Product Line-up

Classification \ Frame (A)		30 32	50 60 63	100 125	160
Molded Case Circuit Breakers	NF-C Economy class	NF30-CS	NF63-CV	NF125-CV	
	NF-S Standard class	NF32-SV	NF63-SV	NF125-SV NF125-SGV NF125-SEV	NF160-SGV
	NF-H/L High-performance class		NF63-HV	NF125-HV NF125-LGV NF125-HEV NF125-HGV	NF160-LGV NF160-HGV
	NF-R/U Ultra current-limiting class			NF125-RGV NF125-UV	
Earth Leakage Circuit Breakers	NV-C Economy class		NV63-CV	NV125-CV	
	NV-S Standard class	NV32-SV	NV63-SV	NV125-SV NV125-SEV	
	NV-H/R High-performance class		NV63-HV	NV125-HV NV125-HEV	
Motor Protection Breakers	NF-MB	MB30-CS NF32-SV (*1)	NF63-CV (*1) NF63-SV (*1)	NF125-SV (*1)	
UL 489 Listed Circuit Breakers	UL 489 Listed MCCB	NF30-FAU	NF50-SVFU NF50-FAU NF50-SMU NF50-FHU	NF100-CVFU NF100-SRU NF125-SVU NF100-HRU NF125-HVU NF100-FHU	
	UL 489 Listed ELCB	NV30-FAU	NV50-SVFU NV50-FAU NV50-FHU	NV100-CVFU NV100-SRU NV125-SVU NV100-HRU NV125-HVU NV100-FHU	
Measuring Display Unit Breakers	MDU Breakers				
DC high voltage	NF-HDV		NF63-HDV	NF125-HDV	
	NF-HDVA			NF125-HDVA	
	NF-HDW				
Miniature Circuit Breakers		BH-DN	BH-D6 BH-D10		
Residual Current Circuit Breaker			BV-D		
Residual Current Circuit Breaker with Overload Protection			BV-DN		
Isolating Switch			KB-D		
Circuit Protectors		CP30-BA CP-S			
Air Circuit Breakers	AE-SW				
Related Components	Earth Leakage Relays	NV-ZBA, NV-ZSA, NV-ZHA, NV-ZLA			

