

# Low Voltage Circuit Breakers

〈General Catalog〉



World Super  
**WS-V** Series

Molded Case Circuit Breakers and Earth Leakage Circuit Breakers

# GLOBAL IMPACT OF MITSUBISHI ELECTRIC



Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

## ***Changes for the Better***

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following:

### **Energy and Electric Systems**

A wide range of power and electrical products from generators to large-scale displays.

### **Electronic Devices**

A wide portfolio of cutting-edge semiconductor devices for systems and products.

### **Home Appliance**

Dependable consumer products like air conditioners and home entertainment systems.

### **Information and Communication Systems**

Commercial and consumer-centric equipment, products and systems.

### **Industrial Automation Systems**

Maximizing productivity and efficiency with cutting-edge automation technology.

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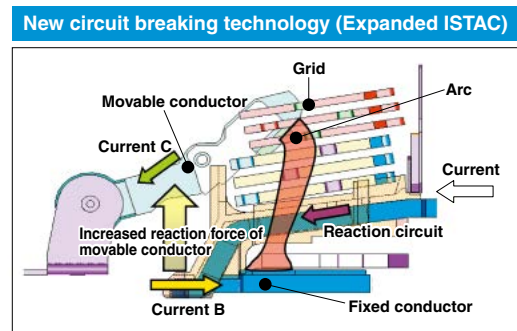
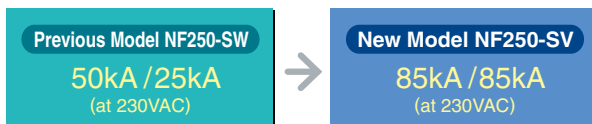
# High-Performance



## Technologies based on long year experience are brought together to realize more improved performance

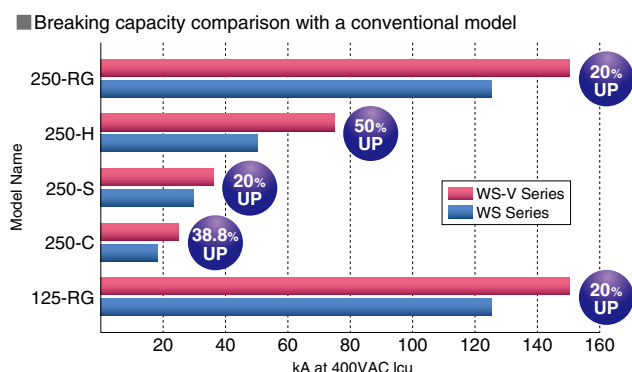
- The new circuit breaking technology “Expanded ISTAC” has improved the current-limiting performance and upgraded the overall breaking capacity. Expansion of the conductor under the stator shortens the contact parting time of the mover as compared to the conventional ISTAC structure. The current-limiting performance has been improved remarkably. (The maximum peak current value has been reduced by approx. 10%.)

### Example of breaking capacity improvement



## Breaking capacity of 5 models is 20% to 50% higher than the W & WS Series

- Improvement of breaking capacity on 250AF-C/S/H models (Fixed) & 125.250AF-R models (Thermal/Adjustable).





## The new electronic circuit breakers (with display) and MDU breakers can display various measurement items

■ This will enable energy management through “visualization”, which leads to energy saving.

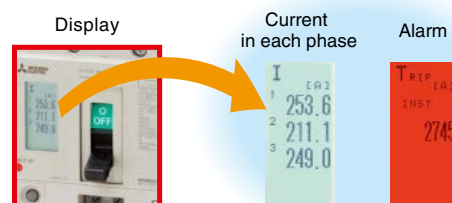


Electronic Circuit Breaker  
(with display)



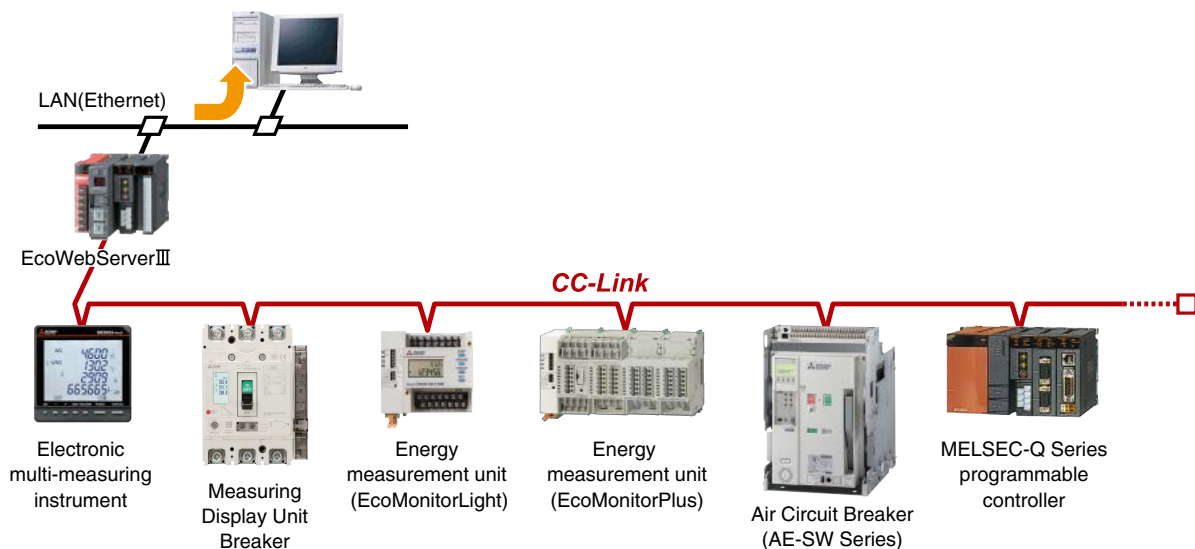
Measuring Display Unit  
Breaker

- The display is on the circuit breaker body and shows circuit information.
- Detailed setting can be done on the display.
- The display turns red during alarms.



## Intelligent Communications through CC-Link

■ Measuring data can be transmitted to Personal Computer through CC-Link.



# Standardizaion

## Compact design for easy to use

- The thermal adjustable circuit breakers and electronic circuit breakers are smaller.

NF250-SGW



NF250-SGV



**Volume ratio 79%**

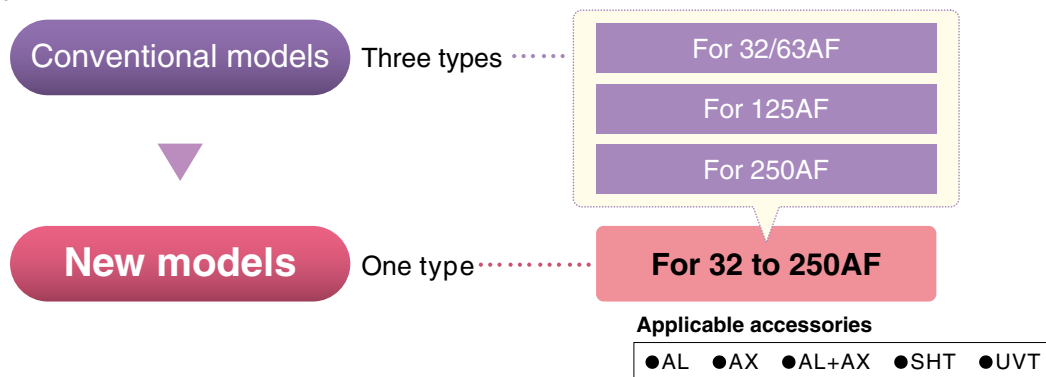
(Compared with our conventional models)

(Conventional model : 105 × 165 × **86mm**) (New model : 105 × 165 × **68mm**)

- 250AF circuit breakers' fixed types (NF250-CV, NF250-SV, NF250-HV, NV250-CV, NV250-SV, NV250-HV), thermal adjustable types (NF250-SGV, NF250-HGV, NF250-RGV), and electronic types (NF250-SEV, NF250-HEV, NV250-SEV, NV250-HEV) are the same size, leading to the reduction and standardization of panel design.

## Types of internal accessories are reduced from 3 types to 1 type

- Standardization of internal accessories contributes to the reduction of stock and delivery time.



- 32AF and 63AF circuit breakers can now be used in both AC and DC circuits without specifying when ordering. This will lead to prevention of ordering mistakes.
- The earth leakage circuit breakers can now be equipped with a voltage shunt trip device (SHT).



# High Quality



## Innovative manufacturing using a robot-cell production line

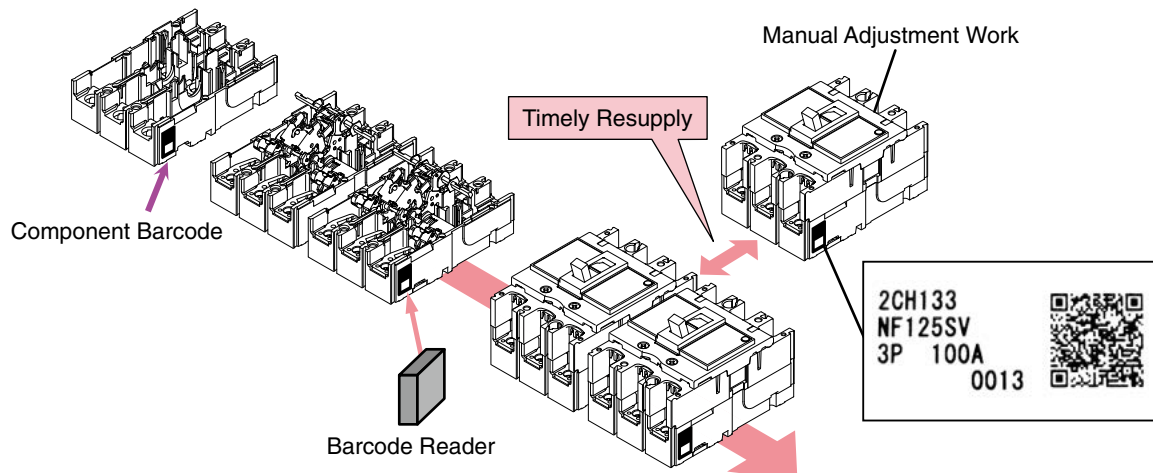
- This manufacturing innovation takes the pursuit of increased productivity, shortened manufacturing lead-time and improved quality to the upper limits.



Robot-cell Production Line

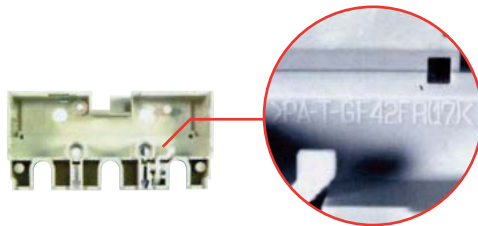
## Individual unit production management system

- A multi-model, single-unit flow production system is utilized the ultimate multi-cycle production method. The production line is controlled using barcodes to manage the model information for each unit. Small-lot, flexible production that's one step ahead!



## Use of Various Recyclable Materials

- The circuit breakers are made of thermo-plastic materials that are easy to recycle. (Some models are partially made of thermoset materials.)  
The major plastic parts bear material identifications so that they can be recycled.



## Nonuse of Hazardous Substances

- Eco-friendly design is used for all circuit breakers, and they do not use hazardous substances. The circuit breakers comply with RoHS regulation.

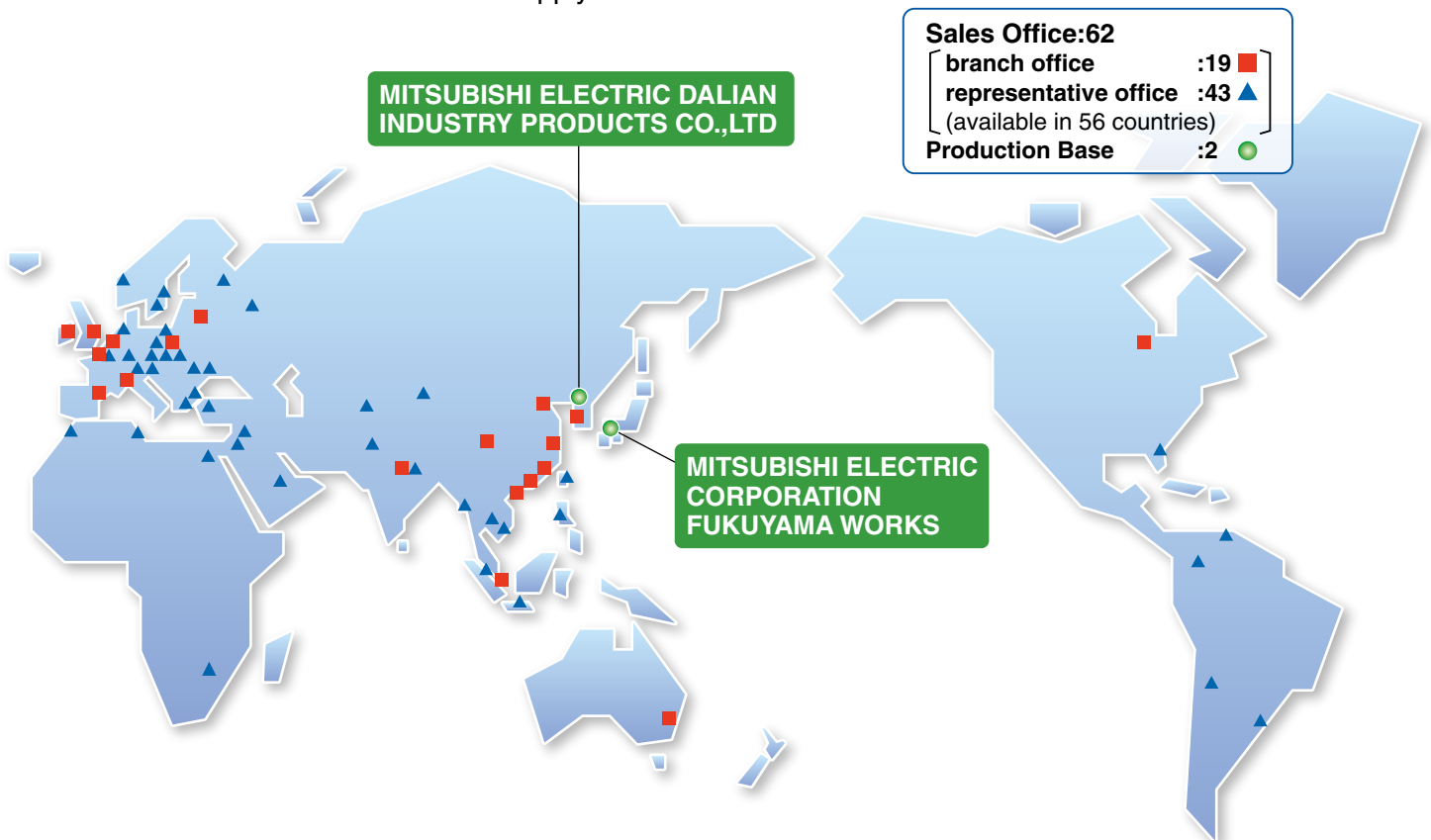
## Energy Saving at Mitsubishi Electric Corporation Fukuyama Works

- Mitsubishi Electric Corporation Fukuyama Works uses energy saving support devices such as MDU breakers and EcoServer to save energy through “visualization” of energy. Along with “visualization”, Fukuyama Works also installed high-efficiency equipments to further promote energy saving.  
Through energy saving activity, Fukuyama Works has successfully reduced its electrical power consumption rate by 27% in 2007 (compared with 1990).



## Global Networks of Sales Offices and Production Bases

■ Our sales networks are designed to comfort customers internationally through the worldwide distributors. Constantly contactable distributors enable us to accommodate customer's needs for smooth supply.



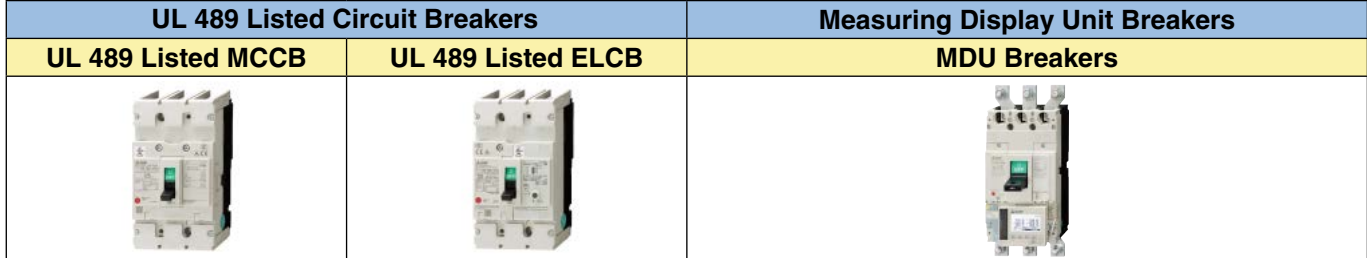
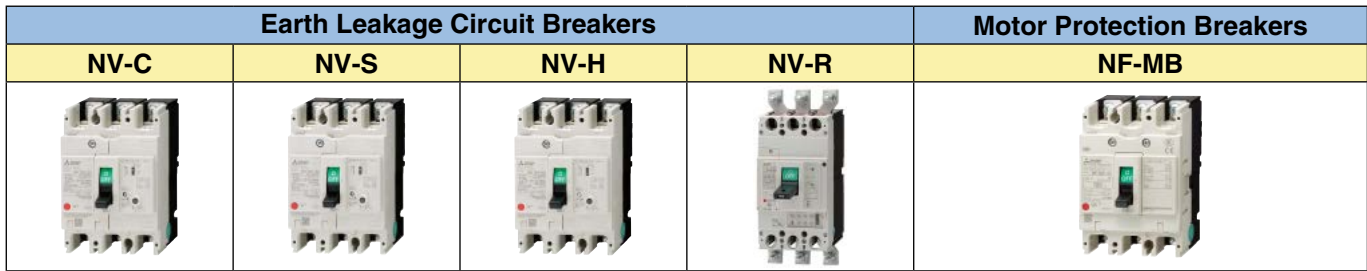
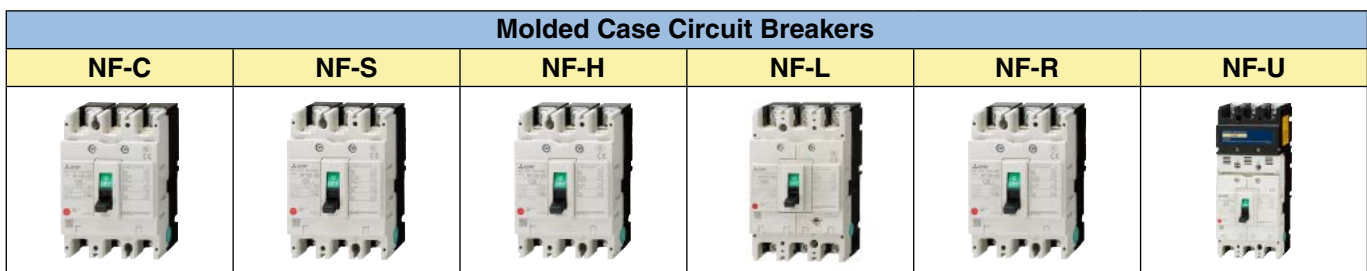
# 1 Outline of Circuit Breakers

## Product Line-up




Outline of Circuit Breakers




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	NF160-SGV
	NF-H/L High-performance class			NF63-HV	NF125-HV NF125-LGV	NF160-LGV
	NF-R/U Ultra current-limiting class				NF125-HEV NF125-HGV	NF160-HGV
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		NF63-CV (*1) NF63-SV (*1)	NF125-SV (*1)	
		NF32-SV (*1)				
UL 489 Listed Circuit Breakers	UL 489 Listed MCCB	NF30-FAU		NF50-SVFU NF50-SMU NF50-FHU	NF100-CVFU NF100-SRU NF100-HRU NF100-FHU	
	UL 489 Listed ELCB	NV30-FAU		NV50-SVFU NV50-FAU NV50-FHU	NV100-CVFU NV100-SRU NV100-HRU 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



	250	400	600 630	800	1000	1250	1600	2000	2500	3200	4000	5000	6300		
NF250-CV	NF250-SV	NF400-CW	NF630-CW	NF800-CEW	NF1000-SEW	NF1250-SDW NF1250-SEW	NF1600-SDW NF1600-SEW								
NF250-SV NF250-SGV	NF400-SW	NF630-SW	NF800-SDW												
NF250-SEV	NF400-SEW	NF630-SEW	NF800-SEW												
NF250-HV	NF400-HEW	NF630-HEW	NF800-HEW												
NF250-HEV	NF400-REW	NF630-REW	NF800-REW												
NF250-RGV	NF400-UEW	NF630-UEW	NF800-UEW												
NF250-UV															
NV250-CV	NV400-CW	NV630-CW													
NV250-SV	NV400-SW	NV630-SW													
NV250-SEV	NV400-SEW	NV630-SEW		NV800-SEW											
NV250-HV	NV400-HEW	NV630-HEW		NV800-HEW											
NV250-HEV															
NF250-SV (*1)															
NF250-CVU	NF400-SWU	NF630-SWU													
NF250-SVU	NF400-HWU	NF630-HWU													
NF250-HVU															
NV250-CVU															
NV250-SVU															
NV250-HVU															
NF250-SEV with MDU	NF400-SEW with MDU			NF800-SEW with MDU											
NF250-HEV with MDU	NF400-HEW with MDU			NF800-HEW with MDU											
NF250-HDV															
NF250-HDVA															
	NF400-HDW			NF800-HDW											
			AE630-SW		AE1000-SW	AE1250-SW	AE1600-SW	AE2000-SW AE2000-SWA	AE2500-SW	AE3200-SW	AE4000-SWA AE4000-SW	AE5000-SW	AE6300-SW		

Miniature Circuit Breakers		
BH-DN	BH-D6	BH-D10
		

Residual Current Circuit Breaker	Residual Current Circuit Breaker with Overload Protection	Isolating Switch
BV-D	BV-DN	KB-D
		

Circuit Protectors		Air Circuit Breakers	Related Components
CP30-BA	CP-S	AE-SW	Earth Leakage Relays
			

# Instructions for Application

## 1. Warranty period and warranty coverage

If any faults or defects (hereinafter “Failure”) found to be the responsibility of Mitsubishi Electric occurs during use of the product within the warranty period, the product shall be repaired at no cost via the sales representative or Mitsubishi Electric Sales office. However, if repairs are required on-site at domestic or overseas locations, expenses to send an engineer will be charged.

