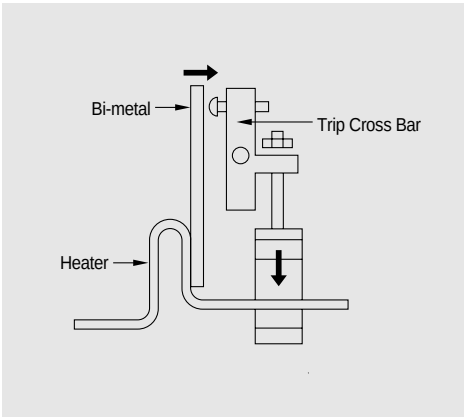
Trip mechanism

Thermal magnetic trip

Thermal magnetic breakers are tripped by the bimetal heated by the load current. Bimetals are responsive to the heat emitted by the current flow so as to cause the operating mechanism to trip on a sustained overload. It also means to allow a long time delay on light overloads.

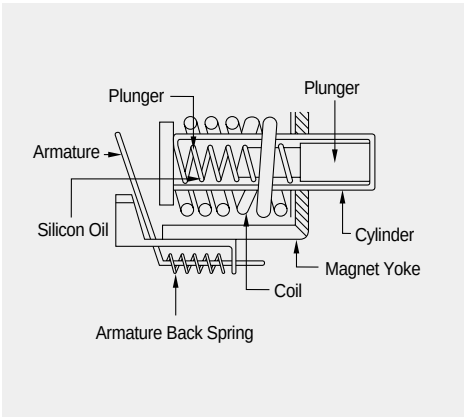
Thermal magnetic breakers are also tripped through the use of electro magnet. This provides an instantaneous tripping action when the current over the predetermined value flows.



Hydraulic magnetic Trip

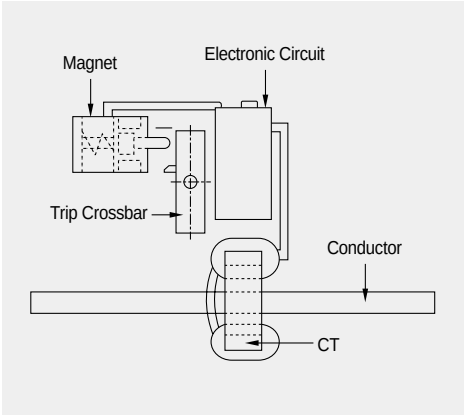
Hydraulic magnetic trip mechanism consists of cylinder assembly, current carrying coil and an armature supported on a yoke. The overcurrent flowing through the coil initiates the movement of plunger, which depends on the extent of the overload. It caused tripping of breakers.

During flow of the short circuit current, the magnetomotive force is so high that the armature is attracted without the movement of the moving core and trips the MCCB instantaneously.



Electronic trip

Electronic trip operation is caused by current transformers and solid state circuitry, which monitors the current and initiates tripping through a flux shunt trip when an overload or short circuit is present.



Application for transformer protection

It's recommended to select proper circuit breakers according to the continuous current carrying capacity of transformer. It requires to consider separately whether transformer is single phase or three phase. The below table indicates the proper molded case circuit breaker suitable for each transformer.

● AC220V

Capacity of 3 phase transformer (kVA)		Below 30	Below 50	75~100	150~300	500~750	Below 1500	Below 2000
Capacity of single phase transformer (kVA)		Below 16	Below 30	Below 50	Below 150	Below 300	-	
Breaking capacity (kA) (sym)		2.5	5	10	25	35 42	50 65	85 100 125
Frame (A)	30	ABE33	ABS33b		ABH33b			
	50	ABE53b			ABS53b	GBN103(Up to 50A)	GBH103(Up to 50A)	GBL103(Up to 50A)
						ABH53b	GBH104	
	60	ABE63b			ABS63b			
	100	ABE103b				GBN103	GBH103	GBL103
						ABS103b	ABH103b ABL103a	
	200	ABE203b				GBN203	GBH203	GBL203
						ABS203b	ABH203b ABH 203a	ABL203a
	400	ABE403b				ABS403b	ABH403b	ABL403b
	600	ABE803b					ABS803b	ABL803b
	800							
	1000~1200	ABS1003, ABS1203						

● AC460V

Capacity of 3 phase transformer (kVA)		Below 30	Below 50	Below 300	Below 750	Below 1500	Below 2000	Below 3000
Breaking capacity (kA) (sym)		1.5	5	10	18	25 35	42 50	65 85
Frame (A)	30	ABE33	ABS33b	ABH33b				
	50	ABE53b		ABS53b	ABH53b	GBN103(Up to 50A)	GBH103(Up to 50A)	GBL103(Up to 50A)
						ABL53a		
	60	ABE63b		ABS63b				
	100	ABE103b			ABS103b	GBN103	GBH103	GBL103
						ABH103b	ABL103a	
	200	ABE203b			ABS203b	GBN203	GBH203	GBL203
						ABH203b	ABH 203a	ABL203a
	400	ABE403b				ABS403b	ABH403b	ABL403b
	600	ABE803b					ABS803b	ABL803b
	800							
	1000~1200	ABS1003, ABS1203						

Application for protection of lighting circuit

It requires to select proper circuit breakers according to short circuit breaking capacity.
It's recommended to make the maximum operating current not to exceed 80% of the rated current.

● AC220V

The maximum operating current	The rated current of MCCB	Breaking current (kA) sym 2.5	5	10	25	35	50	65	85	100	125
12	15	ABE33	ABS33b	ABH33b	GBN103 (Up to 50A)			GBH103 (Up to 50A)		GBL103 (Up to 50A)	
16	20										
24	30										
32	40	ABE53b		ABS53b	ABH53b				ABL53a		
40	50										
48	60	ABE63b		ABS63b							
60	75	ABE103b			ABS103b	GBN103		ABH103b	GBH103	ABL103a	GBL103
80	100										
100	125	ABE203b				GBN203 ABS203b		ABH203b	GBH 203	ABL203a	GBL203
120	150										
140	175										
160	200										
180	225										
200	250	ABE403b				ABS403b		ABH403b		ABL403b	
240	300										
280	350										
320	400										
400	500	ABE803b						ABS803b		ABL803b	
480	600										
560	700										
640	800										
800	1000	ABS1003									
960	1200	ABS1203									

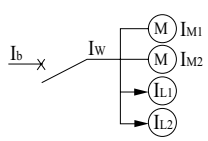
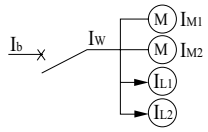
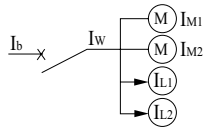
● AC460V

The maximum operating current	The rated current of MCCB	Breaking current (kA) sym 1.5	5	10	18	25	35	42	50	65	85
12	15	ABH33	ABS33b	ABH33b							
16	20										
24	30										
32	40	ABE53b		ABS53b	ABH53b		GBN103 (Up to 50A)	GBH103 (Up to 50A)		ABL53a	GBL103 (Up to 50A)
40	50										
48	60	ABE63b		ABS63b							
60	75	ABE103b			ABS103b					ABL103a	GBL103
80	100										
100	125	ABE203b				ABE203b	GBN203 ABH203b		GBH203	ABl203a	GBL203
120	150										
140	175										
160	200										
180	225										
200	250	ABE403b				ABS403b	ABH403b			ABL403b	
240	300										
280	350										
320	400										
400	500	ABE803b					ABS803b			ABL803b	
480	600										
560	700										
640	800										
800	1000	ABS1003									
960	1200	ABS1203									

Application for protection of several kinds of loads

It requires to select proper circuit breakers according to the characteristics of loads when they are installed to protect several kinds of loads. It's needed to consider the maximum operating current and the capacity of loads in total so as to select the rated current of breakers.

● Selection of circuti breaker protecting the several loads simultaneously

The kind of loads (I_M : motors, I_L : others)	Permissible current in cable or wire : I_W	The rated current of circuit breaker : I_b
In case of, $\Sigma I_M \leq \Sigma I_L$ 	$I_W \geq \Sigma I_M + \Sigma I_L$	Choose the low value among two formulas: $I_b \geq 3\Sigma I_M + \Sigma I_L$ and $I_b \leq 2.5 I_W$ * It's permitted to select the above value only if I_W (above 100A) isn't subject to the rated current of circuit breaker.
In case of, $\Sigma I_M > \Sigma I_L$, $\Sigma I_M \leq 50A$ 	$I_W \geq 1.25\Sigma I_M + \Sigma I_L$	
In case of, $\Sigma I_M > \Sigma I_L$, $\Sigma I_M > 50A$ 	$I_W \geq 1.1\Sigma I_M + \Sigma I_L$	

● The rated current of breakers as the main circuit of 3 phase inductive loads (AC 220V)

Capacity of loads In total (below kW)	The maximum operating current (below A)	Capacity of the highest motor (kW / A)																	
		0.75 4.8	1.5 8	2.2 11.1	3.7 17.4	5.5 26	7.5 34	11 48	15 65	18.5 79	22 93	30 125	37 160	45 190	55 230	75 310	90 360	110 440	132 500
3	15	20	30	30															
4.5	20	30	30	30	50														
6.3	30	40	40	40	50	60													
8.2	40	50	50	50	50	75	100												
12	50	60	60	60	60	75	100												
15.7	75	100	100	100	100	100	100	125	150										
19.5	90	100	100	100	100	100	100	125	150	175									
23.2	100	125	125	125	125	125	125	125	150	175	200								
30	125	150	150	150	150	150	150	150	150	175	225								
37.5	150	175	175	175	175	175	175	175	175	200	225	300							
45	175	200	200	200	200	200	200	200	200	200	225	300	400						
52.5	200	225	225	225	225	225	225	225	225	225	225	300	400	500					
63.7	250	300	300	300	300	300	300	300	300	300	300	300	400	500	500				
75	300	350	350	350	350	350	350	350	350	350	350	350	400	500	500				
86.2	350	400	400	400	400	400	400	400	400	400	400	400	400	500	500	600			
97.5	400	500	500	500	500	500	500	500	500	500	500	500	500	500	500	600	700		
112.5	450	500	500	500	500	500	500	500	500	500	500	500	500	500	500	700	700		
125	500	600	600	600	600	600	600	600	600	600	600	600	600	600	600	700	700	1000	
150	600	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	800	1000	1000
175	700	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	1000	1000
200	800	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	1000

● The rated current of breakers as the main circuit of 3 phase inductive loads (AC 440V)

Capacity of loads In total (below kW)	The maximum operating current (below A)	Capacity of the highest motor (kW / A)																	
		0.75 4.8	1.5 8	2.2 11.1	3.7 17.4	5.5 26	7.5 34	11 48	15 65	18.5 79	22 93	30 125	37 160	45 190	55 230	75 310	90 360	110 440	132 500
3	**7.5**	15	15	15															
4.5	**10**	15	15	15	30														
6.3	**15**	20	20	20	30	40													
8.2	**20**	30	30	30	30	40	50												
12	**25**	30	30	30	30	40	50												
15.7	**38**	50	50	50	50	50	50	60	75										
19.5	**45**	50	50	50	50	50	50	60	75	100									
23.2	**50**	60	60	60	60	60	60	60	75	100	125								
30	**63**	75	75	75	75	75	75	75	100	100	125								
37.5	**75**	100	100	100	100	100	100	100	100	100	125	150							
45	**88**	100	100	100	100	100	100	100	100	100	125	150	175						
52.5	**100**	125	125	125	125	125	125	125	125	125	125	150	175	225					
63.7	**125**	150	150	150	150	150	150	150	150	150	150	150	200	225	250				
75	**150**	175	175	175	175	175	175	175	175	175	175	175	200	225	250				
86.2	**175**	200	200	200	200	200	200	200	200	200	200	200	200	225	300	350			
97.5	**200**	225	225	225	225	225	225	225	225	225	225	225	225	225	300	350	400		
112.5	**225**	250	250	250	250	250	250	250	250	250	250	250	250	250	300	350	400		
125	**250**	300	300	300	300	300	300	300	300	300	300	300	300	300	300	350	400	500	
150	**300**	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	400	500	500
175	**350**	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	500	500	500
200	**400**	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
250	**500**	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
300	**600**	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
350	**700**	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
400	**700**	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
450	**900**	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
500	**1000**	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200

Note) The above mentioned technical data is defined under the usage conditions as follows ;

1) The circuit breaker is tripped within 10 seconds in 600 % of the current of the fully operating loads.

2) The start-up input current is set within 1700 % of the current of the fully operating loads.

3) The capacity of highest motor is also applied when several loads starts up simultaneously.

Application on resistance welding circuits

Short circuit protection for resistance welding devices can be obtained by applying molded case circuit breaker properly. These breakers permit normally high welding currents, but trip instantaneously if a short circuit develops. It's recommended to select proper circuit breaker according to the characteristics of welding devices as the follow table.

Characteristics of welding device		Applied Circuit breaker	
Capacity (kVA)	**Maximum Input (kVA)**	**220V (Single phase)**	**400V (Single phase)**
15	35	ABE 102b /100 A ABS 102b /100 A ABH 102b /100 A ABL 102a /100 A	ABE 52b /50A ABS 52b /50A ABH 52b /50A ABL 52a /50A
30	65	ABE 202b /125 A ABS 202b /125 A ABH 202b /125 A ABL 202a /125 A	ABE 102b /100A ABS 102b /100A ABH 102b /100A ABL 102a /100A
55	140	ABE 202b /225 A ABS 202b /225 A ABH 202b /225 A ABL 202a /225 A	ABE 202b /100A ABS 202b /100A ABH 202b /100A ABL 202a /100A

Application for protection of capacitor circuit

In normal conditions, It's recommended to set the rated current of circuit breakers as 150% of the rated current of capacitors.

Capacity of capacitor (kVA)	Rated current of breaker							
	Single phase				Three phase			
	220V		440V		220V		440V	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
5	60	50	30	30	40	50	30	20
10	75	60	40	40	50	50	30	30
15	100	100	60	50	60	60	40	40
20	175	175	75	60	100	75	50	40
25	200	200	100	100	100	100	50	50
30	225	225	100	100	175	150	60	60
40	400	400	150	125	200	200	100	75
50	400	400	175	175	225	225	100	100
75	600	500	300	300	400	400	150	150
100	800	800	400	400	400	400	225	225
150	1000 Note)	1000 Note)	600	500	600	600	300	300
200	-	1200 Note)	800	800	800	800	400	400
300	-	-	1000	1000	-	-	600	600
400	-	-	-		-	-	-	800

Note) It indicates that it's available to apply to short-circuit breaking capacity of up to 42kA.

* The input current at capacitor's circuit making changes according to the inductive reactance of circuit.
* It's possible to apply to short-circuit breaking capacity to the maximum of each circuit breaker.
* Please set the rated current of MCCB around 150% of rated current of capacitor.

Application to DC circuits

It's available to use some of the circuit breakers in DC circuit conditions according to the trip method.