Note *1 When placing an order, specify "MB."
WS-V Series

Molded Case Circuit Breakers

NF-C	NF-S	NF-H	NF-L	NF-R	NF-U
					

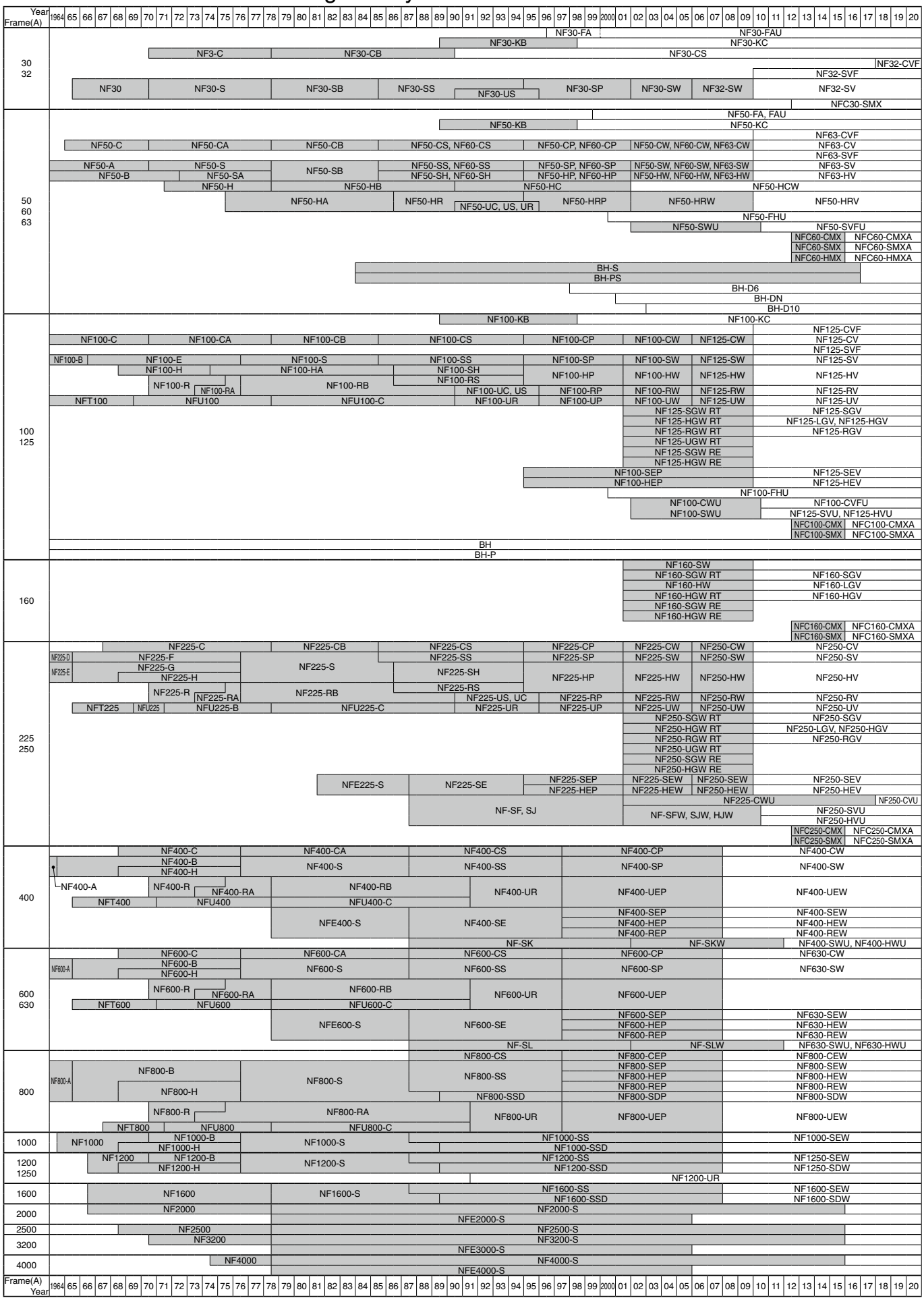
Earth Leakage Circuit Breakers | **Motor Protection Breakers**

NV-C	NV-S	NV-H	NV-R	NF-MB
				

UL 489 Listed Circuit Breakers | **Measuring Display Unit Breakers**

UL 489 Listed MCCB	UL 489 Listed ELCB	MDU Breakers
		

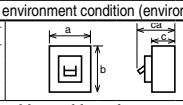
Mitsubishi MCCB Manufacturing History



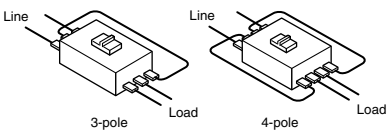
:Production stopped model

This manufacturing history is based on Japanese domectic market.

NF-C (Economy class)