### 1. Warranty period

The warranty period of the product shall be for twelve (12) months after the date of purchase or delivery to the designated place.

### 2. Warranty coverage

- (1) The primary failure diagnosis should be performed by users. However, if required by users, Mitsubishi Electric or Mitsubishi Electric Sales office may be able to perform the diagnosis. In that case, for damages caused by any cause found to be the responsibility of Mitsubishi Electric, the diagnosis will be performed at no cost. For details, contact a distributor.
- (2) The coverage shall be limited to ordinary use within the usage state, usage methods, usage environment, and other conditions which follow the instructions and precautions given in the instruction manual, user’s manual, and caution labels on the product.
- (3) Even within the warranty period, repair cost shall be charged for the following cases.
  - [1] Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by selection of hardware or software design on the user side.
  - [2] Failure caused by modifications, etc. to the product by the user without any approvals from Mitsubishi Electric.
  - [3] In case Mitsubishi Electric product is assembled into a user’s device, failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user’s device is subject to or as necessary by industry standards, had been provided.
  - [4] Failure that could have been avoided if the maintenance described in the user’s manual has been performed.
  - [5] Failure caused by external irresistible forces such as fires or abnormal voltages, and failure caused by natural disasters such as earthquakes, lightning, wind and water damages.
  - [6] Failure caused by reasons unpredictable based on scientific technology standards at the time of shipment from Mitsubishi Electric.
  - [7] Any other failure found not to be the responsibility of Mitsubishi Electric or that admitted not to be so by the user.

In addition, the warranty applies only to the product delivered. It does not apply to the damage that is caused by the failure of the product.

## 3. The period to supply the spare parts after discontinuation of production

Mitsubishi Electric shall supply spare parts for five (5) years after discontinuation of production. After five years, Mitsubishi Electric shall supply spare parts until the spare parts run out of stock.

## 2. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the warranty period, Mitsubishi Electric shall not be liable for compensation to:

- (1) Damages caused by any cause found not to be the responsibility of Mitsubishi Electric.
- (2) Loss in opportunity, lost profits incurred to the user by failures of Mitsubishi Electric product.
- (3) Damages whether foreseeable or not, secondary damages, compensation for accidents, and compensation for damages to products other than Mitsubishi Electric products, caused by exceptional situations.
- (4) Compensation for cost occurring secondarily from replacement work by the user, maintenance of on-site equipment and start-up test run and other operations.

## 3. Product applications

- (1) When using the products listed in this catalogue, the following conditions must be confirmed and obeyed. The product must be used so that a failure that occurs to the product does not lead to a serious accident. When a damage or failure occurs, the external backup function or fail-safe function must be executed systematically.
- (2) The products listed in this catalogue are designed and manufactured as general-purpose products for application to the general industry field. Therefore, the warranty does not apply to the following special uses.

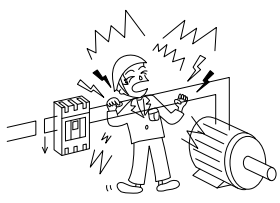
- [1] The use that has a significant influence on the public facilities such as nuclear power plants and other power plants of power companies.
- [2] The use for railway companies, government offices, etc. that require to build the special quality assurance system.
- [3] The use for aerospace equipment, medical equipment, railway equipment, combustion and fuel equipment, passenger vehicles, manned transportation equipment, recreational equipment, safety equipment, and air conditioner for servers and the cooling facilities that are expected to have a significant influence on life, body, and property.

If the products listed in this catalogue are used for the above mentioned special uses, Mitsubishi Electric does not take any responsibility for the quality, performance, and safety of the product, which includes, but is not limited to, default liability, defect liability, quality assurance liability, tort liability, and product liability. However, in case

the special quality (beyond general specifications) is not required and the use is a limited purpose and the backup/fail-safe functions are equipped with the facility, Mitsubishi Electric may determine that the products listed in this catalogue can be guaranteed. For details, consult a distributor or Mitsubishi Electric.

## 4. Safety precautions

- Carefully read the safety precautions prior to use the circuit breaker correctly.
- Important safety instructions are given below. Strictly observe the instructions.
- Be sure to communicate these safety precautions to the end user.

<b>⚠ DANGER</b>
<ul style="list-style-type: none"> <li>● Do not touch the terminal area. Doing so can cause an electric shock.</li> <li>● The earth leakage circuit breakers are designed to operate when the difference between leaving current and returning current exceeds the specified value. In the case shown in this figure, earth leakage is not detected. Therefore, never touch the two bare live parts. The circuit breaker will not operate upon occurrence of an electric shock.</li> </ul>
 <p style="text-align: center;">Earth leakage circuit breaker</p>

### Instructions for installation

<b>⚠ CAUTION</b>
<ul style="list-style-type: none"> <li>● The electrical work shall be performed by qualified personnel (electrical workers).</li> <li>● Before performing wiring work, turn off the upstream circuit breaker, and ensure that no current is flowing through the circuit breaker to be wired. Failure to do so may expose you to shock hazard.</li> <li>● When connecting any wire, tighten the terminal screw to the torque specified in the instruction manual. Failure to do so may cause a fire.</li> <li>● When the model comes with insulating barriers as standard accessories, install the insulating barriers without fail.</li> <li>● Do not install the circuit breaker in an abnormal environment with high temperature, high moisture, dust, corrosive gas, vibration or shock. Doing so may cause a fire or make the circuit breaker inoperative.</li> <li>● Protect the circuit breaker so that foreign particles, such as dust, concrete powder and iron powder, and rain water will not enter the circuit breaker. Failure to do so may make the circuit breaker inoperative.</li> </ul> <p>[Earth leakage circuit breaker]</p> <ul style="list-style-type: none"> <li>● When using an earth leakage circuit breaker for use only in single-phase 3-wire or 3-phase 4-wire systems, connect the neutral wire to the neutral phase without fail. If they are not connected, the circuit breaker may not operate in the case of open phase or overcurrent, thereby resulting in a fire.</li> <li>● Connect the circuit breaker to a power supply appropriate to the rating of its body. Failure to do so may make the circuit breaker inoperative or damage it.</li> <li>● Tighten securely the lead wire in the open phase to the neutral wire on the load side. If the wires are not connected, the open phase of the neutral wire cannot be detected.</li> <li>● When there are two terminal screws for the neutral pole, tighten the screws alternately. Failure to do so may loosen the screws, thereby causing a fire.</li> </ul>

### [Explanation of warning symbols]

<b>⚠ DANGER</b>	Incorrect handling of the product will result in a hazardous situation, such as death or serious injury.
<b>⚠ CAUTION</b>	Incorrect handling of the product may result in a hazardous situation according to circumstances.

### Instructions for use

<b>⚠ CAUTION</b>
<ul style="list-style-type: none"> <li>● When the circuit breaker automatically breaks a circuit, turn on the handle after removing the cause. Failure to do so may cause an electric shock or a fire.</li> </ul> <p>[Earth leakage circuit breaker]</p> <ul style="list-style-type: none"> <li>● Ground the earth terminal of electrical equipment. Failure to do so may cause an electric shock or a fire.</li> <li>● Press the test button to check the operation once a month or so. If the earth leakage circuit breaker is not turned off, it is out of order. Consult an electrician.</li> </ul>

### Instructions for maintenance

<b>⚠ CAUTION</b>
<ul style="list-style-type: none"> <li>● The circuit breakers shall be maintained by persons with specialized knowledge.</li> <li>● Before maintaining, turn off the upstream circuit breaker, and ensure that no current is flowing through the circuit breaker to be maintained. Failure to do so may expose you to shock hazard.</li> <li>● Retighten the terminals periodically. Failure to do so may cause a fire.</li> </ul>

### Instructions for disposal

<b>⚠ CAUTION</b>
<ul style="list-style-type: none"> <li>● When disposing of the product, treat it as industrial waste.</li> </ul>

## 5. Change in product specifications

The specifications of the product listed in this catalogue, manuals or technical documents are subject to change without prior notice.

# 1 Outline of Circuit Breakers

## Mitsubishi MCCB Manufacturing History

Mitsubishi MCCB Manufacturing history

Year	1964	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20																																																															
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	NF3-C										NF30-CB										NF30-CS										NF32-CVF																																																																																									
	NF30										NF30-S										NF30-SB										NF30-SS										NF30-US										NF30-SP										NF30-SW										NF32-SW										NF32-SVF										NF32-SV																													
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	NF50-B										NF50-SA										NF50-SH, NF60-SH										NF50-HP, NF60-HP										NF50-HW, NF60-HW, NF63-HW										NF63-HV										NF63-HV																																																											
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Production stopped model

This manufacturing history is based on Japanese domestic market.







# 2

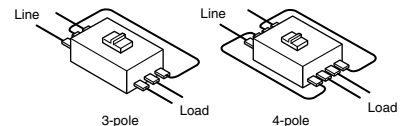
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1)	Earth Leakage Relays.....	58

## NF-C (Economy class)

Frame (A)	30	50	60	63	100	125			
Model	NF30-CS		NF63-CV		NF125-CV				
Image									
Rated current In (A)	3 5 10 15 20 30	3 4 (5) 6 10 (15) 16	(60)	63	50 (60) 63 (75) 80 100	125			
Rated ambient temperature 40°C (45°C for marine use)									
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			
	With current (440VAC)	6,000 (415VAC)	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 90	60 90		
		b	96	130	130	130	130		
		c	52	68	68	68	68		
		ca	67	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		
	Solderless (BOX) terminal (SL)	-	-	-	-	-	-		
	Rear (B)	98	●Round stud (assembled in)	●Round stud	●Round stud	●Round stud	●Bar stud	●Bar stud	
Cassette-type accessories	Plug-in (PM)	-	-	-	-	-	-		
	Alarm switch (AL)	115	● (*5)	● (*6)	● (*6)	● (*6)	● (*6)		
	Auxiliary switch (AX)	-	● (*5)	● (*6)	● (*6)	● (*6)	● (*6)		
	Shunt trip (SHT)	-	-	● (*6)	● (*6)	● (*6)	● (*6)		
	Undervoltage trip (UVT)	-	-	● (*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 (M) (*10)	136	-	●	●	●	●	
	Handle lock device	Panel mounting	-	●	●	●	●	●	
		LC	135	●	●	●	●	●	
		HL	-	●	●	●	●	●	
	External operating handle	HL-S	-	●	●	●	●	●	
		(F)	123	-	●	●	●	●	
Terminal cover (TC-L, TC-S, TTC, BTC, PTC)	(V)	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	148	148	150	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.

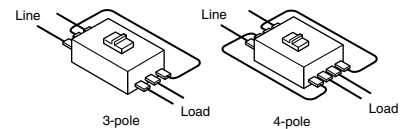




## NF-S (Standard class)

Frame (A)		30		32		50			60			63				
Model		NF32-SV						NF63-SV								
Image																
Rated current In (A) Rated ambient temperature 40°C (45°C for marine use)		3 4 (5) 6 10 15 16 20 25 (30)		32		3 4 (5) 6 10 (15) 16 20 25 (30) 32 40 50			(60)			63				
Number of poles		2 3		2 3		2 3 4			2 3 4			2 3 4				
Rated insulation voltage Ui (V)		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		7.5/7.5			7.5/7.5			7.5/7.5		
			440V	2.5/2.5		2.5/2.5		7.5/7.5			7.5/7.5			7.5/7.5		
			415V	2.5/2.5		2.5/2.5		7.5/7.5			7.5/7.5			7.5/7.5		
			400V	5/5		5/5		7.5/7.5			7.5/7.5			7.5/7.5		
			380V	5/5		5/5		7.5/7.5			7.5/7.5			7.5/7.5		
			230V	7.5/7.5		7.5/7.5		15/15			15/15			15/15		
			200V	7.5/7.5		7.5/7.5		15/15			15/15			15/15		
DC	250V	2.5/2.5 (*5)		2.5/2.5 (*5)		7.5/7.5 (*5)			7.5/7.5 (*5)			7.5/7.5 (*5)				
Rated impulse withstand voltage Uimp (kV)		8		8		8			8			8				
Current (*1)		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		15,000			15,000			15,000				
	With current (440VAC)	6,000		6,000		8,000			8,000			8,000				
Utilization category		A		A		A			A			A				
Pollution degree		3		3		3			3			3				
EMC environment condition (environment A or B)		Not Applicable		Not Applicable		Not Applicable			Not Applicable			Not Applicable				
Overall dimensions (mm)		a	50	75	50	75	50	75	100	50	75	100	50	75	100	
		b	130		130		130			130			130			
		c	68		68		68			68			68			
		ca	90		90		90			90			90			
Mass of front-face type (kg)		0.45	0.65	0.45	0.65	0.5	0.7	0.9	0.55	0.75	1.0	0.55	0.75	1.0		
Installation and connections	Front connection (F)	Page	●Screw terminal		●Screw terminal		●Screw terminal			●Screw terminal			●Screw terminal			
	Solderless (BOX) terminal (SL)	98	-		-		-			-			-			
	Rear (B)	98	●Bar stud		●Round stud		●Round stud			●Round stud			●Round stud			
	Plug-in (PM)	98	●		●		●			●			●			
Cassette-type accessories	Alarm switch (AL)	115	●(*4)		●(*4)		●(*4)			●(*4)			●(*4)			
	Auxiliary switch (AX)	115	●(*4)		●(*4)		●(*4)			●(*4)			●(*4)			
	Shunt trip (SHT)	115	●(*4)		●(*4)		●(*4)			●(*4)			●(*4)			
	Undervoltage trip (UVT)	115	●(*4)		●(*4)		●(*4)			●(*4)			●(*4)			
With lead-wire terminal block (SLT)	120	●		●		●			●			●				
Pre-alarm (PAL)	122	-		-		-			-			-				
External accessories	Enclosure	Closed (S)	●		●		●			●			●			
		Dustproof (I)	●		●		●			●			●			
	Waterproof (W)	137	-		●		-			-			-			
		137	-		-		-			-			-			
	Electrical operation device (NFM)	140	-		-		-			-			-			
	Mechanical interlock (MI) (*7)	Panel mounting	136	●		●		●			●			●		
		Breaker mounting	136	●		●		●			●			●		
	Handle lock device	LC	135	●		●		●			●			●		
		HL	135	●		●		●			●			●		
	External operating handle	HL-S	135	●		●		●			●			●		
(F)		123	●		●		●			●			●			
(V)	123	●		●		●			●			●				
Terminal cover (TC-L, TC-S, TTC, BTC, PTC)	128	●		●		●			●			●				
Rear stud (B-ST)	98	●		●		●			●			●				
Plug-in (PM)	98	●		●		●			●			●				
IEC 35mm rail mounting adapters	143	●		●		●			●			●				
CE marking		Self-declaration		Self-declaration		Self-declaration			Self-declaration			Self-declaration				
CCC recognition		Recognized		Recognized		Recognized			Recognized			Recognized				
Marine use approval (*:Certified) (NK, LR, ABS, DNV-GL)		☆		☆		☆			☆			☆				
Automatic tripping device		Thermal-magnetic		Thermal-magnetic		Thermal-magnetic			Thermal-magnetic			Thermal-magnetic				
Trip button		Equipped		Equipped		Equipped			Equipped			Equipped				
Page of Characteristics and dimensions		148		148		148			148			148				

- Notes: \*1 The operating characteristics are different between AC and DC.  
 \*2 For 100A of rated current, NK rating is not shown.  
 \*3 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.  
 (For NF250-SV model, connected as shown on the right, maximum of 500VDC can be applied to 3-pole product and maximum of 600VDC to 4-pole product.)  
 \*4 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.  
 \*5 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.  
 \*6 Place an order with circuit breaker.  
 \*7 No isolation function except 400A to 800A frame.

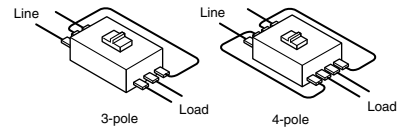




## NF-S (Standard class)







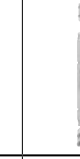

Frame (A)		250			250			400			400			600			630				
Model		NF250-SGV			NF250-SEV			NF400-SW			NF400-SEW			NF630-SW							
Image																					
Rated current In (A)		125-160 140-160-200			80-160(by 8A)			250 300			Adjustable 200 225			500 600			630				
Rated ambient temperature 40°C (45°C for marine use)		175-200-250			125-250(by 12.5A)			350 400			250 300 350 400										
Number of poles		2 3 4			3 4			2 3 4			3 4			2 3 4			2 3 4				
Rated insulation voltage Ui (V)		690			690			690			690			690			690				
Relative short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	8/8			8/8			10/10			10/10			10/10					
			500V	30/30			30/30			30/30			30/30			30/30					
			440V	36/36			36/36			42/42			42/42			42/42					
			415V	36/36			36/36			45/45			50/50			50/50					
			400V	36/36			36/36			45/45			50/50			50/50					
			380V	36/36			36/36			50/50			50/50			50/50					
			230V	85/85			85/85			85/85			85/85			85/85					
			200V	85/85			85/85			85/85			85/85			85/85					
			DC 250V	20/20 (300V) (*2)			-			40/40 (*2)			-			40/40 (*2)			40/40 (*2)		
			Rated impulse withstand voltage Uimp (kV)		8			8			8			8			8			8	
Current		AC/DC compatible			AC			AC/DC compatible			AC			AC/DC compatible			AC/DC compatible				
Suitability for isolation		Yes			Yes			Yes			Yes			Yes			Yes				
Reverse connection		Available			Available			Available			Available			Available			Available				
Number of operating cycles	Without current	25,000			25,000			6,000			6,000			6,000			6,000				
	With current (440VAC)	10,000			10,000			1,000			1,000			1,000			1,000				
Utilization category		A			A			A			B			A			A				
Rated short time with stand current Icw (kA) at 0.25s		-			-			-			5			-			-				
Pollution degree		3			3			3			3			3			3				
EMC environment condition (environment A or B)		Not Applicable			A			Not Applicable			A			Not Applicable			Not Applicable				
Overall dimensions (mm)	a	105 140			105 140			140 185			140 185			140 185			140 185				
	b	165			165			257			257			257			257				
	c	68			68			103			103			103			103				
	ca	92			92			155			155			155			155				
Mass of front-face type (kg)		1.4 1.6 2.0			1.7 2.2			4.6 5.2 6.8			6.0 7.6			5.4 6.2 8.0			5.4 6.2 8.0				
Installation and connections	Front connection (F)	Page			●Screw terminal			●Screw terminal			●Busbar terminal			●Busbar terminal			●Busbar terminal				
	Solderless (BOX) terminal (SL)	98			●Bar stud			●Bar stud			●Bar stud			●Bar stud			●Bar stud				
	Rear (B)	98			●Bar stud			●Bar stud			●Bar stud			●Bar stud			●Bar stud				
	Plug-in (PM)	98			●Bar stud			●Bar stud			●Bar stud			●Bar stud			●Bar stud				
Cassette-type accessories	Alarm switch (AL)	115			●(*3)			●(*3)			●(*3)			●(*3)			●(*3)				
	Auxiliary switch (AX)	115			●(*3)			●(*3)			●(*3)			●(*3)			●(*3)				
	Shunt trip (SHT)	115			●(*3)			●(*3)			●(*3)			●(*3)			●(*3)				
	Undervoltage trip (UVT)	115			●(*3)			●(*3)			●(*3)			●(*3)			●(*3)				
	With lead-wire terminal block (SLT)	120			●			●			●			●			●				
	Pre-alarm (PAL)	122			-			-			●(*5)			-			-				
External accessories	Enclosure	Closed (S)	137			●			●			●			●						
		Dustproof (I)	137			●			●			●			●						
		Waterproof (W)	137			●			●			●			●						
	Electrical operation device (NFM)	Mechanical interlock (MI) (*7)	136			●			●			●			●						
		Panel mounting Breaker mounting	136			●			●			●			●						
	Handle lock device	LC	135			●			●			●			●						
		HL HL-S	135			●			●			●			●						
	External operating handle	(F)	123			●			●			●			●						
		(V)	123			●			●			●			●						
	Terminal cover (TC-L, TC-S, TTC, BTC, PTC)	128			●			●			●			●							
Rear stud (B-ST)	98			●			●			●			●								
Plug-in (PM)	98			●			●			●			●								
IEC 35mm rail mounting adapters	143			-			-			-			-								
CE marking		Self-declaration			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)		☆			☆			☆			☆			☆			☆				
Automatic tripping device		Thermal-magnetic			Electronic (effective value detection)			Thermal-magnetic			Electronic (effective value detection)			Thermal-magnetic			Thermal-magnetic				
Trip button		Equipped			Equipped			Equipped			Equipped			Equipped			Equipped				
Page of Characteristics and dimensions		158			160			162			164			168			168				

- Notes: \*1 The operating characteristics are different between AC and DC.  
 \*2 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.  
 \*3 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.  
 \*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.  
 Not available for use with connection as shown on the right.  
 \*5 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. AS for flush plate type, an outline differs from a standard.  
 \*6 Place an order with circuit breaker.  
 \*7 No isolation function except 400A to 800A frame.





