FX400</td><td rowspan="2">L-400E</td></tr>
<tr><td>110</td><td>(220)</td><td>400</td></tr>
<tr><td>150</td><td>(300)</td><td>600</td><td colspan="11">S-600S
SX600</td><td colspan="2">F-600F
FX600</td><td>L-600E</td></tr>
<tr><td>190</td><td>(380)</td><td>700</td><td colspan="11">S-800S</td><td colspan="2">FX800</td><td>F-800R
F-800RH
L-800E</td></tr>
</table>

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

<table>
<tr><td colspan="2">Motor</td><td rowspan="3">Rated current (A)</td><td colspan="10">FFB</td></tr>
<tr><td rowspan="2">Capacity (kW)</td><td rowspan="2">Full-load current (A)</td><td colspan="10">Interrupting capacity (kA) Sym</td></tr>
<tr><td>5</td><td>10</td><td>14</td><td>25</td><td>30</td><td>35</td><td>42</td><td>50</td><td>85</td><td>175</td></tr>
<tr><td>0.2</td><td>1.4</td><td>15</td><td rowspan="6">S-30E
S-30FB</td><td rowspan="7">S-60RB</td><td rowspan="7" colspan="2">F-60RB</td><td rowspan="6" colspan="4">FXK125-S</td><td rowspan="6">FXK125-H</td><td rowspan="6">L-50E</td></tr>
<tr><td>0.4</td><td>2.6</td><td>15</td></tr>
<tr><td>0.75</td><td>4.2</td><td>15</td></tr>
<tr><td>1.5</td><td>7.4</td><td>15</td></tr>
<tr><td>2.2</td><td>10</td><td>20</td></tr>
<tr><td>3.7</td><td>16</td><td>30</td></tr>
<tr><td>5.5</td><td>25</td><td>50</td><td>S-50EB,
S-50SB</td></tr>
<tr><td>7.5</td><td>33</td><td>60</td><td colspan="3"></td><td rowspan="2" colspan="2">S-100SB</td><td rowspan="2" colspan="2">FXK125-S</td><td rowspan="2">FXK125-H</td><td rowspan="2">L-100E</td></tr>
<tr><td>11</td><td>45</td><td>75</td><td colspan="2" rowspan="2">S-100EB</td><td rowspan="2" colspan="2">S-100S
S-100SB</td></tr>
<tr><td>15</td><td>60</td><td>100</td><td colspan="4">S-100SB</td><td colspan="2">FXK125-S</td><td>FXK125-H</td><td>L-100E</td></tr>
<tr><td>18.5</td><td>75</td><td>100</td><td colspan="2">S-100EB</td><td colspan="2">S-100S
S-100SB</td><td colspan="4">S-100SB</td><td colspan="2">FXK125-S</td><td>FXK125-H</td><td>L-100E</td></tr>
<tr><td>22</td><td>90</td><td>150</td><td colspan="6" rowspan="4">S-225SB
SXK225</td><td colspan="2" rowspan="4">FXK250-S</td><td rowspan="4">FXK250-H</td><td rowspan="4">L-225E</td></tr>
<tr><td>30</td><td>(120)</td><td>200</td></tr>
<tr><td>37</td><td>(150)</td><td>225</td></tr>
<tr><td>45</td><td>(180)</td><td>225</td></tr>
<tr><td>55</td><td>(220)</td><td>350</td><td colspan="8" rowspan="2">S-400S
SX400</td><td rowspan="2">F-400R
FX400</td><td rowspan="2">L-400E</td></tr>
<tr><td>60</td><td>(240)</td><td>400</td></tr>
<tr><td>75</td><td>(300)</td><td>500</td><td colspan="8" rowspan="2">S-600S
SX600</td><td rowspan="2">F-600F
FX600</td><td rowspan="2">L-600E</td></tr>
<tr><td>90</td><td>(360)</td><td>600</td></tr>
</table>

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

<table>
<tr><td colspan="2">Motor</td><td rowspan="3">Rated current (A)</td><td colspan="11">FFB</td></tr>
<tr><td rowspan="2">Capacity (kW)</td><td rowspan="2">Full-load current (A)</td><td colspan="11">Interrupting capacity (kA) Sym</td></tr>
<tr><td>2.5</td><td>5</td><td>10</td><td>14</td><td>25</td><td>30</td><td>35</td><td>50</td><td>85</td><td>125</td><td>175</td></tr>
<tr><td colspan="14">For a capacity of 15 kW or less, select the same breaker among those for direct-starting</td></tr>
<tr><td>18.5</td><td>75</td><td>125</td><td colspan="5" rowspan="4">S-225SB
SXK225</td><td colspan="3" rowspan="4">FXK250-S</td><td rowspan="4">FXK250-H</td><td colspan="2" rowspan="4">L-225E</td></tr>
<tr><td>22</td><td>90</td><td>150</td></tr>
<tr><td>30</td><td>(120)</td><td>200</td></tr>
<tr><td>37</td><td>(150)</td><td>225</td></tr>
<tr><td>45</td><td>(180)</td><td>350</td><td colspan="8" rowspan="2">S-400S, SX400</td><td rowspan="2">F-400R
FX400</td><td colspan="2" rowspan="2">L-400E</td></tr>
<tr><td>55</td><td>(220)</td><td>400</td></tr>
<tr><td>60</td><td>(240)</td><td>500</td><td colspan="8" rowspan="2">S-600S, SX600</td><td rowspan="2">F-600F
FX600</td><td colspan="2" rowspan="2">L-600E</td></tr>
<tr><td>75</td><td>(300)</td><td>600</td></tr>
<tr><td>90</td><td>(360)</td><td>700</td><td colspan="10">S-800S, F-800R, SX800</td><td>F-800RH
FX800</td><td>L-800E</td></tr>
</table>

<Breaker Used for Protection of Motor Against Overload>

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

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

When the above restrictions cannot be met use a general type FFB.
When ordering, please specify the Frame (selected by the interrupting capacity) and the rated current. (About the same as full load current of the motor.)

• When using the breaker for the transformer primary circuit.

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

Table 12 Applicable Conditions of Motor Breaker

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

4. Application to discrimination coordination

In a discrimination coordination system, only the breaker nearest the fault opens to isolate the faulty circuit from the rest of the power system. This system results in maximum continuity of service.
ELECTRONICS TYPE breakers are best suited to application as the upstream (main) breaker.

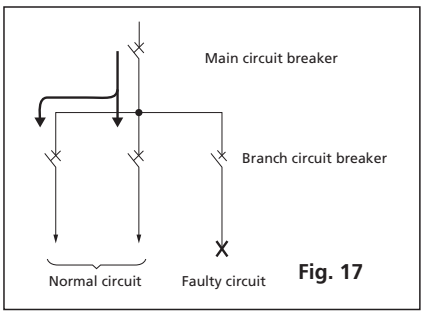


Fig. 17

Table 13 Discrimination between standard FFBs and ELECTRONICS TYPE FFBs

230V class

FFB for main circuit / Type / Interrupting Capacity(kA)	FX400	FX600	FX800	FX1000	FX1200	F-1600CB
FFB for branch circuit / Type / Interrupting Capacity(kA)	100	100	100	125	125	125
F-30FB	5	5	5	5	5	5
F-50FC	10	5	7.5	7.5	10	10
F-60RB	25	5	10	10	25	25
F-50HB	35	5	10	10	35	35
FXK125-H	100	5	14	14	85	85
FXK125-S	50	5	10	10	50	50
FXK125-H	100	5	14	14	85	85
FXK250-S, FXK250-H, F-250FB, F-250KC	85/100	4	10	10	35	35	65
FX400, F-400R	100	—	—	10	18	22	25
F-600F, FX600	100	—	—	—	—	22	25
F-800F, FX800, F-800R	100	—	—	—	—	—	25
FX1000	125	—	—	—	—	—	—
FX1200	125	—	—	—	—	—	—
S-30E, S-50EB, S-50SB	5	4	5	5	5	5	5
S-100EB, S-60RB	10	4	7.5	7.5	10	10	10
S-100SB	35	5	14	14	25	25	25
S-225SB, SXK225	35	4	10	10	25	25	25
SX400, S-400S	50	—	—	10	18	22	25
SX600, S-600S	50	—	—	—	—	22	25
SX800, S-800S	85	—	—	—	—	—	25
L-50E	175	5	14	14	125	125	125
L-100E	175	5	14	14	125	125	125
L-225E	175	4	10	10	42	65	125
L-400E	175	—	—	10	18	22	42
L-600E	175	—	—	—	—	22	42
L-800E	175	—	—	—	—	—	42

380V class

FFB for main circuit / Type / Interrupting Capacity(kA)	FX400	FX600	FX800	FX1000	FX1200	F-1600CB
FFB for branch circuit / Type / Interrupting Capacity(kA)	50	50	50	85	85	85
F-30FB	2.5	2.5	2.5	2.5	2.5	2.5	2.5
F-50FC	7.5	4	7.5	7.5	7.5	7.5	7.5
F-60RB	10	4	7.5	7.5	10	10	10
FXK125-H	50	4	7.5	7.5	50	50	50
FXK125-S	30	4	7.5	7.5	25	25	25
FXK125-H	50	4	7.5	7.5	35	50	50
FXK250-S, F-250FB	30	4	7.5	7.5	22	22	30
FXK250-H, F-250KC	50	4	7.5	7.5	22	22	30
FX400, F-400R	50	—	—	7.5	18	22	22
F-600F, FX600	50	—	—	—	—	22	22
FX800, F-800R	50	—	—	—	—	—	22
FX1000	85	—	—	—	—	—	—
FX1200	85	—	—	—	—	—	—
S-50SB	2.5	2.5	2.5	2.5	2.5	2.5	2.5
S-60RB	5	4	5	5	5	5	5
S-100S, S-100SB	10	4	7.5	7.5	10	10	10
S-225SB, SXK225	15	4	7.5	7.5	15	15	15
SX400, S-400S	35	—	—	7.5	22	22	22
SX600, S-600S	35	—	—	—	—	22	22
SX800, S-800S	35	—	—	—	—	—	22
L-50E	125	4	10	10	30	30	85
L-100E	125	4	10	10	30	30	85
L-225E	125	4	7.5	7.5	22	22	50
L-400E	125	—	—	7.5	18	22	22
L-600E	125	—	—	—	—	22	22
L-800E	125	—	—	—	—	—	22

Interior Accessories

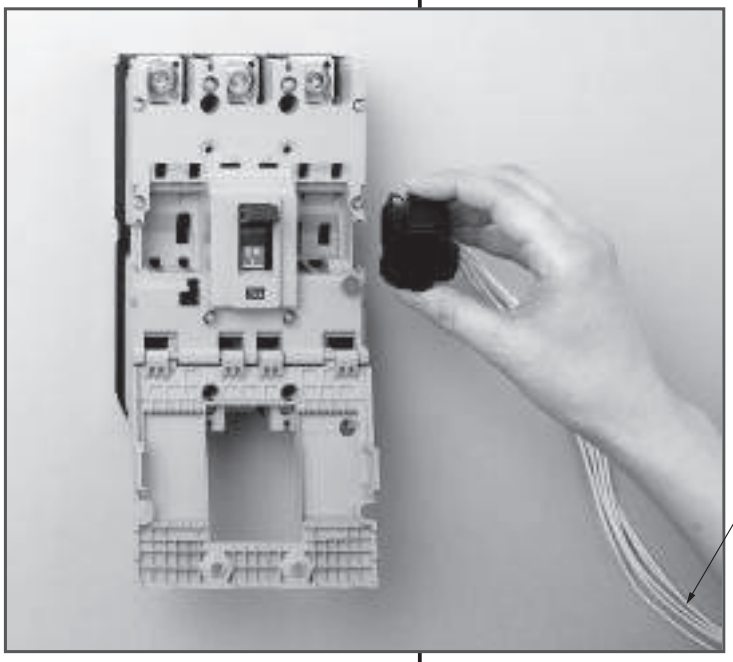
■ **Available accessories inside of FFB are as follows:**

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
0.5mm^2 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	S-1 (S-4) — S-2 (S-5), S-3 (S-6)
Tripped	S-1 (S-4) — S-2 (S-5), S-3 (S-6)

( ): 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	A-1 (A-4) — A-2 (A-5), A-3 (A-6)
OFF or Tripped	A-1 (A-4) — A-2 (A-5), A-3 (A-6)

( ): for 2C contacts

Terminal Block for Interior Accessories

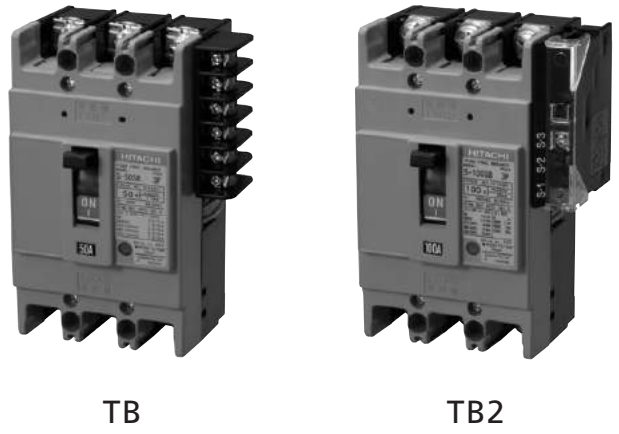


Fig. 18 External View of a Breaker with Terminal Block for an Interior Accessory

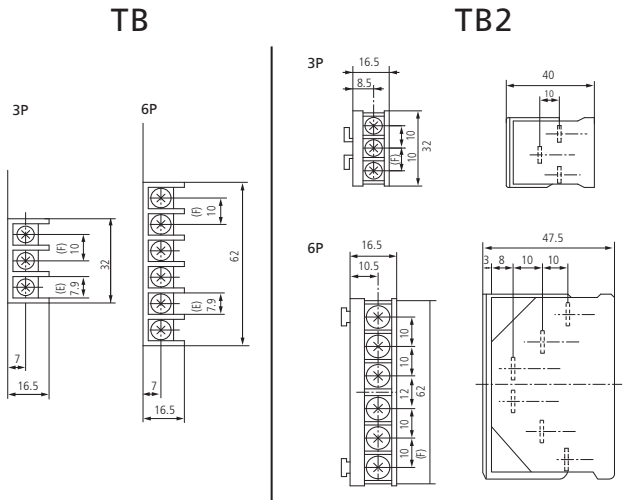
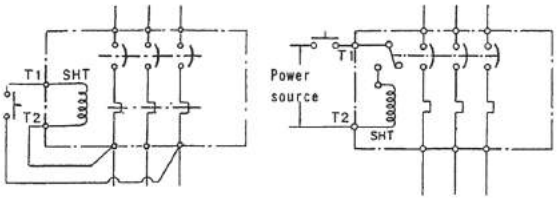


Fig. 19 Dimensions of FFB with Terminal Block for Interior Accessory



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

Table 16 Applicability of interior accessories

Type		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 ✶SXK225	✶SX400 S-400S	✶SX600 S-600S ✶SX800 S-600S	
		L				L-50E L-100E			L-225E L-400E	L-600E L-800E	
Number of poles		M	MS-30E MS-50EB	MS-50SB MS-100SB				✶MFXK100-S ✶MFXK225-S MS-225SB MF-250FB			
Accessories			2	3	2	3	2	3, 4	2, 3	2, 3, 4	2, 3, 4	3, 4
AL			1C	1C	1C	1C	1C	1C	1C	2C	2C	2C
AUX			1C	1C	1C	1C	1C	1C	1C	2C	2C	2C
SHT			⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
UVT								* ●		* ●	●	●
AL + AUX				1C 1C	1C 1C	1C 1C	1C 1C	1C 1C	1C 1C	** 2C 2C	1C 2C *	1C 2C *
AL + SHT				1C ⊗		1C ⊗		1C ⊗	1C ⊗	2C ⊗	2C ⊗	2C ⊗
AL + UVT								* 1C ●		* 2C ●	2C ●	2C ●
AUX + SHT						1C ⊗		1C ⊗	1C ⊗	2C ⊗	2C ⊗	2C ⊗
AUX + UVT								* 1C ●		* 2C ●	2C ●	2C ●
AL + AUX + SHT						1C 1C ⊗		1C 1C ⊗	1C 1C ⊗	** 2C 2C ⊗	1C 2C * ⊗	1C 2C * ⊗
AL + AUX + UVT								* 1C 1C ●		* ** 2C 2C ●	1C 2C * ●	1C 2C * ●

Handle of Breaker ◯ AL □ AUX ⊗ SHT ● UVT

Notes:

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

Exterior Accessories

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

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

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

Rear connecting stud is used as rear connecting terminal.

Fig. 21 FFB with Rear Connecting Studs

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

2. Plug-in Mounting Base Assembly (PK)

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

Fig. 22 FFB with Plug-in Mounting Base Assembly

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

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

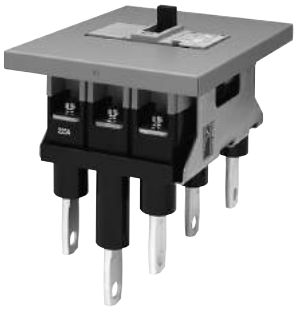


Fig. 23 FFB with Flush-mounting Base Assembly

4. Mechanical Interlock (MIW)

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

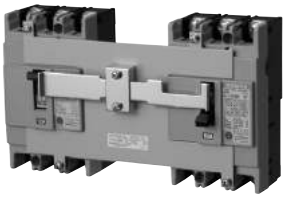


Fig. 24 FFB with Mechanical Interlock

5. Drawout Mechanism (PDK)

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

Fig. 25 FFB with Drawout Mechanism

6. Motor Operating Mechanism (MMK-S)

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

• The manual operation is also available.

Fig. 26 Motor Operating Mechanism

Table 17 Standard Ratings of Motor Operated Mechcanism

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

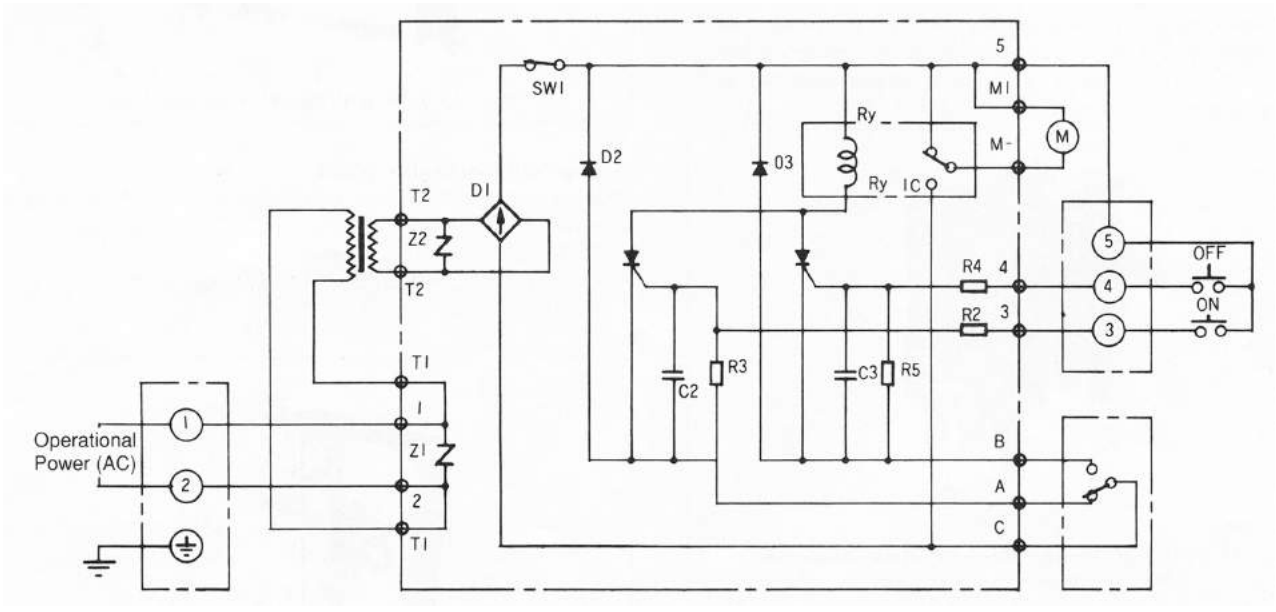
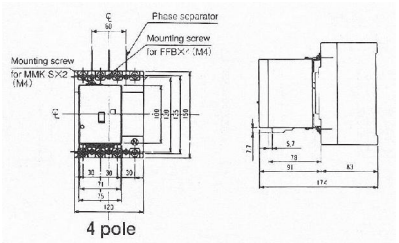
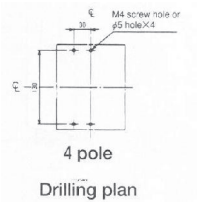


Fig. 27 Control Circuit of Motor Operating Mechanism

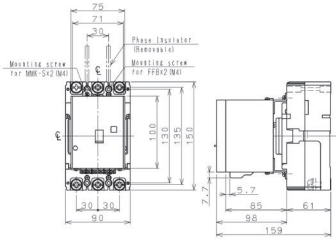
Dimensions of MMK-S

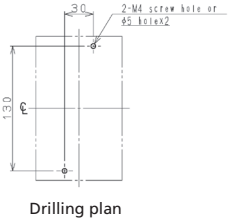
F-100KB



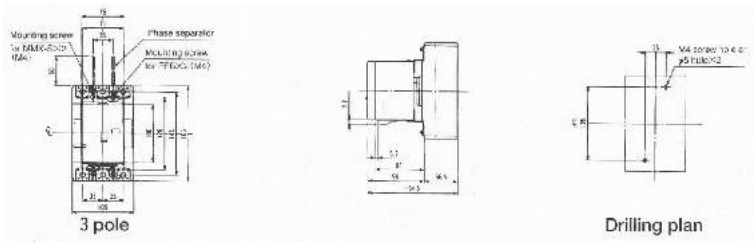


FXK125-S, FXK125-H

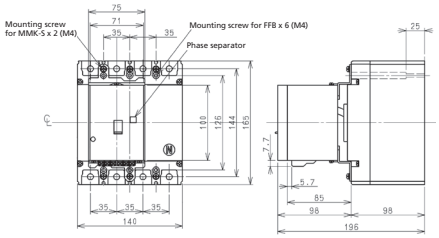


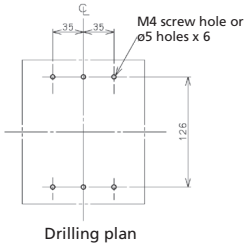


S-225SB

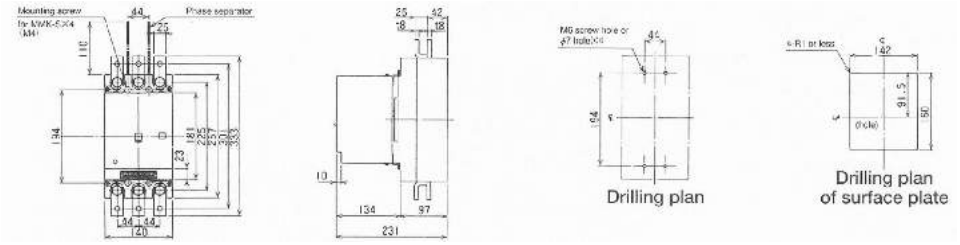


F-250FB, F-250KC

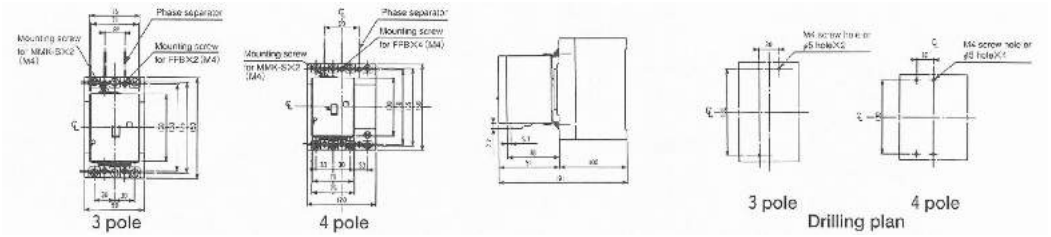




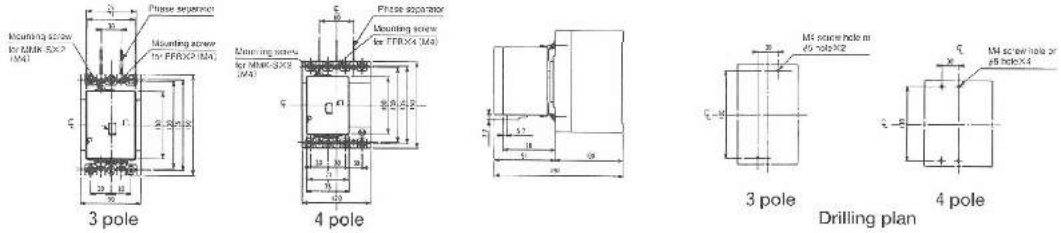
SX400, FX400



L-50E



L-100E



7. Motor Operating Mechanism (MMK-C)

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

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

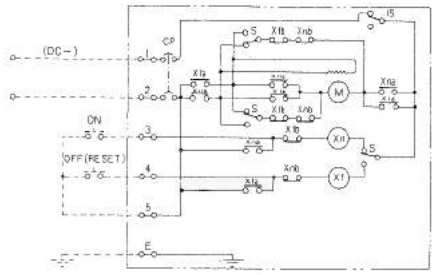
Fig. 28 Motor Operating Mechanism

*excepting 4 poles FFB

Table 18 Standard Ratings of Motor Operated Mechcanism

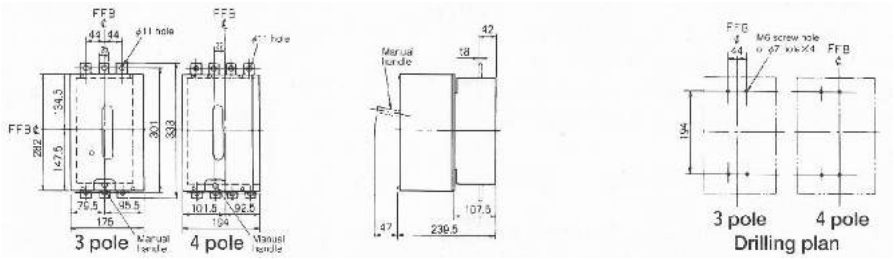
Type		MMK-C			
Type of FFB	F series	F-400R FX400	F-600F FX600	F-800R F-800RH FX800 F-1000C* F-1000K* F-1200C* F-1200K* F-1600CB* F-1600B*	F-1000C (4P) F-1000K (4P) F-1200C (4P) F-1200K (4P) F-1600CB (4P) F-1600B (4P)
	L series	L-225E L-400E	—	L-600E L-800E	—
	S series	S-400S	S-600S	S-800S	—
Max. operational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

Type		
	F series	F-400R FX400 F-600F FX600 F-800R F-800RH FX800 FX1000C F-1000K FX1000 F-1200C F-1200K FX1200 F-1600CB F-1600B
	L series	L-225E L-400E L-600E L-800E
	S series	S-400S S-600S S-800S

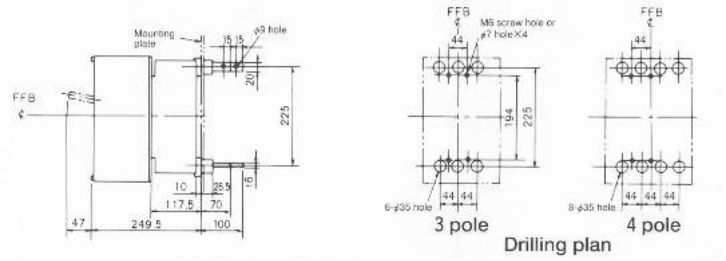


PS	Push-button Switch
X	Auxiliary Electromagnetic Contactor
n	For operating FFB" ON"
f	For operating FFB" OFF"
a	Closed by operation (normally open)
b	Opened by operation (normally closed)
CP	Circuit Protector
2	Timer
Si	Silicon Rectifier
R	Resister
M	Motor
IS S LS	Limit Switch

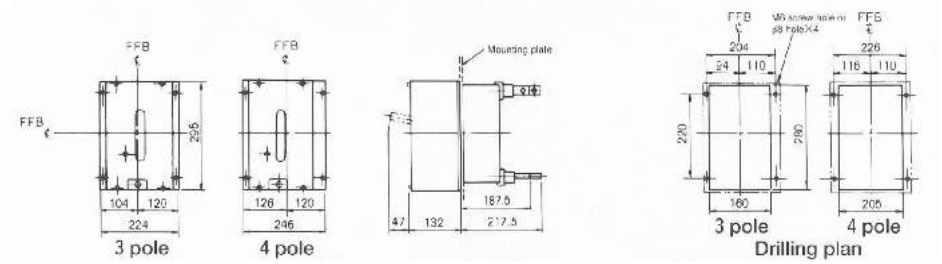
L-225E
(Standard Type)



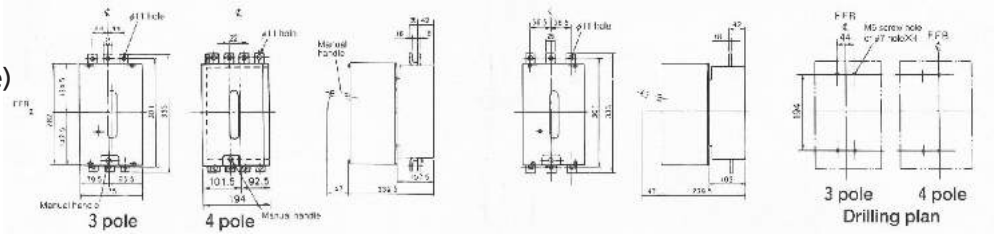
(Rear Connecting Type)



(Built-in Type)



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



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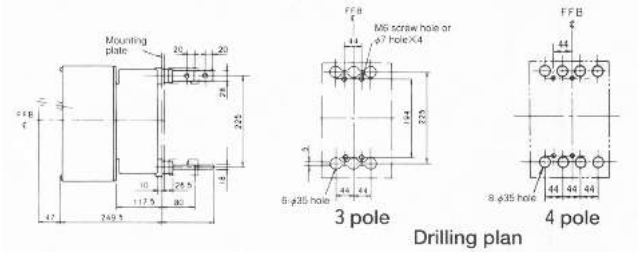

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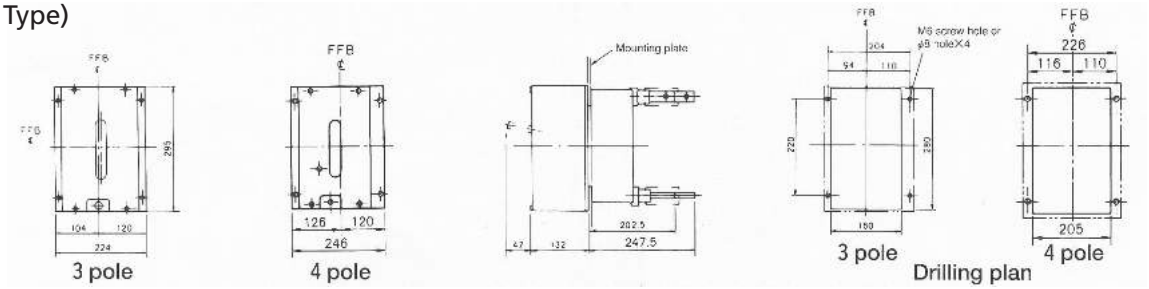
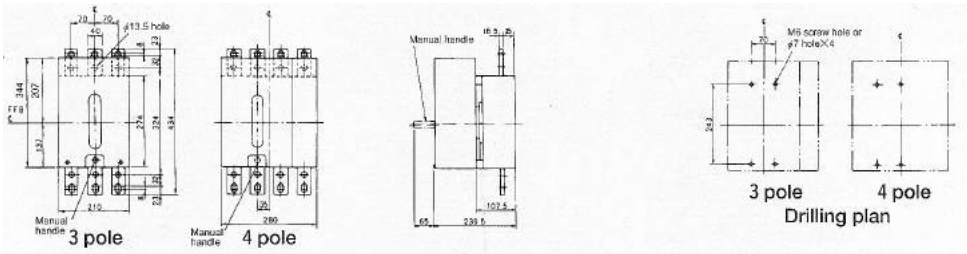


FX600, F-600F
SX600, L-600E
(Standard Type)



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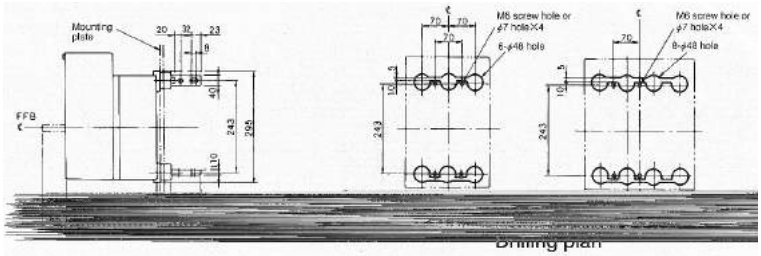

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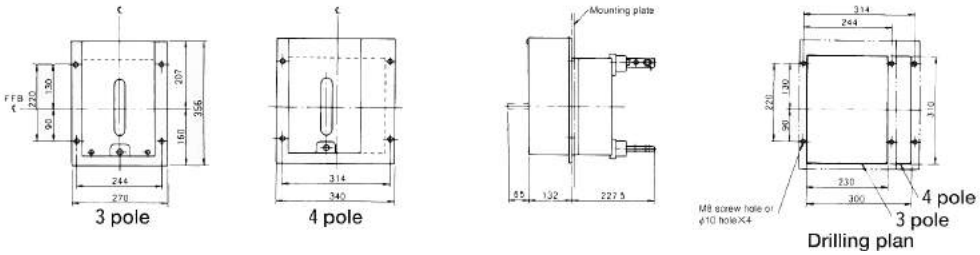
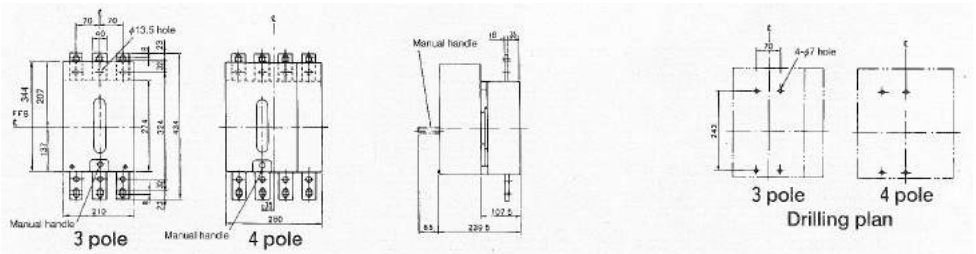


FX800, F-800R
F-800RH, SX800
L-800E
(Standard Type)



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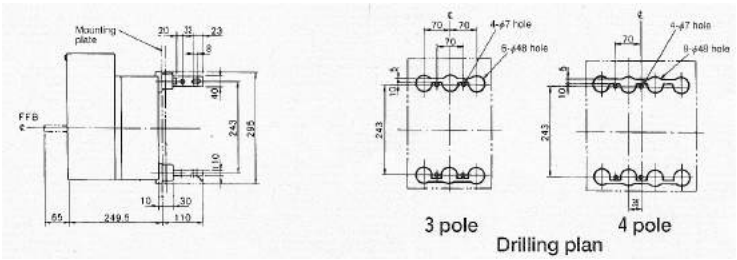

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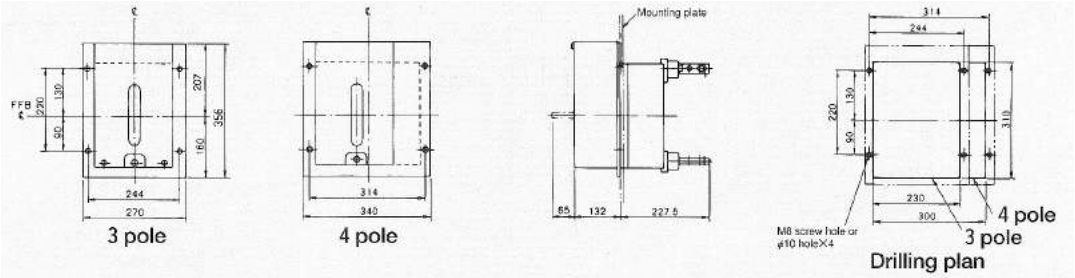
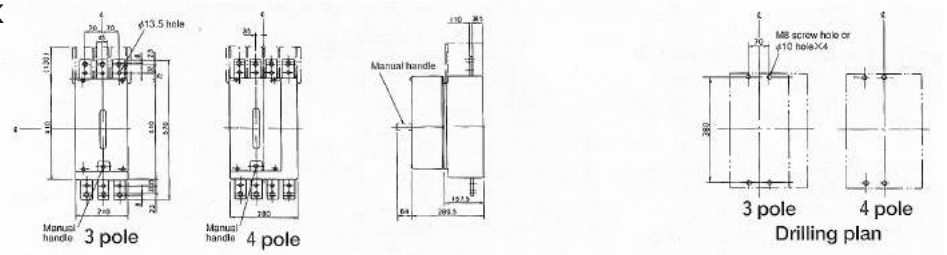


FX1000, F-1000K
(Standard Type)



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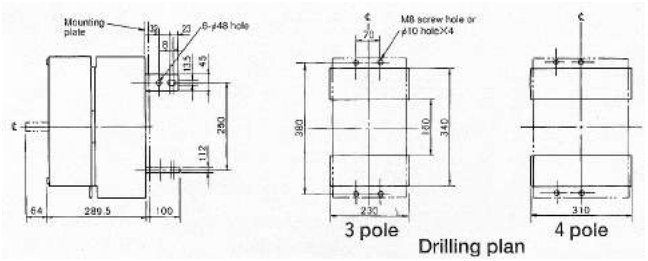

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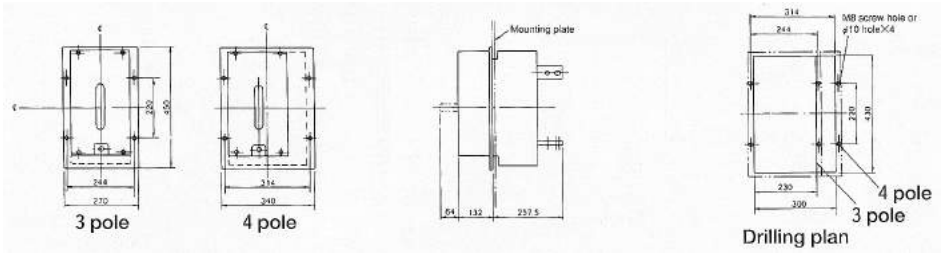
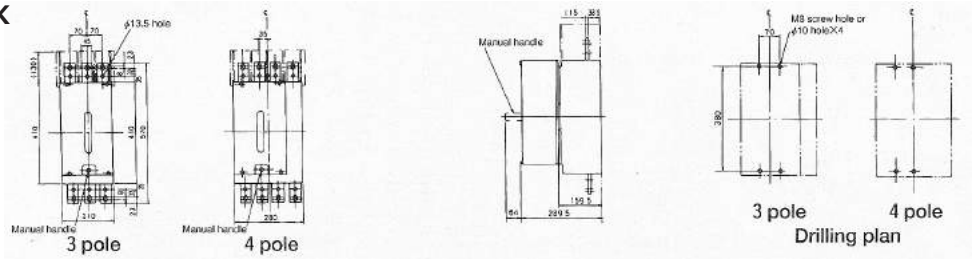


FX1200, F-1200K
(Standard Type)



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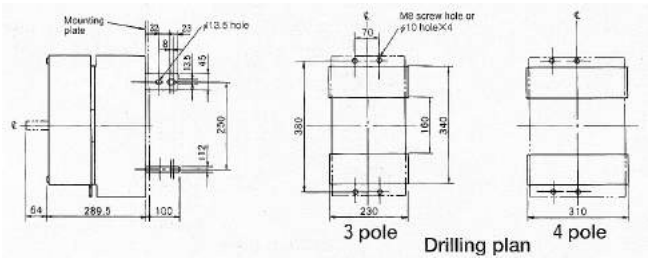

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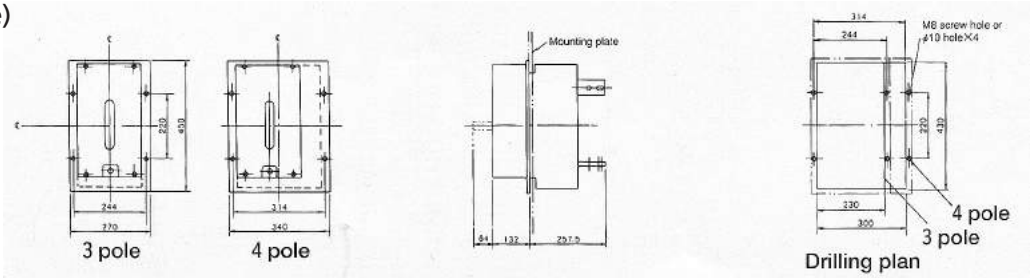
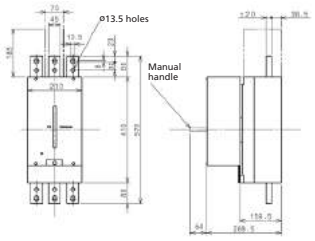
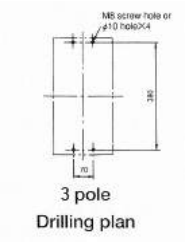


F-1600B, F-1600CB
(Standard Type)





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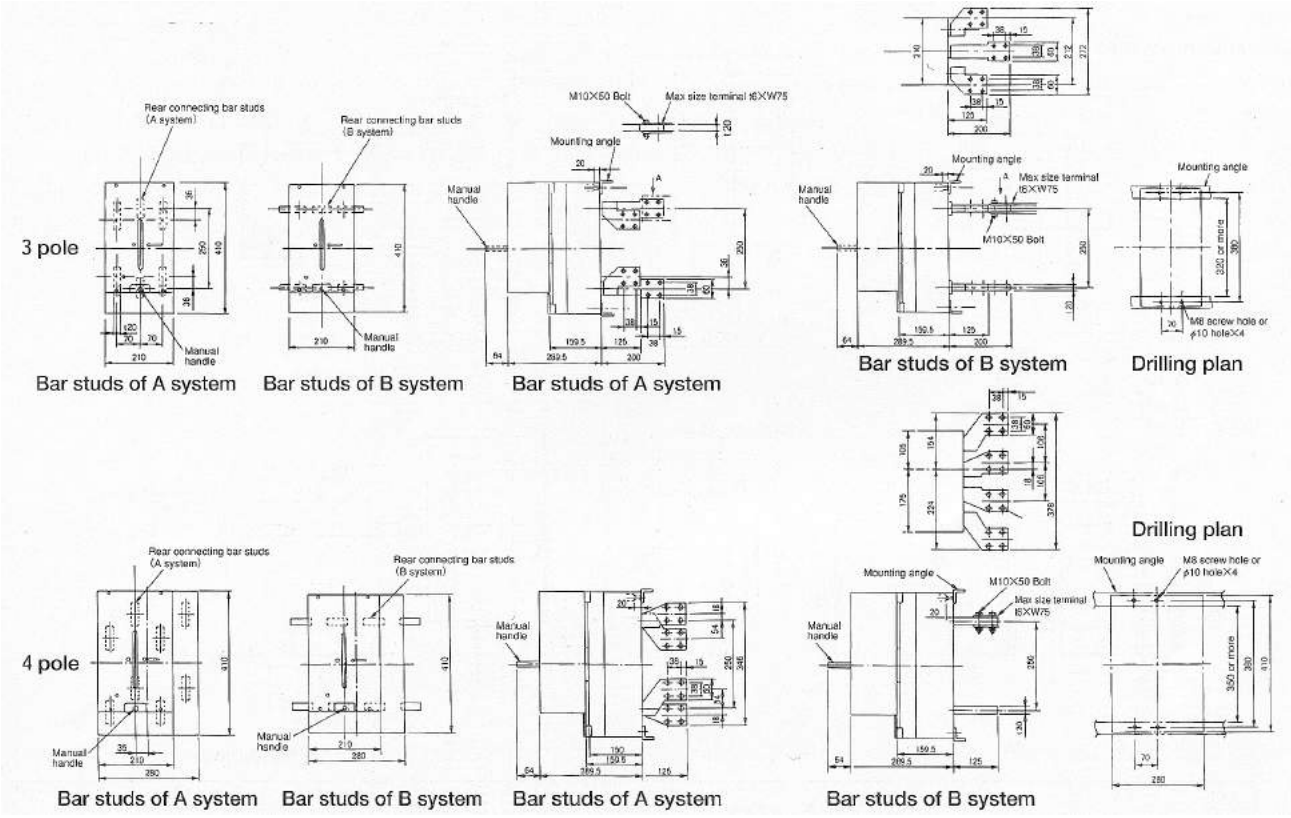

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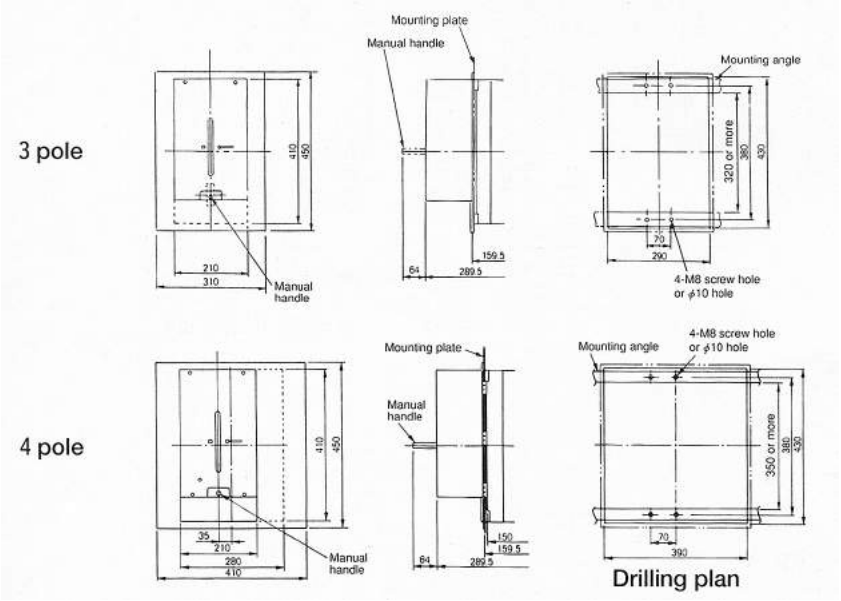


8. Terminal Cover (TMC)

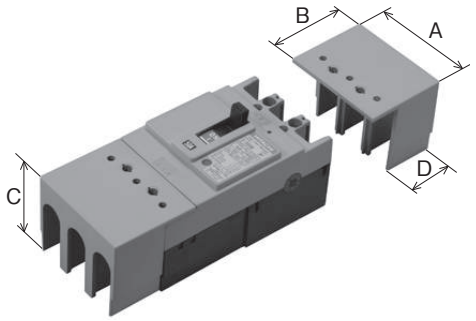
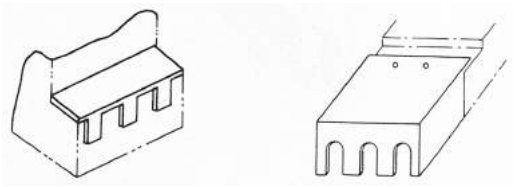


Fig. 29



TMC-0G

All Types
(Excepting TMC-0G)

Fig. 30 Shape of Terminal Cover

Types	Applicable breakers	Dimensions				Remarks
		A	B	C	D	
TMC-0G	S-30E, S-50EB	75 (50)	19.5	56	5	
TMC-1	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 FXK250-S, FX-250-H	105	79	53	50	
TMC-4JS		105	28	51	5	Short type
TMC-4H	F-250FB, F-250KC	105	71	99	40	
TMC-5B	L-225E, S-400S, F-400FB, L-400E	147	147	99	110	
TMC-5D	S-600S, F-600F, L-600E, SX600, FX600, S-800S, F-800R, F-800RH, L-800E, SX800, FX800	210	154	91.5	129	
TMC-6	F-1000K, F-1200K	210	159	145	130	
TMC-6B	FX1000, FX1200	210	159	138.5	130	

Remarks Dimensions with ( ) are for 2-pole types

Terminal Cover (BTC)

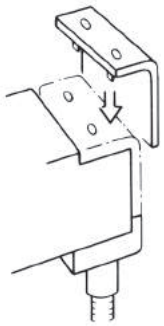


Fig. 31

Types	Applicable FFB Type
BTC-1	F-30FB, S-50SB, S-60RB, F-60RB, S-100EB, S-100SB
BTC-2C	S-100S, F-100S, 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.