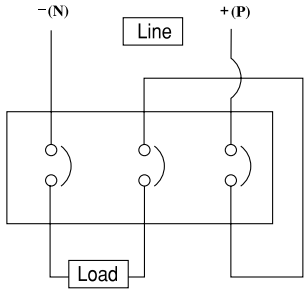
● DC250V

Type	Circuit breaker applied	Applicabilty	
		As standard	By special Order made
Hydraulic Magnetic Trip	ABE33	Not available	Not available
	ABE53b, ABE63b, ABE103b ABS33b, ABS53b, ABS63b ABH33b	Not available	○
Thermal Magnetic Trip	ABE203b, ABE403b, ABE803b ABS103b, ABS203b, ABS403b, ABS803b ABH53b, ABH103b, ABH203b, ABH403b, ABL53a, ABL103a, ABL203a, ABL403b, ABL803b ABS1003, Note) ABS1203 Note) GBN103, GBH103, GBL103 GBN203, GBH203, GBL203	○	Not available
Electronic Trip	ABS1203E	Not available	Not available

Note) It should be applied to only instantaneous trip type MCCBs.

● DC500V

Because there isn't the zero point in the characteristics of time-current curves ofcircuit breakers used in DC circuit conditions, It's more difficult to break the circuit controlled by high voltage than operating voltage should be set as DC250V to the maximum in general usage, it's possible to use breakers under DC 500V only if connecting breakers like the below figure.



Type	Poles	Rated voltage (V)	Short circuit breaking capacity (kA)
ABS53b, ABS63b ABE103b	3	DC500V	5
ABH103b ABS203b ABE403b			10
ABS403b ABE803b			20
GBN103 GBN203			35
ABL103a, ABL203a ABL403b ABL803b ABS1003 Note) ABS1203 Note)			40

Note) It's allowed to use circuit breakerin circuit operated by DC 500V especially only in instantaneous trip.

Application to 400Hz systems

When circuit breakers are used in the situation of high frequency, those breakers in many case require to be derated due to the increased resistance of the copper sections resulting from the skin effect produced by eddy currents at 400Hz.

Thermal trip characteristics

The continuous current carrying capacity and tripping current decreased due to the increased resistance of the copper sections resulting from the skin effect produced by eddy currents at 400Hz. The amount of decrease of those characteristics differs according to each molded case circuit breaker, but It°Øs recommended to derate as 80% in the usage of the maximum rated current and 90% in the usage of half rated current.

Instantaneous trip characteristics

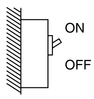
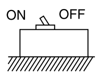
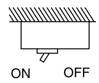
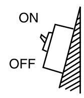
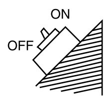
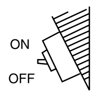
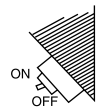
In cases of instantaneous trip characteristics in 400Hz, The tripping value by overcurrent increase according to high frequency. The value in 400Hz will be generally 2 times higher than in 60Hz.

● Derating table

NO	Rated current (A) in 400 Hz	Circuit breaker applied	Rated current of circuit breaker for your ordering	
			Using in the Max.(A)	Using in the half.(A)
1	15		20	20
2	20	ABH 53b, ABH 103b	30	30
3	30	ABS 103b	40	40
4	40	ABL 53a, ABL103a	50	50
5	50	GBN 103	75	60
6	60	GBH103	75	75
7	75	GBL103	100	100
8	100		125	125
9	125	ABE 203b, ABS 203b	175	150
10	150	ABH 203b, ABL 203a	200	175
11	175	GBN 203, GBH 203	225	200
12	200	GBL 203	250	225
13	225		300	250
14	300	ABE 403b, ABS 403b	350	300
15	400	ABH 403b, ABL 403b	400	350
16	350	ABE 803b (500, 600A only)	500	400
17	600	ABS 803b (500, 600A only)	500	500
18	500	ABL 803b (500, 600A only)	-	600

Infuence by mounting position

It needs to mount the circuit breakers under various conditions. In that case, It is recommended to consider the position and other factors which influence the characteristics of circuit breakers with hydraulic magnetic trip device. In especial, the characteristics of rated current might change by the installing position. It results from the gravity which influences the plunger in oil dash pot of hydraulic magnetic trip device.
It is recommendable to compensate the rated current according to the below table.

Type	Vertical	Horizontal	Reverse-horizontal	Back-biased (15°)	Back-biased (45°)	Fore-biased (15°)	Fore-biased (45°)
ABE 3□ **ABH3□b** **ABS 5□b** **ABE 6□b** **ABS 6□b** **ABE 10□b**							
	100%	120%	80%	105%	110%	95%	85%

Discrimination & Cascading Protection of Circuit Breakers

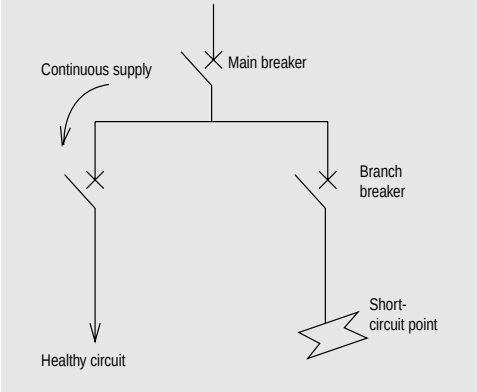
Protective coordination

The primary purpose of a circuit protection system is to prevent damage to series connected equipment and to minimize the area and duration of power loss.
The first consideration is whether an air circuit breaker or molded case circuit breaker is most suitable. The next is the type of system to be used.
The two major types are : Discrimination and cascading.

Type of protective coordination

1. Discrimination

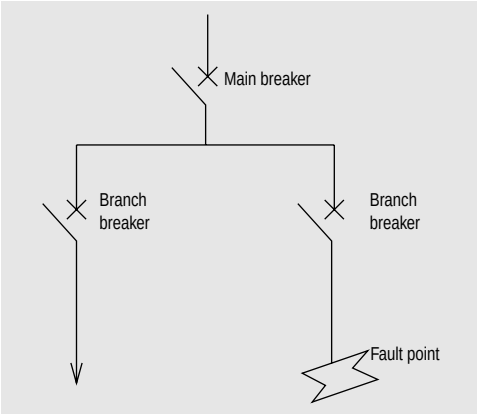
Object : Continuity of service



Discrimination, also called selectivity, is the coordination of automatic protection devices in such a manner that a fault appearing at a given point in a network is cleared by the protection device installed immediately upstream of the fault, and by that device alone.

2. Cascading

Object : Economical use of MCCBs



Cascading is the use of the current limiting capacity if circuit breakers at a given point to permit installation of lower-rated and therefore lower-cost circuit breakers branch. The main circuit breakers acts as a barrier against short-circuit currents. In this way, branch circuit breakers with lower breaking capacities than the prospective short-circuit (at their point of installation) operate under their normal breaking conditions. Since the current is limited throughout the circuit controlled by the limiting circuit breaker, cascading applies to all switchgear branch.

AC 240V

Main breaker / Branch breaker			A type ACB									
			LBA-06	LBA-08	LBA-10	LBA-13	LBA-16	LBA-20	LBA-25	LBA-32	LBA-40	LBA-50
		ICU (kA)	65	65	65	85	85	85	85	100	130	130
AB□ Series	E	ABE103b	25	12.3	17	25	25	25	25	25	25	25
		ABE203b	35	12.2	22.7	35	35	35	35	35	35	35
		ABE403a	35	-	18.2	28.2	35	35	35	35	35	35
		ABE403b	35	-	18.2	28.2	35	35	35	35	35	35
		ABE803a	50	-	-	-	29.1	50	50	50	50	50
		ABE803b	50	-	-	-	29.1	50	50	50	50	50
	S	ABS103b	50	21.6	50	50	50	50	50	50	50	50
		ABS203b	50	12.2	22.7	35	50	50	50	50	50	50
		ABS403a	50	-	18.2	28.2	44	50	50	50	50	50
		ABS403b	50	-	18.2	28.2	44	50	50	50	50	50
		ABS803a	100	-	-	-	29.1	51	86.4	100	100	100	100
		ABS803b	100	-	-	-	29.1	51	86.4	100	100	100	100
	H	ABH103b	65	21.6	51.7	65	65	65	65	65	65	65	65
		ABH203b	65	12.2	22.7	35	65	65	65	65	65	65	65
		ABH403a	85	-	18.2	28.2	44	85	85	85	85	85	85
		ABH403b	85	-	18.2	28.2	44	85	85	85	85	85	85
	L	ABL103a	100	19.5	53.2	100	100	100	100	100	100	100	100
		ABL203a	125	14.1	30.5	51.5	125	125	125	125	125	125	125
		ABL403a	125	-	18.2	28.2	44	92	125	125	125	125	125
		ABL403b	125	-	18.2	28.2	44	92	125	125	125	125	125
		ABL803a	125	-	-	-	29.1	51	86.4	125	125	125	125
		ABL803b	125	-	-	-	29.1	51	86.4	125	125	125	125
GB□ Series		GBN103	50	35.6	50	50	50	50	50	50	50	50	50
		GBH103	85	35.6	85	85	85	85	85	85	85	85	85
		GBL103	125	21.4	85	125	125	125	125	125	125	125	125
		GBN203	50	21.4	50	50	50	50	50	50	50	50	50
		GBH203	85	21.4	85	85	85	85	85	85	85	85	85
		GBL203	125	21.4	85	125	125	125	125	125	125	125	125
GB□E Series		GBL103E	125	25.8	125	125	125	125	125	125	125	125	125
		GBL203E	125	25.8	125	125	125	125	125	125	125	125	125
		GBN403E	50	-	10.2	22.1	33.4	50	50	50	50	50	50
		GBN803E	100	-	-	-	23.4	41.6	72.6	100	100	100	100

	Ace-MEC									
	LBA-06C	LBA-08C	LBA-10C	LBA-13C	LBA-16C	LBA-20C	LBA-25C	LBA-32C	LBA-40C	LBA-50C
	65	65	65	65	65	85	85	85	100	100
	13.2	25	25	25	25	25	25	25	25	25
	13.3	25.8	35	35	35	35	35	35	35	35
	-	20.2	31.3	35	35	35	35	35	35	35
	-	20.2	31.3	35	35	35	35	35	35	35
	-	-	-	31.6	50	50	50	50	50	50
	-	-	-	31.6	50	50	50	50	50	50
	23.8	50	50	50	50	50	50	50	50	50
	13.3	25.8	40	50	50	50	50	50	50	50
	-	20.2	31.3	50	50	50	50	50	50	50
	-	20.2	31.3	50	50	50	50	50	50	50
	-	-	-	31.6	56.7	100	100	100	100	100
	-	-	-	31.6	56.7	100	100	100	100	100
	23.8	57.8	65	65	65	65	65	65	65	65
	13.3	25.8	40	65	65	65	65	65	65	65
	-	20.2	31.3	50.8	85	85	85	85	85	85
	-	20.2	31.3	50.8	85	85	85	85	85	85
	22.3	69.6	100	100	100	100	100	100	100	100
	15.8	35.4	61.4	125	125	125	125	125	125	125
	-	20.2	31.3	50.8	104.8	125	125	125	125	125
	-	20.2	31.3	50.8	104.8	125	125	125	125	125
	-	-	21	31.6	56.7	104.2	125	125	125	125
	-	-	-	31.6	56.7	104.2	125	125	125	125
	44	50	50	50	50	50	50	50	50	50
	44	85	85	85	85	85	85	85	85	85
	24.9	104.2	125	125	125	125	125	125	125	125
	24.9	50	50	50	50	50	50	50	50	50
	24.9	85	85	85	85	85	85	85	85	85
	24.9	104.2	125	125	125	125	125	125	125	125
	31.3	125	125	125	125	125	125	125	125	125
	31.3	125	125	125	125	125	125	125	125	125
	-	17.8	24.2	37.8	50	50	50	50	50	50
	-	-	-	25.9	47	88	100	100	100	100

AC 415V

Branch breaker \ Main breaker				A type ACB									
				LBA-06	LBA-08	LBA-10	LBA-13	LBA-16	LBA-20	LBA-25	LBA-32	LBA-40	LBA-50
			ICU (kA)	50	50	50	65	65	65	65	85	100	100
AB□ Series	E	ABE103b	10	10	10	10	10	10	10	10	10	10	10
		ABE203b	18	10	16.8	18	18	18	18	18	18	18	18
		ABE403a	25	-	15.6	21.4	25	25	25	25	25	25	25
		ABE403b	25	-	15.6	21.4	25	25	25	25	25	25	25
		ABE803a	35	-	-	-	23	35	35	35	35	35	35
		ABE803b	35	-	-	-	23	35	35	35	35	35	35
	S	ABS103b	25	13	25	25	25	25	25	25	25	25	25
		ABS203b	25	10	16.8	23.5	25	25	25	25	25	25	25
		ABS403a	35	-	15.6	21.4	29.4	35	35	35	35	35	35
		ABS403b	35	-	15.6	21.4	29.4	35	35	35	35	35	35
		ABS803a	50	-	-	-	23	36.4	50	50	50	50	50
		ABS803b	50	-	-	-	23	36.4	50	50	50	50	50
	H	ABH103b	35	13	25.8	35	35	35	35	35	35	35	35
		ABH203b	35	10	16.8	23.5	35	35	35	35	35	35	35
		ABH403a	50	-	15.6	21.4	29.4	47.3	50	50	50	50	50
		ABH403b	50	-	15.6	21.4	29.4	47.3	50	50	50	50	50
	L	ABL103a	65	14.2	29.2	47.9	65	65	65	65	65	65	65
		ABL203a	65	11	19.2	28.7	45.8	65	65	65	65	65	65
		ABL403a	65	-	15.6	21.4	29.4	47.3	65	65	65	65	65
		ABL403b	85	-	15.6	21.4	29.4	47.3	66.9	85	85	85	85
		ABL803a	65	-	-	-	23	36.4	53	65	65	65	65
		ABL803b	85	-	-	-	23	36.4	53	85	85	85	85
GB□ Series		GBN103	35	19.8	35	35	35	35	35	35	35	35	35
		GBH103	50	19.8	50	50	50	50	50	50	50	50	50
		GBL103	85	15.8	38	66	85	85	85	85	85	85	85
		GBN203	35	15.8	35	35	35	35	35	35	35	35	35
		GBH203	50	15.8	38	50	50	50	50	50	50	50	50
		GBL203	85	15.8	38	66	85	85	85	85	85	85	85
GB□E Series		GBL103E	85	8.1	25.5	70.8	85	85	85	85	85	85	85
		GBL203E	85	8.1	25.5	70.8	85	85	85	85	85	85	85
		GBN403E	35	-	10.2	17.8	25	35	35	35	35	35	35
		GBN803E	50	-	-	-	20	30.4	50	50	50	50	50