**NF-S (Standard class)**

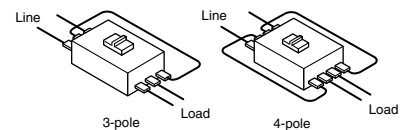
630		800		800		1000		1250		1200		1600		1600	
NF630-SEW		NF800-SEW		NF800-SDW		NF1000-SEW		NF1250-SEW		NF1250-SDW		NF1600-SEW		NF1600-SDW	
															
Adjustable 300 350 400 500 600 630		Adjustable 400 450 500 600 700 800		(700) 800		Adjustable 500 600 700 800 900 1000		Adjustable 600 700 800 1000 1200 1250		1000 1250		Adjustable 800 1000 1200 1400 1500 1600		1600	
3 4		3 4		2		3 4		3 4		2		3 4		2	
690		690		690		690		690		690		690		690	
10/10		10/10		-		25/13		25/13		-		25/13		-	
30/30		30/30		-		65/33		65/33		-		65/33		-	
42/42		42/42		-		85/43		85/43		-		85/43		-	
50/50		50/50		-		85/43		85/43		-		85/43		-	
50/50		50/50		-		85/43		85/43		-		85/43		-	
50/50		50/50		-		85/43		85/43		-		85/43		-	
85/85		85/85		-		125/63		125/63		-		125/63		-	
85/85		85/85		-		125/63		125/63		-		125/63		-	
-		-		40/40		-		-		40/20		-		40/20	
8		8		8		8		8		8		8		8	
AC		AC		DC		AC		AC		DC		AC		DC	
Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Available		Available		Available		Available		Available		Available		Available		Available	
6,000		4,000		4,000		3,000		3,000		3,000		3,000		3,000	
1,000		500		500		500		500		500		500		500	
B		B		A		B		B		A		B		A	
7.6		9.6		-		20 at 0.1		20 at 0.1		-		20 at 0.1		-	
3		3		3		3		3		3		3		3	
A		A		Not Applicable		A		A		Not Applicable		A		Not Applicable	
140 185		210 280		210		210 280		210 280		210		210 280		210	
257		275		275		406		406		406		406		406	
103		103		103		140		140		140		140		140	
155		155		155		190		190		190		190		190	
6.5 8.3		10.9 14.2		9.0		23.5 30.7		23.5 30.7		22.0		34.5 41.2		32.0	
●Busbar terminal		●Busbar terminal		●Busbar terminal		●Busbar terminal ●Busbar terminal		●Busbar terminal ●Busbar terminal		●Busbar terminal		●Busbar terminal ●Busbar terminal		●Busbar terminal	
●Bar stud ●Bar stud		●Bar stud ●Bar stud		●Bar stud		●Bar stud ●Bar stud		●Bar stud ●Bar stud		●Bar stud		●Bar stud ●Bar stud		●Bar stud	
●(*3)		●(*3)		●		●		●		●		●		●	
●(*3)		●(*3)		●		●		●		●		●		●	
●(*3)		●(*3)		●		●		●		●		●		●	
●(*5)		●(*5)		-		●(*5)		●(*5)		-		●(*5)		-	
●(*6)		●(*6)		●(*6)		●(*6)		●(*6)		●(*6)		●(*6)		●(*6)	
●(*6)		●(*6)		●(*6)		●(*6)		●(*6)		●(*6)		●(*6)		●(*6)	
●(*6)		●(*6)		●(*6)		●(*6)		●(*6)		●(*6)		●(*6)		●(*6)	
Self-declaration Recognized		Self-declaration Recognized		Self-declaration Recognized		Self-declaration Recognized		Self-declaration Recognized		Self-declaration		Self-declaration Recognized		Self-declaration	
☆ -		☆ -		-		☆ -		☆ -		-		-		-	
Electronic (effective value detection) Equipped		Electronic (effective value detection) Equipped		Thermal-magnetic Equipped		Electronic (effective value detection) Equipped		Electronic (effective value detection) Equipped		Thermal-magnetic Equipped		Electronic (effective value detection) Equipped		magnetic Equipped	
170		172		174		178		178		180		182		184	

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.  
 2. Specify "P-LT" when selecting plug-in type with lead-wire terminal block.  
 3. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.

## NF-L / NF-H / NF-R (High-performance class)

Frame (A)	50	60	63	100	125	125	125	125	
Model	NF63-HV			NF125-HV		NF125-LGV	NF125-HGV	NF125-RGV	
Image									
Rated current In (A) Rated ambient temperature 40°C (45°C for marine use)	10 15 16 20 25 30 32 40 50	60	(63)	15 16 20 30 32 40 50 60 63 75 80 100	125	16-20 20-25 25-32 32-40 35-40-50 45-50-63 53-63-80 70-80-100 90-100-125	16-20 20-25 25-32 32-40 35-40-50 45-50-63 53-63-80 70-80-100 90-100-125	16-20 20-25 25-32 32-40 40-50 50-63 63-80 80-100 100-125	
Number of poles	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3	
Rated insulation voltage Ui (V)	690	690	690	690	690	690	690	690	
Rated short-circuit breaking capacities (kA) IEC 60947-2 EN 60947-2 (Icu/Ics) AC	690V	2.5/2.5	2.5/2.5	2.5/2.5	10/8	10/8	8/8	10/8	
	500V	7.5/7.5	7.5/7.5	7.5/7.5	30/23	30/23	36/36	50/38	
	440V	10/8	10/8	10/8	50/38	50/38	50/50	65/65	
	415V	10/8	10/8	10/8	50/38	50/38	50/50	70/70	
	400V	10/8	10/8	10/8	50/38	50/38	50/50	75/75	
	380V	10/8	10/8	10/8	50/38	50/38	50/50	75/75	
	230V	25/19	25/19	25/19	100/75	100/75	90/90	100/100	
	200V	25/19	25/19	25/19	100/75	100/75	90/90	100/100	
DC	250V	7.5/7.5 (*5)	7.5/7.5 (*5)	7.5/7.5 (*5)	-	-	20/20 (300V) (*2)	40/40 (300V) (*2)	
Rated impulse withstand voltage Uimp (kV)	8	8	8	8	8	8	8	8	
Current	AC/DC compatible (*1)	AC/DC compatible (*1)	AC/DC compatible (*1)	AC	AC	AC/DC compatible	AC/DC compatible	AC	
Suitability for isolation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Reverse connection	Available	Available	Available	Available	Available	Available	Available	Available	
Number of operating cycles	Without current	15,000	15,000	15,000	25,000	25,000	50,000	50,000	
	With current (440VAC)	8,000	8,000	8,000	10,000	10,000	30,000	30,000	
Utilization category	A	A	A	A	A	A	A	A	
Pollution degree	3	3	3	3	3	3	3	3	
EMC environment condition (environment A or B)	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	
Overall dimensions (mm)	a	50 75 100	50 75 100	50 75 100	90 120	90 120	105 140	105 140	
	b	130	130	130	130	130	165	165	
	c	68	68	68	68	68	68	68	
	ca	90	90	90	90	90	92	92	
	Mass of front-face type (kg)	0.5 0.7 0.9	0.55 0.75 1.0	0.55 0.75 1.0	0.8 1.0 1.3	0.8 1.0 1.3	1.4 1.6 2.0	1.4 1.6 2.0	1.5 1.8
Installation and accessories	Front connection (F)	Page	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	
	Solderless (BOX) terminal (SL)		●	●	●	●	●	●	
	Rear (B)	98	●Round stud	●Round stud	●Round stud	●Bar stud	●Bar stud	●Bar stud	
	Plug-in (PM)		●	●	●	●	●	●	
	Alarm switch (AL)	115	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	
	Auxiliary switch (AX)		●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	
	Shunt trip (SHT)		●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	
Undervoltage trip (UVT)		●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)		
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) (*4)	136	●	●	●	●	●	●
	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	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	
CCC recognition	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	
Marine use approval (☆:Certified) (NK, LR, ABS, DNV-GL)	☆	-	☆	-	☆	-	☆	-	
Automatic tripping device	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	
Trip button	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	
Page of Characteristics and dimensions		148		150		158		158	

- Notes: \*1 The operating characteristics are different between AC and DC.  
 \*2 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 500VDC can be applied to 3-pole product and maximum of 600VDC to 4-pole product.  
 \*3 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.  
 \*4 No isolation function except 400A to 800A frame.  
 \*5 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.

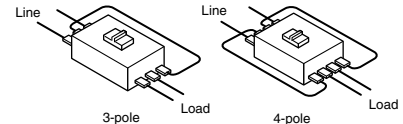




## NF-H / NF-R (High-performance class)



Frame (A)		250		400				630				800			
Model		NF250-HEV		NF400-HEW		NF400-REW		NF630-HEW		NF630-REW		NF800-HEW		NF800-REW	
Image															
Rated current In (A)		80-160(by 8A)		Adjustable 200 225		Adjustable 200 225		Adjustable 300 350		Adjustable 300 350		Adjustable 400 450		Adjustable 400 450	
Rated ambient temperature 40°C (45°C for marine use)		125-250(by 12.5A)		250 300 350 400		250 300 350 400		400 500 600 630		400 500 600 630		500 600 700 800		500 600 700 800	
Number of poles		3 4		3 4		3		3 4		3		3 4		3	
Rated insulation voltage Ui (V)		690		690		690		690		690		690		690	
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	10/8	35/18	-	35/18	-	15/15	-					
			500V	50/38	50/50	70/35	50/50	70/35	50/50	70/35					
			440V	65/65	65/65	125/63	65/65	125/63	65/65	125/63					
			415V	70/70	70/70	125/63	70/70	125/63	70/70	125/63					
			400V	75/75	70/70	125/63	70/70	125/63	70/70	125/63					
			380V	75/75	70/70	125/63	70/70	125/63	70/70	125/63					
			230V	100/100	100/100	150/75	100/100	150/75	100/100	150/75					
			200V	100/100	100/100	150/75	100/100	150/75	100/100	150/75					
			DC	250V	-	-	-	-	-	-					
			Rated impulse withstand voltage Uimp (kV)		8		8		8		8		8		8
Current		AC		AC		AC		AC		AC		AC		AC	
Suitability for isolation		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Reverse connection		Available		Available		Available		Available		Available		Available		Available	
Number of operating cycles	Without current	25,000		6,000		6,000		6,000		6,000		4,000		4,000	
	With current (440VAC)	10,000		1,000		1,000		1,000		1,000		500		500	
Utilization category		A		B		B		B		B		B		B	
Rated short time with stand current Icu (kA) at 0.25s		-		5		5		7.6		7.6		9.6		9.6	
Pollution degree		3		3		3		3		3		3		3	
EMC environment condition (environment A or B)		A		A		A		A		A		A		A	
Overall dimensions (mm)		a	105	140	140	185	140	185	140	185	210	280	210	280	210
		b	165	257	257	257	257	257	257	257	275	275	275	275	275
		c	68	103	103	103	103	103	103	103	103	103	103	103	103
		ca	92	155	155	155	155	155	155	155	155	155	155	155	155
		Mass of front-face type (kg)	1.7	2.2	6.0	7.6	6.0	6.5	8.3	6.0	10.9	14.2	10.9		
Installation and connections	Front connection (F)	Page	●Screw terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal			
	Solderless (BOX) terminal (SL)	98	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud			
	Rear (B)	98	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud			
Cassette-type accessories	Plug-in (PM)	98	●	●	●	●	●	●	●	●	●	●			
	Alarm switch (AL)	115	●(*1)	●	●(*1)	●	●(*1)	●	●(*1)	●	●(*1)	●			
	Auxiliary switch (AX)	115	●(*1)	●	●(*1)	●	●(*1)	●	●(*1)	●	●(*1)	●			
	Shunt trip (SHT)	115	●(*1)	●	●(*1)	●	●(*1)	●	●(*1)	●	●(*1)	●			
	Undervoltage trip (UVT)	115	●(*1)	●	●(*1)	●	●(*1)	●	●(*1)	●	●(*1)	●			
	With lead-wire terminal block (SLT)	120	●	●	●	●	●	●	●	●	●	●			
	Pre-alarm (PAL)	122	●	●	●(*2)	●(*2)	●(*2)	●(*2)	●(*2)	●(*2)	●(*2)	●(*2)			
External accessories	Enclosure Closed (S)	137	●	●	●	●	●	●	●	●	●	●			
	Dustproof (I)	137	●	●	●	●	●	●	●	●	●	●			
	Waterproof (W)	137	●	●	●	●	●	●	●	●	●	●			
	Electrical operation device (NFM)	140	●	●	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)			
	Mechanical interlock (MI) (*4)	136	●	●	●	●	●	●	●	●	●	●			
	Panel mounting Breaker mounting	136	●	●	●	●	●	●	●	●	●	●			
	Handle lock device LC	135	●	●	●	●	●	●	●	●	●	●			
	HL	135	●	●	●	●	●	●	●	●	●	●			
	HL-S	135	●	●	●	●	●	●	●	●	●	●			
	External operating handle (F)	123	●	●	●	●	●	●	●	●	●	●			
(V)	123	●	●	●	●	●	●	●	●	●	●				
Terminal cover (TC-L, TC-S, TTC, BTC, PTC)	128	●	●	●	●	●	●	●	●	●	●				
Rear stud (B-ST)	98	●	●	●	●	●	●	●	●	●	●				
Plug-in (PM)	98	●	●	●	●	●	●	●	●	●	●				
IEC 35mm rail mounting adapters	143	●	●	●	●	●	●	●	●	●	●				
CE marking	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration				
CCC recognition	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized				
Marine use approval (*:Certified) (NK, LR, ABS, DNV-GL)	☆	-	☆	-	☆	-	☆	-	☆	-	☆				
Automatic tripping device	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)				
Trip button	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped				
Page of Characteristics and dimensions	160	164	164	164	170	170	170	170	172	172	172				

Notes: \*1 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.  
 \*2 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.  
 \*3 Place an order with circuit breaker.  
 \*4 No isolation function except 400A to 800A frame.








## NV-C (Economy class) Harmonic Surge Ready

Frame (A)		50		60		63		100		125		
Model		NV63-CV						NV125-CV				
Image												
Rated current In (A) Rated ambient temperature 40°C		(5) (10) (15) 16 20 25 (30) 32 40 50		(60)		63		(60) 63 (75) 80 100		125		
Number of poles		2 3		2 3		2 3		3		3		
Phase line (*1)		1φ2W 3φ3W, 1φ3W, 1φ2W		1φ2W 3φ3W, 1φ3W, 1φ2W		1φ2W 3φ3W, 1φ3W, 1φ2W		3φ3W, 1φ3W, 1φ2W		3φ3W, 1φ3W, 1φ2W		
Rated operational voltage Ue (V) (*2) AC		100-240 100-440		100-240 100-440		100-240 100-440		100-440		100-440		
High-speed type	Rated current sensitivity (mA)	30		30		30		30, 100/200/500 selectable		30, 100/200/500 selectable		
	Max. operating time (s) at IΔn at 5IΔn	0.1 0.04		0.1 0.04		0.1 0.04		0.1 0.04		0.1 0.04		
Time-delay type	Rated current sensitivity (mA)	-		-		-		(100/200/500 selectable)		(100/200/500 selectable)		
	Max. operating time (s) (*3) Internal non-operating (s) (or more)	-		-		-		(0.45/1.0/2.0 selectable) (0.1/0.5/1.0)		(0.45/1.0/2.0 selectable) (0.1/0.5/1.0)		
Earth leakage protection characteristic		Type AC										
Earth leakage indication system		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)		
Rated short-circuit breaking capacities (kA)	AC	440V 415V 400V		2.5/2.5 2.5/2.5 5/5		2.5/2.5 2.5/2.5 5/5		2.5/2.5 2.5/2.5 5/5		10/5 10/5 10/5		
	230V	7.5/7.5		7.5/7.5		7.5/7.5		30/15		30/15		
	200V	7.5/7.5		7.5/7.5		7.5/7.5		30/15		30/15		
	100V	7.5/7.5		7.5/7.5		7.5/7.5		30/15		30/15		
	Rated impulse withstand voltage Uimp (kV)	6		6		6		6		6		
	Current	AC		AC		AC		AC		AC		
Suitability for isolation		Yes										
Reverse connection (below 230VAC)		Available										
Number of operating cycles	Without current	10,000		10,000		10,000		10,000		10,000		
	With current	6,000		6,000		6,000		6,000		6,000		
Utilization category		A										
Pollution degree		2										
EMC environment condition (environment A or B)		A										
Overall dimensions (mm)	a	75		75		75		90		90		
	b	130		130		130		130		130		
	c	68		68		68		68		68		
	ca	90		90		90		90		90		
Mass of front-face type (kg)		0.7 0.75		0.7 0.75		0.7 0.75		1.0		1.0		
Installation and connections	Front connection (F)	●Screw terminal										
	Solderless (BOX) terminal (SL)	-										
	Rear (B)	●Round stud										
	Plug-in (PM)	-										
Cassette-type accessories	Alarm switch (AL)	●(*4)		●(*4)		●(*4)		●(*4)		●(*4)		
	Auxiliary switch (AX)	●(*4)		●(*4)		●(*4)		●(*4)		●(*4)		
	Shunt trip (SHT)	●(*4)		●(*4)		●(*4)		●(*4)		●(*4)		
	Undervoltage trip (UVT)	●(*4)		●(*4)		●(*4)		●(*4)		●(*4)		
	Earth leakage alarm switch (EAL)	-		-		-		-		-		
	With lead-wire terminal block (SLT)	●		●		●		●		●		
Test button module (TBM)	●(*5)		●(*5)		●(*5)		●(*5)		●(*5)			
External accessories	Enclosure	Closed (S)	-		-		-		-		-	
		Dustproof (I)	-		-		-		-		-	
		Waterproof (W)	-		-		-		-		-	
	Electrical operation device (NFM)	Panel mounting	●		●		●		●		●	
		Breaker mounting	●		●		●		●		●	
	Handle lock device	LC	●		●		●		●		●	
		HL	●		●		●		●		●	
		HL-S	●		●		●		●		●	
	External operating handle	(F)	●		●		●		●		●	
		(V)	●		●		●		●		●	
Terminal cover (TC-L, TC-S, TTC, BTC, PTC)	●		●		●		●		●			
Rear stud (B-ST)	●		●		●		●		●			
Plug-in (PM)	-		-		-		-		-			
IEC 35mm rail mounting adapters	●		●		●		-		-			
CE marking		Self-declaration										
CCC recognition		Recognized										
Marine use approval (☆: Certified) (NK, LR, ABS, DNV-GL)		-										
Automatic tripping device		Thermal-magnetic		Thermal-magnetic		Thermal-magnetic		Thermal-magnetic		Thermal-magnetic		
Trip button		Equipped		Equipped		Equipped		Equipped		Equipped		
Page of Characteristics and dimensions		186						188				

Notes: \*1 When using 3-pole earth-leakage circuit breakers for 1-phase 2-wire system, connect cables/busbars to left and right poles, not to center pole. When using 1-phase 3-wire system, connect neutral conductor to center pole of earth leakage circuit breaker.  
 \*2 For time-delay type, the rated voltage is 200-440VAC.  
 \*3 When the operating time are 0.45, 1.0 and 2.0 seconds, the Earth Leakage circuit breaker operates between 0.15 and 0.45 seconds, between 0.6 and 1.0 seconds and between 1.2 and 2.0 seconds respectively.  
 \*4 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.  
 \*5 Standard type is SLT equipped.