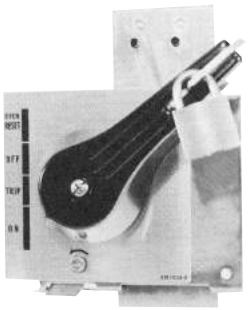
■ Door Interlock

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



(with padlock)

Fig. 32

■ Dimension of HA Type Handle (3P)

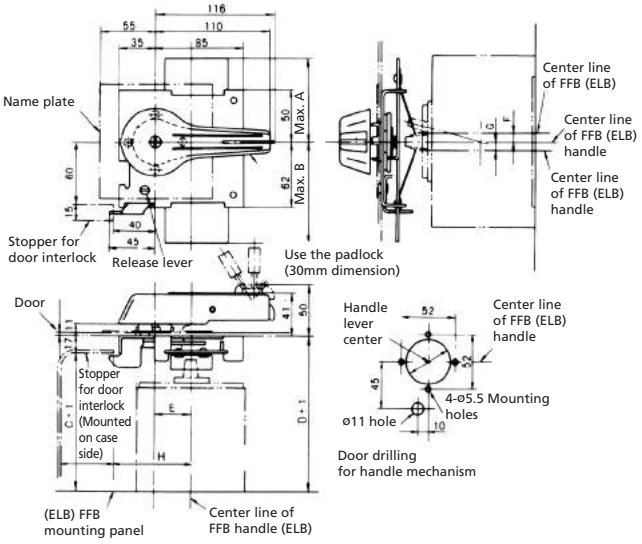


Fig. 33-1

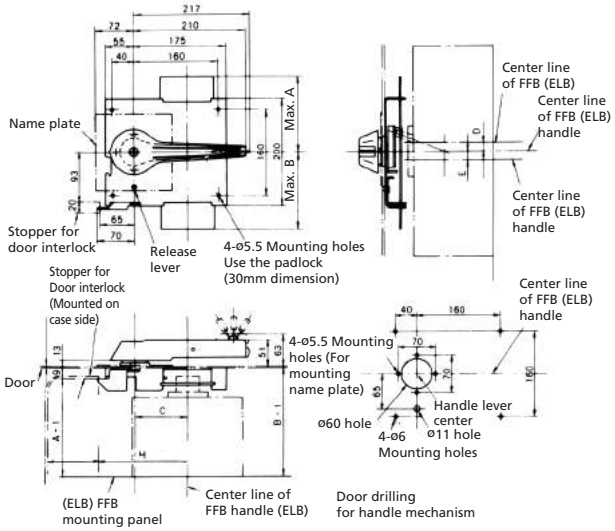
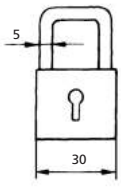


Fig. 33-2

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	Fig.33-1	102	115	110	127	35	—	—	75
	L-50E, L-100E		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)

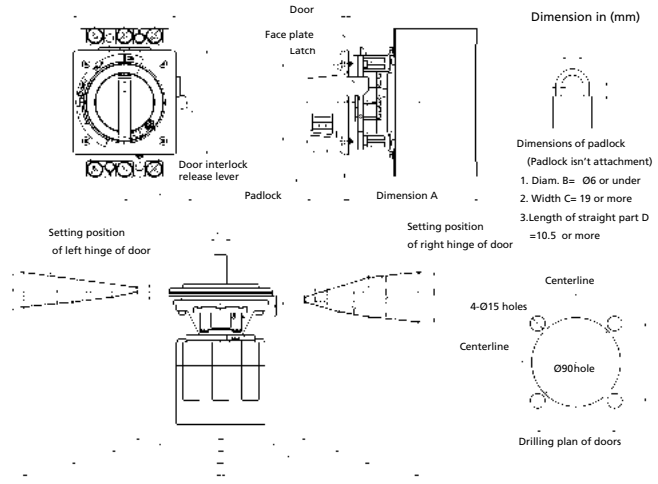


Fig. 36-1

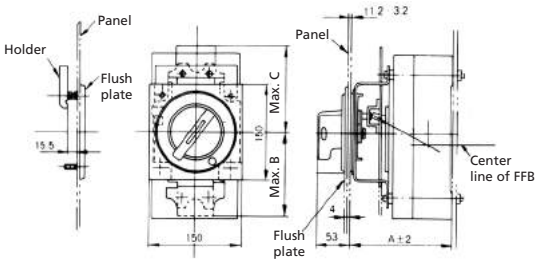


Fig. 36-2

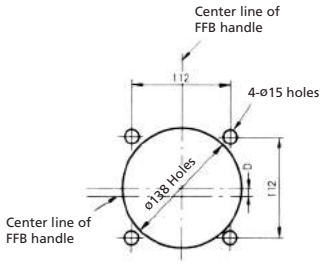
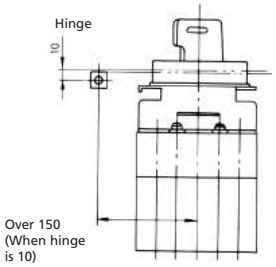
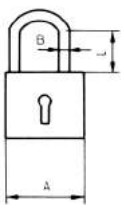


Fig. 36-3



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

■ Padlock



L: Straight length

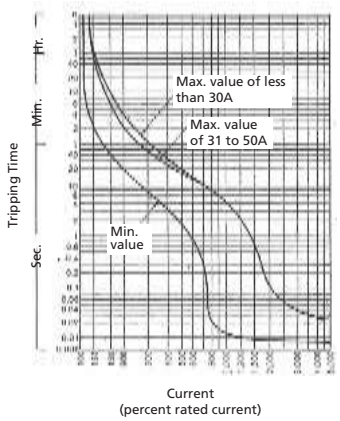
(Padlock is not attached as standard)

Fig. 37

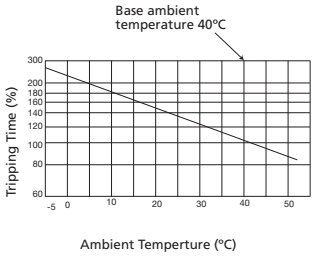
■ Padlock Dimension

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

S-30S/S-50E

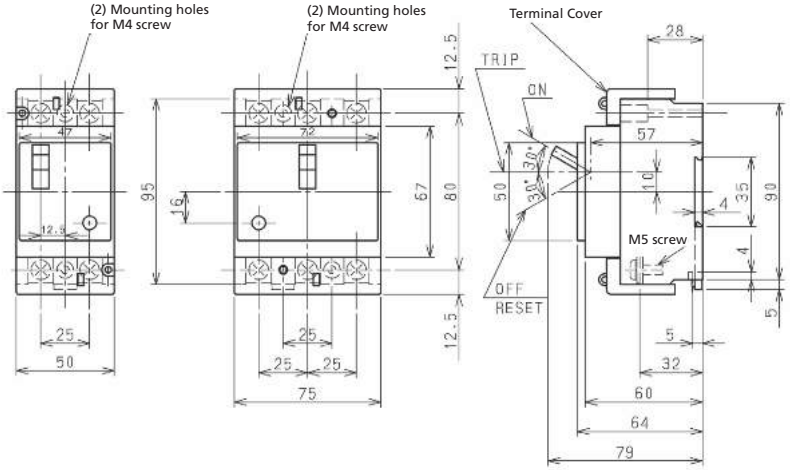


Overcurrent Tripping Characteristic Curve

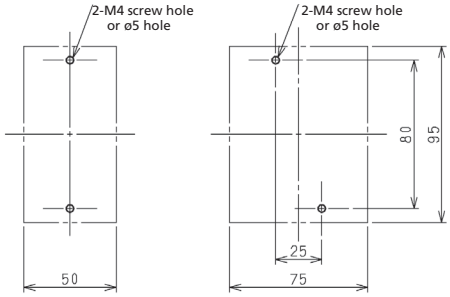


Temperature Compensation Curve

■ Dimensions



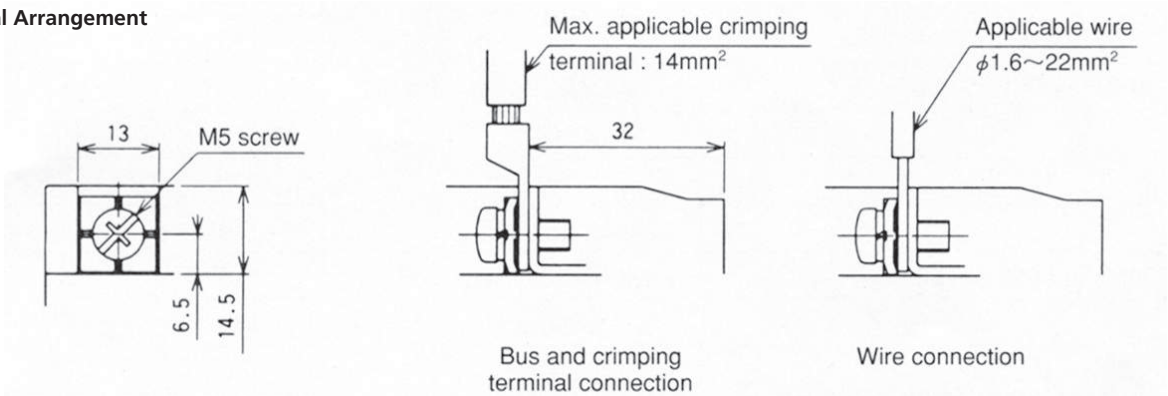
■ Drilling Plan



2 pole 3 pole

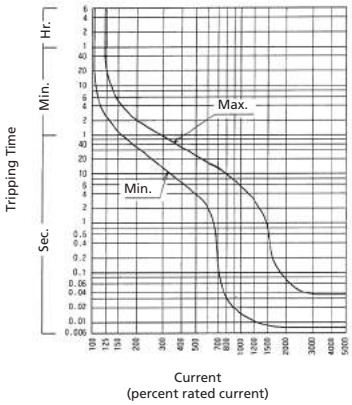
For front mounting bolts

■ Terminal Arrangement

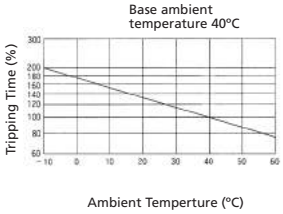


S-30E/S-50EB

(MS-30E/MS-50EB)

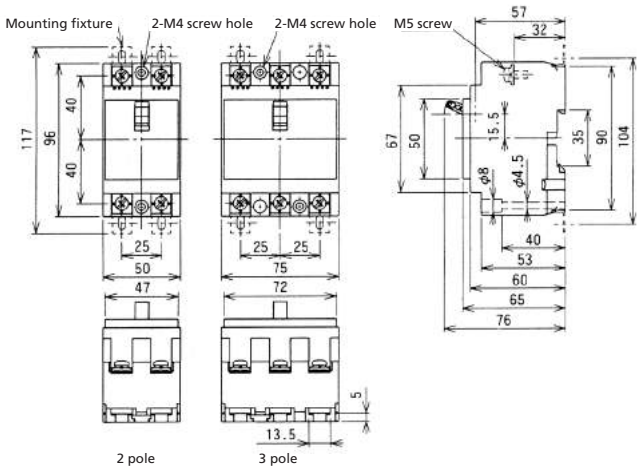


Overcurrent Tripping Characteristic Curve

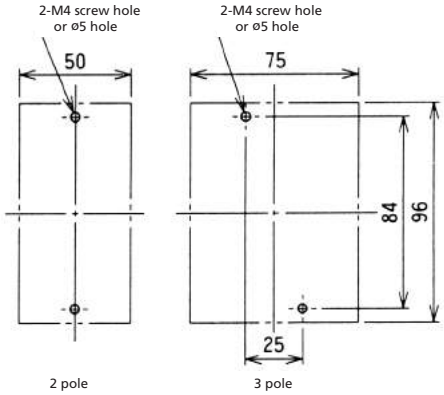


Temperature Compensation Curve

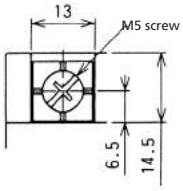
■ Dimensions

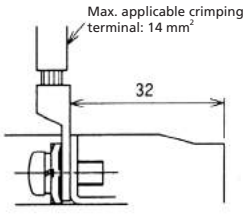


■ Drilling Plan

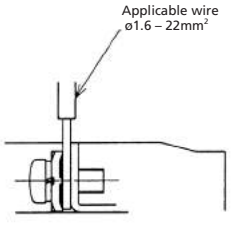


■ Terminal Arrangement

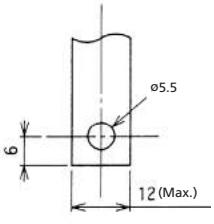




Bus and crimping terminal connection

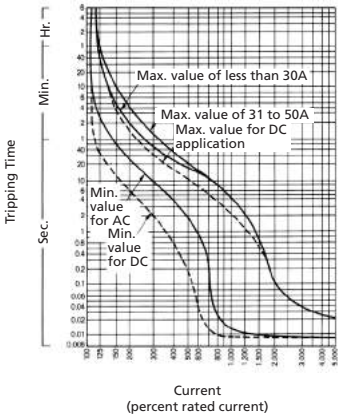


Wire connection

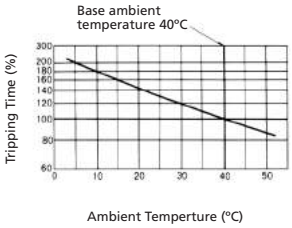


Manufacturing of terminal (Max. 14)

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

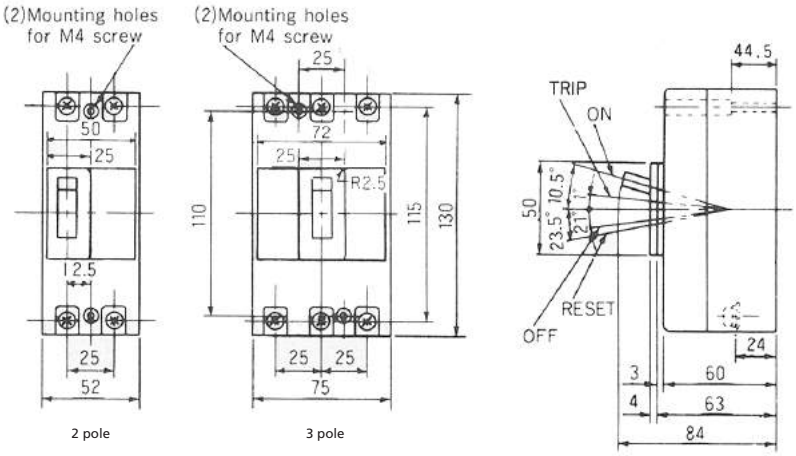


Overcurrent Tripping Characteristic Curve

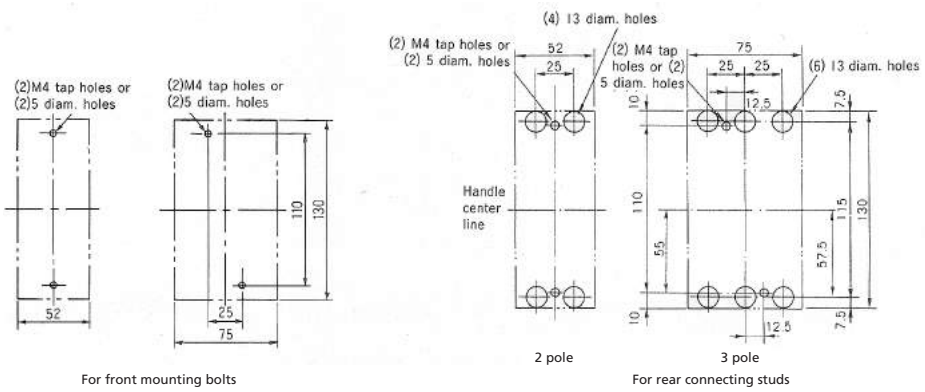


Temperature Compensation Curve

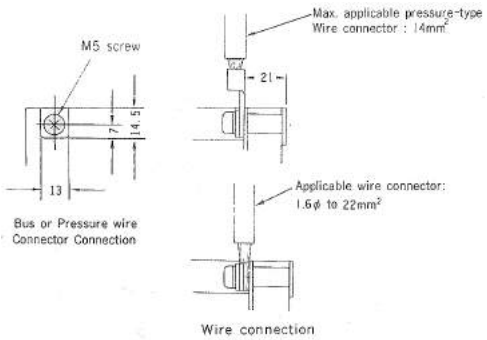
■ **Dimensions**



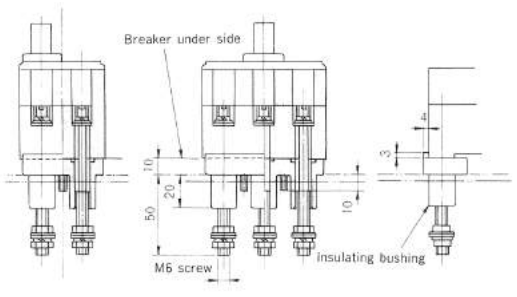
■ **Drilling Plan**



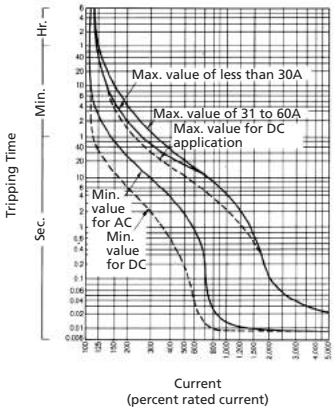
■ **Terminal Arrangement**



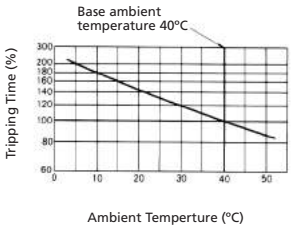
■ **For Rear Connecting Studs**



F-60RB
S-60RB

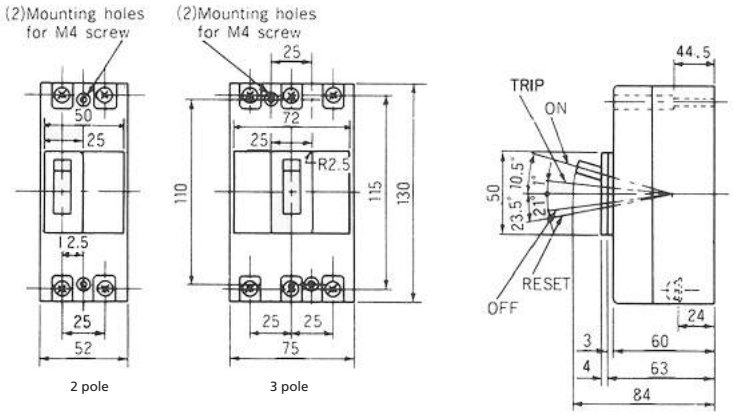


Overcurrent Tripping Characteristic Curve

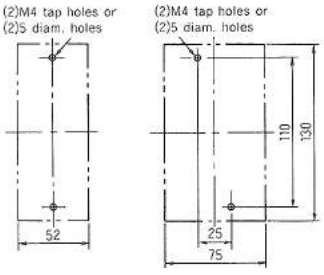


Temperature Compensation Curve

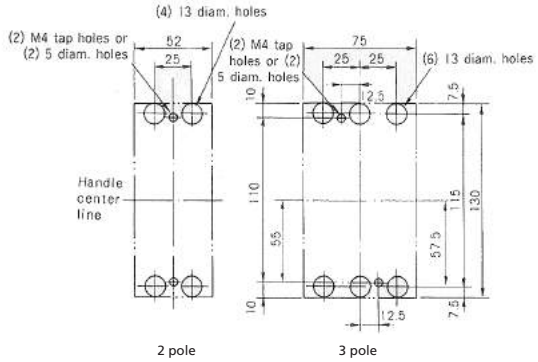
■ Dimensions



■ Drilling Plan

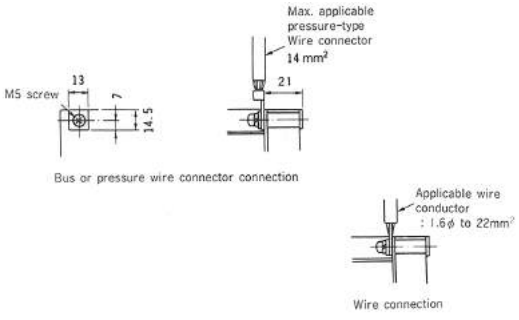


For front mounting bolts

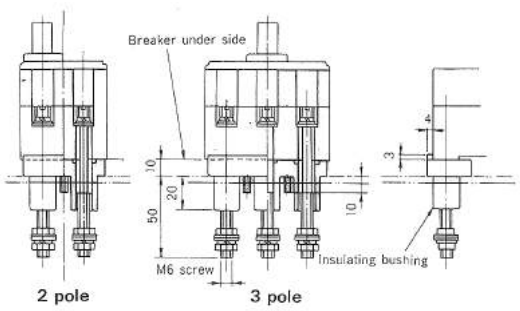


For rear connecting studs

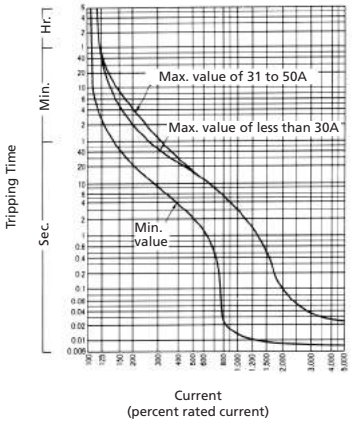
■ Terminal Arrangement



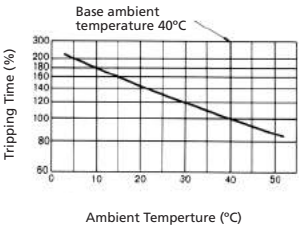
■ For Rear Connecting Studs



L-50E

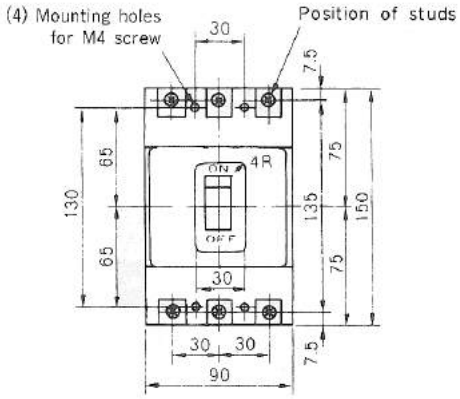


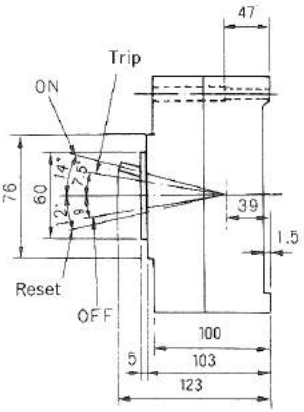
Overcurrent Tripping Characteristic Curve



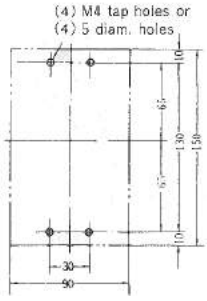
Temperature Compensation Curve

■ Dimensions

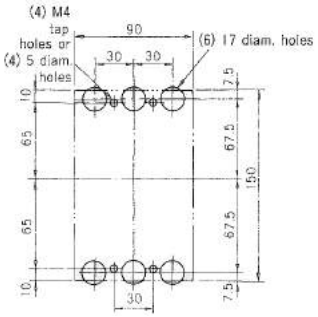




■ Drilling Plan

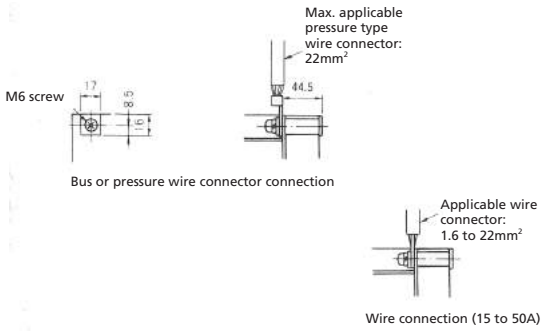


3 pole
For front mounting bolts

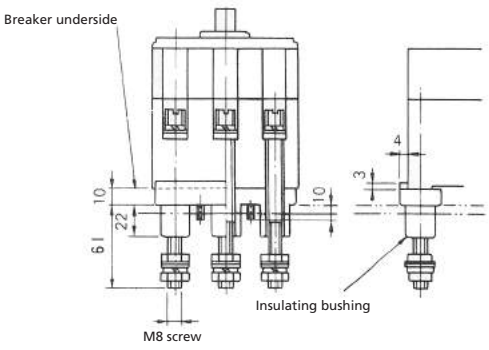


3 pole
For rear connecting studs

■ Terminal Arrangement



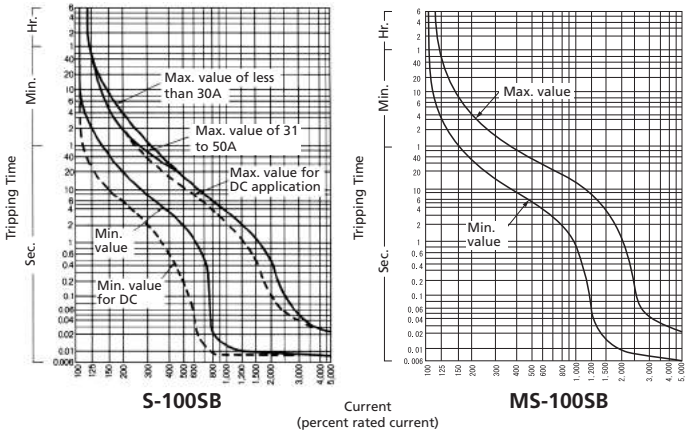
■ For Rear Connecting Studs



3 pole

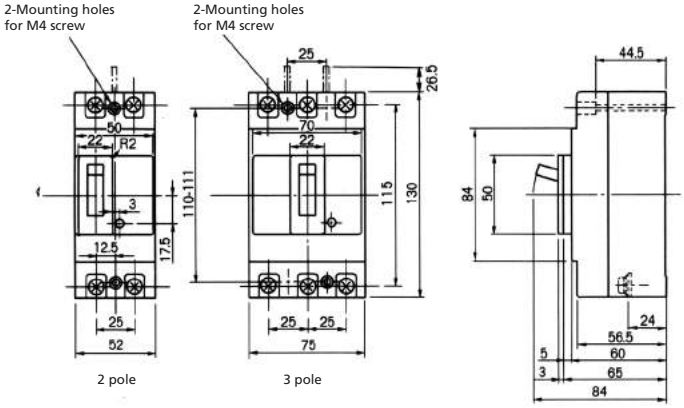
S-100EB/S-100SB

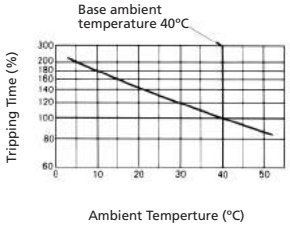
(MS-100SB)



Overcurrent Tripping Characteristic Curve

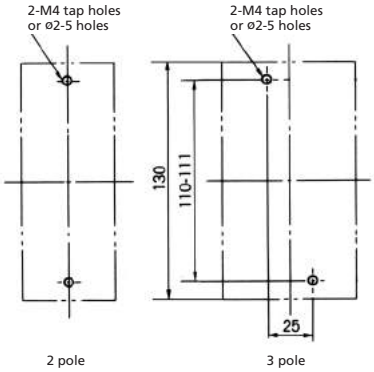
■ Dimensions

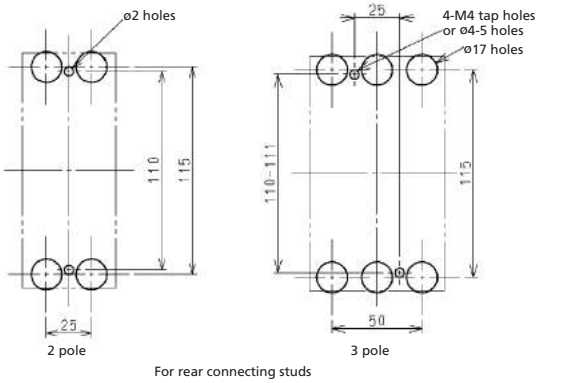




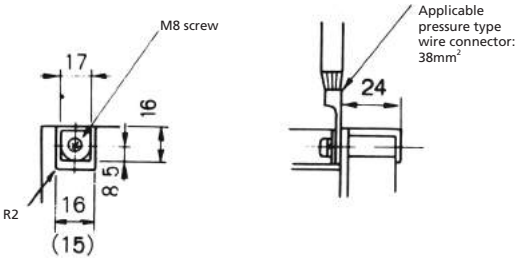
Temperature Compensation Curve

■ Drilling Plan

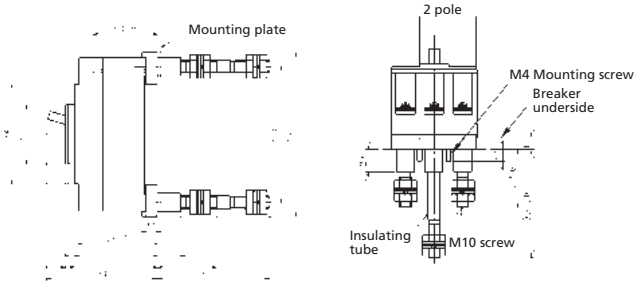




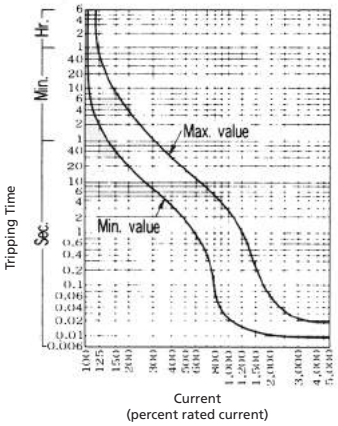
■ Terminal Arrangement



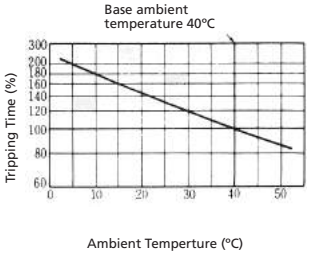
■ For Rear Connecting Studs



S-100S

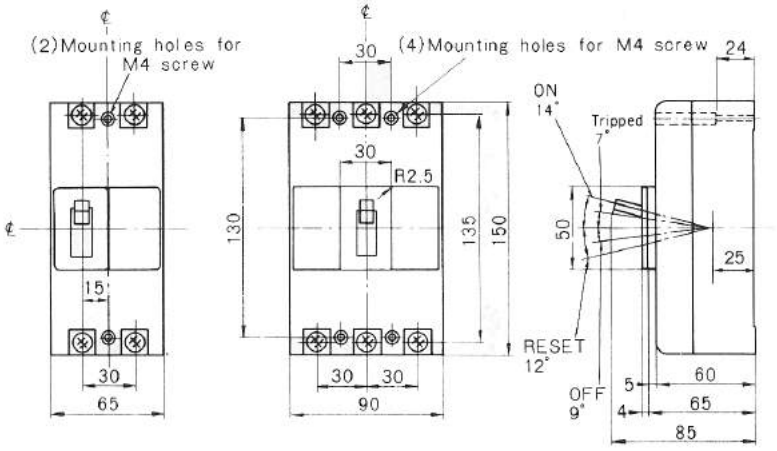


Overcurrent Tripping Characteristic Curve

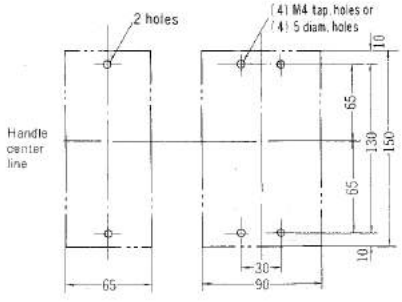


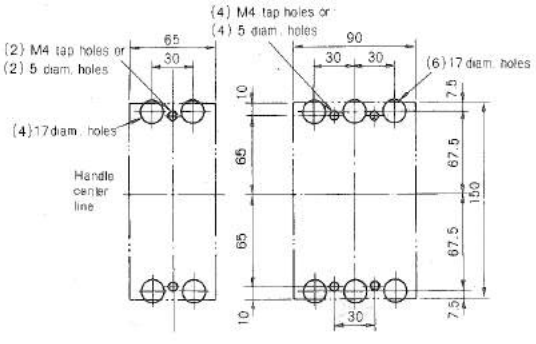
Temperature Compensation Curve

■ Dimensions

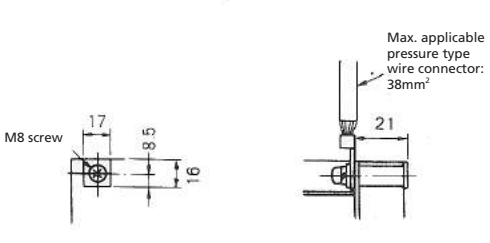


■ Drilling Plan

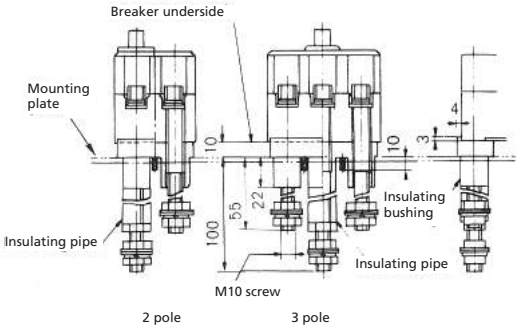




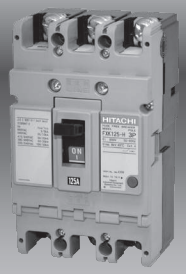
■ Terminal Arrangement

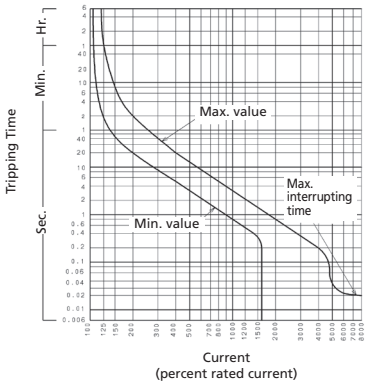


■ For Rear Connecting Studs

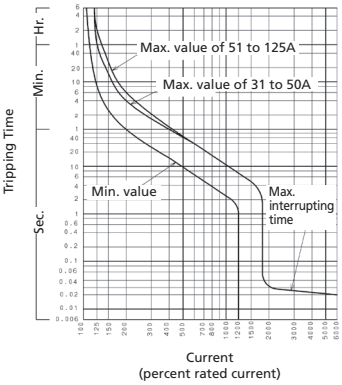


FXK125-S/FXK125-H (MFXK100-S)



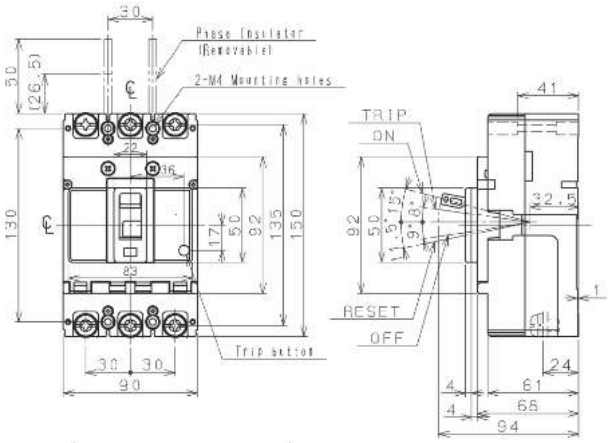


Overcurrent Tripping Characteristic Curve (15-30A)

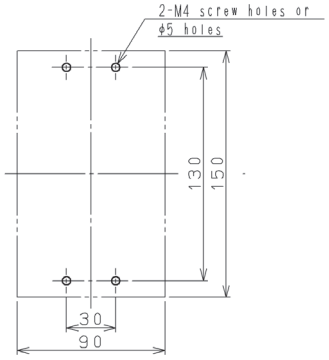


Overcurrent Tripping Characteristic Curve (31-125A)

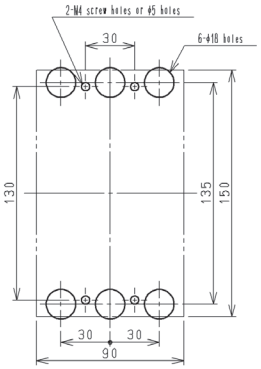
■ Dimensions



■ Drilling Plan

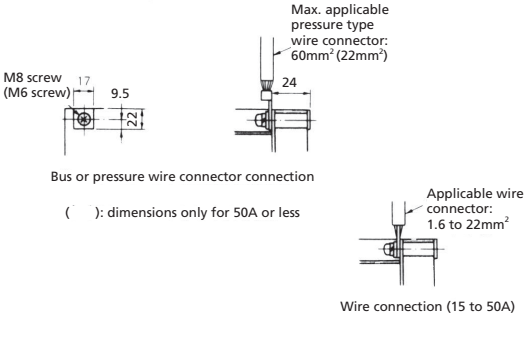


For front mounting bolts

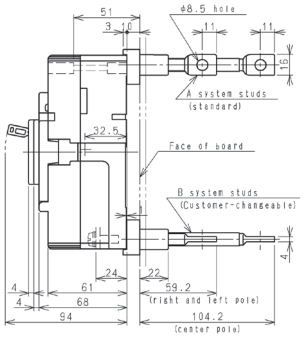


For rear connecting studs

■ Terminal Arrangement

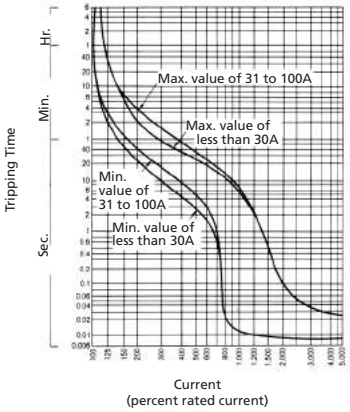


■ For Rear Connecting Studs

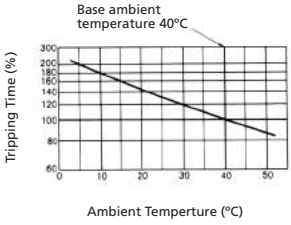


Dimensions are only for 60A to125A

L-100E

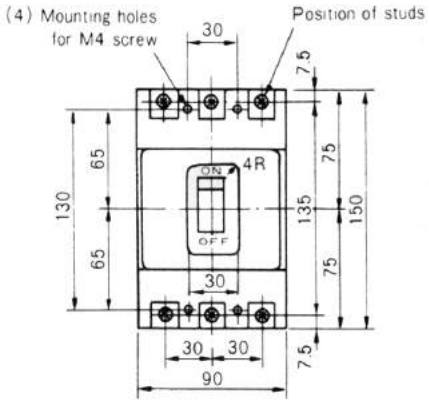


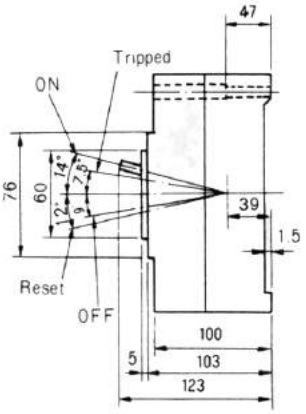
Overcurrent Tripping Characteristic Curve



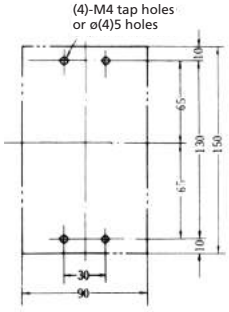
Temperature Compensation Curve

■ Dimensions

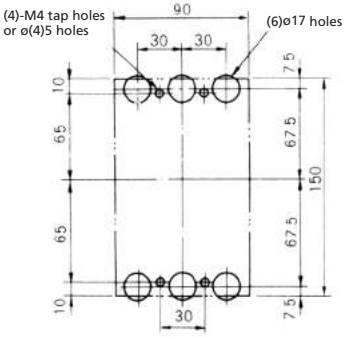




■ Drilling Plan

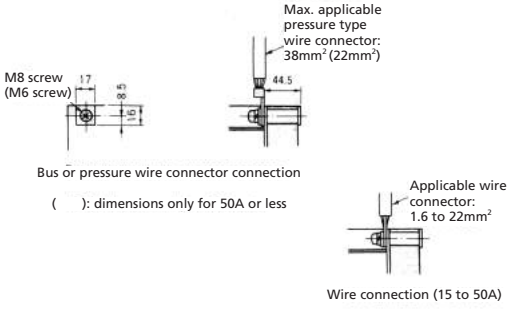


3 pole
For front mounting bolts

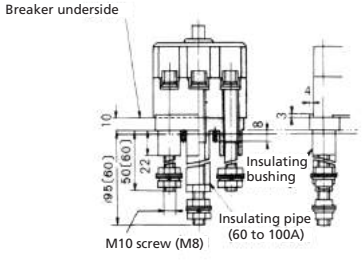


3 pole
For rear connecting studs

■ Terminal Arrangement

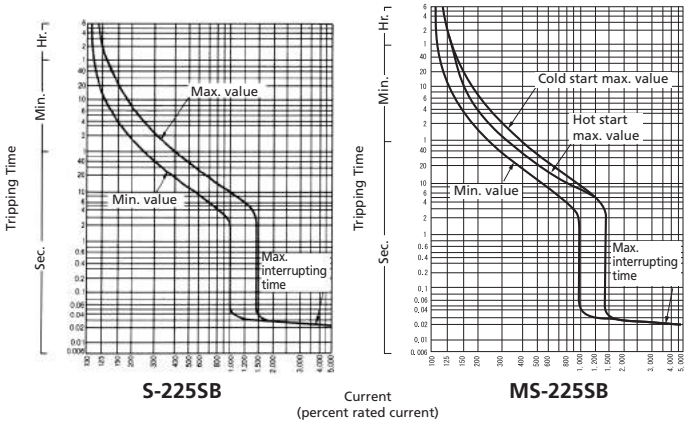


■ For Rear Connecting Studs



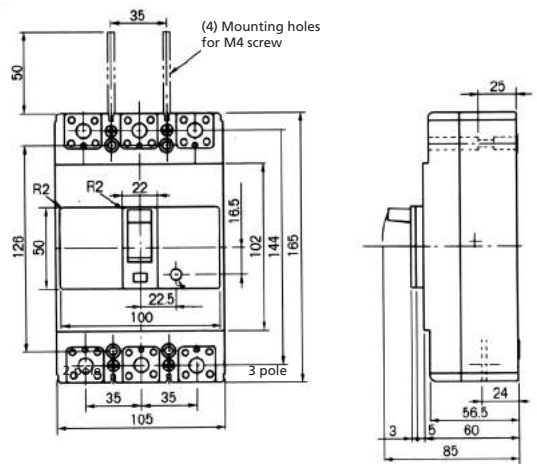
3 pole
( ): dimensions only for 50A or less

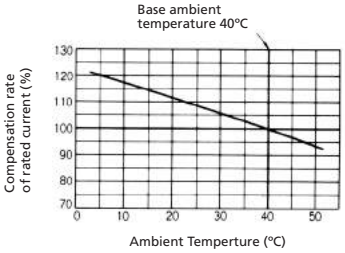
S-225SB
(MS-225SB)



Overcurrent Tripping Characteristic Curve

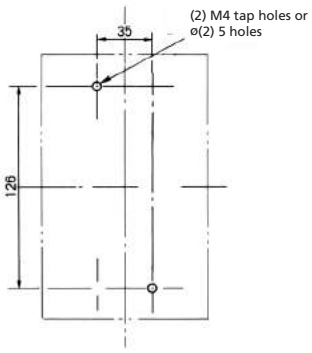
■ **Dimensions**



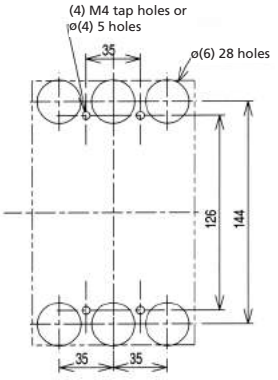


Temperature Compensation Curve

■ **Drilling Plan**



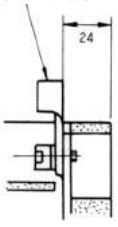
For front mounting bolts



For rear connecting studs

■ **Terminal Arrangement**

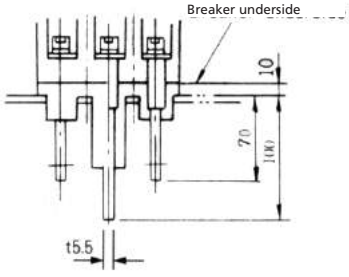
Maximum applicable pressure type-wire connector = 60mm²
Special pressure type wire connector is attached for 175 – 225A as shown on the right table

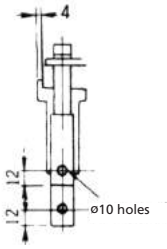


Pressure type wire connector directly connected

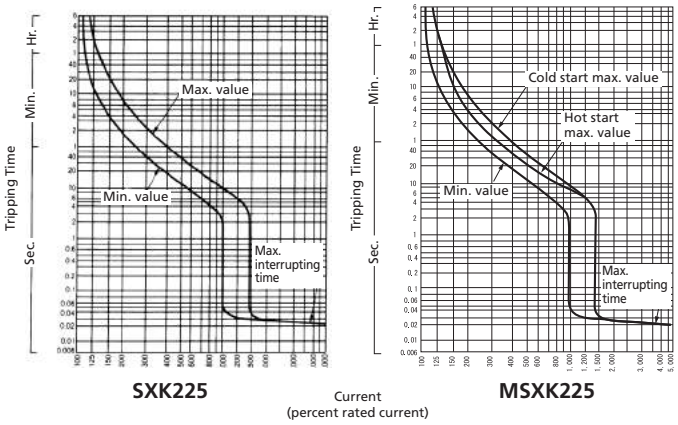
Rated current (A)	Applicable wire size of pressure type wire connector (mm²)
175 – 225	Pressure type wire connector 80, 100, 125 (mm)

■ **For Rear Connecting Studs**



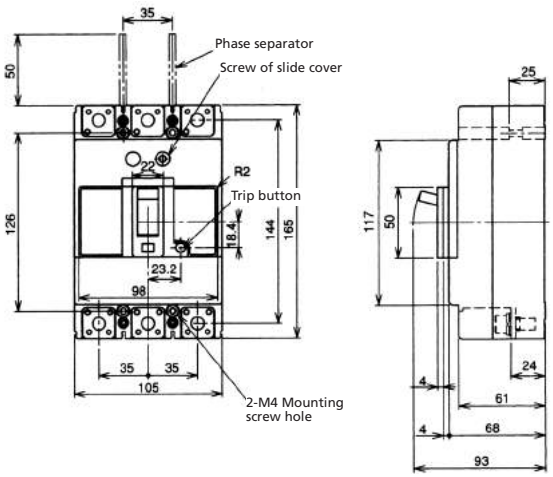


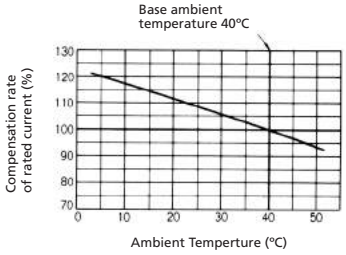
SXK225
(MSKX225)