Ace-MEC										
	LBA-06C	LBA-08C	LBA-10C	LBA-13C	LBA-16C	LBA-20C	LBA-25C	LBA-32C	LBA-40C	LBA-50C
	65	65	65	65	65	85	85	85	100	100
	10	10	10	10	10	10	10	10	10	10
	10.8	18	18	18	18	18	18	18	18	18
	-	17.2	23.4	25	25	25	25	25	25	25
	-	17.2	23.4	25	25	25	25	25	25	25
	-	-	-	25.3	35	35	35	35	35	35
	-	-	-	25.3	35	35	35	35	35	35
	14.2	25	25	25	25	25	25	25	25	25
	10.8	18.4	25	25	25	25	25	25	25	25
	-	17.2	23.4	32.6	35	35	35	35	35	35
	-	17.2	23.4	32.6	35	35	35	35	35	35
	-	-	-	25.3	40.5	50	50	50	50	50
	-	-	-	25.3	40.5	50	50	50	50	50
	14.2	30.5	35	35	35	35	35	35	35	35
	10.8	18.4	26.6	35	35	35	35	35	35	35
	-	17.2	23.4	32.6	50	50	50	50	50	50
	-	17.2	23.4	32.6	50	50	50	50	50	50
	15.6	34.2	55.2	65	65	65	65	65	65	65
	11.9	21.8	31.6	54	65	65	65	65	65	65
	-	17.2	23.4	32.6	52	65	65	65	65	65
	-	17.2	23.4	32.6	52	74.3	85	85	85	85
	-	-	-	25.3	40.5	61.4	65	65	65	65
	-	-	-	25.3	40.5	61.4	85	85	85	85
	22.3	35	35	35	35	35	35	35	35	35
	22.3	50	50	50	50	50	50	50	50	50
	17.4	44.2	85	85	85	85	85	85	85	85
	17.4	35	35	35	35	35	35	35	35	35
	17.4	44.2	50	50	50	50	50	50	50	50
	17.4	44.2	85	85	85	85	85	85	85	85
	8.6	39.5	78.1	85	85	85	85	85	85	85
	8.6	39.5	78.1	85	85	85	85	85	85	85
	-	14.2	19.4	28.1	35	35	35	35	35	35
	-	-	-	22.1	33.5	50	50	50	50	50

AC 240V

Branch breaker / Main breaker				AB□ Series											
				E						S					
				ABE 103b	ABE 203b	ABE 403a	ABE 403b	ABE 803a	ABE 803b	ABS 103b	ABS 203b	ABS 403a	ABS 403b	ABS 803a	ABS 803b
			ICU (kA)	25	35	35	35	50	50	50	50	50	50	100	100
AB□ Series	E	ABE33	2.5	0.8	1.8	2.5	2.5	2.5	2.5	0.8	1.8	2.5	2.5	2.5	2.5
		ABE53b	10	0.8	1.8	4.1	4.1	10.0	10.0	0.8	1.8	4.1	4.1	10.0	10.0
		ABE63b	10	0.8	1.8	4.1	4.1	10.0	10.0	0.8	1.8	4.1	4.1	10.0	10.0
		ABE103b	25	-	1.8	4.1	4.1	15.0	15.0	-	1.8	4.1	4.1	15.0	15.0
		ABE203b	35	-	-	3.6	3.6	10.3	10.3	-	-	3.6	3.6	10.3	10.3
		ABE403a	35	-	-	-	-	8.9	8.9	-	-	-	-	8.9	8.9
		ABE403b	35	-	-	-	-	8.9	8.9	-	-	-	-	8.9	8.9
	S	ABS33b	10	0.8	1.8	4.1	4.1	10.0	10.0	0.8	1.8	4.1	4.1	10.0	10.0
		ABS53b	25	0.8	1.8	4.1	4.1	15.0	15.0	0.8	1.8	4.1	4.1	15.0	15.0
		ABS63b	25	0.8	1.8	4.1	4.1	15.0	15.0	0.8	1.8	4.1	4.1	15.0	15.0
		ABS103b	50	-	1.8	4.4	4.4	15.8	15.8	-	1.8	4.4	4.4	15.8	15.8
		ABS203b	50	-	-	3.6	3.6	10.3	10.3	-	-	3.6	3.6	10.3	10.3
		ABS403a	50	-	-	-	-	8.9	8.9	-	-	-	-	8.9	8.9
		ABS403b	50	-	-	-	-	8.9	8.9	-	-	-	-	8.9	8.9
	H	ABH33b	25	0.8	1.8	4.1	4.1	15.0	15.0	0.8	1.8	4.1	4.1	15.0	15.0
		ABH53b	50	0.8	1.8	4.4	4.4	15.8	15.8	0.8	1.8	4.4	4.4	15.8	15.8
		ABH103b	65	-	1.8	4.4	4.4	15.8	15.8	-	1.8	4.4	4.4	15.8	15.8
		ABH203b	65	-	-	3.6	3.6	10.3	10.3	-	-	3.6	3.6	10.3	10.3
		ABH403a	85	-	-	-	-	8.9	8.9	-	-	-	-	8.9	8.9
		ABH403b	85	-	-	-	-	8.9	8.9	-	-	-	-	8.9	8.9
	L	ABL53a	100	0.8	1.8	3.6	3.6	15.2	15.2	0.8	1.8	3.6	3.6	15.2	15.2
		ABL103a	100	-	1.8	3.6	3.6	15.2	15.2	-	1.8	3.6	3.6	15.2	15.2
		ABL203a	125	-	-	3.6	3.6	11.9	11.9	-	-	3.6	3.6	11.9	11.9
		ABL403a	125	-	-	-	-	8.9	8.9	-	-	-	-	8.9	8.9
		ABL403b	125	-	-	-	-	8.9	8.9	-	-	-	-	8.9	8.9
GB□ Series	*Note1)	GBN103	50	0.8	1.8	5.6	5.6	24.6	24.6	0.8	1.8	5.6	5.6	24.6	24.6
		GBH103	85	0.8	1.8	5.6	5.6	24.6	24.6	0.8	1.8	5.6	5.6	24.6	24.6
		GBL103	125	0.8	1.8	4.2	4.2	15.5	15.5	0.8	1.8	4.2	4.2	15.5	15.5
	*Note2)	GBN103	50	-	1.8	5.6	5.6	24.6	24.6	-	1.8	5.6	5.6	24.6	24.6
		GBH103	85	-	1.8	5.6	5.6	24.6	24.6	-	1.8	5.6	5.6	24.6	24.6
		GBL103	125	-	1.8	4.2	4.2	15.5	15.5	-	1.8	4.2	4.2	15.5	15.5
		GBN203	50	-	-	4.2	4.2	15.5	15.5	-	-	4.2	4.2	15.5	15.5
		GBH203	85	-	-	4.2	4.2	15.5	15.5	-	-	4.2	4.2	15.5	15.5
		GBL203	125	-	-	4.2	4.2	15.5	15.5	-	-	4.2	4.2	15.5	15.5
GB□E Series		GBL53E	125	0.8	1.8	3.6	3.6	20.0	20.0	0.8	1.8	3.6	3.6	20.0	20.0
		GBL103E	125	-	1.8	3.6	3.6	20.0	20.0	-	1.8	3.6	3.6	20.0	20.0
		GBL203E	125	-	-	3.6	3.6	20.0	20.0	-	-	3.6	3.6	20.0	20.0
		GBN403E	50	-	-	-	-	7.2	7.2	-	-	-	-	7.2	7.2

*Note1) The applied ampere ratings are 16, 20, 25, 32, 40, 50A
*Note2) The applied ampere ratings are 63, 80, 100A

AB□ Series										GB□ Series						GB□ Series					
H				L																	
ABH 103a	ABH 203b	ABH 403a	ABH 403b	ABL 103a	ABL 203a	ABL 403a	ABL 403b	ABL 803a	ABL 803b	GBN 103	GBH 103	GBL 103	GBN 203	GBH 203	GBL 203	GBL 103E	GBL 203E	GBN 403E	GBN 803E	ABS 803E	ABS 1203E
35	35	85	85	100	125	125	125	125	125	50	85	125	50	85	125	125	125	50	100	100	100
0.8	1.5	2.5	2.5	0.9	1.8	2.5	2.5	2.5	2.5	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.5	2.5	2.5	2.5	2.5
0.8	1.8	4.1	4.1	0.9	1.8	4.1	4.1	10.0	10.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.6	10.0	10.0	10.0
0.8	1.8	4.1	4.1	0.9	1.8	4.1	4.1	10.0	10.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.6	10.0	10.0	10.0
-	1.8	4.1	4.1	-	1.8	4.1	4.1	15.0	15.0	-	-	-	2.0	2.0	2.0	-	2.7	4.2	16.0	25.0	13.2
-	-	3.6	3.6	-	-	3.6	3.6	10.3	10.3	-	-	-	-	-	-	-	-	3.7	11.0	14.3	35.0
-	-	-	-	-	-	-	-	8.9	8.9	-	-	-	-	-	-	-	-	-	9.1	11.7	26.5
-	-	-	-	-	-	-	-	8.9	8.9	-	-	-	-	-	-	-	-	-	9.1	11.7	26.5
0.8	1.8	4.1	4.1	0.9	1.8	4.1	4.1	10.0	10.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.6	10.0	10.0	10.0
0.8	1.8	4.1	4.1	0.9	1.8	4.1	4.1	15.0	15.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.6	16.0	25.0	13.2
0.8	1.8	4.1	4.1	0.9	1.8	4.1	4.1	15.0	15.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.6	16.0	25.0	13.2
-	1.8	4.4	4.4	-	1.8	4.4	4.4	15.8	15.8	-	-	-	2.0	2.0	2.0	-	3.1	4.5	17.4	24.8	50.0
-	-	3.6	3.6	-	-	3.6	3.6	10.3	10.3	-	-	-	-	-	-	-	-	3.7	11.0	14.3	37.5
-	-	-	-	-	-	-	-	8.9	8.9	-	-	-	-	-	-	-	-	-	9.1	11.7	26.5
-	-	-	-	-	-	-	-	8.9	8.9	-	-	-	-	-	-	-	-	-	9.1	11.7	26.5
0.8	1.8	4.1	4.1	0.9	1.8	4.1	4.1	15.0	15.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.6	16.0	25.0	13.2
0.8	1.8	4.4	4.4	0.9	1.8	4.4	4.4	15.8	15.8	0.8	0.8	0.8	2.0	2.0	2.0	1.1	3.1	4.6	17.4	24.8	50.0
-	1.8	4.4	4.4	-	1.8	4.4	4.4	15.8	15.8	-	-	-	2.0	2.0	2.0	-	3.1	4.5	17.4	24.8	65.0
-	-	3.6	3.6	-	-	3.6	3.6	10.3	10.3	-	-	-	-	-	-	-	-	3.7	11.0	14.3	37.5
-	-	-	-	-	-	-	-	8.9	8.9	-	-	-	-	-	-	-	-	-	9.1	11.7	26.5
-	-	-	-	-	-	-	-	8.9	8.9	-	-	-	-	-	-	-	-	-	9.1	11.7	26.5
0.8	1.8	3.6	3.6	0.9	1.8	3.6	3.6	15.2	15.2	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	3.7	16.8	23.1	100.0
-	1.8	3.6	3.6	-	1.8	3.6	3.6	15.2	15.2	-	-	-	2.0	2.0	2.0	-	2.7	3.7	16.8	23.1	100.0
-	-	3.6	3.6	-	-	3.6	3.6	11.9	11.9	-	-	-	-	-	-	-	-	3.7	12.6	16.0	59.8
-	-	-	-	-	-	-	-	8.9	8.9	-	-	-	-	-	-	-	-	-	9.1	11.7	26.5
-	-	-	-	-	-	-	-	8.9	8.9	-	-	-	-	-	-	-	-	-	9.1	11.7	26.5
0.8	1.8	5.6	5.6	0.9	1.8	5.6	5.6	24.6	24.6	0.8	0.8	0.8	2.0	2.0	2.0	1.1	3.5	5.8	31.2	50.0	50.0
0.8	1.8	5.6	5.6	0.9	1.8	5.6	5.6	24.6	24.6	0.8	0.8	0.8	2.0	2.0	2.0	1.1	3.5	5.8	31.2	50.2	85.0
0.8	1.8	4.2	4.2	0.9	1.8	4.2	4.2	15.5	15.5	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.6	18.9	27.7	125.0
-	1.8	5.6	5.6	-	1.8	5.6	5.6	24.6	24.6	-	-	-	2.0	2.0	2.0	-	3.5	5.8	31.2	50.0	50.0
-	1.8	5.6	5.6	-	1.8	5.6	5.6	24.6	24.6	-	-	-	2.0	2.0	2.0	-	3.5	5.8	31.2	50.2	85.0
-	1.8	4.2	4.2	-	1.8	4.2	4.2	15.5	15.5	-	-	-	2.0	2.0	2.0	-	2.7	4.6	18.9	27.7	125.0
-	-	4.2	4.2	-	-	4.2	4.2	15.5	15.5	-	-	-	-	-	-	-	-	4.6	18.9	27.7	50.0
-	-	4.2	4.2	-	-	4.2	4.2	15.5	15.5	-	-	-	-	-	-	-	-	4.6	18.9	27.7	85.0
-	-	4.2	4.2	-	-	4.2	4.2	15.5	15.5	-	-	-	-	-	-	-	-	4.6	18.9	27.7	125.0
0.8	1.8	3.6	3.6	0.9	0.8	3.6	3.6	20.0	20.0	0.8	0.8	0.8	1.3	1.3	1.3	0.9	2.3	3.7	20.5	17.3	125.0
-	1.8	3.6	3.6	-	0.8	3.6	3.6	20.0	20.0	-	-	-	1.3	1.3	1.3	-	2.3	3.7	20.5	17.3	125.0
-	-	3.6	3.6	-	-	3.6	3.6	20.0	20.0	-	-	-	-	-	-	-	-	3.7	20.5	17.3	125.0
-	-	-	-	-	-	-	-	7.2	7.2	-	-	-	-	-	-	-	-	-	7.5	7.0	18.4