\*6 Place an order with circuit breaker.  
 \*7 No isolation function except 400A to 630A frame.  
 \*8 AC100V does not acquire the CCC certification.

**NV-C (Economy class) Harmonic Surge Ready**

225	250	400	600	630
NV250-CV		NV400-CW		NV630-CW
				
125 150 175 200 225	250	250 300 350 400	500 600	(630)
3	3	3	3	3
3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W
100-440	100-440	100-440	200-440	200-440
30,100/200/500 selectable	30,100/200/500 selectable	(30),100/200/500 selectable	-	-
0.1	0.1	0.1	-	-
0.04	0.04	0.04	-	-
(100/200/500 selectable)	(100/200/500 selectable)	(100/200/500 selectable)	(100/200/500 selectable)	(100/200/500 selectable)
(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)	(0.45/1.0/2.0 selectable)
(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)
Type AC		Type AC		Type AC
Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)
15/12	15/12	25/13	36/18	36/18
25/19	25/19	36/18	36/18	36/18
25/19	25/19	36/18	36/18	36/18
36/27	36/27	50/25	50/25	50/25
36/27	36/27	50/25	50/25	50/25
36/27	36/27	50/25	-	-
6	6	8	8	8
AC	AC	AC	AC	AC
Yes	Yes	Yes	Yes	Yes
Available	Available	Available	Available	Available
8,000	8,000	6,000	6,000	6,000
4,000	4,000	1,000	1,000	1,000
A	A	A	A	A
2	2	3	3	3
A	A	A	A	A
105	105	140	140	140
165	165	257	257	257
68	68	103	103	103
92	92	134	155	155
1.7	1.7	6.1	6.9	6.9
●Screw terminal	●Screw terminal	●Busbar terminal	●Busbar terminal	●Busbar terminal
-	-	-	-	-
●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud
●	●	●	●	●
●(*4)	●(*4)	●(*4)	●(*4)	●(*4)
●(*4)	●(*4)	●(*4)	●(*4)	●(*4)
●(*4)	●(*4)	●(*4)	●(*4)	●(*4)
●(*4)	●(*4)	●	●	●
-	-	-	-	-
●	●	●	●	●
●(*5)	●(*5)	●(*5)	●(*5)	●(*5)
-	-	-	-	-
-	-	-	-	-
●	●	●(*6)	●(*6)	●(*6)
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
●	●	●	●	●
-	-	-	-	-
-	-	-	-	-
TUV approval	TUV approval	Self-declaration	Self-declaration	Self-declaration
Recognized	Recognized	Recognized	Recognized	Recognized
-	-	-	-	-
Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic
Equipped	Equipped	Equipped	Equipped	Equipped
190		194		198

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.  
2. Specify "P-LT" when selecting plug-in type with lead-wire terminal block.  
3. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.

4. Rated operational voltage	Applicable circuit voltage	Available voltage range
100-240V	100/110/200/220/230/240V	85-264V
100-440V	100/110/200/220/240/254/265/380/400/415/440V	85-484V
200-440V	200/220/240/254/265/380/400/415/440V	170-484V

## NV-S (Standard class) Harmonic Surge Ready

Frame (A)		30	32	50	60	63	100	125	125		
Model		NV32-SV			NV63-SV			NV125-SV		NV125-SEV	
Image											
Rated current In (A)		(5) 6 10 (15)	(32)	(5) (10) (15) 16 20	(60)	63	(15) 16 20 (30) 32 40 50	125	63-81 88-106		
Rated ambient temperature 40°C		16 20 25 (30)		(30) 32 40 50			(60) 63 (75) 80 100 (*3)		113-125(by 6A)		
Number of poles		3	3	3	3	3	3 4	3 4	3 4		
Phase line (*1)		3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W 3φ4W	3φ3W, 1φ3W, 1φ2W 3φ4W	3φ3W, 1φ3W, 1φ2W 3φ4W		
Rated operational voltage Ue (V) (*2) AC		100-440	100-440	100-440	100-440	100-440	100-440 200-440	100-440 200-440	100-440		
High-speed type	Rated current sensitivity (mA)	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	(30),100/200/500 selectable		
	Max. operating time (s)	at IΔn 0.1 at 5IΔn 0.04	0.1 0.04	0.1 0.04	0.1 0.04	0.1 0.04	0.1 0.04	0.1 0.04	0.1 0.04		
Time-delay type	Rated current sensitivity (mA)	-	-	-	-	-	(100/200/500selectable)	(100/200/500selectable)	(100/200/500selectable)		
	Max. operating time (s) (*4)	-	-	-	-	-	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)		
Internal non-operating (s) (or more)		-	-	-	-	-	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)		
Earth leakage protection characteristic		Type AC			Type AC			Type AC		Type AC	
Earth leakage indication system		Mechanical type (button)			Mechanical type (button)			Mechanical type (button)		Mechanical type (button)	
Rated short-circuit breaking capacities (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	5/5	5/5	7.5/7.5	7.5/7.5	7.5/7.5	25/25	25/25	36/36
			415V	5/5	5/5	7.5/7.5	7.5/7.5	7.5/7.5	30/30	30/30	36/36
			400V	5/5	5/5	7.5/7.5	7.5/7.5	7.5/7.5	30/30	30/30	36/36
			230V	10/10	10/10	15/15	15/15	15/15	50/50	50/50	85/85
			200V	10/10	10/10	15/15	15/15	15/15	50/50	50/50	85/85
			100V	10/10	10/10	15/15	15/15	15/15	50/50	50/50	85/85
Rated impulse withstand voltage Uimp (kV)		6	6	6	6	6	6	6	6		
Current		AC	AC	AC	AC	AC	AC	AC	AC		
Suitability for isolation		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Reverse connection (below 230VAC)		Available	Available	Available	Available	Available	Available	Available	Available		
Number of operating cycles	Without current	10,000	10,000	15,000	15,000	15,000	25,000	25,000	25,000		
	With current	6,000	6,000	8,000	8,000	8,000	10,000	10,000	10,000		
Utilization category		A	A	A	A	A	A	A	A		
Rated short time withstand current Icu (kA) at 0.25s		-	-	-	-	-	-	-	-		
Pollution degree		2	2	2	2	2	2	2	2		
EMC environment condition (environment A or B)		A	A	A	A	A	A	A	A		
Overall dimensions (mm)		a	75	75	75	75	75	90 120	90 120	105 140	
		b	130	130	130	130	130	130	130	165	
		c	68	68	68	68	68	68	68	68	
		ca	90	90	90	90	90	90	90	92	
Mass of front-face type (kg)		0.75	0.75	0.75	0.8	0.8	1.1 1.4	1.1 1.4	1.9 2.5		
Installation and connections	Front connection (F)	Page	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●		
	Solderless (BOX) terminal (SL)	-	-	-	-	-	-	-	-		
	Rear (B)	98	●Round stud	●Round stud	●Round stud	●Round stud	●Round stud	●Bar stud	●Bar stud		
	Plug-in (PM)	-	●	●	●	●	●	●	●		
Cassette-type accessories	Alarm switch (AL)	115	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)		
	Auxiliary switch (AX)	115	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)		
	Shunt trip (SHT)	115	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)		
	Undervoltage trip (UVT)	115	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)		
	Earth leakage alarm switch (EAL)	-	-	-	-	-	-	-	-		
	With lead-wire terminal block (SLT)	120	●	●	●	●	●	●	●		
Test button module (TBM)	122	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)			
External accessories	Enclosure	Closed (S)	137	-	-	-	-	-	-	●	
		Dustproof (I)	137	-	-	-	-	-	-	●	
		Waterproof (W)	137	-	-	-	-	-	-	●	
	Electrical operation device (NFM)	140	-	-	-	-	-	●	●	●	
		Mechanical interlock (MI) (*8)	Panel mounting	136	●	●	●	●	●	●	●
	Breaker mounting		136	●	●	●	●	●	●	●	
	Handle lock device	LC	135	●	●	●	●	●	●	●	
		HL	135	●	●	●	●	●	●	●	
		HL-S	135	●	●	●	●	●	●	●	
	External operating handle	(F)	123	●	●	●	●	●	●	●	
(V)		123	●	●	●	●	●	●	●		
Terminal cover (TC-L, TC-S, TTC, BTC, PTC)	128	●	●	●	●	●	●	●			
Rear stud (B-ST)	98	-	●	●	●	●	●	●			
Plug-in (PM)	143	-	-	-	-	-	-	-			
IEC 35mm rail mounting adapters	143	●	●	●	●	●	●	●			
CE marking		Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration		
CCC recognition		Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized		
Marine use approval (NK, LR, ABS, DNV-GL)		-	-	-	-	-	-	-	-		
Automatic tripping device		Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Electronic (effective value detection)		
Trip button		Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped		
Page of Characteristics and dimensions		186			186			188		192	

Notes: \*1 When using 3-pole earth-leakage circuit breakers for 1-phase 2-wire system, connect cables/busbars to left and right poles, not to center pole. When using 1-phase 3-wire system, connect neutral conductor to center pole of earth leakage circuit breaker.  
 \*2 For time-delay type, the rated voltage is 200-440VAC.  
 \*3 In case of time delay type, rated current is produced with 20 amp. or more.  
 \*4 When the operating time are 0.45, 1.0 and 2.0 seconds, the Earth Leakage circuit breaker operates between 0.15 and 0.45 seconds, between 0.6 and 1.0 seconds and between 1.2 and 2.0 seconds respectively.

\*5 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.  
 \*6 Standard type is SLT equipped.  
 \*7 Place an order with circuit breaker.  
 \*8 No isolation function except 400A to 800A frame.  
 \*9 100VAC does not acquire the CCC certification.








## NV-H / NV-R (High-performance class) Harmonic Surge Ready

Frame (A)		50	60	63	100	125	125	225	250	250	
Model		NV63-HV			NV125-HV		NV125-HEV	NV250-HV		NV250-HEV	
Image											
Rated current In (A)		(15) 16 20	(60)	63	(15) 16 20 (30) 32 40 50	125	63-81 88-106	125 150 175	250	125-250	
Rated ambient temperature 40°C		(30) 32 40 50			(60) 63 (75) 80 100 (*3)		113-125(by 6A)	200 225		(by 12.5A)	
Number of poles		3	3	3	3	4	3	4	3	4	
Phase line (*1)		3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W	3φ4W	3φ3W, 1φ3W, 1φ2W	3φ4W	3φ3W, 1φ3W, 1φ2W	3φ4W	
Rated operational voltage Ue (V) (*2) AC		100-440	100-440	100-440	100-440	200-440	100-440	100-440	200-440	100-440	
High-speed type	Rated current sensitivity (mA)	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	(30),100/200/500 selectable	30,100/200/500 selectable	30,100/200/500 selectable	(30),100/200/500 selectable	
	Max. operating time (s)	at IΔn 0.1 at 5IΔn 0.04	0.1 0.04	0.1 0.04	0.1 0.04	0.1 0.04	0.1 0.04	0.1 0.04	0.1 0.04	0.1 0.04	0.1 0.04
Time-delay type	Rated current sensitivity (mA)	-	-	-	(100/200/500selectable)	(100/200/500selectable)	(100/200/500selectable)	(100/200/500selectable)	(100/200/500selectable)	(100/200/500selectable)	
	Max. operating time (s) (*4)	-	-	-	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	(0.45/1.0/2.0selectable)	
Internal non-operating (s) (or more)		-	-	-	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	(0.1/0.5/1.0)	
Earth leakage protection characteristic		Type AC				Type AC		Type AC		Type AC	
Earth leakage indication system		Mechanical type (button)				Mechanical type (button)		Mechanical type (button)		Mechanical type (button)	
Rated short-circuit breaking capacities (kA)	AC	440V	10/8	10/8	10/8	50/38	50/38	65/65	65/65	65/65	65/65
		415V	10/8	10/8	10/8	50/38	50/38	70/70	70/70	70/70	70/70
		400V	10/8	10/8	10/8	50/38	50/38	75/75	75/75	75/75	75/75
		230V	25/19	25/19	25/19	100/75	100/75	100/100	100/100	100/100	100/100
		100V	25/19	25/19	25/19	100/75	100/75	100/100	100/100	100/100	100/100
Rated impulse withstand voltage Uimp (kV)		6	6	6	6	6	6	6	6	6	
Current		AC	AC	AC	AC	AC	AC	AC	AC	AC	
Suitability for isolation		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Reverse connection (below 230VAC)		-	-	-	-	-	-	-	-	-	
Number of operating cycles	Without current	15,000	15,000	15,000	25,000	25,000	25,000	25,000	25,000	25,000	
	With current	8,000	8,000	8,000	10,000	10,000	10,000	10,000	10,000	10,000	
Utilization category		A	A	A	A	A	A	A	A	A	
Rated short time withstand current Icu (kA) at 0.25s		-	-	-	-	-	-	-	-	-	
Pollution degree		2	2	2	2	2	2	2	2	2	
EMC environment condition (environment A or B)		A	A	A	A	A	A	A	A	A	
Overall dimensions (mm)		a	75	75	75	90	120	105	140	105	140
		b	130	130	130	130	130	165	165	165	165
		c	68	68	68	68	68	68	68	68	68
		ca	90	90	90	90	90	92	92	92	92
Mass of front-face type (kg)		0.75	0.8	0.8	1.1	1.4	1.1	1.4	1.8	2.5	
Installation and connections	Front connection (F)	Page	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	●Screw terminal	
	Solderless (BOX) terminal (SL)	-	-	-	-	-	-	-	-	-	
	Rear (B)	98	●Round stud	●Round stud	●Round stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	●Bar stud	
Plug-in (PM)	-	●	●	●	●	●	●	●	●		
Cassette-type accessories	Alarm switch (AL)	115	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	
	Auxiliary switch (AX)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	
	Shunt trip (SHT)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	
	Undervoltage trip (UVT)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	●(*5)	
	Earth leakage alarm switch (EAL)	-	-	-	-	-	-	-	-	-	
	With lead-wire terminal block (SLT)	120	●	●	●	●	●	●	●	●	
Test button module (TBM)	122	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	●(*6)		
External accessories	Enclosure	Closed (S)	-	-	-	-	-	-	-	-	
		Dustproof (I)	-	-	-	-	-	-	-	-	
		Waterproof (W)	-	-	-	-	-	-	-	-	
	Electrical operation device (NFM)	140	-	-	-	●	●	●	●	●	
		Mechanical interlock (MI) (*7)	136	●	●	●	●	●	●	●	
	Handle lock device	Panel mounting	●	●	●	●	●	●	●	●	
		LC	●	●	●	●	●	●	●	●	
		HL	●	●	●	●	●	●	●	●	
	External operating handle	HL-S	135	●	●	●	●	●	●	●	
		(F)	123	●	●	●	●	●	●	●	
Terminal cover (TC-L, TC-S, TTC, BTC, PTC)	(V)	128	●	●	●	●	●	●	●		
	128	●	●	●	●	●	●	●	●		
Rear stud (B-ST)	98	●	●	●	●	●	●	●	●		
Plug-in (PM)	143	●	●	●	●	●	●	●	●		
CE marking		Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	Self-declaration	
CCC recognition		Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized	
Marine use approval (NK, LR, ABS, DNV-GL)		-	-	-	-	-	-	-	-	-	
Automatic tripping device		Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Electronic (effective value detection)	Thermal-magnetic	Thermal-magnetic	Electronic (effective value detection)	
Trip button		Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	
Page of Characteristics and dimensions		186			188		192		190		

Notes: \*1 When using 3-pole earth-leakage circuit breakers for 1-phase 2-wire system, connect cables/busbars to left and right poles, not to center pole. When using 1-phase 3-wire system, connect neutral conductor to center pole of earth leakage circuit breaker.  
 \*2 For time-delay type, the rated voltage is 200-440VAC.  
 \*3 In case of time delay type, rated current is produced with 20 amp. or more.  
 \*4 When the operating time are 0.45, 1.0 and 2.0 seconds, the Earth Leakage circuit breaker operates between 0.15 and 0.45 seconds, between 0.6 and 1.0 seconds and between 1.2 and 2.0 seconds respectively.

\*5 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.  
 \*6 Standard type is SLT equipped.  
 \*7 No isolation function.  
 \*8 100VAC does not acquire the CCC certification.

**NV-H / NV-R (High-performance class) Harmonic Surge Ready**

400 NV400-HEW		630 NV630-HEW		800 NV800-HEW	
					
Adjustable 200 225 250 300 350 400		Adjustable 300 350 400 500 600 630		Adjustable 400 450 500 600 700 800	
3		3		3	
3φ3W, 1φ3W, 1φ2W		3φ3W, 1φ3W, 1φ2W		3φ3W, 1φ3W, 1φ2W	
100-440		100-440		100-440	
(30), 100/200/500 selectable		-		-	
0.1		-		-	
0.04		-		-	
(100/200/500 selectable)		(100/200/500 selectable)		(100/200/500 selectable)	
(0.45/1.0/2.0)		(0.45/1.0/2.0)		(0.45/1.0/2.0 selectable)	
(0.1/0.5/1.0)		(0.1/0.5/1.0)		(0.1/0.5/1.0)	
Type AC		Type AC		Type AC	
Mechanical type (button)		Mechanical type (button)		Mechanical type (button)	
65/65		65/65		65/65	
70/70		70/70		70/70	
70/70		70/70		70/70	
100/100		100/100		100/100	
100/100		100/100		100/100	
100/100		100/100		100/100	
8		8		8	
AC		AC		AC	
Yes		Yes		Yes	
-		-		-	
6,000		6,000		4,000	
1,000		1,000		500	
B		B		B	
5		7.6		9.6	
3		3		3	
A		A		A	
140		140		210	
257		257		275	
103		103		103	
155		155		155	
6.6		7.1		15.3	
8.2		-		-	
●Busbar terminal		●Busbar terminal		●Busbar terminal	
-		-		-	
●Bar stud		●Bar stud		●Bar stud	
●		●		●	
● (*5)		● (*5)		● (*5)	
● (*5)		● (*5)		● (*5)	
● (*5)		● (*5)		● (*5)	
●		●		●	
-		-		-	
●		●		●	
● (*6)		● (*6)		● (*6)	
-		-		-	
●		●		●	
●		●		●	
● (*7)		● (*7)		● (*7)	
●		●		●	
●		●		●	
●		●		●	
●		●		●	
●		●		●	
●		●		●	
-		-		-	
-		-		-	
Self-declaration		Self-declaration		Self-declaration	
Recognized		Recognized		Recognized	
-		-		-	
Electronic (effective value detection)		Electronic (effective value detection)		Electronic (effective value detection)	
Equipped		Equipped		Equipped	
196		200		202	

- Remarks: 1. Products with rated current parenthesized are produced when an order is placed.  
 2. The setting is set to 500mA and delivered when not specifying the rated current sensitivity and the time of time-delay type of operation to 2.0 seconds.  
 3. Specify "FP-LT" when using a flush plate product with a lead-wire terminal block.  
 4. Specify "P-LT" when selecting plug-in type with lead-wire terminal block.  
 5. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.