Overcurrent Tripping Characteristic Curve

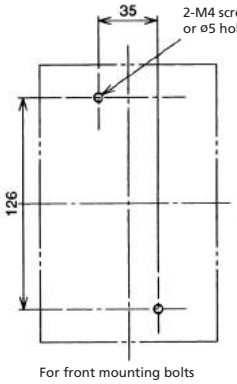
■ **Dimensions**



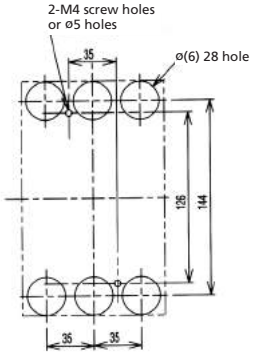


Temperature Compensation Curve

■ **Drilling Plan**



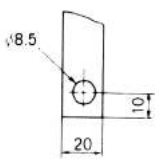
For front mounting bolts



For rear connecting studs

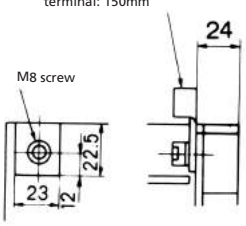
■ **Terminal Arrangement**

Terminal Arrangement



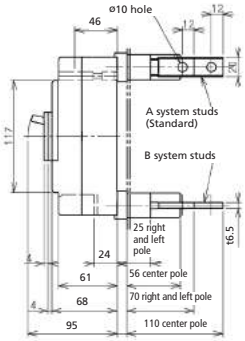
Manufacturing of terminal

Max. applicable crimping terminal: 150mm²

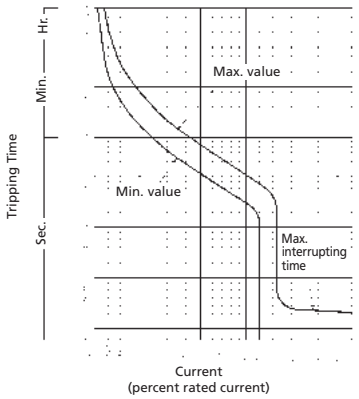


Crimping terminal directly connected

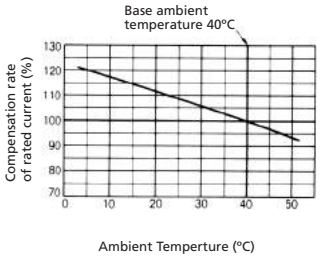
■ **For Rear Connecting Studs**



FXK250-S/FXK250-H
(MFXK225-S)

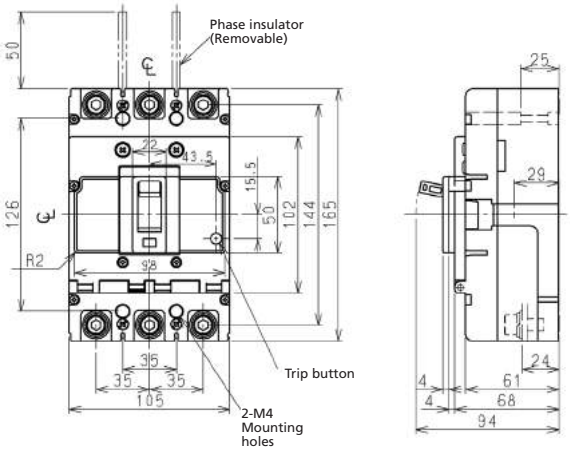


Overcurrent Tripping Characteristic Curve

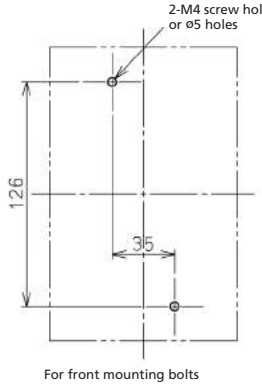


Temperature Compensation Curve

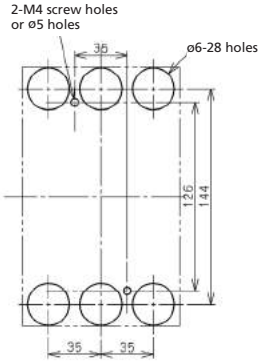
■ Dimensions



■ Drilling Plan



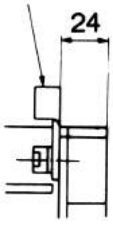
For front mounting bolts



For rear connecting studs

■ Terminal Arrangement

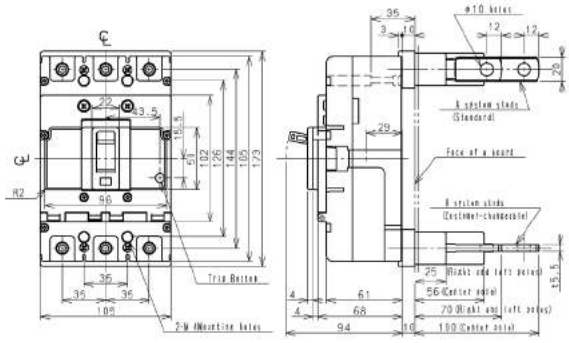
Maximum applicable pressure type-wire connector = 60mm^2
Special pressure type wire connector is attached for 175 – 225A as shown on the right table



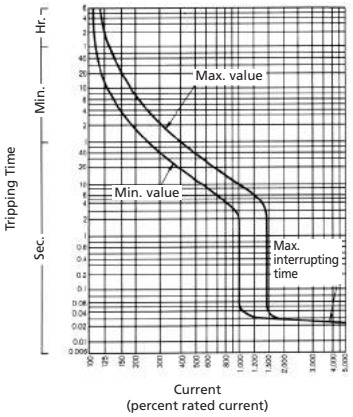
Pressure type wire connector directly connected

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

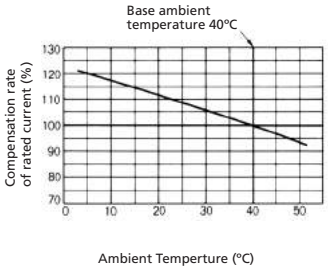
■ For Rear Connecting Studs



L-225E

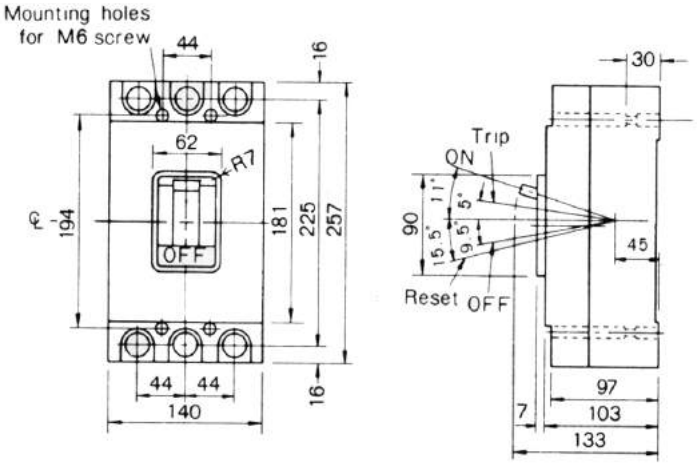


Overcurrent Tripping Characteristic Curve

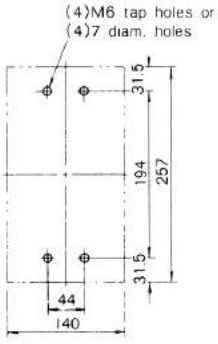


Temperature Compensation Curve

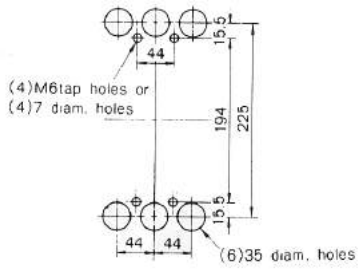
■ Dimensions



■ Drilling Plan

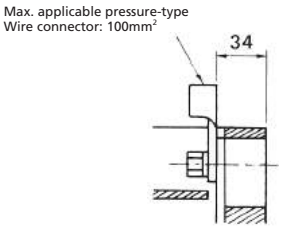


For front mounting bolts



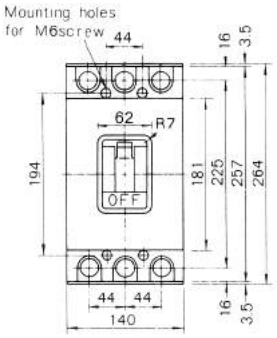
For rear connecting studs

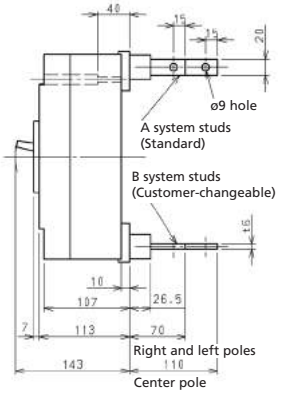
■ Terminal Arrangement



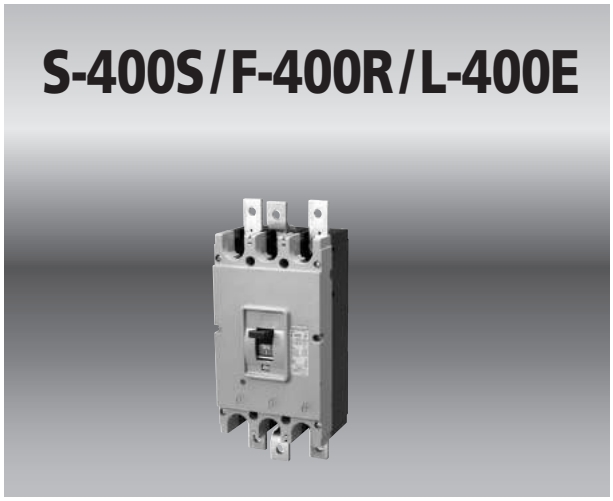
Bus or pressure-type wire connector connection

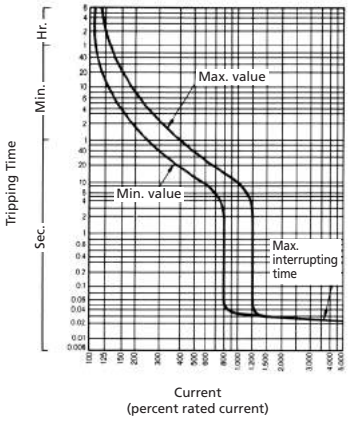
■ For Rear Connecting Studs



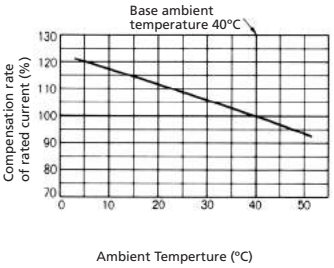


S-400S/F-400R/L-400E



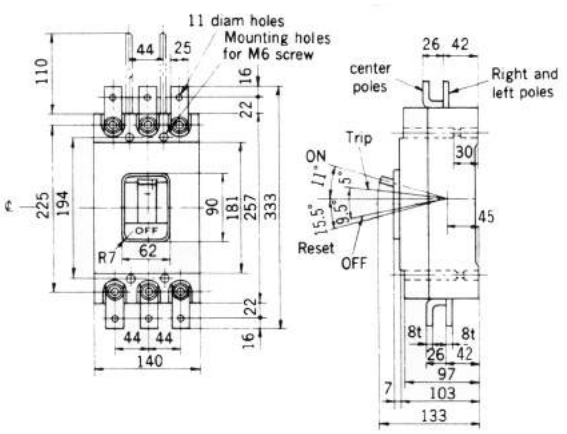


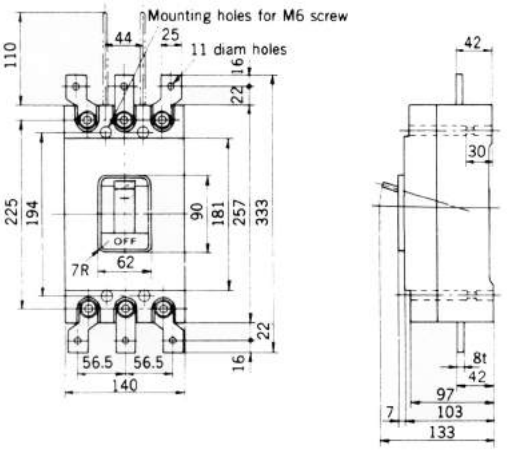
Overcurrent Tripping Characteristic Curve



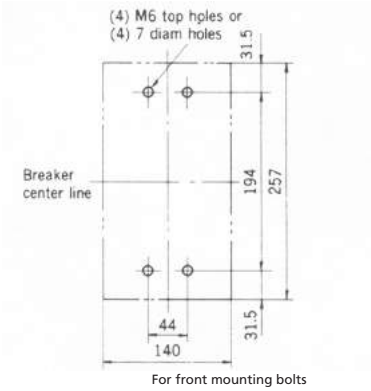
Temperature Compensation Curve

■ Dimensions

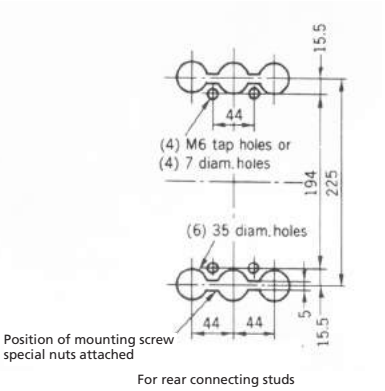




■ Drilling Plan

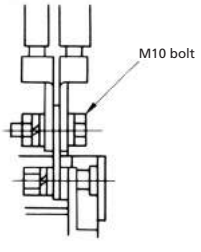


For front mounting bolts



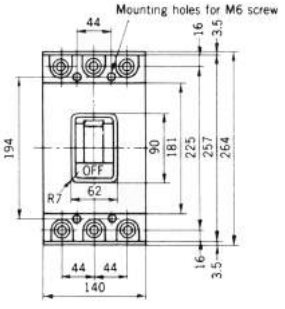
For rear connecting studs

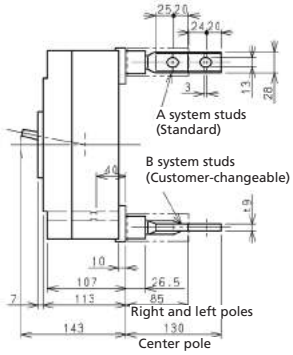
■ For front connection



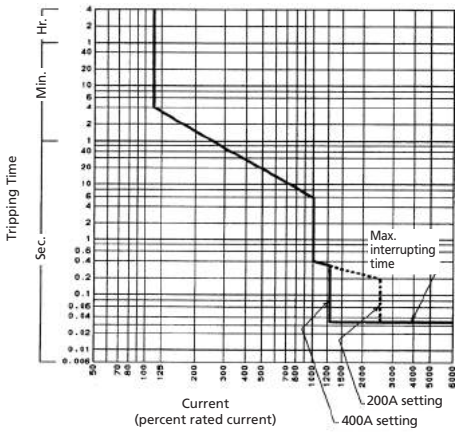
Pressure-type wire connector connection

■ For Rear Connecting Studs



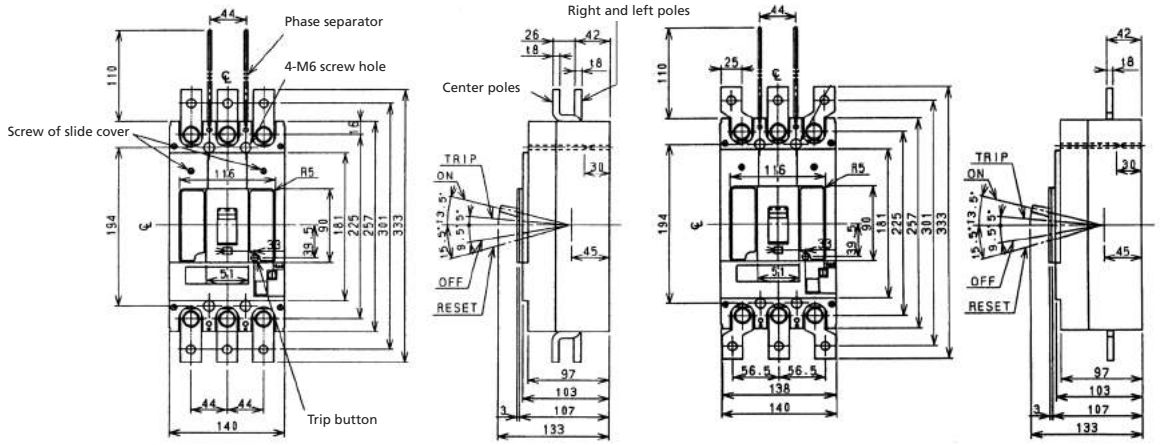


SX400/FX400

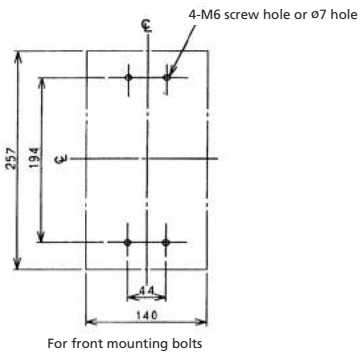


Overcurrent Tripping Characteristic Curve

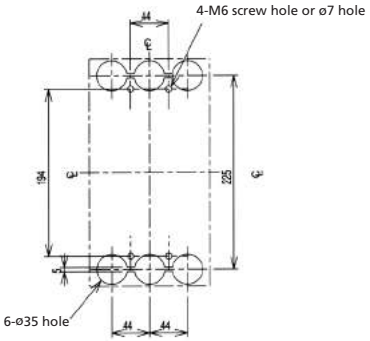
■ Dimensions



■ Drilling Plan

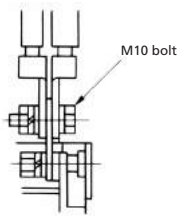


For front mounting bolts



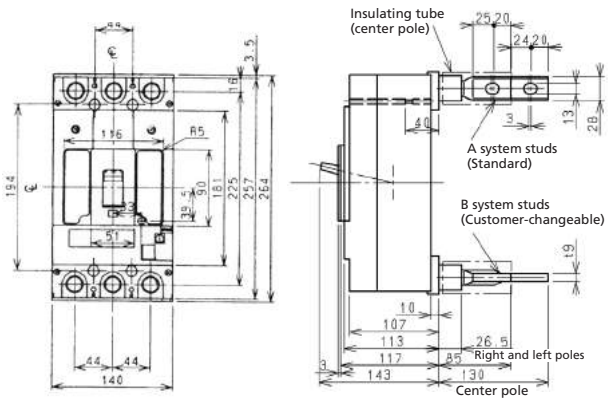
For rear connecting studs

■ Terminal Arrangement

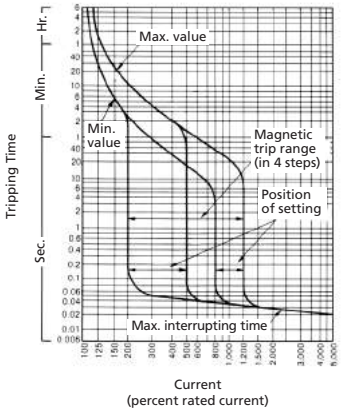


Crimpint terminal connection
(ex. crimping terminal 100mm² x 2 pcs.)

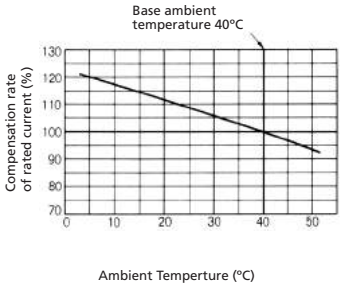
■ For Rear Connecting Studs



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

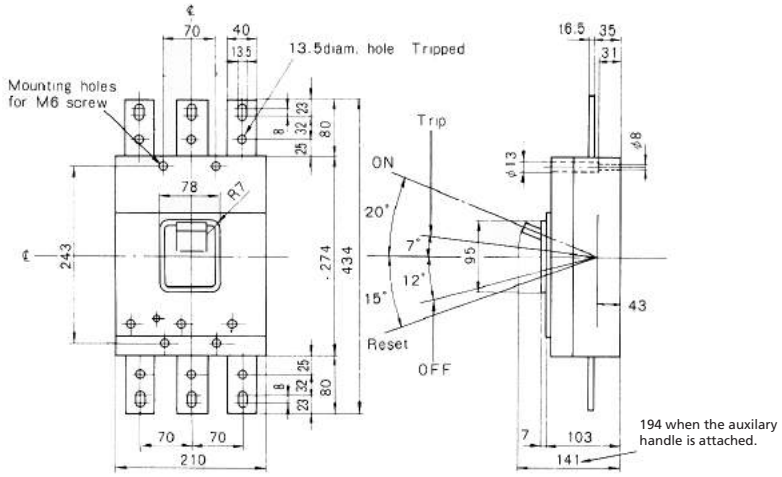


Overcurrent Tripping Characteristic Curve

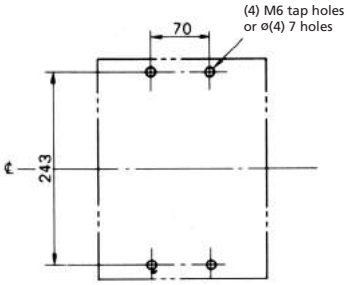


Temperature Compensation Curve

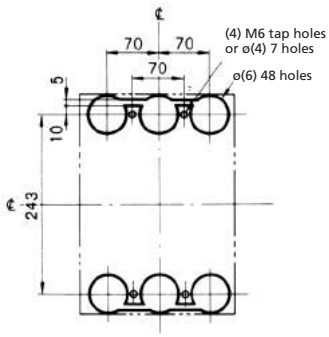
■ Dimensions



■ Drilling Plan

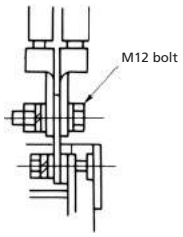


For front mounting bolts



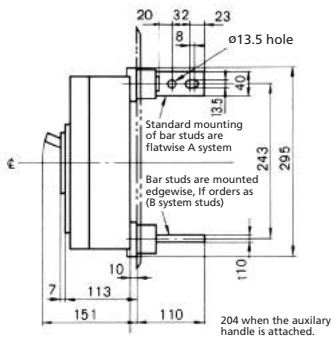
For rear connecting studs

■ For front connection

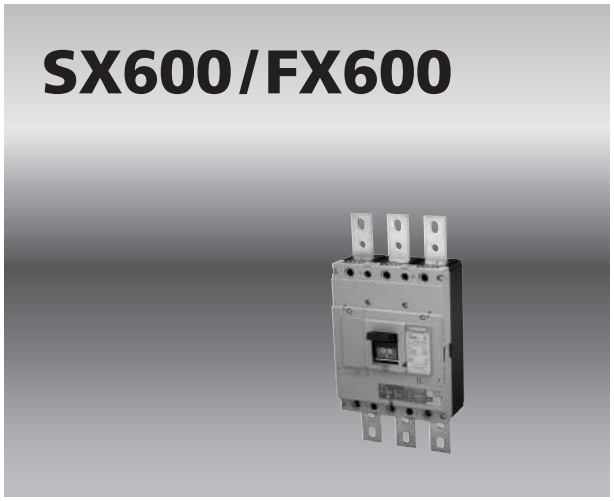


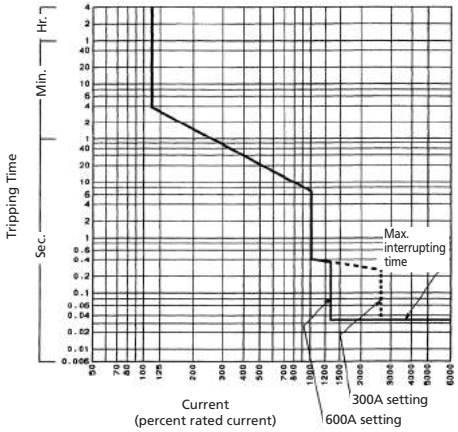
Pressure-type wire connector connection

■ For Rear Connecting Studs



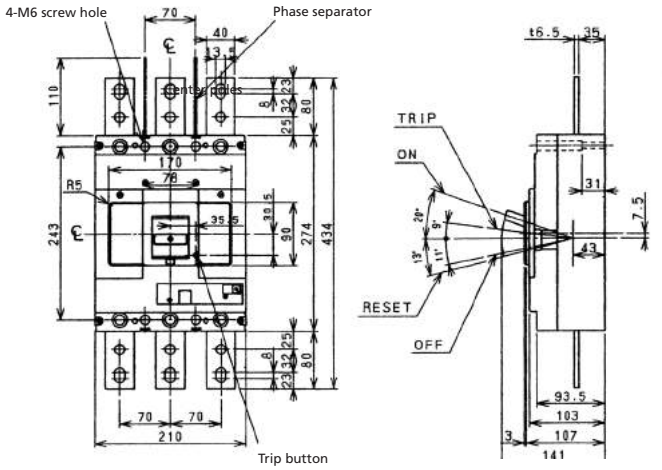
SX600/FX600



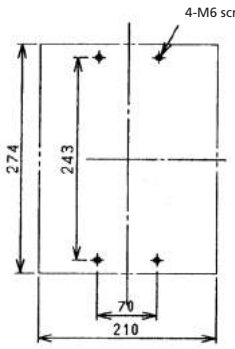


Overcurrent Tripping Characteristic Curve

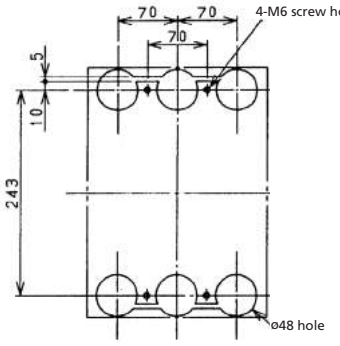
■ Dimensions



■ Drilling Plan

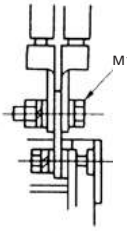


For front mounting bolts



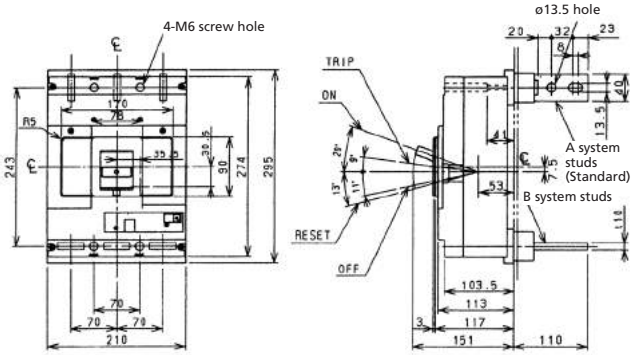
For rear connecting studs

■ Terminal Arrangement

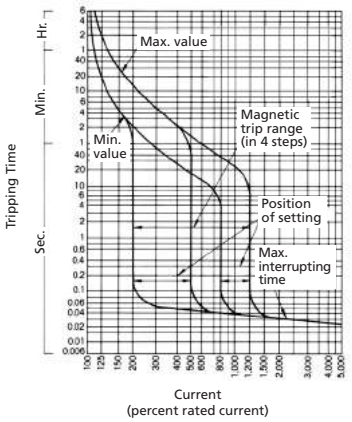


Crimpint terminal connection
(ex. crimping terminal 200mm² x 2)

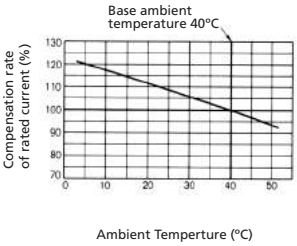
■ For Rear Connecting Studs



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

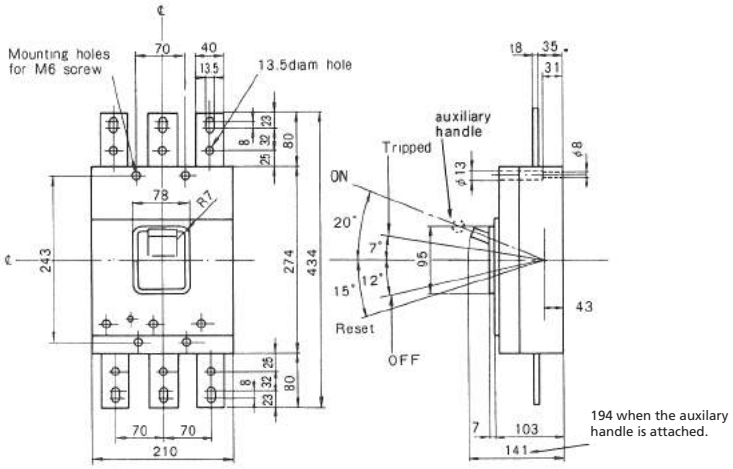


Overcurrent Tripping Characteristic Curve

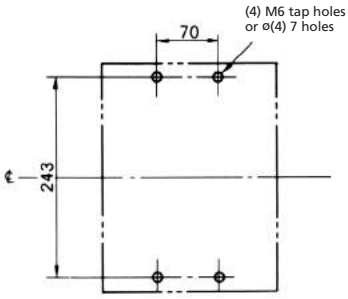


Temperature Compensation Curve

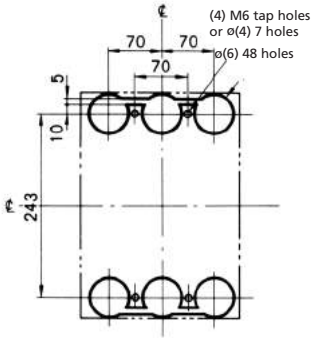
■ Dimensions



■ Drilling Plan

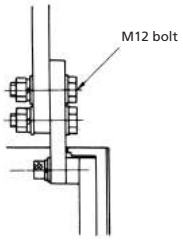


For front mounting bolts

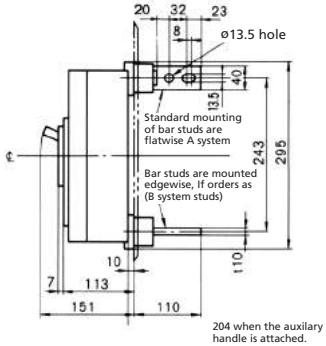


For rear connecting studs

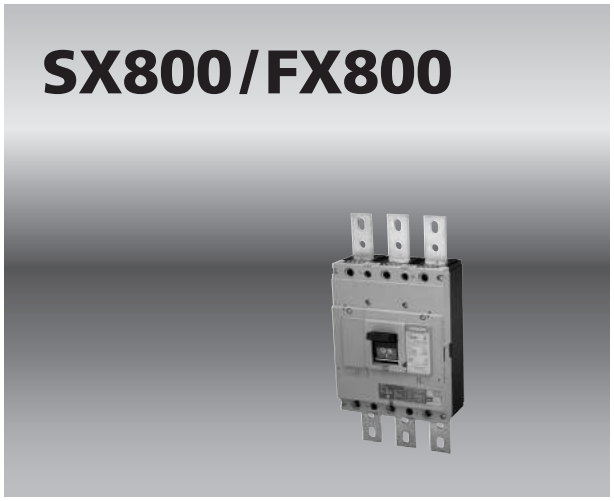
■ For front connection

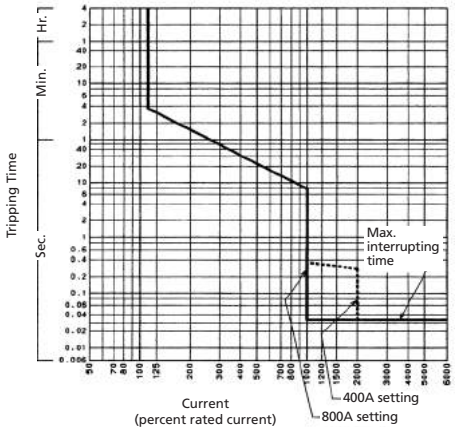


■ For Rear Connecting Studs



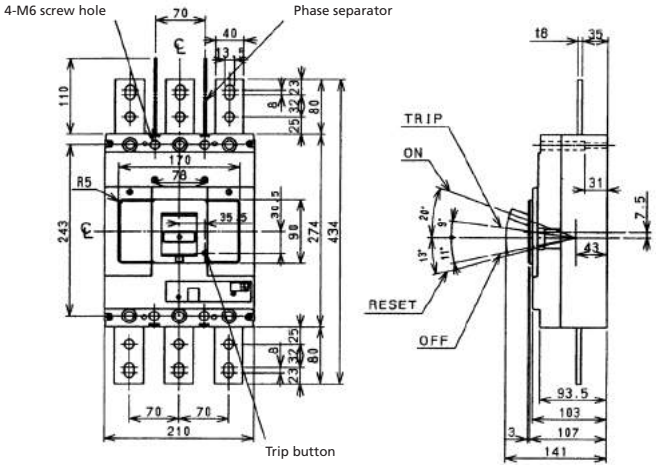
SX800/FX800



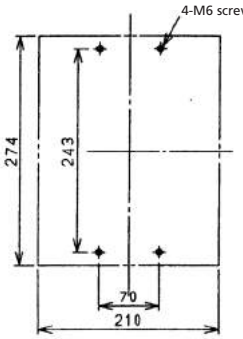


Overcurrent Tripping Characteristic Curve

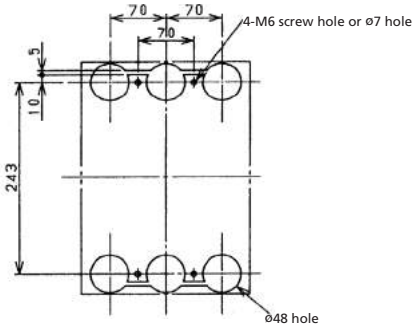
■ Dimensions



■ Drilling Plan

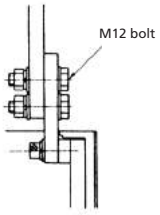


For front mounting bolts

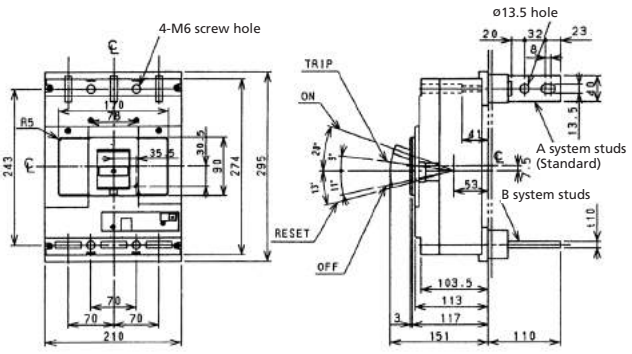


For rear connecting studs

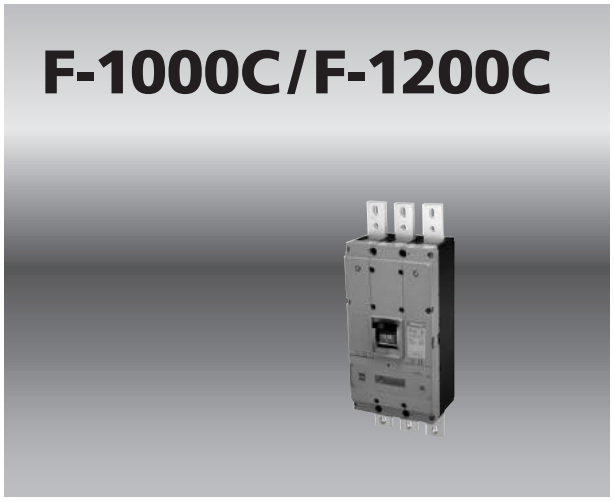
■ Terminal Arrangement

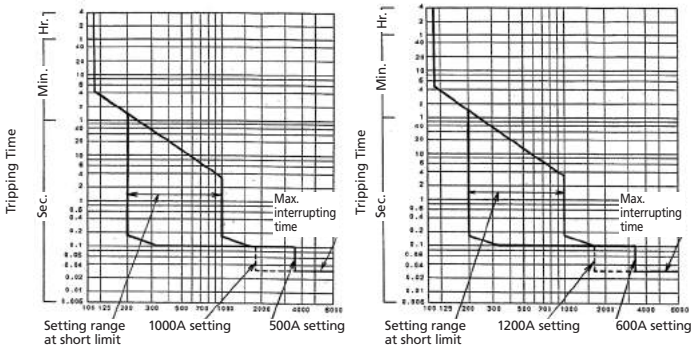


■ For Rear Connecting Studs



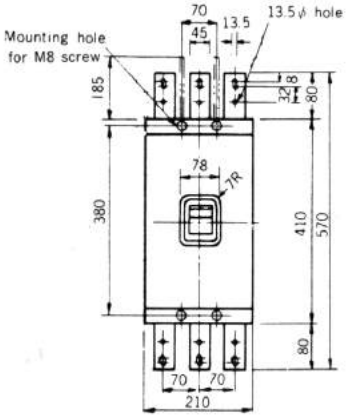
F-1000C/F-1200C

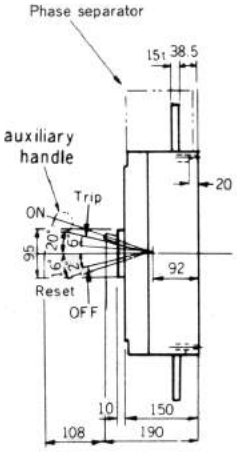




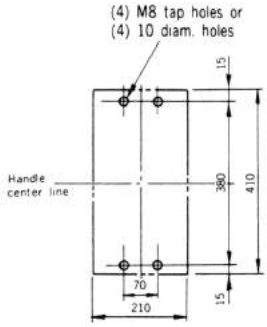
Overcurrent Tripping Characteristic Curve

■ Dimensions

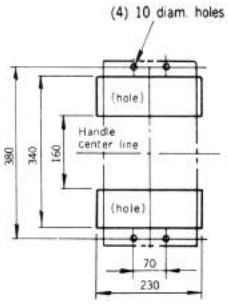




■ Drilling Plan

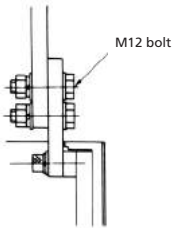


For front mounting bolts

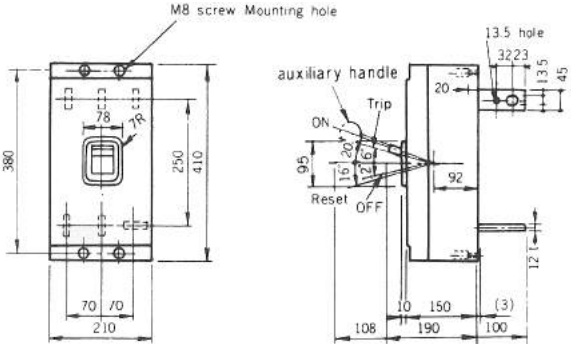


For rear connecting studs

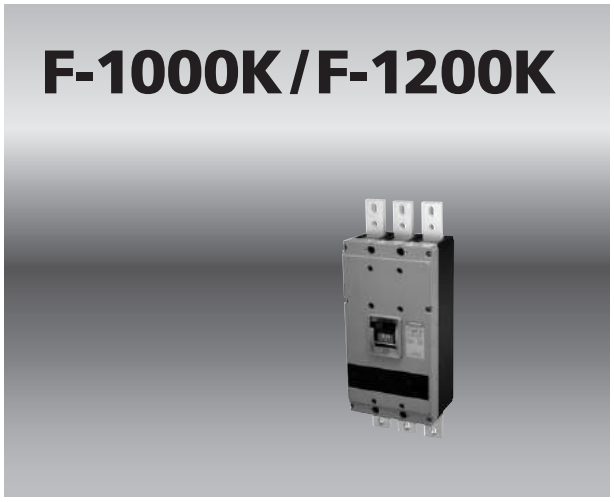
■ For front connection

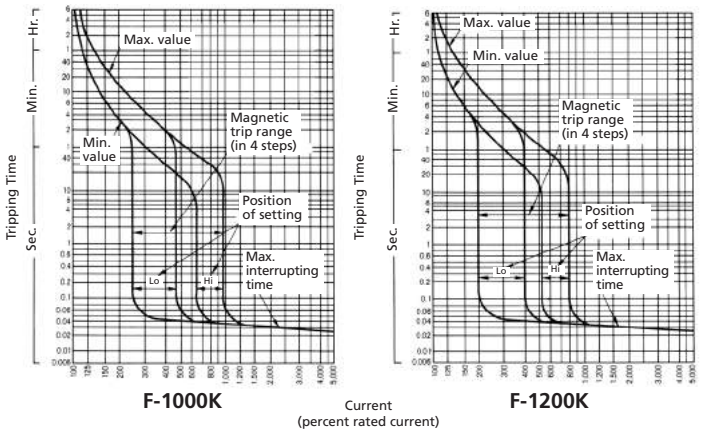


■ For Rear Connecting Studs



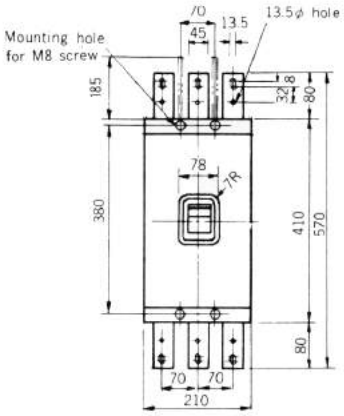
F-1000K / F-1200K

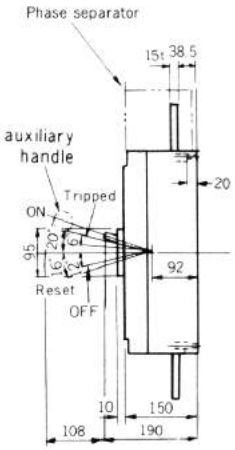


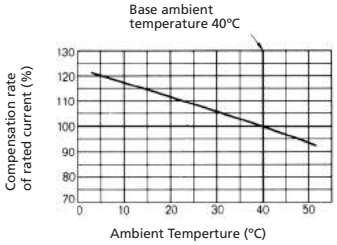


Overcurrent Tripping Characteristic Curve

■ Dimensions

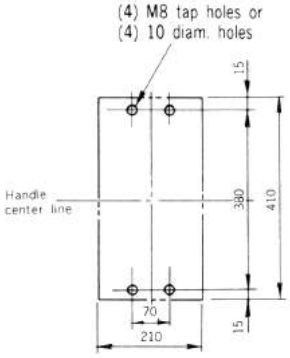




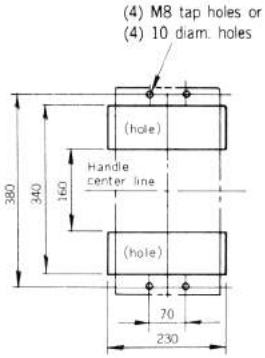


Temperature Compensation Curve

■ Drilling Plan

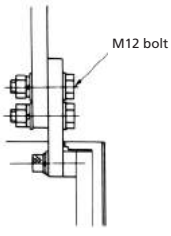


For front mounting bolts

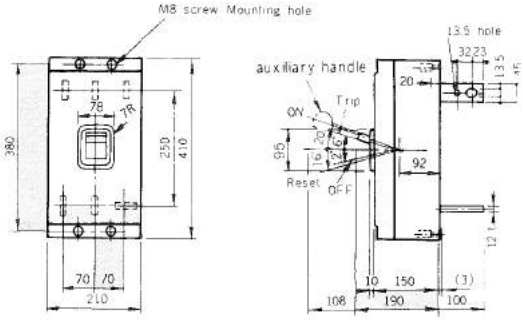


For rear connecting studs

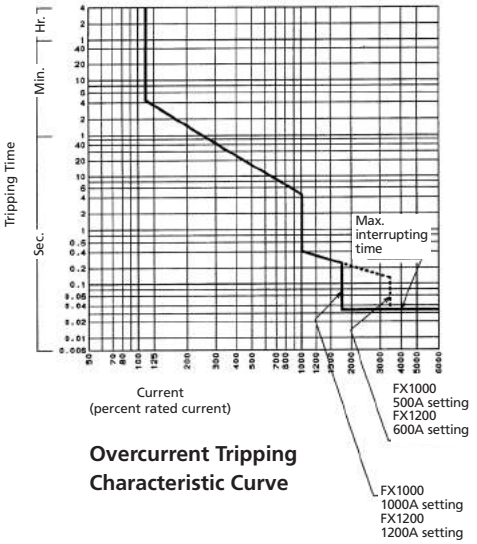
■ For front connection



■ For Rear Connecting Studs

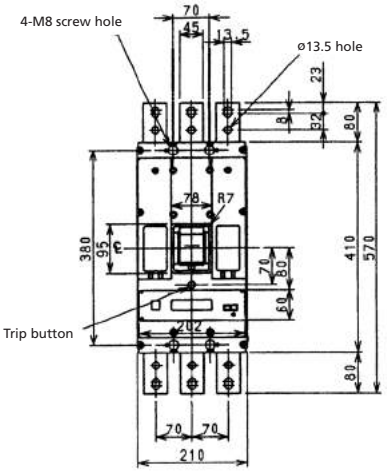


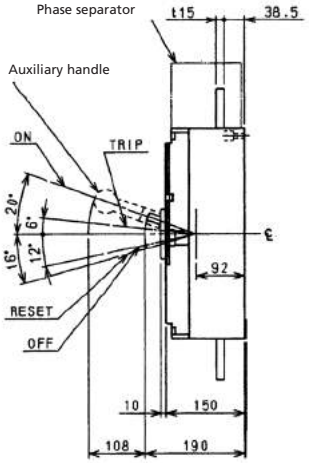
FX1000/FX1200



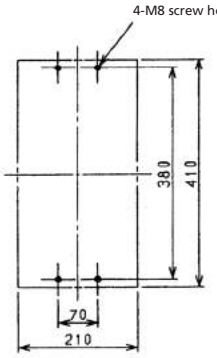
Overcurrent Tripping Characteristic Curve