AC 415V

Branch breaker / Main breaker				AB□ Series											
				E						S					
				ABE 103b	ABE 203b	ABE 403a	ABE 403b	ABE 803a	ABE 803b	ABS 103b	ABS 203b	ABS 403a	ABS 403b	ABS 803a	ABS 803b
			ICU (kA)	10	18	25	25	35	35	25	25	35	35	50	50
AB□ Series	E	ABE33	1.5	0.8	1.5	1.5	1.5	1.5	1.5	0.8	1.5	1.5	1.5	1.5	1.5
		ABE53b	5	0.8	1.8	3.9	3.9	5.0	5.0	0.8	1.8	3.9	3.9	5.0	5.0
		ABE63b	5	0.8	1.8	3.9	3.9	5.0	5.0	0.8	1.8	3.9	3.9	5.0	5.0
		ABE103b	10	-	1.8	3.9	3.9	10.0	10.0	-	1.8	3.9	3.9	10.0	10.0
		ABE203b	18	-	-	3.6	3.6	8.8	8.8	-	-	3.6	3.6	8.8	8.8
		ABE403a	25	-	-	-	-	8.4	8.4	-	-	-	-	8.4	8.4
		ABE403b	25	-	-	-	-	8.4	8.4	-	-	-	-	8.4	8.4
	S	ABS33b	5	0.8	1.8	3.9	3.9	5.0	5.0	0.8	1.8	3.9	3.9	5.0	5.0
		ABS53b	10	0.8	1.8	3.9	3.9	10.0	10.0	0.8	1.8	3.9	3.9	10.0	10.0
		ABS63b	10	0.8	1.8	3.9	3.9	10.0	10.0	0.8	1.8	3.9	3.9	10.0	10.0
		ABS103b	25	-	1.8	4.0	4.0	10.9	10.9	-	1.8	4.0	4.0	10.9	10.9
		ABS203b	25	-	-	3.6	3.6	8.8	8.8	-	-	3.6	3.6	8.8	8.8
		ABS403a	35	-	-	-	-	8.4	8.4	-	-	-	-	8.4	8.4
		ABS403b	35	-	-	-	-	8.4	8.4	-	-	-	-	8.4	8.4
	H	ABH33b	10	0.8	1.8	3.9	3.9	10.0	10.0	0.8	1.8	3.9	3.9	10.0	10.0
		ABH53b	25	0.8	1.8	4.0	4.0	10.9	10.9	0.8	1.8	4.0	4.0	10.9	10.9
		ABH103b	35	-	1.8	4.0	4.0	10.9	10.9	-	1.8	4.0	4.0	10.9	10.9
		ABH203b	35	-	-	3.6	3.6	8.8	8.8	-	-	3.6	3.6	8.8	8.8
		ABH403a	50	-	-	-	-	8.4	8.4	-	-	-	-	8.4	8.4
		ABH403b	50	-	-	-	-	8.4	8.4	-	-	-	-	8.4	8.4
	L	ABL53a	65	0.8	1.8	3.6	3.6	11.5	11.5	0.8	1.8	3.6	3.6	11.5	11.5
		ABL103a	65	-	1.8	3.6	3.6	11.5	11.5	-	1.8	3.6	3.6	11.5	11.5
		ABL203a	65	-	-	3.6	3.6	9.6	9.6	-	-	3.6	3.6	9.6	9.6
		ABL403a	65	-	-	-	-	8.4	8.4	-	-	-	-	8.4	8.4
		ABL403b	85	-	-	-	-	8.4	8.4	-	-	-	-	8.4	8.4
GB□ Series	*Note1)	GBN103	35	0.8	1.8	4.4	4.4	14.8	14.8	0.8	1.8	4.4	4.4	14.8	14.8
		GBH103	50	0.8	1.8	4.4	4.4	14.8	14.8	0.8	1.8	4.4	4.4	14.8	14.8
		GBL103	85	0.8	1.8	3.8	3.8	12.6	12.6	0.8	1.8	3.8	3.8	12.6	12.6
	*Note2)	GBN103	35	-	1.8	4.4	4.4	14.8	14.8	-	1.8	4.4	4.4	14.8	14.8
		GBH103	50	-	1.8	4.4	4.4	14.8	14.8	-	1.8	4.4	4.4	14.8	14.8
		GBL103	85	-	1.8	3.8	3.8	12.6	12.6	-	1.8	3.8	3.8	12.6	12.6
		GBN203	35	-	-	3.8	3.8	12.6	12.6	-	-	3.8	3.8	12.6	12.6
		GBH203	50	-	-	3.8	3.8	12.6	12.6	-	-	3.8	3.8	12.6	12.6
		GBL203	85	-	-	3.8	3.8	12.6	12.6	-	-	3.8	3.8	12.6	12.6
GB□E Series		GBL53E	85	0.8	1.8	3.6	3.6	7.2	7.2	0.8	1.8	3.6	3.6	7.2	7.2
		GBL103E	85	-	1.8	3.6	3.6	7.2	7.2	-	1.8	3.6	3.6	7.2	7.2
		GBL203E	85	-	-	3.6	3.6	7.2	7.2	-	-	3.6	3.6	7.2	7.2
		GBN403E	35	-	-	-	-	7.2	7.2	-	-	-	-	7.2	7.2

*Note1) The applied ampere ratings are 16, 20, 25, 32, 40, 50A
*Note2) The applied ampere ratings are 63, 80, 100A

AB□ Series										GB□ Series						GB□ Series				
H				L																
ABH 103a	ABH 203b	ABH 403a	ABH 403b	ABL 103a	ABL 203a	ABL 403a	ABL 403b	ABL 803a	ABL 803b	GBN 103	GBH 103	GBL 103	GBN 203	GBH 203	GBL 203	GBL 103E	GBL 203E	GBN 403E	GBN 803E	ABS 1203E
35	35	50	50	65	65	65	85	65	85	35	50	85	35	50	85	85	85	35	50	65
0.8	1.5	1.5	1.5	0.9	1.5	1.5	1.5	1.5	1.5	0.8	0.8	0.8	1.5	1.5	1.5	1.1	1.5	1.5	1.5	1.5
0.8	1.8	3.9	3.9	0.9	1.8	3.9	3.9	5.0	5.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.0	5.0	5.0
0.8	1.8	3.9	3.9	0.9	1.8	3.9	3.9	5.0	5.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.0	5.0	5.0
-	1.8	3.9	3.9	-	1.8	3.9	3.9	10.0	10.0	-	-	-	2.0	2.0	2.0	-	2.7	4.0	10.0	10.0
-	-	3.6	3.6	-	-	3.6	3.6	8.8	8.8	-	-	-	-	-	-	-	-	3.7	9.2	18.0
-	-	-	-	-	-	-	-	8.4	8.4	-	-	-	-	-	-	-	-	-	-	21.7
-	-	-	-	-	-	-	-	8.4	8.4	-	-	-	-	-	-	-	-	-	-	21.7
0.8	1.8	3.9	3.9	0.9	1.8	3.9	3.9	5.0	5.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.0	5.0	5.0
0.8	1.8	3.9	3.9	0.9	1.8	3.9	3.9	10.0	10.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.0	10.0	10.0
0.8	1.8	3.9	3.9	0.9	1.8	3.9	3.9	10.0	10.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.0	10.0	10.0
-	1.8	4.0	4.0	-	1.8	4.0	4.0	10.9	10.9	-	-	-	2.0	2.0	2.0	-	2.9	4.1	11.6	25.0
-	-	3.6	3.6	-	-	3.6	3.6	8.8	8.8	-	-	-	-	-	-	-	-	3.7	9.2	25.0
-	-	-	-	-	-	-	-	8.4	8.4	-	-	-	-	-	-	-	-	-	-	21.7
-	-	-	-	-	-	-	-	8.4	8.4	-	-	-	-	-	-	-	-	-	-	21.7
0.8	1.8	3.9	3.9	0.9	1.8	3.9	3.9	10.0	10.0	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.0	10.0	10.0
0.8	1.8	4.0	4.0	0.9	1.8	4.0	4.0	10.9	10.9	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.9	4.1	11.6	25.0
-	1.8	4.0	4.0		1.8	4.0	4.0	10.9	10.9	-	-	-	2.0	2.0	2.0	-	2.9	4.1	11.6	35.0
-	-	3.6	3.6	-	-	3.6	3.6	8.8	8.8	-	-	-	-	-	-	-	-	3.7	9.2	25.4
-	-	-	-	-	-	-	-	8.4	8.4	-	-	-	-	-	-	-	-	-	-	21.7
-	-	-	-	-	-	-	-	8.4	8.4	-	-	-	-	-	-	-	-	-	-	21.7
0.8	1.8	3.6	3.6	0.9	1.8	3.6	3.6	11.5	11.5	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	3.7	11.8	55.2
-	1.8	3.6	3.6	-	1.8	3.6	3.6	11.5	11.5	-	-	-	2.0	2.0	2.0	-	2.7	3.7	11.8	55.2
-	-	3.6	3.6	-	-	3.6	3.6	9.6	9.6	-	-	-	-	-	-	-	-	3.7	10.0	31.8
-	-	-	-	-	-	-	-	8.4	8.4	-	-	-	-	-	-	-	-	-	-	21.7
-	-	-	-	-	-	-	-	8.4	8.4	-	-	-	-	-	-	-	-	-	-	21.7
-	-	4.4	4.4	0.9	1.8	4.4	4.4	14.8	14.8	0.8	0.8	0.8	2.0	2.0	2.0	1.1	3.1	4.6	16.1	35.0
-	-	4.4	4.4	0.9	1.8	4.4	4.4	14.8	14.8	0.8	0.8	0.8	2.0	2.0	2.0	1.1	3.1	4.6	16.1	50.0
0.8	1.8	3.8	3.8	0.9	1.8	3.8	3.8	12.6	12.6	0.8	0.8	0.8	2.0	2.0	2.0	1.1	2.7	4.0	13.2	73.1
0.8	1.8	4.4	4.4	-	1.8	4.4	4.4	14.8	14.8	-	-	-	2.0	2.0	2.0	-	3.1	4.6	16.1	35.0
0.8	1.8	4.4	4.4	-	1.8	4.4	4.4	14.8	14.8	-	-	-	2.0	2.0	2.0	-	3.1	4.6	16.1	50.0
-	1.8	3.8	3.8	-	1.8	3.8	3.8	12.6	12.6	-	-	-	2.0	2.0	2.0	-	2.7	4.0	13.2	73.1
-	1.8	3.8	3.8	-	-	3.8	3.8	12.6	12.6	-	-	-	-	-	-	-	-	4.0	13.2	35.0
-	1.8	3.8	3.8	-	-	3.8	3.8	12.6	12.6	-	-	-	-	-	-	-	-	4.0	13.2	50.0
-	-	3.8	3.8	-	-	3.8	3.8	12.6	12.6	-	-	-	-	-	-	-	-	4.0	13.2	73.1
0.8	1.8	3.6	3.6	0.9	0.8	3.6	3.6	7.2	7.2	0.8	0.8	0.8	1.3	1.3	1.3	0.9	2.3	3.7	7.5	34.2
-	1.8	3.6	3.6	-	0.8	3.6	3.6	7.2	7.2	-	-	-	1.3	1.3	1.3	-	2.3	3.7	7.5	34.2
-	-	3.6	3.6	-	-	3.6	3.6	7.2	7.2	-	-	-	-	-	-	-	-	3.7	7.5	34.2
-	-	-	-	-	-	-	-		7.2	7.2	-	-	-	-	-	-	-	-	-	13.8

AC 240V

Main breaker / Branch breaker			AB□ Series														
			E									S					
			ABE 33	ABE 53b	ABE 63b	ABE 103b	ABE 203b	ABE 403a	ABE 403b	ABE 803a	ABE 803b	ABS 33b	ABS 53b	ABS 63b	ABS 103b	ABS 203b	ABS 403a
		ICU (kA)	2.5	10	10	25	35	35	35	125	125	10	25	25	50	50	50
BKN C Curves	≥63A	4.5	-	-	-	0.8	1.8	4.5	4.5	4.5	4.5	-	-	-	0.8	1.8	4.5
	≥40A	6	-	-	0.5	0.8	2.3	6.0	6.0	6.0	6.0	-	-	0.5	0.8	2.3	6.0
	≥10A	6	0.2	0.4	0.5	0.8	3.9	6.0	6.0	6.0	6.0	0.2	0.4	0.5	0.8	3.9	6.0

Main breaker / Branch breaker			GB□ Series									GB□E Series					
			GBN 53	GBH 53	GBL 53	GBN 103	GBH 103	GBL 103	GBN 203	GBH 203	GBL 203	GBL 53E	GBL 103E	GBL 203E	GBN 403E	GBN 803E	ABS 203E
		ICU (kA)	50	85	125	50	85	125	50	85	125	125	125	125	50	100	100
BKN C Curves	≥63A	4.5	-	-	-	0.8	0.8	0.8	2.2	2.2	2.2	-	0.9	2.8	4.5	4.5	4.5
	≥40A	6	-	-	-	0.8	0.8	0.8	2.2	2.2	2.2	-	0.9	3.3	6.0	6.0	6.0
	≥10A	6	0.4	0.4	0.4	0.8	0.8	0.8	2.2	2.2	2.2	0.5	0.9	6.0	6.0	6.0	6.0

AC415V

Main breaker / Branch breaker			AB□ Series														
			E									S					
			ABE 33	ABE 53b	ABE 63b	ABE 103b	ABE 203b	ABE 403a	ABE 403b	ABE 803a	ABE 803b	ABS 33b	ABS 53b	ABS 63b	ABS 103b	ABS 203b	ABS 403a
		ICU (kA)	2.5	10	10	25	35	35	35	125	125	10	25	25	50	50	50
BKN C Curves	≥63A	4.5	-	-	-	0.8	1.8	4.5	4.5	4.5	4.5	-	-	-	0.8	1.8	4.5
	≥40A	6	-	-	0.5	0.8	2.0	5.0	6.0	6.0	6.0	-	-	0.5	0.8	2.3	5.0
	≥10A	6	0.2	0.4	0.5	0.8	2.8	6.0	6.0	6.0	6.0	0.2	0.4	0.5	0.8	3.9	6.0

Main breaker / Branch breaker			GB□ Series									GB□E Series					
			GBN 53	GBH 53	GBL 53	GBN 103	GBH 103	GBL 103	GBN 203	GBH 203	GBL 203	GBL 53E	GBL 103E	GBL 203E	GBN 403E	GBN 803E	ABS 1203E
		ICU (kA)	35	50	85	35	50	85	35	50	85	85	85	85	35	50	65
BKN C Curves	≥63A	4.5	-	-	-	0.8	0.8	0.8	1.3	1.3	1.3	-	0.9	2.6	4.5	4.5	4.5
	≥40A	6	-	-	-	0.8	0.8	0.8	1.3	1.3	1.3	-	0.9	2.9	5.2	6.0	6.0
	≥10A	6	0.4	0.4	0.4	0.8	0.8	0.8	1.3	1.3	1.3	0.5	0.9	4.1	6.0	6.0	6.0

AB□ Series															
S			H						L						
	ABS 403b	ABS 803a	ABS 803b	ABH 33b	ABH 53b	ABH 103b	ABH 203b	ABH 403a	ABH 403b	ABL 53a	ABL 103a	ABL 203a	ABL 403a	ABL 403b	ABL 803a	ABL 803b
	50	100	100	25	50	65	65	85	85	100	100	125	125	125	125	125
	4.5	4.5	4.5	-	-	0.8	1.8	4.5	4.5	-	0.9	1.8	4.5	4.5	4.5	4.5
	6.0	6.0	6.0	-	-	0.8	2.3	6.0	6.0	-	0.9	2.3	6.0	6.0	6.0	6.0
	6.0	6.0	6.0	0.2	0.4	0.8	3.9	6.0	6.0	0.5	0.9	3.9	6.0	6.0	6.0	6.0