Frame (A)				30	50	60	63	100	125
Model				NF30-CS	NF63-CV			NF125-CV	
Image									
Rated current In (A) Rated ambient temperture 40°C (45°C for marine use)				3 5 10 15 20 30	3 4 (5) 6 10 (15) 16 20 25 (30) 32 40 50	(60)	63	50 (60) 63 (75) 80 100	125
Number of poles				2 / 3	2 / 3	2 / 3	2 / 3	2 / 3	2 / 3
Rated insulation voltage Ui (V)				500	600	600	600	600	600
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	–	–	–	–	–	–
			500V	–	2.5/2.5	2.5/2.5	2.5/2.5	7.5/4	7.5/4
			440V	–	2.5/2.5	2.5/2.5	2.5/2.5	10/5	10/5
			415V	1.5/1.5	2.5/2.5	2.5/2.5	2.5/2.5	10/5	10/5
			400V	1.5/1.5	5/5	5/5	5/5	10/5	10/5
			380V	1.5/1.5	5/5	5/5	5/5	10/5	10/5
			230V	2.5/2 (240V)	7.5/7.5	7.5/7.5	7.5/7.5	30/15	30/15
			200V	2.5/2 (240V)	7.5/7.5	7.5/7.5	7.5/7.5	30/15	30/15
		DC	250V	–	2.5/2.5 (*7)	2.5/2.5 (*7)	2.5/2.5 (*7)	7.5/4 (*4)	7.5/4 (*4)
Rated impulse withstand voltage Uimp (kV)				4	8	8	8	8	8
Current (*1)				AC	AC/DC compatible	AC/DC compatible	AC/DC compatible	AC/DC compatible	AC/DC compatible
Suitability for isolation				–	Yes	Yes	Yes	Yes	Yes
Reverse connection				–	Available	Available	Available	Available	Available
Number of operating cycles	Without current			10,000	10,000	10,000	10,000	10,000	10,000
	With current (440VAC)			6,000 (415VAC)	6,000	6,000	6,000	6,000	6,000
Utilization category				A	A	A	A	A	A
Pollution degree				2	3	3	3	3	3
EMC environment condition (environment A or B)				Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Overall dimensions (mm)			a	45 / 67.5	50 / 75	50 / 75	50 / 75	60 / 90	60 / 90
			b	96	130	130	130	130	130
			c	52	68	68	68	68	68
			ca	67	90	90	90	90	90
Mass of front-face type (kg)				0.25 / 0.35	0.45 / 0.65	0.5 / 0.7	0.5 / 0.7	0.6 / 0.9	0.6 / 0.9
Installation and connections	Front connection	(F)	Page	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal
	Solderless (BOX) terminal	(SL)	98	–	–	–	–	●	●
	Rear	(B)		●Round stud (assembled in)	●Round stud	●Round stud	●Round stud	●Bar stud	●Bar stud
	Plug-in	(PM)		–	●	●	●	●	●
Cassette-type accessories	Alarm switch	(AL)	115	● (*5)	● (*6)	● (*6)	● (*6)	● (*6)	●(*6)
	Auxiliary switch	(AX)		● (*5)	● (*6)	● (*6)	● (*6)	● (*6)	●(*6)
	Shunt trip	(SHT)		–	● (*6)	● (*6)	● (*6)	● (*6)	●(*6)
	Undervoltage trip	(UVT)		–	● (*6)	● (*6)	● (*6)	● (*6)	●(*6)
	With lead-wire terminal block	(SLT)	120	●	●	●	●	●	●
	Pre-alarm	(PAL)	122	–	–	–	–	–	–
External accessories	Enclosure	Closed (S)	137	●	●	●	●	●	●
		Dustproof (I)		–	●	●	●	●	●
		Waterproof (W)		–	– ●	– ●	– ●	– ●	– ●
	Electrical operation device	(NFM)	140	–	–	–	–	– ●	– ●
	Mechanical interlock (MI) (*10)	Panel mounting	136	–	●	●	●	●	●
		Breaker mounting		–	●	●	●	●	●
	Handle lock device	LC	135	●	●	●	●	●	●
		HL		●	●	●	●	●	●
		HL-S		–	●	●	●	●	●
	External operating handle	(F)	123	–	●	●	●	●	●
		(V)		–	●	●	●	●	●
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)		128	●	●	●	●	●	●
	Rear stud	(B-ST)	98	–	●	●	●	●	●
	Plug-in	(PM)		–	●	●	●	●	●
	IEC 35mm rail mounting adapters		143	●	●	●	●	–	–
CE marking				TÜV approval	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration
CCC recognition				Recognized	Recognized	Recognized	Recognized	Recognized	Recognized
Marine use approval (☆:Certified) (NK, LR, ABS, DNV·GL)				☆ (NK, LR, ABS)	☆	☆	☆	☆	☆
Automatic tripping device				Hydraulic magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Trip button				– (*2)	Equipped	Equipped	Equipped	Equipped	Equipped
Page of Characteristics and dimensions				146	148			150	