6. Rated operational voltage	Applicable circuit voltage	Available voltage range
100-440V	100/110/200/220/240/254/265/380/400/415/440V	85-484V
200-440V	200/220/240/254/265/380/400/415/440V	175-484V

## NF-MB

Please specify MB

Frame (A)		30			32			50			100			225						
Model		NF32-SV						NF63-CV			NF63-SV			NF125-SV			NF250-SV			
Rated current In (A)	Rated motor capacity (kW)	A	200/220V kW	400/440V kW	A	200/220V kW	400/440V kW	A	200/220V kW	400/440V kW	A	200/220V kW	400/440V kW	A	200/220V kW	400/440V kW				
		Rated ambient temperature 40°C (45°C for marine use)		25	5.5	11	32	7.5	15	45	11	22	7.1	1.5	-	100	-	55	225	55
		16	3.7	7.5				40	-	18.5	5	-	2.2	90	22	45	200	-	-	
		12	-	5.5				32	7.5	15	4	0.75	1.5	71	18.5	37	175	45	90	
		10	2.2	-				25	5.5	11				63	15	30	150	37	75	
		8	-	3.7				16	3.7	7.5				45	11	22	125	30	-	
		7.1	1.5	-				12	-	5.5				(40)	-	18.5				
		5	-	2.2				10	2.2	-				32	7.5	15				
		4	0.75	1.5				8	-	3.7				(25)	5.5	11				
														(16)	3.7	7.5				
														(12.5)	-	5.5				
Number of poles		3						3			3			3						
Rated insulation voltage Ui (V)		500						500			500			500						
Rated short-circuit breaking capacity (kA)	AC	440V	2.5/2.5			2.5/2.5			2.5/2.5			7.5/7.5			25/25			36/36		
		415V	2.5/2.5			2.5/2.5			2.5/2.5			7.5/7.5			30/30			36/36		
		400V	5/5			5/5			5/5			7.5/7.5			30/30			36/36		
		380V	5/5			5/5			5/5			7.5/7.5			30/30			36/36		
		230V	7.5/7.5			7.5/7.5			7.5/7.5			15/15			50/50			85/85		
Rated impulse withstand voltage Uimp (kV)		8						8			8			8			8			
Current		AC						AC			AC			AC			AC			
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			15,000			25,000			25,000			
	With current (440VAC)	6,000						6,000			8,000			10,000			10,000			
Utilization category		A						A			A			A			A			
Pollution degree		3						3			3			3			3			
EMC environment condition (environment A or B)		Not Applicable						Not Applicable			Not Applicable			Not Applicable			Not Applicable			
Overall dimensions (mm)		a	75			75			75			90			105					
		b	130			130			130			130			165					
		c	68			68			68			68			68					
		ca	90			90			90			90			92					
		Mass of front-face type (kg)		0.65						0.65			0.7			1.0			1.6	
Installation and connections	Front connection (F)	Page	●Screw terminal						●Screw terminal			●Screw terminal			●Screw terminal					
	Solderless (BOX) terminal (SL)		-						-			-			-					
	Rear (B)	98	●Round stud						●Round stud			●Round stud			●Bar stud			●Bar stud		
Cassette-type accessories	Plug-in (PM)		●						●			●			●					
	Alarm switch (AL)		●(*1)						●(*1)			●(*1)			●(*1)					
	Auxiliary switch (AX)		●(*1)						●(*1)			●(*1)			●(*1)					
	Shunt trip (SHT)	115	●(*1)						●(*1)			●(*1)			●(*1)					
	Undervoltage trip (UVT)		●(*1)						●(*1)			●(*1)			●(*1)					
	With lead-wire terminal block (SLT)	120	●						●			●			●					
External accessories	Enclosure	Closed (S)	●						●			●			●					
		Dustproof (I)	●						●			●			●					
		Waterproof (W)	●						●			●			●					
	Electrical operation device (NFM)	140	-						-			●(*3)			●(*3)					
	Mechanical interlock (M) (*2)	Panel mounting	136	●						●			●			●				
		Breaker mounting		●						●			●			●				
	Handle lock device	LC		●						●			●			●				
		HL	135	●						●			●			●				
		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		Self-declaration						Self-declaration			Self-declaration			Self-declaration			TUV approval			
CCC recognition		Recognized						Recognized			Recognized			Recognized			Recognized			
Marine use approval (*:Certified) (NK, LR, ABS, DNV-GL)		☆						☆			☆			☆			☆			
Automatic tripping device		Thermal-magnetic						Thermal-magnetic			Thermal-magnetic			Thermal-magnetic			Thermal-magnetic			
Trip button		Equipped						Equipped			Equipped			Equipped			Equipped			
Page of Characteristics and dimensions		148						148			150			154						

Notes: \*1 The operating characteristics are different between AC and DC. 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.  
\*2 No isolation function.  
\*3 Place an order with circuit breaker.

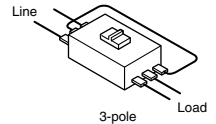
Remarks: 1. The motor circuit breakers do not have an applicable rated motor capacity. Select a motor circuit breaker based on the total load current of the motor.  
2. Products with rating parenthesized are produced when the total order is placed.  
3. Specify "P-LT" when selecting plug-in type with lead-wire terminal block.  
4. The circuit breaker has the rated short circuit breaking capacity specified in the shaded cells.  
5. Please refer to "Table 4-17", of Page 79 for details.

## UL 489 Listed Molded Case Circuit Breakers

Frame (A)		50						100						125							
Model		NF50-SMU		NF50-SVFU		NF100-CVFU		NF100-SRU		NF100-HRU		NF125-SVU		NF125-HVU							
Image																					
Rated current In (A) (*4) Rated ambient temperature 40°C (IEC 30°C)		0.5 1 (1.5) 2 3 4 5 (6) 7 (8) 10 13 15 20 (25) 30 (35) (40) 50		(0.5) (1) (1.5) (2) (3) 4 5 (6) (7) (8) 10 13 15 20 25 30 (35) 40 50		(3) 5 10 15 20 30 40 50		60 (70) 75 (80) (90) 100		(1) (2) 3 5 10 15 20 (25) 30 40 50 60 (70) 75 (80) (90) 100		(1) (2) 3 5 10 15 20 (25) 30 40 50 60 (70) 75 (80) (90) 100		15 20 30 40 50 60 (70) 75 (80) (90) 100		15 20 30 40 50 60 (70) 75 (80) (90) 100					
Number of poles		1 2 3		2 3		2 3		2 3		2 3		2 3		2 3							
Rated short-circuit breaking capacities (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage	AC (V)	240		240		240		240		480		480		600Y/347		600Y/347			
			DC (V)	60		-		-		-		-		-		-		-			
		AC	600Y/347V	-		-		-		-		-		-		-		18		18	
			480V	-		-		-		-		18(10) (*11)		30		30		50		50	
			480Y/277V	-		-		-		-		-		-		-		-		-	
			240V	5		10		14		14		35(25) (*11)		50(25) (*11)		50		50		100	
	120V	10		-		-		-		-		-		-		-		-			
	60V	10		-		-		-		-		-		-		-		-			
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)	AC	440		440		600		500		500		690		690		690		690	
			DC	690V		-		-		-		-		8/4		8/4		10/5		10/5	
AC		500V	-		-		7.5/4		10/5		18/9(10/5) (*11)		18/9		18/9		25/13		25/13		
		440V	-		7.5/4		10/5		15/8		25/13(15/8) (*11)		30/15		30/15		50/25		50/25		
		415V	-		10/5		10/5		15/8		25/13(15/8) (*11)		30/15		30/15		50/25		50/25		
		400V	-		10/7.5		10/5		15/8		25/13(15/8) (*11)		30/15		30/15		50/25		50/25		
		380V	-		10/5		10/5		15/8		25/13(15/8) (*11)		30/15		30/15		50/25		50/25		
		230V	10/7.5		10/7.5		15/8		15/8		35/18(25/13) (*11)		50/25(25/13) (*11)		50/25		50/25		100/50		
DC	250V	-		-		-		-		-		-		-		-		-			
	60V	10/7.5		-		-		-		-		-		-		-		-			
Rated impulse withstand voltage Uimp (kV)		6		6		8		8		8		8		8		8		8			
Current (*1)		AC		AC		AC		AC		AC		AC		AC		AC		AC			
Suitability for isolation		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes			
Reverse connection		Available		-		Available		Available		Available		Available		Available		Available		Available			
Utilization category		A		A		A		A		A		A		A		A		A			
Pollution degree		3		3		3		3		3		3		3		3		3			
EMC environment condition (environment A or B)		Not applicable		Not Applicable		Not Applicable		Not applicable		Not applicable		Not Applicable		Not Applicable		Not Applicable		Not Applicable			
Overall dimensions (mm)		a	18	36	54	36	54	50	75	50	75	50	75	90	90	90	90	90	90		
		b	124		120		150		120		120		160		160		160		160		
		c	44 (*8)		68		68		68		74		68		68		68		68		
		ca	70 (*8)		90		90		96		102		90		90		90		90		
Mass of front-face type (kg)		0.15	0.3	0.45	0.3	0.45	0.55	0.8	0.5	0.75	0.55	0.8	1.0	1.1	1.0	1.1	1.1	1.1			
Installation and connections	Front (F)	Screw terminal (AMP-N)	Page		● (*9)		●		●		●		●		●		●				
		Solderless terminal (SL)	98		-		-		-		-		-		-		-				
		Bar (BAR)	-		-		● (*5)		●		●		●		●		●				
		Power supply solderless load bar (SLBAR)	-		-		● (*5, 6)		● (*6)		● (*6)		● (*6)		● (*6)		● (*6)				
Cassette-type accessories (*2)	Alarm switch (AL)	●		● (*7)		● (*7)		●		●		● (*7)		● (*7)		● (*7)		● (*7)			
	Auxiliary switch (AX)	●		● (*7)		● (*7)		●		●		● (*7)		● (*7)		● (*7)		● (*7)			
	Shunt trip (SHT)	●		● (*7)		● (*7)		●		●		● (*7)		● (*7)		● (*7)		● (*7)			
	Undervoltage trip (UVT)	-		-		● (*7)		●		●		● (*7)		● (*7)		● (*7)		● (*7)			
	With lead-wire terminal block (SLT)	120		-		-		-		-		-		-		-		-			
External accessories (*2)	Mechanical interlock (MI)	136		-		-		-		-		-		-		-		-			
	Handle lock device (HL)	135		-		-		-		-		-		-		-		-			
	External operating handle (V)	123		-		-		-		-		-		-		-		-			
	Terminal Large terminal cover (TC-L)	128		-		-		-		-		-		-		-		-			
	Small terminal cover (TC-S)	98		-		-		-		-		-		-		-		-			
IEC 35mm rail mounting adapters	143		Standard accessory		Standard accessory		Standard accessory		Standard accessory		Standard accessory		-		-		-				
CE marking		Self-declaration		TUV approval		TUV approval		TUV approval		TUV approval		TUV approval		TUV approval		TUV approval		TUV approval			
CCC recognition		Recognized		Recognized		Recognized		Recognized		Recognized		Recognized		Recognized		Recognized		Recognized			
Automatic tripping device		Thermal-magnetic		Thermal-magnetic		Thermal-magnetic		Hydraulic-magnetic		Hydraulic-magnetic		Thermal-magnetic		Thermal-magnetic		Thermal-magnetic		Thermal-magnetic			
Trip button		-		Equipped		Equipped		Equipped		Equipped		Equipped		Equipped		Equipped		Equipped			
Page of Characteristics and dimensions		204		206		208		210		210		212		212		212		212			

- Notes: \*1 The trip action characteristics differ between AC and DC for products that are compatible with both AC and DC.  
 \*2 These accessories differ from the general and CE/CCC products in specifications. Please consult us for details.  
 \*3 The standard structure conforms to IP20 (finger protection).  
 \*4 The rated ambient temperature for NF50-SVFU, NF100-CVFU, NF125-SVU and NF125-HVU is specified at 40°C also by IEC.  
 \*5 The circuit breakers with busbar terminals have insulation barriers.  
 \*6 Circuit breakers for power supply solderless load screw terminal (SL/AMP-N) are available. In this case, a busbar terminal is not provided on the load side.  
 \*7 This accessory is cassette type and can be installed by customer. The breakers can be closely installed, except for those with UVT and NF50-SVFU model.  
 \*8 Dimensions indicated is as below.

- Remarks: 1. Products with rated current parenthesized are produced when an order is placed.  
 2. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.  
 3. The 3-pole circuit breakers can be used on single-phase circuits.



\*9 Refer to page 204.  
 \*10 Refer to page 210.  
 \*11 Rated short-circuit breaking capacities parenthesized are applied to below rated current 15A.

US UL Standard 489  
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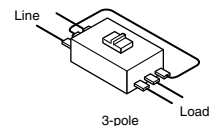
Canada CSA Standard  
 C22.2 No.5

## UL 489 Listed Molded Case Circuit Breakers

Frame (A)		250								
Model		NF250-CVU		NF250-SVU		NF250-HVU				
Image										
Rated current In (A) (*5)		125 150 175	250	125 150 175	250	125 150 175	250			
Rated ambient temperature 40°C (IEC 30°C)		200 225		200 225		200 225				
Number of poles		3	3	3	3	3	3			
Rated short-circuit breaking capacities (kA)	UL 489 CSA C22.2 No.5-02	AC (V)	240	240	480	480	600Y/347	600Y/347		
			DC (V)	-	-	-	-	-	-	
		600Y/347V	-	-	-	-	18	18		
			480V	-	-	35	35	50	50	
			480Y/277V	-	-	-	-	-	-	
	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	240V	35	35	65	65	100	100	
			120V	-	-	-	-	-	-	
		DC	60V	-	-	-	-	-	-	
			Rated insulation voltage Ui (V)		600	600	690	690	690	690
			690V	-	-	8/4	8/4	10/5	10/5	
AC	500V	10/8	10/8	25/13	25/13	36/18	36/18			
	440V	15/12	15/12	36/18	36/18	50/25	50/25			
	415V	25/19	25/19	36/18	36/18	50/25	50/25			
	400V	25/19	25/19	36/18	36/18	50/25	50/25			
	380V	25/19	25/19	36/18	36/18	50/25	50/25			
	230V	36/27	36/27	65/33	65/33	100/50	100/50			
	250V (*3)	-	-	-	-	-	-			
DC	60V	-	-	-	-	-	-			
Rated impulse withstand voltage Uimp (kV)		8	8	8	8	8	8			
Current (*1)		AC	AC	AC	AC	AC	AC			
Suitability for isolation		Yes	Yes	Yes	Yes	Yes	Yes			
Reverse connection		Available	Available	Available	Available	Available	Available			
Utilization category		A	A	A	A	A	A			
Pollution degree		3	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	105	105	105	105	105			
		b	185	185	185	185	185			
		c	68	68	68	68	68			
		ca	92	92	92	92	92			
		Mass of front-face type (kg)	1.6	1.6	1.6	1.6	1.6	1.6		
Installation and connections	Front (F)	Screw terminal (AMP-N)	Page	●	●	●	●			
		Solderless terminal (SL)	98	●	●	●	●			
		Bar (BAR)	●	●	●	●				
		Power supply solderless load bar (SUBAR)	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)			
Cassette-type accessories (*2)	Accessories	Alarm switch (AL)	115	●(*7)	●(*7)	●(*7)	●(*7)			
		Auxiliary switch (AX)	●(*7)	●(*7)	●(*7)	●(*7)				
		Shunt trip (SHT)	●(*7)	●(*7)	●(*7)	●(*7)				
		Undervoltage trip (UVT)	●(*7)	●(*7)	●(*7)	●(*7)				
		With lead-wire terminal block (SLT)	120	●	●	●	●			
External accessories (*2)	Accessories	Mechanical interlock (MI)	136	-	-	-	-			
		Handle lock device (HL)	135	●	●	●	●			
		Handle lock device (HL-S)	●	●	●	●				
		External operating handle (F)	123	●	●	●	●			
		External operating handle (V)	●	●	●	●				
		Terminal Large terminal cover (TC-L)	128	●	●	●	●			
Terminal Small terminal cover (TC-S)	98	●(*4)	●(*4)	-(*4)	-(*4)	-(*4)				
IEC 35mm rail mounting adapters	143	-	-	-	-	-				
CE marking		TÜV approval	TÜV approval	TÜV approval	TÜV approval	TÜV approval	TÜV approval			
CCC recognition		Recognized	Recognized	Recognized	Recognized	Recognized	Recognized			
Automatic tripping device		Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic			
Trip button		Equipped	Equipped	Equipped	Equipped	Equipped	Equipped			
Page of Characteristics and dimensions		214		214		214				

- Notes:
- \*1 The operating characteristics are different between AC and DC.
  - \*2 These accessories differ from the general products in specifications. Please consult us for details.
  - \*3 When using a 3-pole circuit breaker, use two poles. When wired as shown right, NF225-CWU can be used at up to 400VDC.
  - \*4 Since NF225-CWU comes with a protective cover, it has an IP20 (finger protection) structure as standard. Other models have IP20 (finger protection) structures as standard.
  - \*5 The rated ambient temperature for NF250-SVU and NF250-HVU is specified at 40°C also by IEC.
  - \*6 No isolation function.
  - \*7 This accessory is cassette type and can be installed by customer. The breakers can be closely installed, except for those with UVT.
  - \*8 Circuit breakers for power supply solderless load screw terminal (SL/AMP-N) are available. In this case, a busbar terminal is not provided on the load side.

- Remarks:
1. Products with rated current parenthesized are produced when an order is placed.
  2. The circuit breaker has the rated short-circuit breaking capacity specified in the shaded cells.
  3. The 3-pole circuit breakers can be used on single-phase circuits.



US UL Standard 489  
 UL File No.E167691 Body  
 UL File No.E108284 Accessories

Canada CSA Standard  
 C22.2 No.5



## UL 489 Listed Molded Case Circuit Breakers and Earth leakage Circuit Breakers

Frame (A)		30		50				100		30		50				100					
Model		NF30-FAU		NF50-FAU		NF50-FHU		NF100-FHU		NV30-FAU		NV50-FAU		NV50-FHU		NV100-FHU					
Image																					
Phase line (*1)		-		-		-		-		1φ2W 3φ3W 1φ2W		1φ2W 3φ3W 1φ2W		1φ2W 3φ3W 1φ2W		3φ3W 1φ3W 1φ2W					
Number of poles		2 3		2 3		2 3		2		2 3		2 3		2 3		2					
Rated current In(A) Rated ambient temperature 40°C		5 10 15 20 30		5 10 15 20 30 40 50				3 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		60 75 100	
High-speed type	Rated current sensitivity IΔm (mA)	-		-		-		-		30		30		30 50 100				30 50 100			
	Pickup current sensitivity UL1053	-		-		-		-		75% of IΔn		75% of IΔn		75% of IΔn				75% of IΔn			
	Max. operating time(s) at 5IΔn	-		-		-		-		0.04		0.04		0.04				0.04			
Earth-leakage indication system		-		-		-		-		Mechanical type(button)		Mechanical type(button)		Mechanical type(button)				Mechanical type(button)			
Rated short-circuit breaking capacities (kA)	UL 1077 CSA C22.2 No.235	Rated insulation voltage (V)		240		240		240		240		240		240				240			
		AC 240V	2.5(*2)		2.5(*2)		5		5		2.5(*2)		2.5(*2)		5				5		
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage (V)		250		250		500		500		230		230		230				230	
		AC 400 V	-		-		1.5/1		-		-		-		-				-		
DC 60 V	2.5/1(*3)		2.5/1(*3)		5/2		5/2		2.5/1(*3)		2.5/1(*3)		5/2				5/2				
DC 60 V	1.5/1		1.5/1		-		-		-		-		-				-				
Rated impulse withstand voltage Uimp (kV)		2.5		2.5		4		4		2.5		2.5		4				4			
Suitability for isolation		AC/DC compatible		AC/DC compatible		AC		AC		AC		AC		AC				AC			
Reverse connection		-		-		-		-		-		-		-				-			
Utilization category		A		A		A		A		A		A		A				A			
Pollution degree		2		2		2		2		2		2		2				2			
Overall dimensions (mm)		a	40	60	40	60	50	75	75	40	60	40	60	50	75	75	40	60			
		b	72		72		96		97.5		72		72		96		97.5				
		c	57		57		60		60		57		57		60		60				
		ca	73.5		73.5		76		76		73.5		73.5		76		76				
		ca2	-		-		-		-		-		-		-				-		
Mass of front-face type (kg)		0.14 0.2		0.16 0.22		0.25 0.37		0.51		0.16 0.22		0.18 0.24		0.3 0.43		0.57					
Adapter for IEC 35mm rail		Equipped		Equipped		Equipped		Equipped		Equipped		Equipped		Equipped				Equipped			
Mounting screws		●(*4)		●(*4)		●(*4)		●(*4)		●(*4)		●(*4)		●(*4)				●(*4)			
Front-plate attachment		●(*5)		●(*5)		-		-		●(*5)		●(*5)		-				-			
Connection		Front type		●		●		●		●		●		●				●			
Internal accessories		Alarm switch (AL)		●		●(*7)		●(*7)		●		●		●(*7)				●(*7)			
Auxiliary switch (AX)		115		●		●(*7)		●(*7)		●		●		●(*7)				●(*7)			
Shunt trip (SHT)		●		●		●(*7)		●(*7)		-		-		-				-			
With lead-wire terminal block (SLT)		120		●		●		●		●		●		●				●			
External accessories		Lock cover (LC)		●		●		●		●		●		●				●			
Handle lock device (HL)		135		●		●		●		●		●		●				●			
Terminal (TC-L)		-		-		●		●		-		-		●				●			
Small terminal cover (TC-S)		128		●		●		●		●		●		●				●			
Reat terminal cover (RTC)		-		●		-		-		●		●		-				-			
CE marking		TUV approval		TUV approval		TUV approval		TUV approval		TUV approval		TUV approval		TUV approval				TUV approval			
CCC recognition		Recognized		Recognized		Recognized		Recognized		Recognized		Recognized		Recognized				Recognized			
Automatic tripping device		Thermal-magnetic		Thermal-magnetic		Hydraulic-magnetic		Hydraulic-magnetic		Thermal-magnetic		Thermal-magnetic		Hydraulic-magnetic				Hydraulic-magnetic			
Trip button		-(*6)		-(*6)		-(*6)		-(*6)		-		-		-				-			
Page of Characteristics and dimensions		220		220		222		222		220		220		222				222			

Notes: \*1 If using a 3-pole Earth-leakage circuit-breakers as a 1-pole 2-phase device, connect the left and right poles and not the central pole. If using as 1-pole 3-phase, connect the neutral wire to the central pole.  
 \*2 Rated short-circuit breaking capacity of rated current 5A is 1.5kA.  
 \*3 Rated short-circuit breaking capacity of rated current 5A is 1.5/1kA.  
 \*4 Mounting screws are not attached.  
 \*5 Front-plate attachment is possible without nut bolting from back.(Mounting screws are not attached.) In this case a terminal screw can be bolted from the back of molded-case circuit breaker.  
 \*6 When alarm switch (AL) is installed, this product has a trip-button. (When Shunt trip device (SHT) + alarm switch (AL) is installed, this product don't have a trip-button.)  
 \*7 The standard lead drawing is performed laterally. Load drawing is also available.