AB□ Series															
S			H						L						
	ABS 403b	ABS 803a	ABS 803b	ABH 33b	ABH 53b	ABH 103b	ABH 203b	ABH 403a	ABH 403b	ABL 53a	ABL 103a	ABL 203a	ABL 403a	ABL 403b	ABL 803a	ABL 803b
	35	50	50	10	25	35	35	50	50	65	65	65	65	85	65	85
	4.5	4.5	4.5	-	-	0.8	1.8	4.5	4.5	-	0.9	1.8	4.5	4.5	4.5	4.5
	5.0	6.0	6.0	-	-	0.8	2.0	5.0	5.0	-	0.9	2.0	5.0	5.0	6.0	6.0
	6.0	6.0	6.0	0.2	0.4	0.8	2.8	6.0	6.0	0.5	0.9	2.8	6.0	6.0	6.0	6.0

240V

Branch MCCB		Main breaker	E							S					
			ABE 103b	ABE 203b	ABE 403a	ABE 403b	ABE 803a	ABE 803b	ABS 103b	ABS 203b	ABS 403a	ABS 403b	ABS 803a	ABS 803b	
		ICU (kA)	25	35	35	35	50	50	50	50	50	50	100	100	
E	ABE 33	2.5	5	5	-	-	-	-	5	-	-	-	-	-	
	ABE 53b	10	25	30	30	30	-	-	35	35	35	35	-	-	
	ABE 63b	10	25	30	30	30	-	-	35	35	35	35	-	-	
	ABE 103b	25	-	35	35	35	42	42	42	42	42	42	65	65	
	ABE 203b	35	-	-	-	-	50	50	-	50	50	50	65	65	
	ABE 403a	35	-	-	-	-	50	50	-	-	50	50	65	65	
	ABE 403b	35	-	-	-	-	50	50	-	-	50	50	65	65	
S	ABS 33b	10	25	30	30	30	-	-	35	35	35	35	-	-	
	ABS 53b	25	-	35	35	35	42	42	42	42	42	42	65	65	
	ABS 63b	25	-	35	35	35	42	42	42	42	42	42	65	65	
	ABS 103b	50	-	-	-	-	-	-	-	-	-	-	85	85	
	ABS 203b	50	-	-	-	-	-	-	-	-	-	-	85	85	
	ABS 403a	50	-	-	-	-	-	-	-	-	-	-	85	85	
	ABS 403b	50	-	-	-	-	-	-	-	-	-	-	85	85	
H	ABH 33b	25	-	35	35	35	42	42	42	42	50	50	65	65	
	ABH 53b	50	-	-	-	-	-	-	-	-	-	-	100	100	
	ABH 103b	65	-	-	-	-	-	-	-	-	-	-	100	100	
	ABH 203b	65	-	-	-	-	-	-	-	-	-	-	100	100	
	ABH 403a	85	-	-	-	-	-	-	-	-	-	-	100	100	
	ABH 403b	85	-	-	-	-	-	-	-	-	-	-	100	100	
L	ABL 103a	100	-	-	-	-	-	-	-	-	-	-	-	-	
	ABL 203a	125	-	-	-	-	-	-	-	-	-	-	-	-	
	ABL 403a	125	-	-	-	-	-	-	-	-	-	-	-	-	
	ABL 403b	125	-	-	-	-	-	-	-	-	-	-	-	-	
GB	GBN 103	50	-	-	-	-	-	-	-	-	-	-	85	85	
	GBH 103	85	-	-	-	-	-	-	-	-	-	-	100	100	
	GBL 103	125	-	-	-	-	-	-	-	-	-	-	-	-	
	GBN 203	50	-	-	-	-	-	-	-	-	-	-	85	85	
	GBH 203	85	-	-	-	-	-	-	-	-	-	-	100	100	
	GBL 203	125	-	-	-	-	-	-	-	-	-	-	-	-	

H		L								GB					
ABH 103b	ABH 203b	ABH 403a	ABH 403b	ABL 103a	ABL 203a	ABL 403a	ABL 403b	ABL 803a	ABL 803b	GBN 103	GBH 103	GBL 103	GBN 203	GBH 203	GBL 203
65	**65**	**85**	**85**	**100**	**125**	**125**	**125**	**125**	**125**	**50**	**85**	**125**	**50**	**85**	**125**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	42	50	50	50	85	85	85	-	-	42	50	85	42	50	85
42	42	50	50	50	85	85	85	-	-	42	50	85	42	50	85
50	50	65	65	65	85	85	85	85	85	-	50	85	50	65	85
-	65	65	65	-	85	85	85	85	85	-	-	-	-	65	85
-	-	65	65	-	-	85	85	85	85	-	-	-	-	-	-
-	-	65	65	-	-	85	85	85	85	-	-	-	-	-	-
42	42	50	50	65	85	85	85	-	-	42	50	85	42	50	85
50	50	65	65	85	100	100	100	100	100	50	65	100	50	65	100
50	50	65	65	85	100	100	100	100	100	50	65	100	50	65	100
65	65	85	85	100	100	100	100	100	100	-	85	100	-	85	100
-	65	85	85	-	100	100	100	100	100	-	-	-	-	85	100
-	-	85	85	-	-	100	100	100	100	-	-	-	-	-	-
-	-	85	85	-	-	100	100	100	100	-	-	-	-	-	-
-	-	65	65	85	100	100	100	85	85	50	65	100	50	65	100
-	-	85	85	100	125	125	125	125	125	-	85	100	-	85	125
50	50	85	85	100	125	125	125	125	125	-	85	100	-	85	125
65	65	85	85	-	125	125	125	125	-	-	-	-	-	85	125
-	-	-	-	-	-	-	-	125	125	-	-	-	-	-	-
-	-	-	-	-	-	-	-	125	125	-	-	-	-	-	-
-	-	-	-	-	125	125	125	125	125	-	-	-	-	-	125
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	85	85	85	100	100	100	100	100	-	85	100	-	85	100
-	-	-	-	100	125	125	125	125	125	-	-	125	-	-	125
65	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	85	85	-	100	100	100	100	100	-	-	-	-	85	100
-	-	-	-	-	125	125	125	125	125	-	-	-	-	-	125
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

415V

Branch MCCB		Main breaker	E							S					
			ABE 103b	ABE 203b	ABE 403a	ABE 403b	ABE 803a	ABE 803b	ABS 103b	ABS 203b	ABS 403a	ABS 403b	ABS 803a	ABS 803b	
		ICU (kA)	10	18	25	25	35	35	25	25	35	35	50	50	
E	ABE 33	1.5	-	-	-	-	-	-	-	-	-	-	-	-	
	ABE 53b	5	10	7.5	7.5	7.5	-	-	22	10	10	10	-	-	
	ABE 63b	5	10	7.5	7.5	7.5	-	-	22	10	10	10	-	-	
	ABE 103b	10	-	14	14	14	14	14	18	18	18	18	25	25	
	ABE 203b	18	-	-	25	25	30	30	-	25	30	30	35	35	
	ABE 403a	25	-	-	-	-	35	35	-	-	35	35	42	42	
	ABE 403b	25	-	-	-	-	35	35	-	-	35	35	42	42	
S	ABS 33b	5	10	7.5	7.5	7.5	-	-	22	10	10	10	-	-	
	ABS 53b	10	-	14	14	14	-	-	25	18	18	18	14	14	
	ABS 63b	10	-	14	14	14	-	-	25	18	18	18	14	14	
	ABS 103b	25	-	-	-	-	35	35	-	-	35	35	42	42	
	ABS 203b	25	-	-	-	-	35	35	-	-	35	35	42	42	
	ABS 403a	35	-	-	-	-	-	-	-	-	-	-	50	50	
	ABS 403b	35	-	-	-	-	-	-	-	-	-	-	50	50	
H	ABH 33b	10	-	14	14	14	-	-	25	18	18	18	14	14	
	ABH 53b	25	-	-	-	-	30	30	-	-	35	35	35	35	
	ABH 103b	35	-	-	-	-	-	-	-	-	-	-	50	50	
	ABH 203b	35	-	-	-	-	-	-	-	-	-	-	50	50	
	ABH 403a	50	-	-	-	-	-	-	-	-	-	-	-	-	
	ABH 403b	50	-	-	-	-	-	-	-	-	-	-	-	-	
L	ABL 103a	65	-	-	-	-	-	-	-	-	-	-	-	-	
	ABL 203a	65	-	-	-	-	-	-	-	-	-	-	-	-	
	ABL 403a	65	-	-	-	-	-	-	-	-	-	-	-	-	
	ABL 403b	85	-	-	-	-	-	-	-	-	-	-	-	-	
GB	GBN 103	35	-	-	-	-	-	-	-	-	-	-	50	50	
	GBH 103	50	-	-	-	-	-	-	-	-	-	-	-	-	
	GBL 103	85	-	-	-	-	-	-	-	-	-	-	-	-	
	GBN 203	35	-	-	-	-	-	-	-	-	-	-	50	50	
	GBH 203	50	-	-	-	-	-	-	-	-	-	-	-	-	
	GBL 203	85	-	-	-	-	-	-	-	-	-	-	-	-	

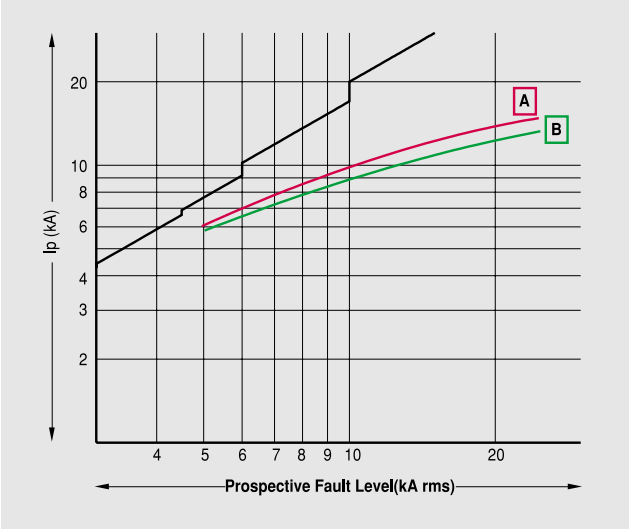
H		L								GB					
ABH 103b	ABH 203b	ABH 403a	ABH 403b	ABL 103a	ABL 203a	ABL 403a	ABL 403b	ABL 803a	ABL 803b	GBN 103	GBH 103	GBL 103	GBN 203	GBH 203	GBL 203
35	**35**	**50**	**50**	**65**	**65**	**65**	**85**	**65**	**85**	**35**	**50**	**85**	**35**	**50**	**85**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	14	14	14	35	25	18	18	-	-	25	30	35	25	30	35
25	14	14	14	35	25	18	18	-	-	25	30	35	25	30	35
18	18	25	25	35	35	30	30	30	30	-	30	35	25	30	35
-	30	35	35	-	50	35	42	35	42	-	-	-	-	35	42
-	-	42	42	-	-	42	42	50	50	-	-	-	-	-	-
-	-	42	42	-	-	42	42	50	50	-	-	-	-	-	-
25	14	14	14	35	25	18	18	-	-	25	30	35	25	30	35
30	25	25	25	42	35	30	30	25	25	30	35	42	30	35	42
30	25	25	25	42	35	30	30	25	25	30	35	42	30	35	42
35	35	42	42	50	50	42	50	42	50	-	42	50	35	42	50
-	35	42	42	-	65	42	50	42	50	-	-	-	-	50	65
-	-	50	50	-	-	50	65	50	65	-	-	-	-	-	-
-	-	50	50	-	-	50	65	50	65	-	-	-	-	-	-
30	25	25	25	42	35	30	30	25	25	30	35	42	30	25	42
35	35	42	42	50	50	42	42	42	42	30	42	50	30	42	50
-	-	50	50	65	65	50	65	50	65	-	50	85	-	50	85
-	-	50	50	-	65	50	65	50	65	-	-	-	-	50	85
-	-	-	-	-	-	65	85	65	85	-	-	-	-	-	-
-	-	-	-	-	-	65	85	65	85	-	-	-	-	-	-
-	-	-	-	-	-	-	85	-	85	-	-	85	-	-	85
-	-	-	-	-	-	-	85	-	85	-	-	-	-	-	85
-	-	-	-	-	-	-	85	-	85	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	50	50	65	65	65	65	65	65	-	50	65	-	50	65
-	-	-	-	65	65	65	85	65	85	-	-	85	-	-	85
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	50	50	-	65	65	65	65	65	-	-	-	-	50	65
-	-	-	-	-	65	65	85	65	85	-	-	-	-	-	85
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