Notes: *1 The operating characteristics are different between AC and DC.
*2 Equipped if AL is installed.
*3 For 100A of rated current, NK rating is not shown.
*4 For 3-pole product, connect cables/busbars to any two terminals, and for 4-pole product, connect cables/busbars to any two terminals except N-pole.
When connected cables/busbars as shown on the right, maximum of 400VDC can be applied to 3-pole product and maximum of 500VDC to 4-pole product.
*5 For draw-out direction of lead wire, lateral direction is standard but for front connection, load-side direction is available if specified.
*6 This accessory is cassette type and can be installed by customer. The frame size up to 250A can be closely installed, except for those with UVT.
*7 For 3-pole product, connect cables/busbars to any two terminals, and for 4-pole product, connect cables/busbars to any two terminals except N-pole.
Not available for use with connection as shown on the right.
*8 Place an order with circuit breaker.
*9 Solid state relay output is available as an option. Specify if this contact output is required. Lead-wire terminal block (SLT) is equipped as standard.
*10 No isolation function except 400A to 800A frame.



●Automatic Tripping Devices

Thermal-Magnetic Type

(NF32-SV, NF63-CV/SV/HV, NF125-CV/SV/HV, NF250-CV/SV/HV
NF400-CW/SW, NF630-CW/SW, NF800-SDW, etc.)

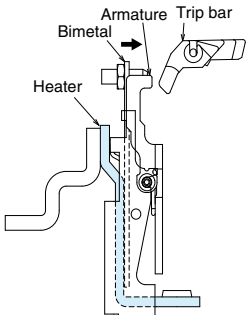


Fig. 4.3

1. Time-Delay Operation
   An overcurrent heats and warps the bimetal to actuate the trip bar.
2. Instantaneous Operation
   If the overcurrent is excessive, the amature is attracted and the trip bar actuated.

Thermal-Magnetic Type (NF1250-SDW)

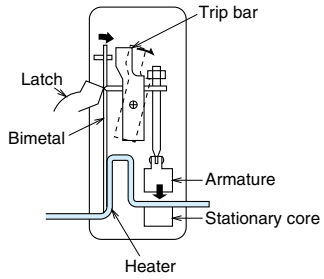


Fig. 4.4

1. Time-Delay Operation
   An overcurrent heats and warps the bimetal to actuate the trip bar.
2. Instantaneous Operation
   If the overcurrent is excessive, magnetization of the stationary core is strong enough to attract the armature and actuate the trip bar.

Hydraulic-Magnetic Type (NF30-CS etc.)

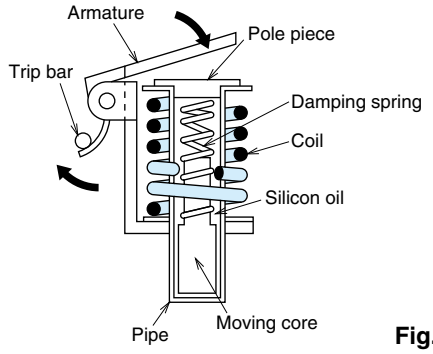


Fig. 4.5

1. Time-Delay Operation
   At an overcurrent flow, the magnetic force of the coil overcomes the spring, the core closes to the pole piece, attracts the armature, and actuates the trip bar.
   The delay is obtained by the viscosity of silicon oil.
2. Instantaneous Operation
   If the overcurrent is excessive, the armature is instantly attracted, without the influence of the moving core.

Principle of Electronic Trip Relay (ETR) Operation

(NF125-SEV/HEV, NF250-SEV/HEV, etc.) (NF400-SEW~NF800-CEW
NF1000-SEW~NF1600-SEW, etc.)