**UL 489 Listed Earth Leakage Circuit Breakers (Harmonic Surge Ready)**

Frame (A)		50		100				125					
Model		NV50-SVFU		NV100-CVFU		NV100-SRU		NV100-HRU		NV125-SVU		NV125-HVU	
Image													
Rated current In (A)		(5) (10) 15 20 30 40 50		60 (70) 75 (80) (90) 100		5 10 15 20 (25) 30 40 50		5 10 15 20 (25) 30 40 50 60 (70) 75 (80) (90) 100		15 20 30 (40) 50 60 75 100		125 15 20 30 (40) 50 60 75 100	
Rated ambient temperature 40°C													
Number of poles		2 3		3		2 3		3		3		3	
Phase line (*1)		1φ2W 3φ3W, 1φ2W		3φ3W, 1φ2W		1φ2W 3φ3W, 1φ2W		3φ3W, 1φ2W		3φ3W, 1φ2W		3φ3W, 1φ2W	
Rated operational voltage AC V		UL 489 IEC 60947-2 EN 60947-2		120-240		120-240		120-240		120-240-480		120-480	
High-speed type		UL 489		120-240		120-240		120-240		120-480		120-480	
Rated current sensitivity IΔn mA		30 50 30 50 100		30 50 100/200/500 selectable		30 50 30 50 100/300/500 selectable		30 50 100/300/500 selectable		30 50 100/200/500 selectable		30 50 100/200/500 selectable	
Pickup current, UL 1053		75% of IΔn		75% of IΔn		75% of IΔn		75% of IΔn		75% of IΔn		75% of IΔn	
Max. operating time (s) at 5IΔn (*4)		0.04		0.04		0.04		0.04		0.04		0.04	
Earth leakage protection characteristic		Type A		Type A		Type A		Type A		Type A		Type A	
Earth leakage indication system		Display window		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)	
Rated short-circuit breaking capacities (kA)		UL 489 CSA C22.2 No.5-02		AC		AC		AC		AC		AC	
Rated impulse withstand voltage Uimp (kV)		4 6		6		8		8		6 6		6 6	
Suitability for isolation		Yes		Yes		Yes		Yes		Yes		Yes	
Reverse connection (below 240VAC)		-		Available		-		Available		Available		Available	
Utilization category		A		A		A		A		A		A	
Pollution degree		2		2		2		2		2		2	
EMC environment condition (environment A or B)		A		A		A		A		A		A	
Overall dimensions (mm)		a b c ca		36 54		75		50 75		75		90 90	
Mass of front-face type (kg)		0.4 0.5		0.9		0.55 0.85		0.95		1.2		1.2	
Installation and connections		Screw terminal (AMP-N)		Page		Solderless terminal (SL)		98		Bar (BAR)		98	
Cassette-type accessories (*2)		Alarm switch (AL)		115		Auxiliary switch (AX)		115		Shunt trip (SHT)		115	
External accessories (*2)		Mechanical interlock (MI)		136		Handle lock device (HL)		135		External operating handle (F)		123	
Terminal cover		Large terminal cover (TC-L)		128		Small terminal cover (TC-S)		98		IEC 35mm rail mounting adapters		143	
CE marking		TUV approval		TUV approval		TUV approval		TUV approval		TUV approval		TUV approval	
CCC recognition		Recognized		Recognized		Recognized		Recognized		Recognized		Recognized	
Automatic tripping device		Thermal-magnetic		Thermal-magnetic		Hydraulic-magnetic		Hydraulic-magnetic		Thermal-magnetic		Thermal-magnetic	
Trip button		Equipped		Equipped		Equipped		Equipped		Equipped		Equipped	
Page of Characteristics and dimensions		206		208		210		210		212		212	

- Notes: \*1 When using 3-pole earth-leakage circuit breakers for 1-phase 2-wire system, connect cables/busbars to left and right poles, not to center pole.  
\*2 These are different from general models in specifications. Consult us for the details.  
\*3 The standard structure conforms to IP20 (finger protection).  
\*4 The maximum operating time is 0.1 according to UL 1053.  
\*5 The circuit breakers with busbar terminals have insulation barriers.  
\*6 Circuit breakers for power supply solderless load screw terminal (SL/AMP-N) are available. In this case, a bar terminal is not provided on the load side.  
\*7 Circuit breakers for 100VAC do not have obtained CCC certificate.  
\*8 This accessory is cassette type and can be installed by customer. The breakers can be closely installed, except for those with UVT and NV50-SVFU model.  
\*9 Standard type is SLT equipped.  
\*10 Rated short-circuit breaking capacities parenthesized are applied to below rated current 15A.

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.  
2.

Rated operational voltage	Applicable circuit voltage	Available voltage range
120-240V (UL)	120/240V	66-264V
120-240-480V (UL)	120/240/480V	66-528V
240V (UL)	240V	132-264V
100-230V (IEC)	100/110/200/220/230V	85-253V
100-240V (IEC)	100/110/200/220/230/240V	85-264V
100-230-400-440V (IEC)	100/110/200/220/230/240/254/265/380/400/415/440V	85-484V
230-400-440V (IEC)	230/240/254/265/380/400/415/440V	195-484V

US UL Standard 489  
UL File No.E167691 Body  
UL File No.E108284 Accessories

Canada CSA Standard  
C22.2 No.144  
C22.2 No.5

## UL 489 Listed Earth Leakage Circuit Breakers (Harmonic Surge Ready)

Frame (A)		250							
Model		NV250-CVU		NV250-SVU		NV250-HVU			
Image									
Rated current In (A) Rated ambient temperature 40°C		125 150 175 200 225		250		125 150 175 200 225			
Number of poles		3		3		3			
Phase line (*1)		3φ3W, 1φ2W		3φ3W, 1φ2W		3φ3W, 1φ2W			
Rated operational voltage AC V		120-240		120-480		120-480			
UL 489		100-440		100-440		100-440			
IEC 60947-2		100-440		100-440		100-440			
EN 60947-2		100-440		100-440		100-440			
High-speed type	Rated current sensitivity IΔn mA	30 50 100/300/500 selectable		30 50 100/200/500 selectable		30 50 100/200/500 selectable			
	Pickup current, UL 1053	75% of IΔn		75% of IΔn		75% of IΔn			
Max. operating time (s) at 5IΔn (*4)		0.04		0.04		0.04			
Earth leakage protection characteristic		Type A		Type A		Type A			
Earth leakage indication system		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)			
Rated short-circuit breaking capacities (kA)	UL 489 CSA C22.2 No.5-02	AC	480V	-	-	35	35	50	50
			240V	35	35	65	65	100	100
			120V	35	35	65	65	100	100
	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	15/12	15/12	36/18	36/18	50/25	50/25
			400V	25/19	25/19	36/18	36/18	50/25	50/25
			230V	36/27	36/27	65/33	65/33	100/50	100/50
100V	36/27	36/27	65/33	65/33	100/50	100/50			
Rated impulse withstand voltage Uimp (kV)		6		6		6			
Suitability for isolation		Yes		Yes		Yes			
Reverse connection (below 240VAC)		Available		Available		Available			
Utilization category		A		A		A			
Pollution degree		2		2		2			
EMC environment condition (environment A or B)		A		A		A			
Overall dimensions (mm)		a	105	105	105	105	105	105	
		b	185	185	185	185	185	185	
		c	68	68	68	68	68	68	
		ca	92	92	92	92	92	92	
		Mass of front-face type (kg)	1.2		1.2		1.8		1.8
Installation and connections	Front (F)	Screw terminal (AMP/N)	Page	●	●	●	●	●	
		Solderless terminal (SL)		●	●	●	●	●	
		Bar (BAR)	98	●	●	●	●	●	
		Power supply solderless load bar (SL/BAR)		●(*6)	●(*6)	●(*6)	●(*6)	●(*6)	
Cassette-type accessories (*2)	Alarm switch (AL)	115	●(*8)	●(*8)	●(*8)	●(*8)	●(*8)		
	Auxiliary switch (AX)		●(*8)	●(*8)	●(*8)	●(*8)	●(*8)		
	Shunt trip (SHT)		●(*8)	●(*8)	●(*8)	●(*8)	●(*8)		
	Undervoltage trip (UVT)		●(*8)	●(*8)	●(*8)	●(*8)	●(*8)		
	With lead-wire terminal block (SLT)	120	●	●	●	●	●		
	Test button module (TBM)	122	●(*9)	●(*9)	●(*9)	●(*9)	●(*9)		
External accessories (*2)	Mechanical interlock (MI)	136	-	-	-	-	-		
	Handle lock device (HL)		●	●	●	●	●		
	External operating handle (HL-S)	135	●	●	●	●	●		
	External operating handle (F)	123	●	●	●	●	●		
	External operating handle (V)		●	●	●	●	●		
	Terminal Large terminal cover (TC-L)	128	●	●	●	●	●		
Terminal Small terminal cover (TC-S)	98	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)			
IEC 35mm rail mounting adapters	143	Standard accessory	Standard accessory	-	-	-	-		
CE marking	TUV approval	TUV approval	TUV approval	TUV approval	TUV approval	TUV approval			
CCC recognition	Recognized	Recognized	Recognized	Recognized	Recognized	Recognized			
Automatic tripping device	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic	Thermal-magnetic			
Trip button	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped			
Page of Characteristics and dimensions	214		214		214				

- Notes:
- \*1 When using 3-pole earth-leakage circuit breakers for 1-phase 2-wire system, connect cables/busbars to left and right poles, not to center pole.
  - \*2 These are different from general models in specifications. Consult us for the details.
  - \*3 The standard structure conforms to IP20 (finger protection).
  - \*4 The maximum operating time is 0.1 according to UL 1053.
  - \*5 The circuit breakers with busbar terminals have insulation barriers.
  - \*6 Circuit breakers for power supply solderless load screw terminal (SL/AMP-N) are available. In this case, a bar terminal is not provided on the load side.
  - \*7 Circuit breakers for 100VAC do not have obtained CCC certificate.
  - \*8 This accessory is cassette type and can be installed by customer. The breakers can be closely installed, except for those with UVT and NV50-SVFU model.
  - \*9 Standard type is SLT equipped.
  - \*10 Rated short-circuit breaking capacities parenthesized are applied to below rated current 15A.

Remarks: 1. Products with rated current parenthesized are produced when an order is placed.

Rated operational voltage	Applicable circuit voltage	Available voltage range
120-240V (UL)	120/240V	66-264V
120-240-480V (UL)	120/240/480V	66-528V
240V (UL)	240V	132-264V
100-230V (IEC)	100/110/200/220/230V	85-253V
100-240V (IEC)	100/110/200/220/230/240V	85-264V
100-230-400-440V (IEC)	100/110/200/220/230/240/254/265/380/400/415/440V	85-484V
100-440V (IEC)	100/110/200/220/230/240/254/265/380/400/415/440V	195-484V

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## MDU Breakers

Frame (A)		250				400				800								
Model		NF250-SEW with MDU   NF250-HEV with MDU				NF400-SEW with MDU   NF400-HEW with MDU				NF800-SEW with MDU		NF800-HEW with MDU		NF800-SEW with MDU		NF800-HEW with MDU		
Image																		
Rated current In (A)		250				400				630				800				
Current setting Ir (A)		Adjustable 125-250A (by 12.5A)				Adjustable 200-400				Adjustable 300-630				Adjustable 400-800				
Number of poles		3		4		3		4		3		4		3		4		
Phase line		3-pole type: 3φ3W 4-pole type: 3φ4W (3-pole type can be used as a 1φ2W unit.)																
Rated insulation voltage Ui (V)		690				690				690				690				
Rated short-circuit breaking capacities (kA)	JIS C 8201-2-1 Ann.1 JIS C 8201-2-1 Ann.2 IEC 60947-2 (Icu/Ics)	AC	690V	8/8	10/8	10/10	10/10	10/10	10/10	10/10	15/15	10/10	15/15	10/10	15/15	10/10	15/15	
			500V	18/18	30/23	30/30	50/50	30/30	50/50	30/30	50/50	30/30	50/50	30/30	50/50			
			440V	36/36	50/50	42/42	65/65	42/42	65/65	42/42	65/65	42/42	65/65	42/42	65/65			
			415V	36/36	70/70	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70			
			400V	36/36	75/75	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70			
	GB/T 14048.2 (Icu/Ics)	AC	380V	36/36	75/75	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70			
			230V	85/85	100/100	85/85	100/100	85/85	100/100	85/85	100/100	85/85	100/100	85/85	100/100			
			200V	85/85	100/100	85/85	100/100	85/85	100/100	85/85	100/100	85/85	100/100	85/85	100/100			
			415 V	36/36	70/70	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70			
			400 V	36/36	75/75	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70			
380 V	36/36	75/75	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70	50/50	70/70						
230 V	85/85	100/100	85/85	100/100	85/85	100/100	85/85	100/100	85/85	100/100	85/85	100/100						
Rated impulse withstand voltage Uimp (kV)		8				8				8				8				
Current		AC				AC				AC				AC				
Suitability for isolation		Yes				Yes				Yes				Yes				
Reverse connection		-				-				-				-				
Number of operating cycles		Without current		25,000		Without current		6,000		Without current		6,000		Without current		4,000		
		With current(440VAC)		10,000		With current(440VAC)		1,000		With current(440VAC)		1,000		With current(440VAC)		500		
Utilization category		A		B		A		B		A		B		A		B		
Rated short-time resistant current Icw kA (0.25s)		-		5		-		7.6		-		3		-		9.6		
Pollution degree		3		3		3		3		3		3		3		3		
EMC environment condition (environment A or B)		A				A				A				A				
Overall dimensions (mm)	a		105	140	105	140	140	185	140	185	210	280	210	280	210	280	210	280
	b		165				257				275							
	c		68				103				103							
	ca		92				155				155							
	Mass of front-face type (Breaker mounting) (kg)		1.8	2.3	1.8	2.3	6.2	8	6.2	8	10.7	13.8	10.7	13.8	11.1	14.4	11.1	14.4
MDU mounting method (*1)		External mounting, panel mounting, breaker mounting, breaker mounting unit separate installation																
Installation and connections	Front	(F)	Page	●	●	●	●	Busbar terminal										
	Rear (*2)	(B)	98	●	●	●	●	Bar stud										
Cassette-type accessories (*4)	Alarm switch (AL)	115	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	
	Auxiliary switch (AX)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	
	Shunt trip (SHT)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	
	Undervoltage trip (UVT)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	
	MDU transmission AL, AX, AL + AX	120	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	●(*3)	
	With lead-wire terminal block (SLT)	122	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Alarm contact (PAL)	122	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	output (*5) Cause of fault (TI)	122	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Electrical operation device (*6) (NFM)	144	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Mechanical interlock (MI) (*7)	136	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
External accessories	Handle lock device	135	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	External operating handle	123	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Terminal cover	128	●(*9)	●(*10)	●(*9)	●(*10)	●(*9)	●(*10)	●(*9)	●(*10)	●(*9)	●(*10)	●(*9)	●(*10)	●(*9)	●(*10)	●(*9)	
	Rear stud (B-ST)	98	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Automatic tripping device	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	Electronic (effective value detection)	
	Trip button	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	Equipped	
	Page of Characteristics and dimensions	224	226	228	228	228	228	228	228	228	228	228	228	228	228	228	228	

Notes: \*1 When the panel mounting is specified, the breaker comes with panel fittings and mounting screws, and the 2m long connecting cable (standard) is supplied. (The connecting cable length, 0.5m, 3m, 5m or 10m, can be specified.) When the breaker mounting separate unit is specified, the 2m long connecting cable (standard) is supplied. (The connecting cable length, 0.5m, 3m, 5m or 10m, can be specified.) Note that the cutout size in the breaker front plate varies depending on the MDU mounting method.

\*2 The 250A frame models come with the studs in the package. In the case of the 400 and 800A frame models, the studs are fitted before shipment. Specify the mounting direction.

\*3 These are cassette-type devices and can be installed by the user.

\*4 When the following devices are installed on the built-in display type, the built-in display unit must be separately mounted.  
250A frame: Accessories with SLT or module on the right pole side  
400/630/800A frame: Accessories on right pole side

\*5 The breaker with alarm contact output is provided with the module on the right side

and requires a control power supply (common to 100 to 240VAC/DC, 50/60Hz, 5VA). The PAL output does not operate if the MDU is connected and the control power is not applied to the MDU.  
The output method of PAL of the alarm contact output can be set to "self-holding" or "automatic reset" from the MDU. The default setting is "automatic reset."

\*6 The breaker with alarm contact output (PAL), (TI) is not available.

\*7 It does not have an isolation function except for 400 to 800A frame models.

\*8 It can be manufactured only in the case of panel mounting.

\*9 For a 250A frame model with built-in display and PAL, the cover dedicated for the MDU is used. When placing an order only for the terminal cover, add MP to the end of the model name. (Example: TCL-2SV3MP)

\*10 In the case of breaker mounting, the cover dedicated for the MDU is used. When placing an order only for the terminal cover, add -MDUB to the end of the model name. (Example: TCL-2SV3-MDUB)

\*11 250A frame 4-pole models are not provided with TTC for breaker mounting.

## Measuring Display Unit Breakers (Circuit Breakers with Measuring Display Unit)

### ● Three major features of Measuring Display Unit Breakers

1. Saving of space and labor for installation
2. Improved and diversified functions
3. Provision of total cost advantages

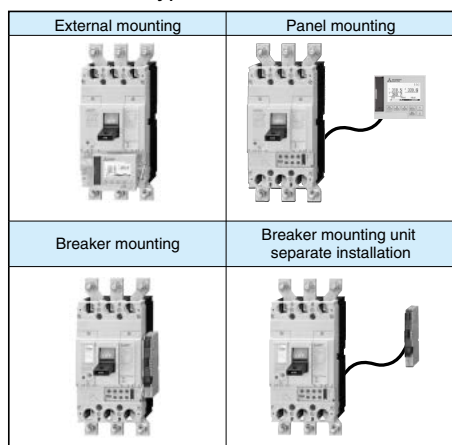
Measuring Display Unit Breakers with built-in VT and CT and Measuring Display Unit realize measurement, display and transmission of electric circuit information in small space with less installation and wiring work and provide total cost advantages.

The Measuring Display Unit Breakers full of functions in small bodies are suitable for monitoring and protection of electric circuits and maintenance of equipment. A wide variety of models applicable to various networks supports the customers' energy saving activities through detailed energy control as energy saving supporting devices.