AC 240V

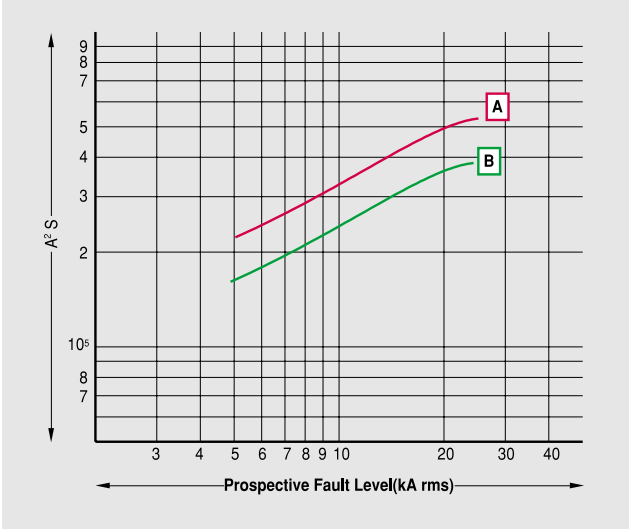
A ABE103b, ABH33b, ABS53b, ABS63b

B ABS33b, ABE53b, ABE63b

Peak current curve



Thermal stress curve

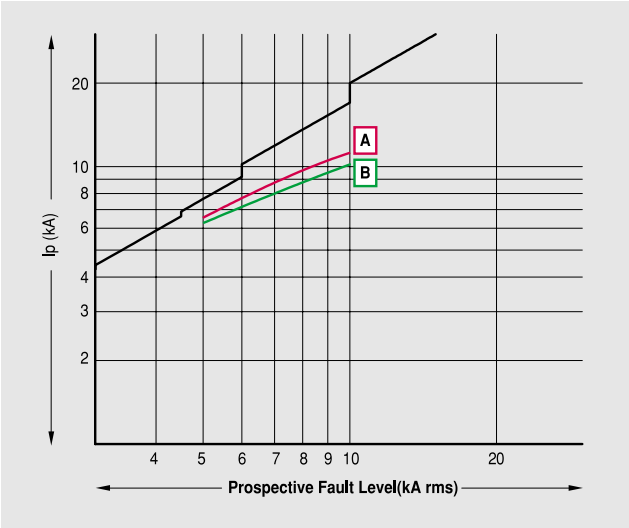


AC 415V

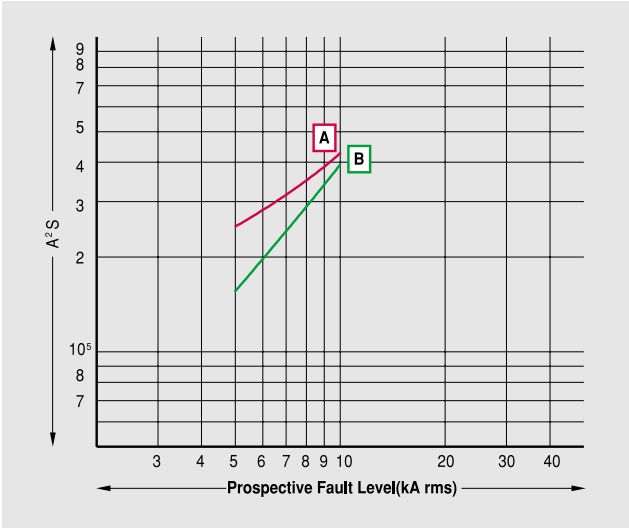
A ABE103b, ABH33b, ABS53b, ABS63b

B ABS33b, ABE53b, ABE63b

Peak current curve



Thermal stress curve

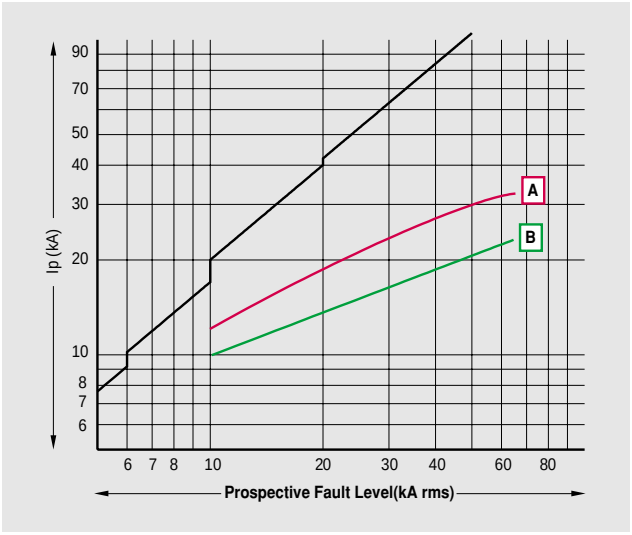


AC 240V

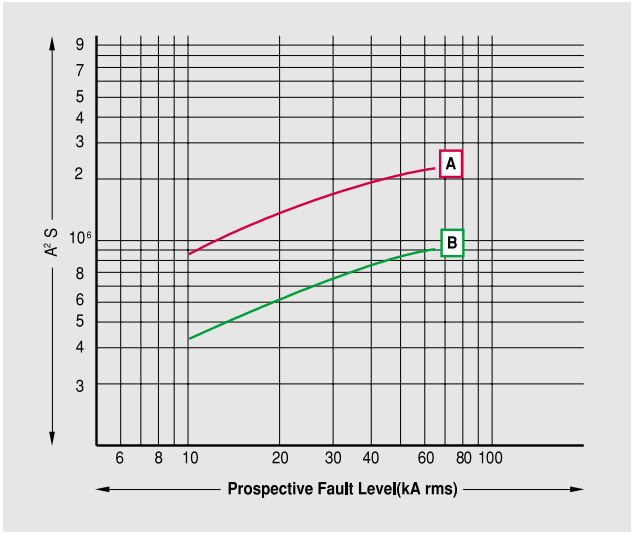
A ABE203b, ABS203b, ABH203b

B ABH53b, ABS103b, ABH103b

Peak current curve



Thermal stress curve

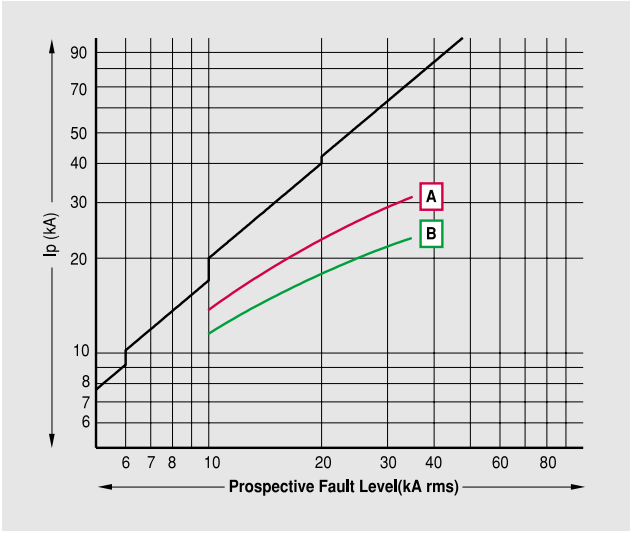


AC 415V

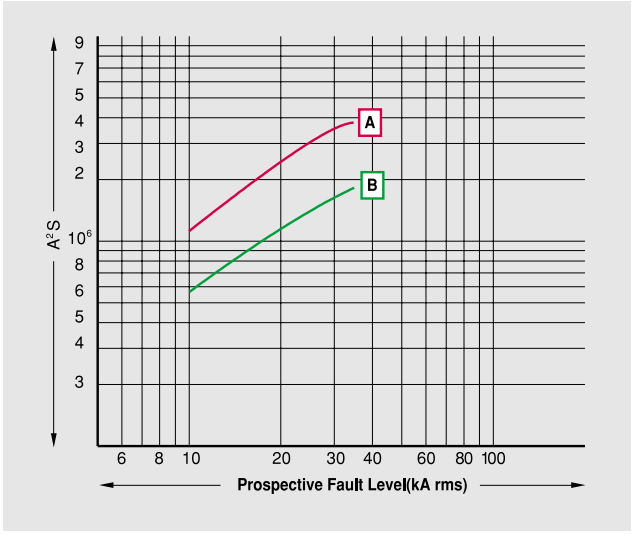
A ABE203b, ABS203b, ABH203b

B ABH53b, ABS103b, ABH103b

Peak current curve



Thermal stress curve

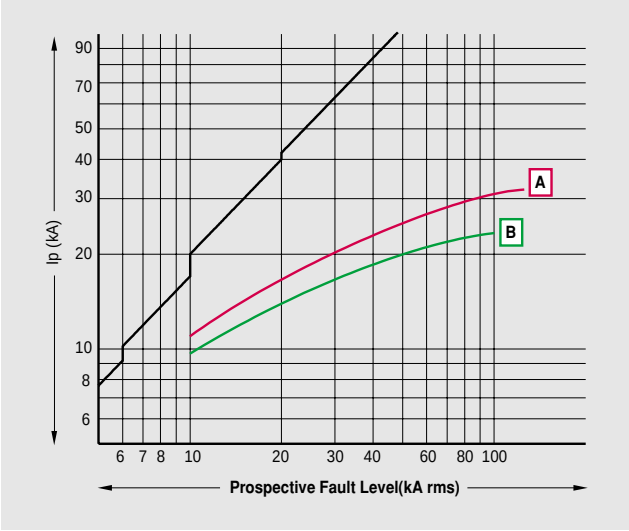


AC 240V

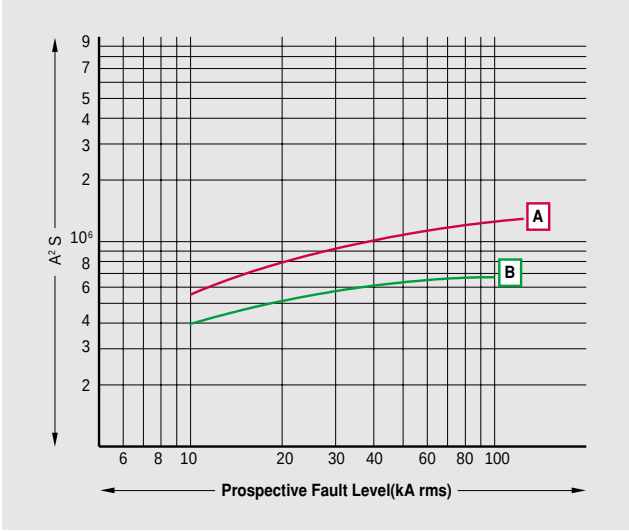
A ABL203a

B ABL53b, ABL103a

Peak current curve



Thermal stress curve

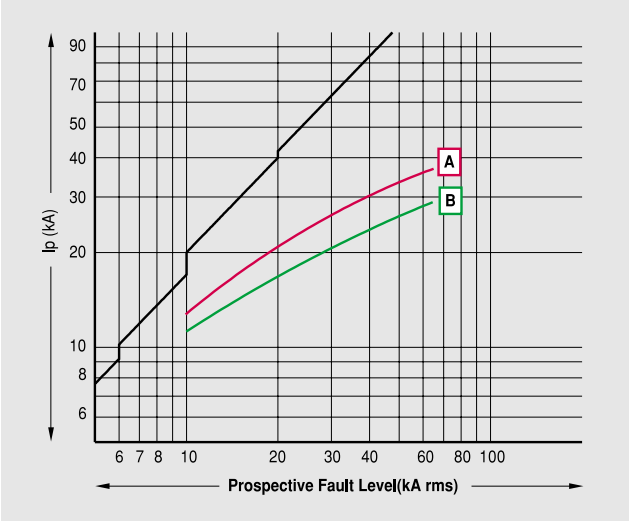


AC 415V

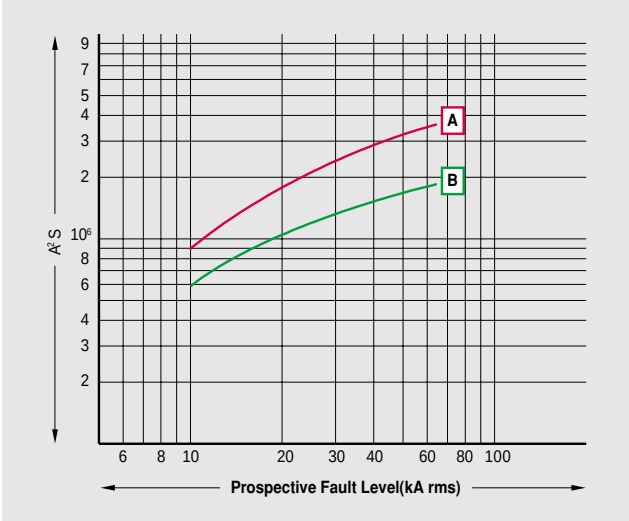
A ABL203a

B ABL53b, ABL103a

Peak current curve



Thermal stress curve

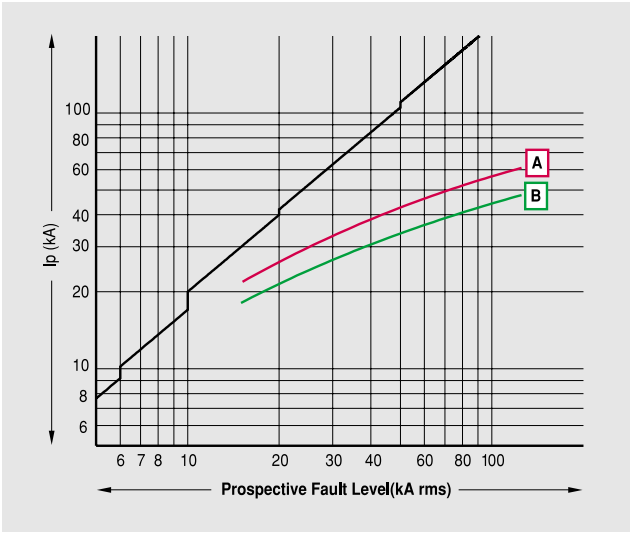


AC 240V

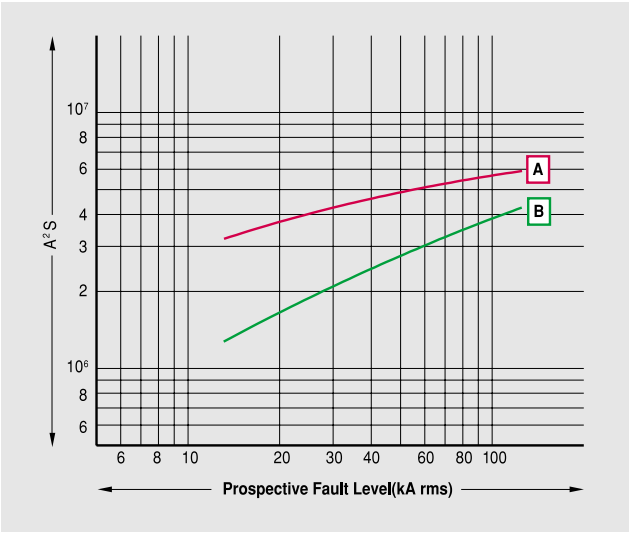
A ABE803b, ABS803b, ABL803b

B ABE403b, ABS403b, ABH403b, ABL403b

Peak current curve



Thermal stress curve

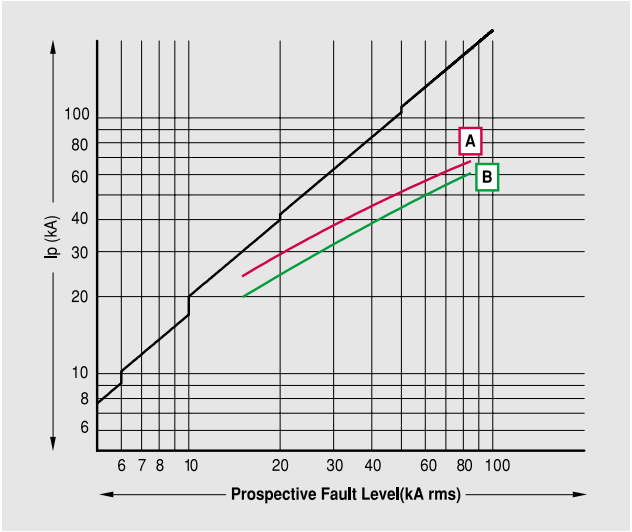


AC 415V

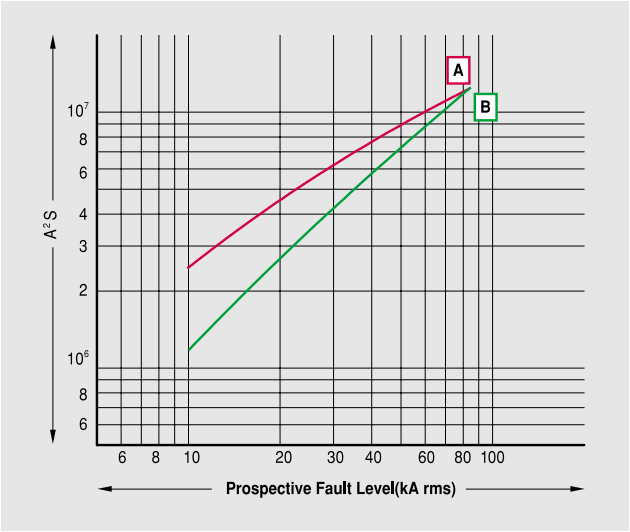
A ABE803b, ABS803b, ABL803b

B ABE403b, ABS403b, ABH403b, ABL403b

Peak current curve



Thermal stress curve



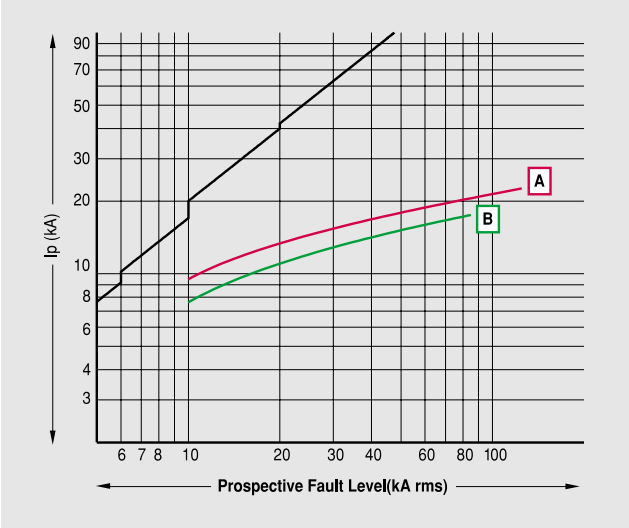
Current limiting curves

AC 240V

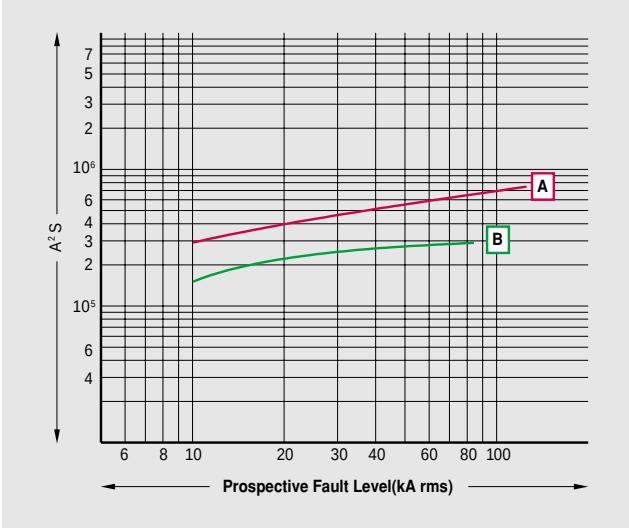
A GBL103, GBN203, GBH203, GBL203

B GBN103, GBH103

Peak current curve



Thermal stress curve

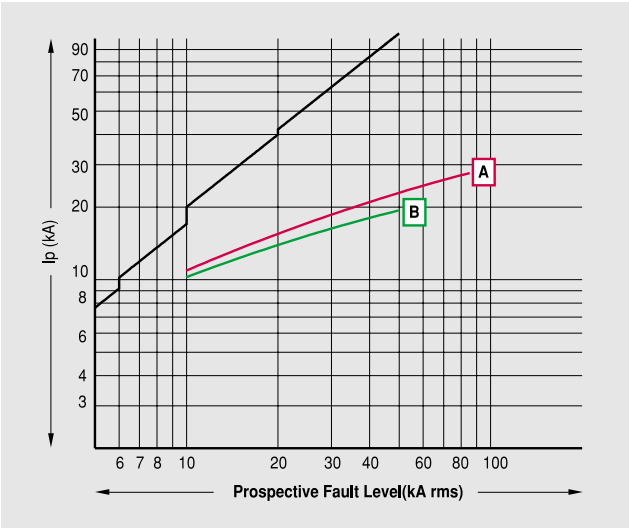


AC 415V

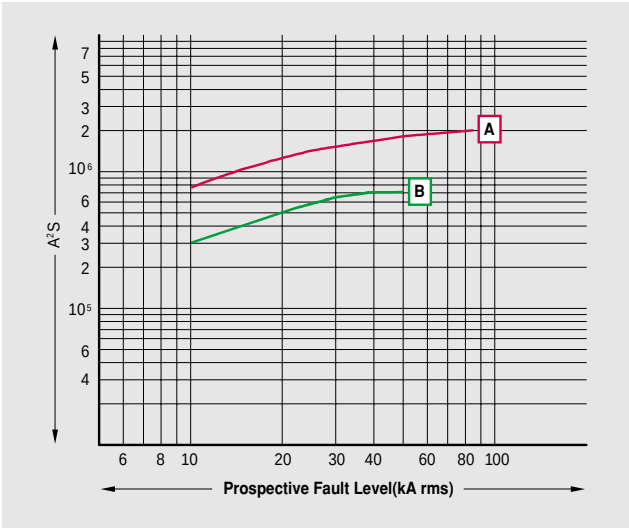
A GBL103, GBN203, GBH203, GBL203

B GBN103, GBH103

Peak current curve



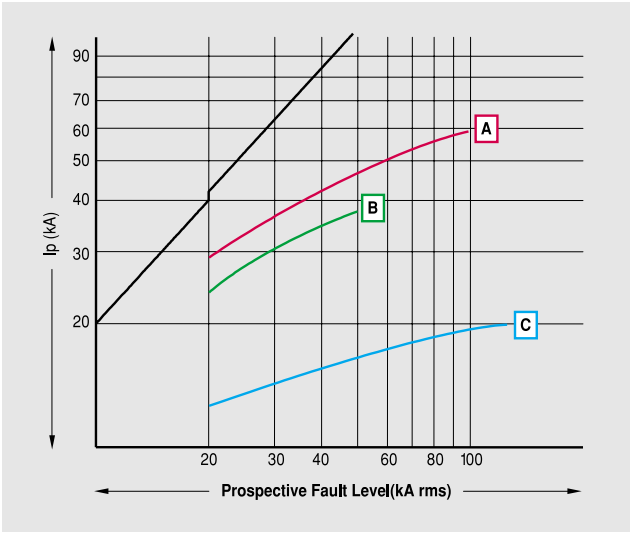
Thermal stress curve



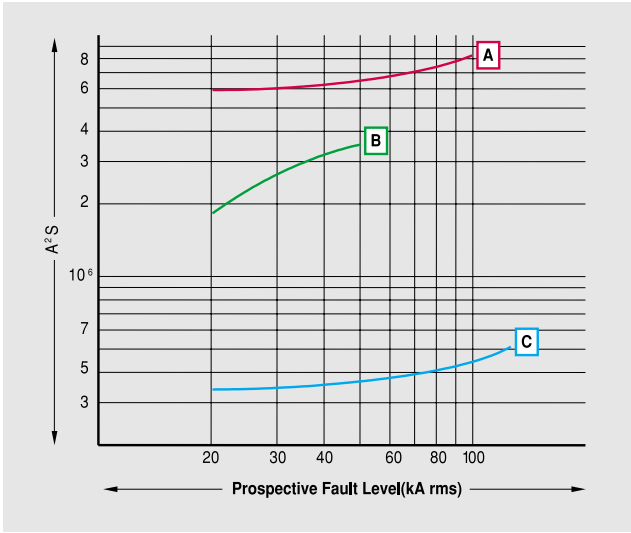
AC 240V

A GBN803E B GBN403E C GBL203E, GBL103E, GBL53E

Peak current curve



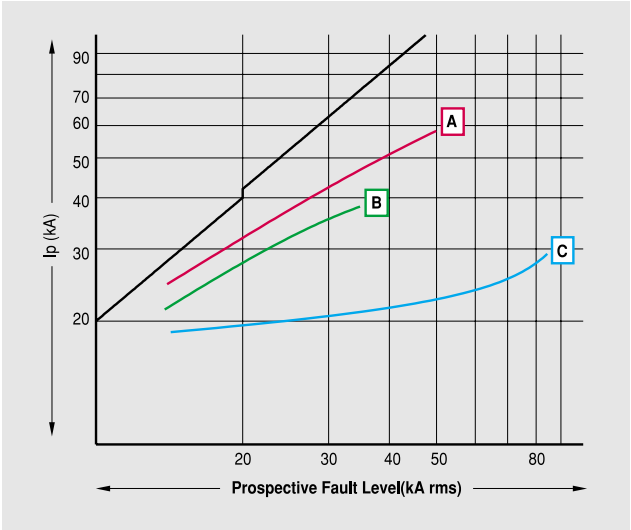
Thermal stress curve



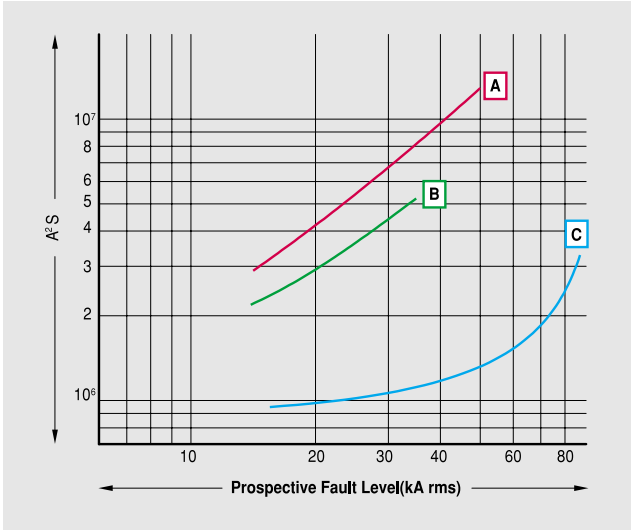
AC 415V

A GBN803E B GBN403E C GBL203E, GBL103E, GBL53E

Peak current curve



Thermal stress curve



Short circuit coordination

Direct starters with molded case circuit breakers (50kA-415V · IEC60947)

Motor		MCCB		Contactor	Thermal overload relay	
(kW)	440V(A)	Type	Rating Ir(A)	Type	Type	Settings range (A)
5.5	11	GBH(L)103	16	GMC-32	GTH(K)-40	9~13
7.5	15	GBH(L)103	16	GMC-32	GTH(K)-40	12~18
10	19	GBH(L)103	25	GMC-32	GTH(K)-40	18~26
11	21	GBH(L)103	25	GMC-32	GTH(K)-40	18~26
15	28	GBH(L)103	32	GMC-32	GTH(K)-40	24~36
18.5	34	GBH(L)103	40	GMC-75	GTH(K)-85	28~40
22	39	GBH(L)103	50	GMC-75	GTH(K)-85	34~50
30	54	GBH(L)103	63	GMC-75	GTH(K)-85	45~65
37	66	GBH(L)103	80	GMC-75	GTH(K)-85	54~75
45	80	GBH(L)103	100	GMC-100	GTH(K)-100	65~100
55	99	GBH(L)103	100	GMC-100	GTH(K)-100	85~125
75	135	GBH(L)203	160	GMC-150	GTH(K)-150	100~150
90	160	GBH(L)203	200	GMC-180	GTH(K)-220	120~180
110	192	GBH(L)203	200	GMC-180	GTH(K)-220	160~240
132	226	GBH(L)203	250	GMC-220	GTH(K)-220	160~240
160	265	ABH(L)403b	300	GMC-400	GTH(K)-400	200~300
200	330	ABH(L)403b	350	GMC-400	GTH(K)-400	260~400