■ Dimensions

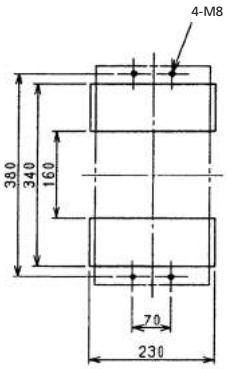




■ Drilling Plan

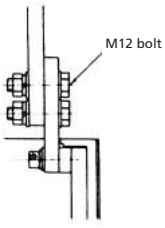


For front mounting bolts

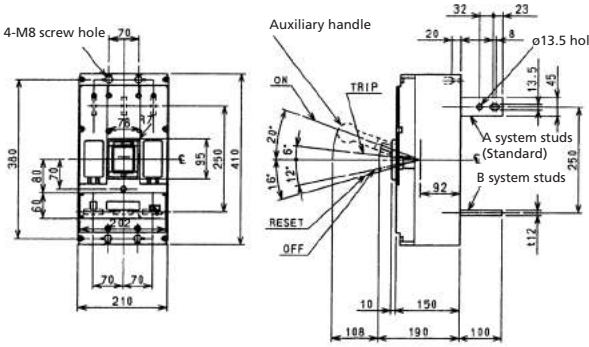


For rear connecting studs

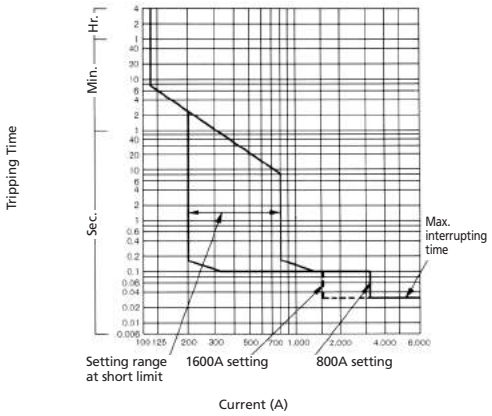
■ Terminal Arrangement



■ For Rear Connecting Studs

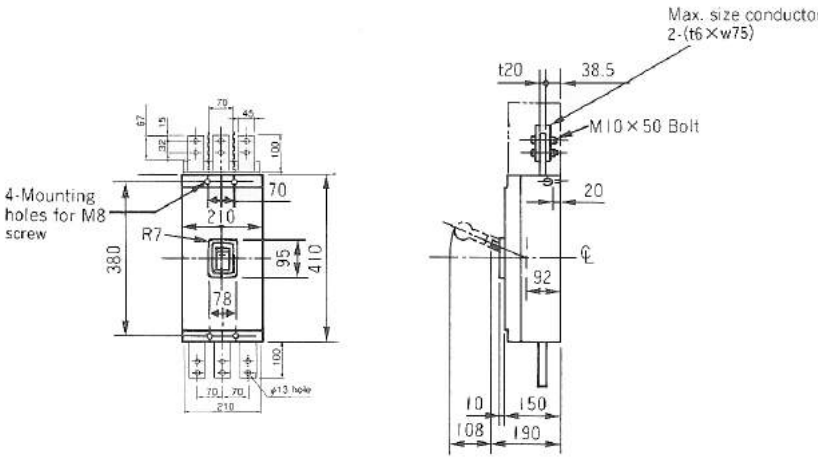


F-1600CB

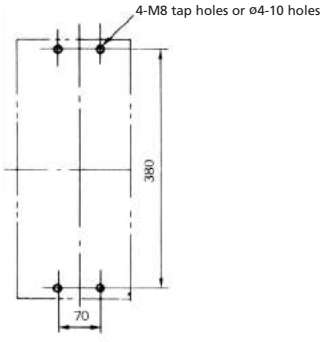


Overcurrent Tripping Characteristic Curve

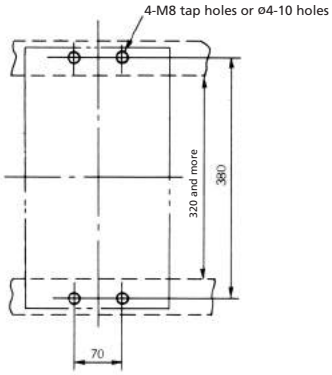
■ Dimensions



■ Drilling Plan

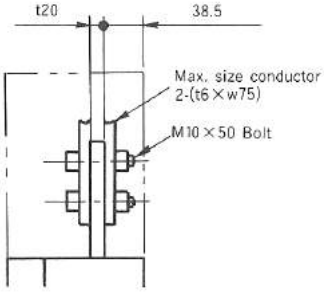


For front mounting bolts

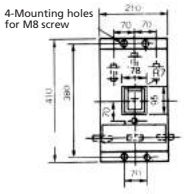


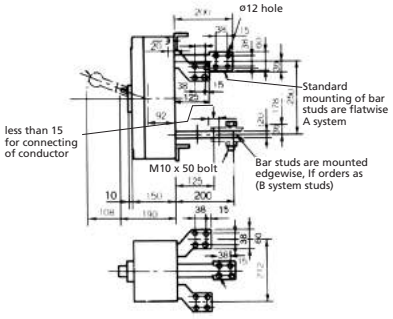
For rear connecting studs

■ Terminal Arrangement

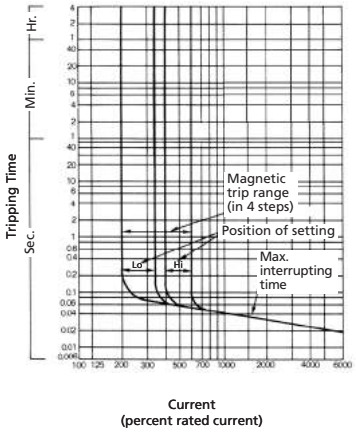


■ For Rear Connecting Studs



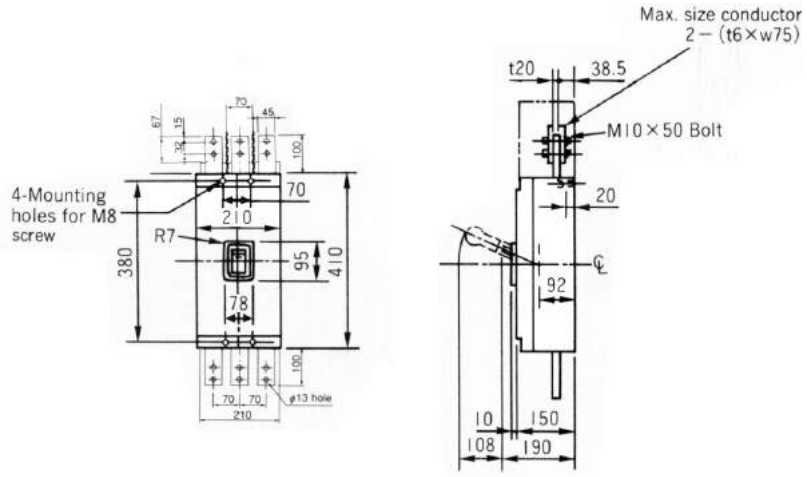


F-1600B

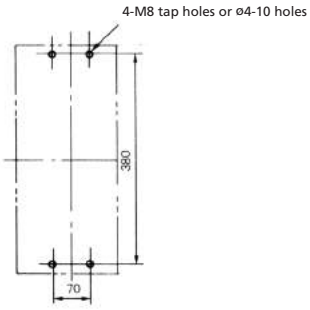


Overcurrent Tripping Characteristic Curve

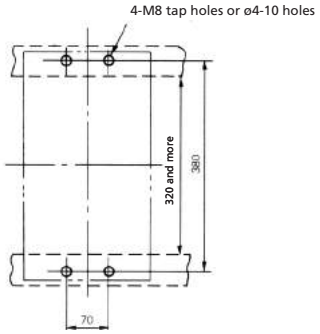
■ Dimensions



■ Drilling Plan

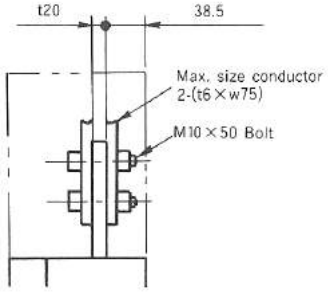


For front mounting bolts

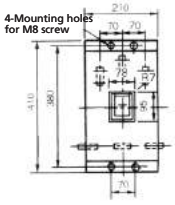


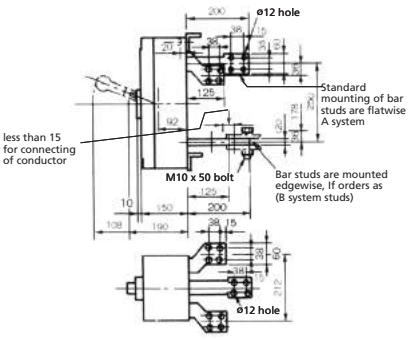
For rear connecting studs

■ Terminal Arrangement

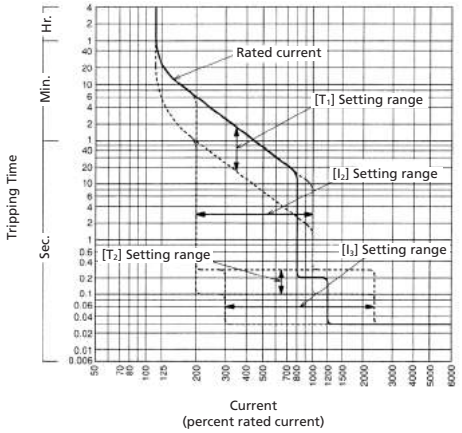


■ For Rear Connecting Studs



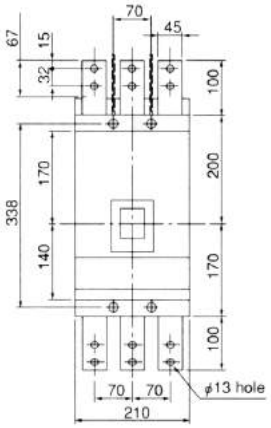


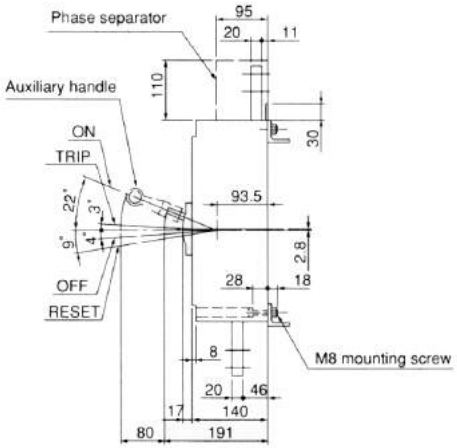
F-1600E



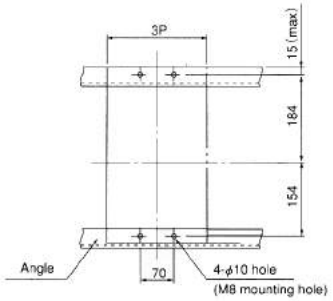
Overcurrent Tripping Characteristic Curve

■ Dimensions

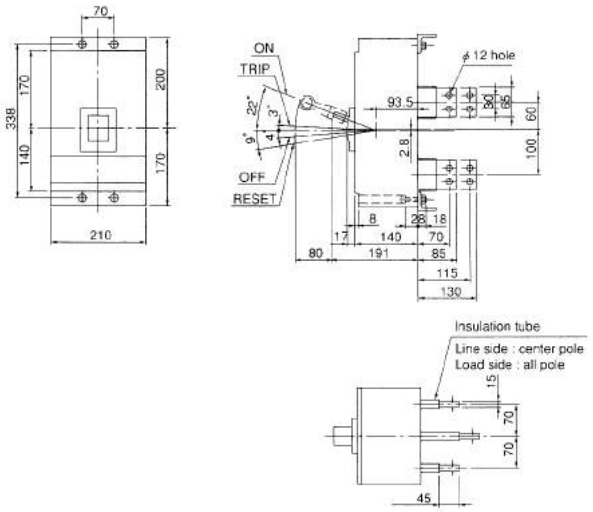




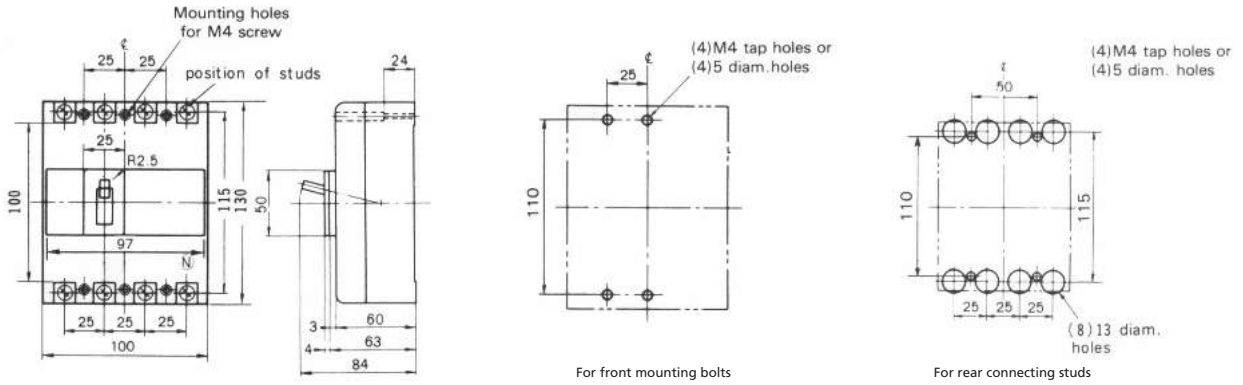
■ Drilling Plan



■ For Rear Connecting Studs

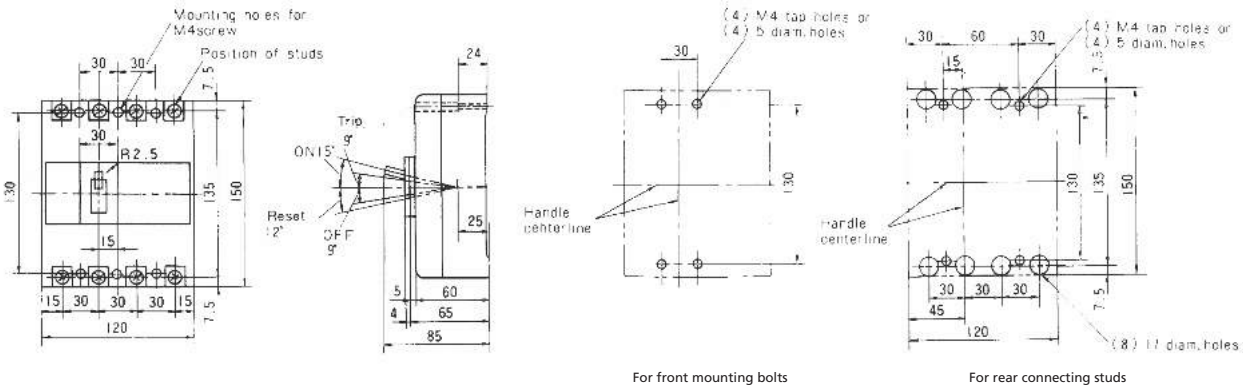


F-60R 4 pole



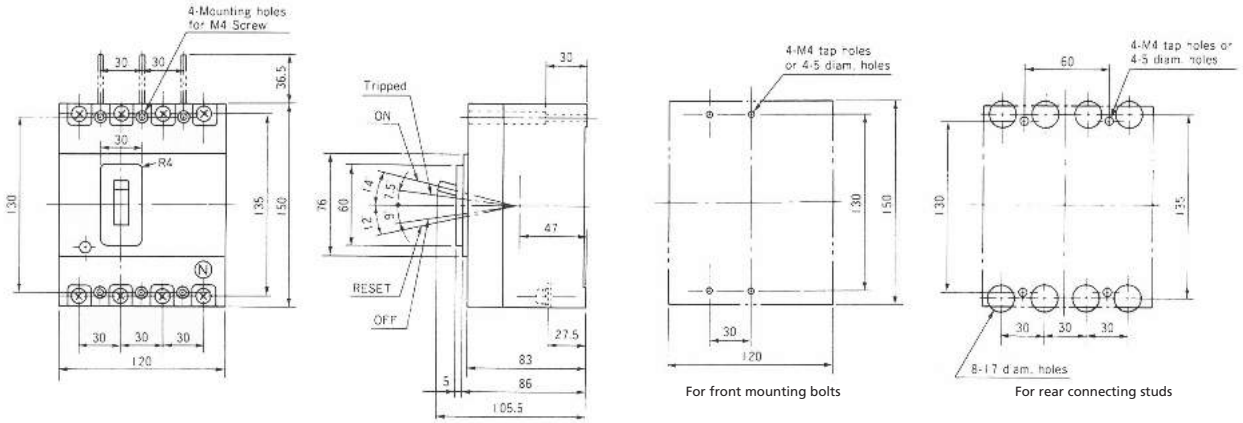
Drilling plan

F-100S 4 pole



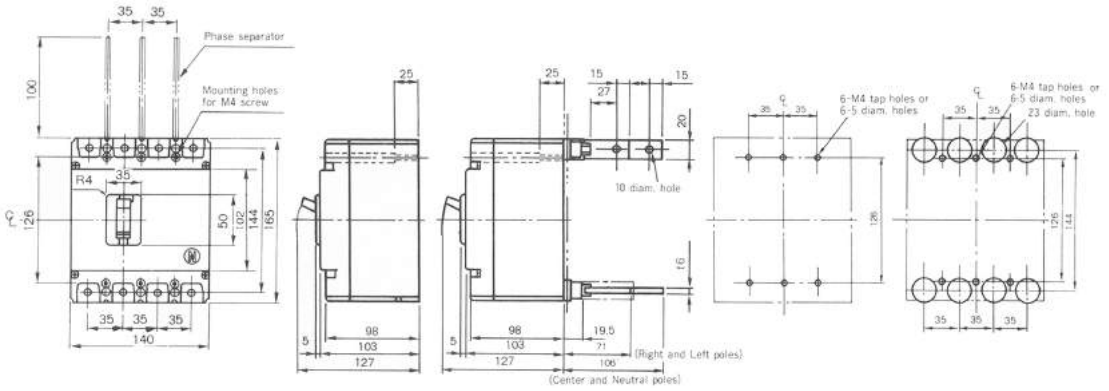
Drilling plan

F-100KB 4 pole

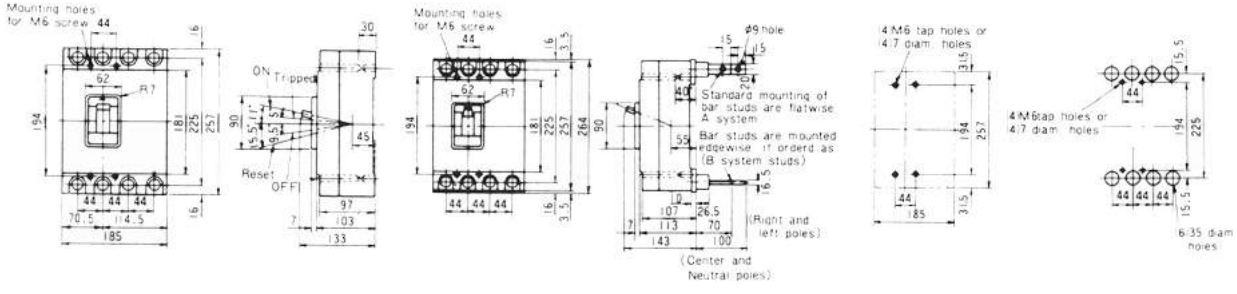


Drilling plan

F-250FB / F-250KC 4 pole



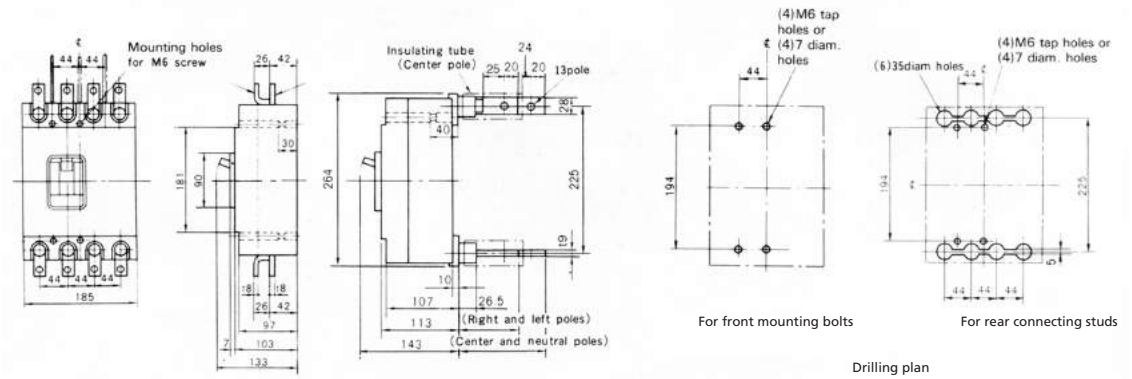
L-225E 4 pole



For front mounting bolts For rear connecting studs

Drilling plan

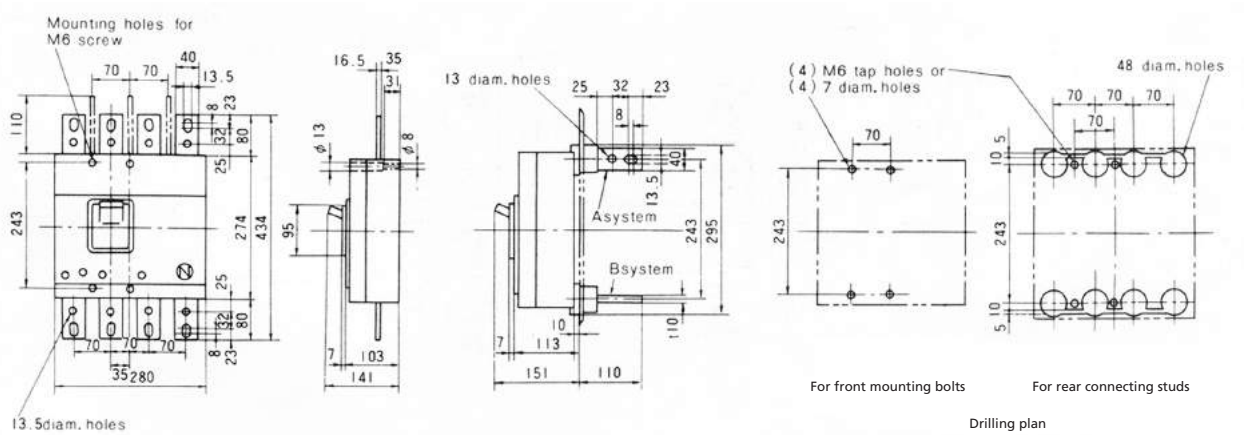
F-400R / L-400E 4 pole



For front mounting bolts For rear connecting studs

Drilling plan

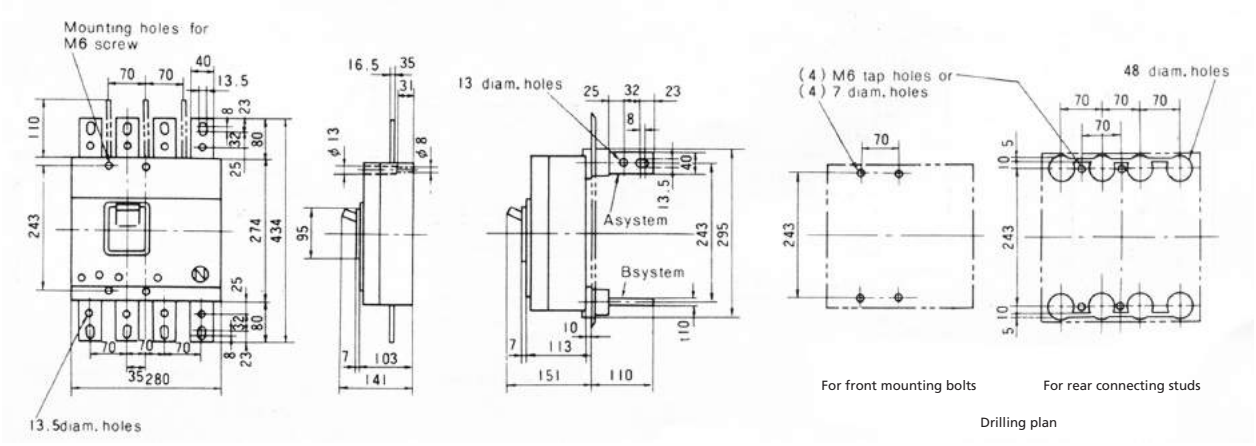
F-600F / L-600E 4 pole



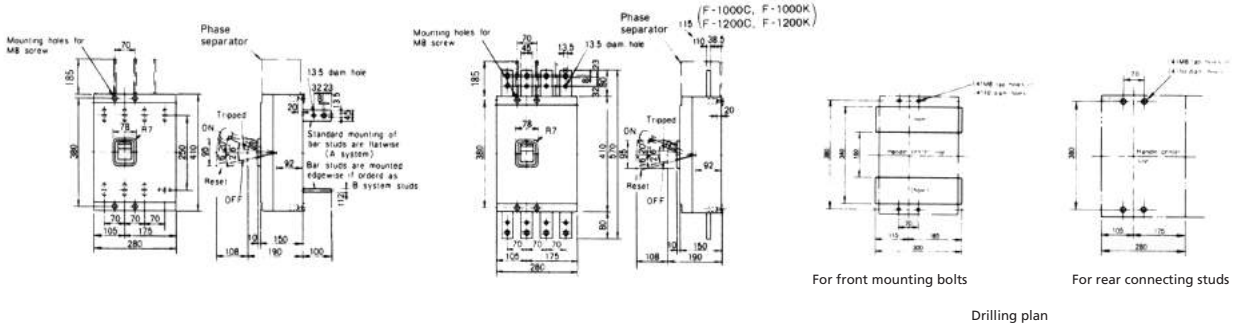
For front mounting bolts For rear connecting studs

Drilling plan

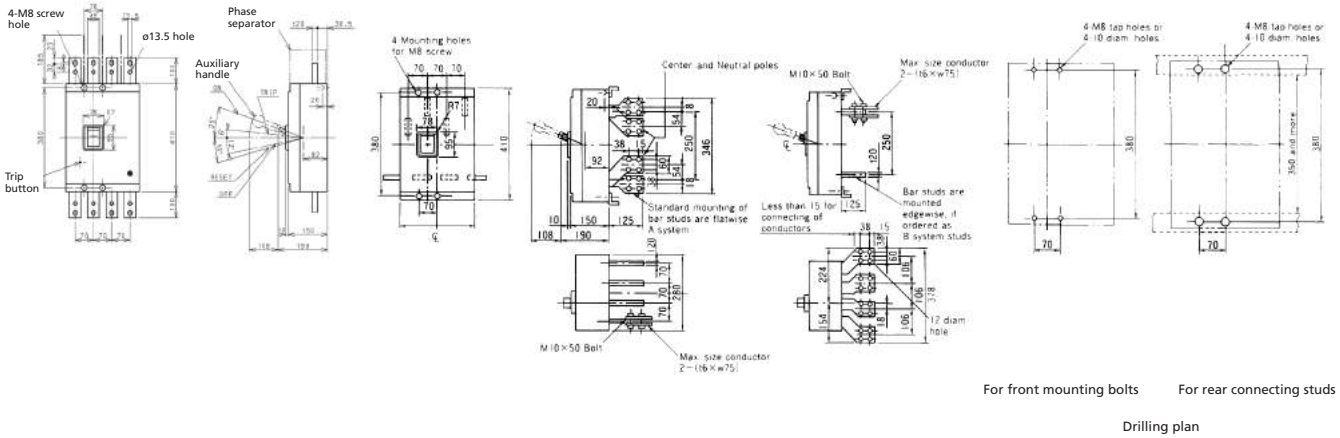
F-800R / L-800RH 4 pole



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.

i1 + i2 + i3 = 0

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

i1 + i2 + i3 = ig

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

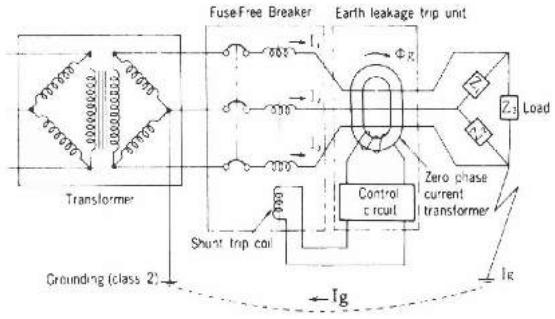


Fig. 37 Principle of operation

Classification and Composition

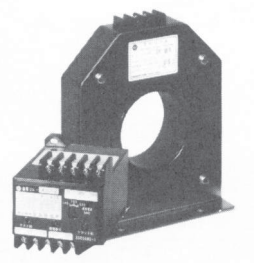
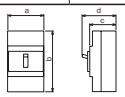
E Series Standard Breaker	**R Series** High Interrupting Breaker	**Earth Leakage Relay Series**
		
30A – 800A frame	30A – 1200A frame	–

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	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
	Motor-operating Mechanism		MMK-S	—	—	—	—	—	—
			MMK-C	—	—	—	—	—	—
	Lock Cover		LC	LC-03	LC-03	LC-2G	LC-2G	LC-2G	LC-2G
	Handle Lock		HL	—	—	HL-2G	HL-2G	HL-2G	HL-2G
	Handle Operating Mechanism		HA	—	—	HA-108	HA-108	HA-108	HA-108
			HM	—	—	HM-S12	HM-S12	HM-S12	HM-S12
	Terminal Cover	Front Type	TMC	TMC-0G	TMC-0H	TMC-1	TMC-1	TMC-1	TMC-1
			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

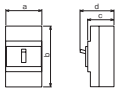
1. ● : Standard ○ : Option
2. Please use right and left poles in case of using ELBs of 3 poles 200V to 1ø2W 200V wiring sysytem.
3. Please connect neutral line to middle pole of ELBs incase of using ELBs of 3 poles 200V to 1ø3W100/200V distribution system.
4. Standard flush mounting base assembly of up to 400AF are GKW and GK is standard in case of 600AF or more.
5. Installation of phase separators is required in case of types marked (*2)
6. IEC rail is standard installation in case of EB-50E and EB-100E, so installation screws and metal fittings are not attached.
7. The accessories marked (*3) can be installed by customers
8. 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	○	○	○	○	○	○		○	○
			TB2	○	○	○	○	○	—		○	○
Exterior Accessories	Rear-connecting Stud		STB	STB-2S (Up to 50A)	STB-2S (Up to 50A)	○	—	—	—		—	—
			BSD	BSD-3S (60A or more)	BSD-3S (60A or more)	—	○	○	○		○	○
	Flush Mounting Base Assembly		GKW (STB)	○ (Up to 50A)	○ (Up to 50A)	○	—	—	—		—	—
			GK·GKW (BSD)	○ (60A or more)	○ (60A or more)	—	○	○	○ (GK)		○	○
	Plug-in Mounting Base Assembly		PK	○	○	—	—	—	—		—	—
	Mechanical Interlock		MIW	MIW-3H	MIW-3H	MIW-3F	MIW-4M	MIW-4M	MIW-5DE		○	MIW-5F
	Motor-operating Mechanism		MMK-S	—	—	—	—	—	—		—	—
			MMK-C	—	—	—	—	—	—		—	—
	Lock Cover		LC	○	○	LC-2C	LC-4J	LC-4J	—		—	—
	Handle Lock		HL	○	○	○	HL-4J	HL-4J	HL-5		HL-5	HL-5
	Handle Operating Mechanism		HA	—	—	HA-106	HA-210	HA-210	HA-405		HA-405	HA-406
			HM	HM-S13	HM-S13	HM-S11	HM-S25	HM-S25	—		—	—
	Terminal Cover	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

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

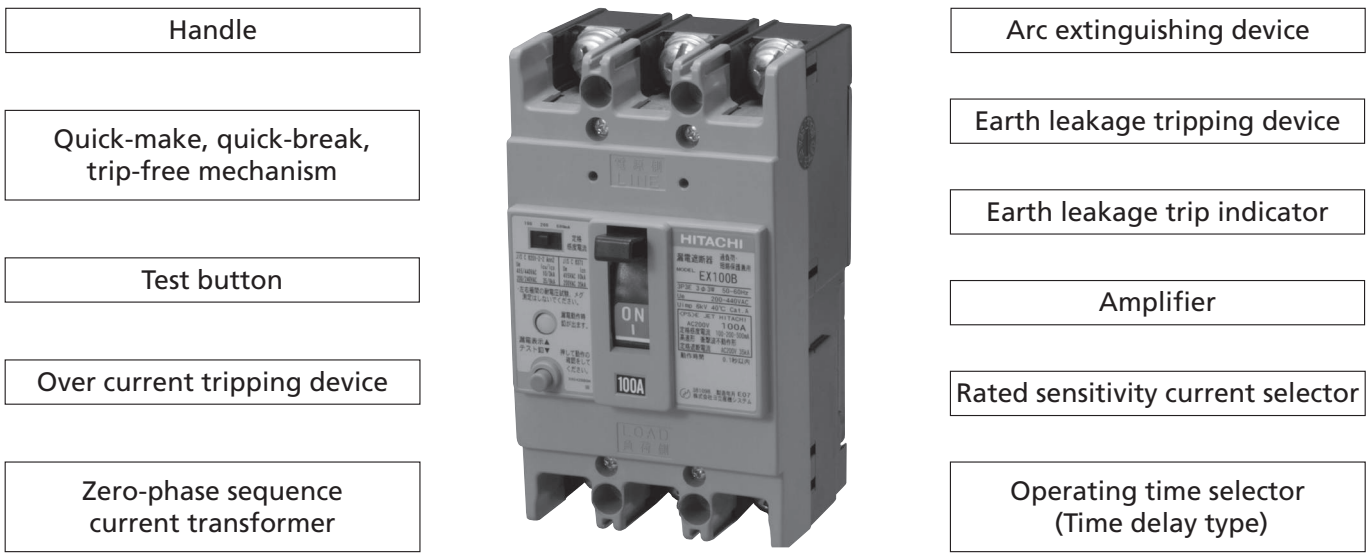
RG-400BN	RG-400BH	RX600B	RF-600FN	RX800B	RF-800KN	RF-1000KN		RF-1000CBN	RF-1200KN		RF-1200CBN
											
3ø4W		3ø3W 1ø3W 1ø2W	3ø4W	3ø3W 1ø3W 1ø2W	3ø4W	3ø3W 1ø3W 1ø2W	3ø4W	3ø3W 1ø3W 1ø2W	3ø3W 1ø3W 1ø2W	3ø4W	3ø3W 1ø3W 1ø2W
4		3	4	3	4	3	4	3	3	4	3
200 – 440		200 – 440	440 (200)	200 – 440	440 (200)	440 (200)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

9. Applicable voltage range

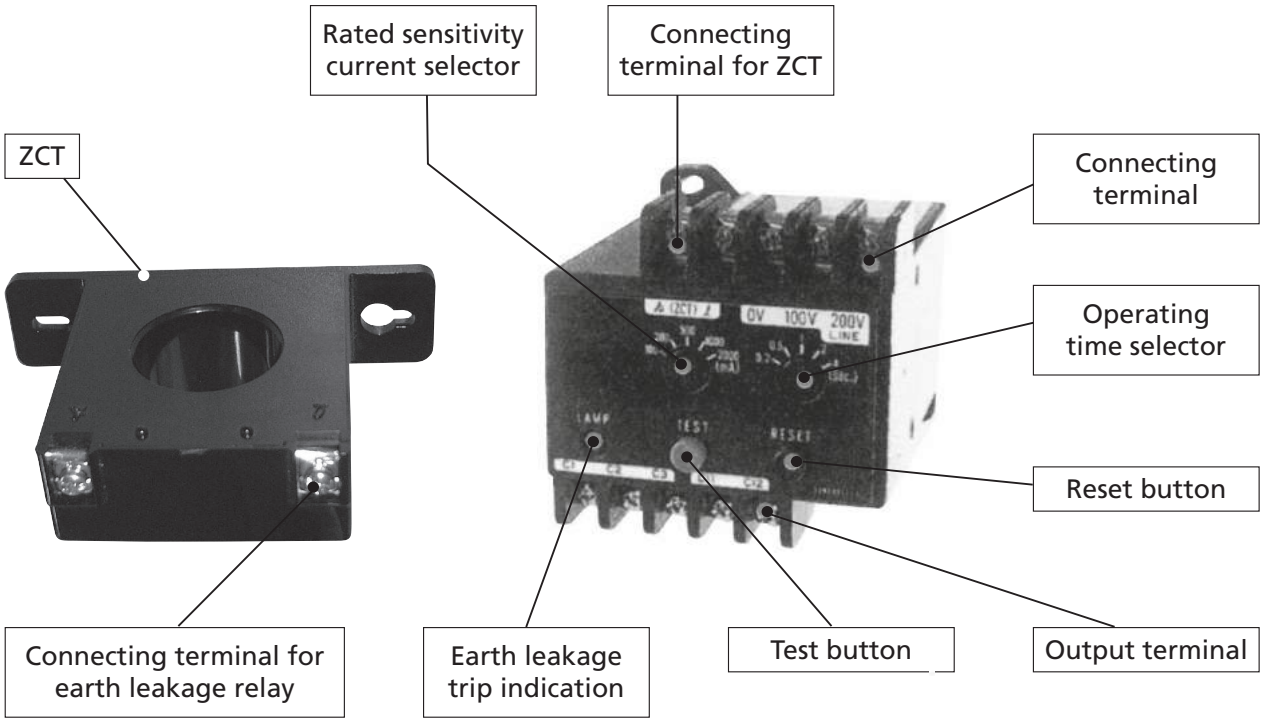
Rated voltage	Applicable circuit voltage	Permissible range of voltage
100 – 200V	100·110·200·220V	80 – 242V
200V	200·220V	160 – 220V
440V	400·415·440V	320 – 484V
200 – 440V	200·220·240 380·400·415·440V	160 – 484V

Construction

The Earth Leakage Circuit Breakers (ELB) consists of circuit breaker unit composed by a switching mechanism, are 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.

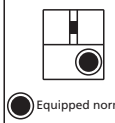
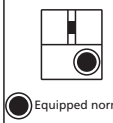
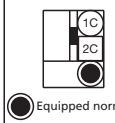
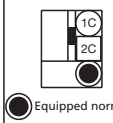


Typical construction of Earth leakage breaker for power supply



Typical construction of Earth leakage relays

Table 21 **Applicability of interior accessories**

Frame / Poles / Accessories		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
Accessories		2	3	3	3, 4	3	3, 4	3
Alarm Switch	AL							
Auxiliary Switch	AUX							
Alarm + Auxiliary	AL + AUX	—						
Earth Leakage Alarm Switch	EAL	—	—	—	—	—		
Alarm + Auxiliary + EAL Switch	AL + AUX + EAL	—	—	—	—	—		
Test Button Lead Wire	TBL							

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

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 (kg)		0.45				

Notes: (1) Interchangeable by manual operation.
(2) Rating with ( ) are manufactured by customer's order.
(3)

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

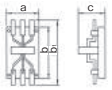
Table 23 Contact Specifications

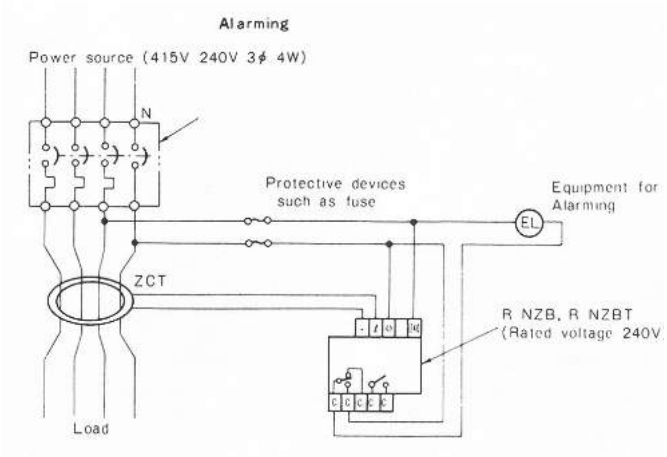
Load		Resistive Load cosø = 1	Inductive Load cosø = 0.3, L/R = 7ms
Rated Thermal Current (A)		3	
Rated Current (A)	AC 120V	3	2
	AC 240V	3	1.5
	AC 415V	1	0.5
	DC 24V	3	1.5
	DC 100V	0.2	0.2

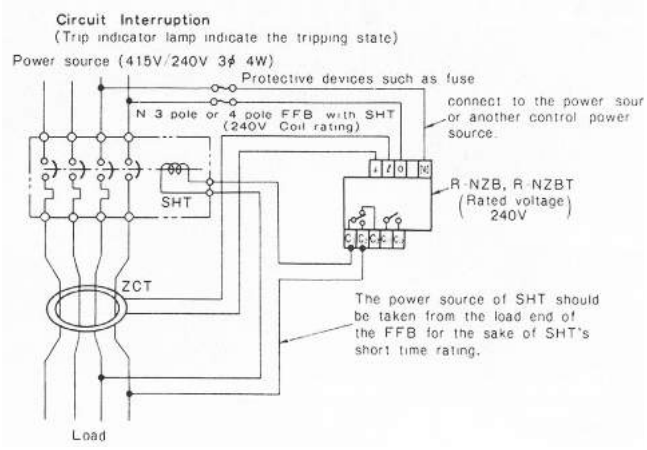
Table 24 Zero-phase-sequence Current Transformer

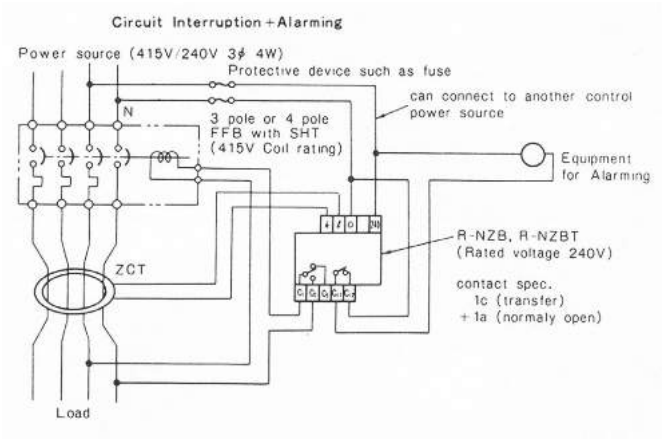
Type	Aperture Diameter	Maximum Available Wire Size					
		Vinyl-insulated 600V Wire (IV)			Polyethylene-Insulated 600V Wire (CV)		
		2-wire	3-wire	4-wire	2-wire	3-wire	4-wire
ZR-15	ø15	14mm² (88A)	8mm² (61A)	8mm² (61A)	2mm² (33A)	2mm² (33A)	—
ZR-30B	ø30	60mm² (217A)	50mm² (190A)	38mm² (162A)	38mm² (190A)	22mm² (135A)	14mm² (105A)
ZR-58B	ø58	250mm² (556A)	200mm² (469A)	150mm² (395A)	200mm² (560A)	150mm² (480A)	100mm² (365A)
ZR-65	ø65	325mm² (650A)	250mm² (556A)	200mm² (469A)	250mm² (655A)	200mm² (560A)	150mm² (480A)
ZR-80	ø80	500mm² (842A)	500mm² (842A)	325mm² (650A)	400mm² (870A)	325mm² (760A)	250mm² (655A)
ZR-100	ø100	500mm² x 4 (1,684A)	400mm² x 6 (1,490A)	500mm² (842A)	600mm² (1,140A)	600mm² (1,140A)	400mm² (870A)
ZR-120	ø120	—	350mm² x 9 (1,950A)	400mm² x 8 (1,490A)	1000mm² (1,600A)	800mm² (1,370A)	600mm² (1,140A)

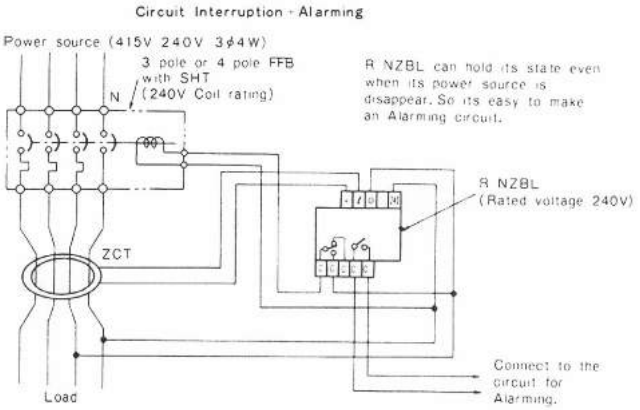
Table 25 ZCT with Primary Conductors

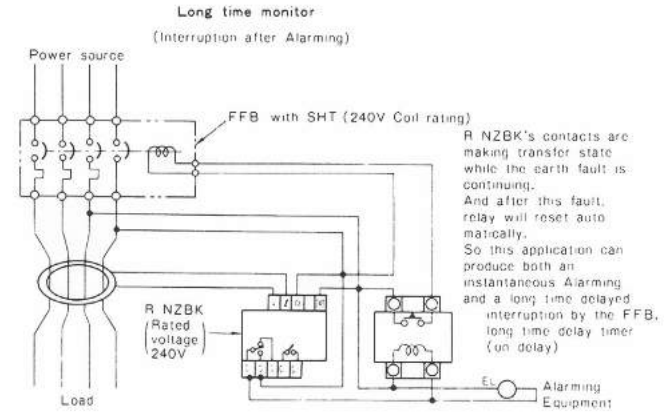
Type		Z-400B		Z-600B		Z-800B		Z-1000B		Z-1200B		Z-2000B	
Appearance													
Number of Poles		3	4	3	4	3	4	3	4	3	4	3	4
Continuous Thermal Current (A)		400		600		800		1000		1200		2000	
Rated Voltage (AC V)		600											
Frequency (Hz)		50, 60											
Rated withstand Current (kA)		100 (peak value)										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

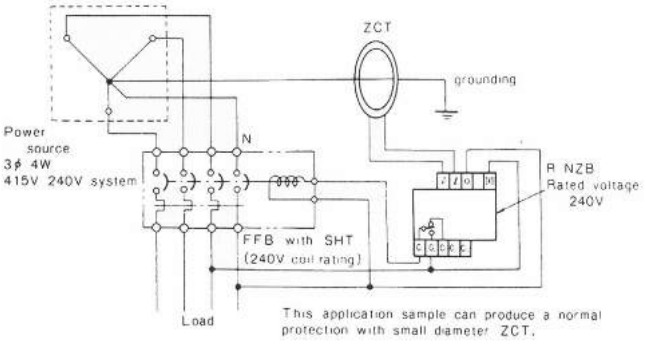

Alarming
Power source (415V 240V 3φ 4W)
N
Protective devices such as fuse
Equipment for Alarming
EL
ZCT
R NZB, R NZBT
(Rated voltage 240V
Load


Circuit Interruption
(Trip indicator lamp indicate the tripping state)
Power source (415V/240V 3φ 4W)
Protective devices such as fuse
N 3 pole or 4 pole FFB with SHT
(240V Coil rating)
connect to the power sour
or another control power
source.
SHT
R-NZB, R-NZBT
(Rated voltage)
240V
ZCT
The power source of SHT should
be taken from the load end of
the FFB for the sake of SHT's
short time rating.
Load

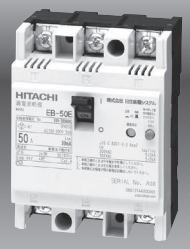

Circuit Interruption+Alarming
Power source (415V/240V 3φ 4W)
Protective device such as fuse
can connect to another control
power source
N
3 pole or 4 pole
FFB with SHT
(415V Coil rating)
Equipment
for Alarming
R-NZB, R-NZBT
(Rated voltage 240V)
contact spec.
1c (transfer)
+1a (normaly open)
ZCT
Load

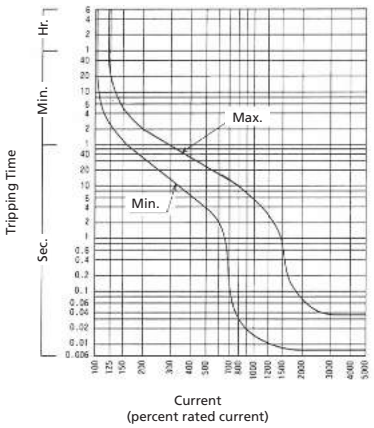

Circuit Interruption+Alarming
Power source (415V 240V 3φ4W)
3 pole or 4 pole FFB
with SHT
(240V Coil rating)
N
R NZBL can hold its state even
when its power source is
disappear. So its easy to make
an Alarming circuit.
R NZBL
(Rated voltage 240V)
ZCT
Connect to the
circuit for
Alarming.
Load


Long time monitor
(Interruption after Alarming)
Power source
FFB with SHT (240V Coil rating)
R NZBK's contacts are
making transfer state
while the earth fault is
continuing.
And after this fault,
relay will reset auto
matically.
So this application can
produce both an
instantaneous Alarming
and a long time delayed
interruption by the FFB,
long time delay timer
(on delay)
R NZBK
(Rated
voltage
240V)
EL
Alarming
Equipment
Load

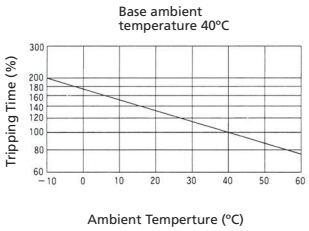

ZCT
grounding
Power
source
3φ 4W
415V 240V system
N
R NZB
Rated voltage
240V
FFB with SHT
(240V coil rating)
Load
This application sample can produce a normal
protection with small diameter ZCT.