### ● Simply realizing measurement and monitoring of electric circuits for supporting various types of energy saving control

The circuit breakers measure and display the load current, line voltage, electric power, electric energy, harmonic current, leak current and power factor to realize detailed energy control. They support customers' energy saving control.

#### ◆ Installation type



#### ◆ Communication type

	External mounting	Panel mounting	Breaker mounting	Breaker mounting unit separate installation
CC-Link	○	○	○	○
Pulse Output	○	○	○	○
MODBUS RTU	○	○	-	-
No Transmission	○	○	○	○

#### ◆ Measuring Display Unit cable list

Type name	Cable length
MDU-DP-CB-05M	0.5m
MDU-DP-CB-2M	2m
MDU-DP-CB-3M	3m
MDU-DP-CB-5M	5m
MDU-DP-CB-10M	10m

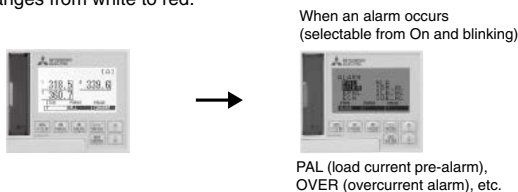
#### ◆ Measuring Display Unit list

Model type	Type name	Remarks
CC-Link communication	MDU-BC ○○○	<ul style="list-style-type: none"> <li>• The model names do not include ○○○.</li> <li>• When installing the Measuring Display Unit on the body, specify the A frame type in ○○○.</li> <li>• For example, when the circuit breaker NF400-SEW with MDU and the Measuring Display Unit with CC-Link communication are combined, the model name is MDU-BC400. If 800A frame is used, specify 800 in ○○○.</li> <li>• When installing the Measuring Display Unit on the panel, specify the cable length (0.5m, 2m, 3m, 5m or 10m) in ○○○. For example, when the Measuring Display Unit with CC-Link communication is installed on the panel with a 3m cable, the model name is MDU-BC-PANEL 3M.</li> </ul>
MODBUS communication	MDU-BM ○○○	
Electric energy pulse output	MDU-BP ○○○	
No transmission	MDU-BN ○○○	

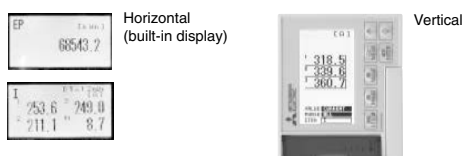
#### ◆ Visibility and operability improvement

##### Improved visibility

When an alarm or fault occurs, the LCD backlight changes from white to red.

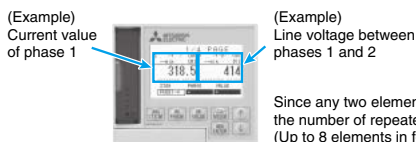
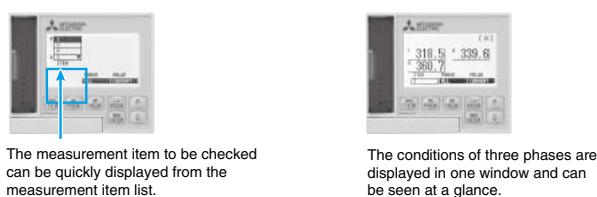


The display direction can be switched.



##### Improved operability

The multi-function display screen reduces the number of operations.



## Specifications for Measuring Display Units (MDU)

The measurement and display items vary depending on the model and A frame.

Measurement/stored item (accuracy)(*)1)(2)(3)		Function	Display	Storage (*4)	With electric energy pulse output (*5)	With CC-Link communication	With MODBUS communication	Remarks	
Load current (±1.0%)	Present value	Each phase	○	—	—	○	○		
		Total (average) (*7)	—	—	—	○	○		
		Max. phase	—	—	—	○	○		
	Present demand value (*6)	Each phase	○	—	—	○	○		
		Max. phase	○	—	—	○	○		
		Max. demand value of all phases	○	○	—	○	○		
		Time of occurrence of max. demand value of all phases	○	○	—	○	○		
Line voltage (±1.0%)	Present value	Between each two lines	○	—	—	○	○		
		Total (average) (*7)	○	—	—	○	○		
			Max. value between all lines	○	○	—	○	○	
			Time of occurrence of max. value between all lines	○	○	—	○	○	
Harmonic current (±2.5%)	Present value	Fundamental wave of each phase	○	—	—	○	○		
		Individual harmonic current of each phase	○	—	—	○	○		
		Total harmonic current of each phase (*8)	○	—	—	○	○		
			Max. fundamental wave value of all phases	○	○	—	○	○	
			Time of occurrence of max. fundamental wave value of all phases	○	○	—	○	○	
			Max. value of individual harmonic current of all phases	○	○	—	○	○	
			Time of occurrence of max. value of individual harmonic current of all phases	○	○	—	○	○	
	Demand value (*6)	Total harmonic current of each phase (*8)	○	—	—	○	○		
		Max. total demand value of all phases	○	○	—	○	○		
		Time of occurrence of max. total demand value of all phases	○	○	—	○	○		
		Total distortion rate of each phase	○	—	—	○	○		
		Individual content of each phase	○	—	—	○	○		
Electric power (±1.5%)	Present value	Present value	○	—	—	○	○		
		Demand value (*6)	○	○	—	○	○		
		Time of occurrence of max. value	○	○	—	○	○		
Reactive power (±2.5%)	Present value	Present value	○	—	—	○	○		
		Demand value (*6)	○	○	—	○	○		
		Time of occurrence of max. value	○	○	—	○	○		
Electric energy (±2.0%) (*9)	Integrated value	Integrated value	○	○	○	○	○	Value accumulated to the present after the previous reset	
		Amount for last one house	○	—	—	○	○		
		Max. value of amount for one hour	○	○	—	○	○		
		Time of occurrence of max. value of amount for one hour	○	○	—	○	○		
Reactive electric energy (±3.0%) (*9)	Integrated value	Integrated value	○	○	—	○	○	Value accumulated to the present after the previous reset	
		Amount for last one house	○	—	—	○	○		
		Max. value of amount for one hour	○	○	—	○	○		
		Time of occurrence of max. value of amount for one hour	○	○	—	○	○		
Cause of fault (*10)	Present value	Fault current (accuracy: ±15%)	○	○	—	○	○	Information on and causes of faults after the previous reset or the latest fault (Continuous monitoring)	
		Cause of fault	○	○	—	○	○		
Power factor (±5.0%)	Present value	Present value	○	—	—	○	○		
		Max. value	○	○	—	○	○		
		Time of occurrence of max. value	○	○	—	○	○		
Frequency (±2.5%)	Present value	○	—	—	○	○			
Phase sequence	—	○	—	—	○	○	Except 250A frame		
Status of breaker	Present value	Tripping status of breaker (AL)	—	—	—	○	○	When the alarm switch for MDU transmission (option) is installed	
		ON/OFF status of breaker (AX)	—	—	—	○	○	When the auxiliary switch for MDU transmission (option) is installed	
		Number of times of tripping of breaker	—	○	—	○	○	When the alarm switch for MDU transmission (option) is installed	
		Number of times of opening/closing of breaker	—	○	—	○	○	When the auxiliary switch for MDU transmission (option) is installed	
Breaker alarms (*11)	Present value	PAL, OVER, IDM_AL, ILA_AL, IUB_AL	○	—	—	○	○	The LC display, transmission and contact output of the PAL function of 250A frame model are activated when the PAL module (option)	
		Neutral wire open phase alarm (NLA)	○	—	—	○	○	The neutral wire open phase alarm is displayed only. When the phase wire system is set to 1-phase 3-wire system, the function is turned on. Rated operating overvoltage: 135VAC. Operating time: 1s	
Initial setting	Time setting	Time setting	○	—	—	○	○	It is necessary to re-set at the initial setting and after power failure (no power failure compensation).	
		Demand time limit setting (*6)	○	○	—	○	○	The default setting is 2min. The time limit can be set in one-minute increments in the range from 0 to 15min.	
	IDM_AL (current demand alarm)	Present value	IDM_AL (current demand alarm)	○	○	—	○	○	The default setting of the function is OFF. Function: ON/OFF. Pickup current: 50 to 100% (in 1% steps). Demand time limit: Can be set to 1 to 10min (1min steps), 15, 20, 25 or 30min.
			ILA_AL (current open phase alarm)	○	○	—	○	○	The default setting of the function is OFF. Function: Can be set to ON or OFF. Pickup current: Fixed to 10% (no setting). Operating time: 30s (no setting)
			IUB_AL (current unbalance alarm)	○	○	—	○	○	The default setting of the function is OFF. Function: Can be set to ON or OFF. Pickup current: Fixed to 30% (no setting). Operating time: 30s (no setting)
			Phase switching setting	○	○	—	○	○	The default setting is "no phase switching."
	Alarm retention (self-holding/automatic reset) setting	Present value	Alarm retention (self-holding/automatic reset) setting	○	○	—	○	○	The default setting is "automatic reset."
			Phase wire system	○	○	—	○	○	The default setting is "3-phase 3-wire" for 3-pole breakers or "3-phase 4-wire" for 4-pole breakers.
			Electric energy arbitrary setting	○	○	—	○	○	
			Reactive electric energy arbitrary setting	○	○	—	○	○	
Display direction			○	○	—	○	○	The default setting is "horizontal" for mounting on breaker and mounting on panel or "horizontal" for built-in display and separate mounting of built-in display unit.	

Notes: \*1 The term "each phase" for load current and harmonic current refers to the 1st, 2nd, 3rd or N-th phase. However, the N-th phase applies only to 4-pole breakers. The term "between each two phases" for line voltage refers to "between 1 and 2," "2 and 3," "3 and 1," "1 and N," "2 and N" or "3 and N." However, "between 1 and N," "between 2 and N" and "between 3 and N" apply only to 4-pole breakers.  
 \*2 This unit measures data every 0.25s. Therefore, it may not measure the operating current even when a low-order circuit breaker operates.  
 \*3 The term "each max. value" refers to the largest value during the period from the start of use (the previous reset) to the present.  
 \*4 Each max. value cannot be individually cleared.  
 \*5 In the nonvolatile memory, the integrated values of electric energy and reactive electric energy are stored at power failure and every 30minutes, the fault current and its cause are stored upon occurrence of the fault, each set value is stored when it is set, and others are stored every 30minutes.  
 \*6 Every time the electric energy is integrated into a pulse unit (the unit can be set to any of 1kWh, 10kWh, 100kWh, 1000kWh and 10000kWh), a pulse is output. The pulse can be counted with a PLC.)  
 \*7 The demand time limit cannot be set individually. The setting is common.  
 \*8 When the phase wire system is set, the average values of load current and line voltage are calculated as shown below.

Phase wire system	Average present value of current	Average present value of voltage
1-phase 2-wire system	Average present value of current = current of the 3rd phase	Average present value of voltage = voltage between 2 and 3
1-phase 3-wire system	Average present value of current = (current of the 1st phase + current of the 3rd phase)/2	Average present value of voltage = (voltage between 1 and 2 + voltage between 2 and 3)/2
3-phase 3-wire system	Average present value of current = (current of the 1st phase + current of the 2nd phase + current of the 3rd phase)/3	Average present value of voltage = (voltage between 1 and 2 + voltage between 2 and 3 + voltage between 3 and 1)/3

\*8 Sum of 3rd to 19th harmonic components excluding fundamental wave components  
 \*9 The reverse power is not measured.  
 \*10 When overload or short circuit fault occurs and the current value exceeds the upper limit of the fault current measurement range (rated current 125 to 250A (adjustable): 4000A, rated current 50, 60, 75, 100 and 125A (fixed): 2000A), some 250A frame models may not display the cause of the fault or measure the fault current.  
 The display of cause of fault caused by instantaneous tripping and the measurement of the fault current are enabled when the AL for MDU transmission (option) is installed.  
 \*11 The display of alarm on the MDU is automatically reset when the alarm retention setting is "automatic reset." When the alarm retention method is "self-holding," the alarm is self-held. When the setting is "self-holding," the alarm is reset by performing the alarm reset operation (collective reset). "OVER" is automatically reset regardless of the setting.

Remarks: The LCD may have bright spots (spots that are constantly on) and dark spots (spots that do not light) by its nature. The LCD has many display elements, and it is impossible to completely eliminate the occurrence of bright and dark spots. The occurrence of bright and dark spots is not a defect of this product.

## Specifications for Measuring Display Units (MDU)

Item	Specifications	
Data update cycle	250ms (harmonic current: 2s)	
Tolerances	Current, voltage: ±1.0% (of rated input) Electric power: ±1.5% (of rated input) Reactive energy: ±2.5% (of rated input) Harmonic current: ±2.5% (of rated input) Power factor ±5.0% Frequency ±2.5% Electric energy ±2.0% (voltage range from 100V to 440V, range from 5 to 100% of current rating, power factor 1) Reactive electric energy (voltage range from 100V to 440V, range from 10 to 100% of current rating, power factor 0) Fault current ±15% (*1)	
Demand time limit setting range	0 to 15min (in 1min steps)	
Measurement rating input	Voltage circuit	440V (3-phase 4-wire system is applicable only to 4-pole models.)
	Current circuit	Load current/harmonic current: 125A/250A/400A/630A/ 800A (Automatically discriminated. Determined according to the A frame of breaker. 125A when the rated current of 250A frame is 125A or less.)
	Frequency	50Hz/60Hz (Automatic discrimination of frequency)
Power failure compensation	(1) Wh (integrated value), varh (integrated value) (2) Max. value (3) Setting data	Stored in the nonvolatile memory * Wh and varh are stored at power failure and every 30min. The max. value is stored every 30min. The setting data is stored when the data is set.
	Clock	No power failure compensation
Clock accuracy	Error: approx. 1min/month	
Outside dimensions (unit: mm)	See "Features and outline."	
Control power	Common to 100 to 240VAC/DC, 50/60Hz (allowable voltage range: 85% to 110%), 12VA * Rush current flows transiently when the control power supply is turned on. (Rush current max. value 2A, current carrying time 1ms (240VAC))	
Other functions	Function for switching the measurement phases from 1-3 to 3-1 Self-holding/automatic reset setting function Function for counting the number of times of opening/closing of breaker body (*2), function for counting the number of times of tripping of breaker body (*3).	

Notes: \*1 The measurement of fault current caused by instantaneous tripping of the 250A frame breaker is enabled when the alarm switch for MDU transmission (option) is installed on the MDU breaker body.  
\*2 The function is enabled when the auxiliary switch for MDU transmission (option) is installed on the MDU breaker body.  
\*3 The function is enabled when the alarm switch for MDU transmission (option) is installed on the MDU breaker body.

### Electric energy pulse output

Item	Specifications
Output element	Solid state relay (SSR), no-voltage a contact (Ca and Cb terminals: no polarity)
Contact capacity	Common to 24VDC and 100 to 200VAC, 20mA
Output pulse unit	1, 10, 100, 1000 or 10000kWh/pulse (selectable) (*1)
Output pulse width	0.34 to 0.45s
Max. wiring length	100m

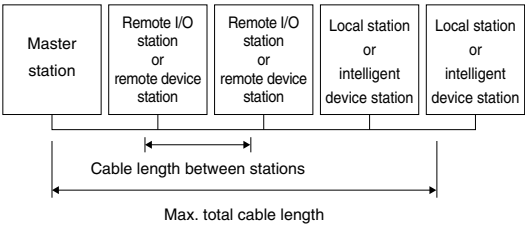
Notes: \*1 The default setting is 1kWh/pulse.

### MODBUS communication

Item	Specifications
Communication system	RS-485/2-wire system/half-duplex communication
Communication protocol	MODBUS-RTU communication (binary data transfer)
Synchronization system	Asynchronous
Connection system	Multi-drop wiring
Transmission rate	2,400, 4,800, 9,600, 19,200, 38,400bps
Bit length	8bits
Stop bit	1bit or 2bits
Parity bit	ODD, EVEN, NONE
Slave address	1 to 127
Response time	Response is sent 1 sec or less after the completion of receipt of query data.
Termination resistance	120Ω 1/2W
Max. transmission distance	1,200m
Max. number of connected units	31 units/system
Transmission line	SPEV(SB)-MPC-0.2x1P (Mitsubishi Cable Industries, Ltd.) or its equivalent

Note: MODBUS communication is applicable to mounting on breaker and mounting on panel.

### CC-Link communication

Item	Specifications																		
Communication speed	10M/5M/2.5M/625k/156kbps																		
Communication system	Broadcast polling system																		
Synchronization system	Frame synchronization system																		
Coding system	NRZI																		
Transmission format	Conforming to HDLC																		
Number of occupied stations	Remote device occupying one station																		
Number of connected units	Meet the following conditions. Up to 42 units can be connected when only MDU breakers are used. Condition 1 for number of connected units $[(1 \times a) + (2 \times b) + (3 \times c) + (4 \times d)] \leq 64$ a: Number of units occupying 1 station, b: Number of units occupying 2 stations c: Number of units occupying 3 stations, d: Number of units occupying 4 stations Condition 2 for number of connected units $[(16 \times A) + (54 \times B) + (88 \times C)] \leq 2304$ A: number of units with 1 remote I/O station $\leq 64$ , B: number of remote device stations $\leq 42$ , C: number of local stations $\leq 26$																		
Station No.	Set in the range from 1 to 64. (Set the station No. without fail.)																		
CC-Link version	CC-Link Ver.1.10																		
Max. total cable length and cable length between stations	 <p>Cable compatible with CC-Link Ver.1.10 (110-ohm termination resistance is used.)</p> <table border="1"> <thead> <tr> <th>Communication speed</th> <th>156kbps</th> <th>625kbps</th> <th>2.5Mbps</th> <th>5Mbps</th> <th>10Mbps</th> </tr> </thead> <tbody> <tr> <td>Cable length between stations</td> <td colspan="5">0.2m or more</td> </tr> <tr> <td>Max. total cable length</td> <td>1200m</td> <td>900m</td> <td>400m</td> <td>160m</td> <td>100m</td> </tr> </tbody> </table>	Communication speed	156kbps	625kbps	2.5Mbps	5Mbps	10Mbps	Cable length between stations	0.2m or more					Max. total cable length	1200m	900m	400m	160m	100m
Communication speed	156kbps	625kbps	2.5Mbps	5Mbps	10Mbps														
Cable length between stations	0.2m or more																		
Max. total cable length	1200m	900m	400m	160m	100m														
Connecting cable	Cable compatible with CC-Link Ver.1.10 (shielded 3-core twisted pair cable) * Cables made by different manufacturers can be used if the cables are compatible with Ver.1.10.																		

Note: For more information, refer to the website of CC-Link Partner Association (<http://www.cc-link.org/>).

## ● Cautions when Using Measuring Display Unit Breakers (common instructions)

### Measuring accuracy

- (1) Electric current measurement accuracy  
 The MDU electric current measurement accuracy is  $\pm 1.0\%$  of  $I_n$  of the circuit breaker.  
 For example, the permissible difference of NF400-SEW with MDU is 4.0A ( $400A \times 1.0\%$ ), so the permissible difference from a current of 0A to 400A would be  $\pm 4.0A$ .  
 If the measurement value is less than 1.0%, the display value is cut off to 0A. However, if the current is 0.4% or more of the rated value, the electric power and electric energy are measured.
- (2) When the current is cut off, the current is displayed as 0 A. However, if the current is 0.4% or more of the measurement rated current, the electric energy is measured.
- (3) The accuracy of power factor is the percentage to electrical angle of  $90^\circ$ . A power factor of 50% or less is displayed as a reference value.
- (4) The accuracy of electric energy is  $\pm 2.0\%$  of the true value in the case of WS-V Series Measuring Display Unit Breakers in the range of measurement rated voltage (100V to 440V)  $\times$  current (measurement rated current of 5 to 100%).

### How to use Measuring Display Unit Breaker on single-phase 2-wire circuitry

Connect the breaker as shown in the right figure.

The phase 1 on the load side is charged. Insulate it.

As measurement data, use the current of the phases 2 and 3 and the voltage between the phases 2 and 3.

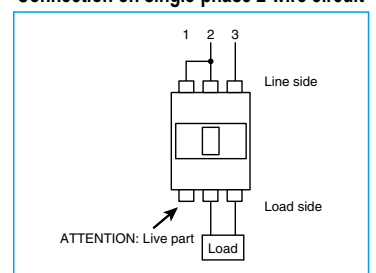
Although the current of the phase 1 and the voltage between the phases 1 and 2 and the phases 3 and 1 are measured, ignore the measurements. The Measuring Display Unit is designed for 3-phase 3-wire and single-phase and 3-wire circuits.

On W & WS Series Measuring Display Unit Breakers, the average values of load current and line voltage are calculated from the values of the phases 1, 2 and 3 (between the phases). Ignore these measurement values.