220	353	ABH(L)403b	400	GMC-400	GTH(K)-400	260~400
250	400	ABS(L)803b	500	GMC-600	GTH(K)-600	260~400
300	480	ABS(L)803b	500	GMC-600	GTH(K)-600	400~600

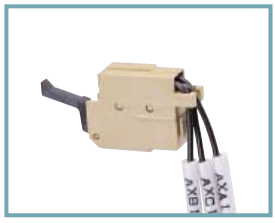
* Note; Magnetic only

Direct starters with molded case circuit breakers (85kA-415V · IEC60947)

Motor		MCCB		Contactor	Thermal overload relay	
(kW)	440V(A)	Type	Rating Ir(A)	Type	Type	Settings range (A)
5.5	11	GBH(L)103	16	GMC-32	GTH(K)-40	9~13
7.5	15	GBH(L)103	16	GMC-32	GTH(K)-40	12~18
10	19	GBH(L)103	25	GMC-32	GTH(K)-40	18~26
11	21	GBH(L)103	25	GMC-32	GTH(K)-40	18~26
15	28	GBH(L)103	32	GMC-32	GTH(K)-40	24~36
18.5	34	GBH(L)103	40	GMC-75	GTH(K)-85	28~40
22	39	GBH(L)103	50	GMC-75	GTH(K)-85	34~50
30	54	GBH(L)103	63	GMC-75	GTH(K)-85	45~65
37	66	GBH(L)103	80	GMC-75	GTH(K)-85	54~75
45	80	GBH(L)103	100	GMC-100	GTH(K)-100	65~100
55	99	GBH(L)103	100	GMC-100	GTH(K)-100	85~125
75	135	GBH(L)203	160	GMC-150	GTH(K)-150	100~150
90	160	GBH(L)203	200	GMC-180	GTH(K)-220	120~180
110	192	GBH(L)203	200	GMC-180	GTH(K)-220	160~240
132	226	GBH(L)203	250	GMC-220	GTH(K)-220	160~240
160	265	ABH(L)403b	300	GMC-400	GTH(K)-400	200~300
200	330	ABH(L)403b	350	GMC-400	GTH(K)-400	260~400
220	353	ABH(L)403b	400	GMC-400	GTH(K)-400	260~400
250	400	ABS(L)803b	500	GMC-600	GTH(K)-600	260~400
300	480	ABS(L)803b	500	GMC-600	GTH(K)-600	400~600

* Note; Tables are based on a combination of tests on a previous range and technical comparison.

AX, AL



Auxiliary switch, AX

Alarm switch, AL

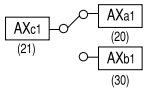
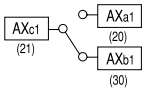
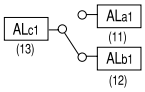
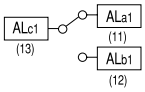
Auxiliary switch (AX)

It can be used to check circuit-breaker status information on On/Off.
It indicates the position of the circuit-breaker contacts.

Alarm switch (AL)

When the circuit-breaker has tripped, It indicates the tripped status of the circuit-breaker. (trip indication)

Operating characteristics of AX and AL

Type	Status of MCCB handle		
	ON	OFF	Tripped
AX			
AL			

Electrical characteristics of Auxiliary Switch(AX) and Alarm Switch(AL)

AF	Applies Circuit Breakers		AC			DC		
	MCCB	ELCB	Voltage	Operating current(A)		Voltage	Operating current(A)	
			(V)	Resistance	Inductance	(V)	Resistance	Inductance
30AF~225AF (Meta-MEC)	ABE50b,60b,100b,225b ABS 30b,50b,60b,100b,225b ABH 30b,50b,100b,225b	EBE50b,60b,100b,225b EBS 30b,50b,60b,100b,225b EBH 30b,50b,100b,225b	125 250	5 3	3 2	30 125	4 0.4	3 0.4
50AF~225AF (Hi-MEC)	ABL 50a,100a,225a	EBL 50,100,225	500	-	-	250	0.2	0.2
50AF~250AF (Meta-MEC)	GBN50, 100, 250 GBH50, 100, 250 GBL50, 100, 250 GBL53E, GBL103E, GBL203E		125 250	5 3	3 2	30 125 250	4 0.4 0.2	3 0.4 0.2
400AF~800AF (Meta-MEC)	ABE 400b,800b ABS 400b,800b ABH 400b ABL 400b,800b GBN 403E,803E GBH 403E,803E	EBE 400b,800b EBS 400b,800b EBH 400b EBL 400b,800b	125 250 500	5 3 -	3 2 -	30 125 250	4 0.4 0.2	3 0.4 0.2
1000AF-1200AF	ABS 1000,1200 ABS 1200E	1003SGR, 1203SGR	125 250 500	20 20 10	20 20 5	30 125 250	6 0.4 0.2	5 0.05 0.03

Shunt Trip Coil (SHT)

Shunt trip, SHT

Shunt Trip Coil (SHT)

This trip coil trips the circuit breaker when the control voltage exceeds from 0.85 times to 1.1 times the rated voltage at AC and from 0.75 times to 1.25 times the rated voltage at DC.