EB-50E



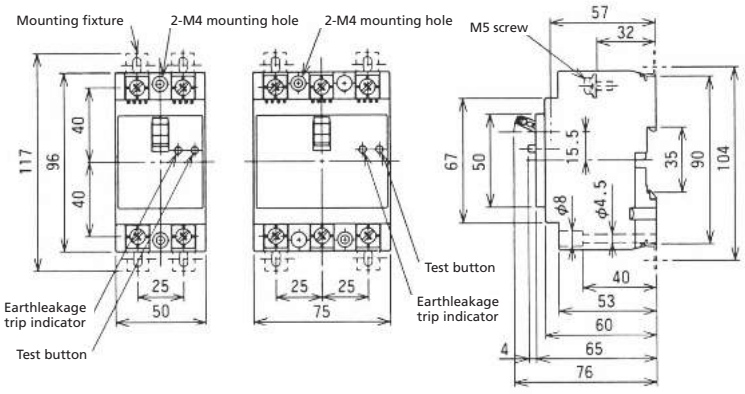


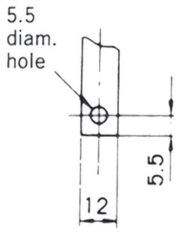
Overcurrent Tripping Characteristic Curve



Temperature Compensation Curve

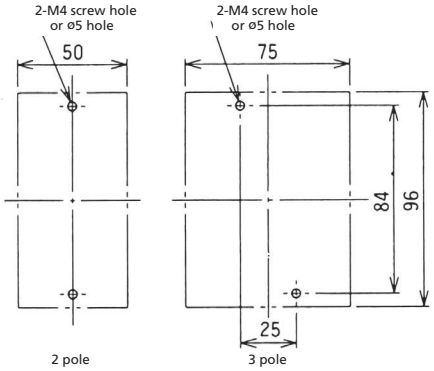
■ Dimensions



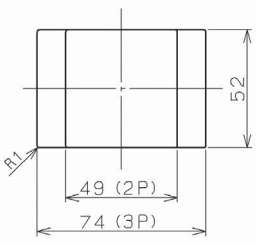


Direct-connected bus drilling

■ Drilling Plan



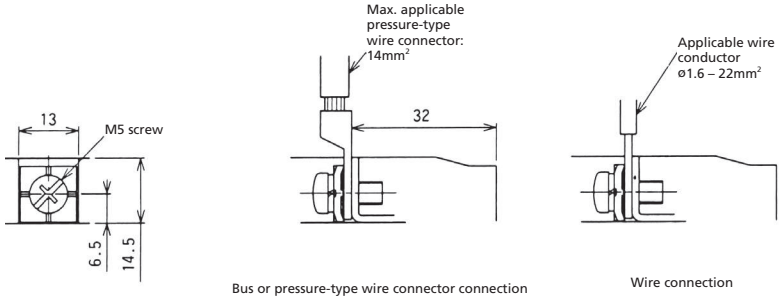
For front mounting bolts



1mm clearance on each side of handle

Frontplate cutout

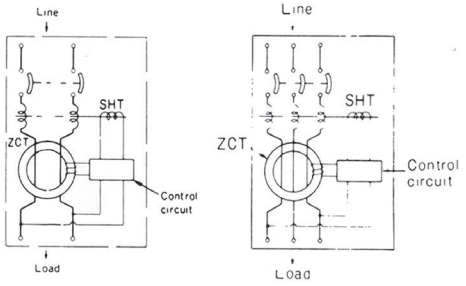
■ Terminal Arrangement



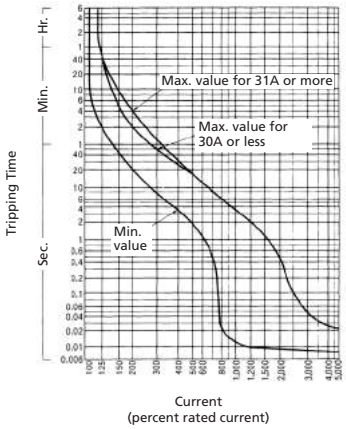
Bus or pressure-type wire connector connection

Wire connection

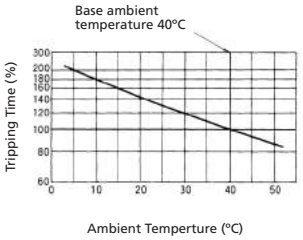
■ Internal Diagram Connection



EX30/EX50/EX50B

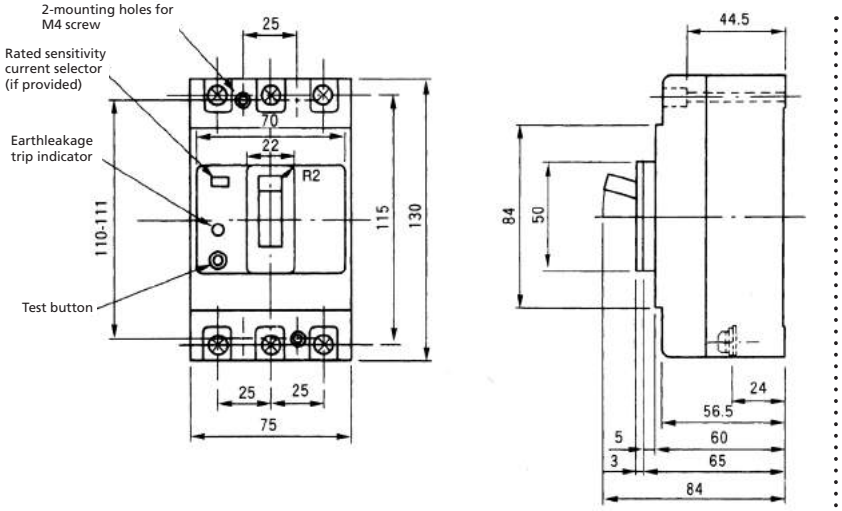


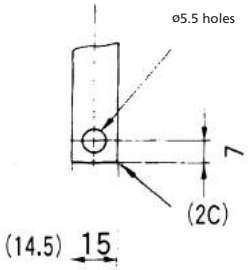
Overcurrent Tripping Characteristic Curve



Temperature Compensation Curve

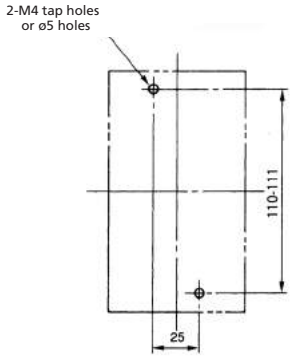
■ Dimensions



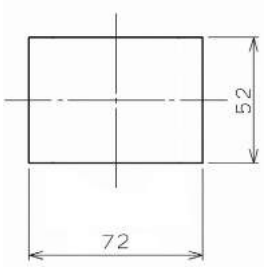


Direct-connected bus drilling

■ Drilling Plan



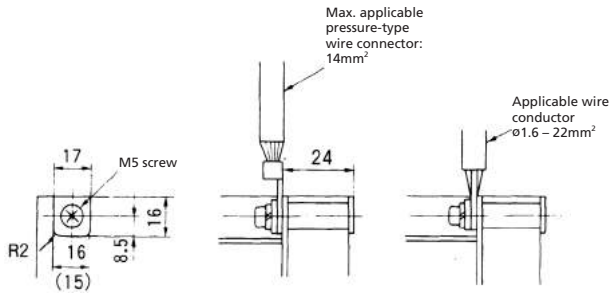
For front mounting bolts



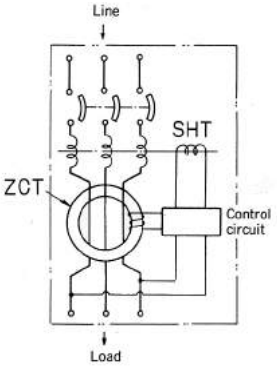
1mm clearance on each side of handle

Frontplate cutout

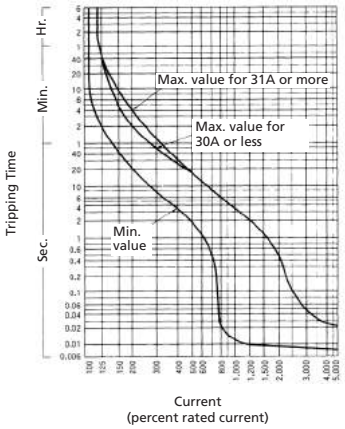
■ Terminal Arrangement



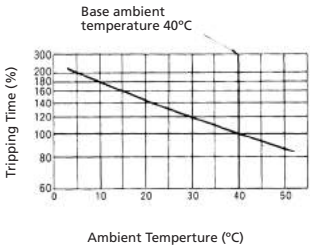
■ Internal Diagram Connection



EX50C

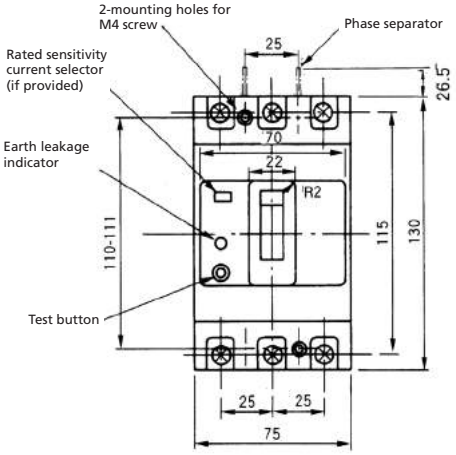


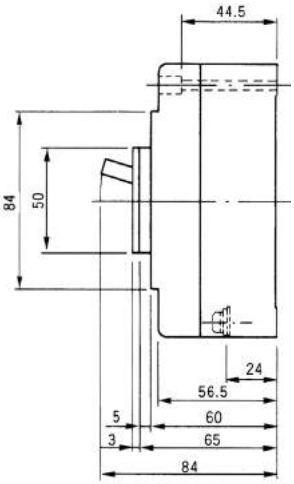
Overcurrent Tripping Characteristic Curve

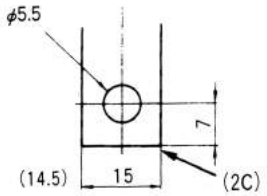


Temperature Compensation Curve

■ Dimensions

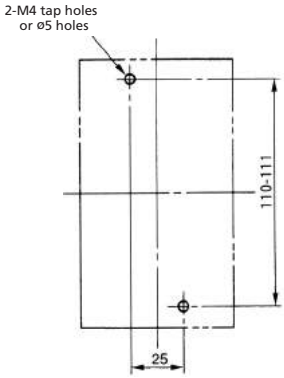




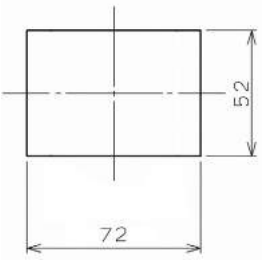


Direct-connected bus drilling

■ Drilling Plan



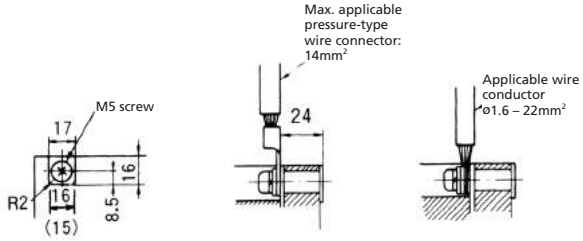
For front mounting bolts



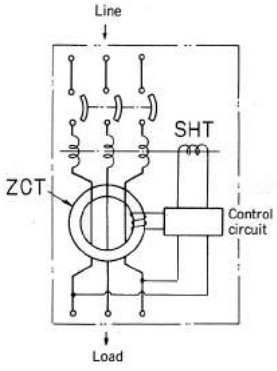
1mm clearance on each side of handle

Frontplate cutout

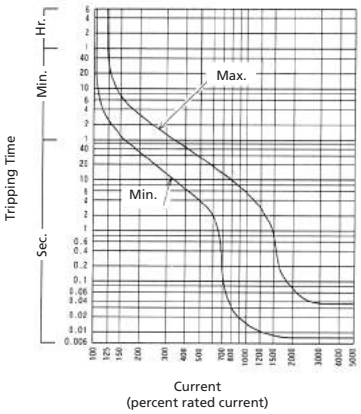
■ Terminal Arrangement



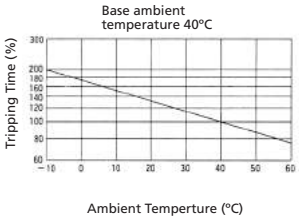
■ Internal Diagram Connection



EB-100E

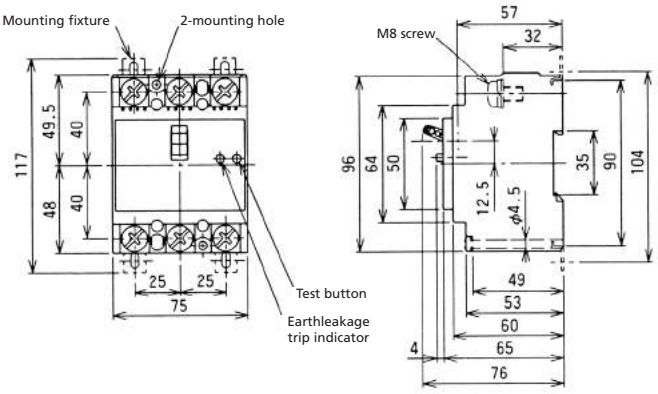


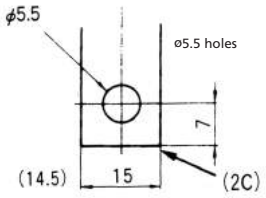
Overcurrent Tripping Characteristic Curve



Temperature Compensation Curve

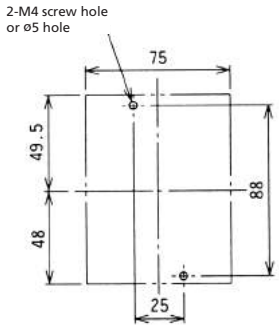
■ Dimensions



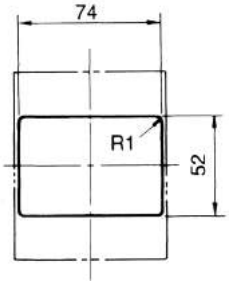


Direct-connected bus drilling

■ Drilling Plan

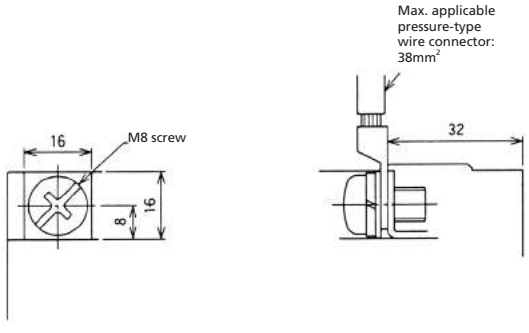


For front mounting bolts

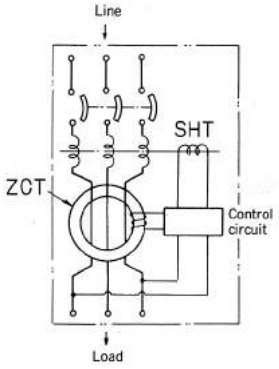


Frontplate cutout

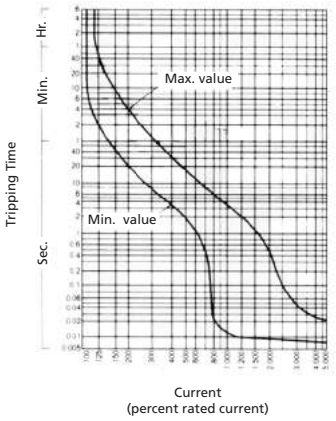
■ Terminal Arrangement



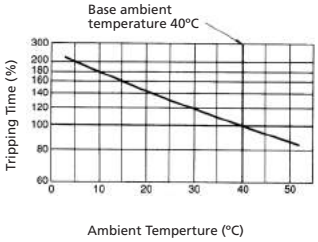
■ Internal Diagram Connection



EX100

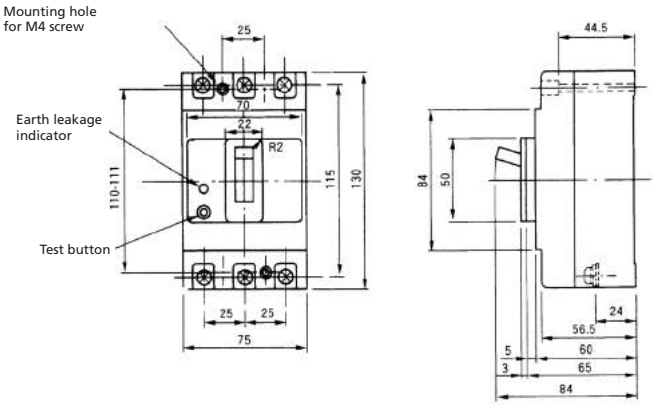


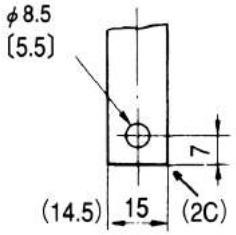
Overcurrent Tripping Characteristic Curve



Temperature Compensation Curve

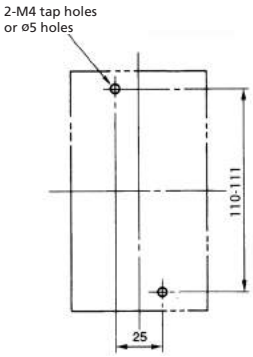
■ Dimensions



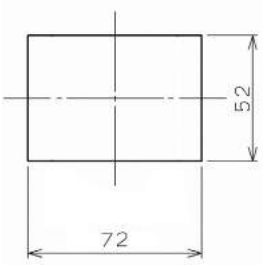


Direct-connected bus drilling

■ Drilling Plan



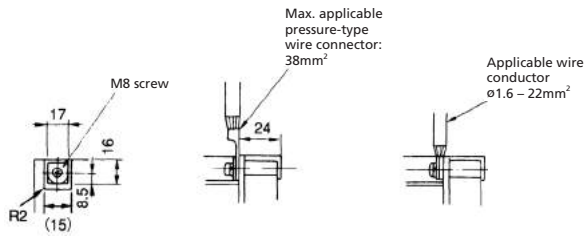
For front mounting bolts



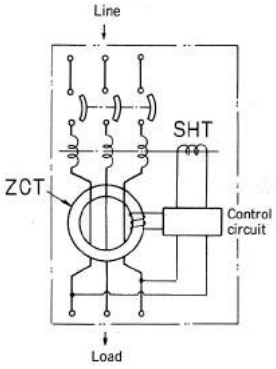
1mm clearance on each side of handle

Frontplate cutout

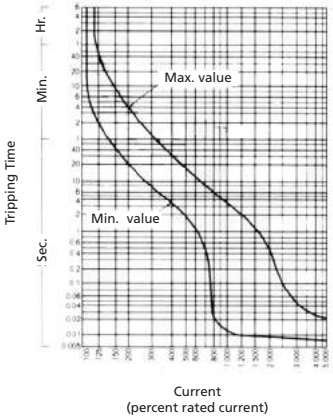
■ Terminal Arrangement



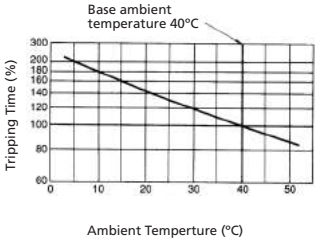
■ Internal Diagram Connection



EX100B

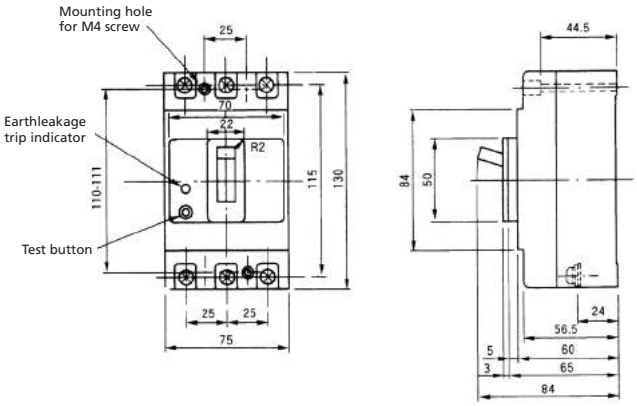


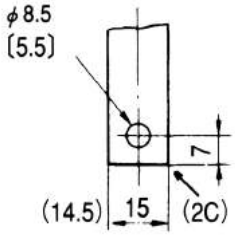
Overcurrent Tripping Characteristic Curve



Temperature Compensation Curve

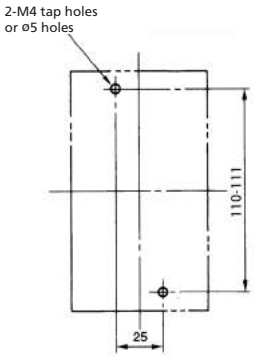
■ Dimensions



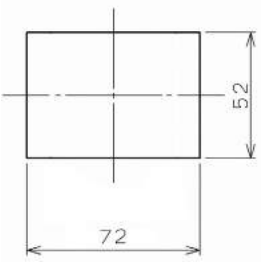


Direct-connected bus drilling

■ Drilling Plan



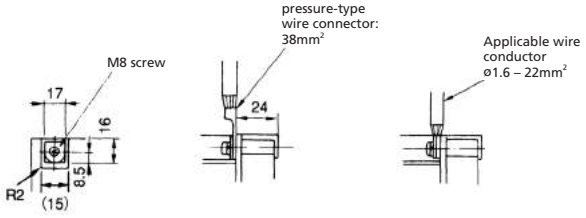
For front mounting bolts



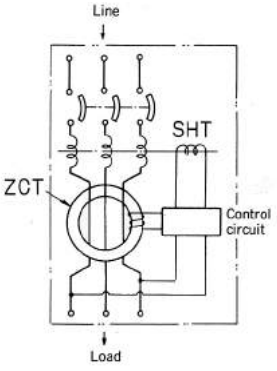
1mm clearance on each side of handle

Frontplate cutout

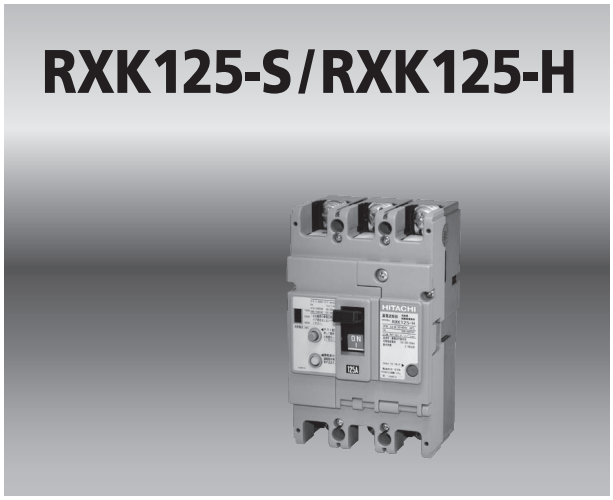
■ Terminal Arrangement

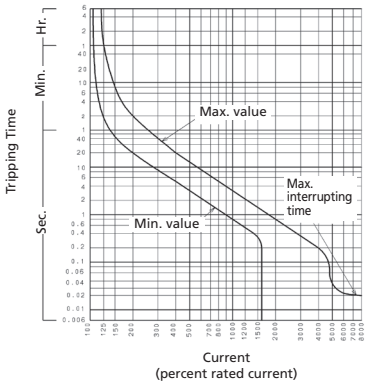


■ Internal Diagram Connection

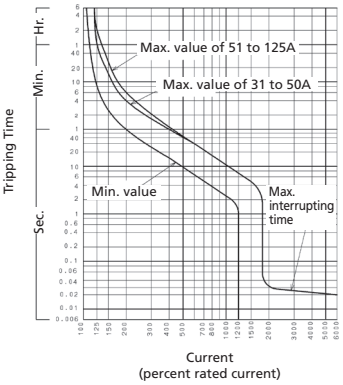


RXK125-S/RXK125-H



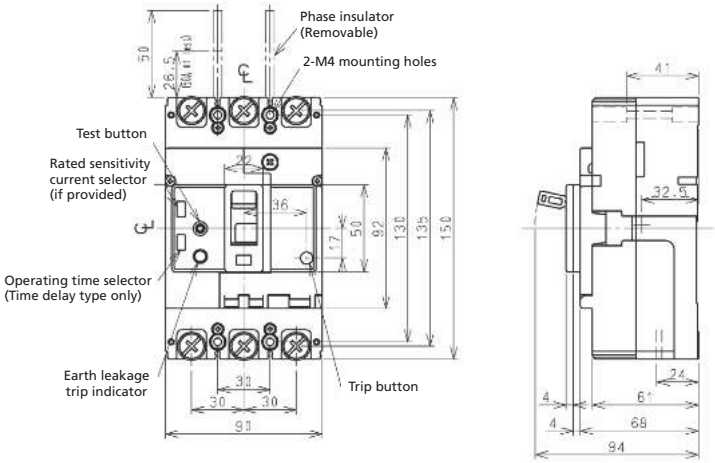


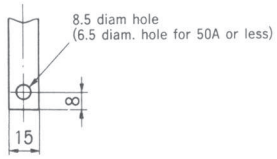
Overcurrent Tripping Characteristic Curve (15-30A)



Overcurrent Tripping Characteristic Curve (31-125A)

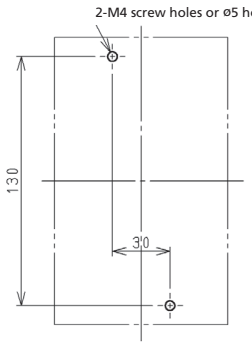
■ Dimensions



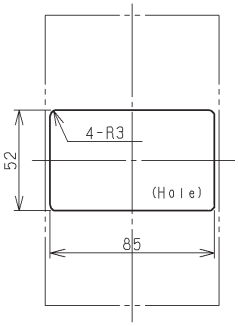


Direct-connected bus drilling

■ Drilling Plan



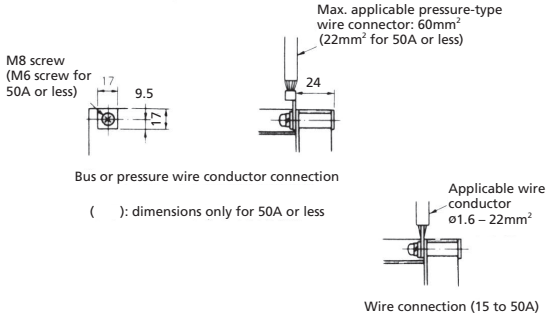
For front mounting bolts



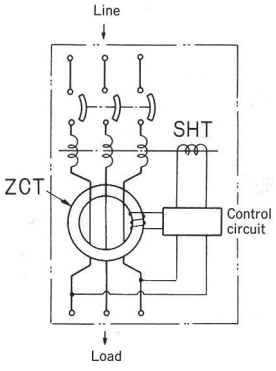
1mm clearance on each side of handle

Frontplate cutout

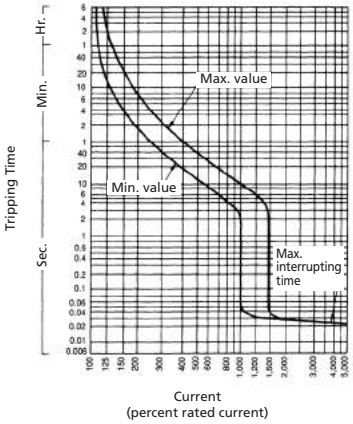
■ Terminal Arrangement



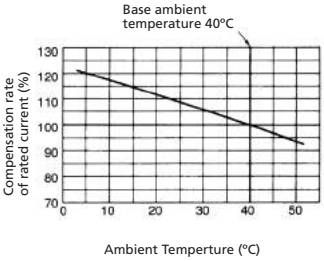
■ Internal Diagram Connection



EX225

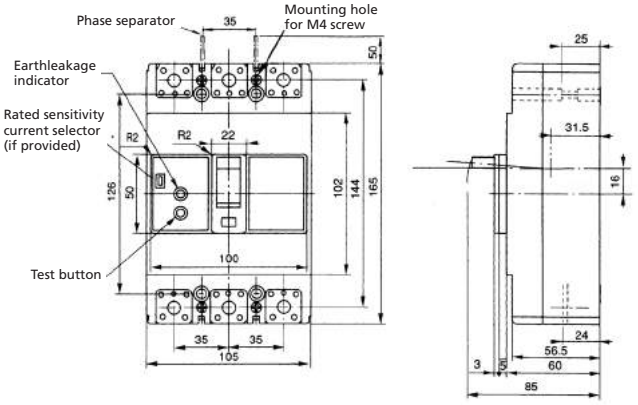


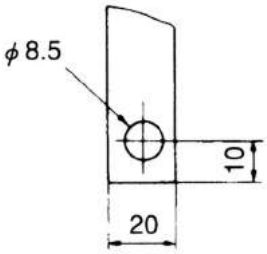
Overcurrent Tripping Characteristic Curve



Temperature Compensation Curve

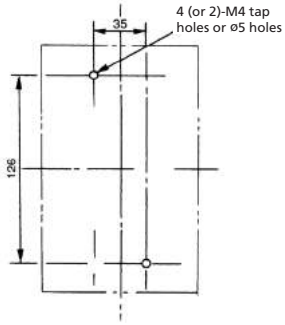
■ Dimensions



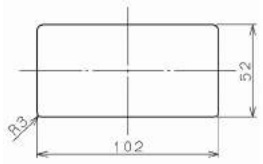


Direct-connected bus drilling

■ Drilling Plan



For front mounting bolts

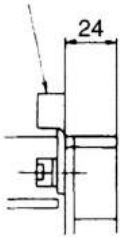


1mm clearance on each side of handle

Frontplate cutout

■ Terminal Arrangement

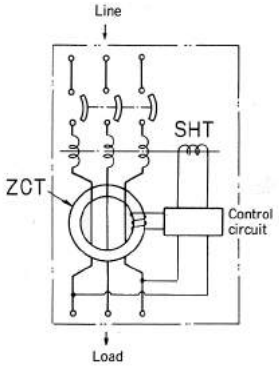
Maximum applicable pressure -type wire connector = 60mm²
Special pressure type wire connector is attached for 175 – 225A as shown on the right table



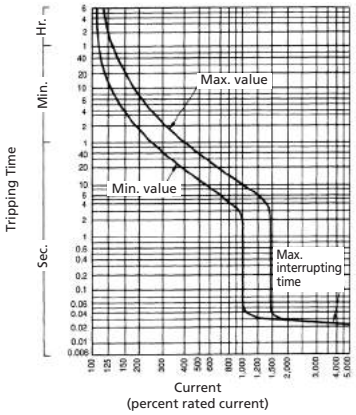
Pressure-type wire connector directly connected

Rated current (A)	Applicable wire size of pressure-type wire connector (mm²)
175 – 225	Pressure-type wire connector 80, 100, 125 (mm)

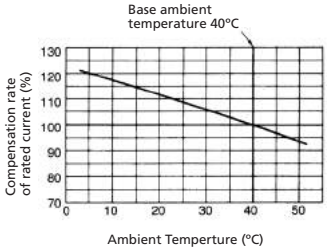
■ Internal Diagram Connection



EXK225

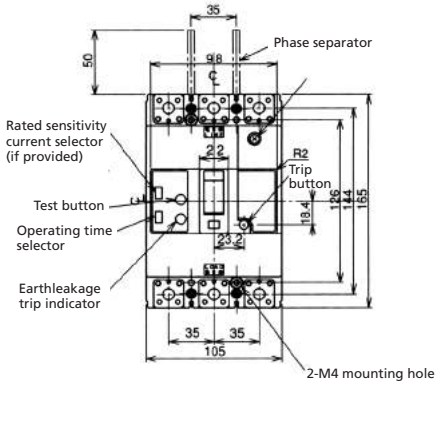


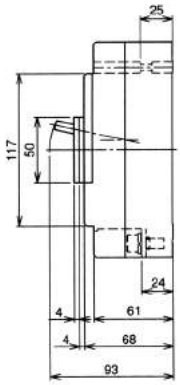
Overcurrent Tripping Characteristic Curve

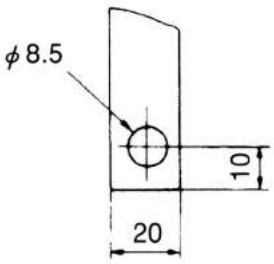


Temperature Compensation Curve

■ Dimensions

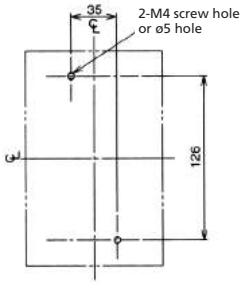




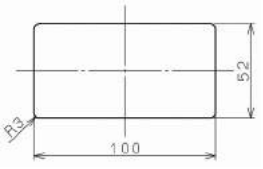


Direct-connected bus drilling

■ Drilling Plan



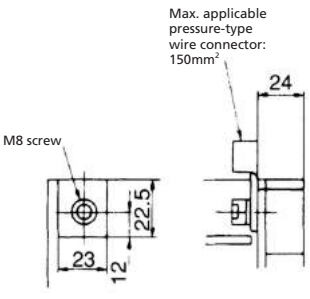
For front mounting bolts



1mm clearance on each side of handle

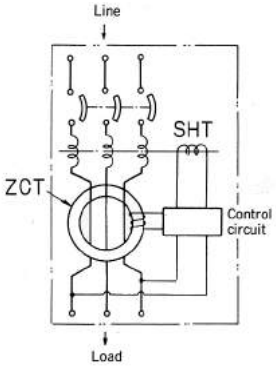
Frontplate cutout

■ Terminal Arrangement

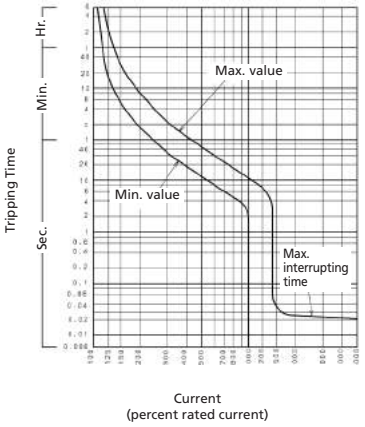


Pressure-type wire connector directly connected

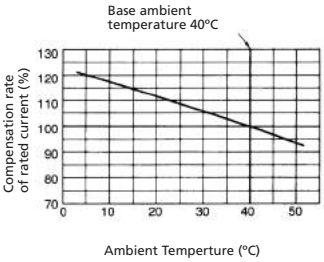
■ Internal Diagram Connection



RXK250-S/RXK250-H

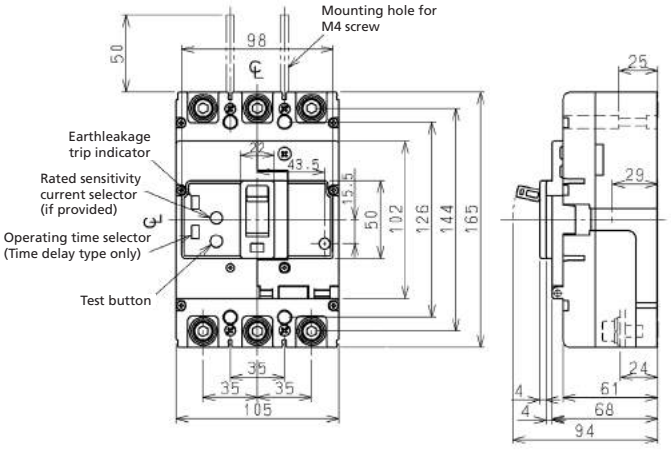


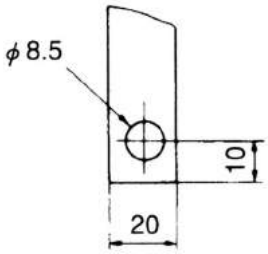
Overcurrent Tripping Characteristic Curve



Temperature Compensation Curve

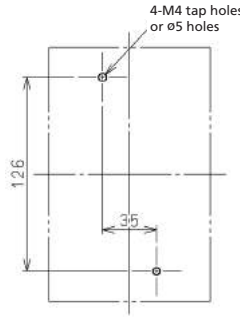
■ Dimensions



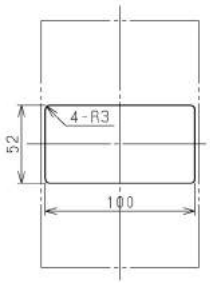


Direct-connected bus drilling

■ Drilling Plan



For front mounting bolts

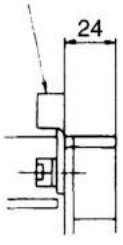


1mm clearance on each side of handle

Frontplate cutout

■ Terminal Arrangement

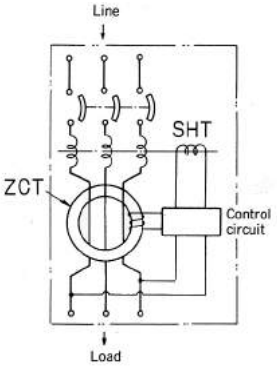
Maximum applicable pressure t-ype wire connector = 60mm^2
Special pressure type wire connector is attached for 175 – 225A as shown on the right table



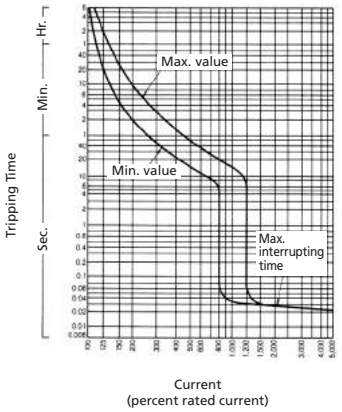
Pressure type wire connector directly connected

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

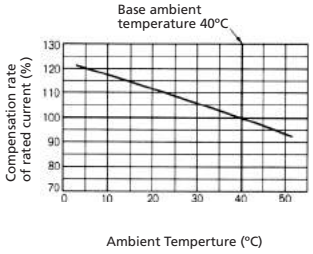
■ Internal Diagram Connection



EX400/RX400

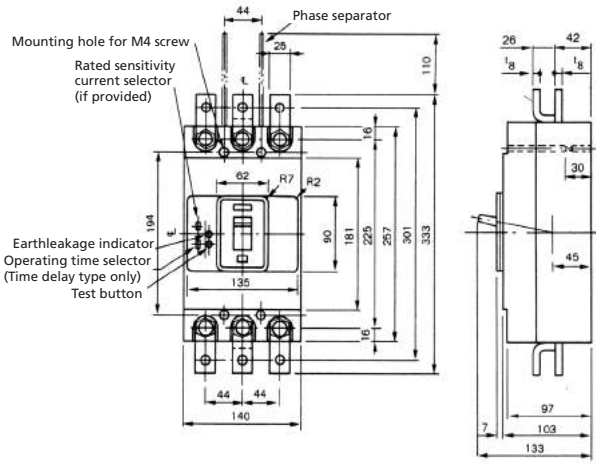


Overcurrent Tripping Characteristic Curve

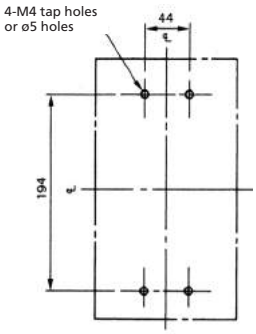


Temperature Compensation Curve

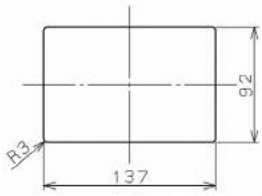
■ Dimensions



■ Drilling Plan



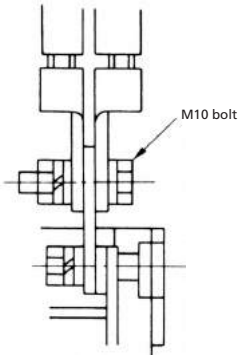
For front mounting bolts



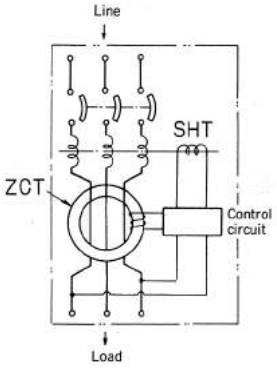
1mm clearance on each side of handle

Frontplate cutout

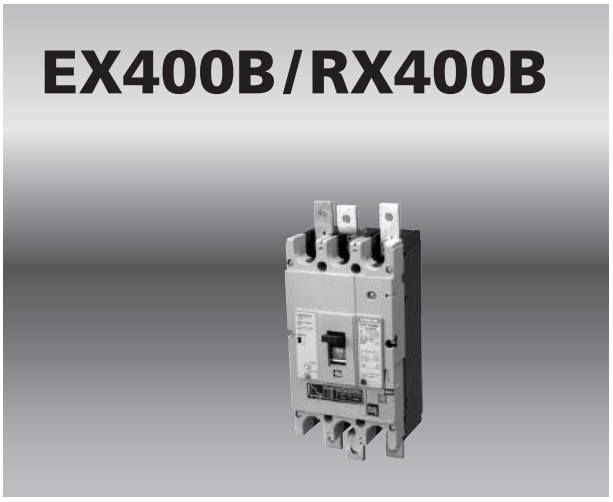
■ Terminal Arrangement

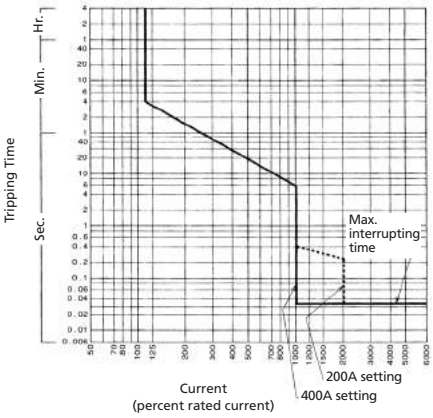


■ Internal Diagram Connection



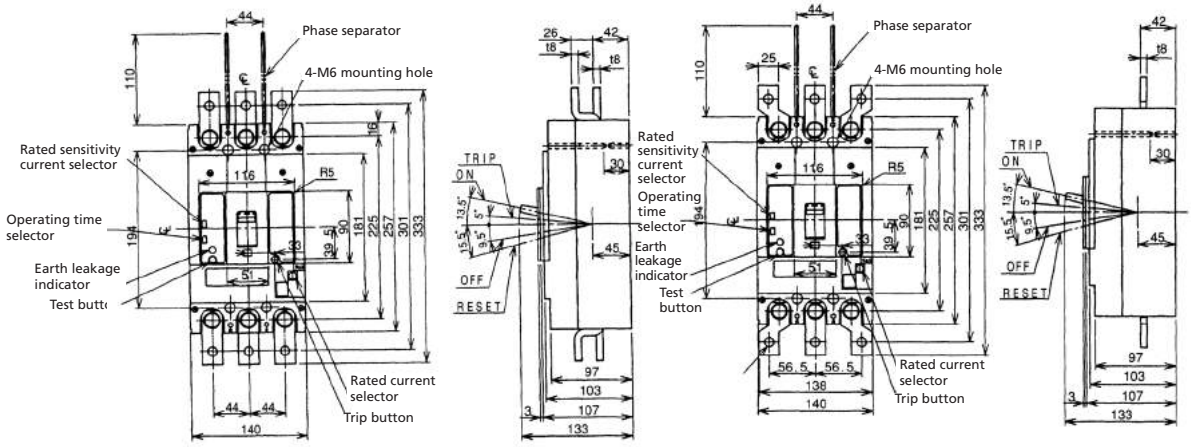
EX400B/RX400B



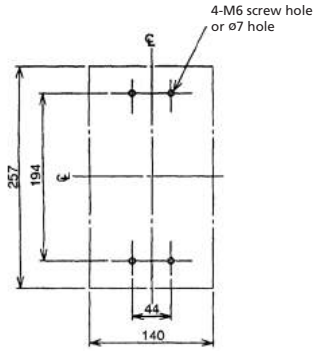


Overcurrent Tripping Characteristic Curve

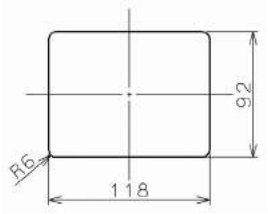
■ Dimensions



■ Drilling Plan



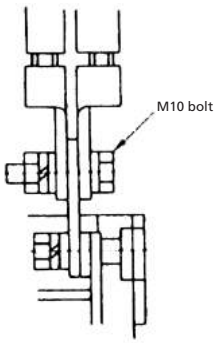
For front mounting bolts



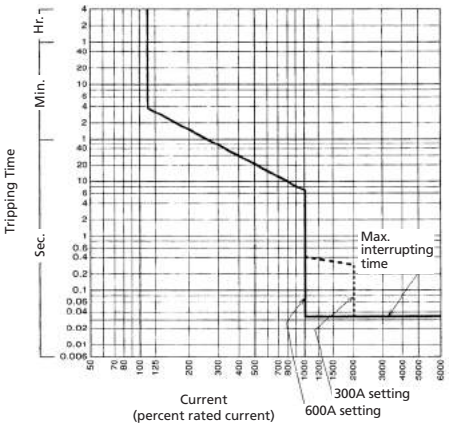
1mm clearance on each side of handle

Frontplate cutout

■ Terminal Arrangement

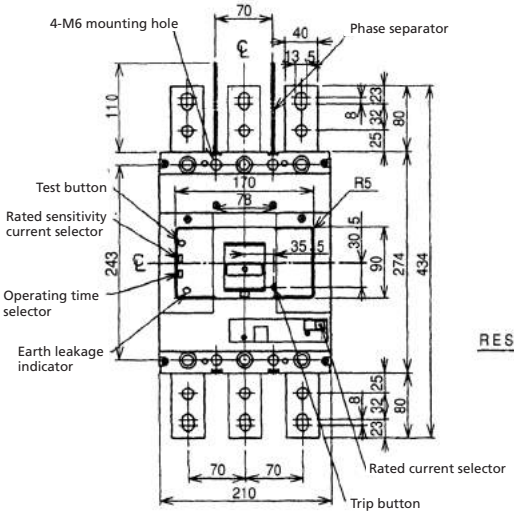


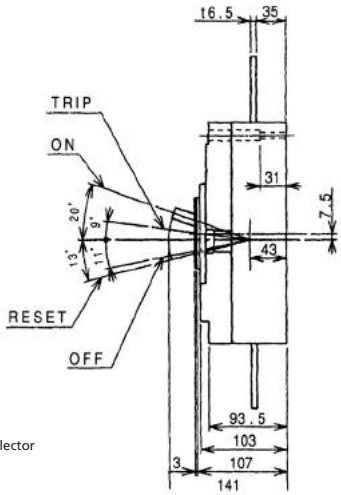
EX600B/RX600B



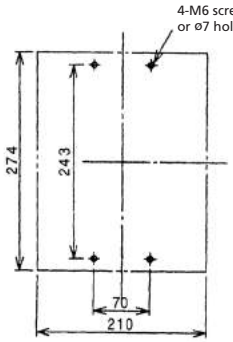
Overcurrent Tripping Characteristic Curve