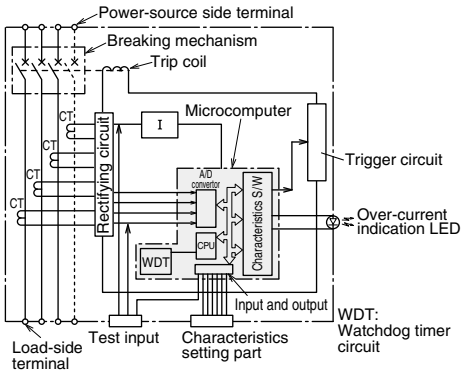


Fig. 4.6.1

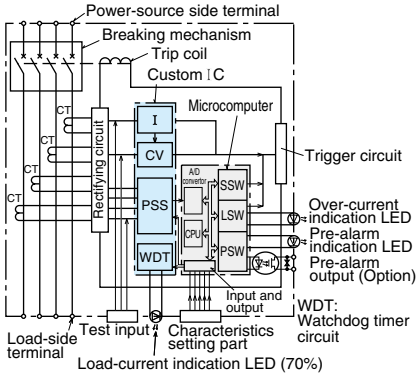


Fig. 4.6.2

1. The current flowing in each phase is monitored by a current transformer (CT).
2. Each phase of the transformed current undergoes full-phase rectification in the rectifier circuit.
3. After rectification, each of the currents are converted by a peak-conversion and an effective-value conversion circuit.
4. The largest phase is selected from the converted currents.
5. Each time-delay circuit generates a time delay corresponding to the largest phase.
6. The trigger circuit outputs a trigger signal.
7. The trip coil is excited, operating the switching mechanism.

Number of tripping devices

Descriptions (e.g. 2P1E and 2P0E) are not given in the number of poles fields of some models. For these models, the same number of overcurrent tripping devices as the number of poles is provided in the circuit breakers.
2 poles: 2P2E, 3 poles: 3P3E, 4 poles: 4P4E or 4P3E
(Some 4-pole models do not have overcurrent tripping devices for the neutral poles.)

(2) Connection of aluminum conductors

- When aluminum conductors are connected, be careful to prevent the contact resistance (due to the oxidized film of aluminum) from being increased.
- The surface of the connection point of the aluminum conductors shall be properly treated by plating (zinc displacement-Copper-Silver) or by joint compound. If the treatment is done only by joint compound, reliability is low, this should be limited to when plating is impossible (eg. at site).
- For aluminum cables, use compression terminals that are exclusively for aluminum cables.
- The compression portion of the terminal shall be provided with taping, and the aluminum wire shall not be exposed to the atmosphere.

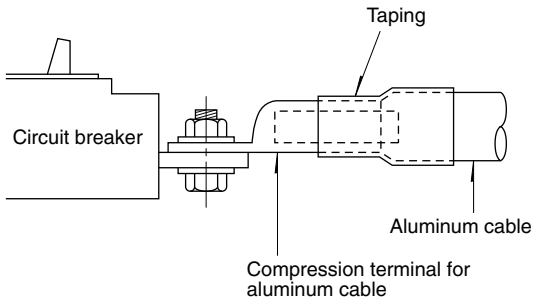


Fig. 4.16 Example of connection of aluminum conductor

(3) Maximum operating current of installation without clearance between breakers

In case of installation without clearance between breakers, because malfunction failures can result by heat of breaker, use the operating current not to exceed the below value.

Table 4-4

Model	Maximum operating current
BH-D6 BH-D10 BH-DN BV-DN CP30-BA CP-S NF30-CS NF32-SV NF63-CV NV32-SV NV63-CV NF63-SV NF63-HV NV63-SV NV63-HV NF125-CV NF125-SGV NF125-SEV NV125-CV NF125-SV NF125-LGV NF125-HEV NV125-SV NF125-HV NF125-HGV NV125-HV NF125-RGV NF160-SGV NF160-LGV NF160-HGV NF250-CV NF250-LGV NV250-CV NF250-SV NF250-SGV NV250-SV NV250-SEV NF250-HV NF250-HGV NF250-RGV NV250-HV NV250-HEV	80% of rated current
NF400-CW NF400-SW NF400-SEW NF400-HEW NV400-CW NV400-SW NV400-SEW NV400-HEW NF400-REW NF400-UEW NF630-CW NF630-SW NF630-SEW NF630-HEW NV630-CW NV630-SW NV630-SEW NV630-HEW NF630-REW NF800-CEW NF800-SDW NF800-SEW NF800-HEW NV800-SEW NV800-HEW NF800-REW NF800-UEW	90% of rated current

4. Application of Circuit Breaker According to Breaking Capacity

■MCCB (NF)

Class C, FAU Series Classes S, H and R

(The correlation between transformers and interrupting capacities is intended for short-circuiting just under the secondary voltage of 3-phase standard transformer, 210V or 420V, or the voltage of single-phase 3-wire transformer, 210V.)