Electrical characteristics (Consumption)

AF	Control voltage(V)	Consumption (A)	Consumption (W)	AF	Control voltage(V)	Consumption (A)	Consumption (W)
30~225AF	AC/DC 12V	2.85	34	400~800AF	24V AC	14mA	0.3
	AC/DC 24V	1.65	40		24V DC	15.4mA	0.4
	AC/DC 48V	0.75	36		48V AC	14mA	0.7
	AC/DC 60V	0.61	36		48V DC	16mA	0.8
	AC100~125V DC100~110V	0.37	37		110V AC	6mA	0.7
					110V DC	6.6mA	0.7
	DC125V	0.3	38		220V AC	6.8mA	1.5
	AC200~240V DC200~220V	0.18	35		200V DC	7.6mA	1.5
					440V AC	4.3mA	1.9
	D 240V	0.15	36		480V AC	4.4mA	3.3
	AC/DC 250V	0.14	35		550V AC	4.6mA	2.4

Way of connection

Undervoltage Trip Coil (UVT)

Under voltage trip, UVT

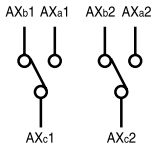
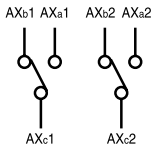
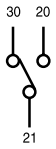
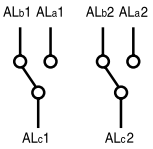
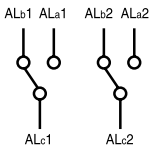
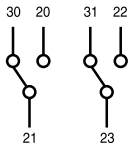
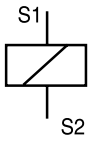
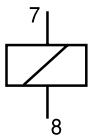
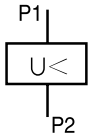
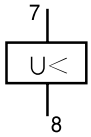
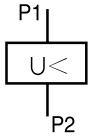
Undervoltage Trip Coil (UVT)

This trip coil trips the circuit breaker when the control voltage drops below the tripping threshold.

- Tripping threshold between 0.2 and 0.7 times the rated voltage.
- The circuit-breaker closing is possible only if the voltage exceeds 0.85 times the rated voltage (AC/DC).

Terminal number of electrical auxiliaries

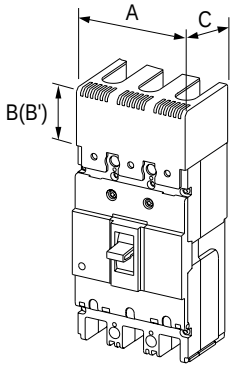
Terminal number

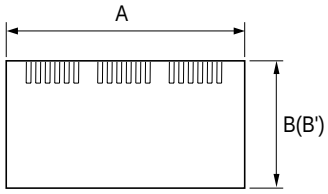
Type		Terminal number		
		Meta-MEC MCCB (30AF~225AF)	Meta-MEC MCCB (400AF~800AF)	MCCB (1000AF~1200AF)
Auxiliary switch (AX)				
Alarm switch (AL)				
Shunt Trip Coil (SHT)				
Under Voltage Trip Coil (UVT)	AC			
	DC			

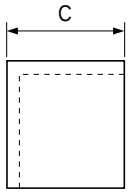
Terminal shields

Terminal shields

These are insulating accessories used for protection against direct contact with power circuits and for protection against insert of a foreign body (a piece of dirt).



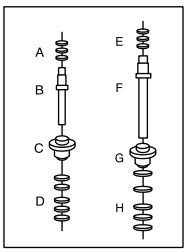
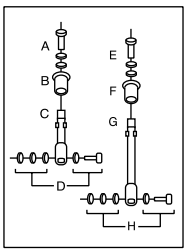




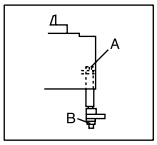
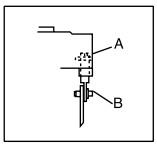
Type		Applied MCCBs	Applied ELCBs	Dimension(mm)		
Long type	Shprt type			A	B(B')	C
TBL-12B	TBS-12B	ABE 52b, ABE 62b, ABE 102b ABS 32b, ABS 52b, ABS 62b, ABH 32b ABE 104b, ABS 54b, ABS 64b (Use two shields for 4 pole MCCB)	-	50	30(5.5)	59
TBL-13B	TBS-13B	ABE 53b, ABE 63b, ABE 103b ABS 33b, ABS 53b, ABS 63b, ABH 33b	EBE 52b, EBE 102b, EBE 53b, EBE 63b, EBE 103b EBS 33b, EBS 53b, EBS 63b, EBH 33b	75	30(5.5)	59
TBL-22B	TBS-22B	ABS 102b, ABH 52b, ABH 102b	-	60	40(5.5)	59
TBL-23B	TBS-23B	ABS 103b, ABH 53b, ABH 103b	EBS 103b, EBH 53b, EBH 103b	90	40(5.5)	59
TBL-24B	TBS-24B	ABS 104b, ABH 54b, ABH 104b	EBS 54b, EBS 104b, EBH 54b, EBH 104b	120	40(5.5)	59
TBL-33B	TBS-33B	ABE 202b, ABS 202b, ABH 202b ABE 203b, ABS 203b, ABH 203b	EBE 203b, EBS 203b, EBH 203b	105	50(4.8)	59.3
TBL-34B	TBS-34B	ABE 204b, ABS 204b, ABH 204b	EBS 204b, EBH 204b	140	50(4.8)	59.3
TBL-43B	-	ABL 202a, ABL 203a	EBL 203	105	50	99.5
TBL-44B	-	ABL 204a	-	140	50	99.5
TBL-52B	-	ABL 52a, ABL 102a	-	74	40	81
TBL-53B	-	ABL 53a, ABL 103a	EBL 53, EBL 103	105	40	81
TBL-54B	-	ABL 54a, ABL 104a	-	140	40	81
T1-43A	-	ABE 402b, ABS 402b, ABH 402b, ABL 402b ABE 403b, ABS 403b, ABH 403b, ABL 403b	EBE 403b, EBS 403b, EBH 403b, EBL 403b	190	120	100
T1-44A	-	ABE 404b, ABS 404b, ABH 404b, ABL 404b	-	234	120	100
T1-63A	-	ABE 802b, ABS 802b, ABL 802b ABE 802b, ABS 802b, ABL 802b ABE 803b, ABS 803b, ABL 803b	EBE 803b, EBS 803b, EBL 803b	230	138.5	100
T1-64A	-	ABE 804b, ABS 804b, ABL 804b	-	300	138.5	100

Rear connection for AB type MCCBs

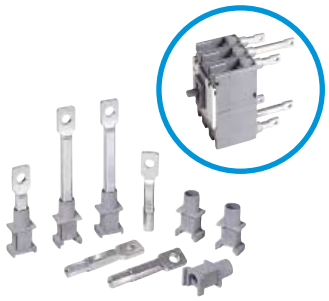
Rear connection

Type	Pole	Applied MCCBs	Applied ELCBs		Quantity							
					A	B	C	D	E	F	G	H
X-35R-52	2, 4	ABE 52b, ABE 102b, ABS 32b, ABS 52b, ABH 32b, ABE 104b, ABS 54b		Round type 	2	2	2	2	2	2	2	2
X-35R-53	3	ABE 53b, ABS 33b, ABS 53b, ABH 33b, ABE 103b	EBE 52b, EBE 102b, EBE 53b, EBE 103b, EBS 33b, EBS 53b, EBH 33b		4	4	4	4	2	2	2	2
X-35R-102 **X-35B-102**	2, 4	ABE 62b, ABE 102b, ABS 62b ABE 104b, ABS 64b			2	2	2	2	2	2	2	2
X-35R-103 **X-35B-103**	3	ABE 63b, ABS 63b, ABE 103b	EBE 102b, EBE 63b, EBE 103b		4	4	4	4	2	2	2	2
X-45R-102 **X-45B-102**	2	ABS 102b, ABH 52b, ABH 102b			2	2	2	2	2	2	2	2
X-45R-103 **X-45B-103**	3	ABS 103b, ABH 53b, ABH 103b	EBS 103b, EBH 53b, EBH 103b	Bar type 	4	4	4	4	2	2	2	2
X-45R-104 **X-45B-104**	4	ABS 104b, ABH 54b, ABH 104b										
X-55R-202 **X-55B-202**	2	ABE 202b, ABS 202b, ABH 202b			4	4	4	4	-	-	-	-
X-55R-203 **X-55B-203**	3	ABE 203b, ABS 203b, ABH 203b	EBE 203b, EBS 203b, EBH 203b		4	4	4	4	2	2	2	2
X-55R-204 **X-55B-204**	4	ABE 204b, ABS 204b, ABH 204b			4	4	4	4	4	4	4	4

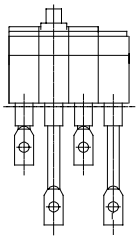
Rear connection

Type	MCCB			ELCB			Torque (kgf.cm)	
	E	S	H	E	S	H	A	B
Round type 	ABE 50b	ABS 30b ABS 50b	ABH 30b	EBE 50b	EBS 30b EBS 50b	EBH 30b	M4 13~18	M6 40~50
	ABE 60b ABE 100b	ABS 60b		EBE 60b EBE 100b	EBS 60b		M6 40~50	M8 70~90
Bar type 		ABS 100b	ABH 50b ABH 100b		EBS 100b	EBH 50b EBH 100b	M6 40~50	M8 120~150
	ABE 225b	ABS 225b	ABH 225b	EBE 225b	EBS 225b	EBH 225b	M6 50~65	M8 120~150

Rear connection for GB type MCCBs

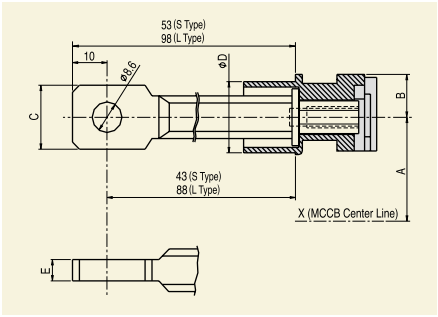


Rear connection kits



Bar type

Rear connection



(Unit: mm)

Applied MCCB	Type	A	B	C	D	E
GBN / H 100	X-10S X-10L	63	8	16	ø14	5
GBN / H 250 GBL 100, 250	X-20S X-20L	72	12	18	ø20	6

Composition

(Unit: pcs)

Type / MCCB	2 pole		3 pole		4 pole	
	X-102	X-202	X-103	X-203	X-104	X-204
GBN 100 GBH 100	X-10S : 4	-	X-10S : 4 X-10L : 2	-	X-10S : 4 X-10L : 2	-
GBN, H 250 GBL 50(E), 100(E), 250(E)	-	X-20S : 4	-	X-20S : 4	- X-20L : 2	X-20S : 4

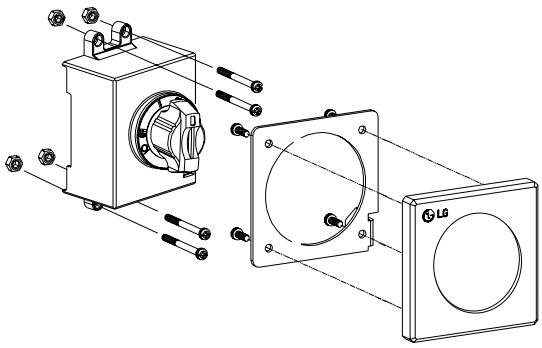
Accessories

Rotary Handle

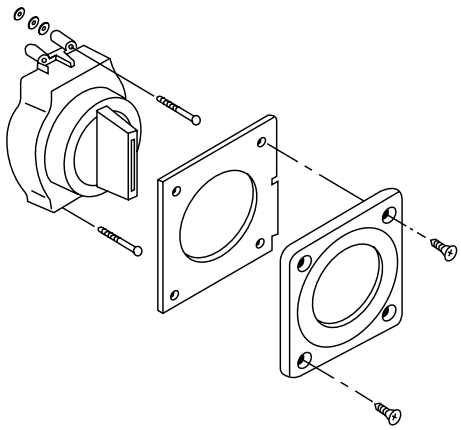
Type of rotary handle

Type		MCCB	ELCB
D, E handle	N handle		
D-35-S		ABE 53b	EBE 52b/53b
D-35-L		ABE 63b	EBE 63b
D-35-R	N-30b-S	ABE 103b	EBE 102b/103b
E-35-S	N-30b-L	ABS 33b	EBS 33b
E-35-L	N-30b-R	ABS 53b/54b	EBS 53b
E-35-R		ABS 63b/64b	EBS 63b
		ABH 33b	EBH 33b
D-45-S			
D-45-L	N-40b-S	ABS 103b/104b	EBS 103b
D-45-R	N-40b-L	ABH 53b/54b	EBH 53b
E-45-S	N-40b-R	ABH 103b/104b	EBH 103b
E-45-L			
E-45-R			
D-55-S			
D-55-L	N-50b-S	ABE 202b/203b/204b	EBE 203b
D-55-R	N-50b-L	ABS 202b/203b/204b	EBS 203b
E-55-S	N-50b-R	ABH 202b/203b/204b	EBH 203b
E-55-L			
E-55-R			
	N-55-S	ABL 53a/54a	EBL 53
-	N-55-L	ABL 103a/104a	EBL 103
	N-55-R		
	N-60-S		
-	N-60-L	ABL 202a/203a/204a	EBL 203
	N-60-R		
	N-70-S	ABE 402b/403b/404b	EBE 403b
		ABS 402b/403b/404b	EBS 403b
-	N-70-L	ABH 402b/403b/404b	EBH 403b
	N-70-R	ABL 402b/403b/404b	EBL 403b
	N-80-S	ABE 802b/803b/804b	EBS 803b
-	N-80-L	ABS 802b/803b/804b	EBL 803b
	N-80-R	ABL 802b/803b/804b	

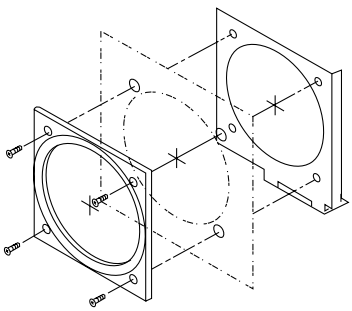
Development figure



(D-35~55)



(N-30b, 40b, 55b, N-55, N-60)



(N-70, N-80)