■ Dimensions

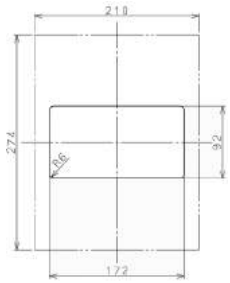




■ Drilling Plan



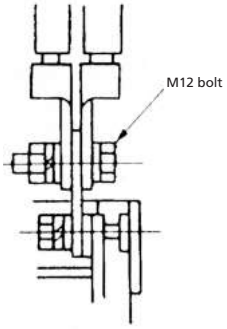
For front mounting bolts



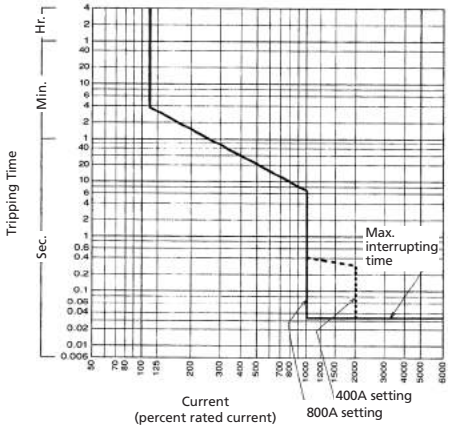
1mm clearance on each side of handle

Frontplate cutout

■ Terminal Arrangement

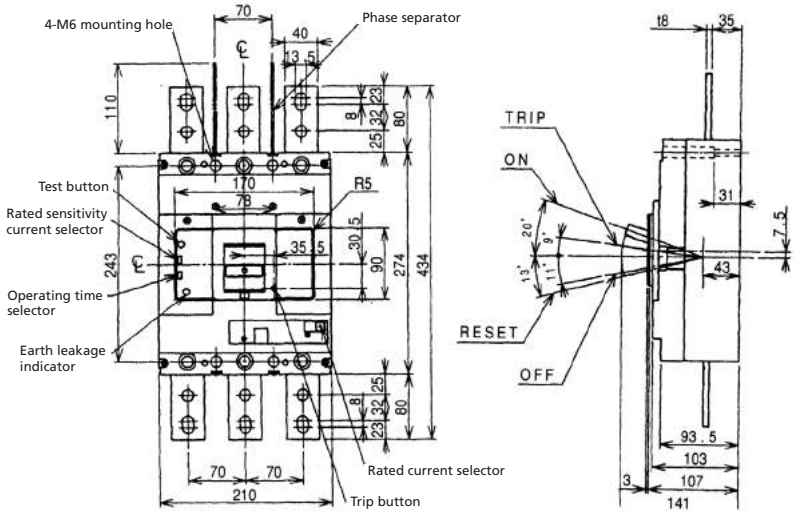


EX800B/RX800B

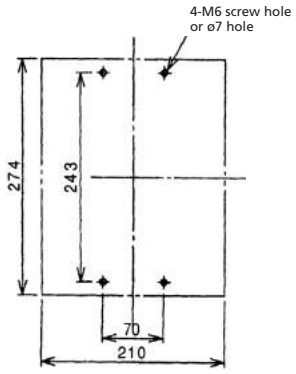


Overcurrent Tripping Characteristic Curve

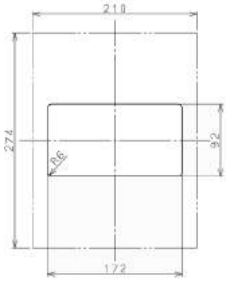
■ Dimensions



■ Drilling Plan



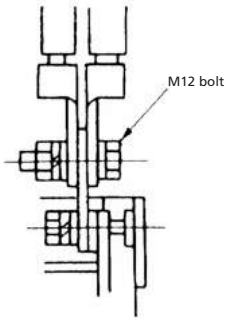
For front mounting bolts



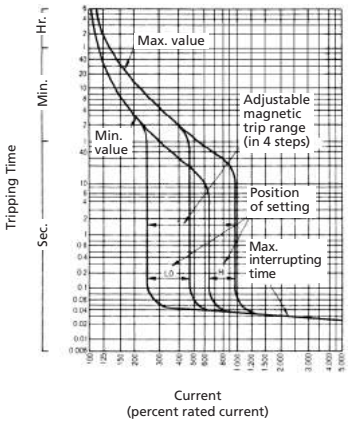
1mm clearance on each side of handle

Frontplate cutout

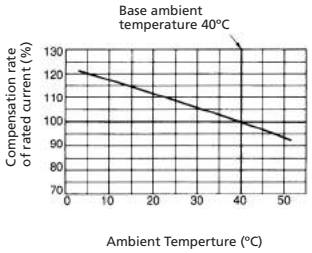
■ Terminal Arrangement



RF-1000KN

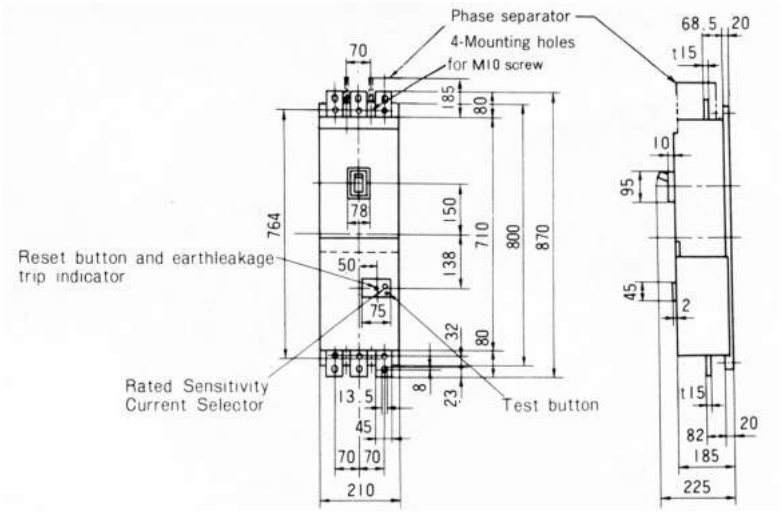


Overcurrent Tripping Characteristic Curve

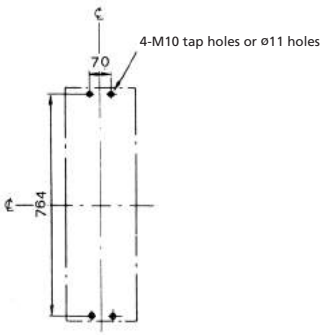


Temperature Compensation Curve

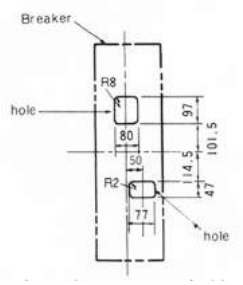
■ Dimensions



■ Drilling Plan



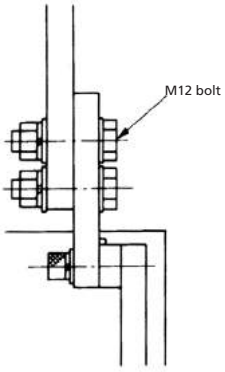
For front mounting bolts



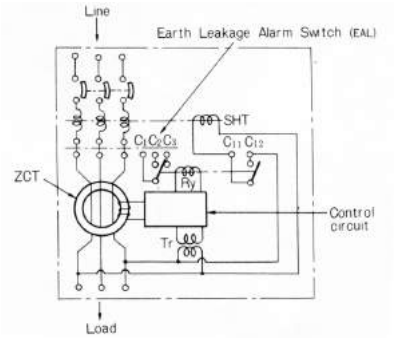
1mm clearance on each side of handle

Frontplate cutout

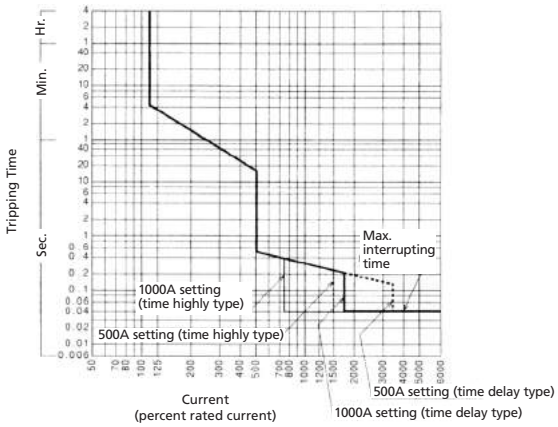
■ Terminal Arrangement



■ Internal Diagram Connection

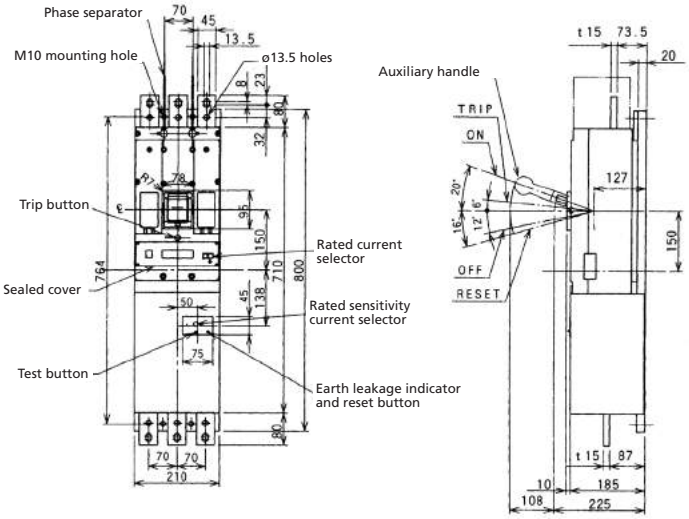


RF-1000CBN

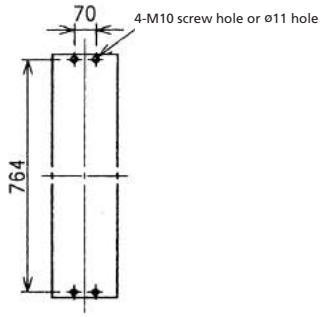


Overcurrent Tripping Characteristic Curve

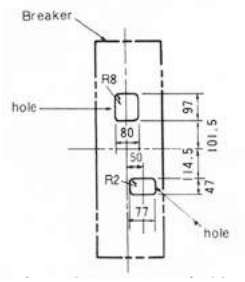
■ Dimensions



■ Drilling Plan



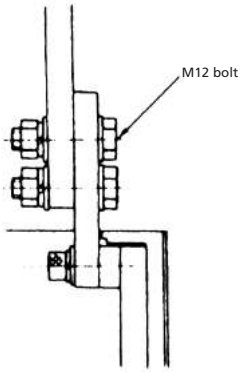
For front mounting bolts



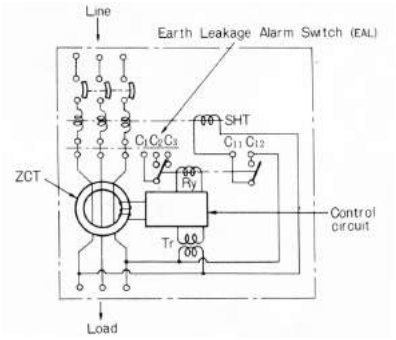
1mm clearance on each side of handle

Frontplate cutout

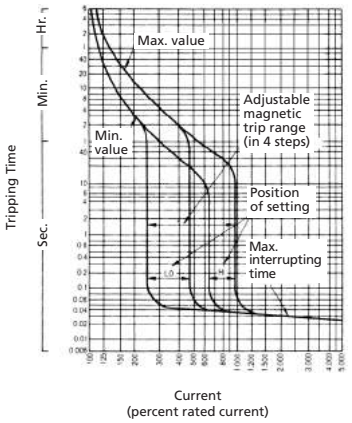
■ Terminal Arrangement



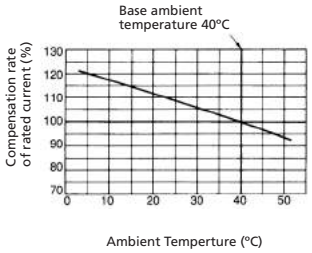
■ Internal Diagram Connection



RF-1200KN

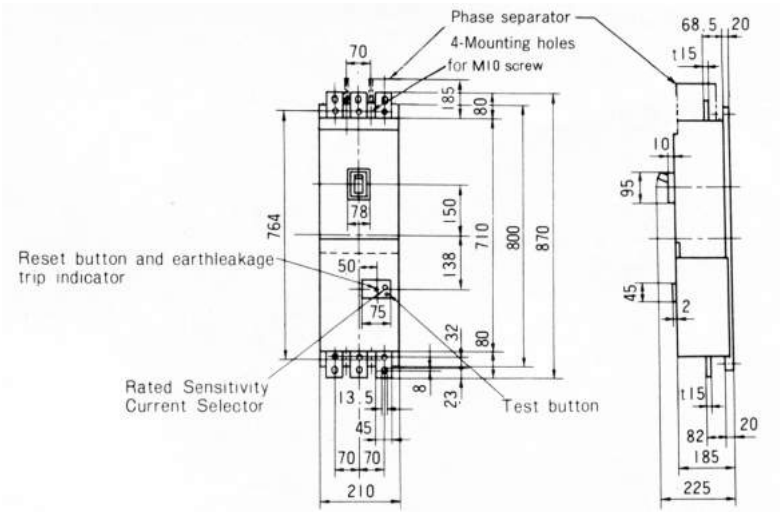


Overcurrent Tripping Characteristic Curve

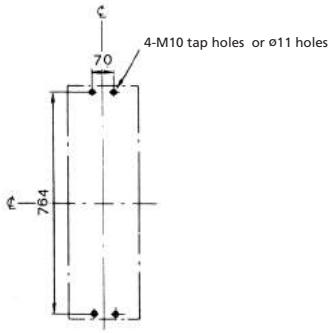


Temperature Compensation Curve

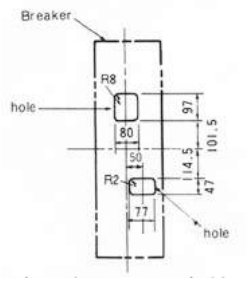
■ Dimensions



■ Drilling Plan



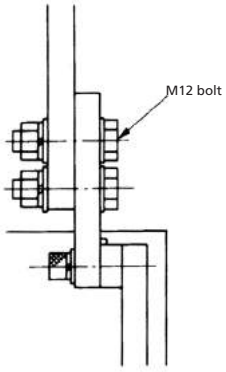
For front mounting bolts



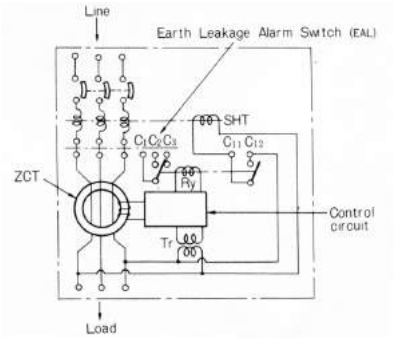
1mm clearance on each side of handle

Frontplate cutout

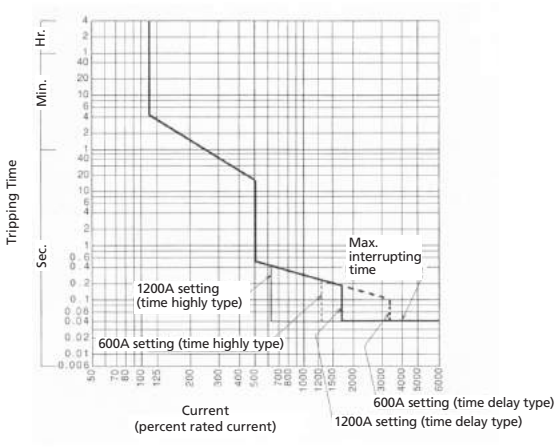
■ Terminal Arrangement



■ Internal Diagram Connection

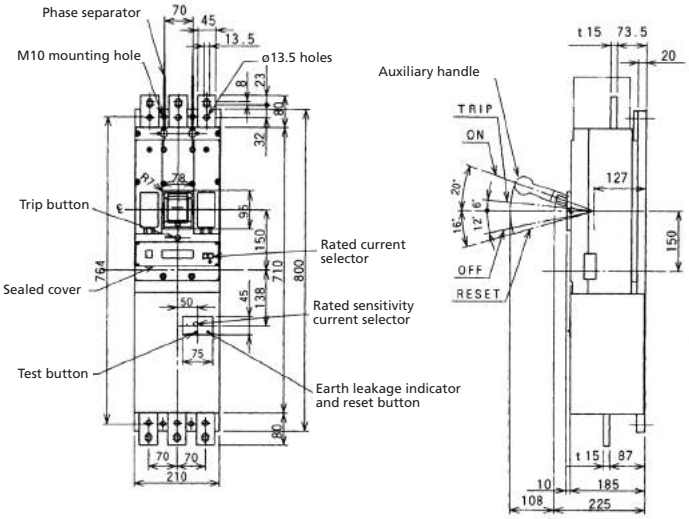


RF-1200CBN

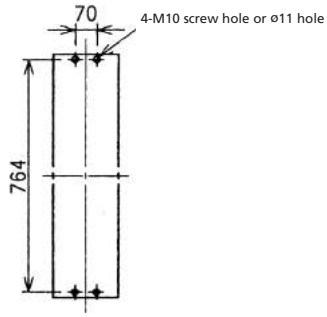


Overcurrent Tripping Characteristic Curve

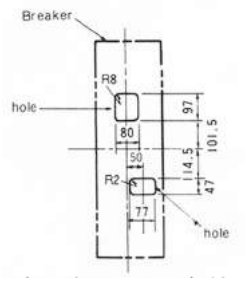
■ Dimensions



■ Drilling Plan



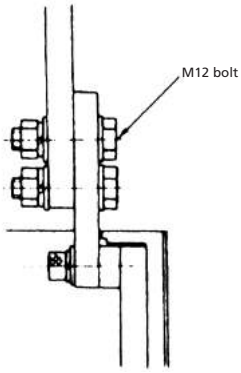
For front mounting bolts



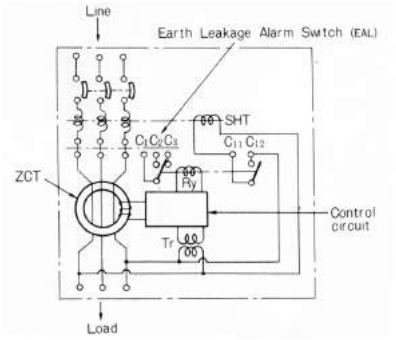
1mm clearance on each side of handle

Frontplate cutout

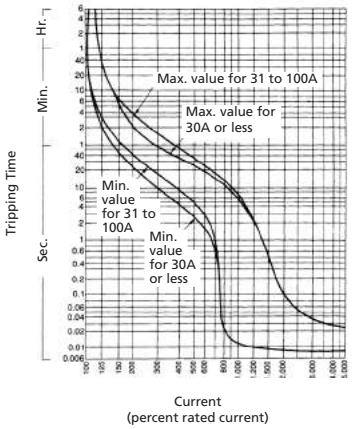
■ Terminal Arrangement



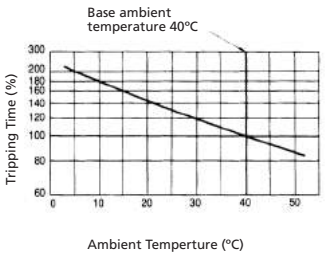
■ Internal Diagram Connection



RX100 4P

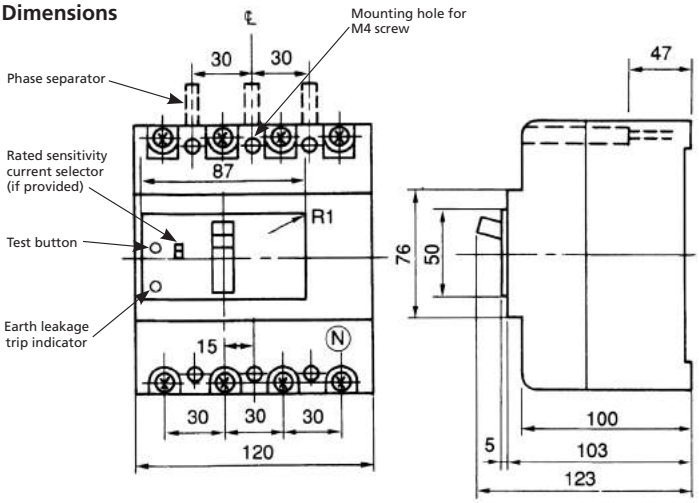


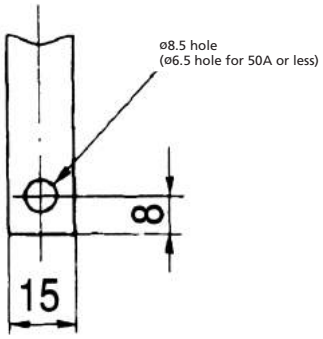
Overcurrent Tripping Characteristic Curve



Temperature Compensation Curve

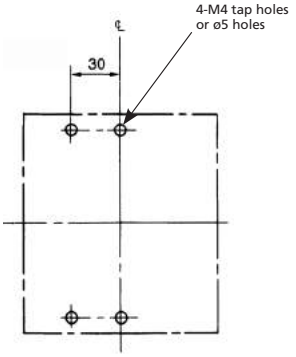
■ Dimensions



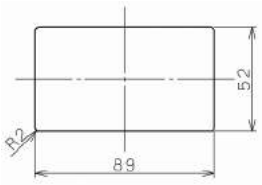


Direct-connected bus drilling

■ Drilling Plan



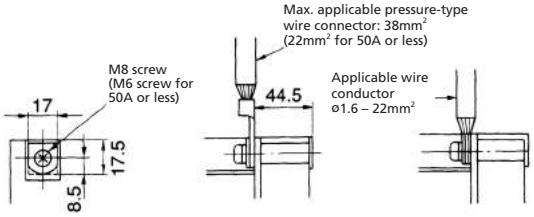
For front mounting bolts



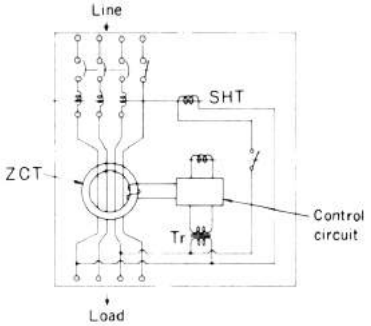
Center of handle

Frontplate cutout

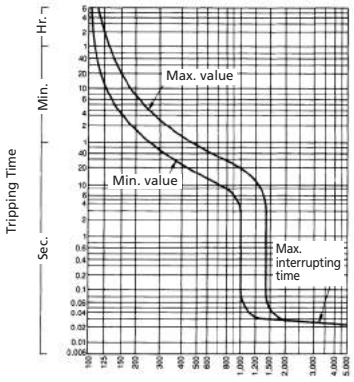
■ Terminal Arrangement



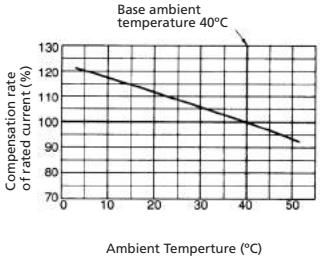
■ Internal Diagram Connection



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

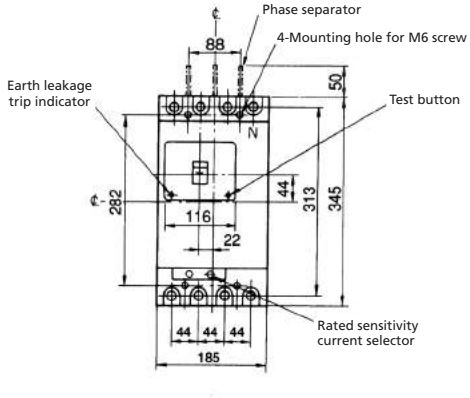


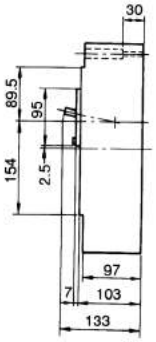
Overcurrent Tripping Characteristic Curve

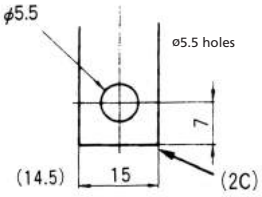


Temperature Compensation Curve

■ Dimensions

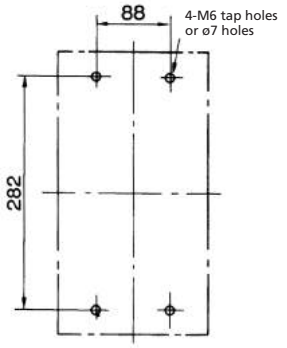




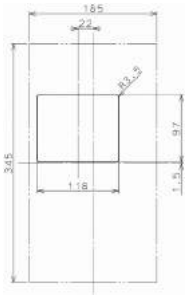


Direct-connected bus drilling

■ Drilling Plan



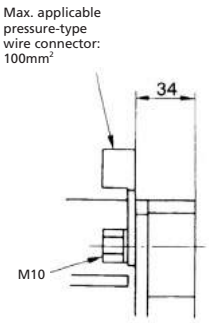
For front mounting bolts



1mm clearance on each side of handle

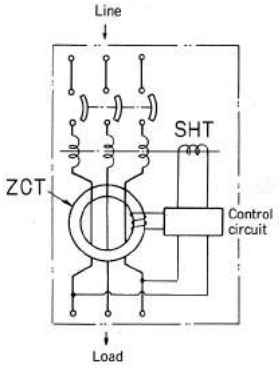
Frontplate cutout

■ Terminal Arrangement

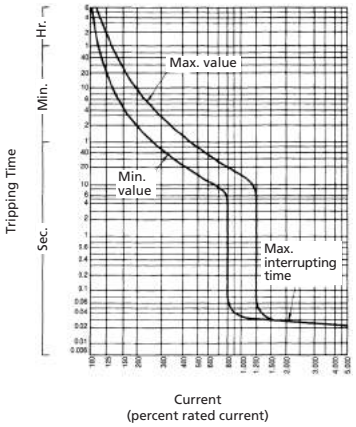


Bus or pressure-type wire connector connection

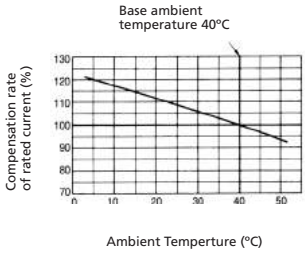
■ Internal Diagram Connection



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

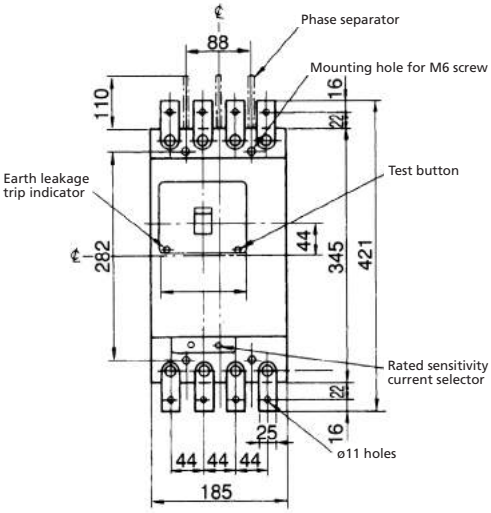


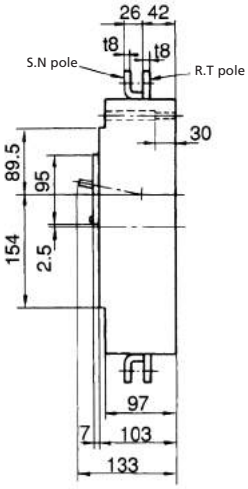
Overcurrent Tripping Characteristic Curve



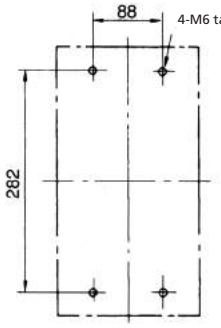
Temperature Compensation Curve

■ Dimensions





■ Drilling Plan

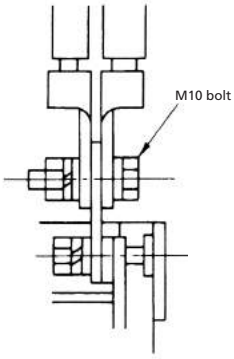


For front mounting bolts

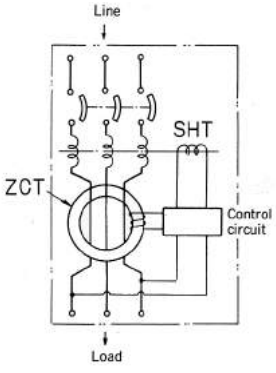
1mm clearance on each side of handle

Frontplate cutout

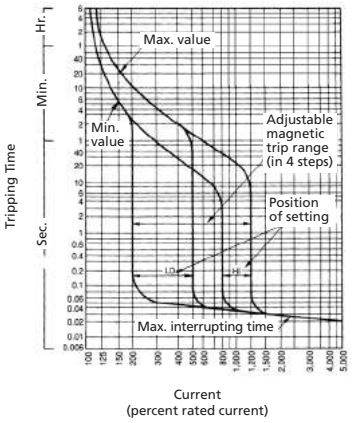
■ Terminal Arrangement



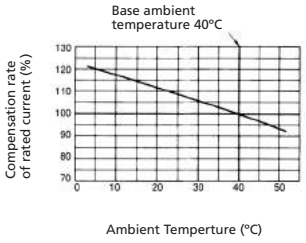
■ Internal Diagram Connection



RF-600FN 4P

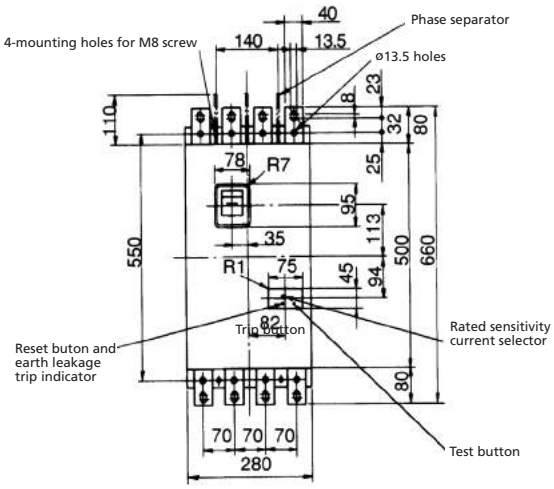


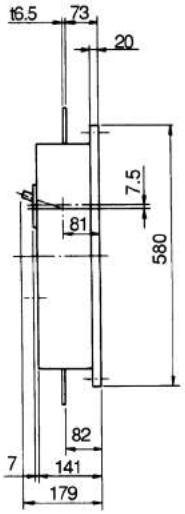
Overcurrent Tripping Characteristic Curve



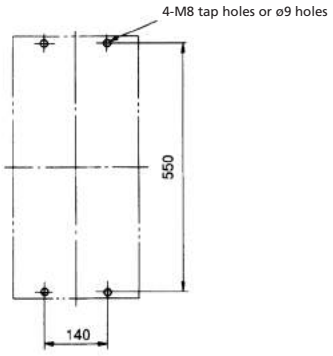
Temperature Compensation Curve

■ Dimensions

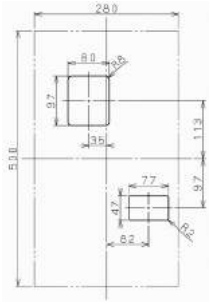




■ Drilling Plan



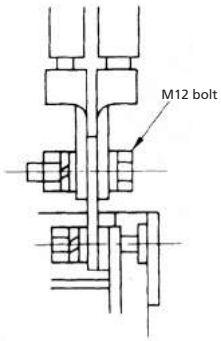
For front mounting bolts



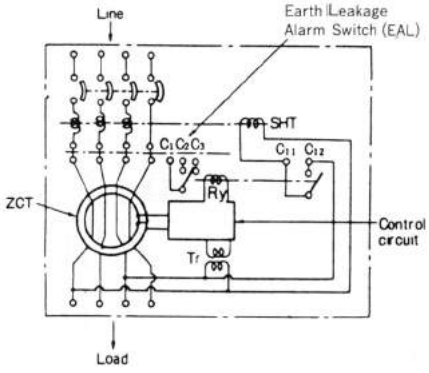
1mm clearance on each side of handle

Frontplate cutout

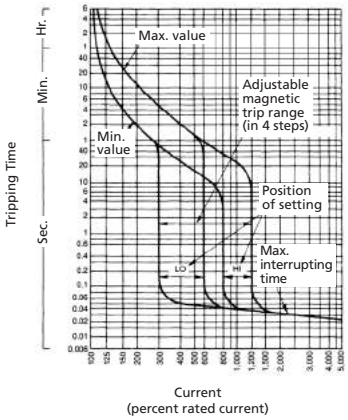
■ Terminal Arrangement



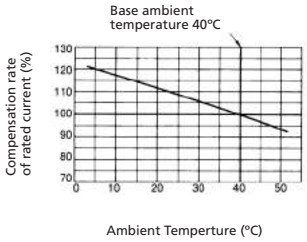
■ Internal Diagram Connection



RF-800KN 4P

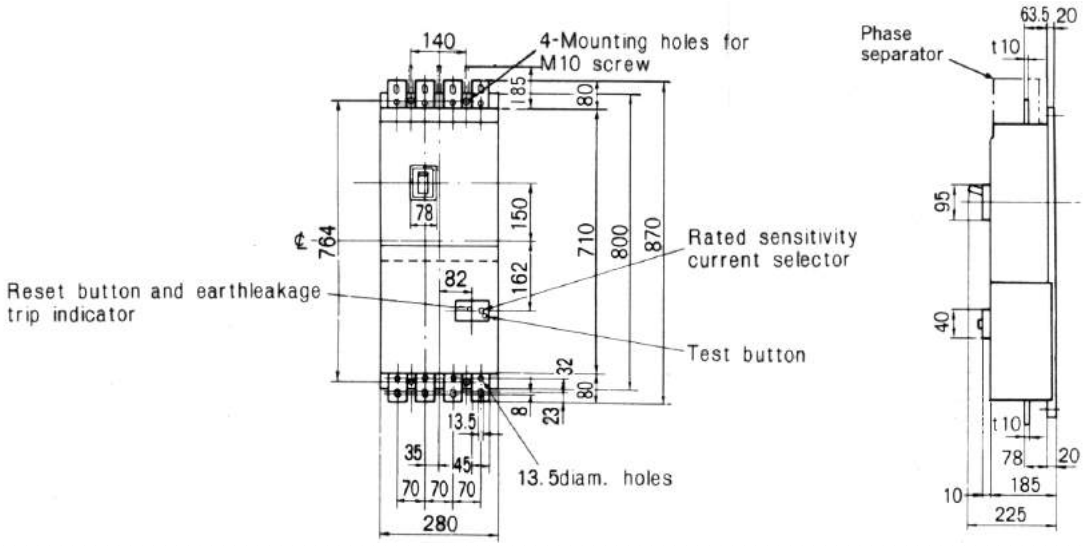


Overcurrent Tripping Characteristic Curve

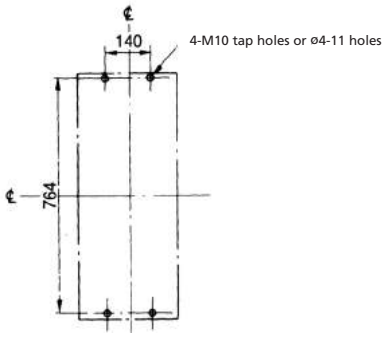


Temperature Compensation Curve

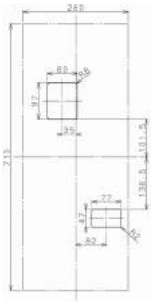
■ **Dimensions**



■ **Drilling Plan**



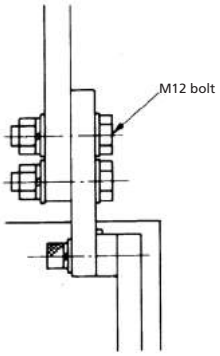
For front mounting bolts



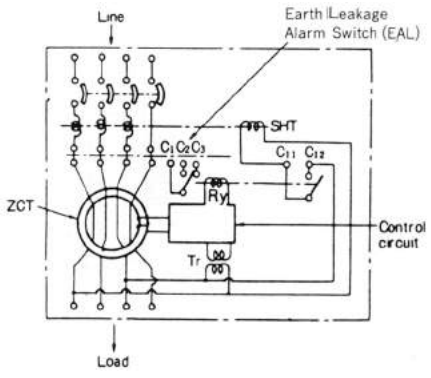
1mm clearance on each side of handle

Frontplate cutout

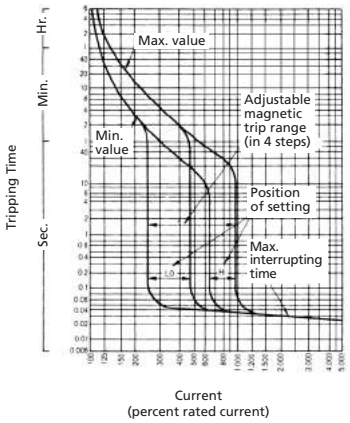
■ **Terminal Arrangement**



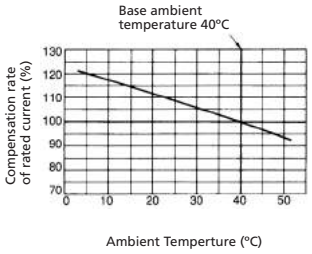
■ **Internal Diagram Connection**



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

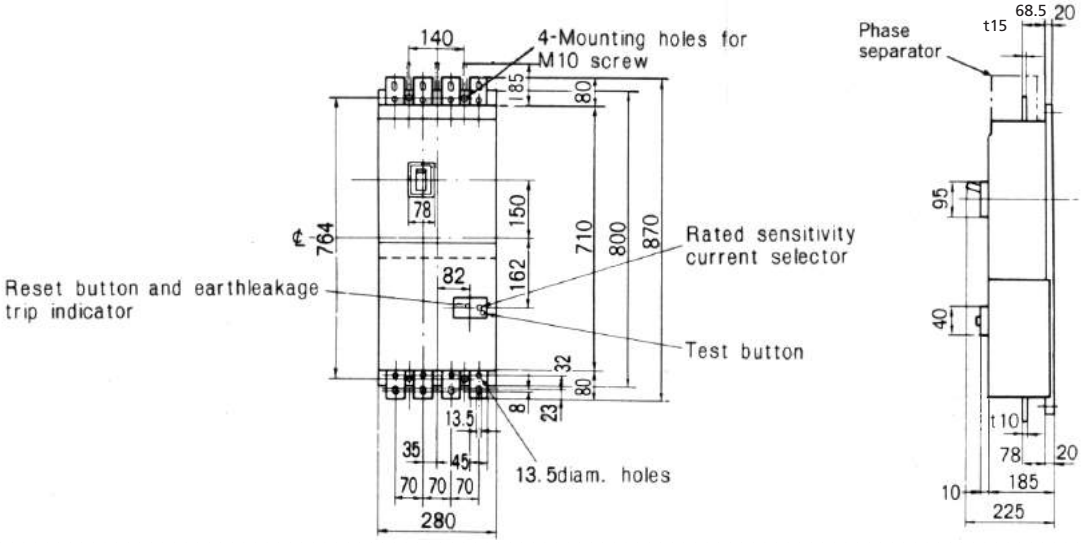


Overcurrent Tripping Characteristic Curve

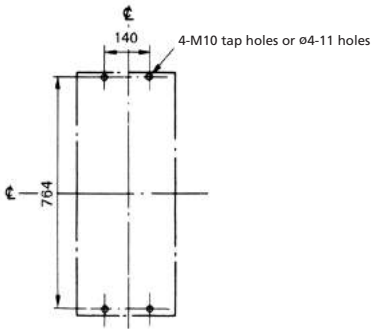


Temperature Compensation Curve

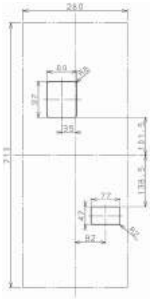
■ Dimensions



■ Drilling Plan



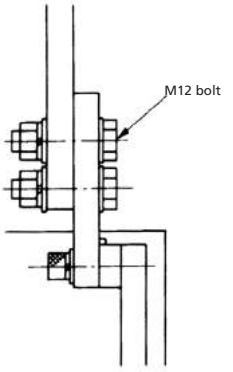
For front mounting bolts



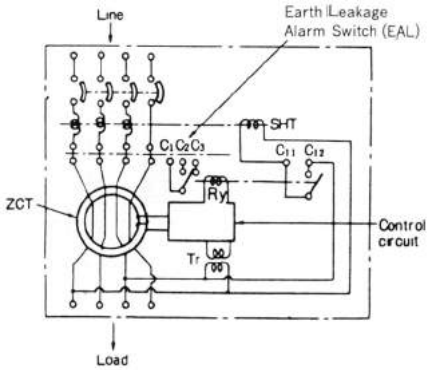
1mm clearance on each side of handle

Frontplate cutout

■ Terminal Arrangement

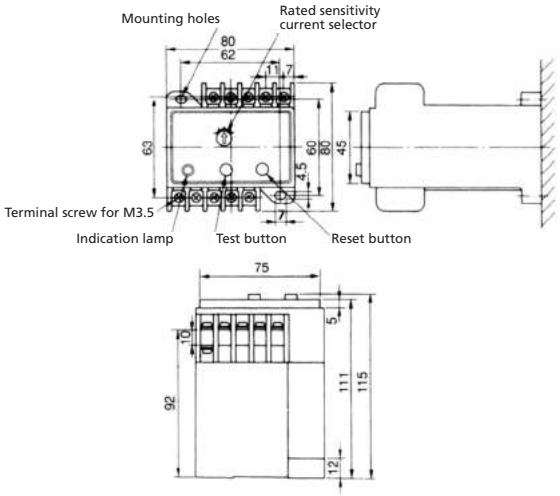


■ Internal Diagram Connection

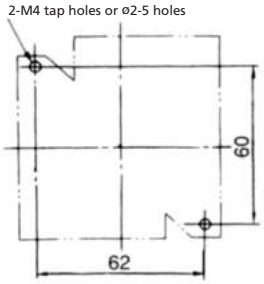


R-NZB

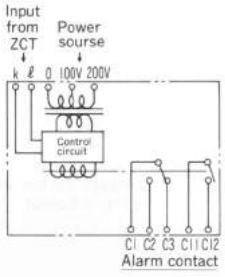
■ Dimensions



■ Drilling Plan

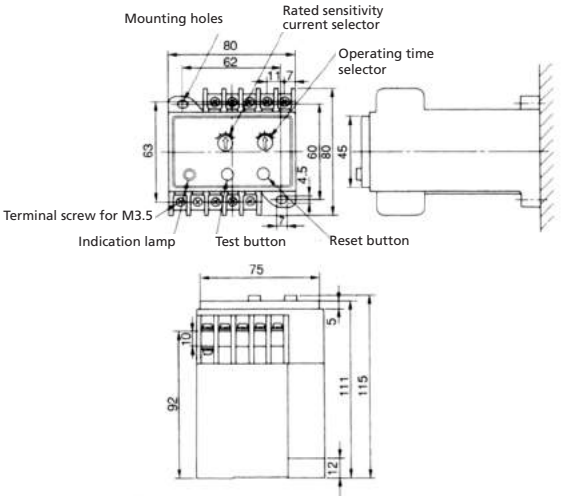


■ Internal Diagram Connection

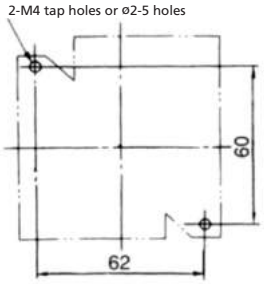


R-NZBT

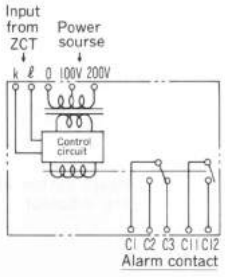
■ Dimensions



■ Drilling Plan

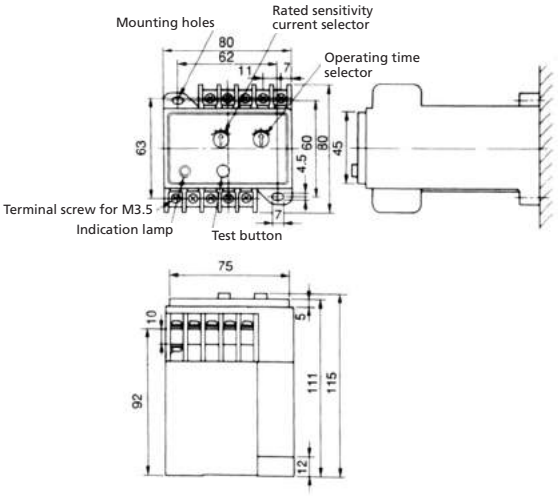


■ Internal Diagram Connection

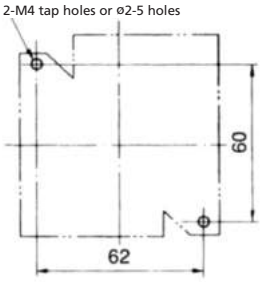


R-NZBK

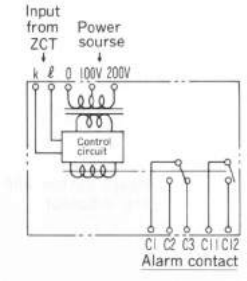
■ Dimensions



■ Drilling Plan

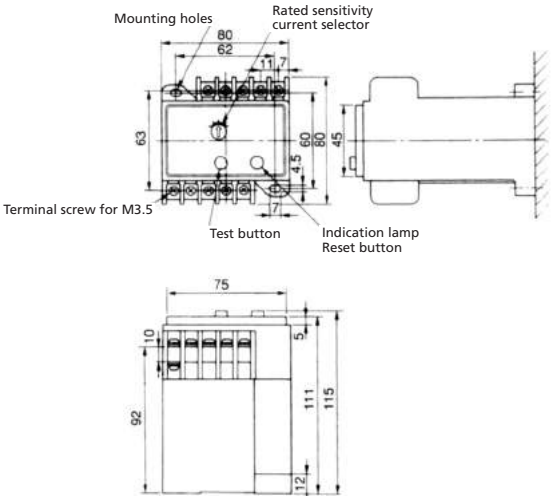


■ Internal Diagram Connection

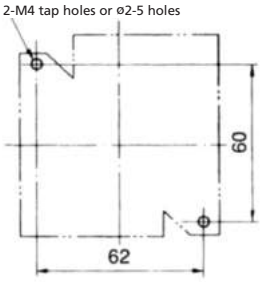


R-NZBL

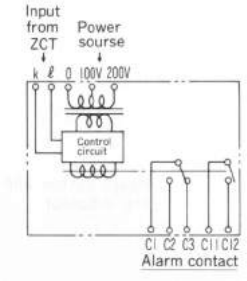
■ Dimensions



■ Drilling Plan



■ Internal Diagram Connection



R-NZBR

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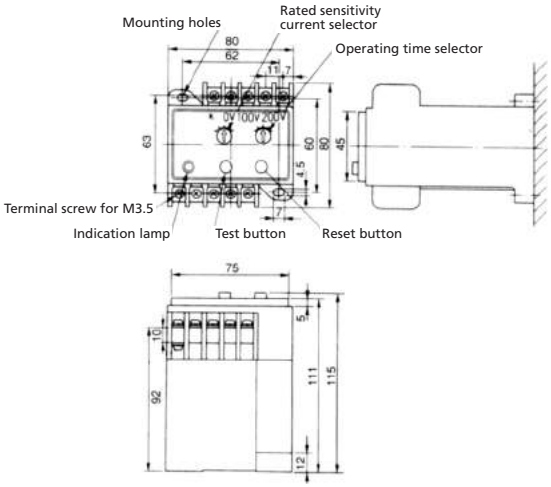
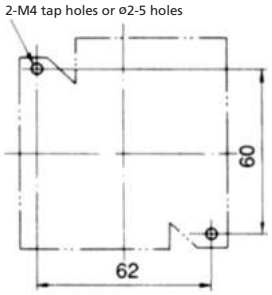
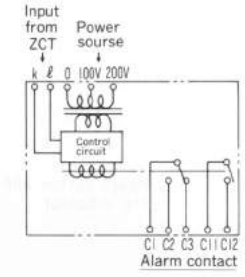