Table 4-5 230VAC

3ph trans. capacity (kVA)	30 or less	50 to 75	100	150 to 300	500 to 1500	2000 to 3000
1ph trans. capacity (kVA)	20 or less	30 to 50	75	100 to 150	200 to 300	–

Frame (A) \ Breaking capacity (kA) (sym)	2.5	5	7.5	10	15	25	30	35	36	50	85	100	125	150	170	200
30 • 32	NF30-CS / NF30-FAU (*1)	NF32-SV														
50 • 60 • 63	NF50-FAU (*1)	NF63-CV		NF63-SV		NF63-HV										
100 • 125	NF125-CV					NF125-SV				NF125-SEV / NF125-HV		NF125-HEV		NF125-RGV		NF125-UV
225 • 250	NF250-CV							NF250-SV / NF250-SEV				NF250-HV / NF250-HEV		NF250-RGV		NF250-UV
400	NF400-CW									NF400-SW/SEW		NF400-HEW		NF400-REW		NF400-UEW
600 • 630	NF630-CW									NF630-SW/SEW		NF630-HEW		NF630-REW		
800	NF800-CEW									NF800-SEW		NF800-HEW		NF800-REW		NF800-UEW
1000 to 4000	NF1000-SEW~NF1600-SEW															

*1 The breaking capacity of NF30-FAU and NF50-FAU having a rated current of 5A is 1.5kA.

Table 4-6 440VAC

Trans. capacity (kVA)	30 or less	50 to 100	150 to 300	500 to 1000	1500 to 2000	2500 to 5000

Frame (A) \ Breaking capacity (kA) (sym)	1.5	2.5	7.5	10	15	20	25	30	35	36	50	65	85	125	200
30 • 32	NF30-CS	NF32-SV													
50 • 60 • 63	NF63-CV		NF63-SV		NF63-HV										
100 • 125	NF125-CV				NF125-SV			NF125-HV					NF125-RV		NF125-UV
					NF125-SEV						NF125-HEV				
225 • 250	NF250-CV					NF250-SV / NF250-SEV					NF250-HV / NF250-HEV		NF250-RV		NF250-UV
400	NF400-CW						NF400-SW/SEW					NF400-HEW	NF400-REW		NF400-UEW
600 • 630	NF630-CW								NF630-SW/SEW			NF630-HEW	NF630-REW		
800	NF800-CEW								NF800-SEW			NF800-HEW	NF800-REW		NF800-UEW
1000 to 4000	NF1000-SEW~NF1600-SEW														

■ELCB (NV)

Class C, FAU Series Classes S, H and R

(The correlation between transformers and interrupting current is intended for short-circuiting just under the secondary voltage of 3-phase standard transformer, 210V or 420V, or the voltage of single-phase 3-wire transformer, 210V.)

Table 4-7 230VAC

3ph trans. capacity (kVA)	30 or less	50 to 75	100	150 to 300	500 to 1500	2000 to 3000
1ph trans. capacity (kVA)	20 or less	30 to 50	75	100 to 150	200 to 300	–

Frame (A) \ Breaking capacity (kA) (sym)	1.5	2.5	5	7.5	10	15	25	30	35	36	50	85	100	125
30 • 32	NV30-FAU (*1)	NV32-SV												
50 • 60 • 63	NV50-FAU (*1)	NV63-CV		NV63-SV		NV63-HV								
100 • 125	NV125-CV						NV125-SV				NV125-HV			
							NV125-SEV						NV125-HEV	
225 • 250	NV250-CV								NV250-SV / NV250-SEV				NV250-HV / NV250-HEV	
400	NV400-CW										NV400-SW/SEW		NV400-HEW	
600 • 630	NV630-CW										NV630-SW/SEW		NV630-HEW	
800	NV800-SEW												NV800-HEW	

*1 The interrupting current of NF30-FAU and NF50-FAU having a rated current of 5A is 1.5kA.