■ Drilling Plan

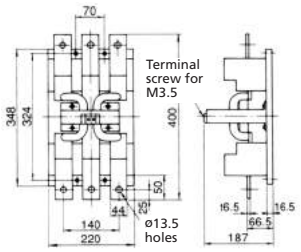


■ Internal Diagram Connection

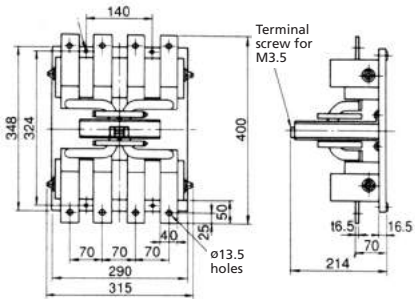


Z-400B

■ Dimensions

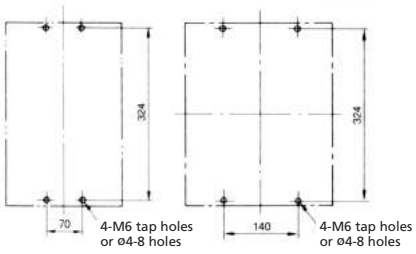


3 pole



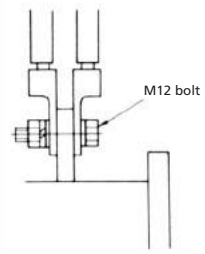
4 pole

■ Drilling Plan



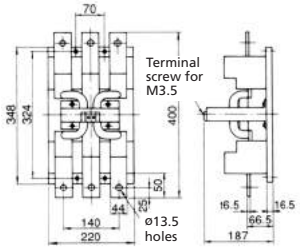
3 pole 4 pole

■ Terminal Arrangement

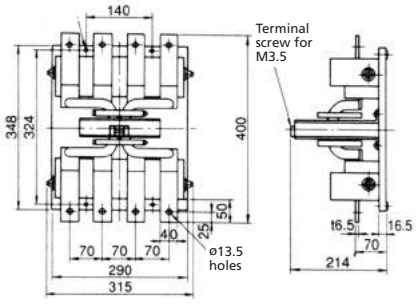


Z-600B

■ Dimensions

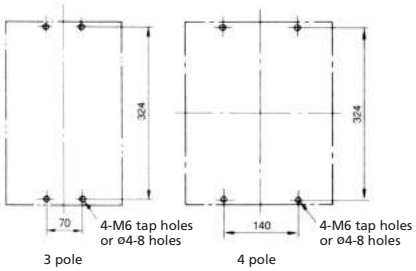


3 pole



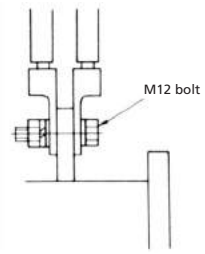
4 pole

■ Drilling Plan



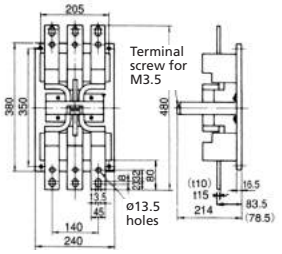
3 pole 4 pole

■ Terminal Arrangement

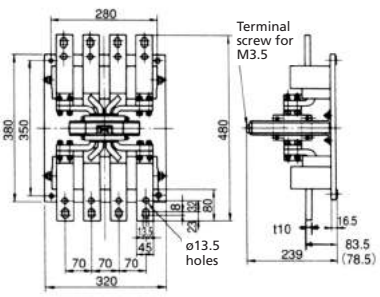


Z-800B

■ Dimensions

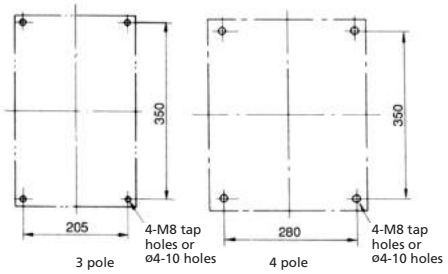


3 pole



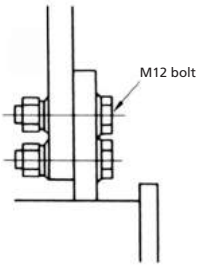
4 pole

■ Drilling Plan



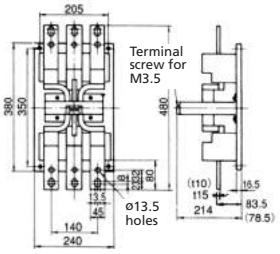
3 pole 4 pole

■ Terminal Arrangement

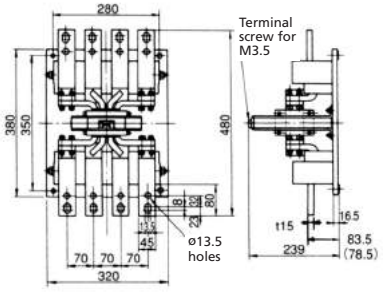


Z-1000B

■ Dimensions

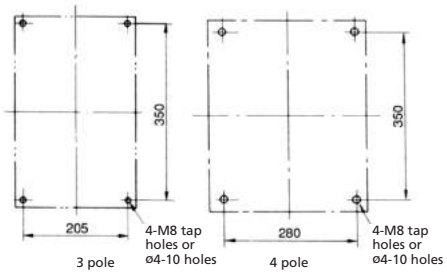


3 pole



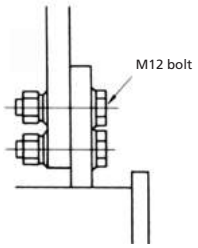
4 pole

■ Drilling Plan



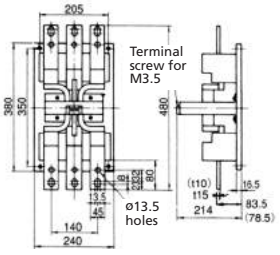
3 pole 4 pole

■ Terminal Arrangement

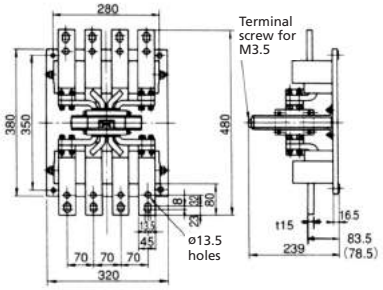


Z-1200B

■ Dimensions

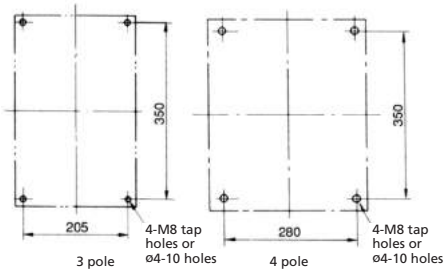


3 pole



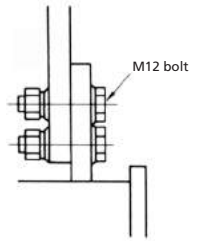
4 pole

■ Drilling Plan



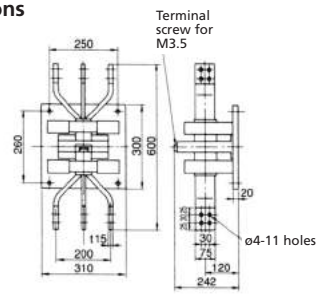
3 pole 4 pole

■ Terminal Arrangement

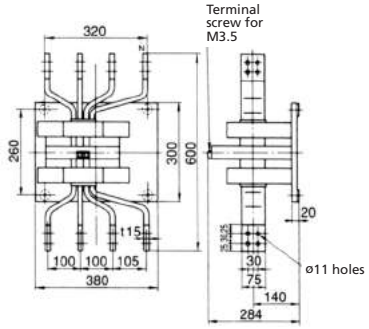


Z-2000B

■ Dimensions

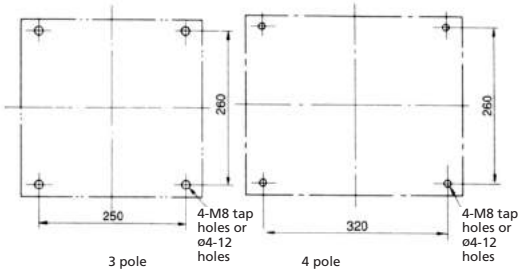


3 pole



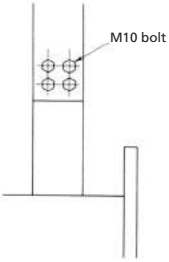
4 pole

■ Drilling Plan

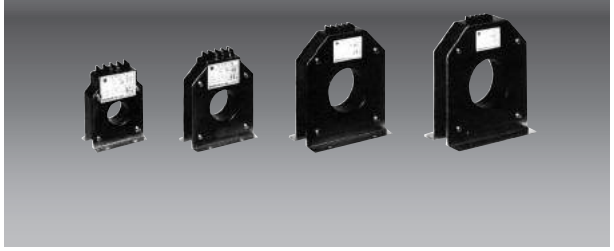


3 pole 4 pole

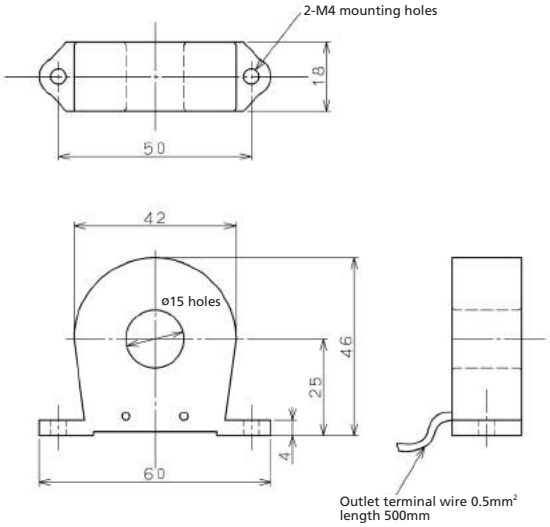
■ Terminal Arrangement



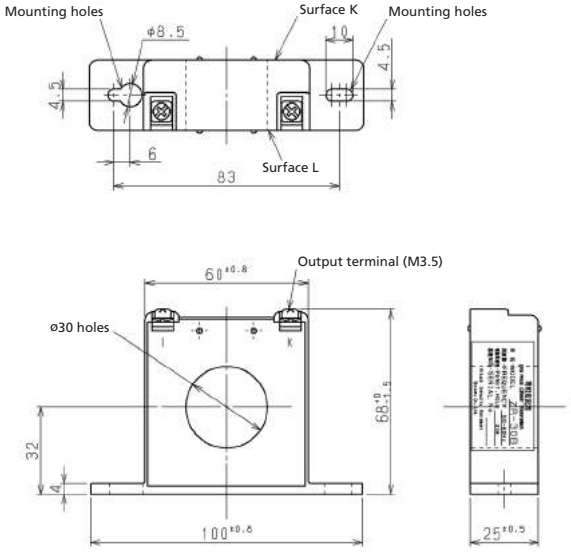
ZR-15 — 120



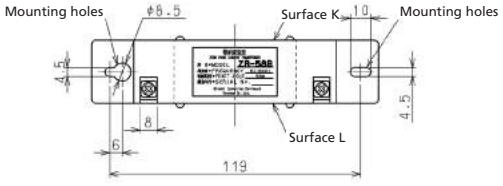
■ Dimensions

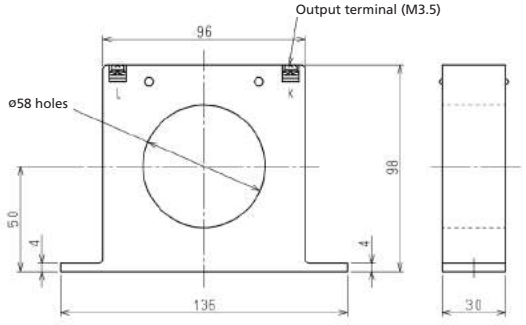


ZR-15

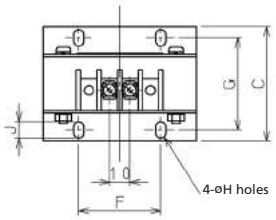


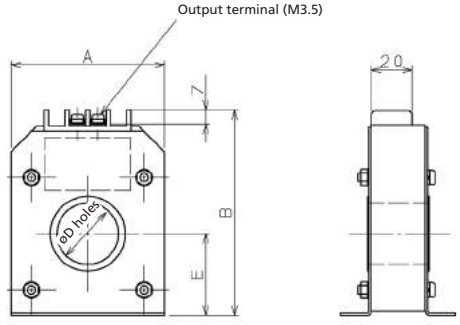
ZR-30B





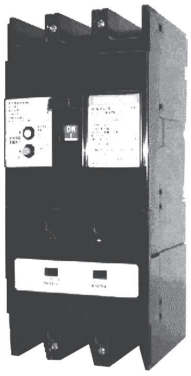
ZR-58B



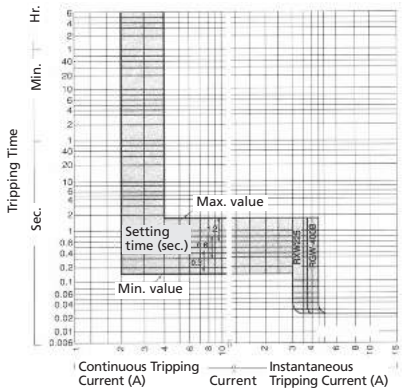


ZR-65 — 120

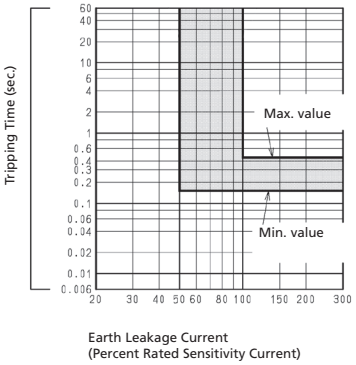
Type	A	B	C	D	E	F×G	H	J	(kg)
ZR-65	145	170	79	Ø65	75	80×60	Ø6	6	1.6
ZR-80	172	198	89	Ø80	90	100×65	Ø6	6	2.0
ZR-100	185	222	90	Ø100	100	110×65	Ø8	8	2.5
ZR-120	226	264	95	Ø120	120	140×70	Ø9.5	9.5	3.0



RXW225



Overcurrent Tripping Characteristic Curve



Earth Leakage Tripping Characteristic Curve (at 0.3 sec.)

■ Ratings and Specifications

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

Note:
* Interchangeable by manual operation.
** Earth leakage tripping time and continuous current tripping time are interlocked.

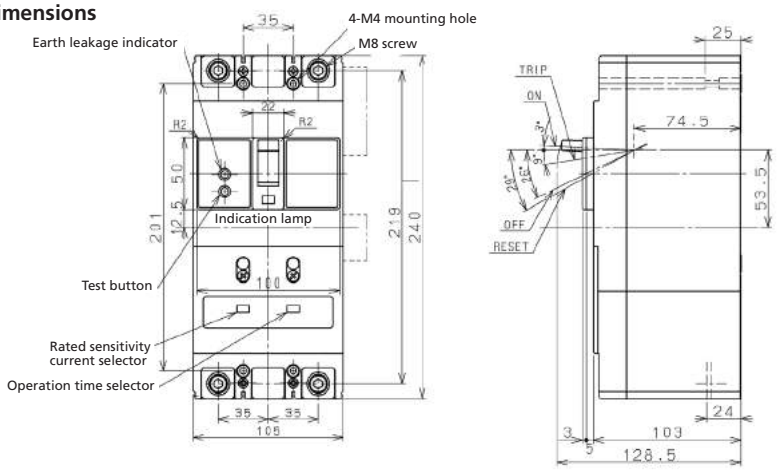
■ Selection

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

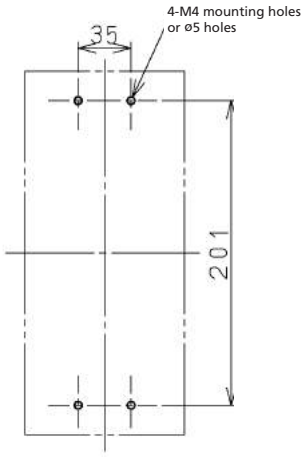
( ): for reference value

RXW225

■ **Dimensions**

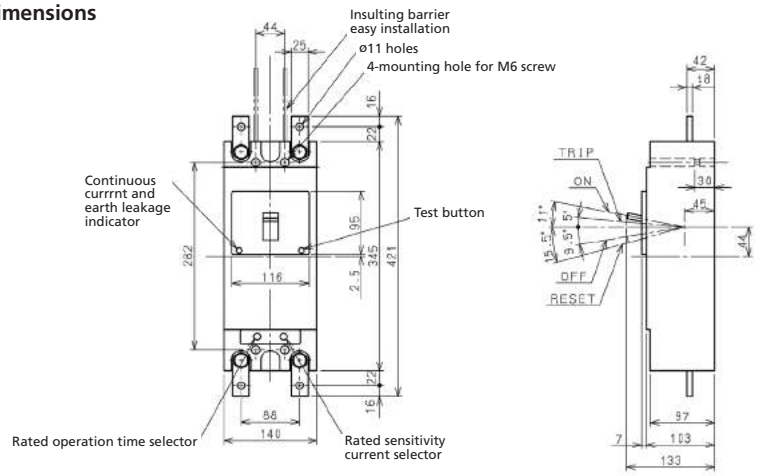


■ **Drilling Plan**

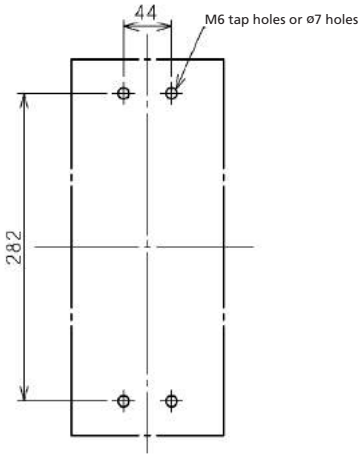


RGW-400B

■ **Dimensions**



■ **Drilling Plan**

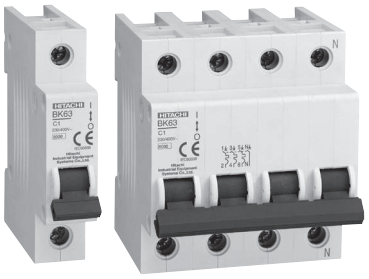
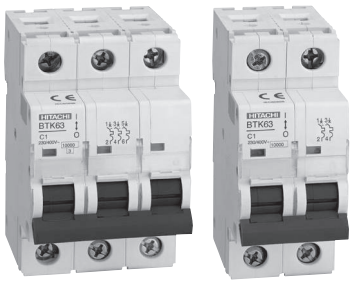


Miniature Circuit Breakers

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

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

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

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

Tripping Characteristics

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

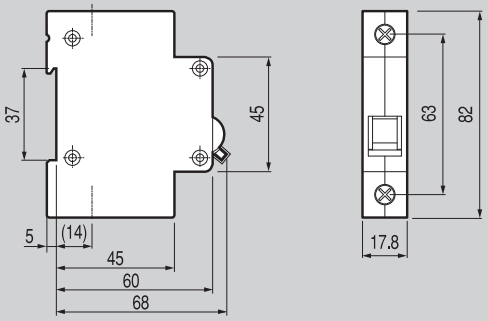
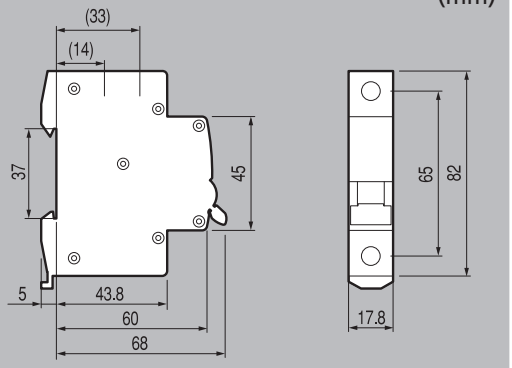
Approval

- **CE marking**
- **CB Certificate**

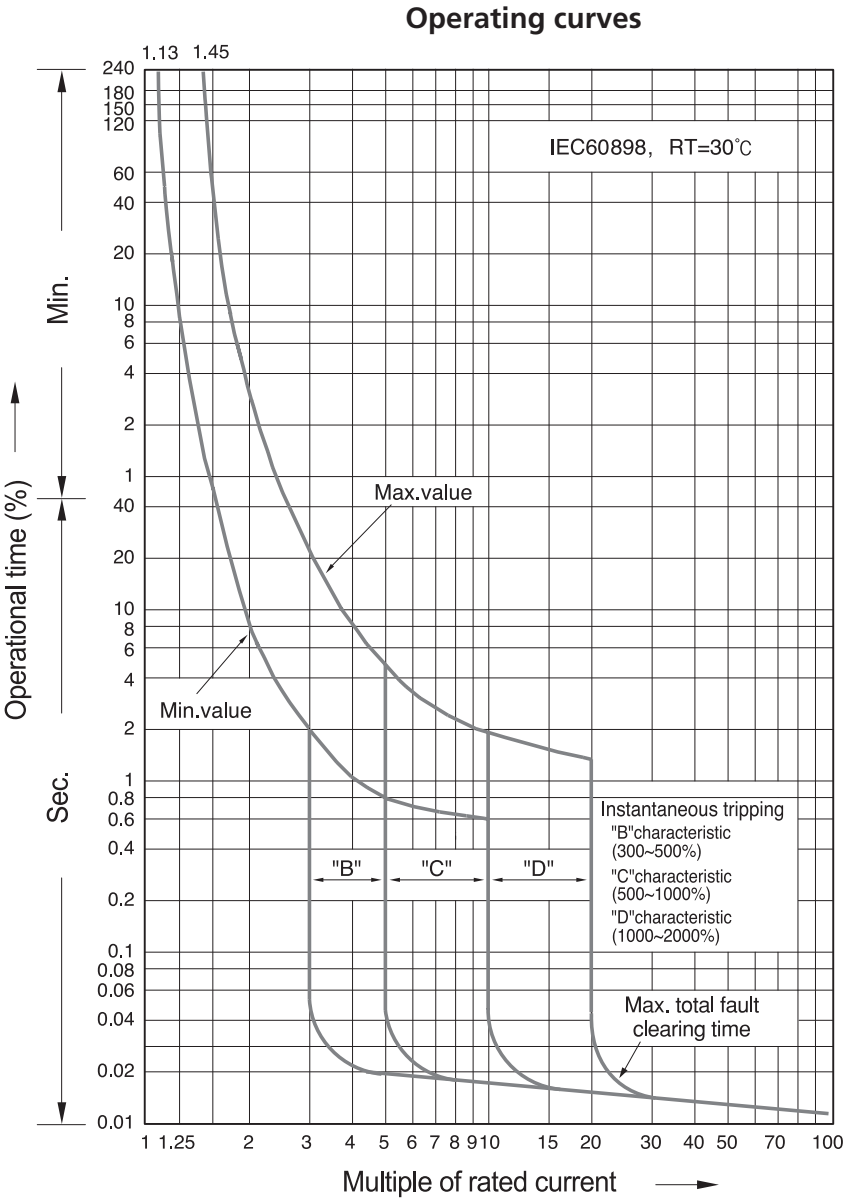
Colored Handles

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	Cupper-colored

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 2.5mm^2 **9mm wide**		Not applicable	
Dimension	(mm) 		(mm) 	

■ Characteristic curve For type BK63, BTK63



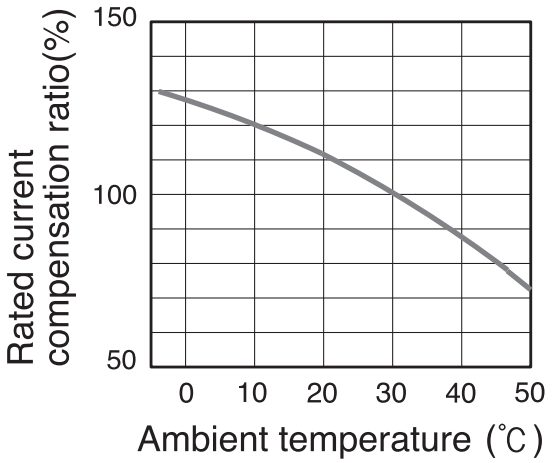
■ Compensation table

[Temperature copensation table](IEC60898-1)

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

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

■ Compensation curve



Residual Current Circuit Breakers

RCCB is applicable to electric circuits with rated voltage 240/415VAC, frequency 50/60Hz and rated current up to63A. 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

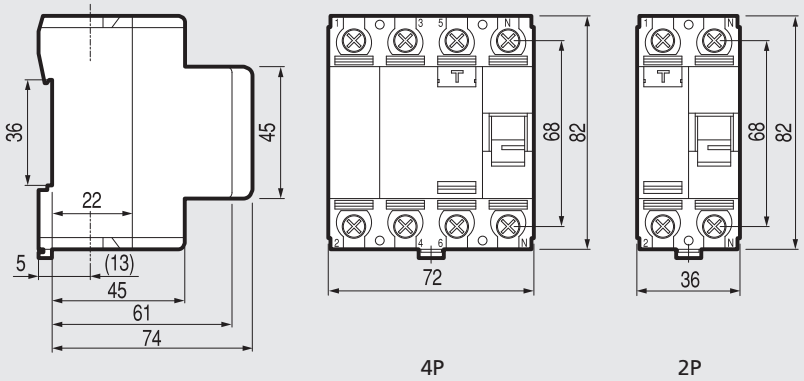
- **CE marking**
- **CB Certificate**

Colored Handles

- Black only.

SPECIFICATIONS

Type	RK63
Protection	Ground fault
Rated current	25, 32, 40, 63A
Operating IΔn	30, 100, 300mA (non-adjustable)
Non operating IΔn	0.5IΔn
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	(mm)



■ 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

ORDERING
ACB & Accessories

AKH — 10 D 3 — 10 J

Type

AKH
AKS
AKN

Ampere frmae

AKH	AKN	-	-
		06	630AF
		08	830AF
		10	1000AF
		13	1250AF
		16	1600AF
	AKS	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

AKH	AKS	20	2000AF
		25	2500AF
		32	3200AF
		40	4000AF

D	3P/4P Standard type RST (N)
W	4P Reverse phase type NRST

3	3P (E)
4	4P (E, X)

06	630A
08	800A
10	1000A
13	1250A
16	1600A
20	2000A
25	2500A
32	3200A
40	4000A

AKS	40	4000AF
	50	5000AF

D	3P/4P Standard type RST(N)
W	4P Reverse phase type NRST

3	3P (F)
4	4P (F, Y)

40	4000A
50	5000A

AKH	AKS	40	4000AF
		50	5000AF
		63	6300AF

D	3P/4P Standard type RST(N)
W	4P Reverse phase type NRST

3	3P (G)
4	4P (G, Z)

40	4000A
50	5000A
63	6300A

M1 D1 D1 AX NG0 U1 AL

Motor rated voltage	
MA	Without Motor
M1	AC/DC 100 – 130V
M2	AC/DC 200 – 250V
M3	DC 125V
M4	DC 24 – 30V
M5	DC 48 – 60V
M6	AC 380 – 415V
M7	AC 440 – 480V
M8	AC 48V

Shunt coil rated voltage	
D0	Without Shunt coil
D1	AC/DC 100 – 130V
D2	AC/DC 200 – 250V
D3	DC 125V
D4	DC 24 – 30V
D5	DC 48 – 60V
D6	AC 380 – 480V
D7	AC 48V

Trip relay

Closing coil rated voltage	
D0	Without Closing coil
D1	AC/DC 100 – 130V
D2	AC/DC 200 – 250V
D3	DC 125V
D4	DC 24 – 30V
D5	DC 48 – 60V
D6	AC 380 – 480V
D7	AC 48V

Closing coil rated voltage	
AX	Standard OFF-Charge 3a3b
AC	Standard ON-Charge 3a3b
BX	Standard OFF-Charge 5a5b
BC	Standard ON-Charge 5a5b
HX	High capacity OFF-Charge 5a5b
HC	High capacity ON-Charge 5a5b
CC	Standard ON-Charge 6a6b
JC	High capacity ON-Charge 6a6b

UVT coil rated voltage	
U0	Without UVT coil
U1	AC/DC 100 – 130V
U2	AC/DC 200 – 250V
U3	DC 125V
U4	DC 24 – 30V
U5	DC 48 – 60V
U6	AC 380 – 480V
U7	AC 48V

*UVT Delay module is available over AC/DC 48V

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

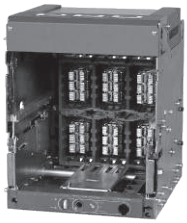
Note) 1. UVT and SHT2 aare alternative.
2. Other accessories should be ordered seperately.

ORDERING

Cradle

AL — N16D — 3 — J H E N

ACB cradle



Rated current & frmae

H16D	AKH-06 – 16D
H20D	AKH-20D
H32E	AKH-20 – 32E
H40E	AKH-40E
H50G	AKH-40 – 50G
H63G	AKH-63G
N16D	AKN-06 – 16D
S20D	AKS-20D
S32E	AKS-20 – 32E
S40E	AKS-40E
S50F	AKS-40 – 50F
S50G	AKS-40 – 50G
S63G	AKS-63G

No. of pole

3	3P
4	4P

Terminal connections

J	Manual connection
A	Automatic connection

Connections

H	Horizontal type
V	Vertical type
P	Front type
M	Mixed type Line: Horizontal Load: Vertical
N	Mixed type Line: Vertical Load: Horizontal

Safety shutter

E	Without safety shutter
F	With safety shutter

Arc cover

N	Without Arc cover
S	With Arc cover

ORDERING

Trip relay

N	G	0

Trip relay type	
0	Without trip relay
N	Normal

Communication & protection	
0	Without trip relay
0	Without comm.

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

Control voltage & frequency	
0	Without trip relay
0	Self-Power, 60Hz
5	Self-Power, 50Hz

A	Ammeter

G	
G	Earth leakage
Z	Earth leakage (extemal CT, fault current ≤ 30A)
E	Earth leakage (extemal CT, fault current > 30A)
C	Earth leakage + Comm.
K	Earth leakage (extemal CT, fault current ≤ 30A) + Comm.
X	Earth leakage (extemal CT, fault current > 30A) + Comm.

*LSIG configuration as standard
*Ground fault system
G, C: 4pole unit - fault current over 20% of rated currenty 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)

0	
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	
C	Earth leakage + Comm.
K	Earth leakage (extemal CT, fault current ≤ 30A) + Comm.
X	Earth leakage (extemal CT, fault current > 30A) + Comm.
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.)

1	
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	
C	Earth leakage + Comm.
K	Earth leakage (extemal CT, fault current ≤ 30A) + Comm.
X	Earth leakage (extemal CT, fault current > 30A) + Comm.
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.)

1	
1	AC/DC 100 – 250V, 60Hz
2	DC 24 – 60V, 60Hz
6	AC/DC 100 – 250V, 50Hz
7	DC 24 – 60V, 50Hz

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) AC 50/60Hz	(Icu)	IEC 60947-2	220V/230V/380V/415V	85					
		JISC 8201-2-1	460V/480V/500V	85					
			550V/600V/690V	65					
Rated service breaking capacity (kA)	(Ics)		...% x Icu	100%					
Rated making capacity (kA peak) AC 50/60Hz	(Icm)	IEC 60947-2	220V/230V/380V/415V	187					
		JISC 8201-2-1	460V/480V/500V	187					
			550V/600V/690V	143					
Rated shot-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)	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, 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	AKH-40G	AKH-50G	AKH-63G
630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
(0.4 – 1.0) x In max									(0.4 – 1.0) x In max		
630	800	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
1,000									1,000		
690									690		
12									12		
50/60									50/60		
3, 4									3, 4		
100									150		
100									150		
85									100		
100%									100%		
220									330		
220									330		
187									220		
85									100		
75									100		
65									100		
40									40		
80									80		
15,000									10,000		
20,000									15,000		
5,000									2,000		
10,000									5,000		
●								○	○		
○								●	●		
○								-	-		
○								-	-		
87/103								104/147	181/223		186/230
85/101								102/145	179/221		184/228
44/55								58/70	97/117		102/124
44/55								63/100	98/123		103/130
42/53								61/98	96/121		101/128
430 x 412 x 375									460 x 785 x 375		
430 x 527 x 375									460 x 1,015 x 375		
300 x 378 x 295									300 x 751 x 295		
300 x 493 x 295									300 x 981 x 295		
N, A, P, S type									N, A, P, S type		
KEMA									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	200 400 630	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) AC 50/60Hz	(Icu)	IEC 60947-2	220V/230V/380V/415V	65					70
		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) AC 50/60Hz	(Icm)	IEC 60947-2	220V/230V/380V/415V	143					154
		JISC 8201-2-1	460V/480V/500V	143					154
			550V/600V/690V	105					143
Rated shot-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 In 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			

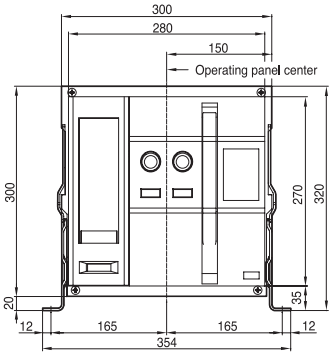
AKS-50F	
4000	5000
4000	5000
(0.4 – 1.0) x In max	
4000	5000
1,000	
690	
12	
50/60	
3, 4	
100	
100	
85	
100%	
220	
220	
187	
85	
75	
65	
40	
80	
10,000	
15,000	
2,000	
5,000	
○	
●	
-	
-	
145/173	
143/171	
78/90	
76/94	
74/92	
460 x 629 x 375	
460 x 799 x 375	
300 x 597 x 295	
300 x 767 x 295	
N, A, P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

AKS-40G	AKS-50G	AKS-63G
4000	5000	6300
4000	5000	6300
(0.4 – 1.0) x In 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		

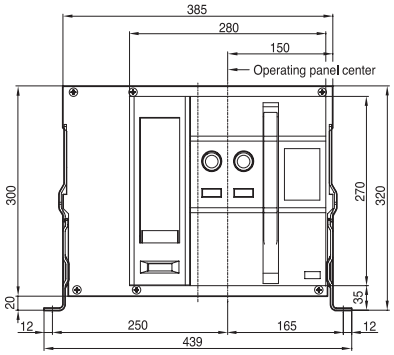
Fixed type 2000AF

630 – 1600A:
AKH / AKN / AKS-06 – 16D

Front view

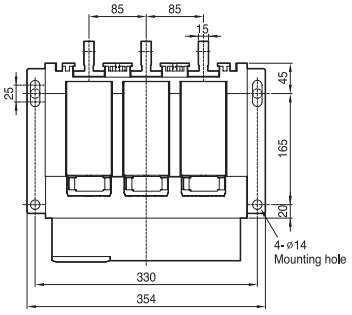


3P



4P

Vertical type



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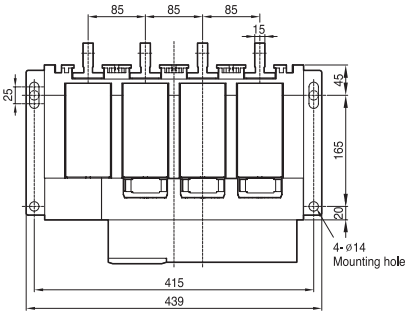

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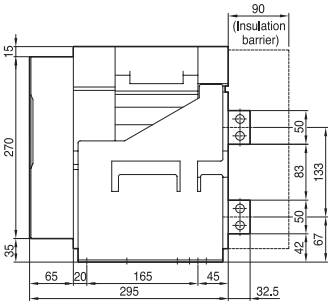
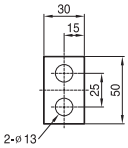
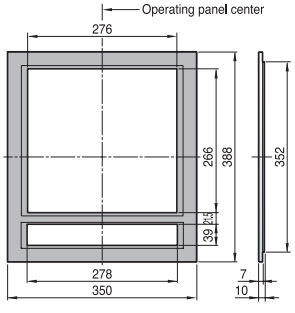




<Conductor>

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



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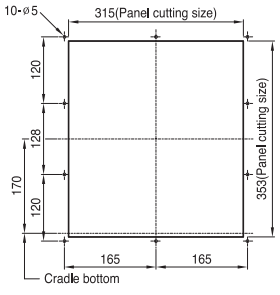

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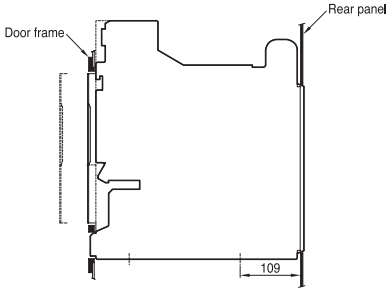

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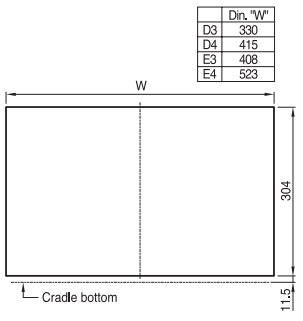

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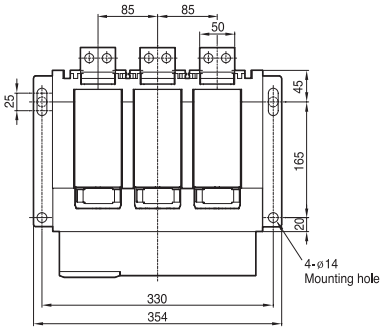
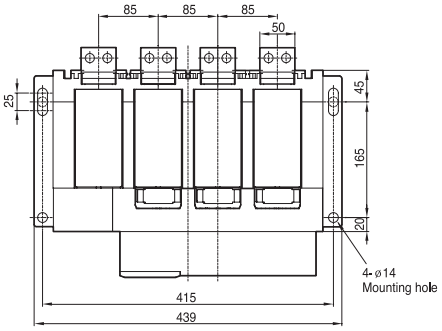
Note) The dimensions are for drawout type.

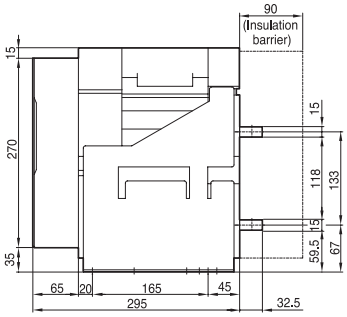
Horizontal type

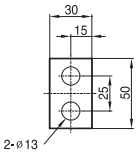


3P



4P





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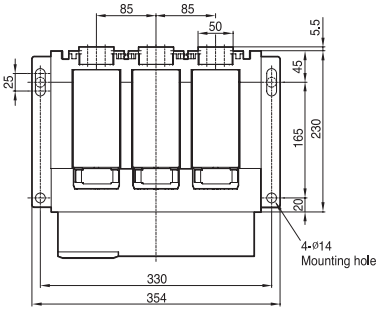
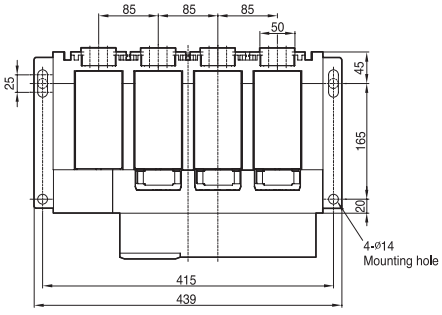
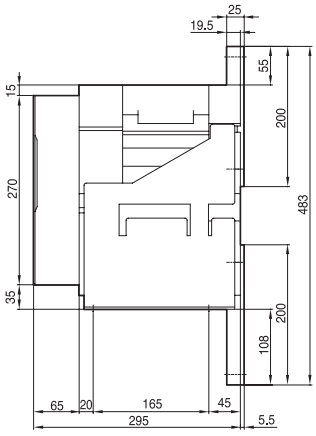
Front connection type

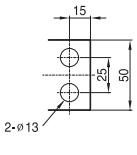


3P



4P





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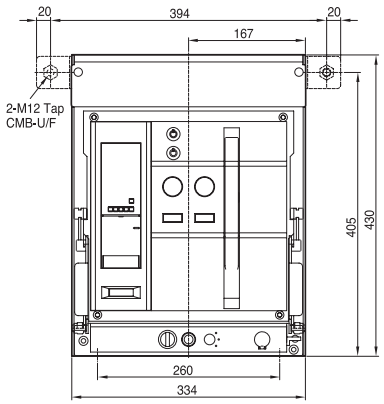
Draw-out type 2000AF

630 – 1600A:
AKH / AKN / AKS-06 – 16D

Front view



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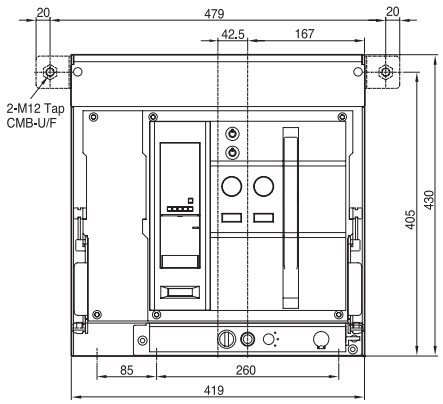
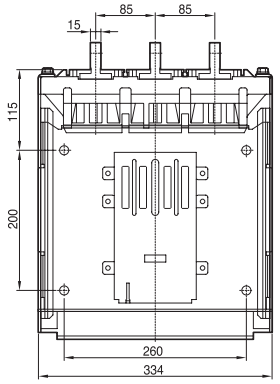
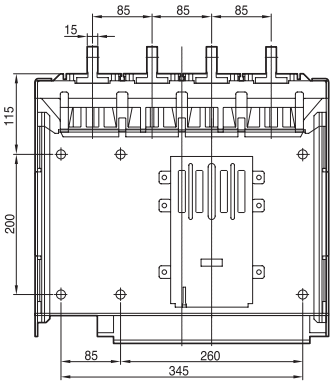


4P

Vertical type



3P



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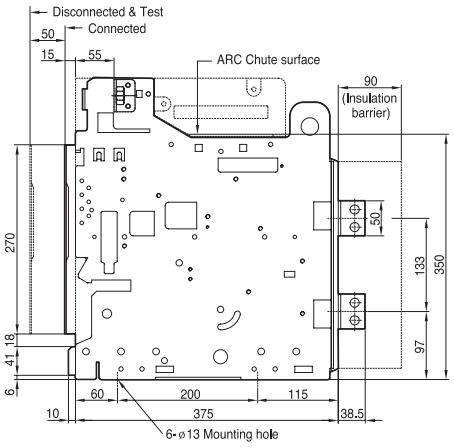

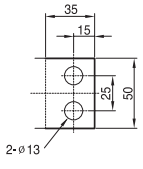

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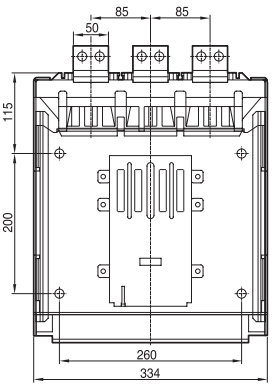
Horizontal type



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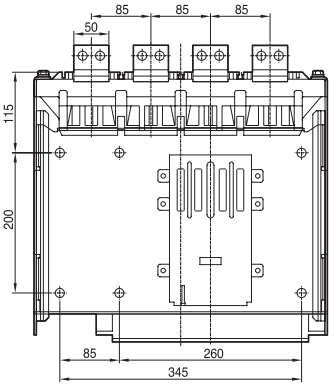

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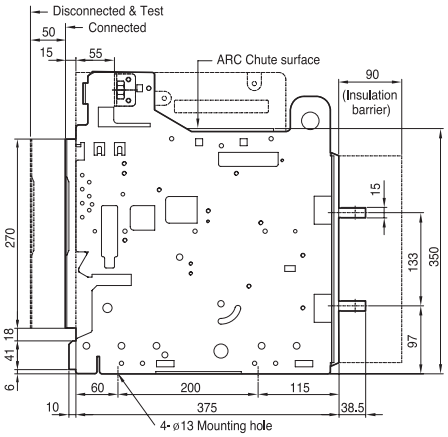
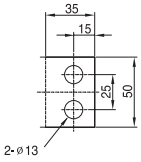
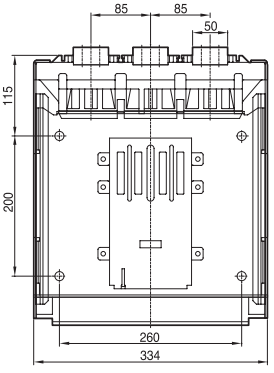




<Conductor>

Front connection type



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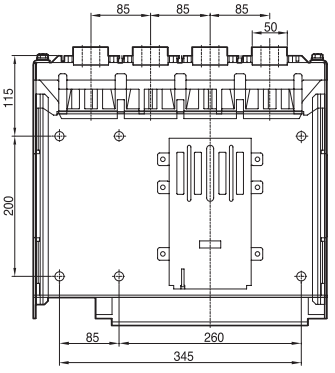

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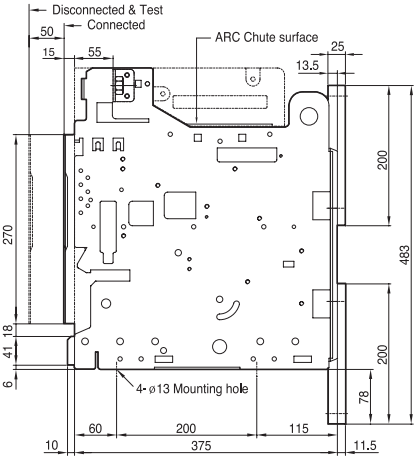
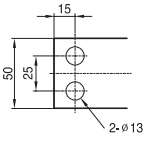




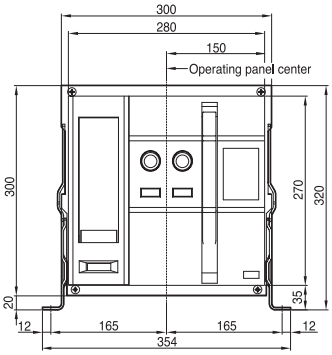
<Conductor>

Fixed type 2000AF

2000A:

AKH / AKS-20D

Front view



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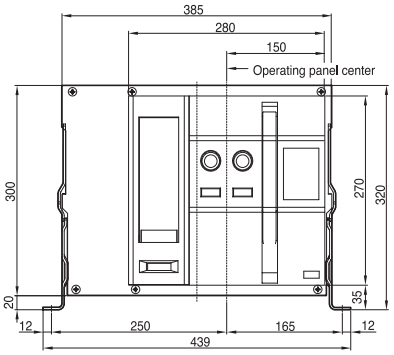

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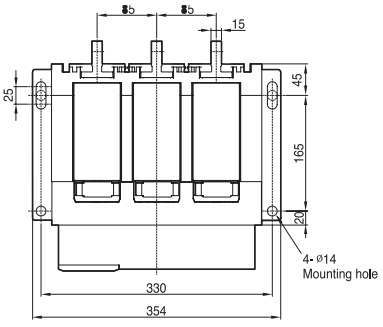
Vertical type



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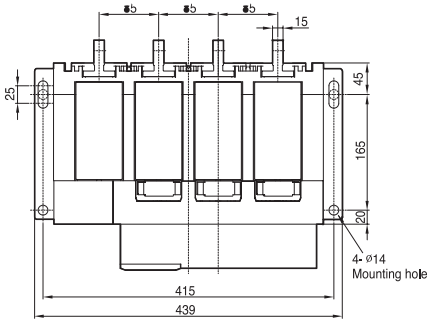

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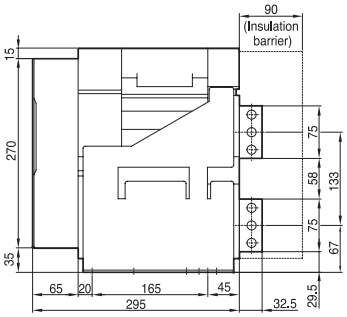
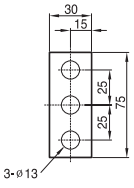




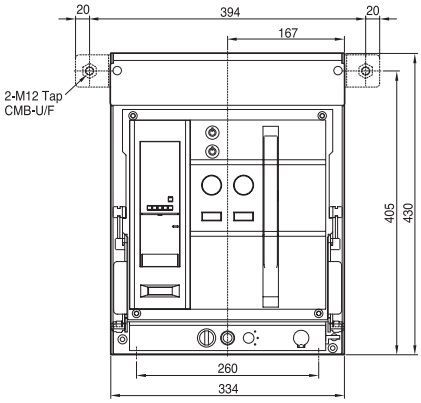
<Conductor>

Draw-out type 2000AF

2000A:

AKH / AKS-20D

Front view



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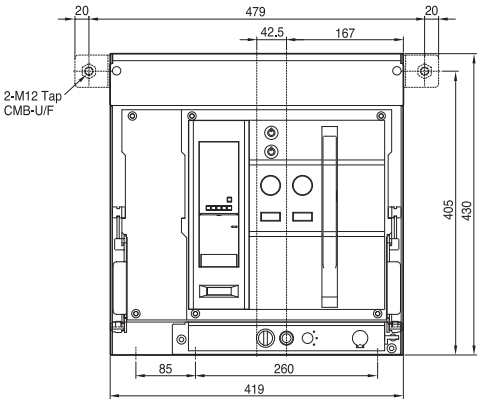

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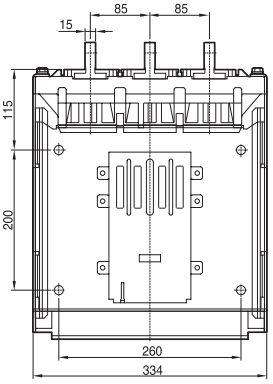
Vertical type



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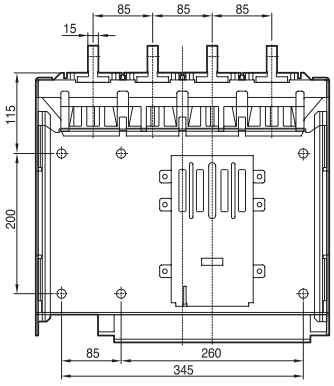

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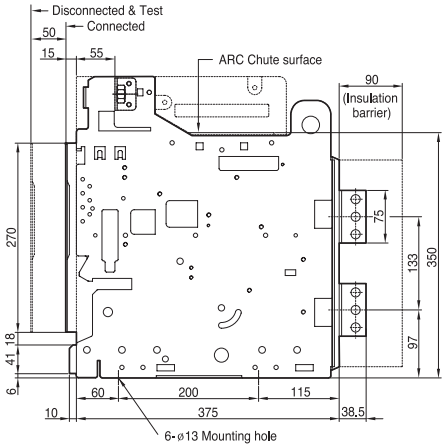
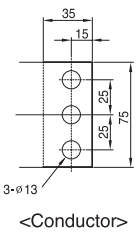




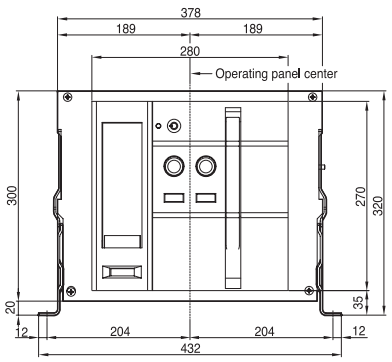
<Conductor>

Fixed type 4000AF

2000 – 3200A:

AKH / AKN / AKS-20 – 32E

Front view



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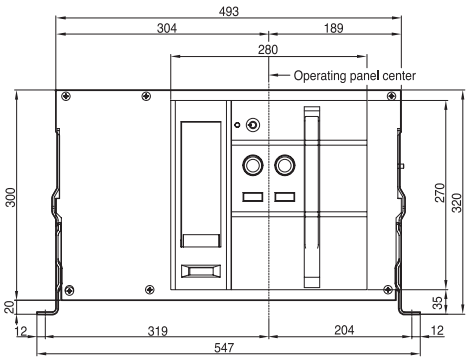

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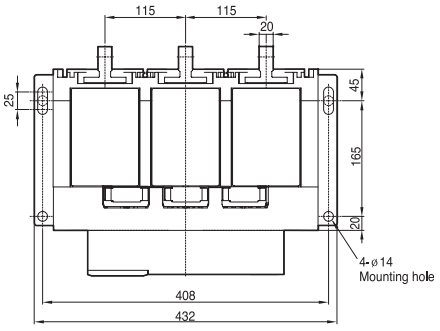
Vertical type



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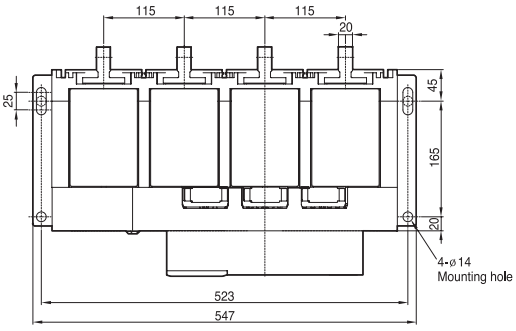

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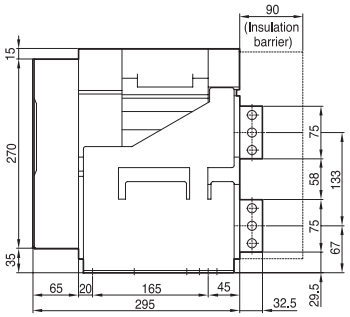

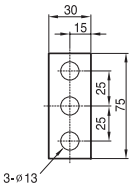

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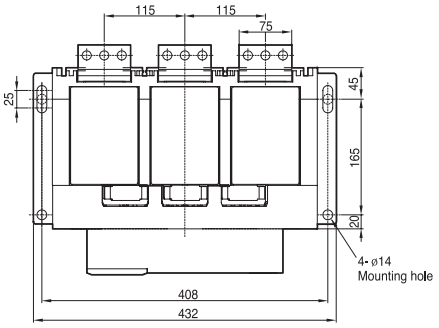
Horizontal type



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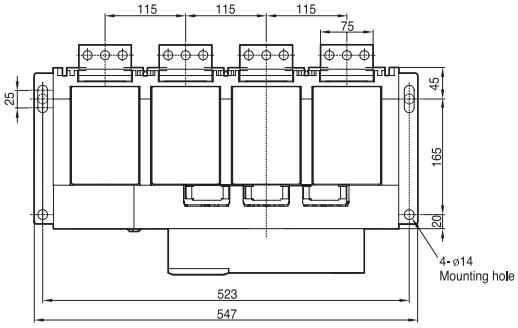

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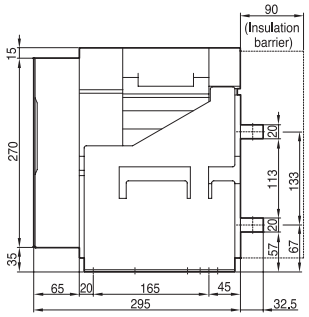

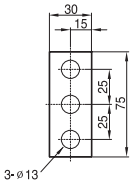

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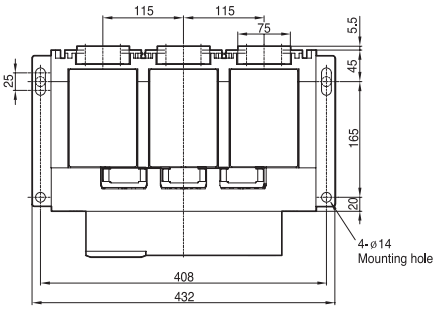
Front connection type



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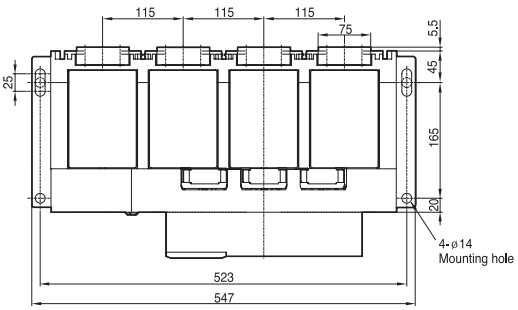

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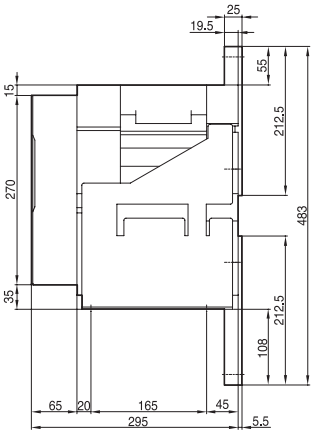
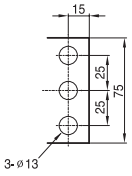




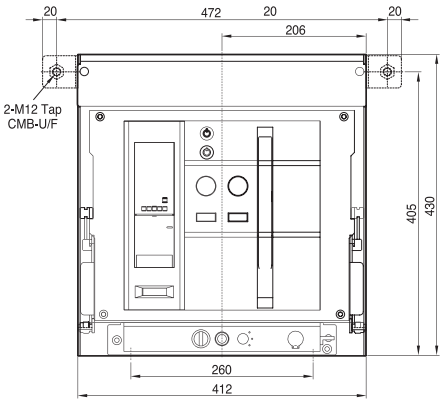
<Conductor>

Draw-out type 4000AF

2000 – 3200A:

AKH / AKN / AKS-20 – 32E

Front view



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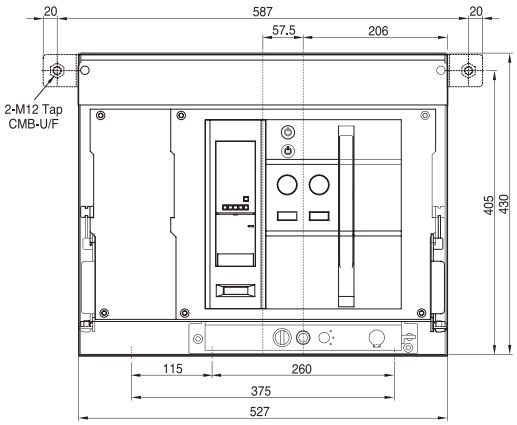
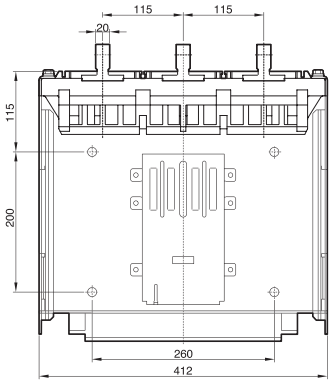


4P

Vertical type



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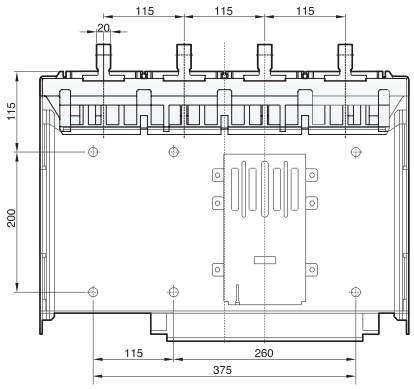

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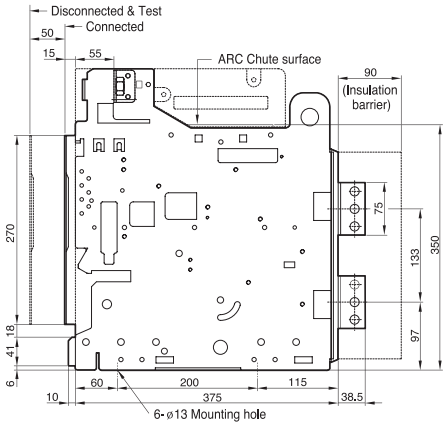
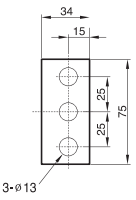
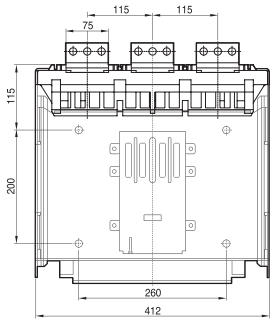


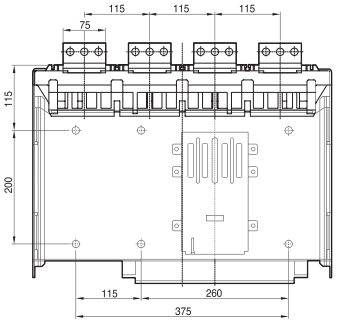


<Conductor>

Horizontal type



3P



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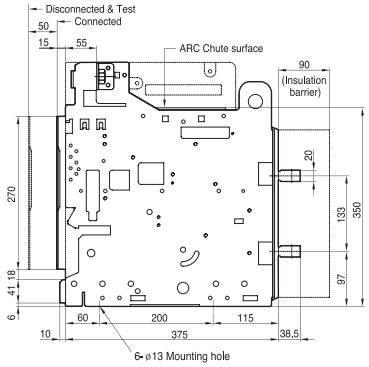
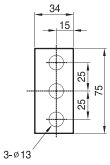
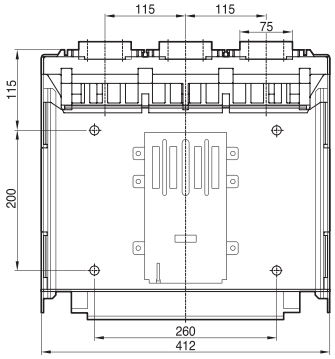


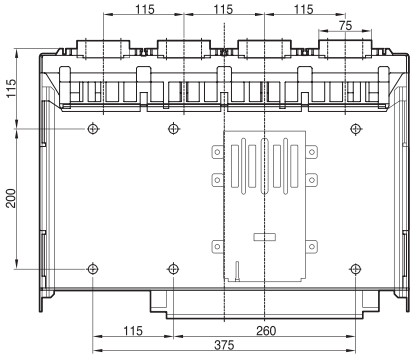


<Conductor>

Front connection type



3P



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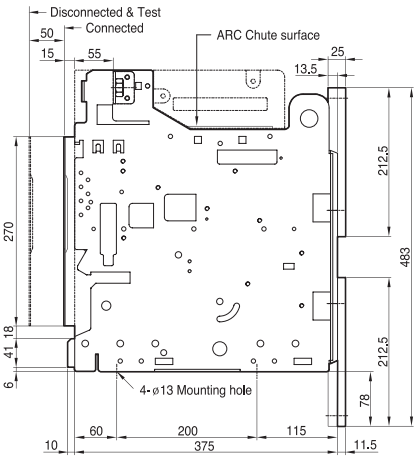
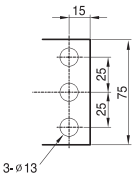




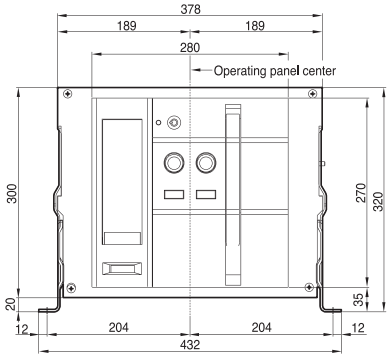
<Conductor>

Fixed type 4000AF

4000A:

AKH / AKS-40E

Front view



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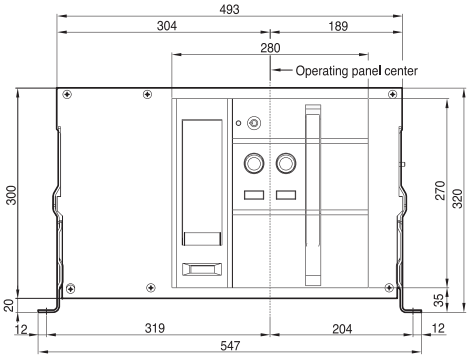
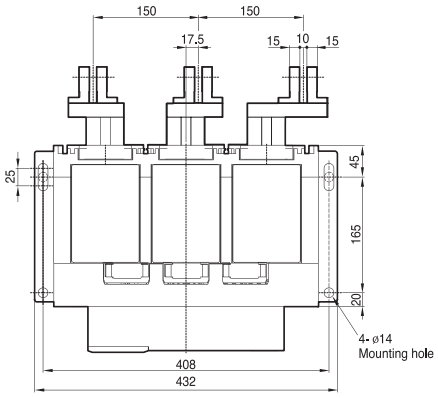
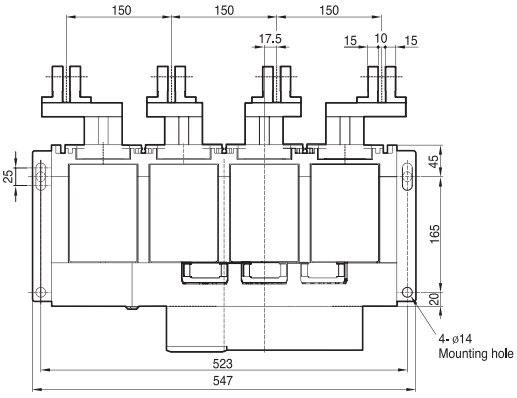


4P

Vertical type



3P



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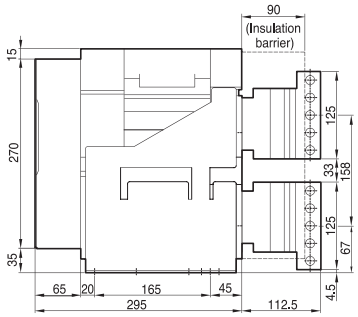
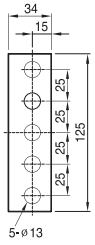
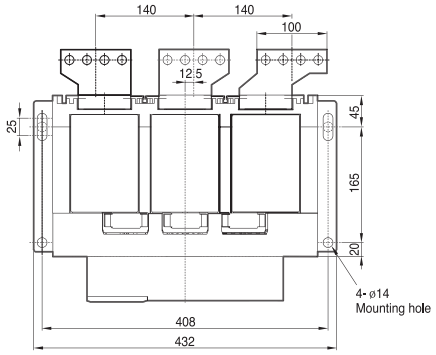


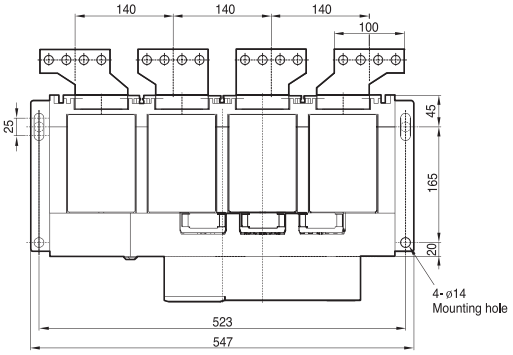


<Conductor>

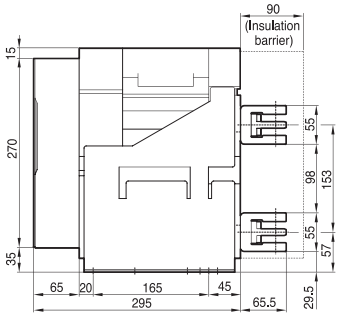
Horizontal type

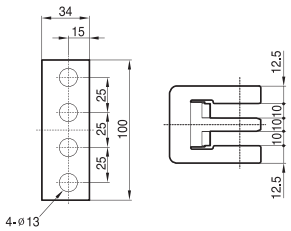


3P



4P





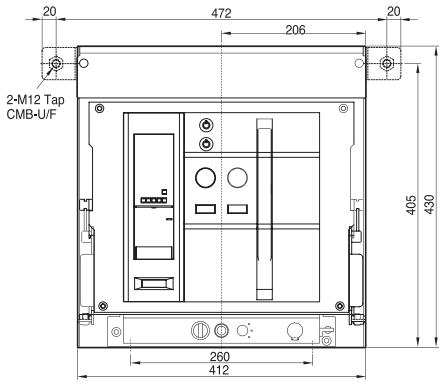
<Conductor>

Draw-out type 4000AF

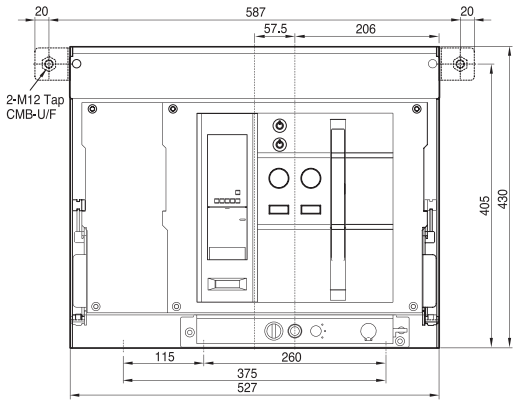
4000A:

AKH / AKS-40E

Front view

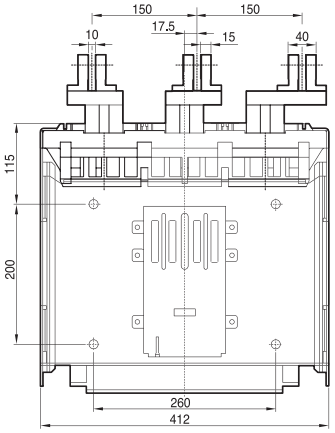


3P



4P

Vertical type



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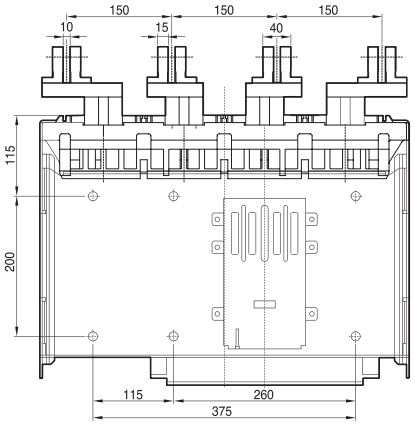
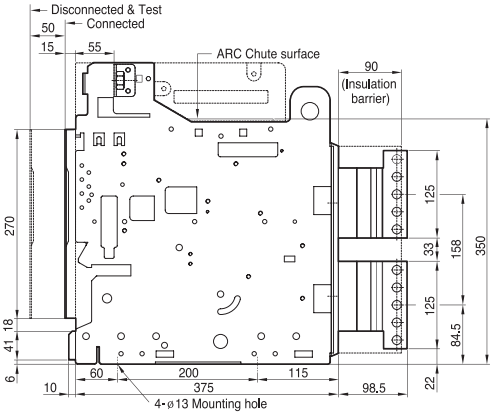
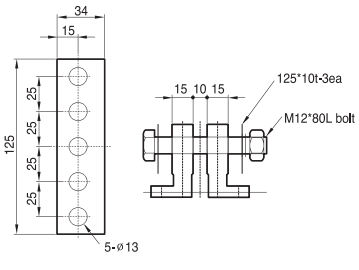


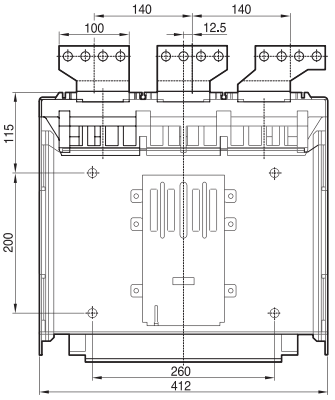
4P



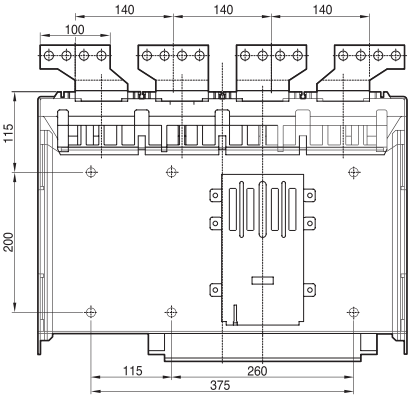


<Conductor>

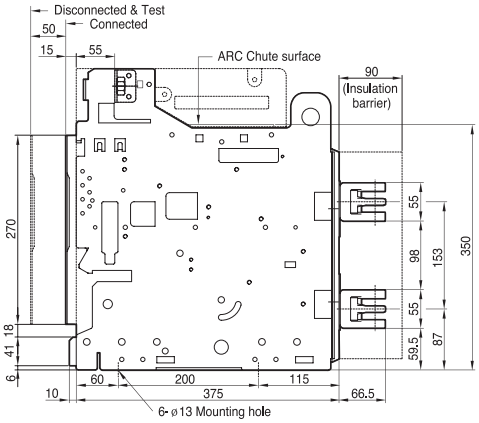
Horizontal type

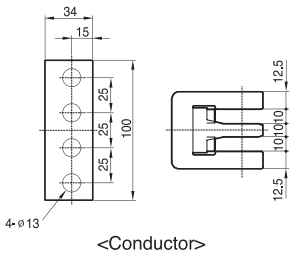


3P



4P



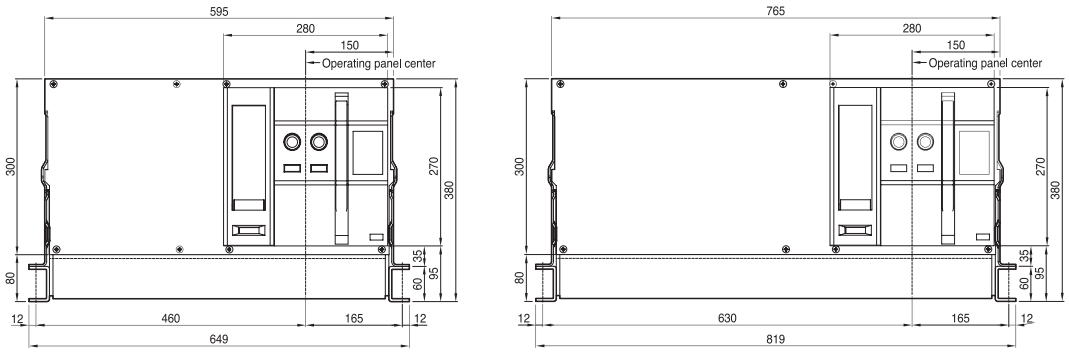


<Conductor>

Fixed type 5000AF

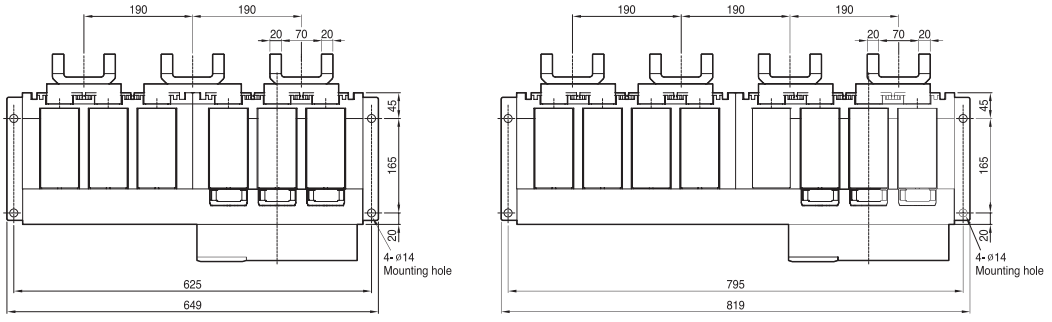
4000 – 5000A:
AKS-40 – 50F

Front view

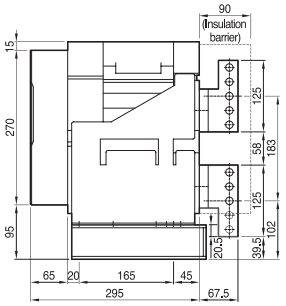


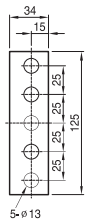
3P 4P

Vertical type



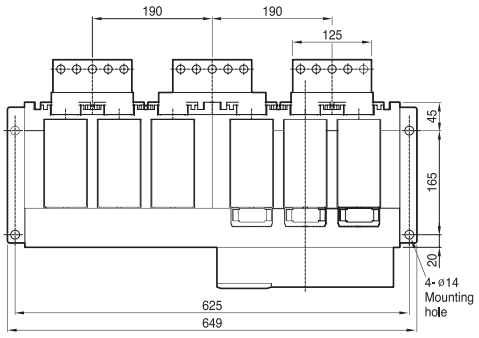
3P 4P





<Conductor>

Horizontal type



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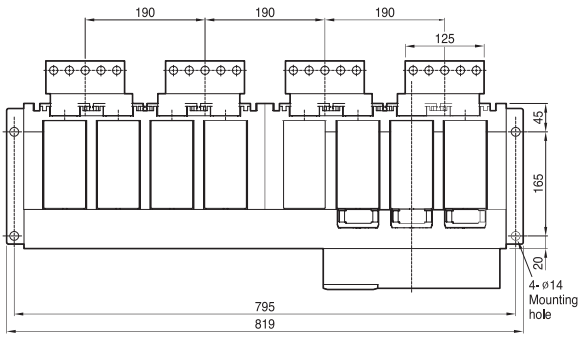
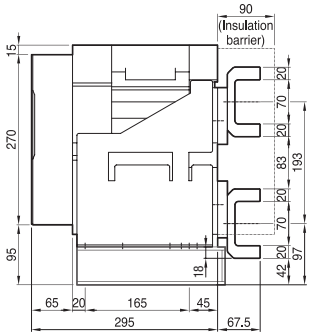
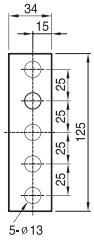


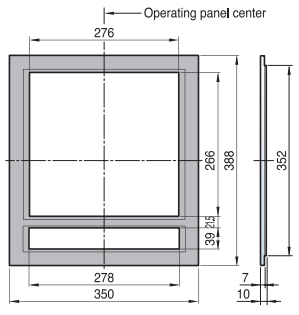
4P



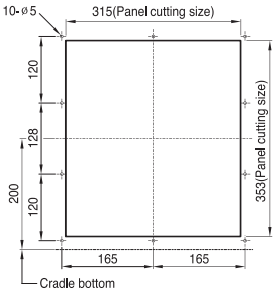


<Conductor>

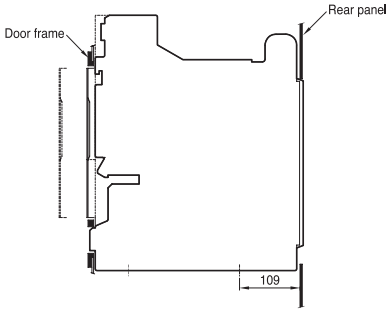
Door Frame: DF (AKH-G, AKS-F)



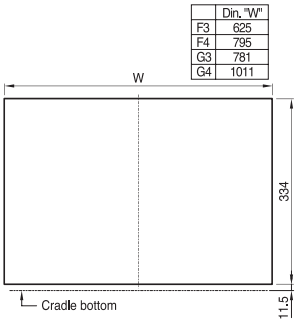
<External size>



<Mounting hole>



<Side hole>



<Panel cutting >

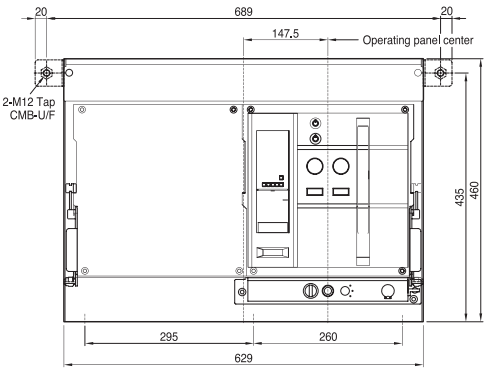
Note) The dimensions are for drawout type.

Draw-out type 5000AF

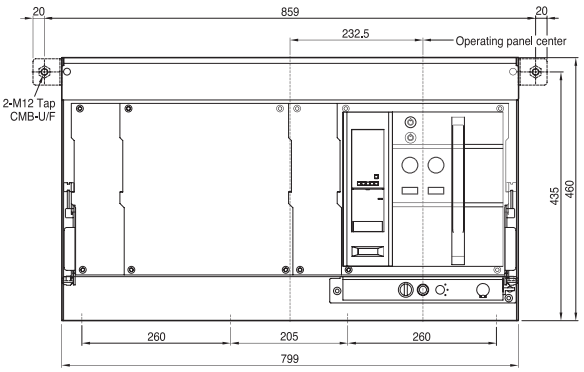
4000 – 5000A:

AKS-40 – 50F

Front view

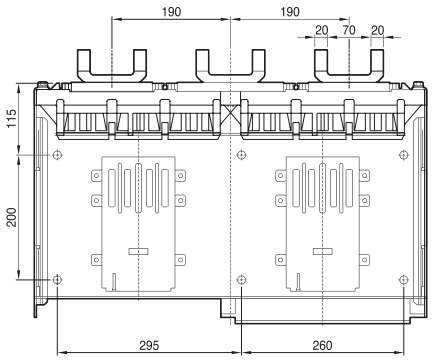


3P

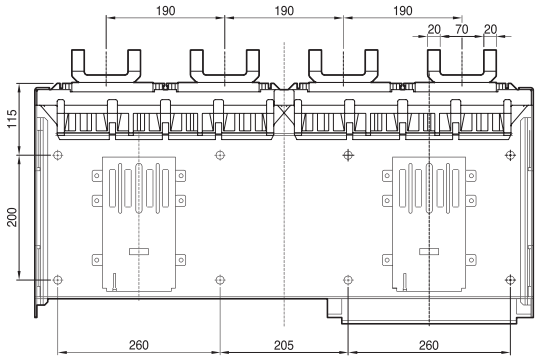


4P

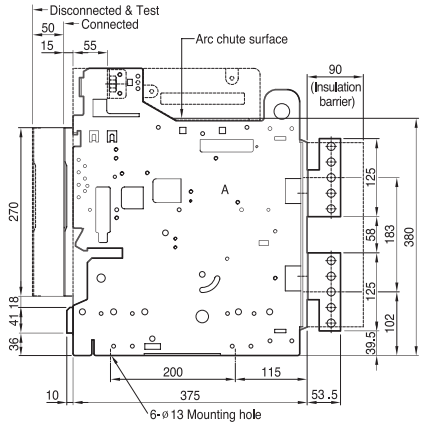
Vertical type

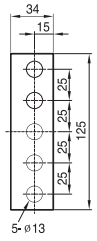


3P



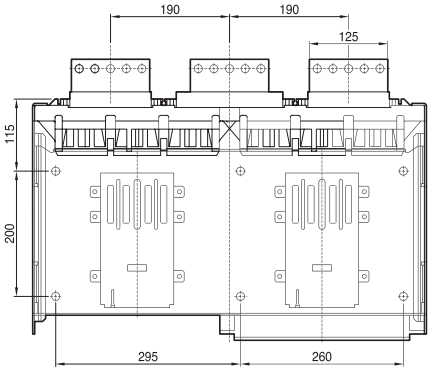
4P



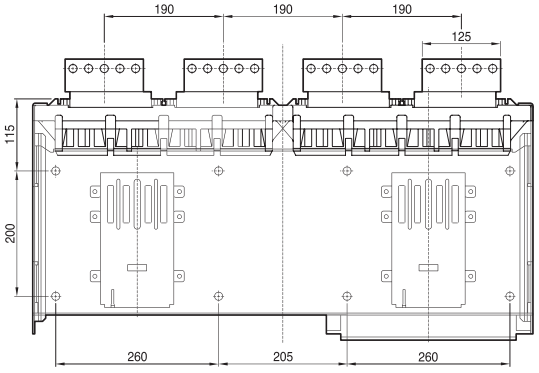


<Conductor>

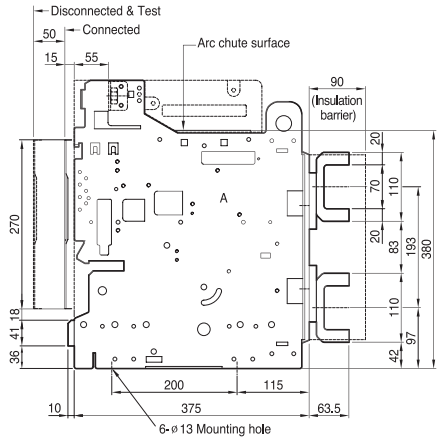
Horizontal type

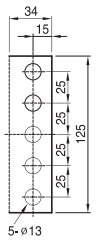


3P



4P





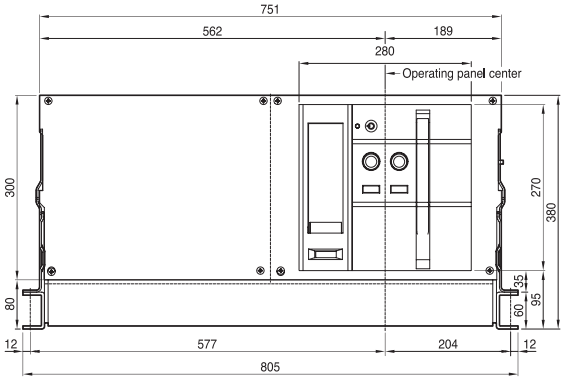
<Conductor>

Fixed type 6300AF

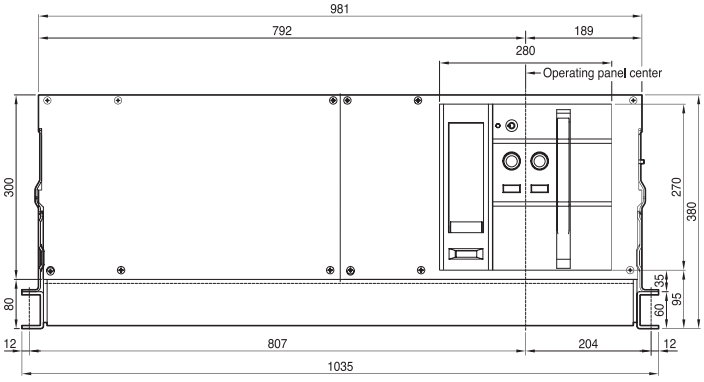
4000 – 6300A:

AKH / AKS-40 – 50G

Front view

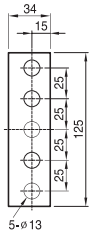


3P



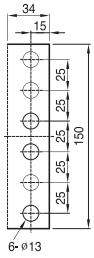
4P

4000A – 5000A



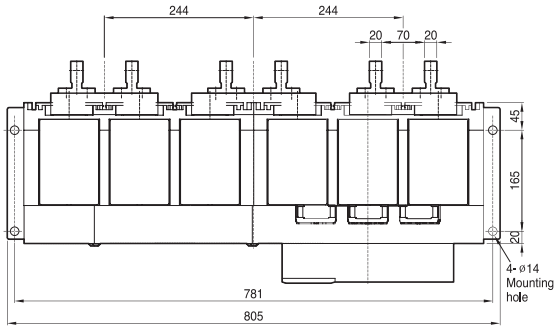
<Conductor>

6300A

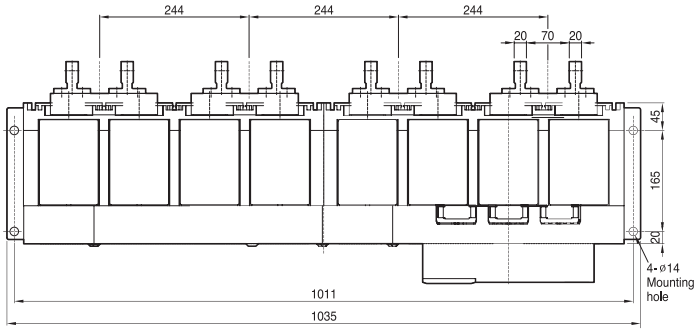


<Conductor>

Vertical type

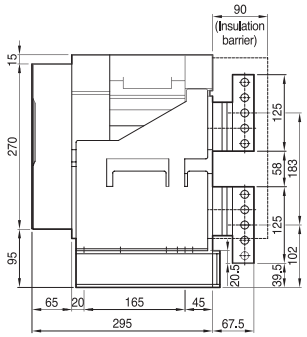


3P

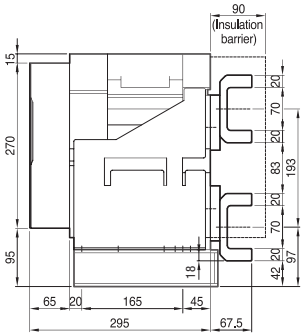


4P

4000A – 5000A

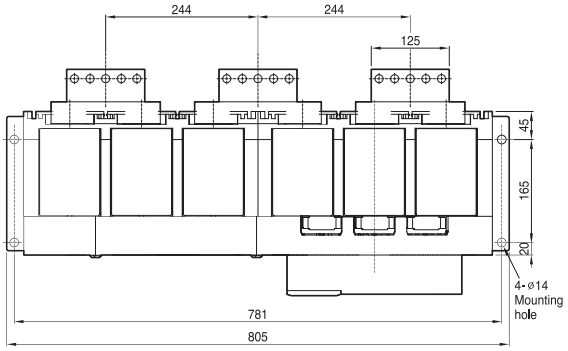


6300A

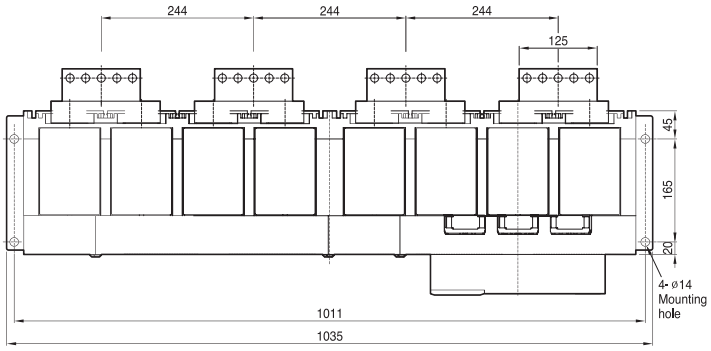


Horizontal type

4000A – 5000A

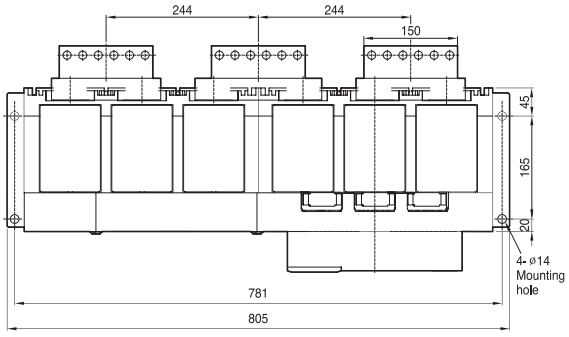


3P

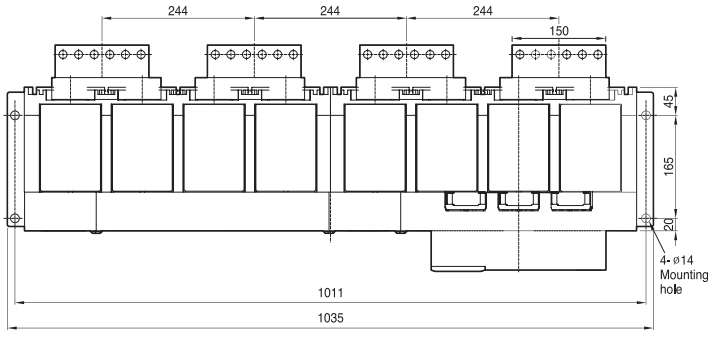


4P

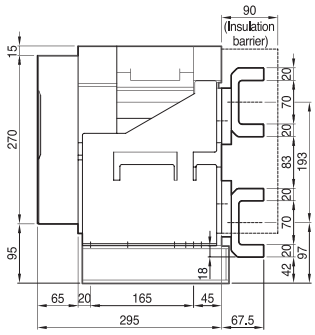
6300A



3P



4P

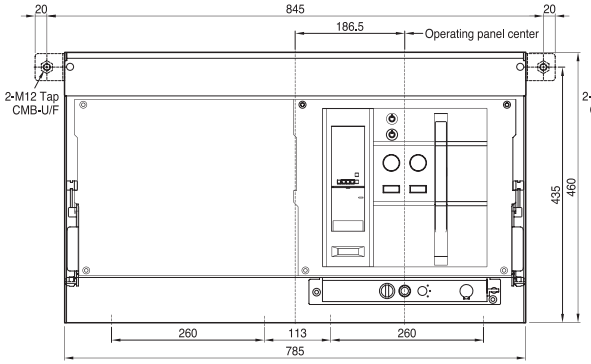


Draw-out type 6300AF

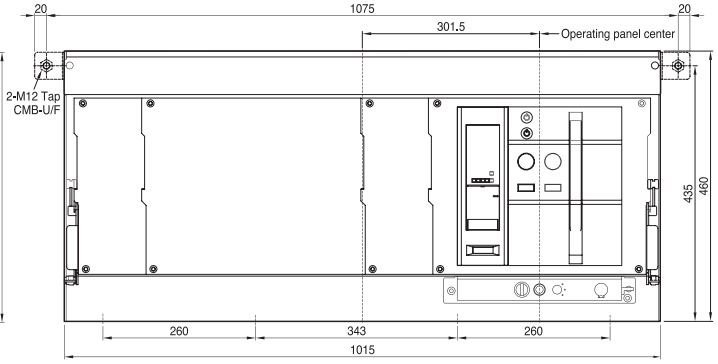
4000 – 6300A:

AKH / AKS-40 – 50G

Front view

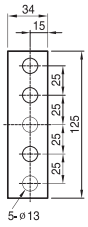


3P



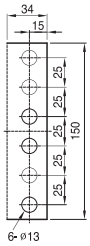
4P

4000A – 5000A



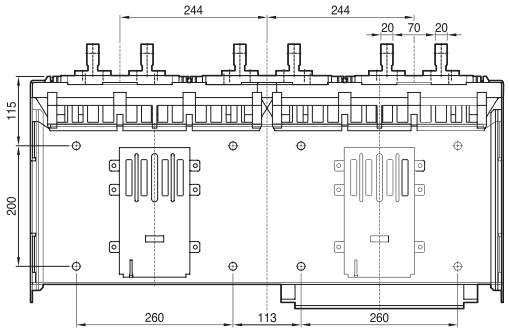
<Conductor>

6300A

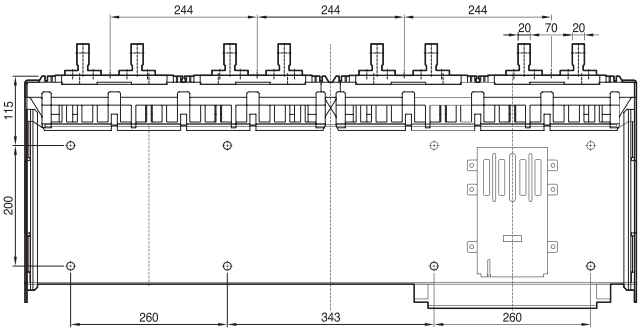


<Conductor>

Vertical type

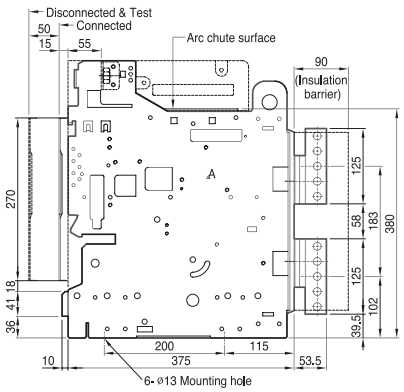


3P

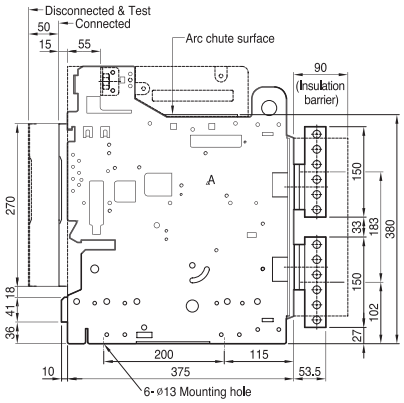


4P

4000A – 5000A

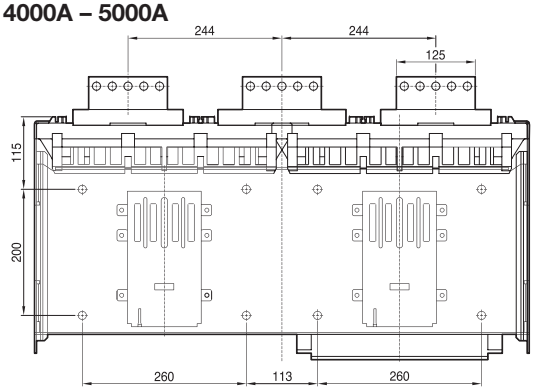


6300A

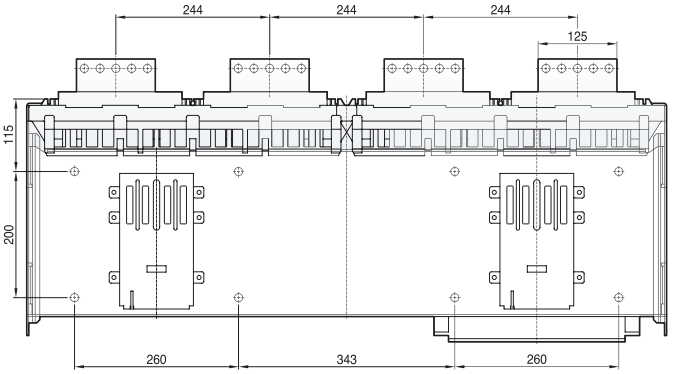


Horizontal type

4000A – 5000A

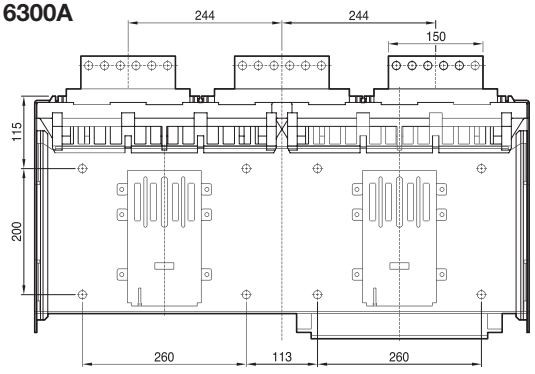


3P

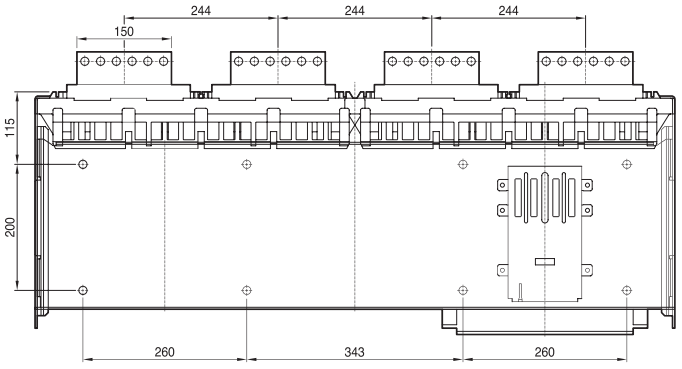


4P

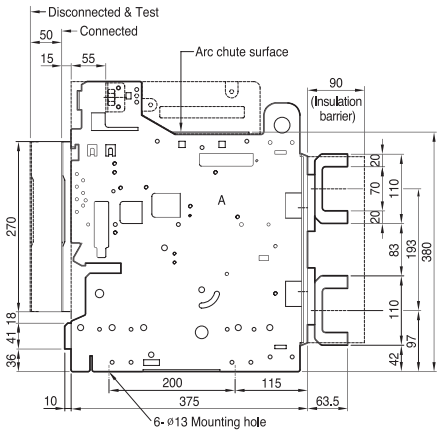
6300A



3P



4P



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