Table 4-8 440VAC

Trans. capacity (kVA)	30 or less	50 to 100	150 to 300	500 to 1000	1500 to 2000	2500 to 5000

Frame (A) \ Breaking capacity (kA) (sym)	2.5	5	7.5	10	15	25	30	35	36	50	65	70	85	125
30 • 32	NV32-SV													
50 • 60 • 63	NV63-CV		NV63-SV		NV63-HV									
100 • 125	NV125-CV						NV125-HV							
							NV125-SV		NV125-SEV		NV125-HEV			
225 • 250	NV250-CV								NV250-SV / NV250-SEV		NV250-HV / NV250-HEV			
400	NV400-CW										NV400-SW/SEW			NV400-HEW
600 • 630	NV630-CW										NV630-SW/SEW			NV630-HEW
800	NV800-SEW													NV800-HEW

In some lighting apparatuses, the service life of circuit breakers may be reduced by the influence of inrush current applied when the lamps are turned on. Periodically check for abnormal temperature rise of the circuit breaker in such an apparatus.

5. Selection of Circuit Breaker for Electric Lamp or Heater Circuit

The maximum working current is 0.8 times the rated current of each circuit breaker.

■MCCB (NF)

Table 4-9 230VAC

Max. working current (A)	Rated current of circuit breaker (A)	Breaking capacity (kA) 230VAC (Icu sym)
		2.5 / 5 / 7.5 / 10 / 15 / 25 / 30 / 36 / 50 / 85 / 100 / 125 / 150 / 170 / 200
12	15	NF30-CS; NF32-SV; NF63-SV; NF63-HV; NF125-SV; NF125-HV; NF125-RGV; NF125-UV
16	20	
24	30	
32	40	NF63-CV
40	50	
48	60	NF125-SV NF125-SEV; NF125-HV NF125-HEV
60	75	
80	100	NF125-CV; NF125-HV NF125-SEV
100	125	
120	150	NF250-CV; NF250-SV NF250-SEV; NF250-HV NF250-HEV; NF250-RGV; NF250-UV
140	175	
160	200	
180	225	
200	250	
240	300	NF400-CW; NF400-SW NF400-SEW; NF400 -HEW; NF400-REW; NF400 -UEW
280	350	
320	400	
400	500	NF630-CW; NF630-SW NF630-SEW; NF630 -HEW; NF630-REW; NF800 -UEW
480	600	
560	700	NF800-CEW; NF800-SEW; NF800 -HEW; NF800-REW
640	800	
800	1000	NF1000-SEW
960	1200	NF1250-SEW
1120	1400	NF1600-SEW
1280	1600	

Table 4-10 440VAC

Max. working current (A)	Rated current of circuit breaker (A)	Breaking capacity (kA) 440VAC (Icu sym)
		1.5 / 2.5 / 5 / 7.5 / 10 / 25 / 30 / 36 / 45 / 50 / 70 / 85 / 125 / 150 / 200
12	15	NF30-CS; NF32-SV; NF32-SV; NF63-SV; NF63-HV; NF125-SV; NF125-SV; NF125-HV; NF125-RGV; NF 125-UV
16	20	
24	30	
32	40	NF63-CV; NF63-CV
40	50	
48	60	NF125-SV NF125-SEV; NF125-HV NF125-SEV; NF125-HV NF125-HEV; NF125-RGV NF125-HEV
60	75	
80	100	NF125-CV
100	125	
120	150	NF250-CV; NF250-SV NF250-SEV; NF250-HV NF250-HEV; NF250-RGV; NF 250-UV
140	175	
160	200	
180	225	
200	250	
240	300	NF400-CW; NF400-SW; NF400-HEW; NF400-REW; NF400-UEW
280	350	NF400-SEW
320	400	
400	500	NF630-CW; NF630-SW NF630-SEW; NF630-HEW; NF630-REW; NF800-UEW
480	600	
560	700	NF800-CEW; NF800-SEW; NF800-HEW; NF800-REW
640	800	
800	1000	NF1000-SEW
960	1200	NF1250-SEW
1120	1400	NF1600-SEW
1280	1600	