Also when the breaker is used on a single-phase 3-wire circuit, ignore these values.

When using any WS-V Series Measuring Display Unit Breaker, set the phase and wire type.

Connection on single-phase 2-wire circuit



### Phase sequence of Measuring Display Unit Breaker

The phase sequence of Measuring Display Unit Breaker can be set by using the phase switching function as shown below.

When the breaker is installed vertically with the power supply side upward (see the right figure), the phase sequence is set as stated below.

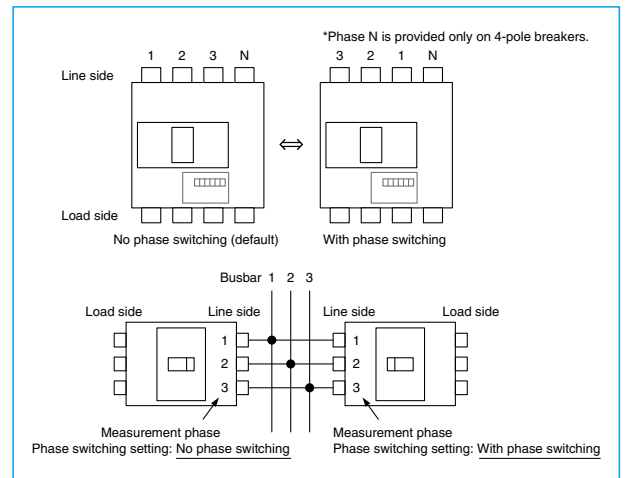
No phase switching: 1, 2, 3 and N from the left (default)

With phase switching: 3, 2, 1, and N from the left

Set the phase sequence in accordance with the installation and wiring methods.

Notes (1) The phase N is provided only on 4-pole circuit breakers.

- (2) Note that the position of the phase N is unchanged regardless of the phase switching setting.



### Reverse connection of Measuring Display Unit Breaker

The Measuring Display Unit Breakers cannot be connected with the power supply and load sides set reversely.

### Installation of Measuring Display Unit Breaker in close contact

The Measuring Display Unit Breakers must not be installed in close contact.

- (1) In the case of external mounting or panel mounting, install the breaker body securing a wiring space of 30mm or more on the right side of the breaker to connect the connecting cables and fitting the connecting cable connectors.
- (2) In the case of breaker mounting or breaker mounting unit separate installation, install the breaker body securing a wiring space of 40mm or more on the right side of the breaker to connect the connecting cables.

## ● Cautions when using Measuring Display Unit Breaker (For Measuring Display Unit)

### Transmission method

- (1) One of No transmission, with pulse output, with CC-Link communication and with MODBUS communication should be specified.
- (2) With transmission is selected, data which can be transmitted depends on the function of the Measuring Display Unit Breaker body. The transmission options cannot be installed or changed later. Specify the options when issuing the initial order.
- (3) For the maximum number of connected units and transmission distance for each transmission type, see the following tables for CC-Link communication and MODBUS communication.

### Installation of Measuring Display Unit

- (1) When the installation of Measuring Display Unit on panel has been specified, the breaker will come with the panel mounting parts, mounting screws and 2m connecting cable (standard). (The 0.5, 3, 5 or 10m connecting cable can be specified.)
- (2) If the installation position of the Measuring Display Unit is changed from the panel to the body or vice versa, the Measuring Display Unit and the breaker body must be returned to the manufacturer for modification.

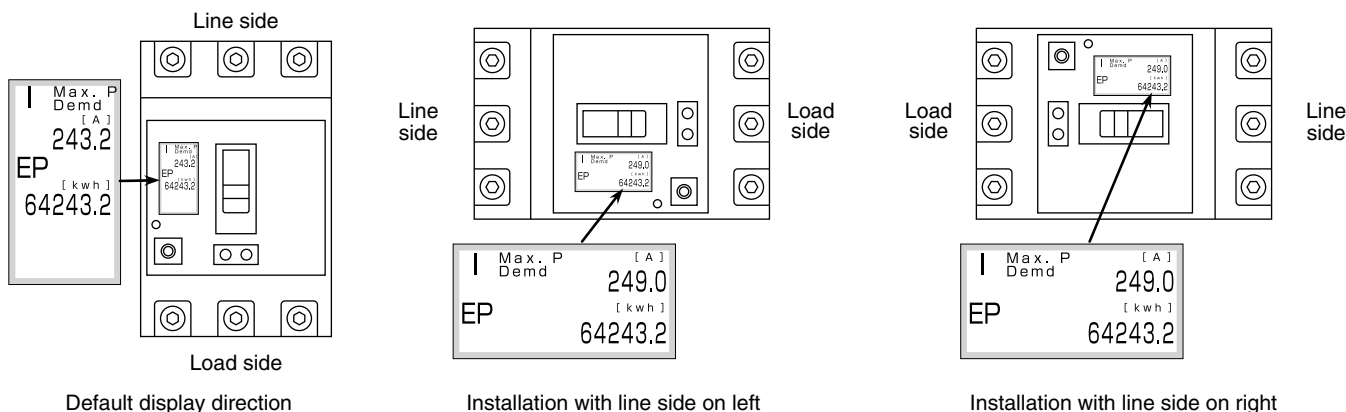
### Measuring Display Unit Breaker with CC-Link communication and MODBUS communication (External mounting type)

- (1) In the case of CC-Link and MODBUS, front plate cutout is not possible.

### ● Change of display direction for breaker mounting

<WS-V Series Measuring Display Unit Breaker>

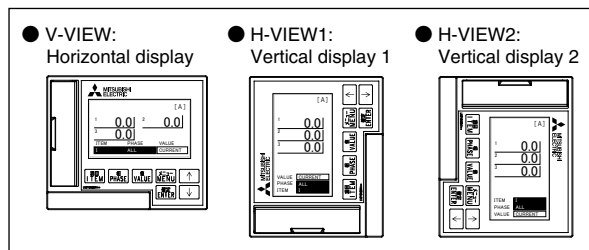
- (1) When installing the Measuring Display Unit on the breaker body installed in the horizontal direction, the direction of the display can be changed according to the installation direction.
- (2) The display direction is set on the display unit.



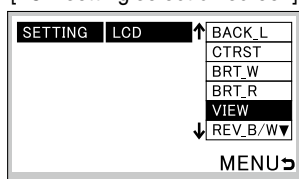
<View setting (vertical or horizontal)>

[Default value: V-VIEW (horizontal display)]

- Select VIEW on the LCD setting selection screen. (Screen [1])
- Press ENTER to switch to the view setting display screen. (Screen [2])
- Setting value switches through V-VIEW ⇔ H-VIEW1 ⇔ H-VIEW2 ⇔ V-VIEW...
- Press ENTER to decide the setting.
- Select YES on the allow changes screen and press ENTER to decide the setting. (Screen [3])



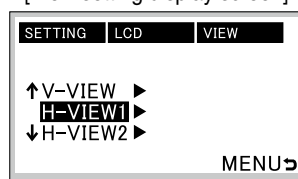
[LCD setting selection screen]



Screen [1]

Select with UP/DOWN

[View setting display screen]



Screen [2]

View setting value Change with UP/DOWN

[Allow changes screen]



Screen [3]

Select NO ⇔ YES with UP/DOWN



## High-Voltage Direct Current Molded Case Circuit Breakers

Frame (A)	50	60	63	100	125	225	250	
Model	NF63-HDV			NF125-HDV		NF250-HDV		
Rated current In (A)	15	20	30	40	50	60	63	
Rated ambient temperature 40°C	75	100	125	125	150	175	200	
Number of poles	2	3	3	3	3	3	3	
Rated insulation voltage Ui (V)	600	690	690	690	690	690	690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2		EN 60947-2		(Icu/Ics)		400V	
	10/5		-		-		600V	
Rated impulse withstand voltage Uimp (kV)	8			8		8		
Current	DC							
Suitability for isolation	Yes							
Reverse connection	Available *1							
Operating temperature degree	-10~+40°C *2							
Number of operating cycles	Without current		10000		10000		8000	
	With current		1500		1500		1000	
Pollution degree	3			3		3		
Overall dimensions (mm)	a		50		75		105	
	b		130		130		165	
	c		68		68		68	
	ca		90		90		92	
Mass of front type (kg)	0.5	0.7	0.75	0.8	0.8	1.5	1.5	
Installation and connection	Front (F)		●		●		●	
	Rear (B)		(Round stud)		(Round stud) *3		(Bar stud) *3,4	
	Flush plate (FP)		-		-		-	
	Plug-in (PM)		●		-		-	
Cassette-type accessories	Alarm switch (AL)		●		●		●	
	Auxiliary switch (AX)		●		●		●	
	Shunt trip (SHT) *5		●		●		●	
	Undervoltage trip (UVT) *5		●		●		●	
	With lead-wire terminal block (SLT)		●		●		●	
External accessories	Handle lock device	LC		●		●		
		HL		●		●		
		HL-S		●		●		
	External operating handle	F type		●		●		●
		V type		●		●		●
		S type		-		-		-
		C type		-		-		-
	Terminal cover		●		●		●	
	IEC35mm mounting rail adapter		●(Option)		●(Option)		-	
	BOX for MCCB		-		-		-	
Electrical operation device (NFM)		-		-		-		
Mechanical Interlock (MI)		-		-		-		
CE marking	Self-declaration		-		-		-	
CCC recognition	●		-		-		-	
Automatic tripping device	Thermal-magnetic							
Trip button	●							
Page of Characteristics and dimensions	232		232		232		232	

Frame (A)	125	225	250	
Model	NF125-HDVA	NF250-HDVA		
Rated current In (A)	125	125	150	
Rated ambient temperature 40°C	175	200	225	
Number of poles	4			
Rated insulation voltage Ui (V)	1000			
Rated short-circuit breaking capacity (kA)	IEC 60947-2		EN 60947-2	
	(Icu/Ics)		10/5	
Rated impulse withstand voltage Uimp (kV)	8			
Current	DC			
Suitability for isolation	Yes			
Reverse connection	Available *1			
Working ambient temperature	-25~+40°C *2,*3			
Number of operating cycles	Without current		8,000	
	With current		1,000	
Pollution degree	2			
Overall dimensions (mm)	a		140	
	b		165	
	c		68	
	ca		92	
Mass of front type (kg)	2.0			
Connection	Front type (F)		●	
	Rear type (B)		●*4	
	Plug-in type (PM)		-	
	Alarm switch (AL) (Normal/Micro load)		●*2	
Cassette-type accessories	Auxiliary switch (AX) (Normal/Micro load)		●*2	
	Shunt trip (SHT)		●*3	
	Undervoltage trip(UVT)		●*3	
	Lead-wire terminal block(SLT)		●*2	
	Handle lock device	LC		●*2
		HL		●*2
		HL-S		●*2
	External operating handle	F type		●*3
		V type		●*3
	Terminal cover (TC-L, TC-LL *6, TC-S, BTC)		●*2	
IEC35mm mounting rail adapter		-		
BOX for MCCB		-		
Electrical operation device (NFM)		-		
Mechanical Interlock (MI)		-		
CE marking	Self-declaration			
CCC recognition	-		- *5	
Automatic tripping device	Thermal-magnetic			
Trip button	Equipped			
Page of Characteristics and dimensions	234	234	234	

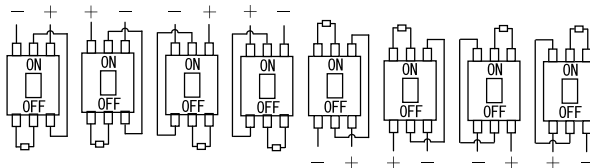
Notes: \*1 Although wiring method as right figure is described on MCCB, other wiring method mentioned in below Wiring diagram chart is also available.

### Wiring diagram chart

	Normal / Reverse connection (Protection + Disconnection)	Grounded system (Protection)	Grounded system (Protection + Disconnection)	Other non-grounded system (Protection + Disconnection)
Normal connection				
Reverse connection				
Applicable voltage (V)	≤ 1000	≤ 1000	≤ 750	≤ 1000



Notes: \*1 Connection methods are available only shown in the following figure.



- \*2 To reduce a current value as follows when the ambient temperature is over 40°C. The average value of the ambient temperature during 24 hours shall not exceed 35°C. To use a wire having a heat resistance suitable for the temperature when using at high temperature.
  - 50°C...90% or less
  - 60°C...70% or less
  - 70°C...65% or less
 (To use less than 6 hours per day, when the ambient temperature is 70°C. Long time use at 70°C causes life time reduction.)
- \*3 This product is shipped from the factory only in an assembled state, cannot be mounted by users.
- \*4 Studs of power source side and a load side for NF125-HDV are provided only for horizontally connecting, and cannot be rotated by 90°.
- \*5 A shunt trip device (SHT) and an undervoltage trip device (UVT) is not available over 60°C of the ambient temperature.

Remark: \*1 The time constant of the circuit is 5ms or less.

- Wires between terminals are prepared by a customer.
- Wires should be selected according to the rated current. Otherwise, there is a risk to change the operating characteristics and unnecessary operation of MCCB.
- \*2 ① To reduce a current value as follows when the ambient temperature is over 40°C. The average value of the ambient temperature during 24 hours shall not exceed 35°C. To use a wire having a heat resistance suitable for the temperature when using at high temperature.
  - 50°C...90% or less
  - 60°C...70% or less
  - 70°C...65% or less
 ② Caution using at ambient temperature 70°C
  - To use less than 6 hours per day at 70°C. Otherwise, it will cause life time reduction.
  - There is a risk of tripping during switching operation or due to vibration and shock. In such case, please make the breaker "Reset" after a while.
 ③ Caution using at low ambient temperature
  - To use in an environment without frost and ice.
- \*3 Shunt trip device (SHT), undervoltage trip device (UVT) and external operating handle (F type, V type) should be used at standard operating condition. In case of external operating handle (F type, V type), those can be used at up to 60°C with reducing a current values according to the above \*2 ①.
- \*4 In case of rear type, rear terminal cover is included as standard and it must be used.
- \*5 Circuit breakers for NF250-HDVA have obtained CCC certificate. Please consult us for details.
- \*6 It is only shipped with MCCB. Please specify "TC-LL" when ordering. If the wire size 150mm<sup>2</sup> is used, please use cramp terminal CB150-S8 (with or without insulation tape).

Remark: \*1 Time constants of circuit are as follows:

Range of current	Time constant
Rated current	2ms or less
Short circuit current	5ms or less

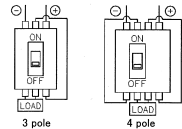
### High-Voltage Direct Current Molded Case Circuit Breakers

Frame (A)	400	800	
Model	NF400-HDW	NF800-HDW	
Rated current In (A) Rated ambient temperature 40°C	250 300 350 400	500 600 630 700 800	
Number of poles	3	4	
Rated insulation voltage Ui (V)	800	1000	
Rated short-circuit breaking capacity (kA)	1000V	10/5	
	750V	10/10	
Rated impulse withstand voltage Uimp (kV)	8	8	
Current	DC		
Suitability for isolation	Yes		
Reverse connection (terminals unmarked)	Available		
Number of operating cycles	Without current	3000	
	With current	500	
Pollution degree	3	2	
Overall dimensions (mm)	a	140	
	b	257	
	c	109 *1	
	ca	161 *1	
		210	
Connection	Front type (F)	● Busbar terminal	
	Rear type (B)	● Bar stud *2	
Cassette-type accessories (Option)	Alarm switch (AL)	● *3	
	Auxiliary switch (AX)	● *3	
	Shunt trip (SHT)	● *3	
	Undervoltage trip (UVT)	● *4	
	With lead-wire terminal block (SLT)	●	
External accessories (Option)	Handle lock device	LC	-
		HL	●
		HL-S	-
	External operating handle	F type	●
		V type	●
		S type	-
Terminal cover	● (TC-L, TTC,BTC *5)	● (TC-L, TTC,BTC *5)	
CE marking	Self-declaration		
CCC recognition	Acquisition		
Automatic tripping device	Thermal-magnetic		
Trip button	Equipped		
Page of Characteristics and dimensions	236	236	

- Notes: \*1. Dimensions are different from NF400-SW/SEW/HEW or NF800-SEW/HEW.  
 \*2. Order with the breaker.  
 \*3. Available to install at customer site.  
 \*4. Only Reset type is available. (Non-reset type is not available).  
 \*5. BTCs for NF400-HDW or NF800-HDW are exclusive.

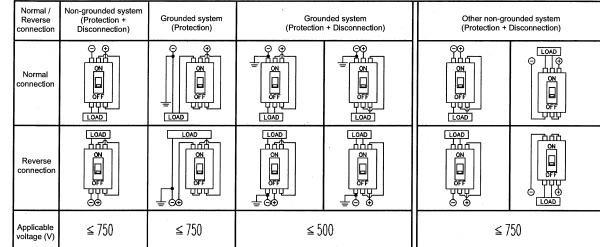
Remark: \*1. Right diagrams as wiring method are shown on breaker, others shown in "Wiring diagrams" are also available.  
 \*2. Time constants of circuit are as follows:

Range of current	Time constant
Rated current	2ms or less
Short circuit current	5ms or less

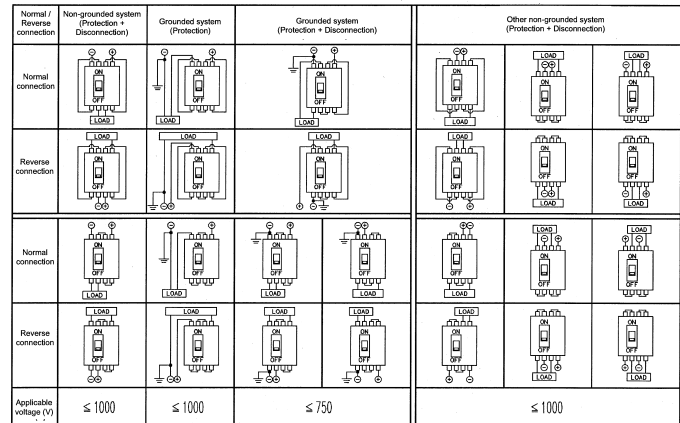


#### Wiring diagrams

For 3 pole



For 4 pole




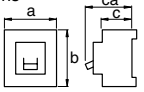
Model		MCB														
		BH-D6					BH-D10				BH-DN					
Image																
Number of poles [P]		1	2		3	4(3+N) <sup>*1</sup>		2(1+N) <sup>*1</sup>		1	2	3	4(3+N) <sup>*1</sup>		2 (1+N) <sup>*1</sup>	
Instantaneous tripping		Type B, C, D <sup>*2</sup>					Type B, C, D <sup>*2</sup>				Type C <sup>*2</sup>					
Rated insulation voltage $U_i$ [V]		440					440				230					
Rated current $I_n$ [A] at ambient temperature 30°C		0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63					0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40		0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63				6, 10, 16, 20			
Rated short-circuit capacity [kA]	IEC60898-1 GB/T10963.1 (lcn)	AC	230V	6					10				4.5			
			230/400V	6					10				-			
			400V	-					10				-			
Number of operating cycles		Without current		8,000					10,000				20,000			
		With current		8,000					10,000				20,000			
Dimensions [mm]				a	18	36	54	72	36	18	36	54	72	18		
				b	87					87				88		
				c	44					44				44		
				ca	70					70				70		
				Type of overcurrent release	Thermal-magnetic					Thermal-magnetic				Thermal-magnetic		
Mounting		IEC35mm rail					IEC35mm rail				IEC35mm rail					
Applicable wire size		1 to 25mm <sup>2</sup>					1 to 25mm <sup>2</sup>				1 to 10mm <sup>2</sup>					
Mass [kg]		0.15	0.3	0.45	0.55	0.25	0.15	0.3	0.45	0.55	0.12					
Accessories (optional)	Alarm switch (AL)		●					●				-				
	Auxiliary switch (AX)		●					●				-				
	Shunt trip (SHT)		●					●				-				
	Handle lock device (HL)		●					●				-				
Terminal connection		Solderless					Solderless				Solderless					
Based on standard		IEC 60898-1					IEC 60898-1				IEC 60898-1					
CE marking		EN 60898-1 : Self-declaration					EN 60898-1 : Self-declaration				EN 60898-1 : Self-declaration					
CCC		GB/T 10963.1					GB/T 10963.1				GB/T 10963.1					
Marine use approval		CCS <sup>*3</sup> , DNV-GL					CCS <sup>*3</sup> , DNV-GL				-					

Notes: \*1 N pole is a switched neutral pole (without overcurrent release device).  
 \*2 Type B: (3 In <, ≤ 5 In), Type C: (5 In <, ≤ 10 In), Type D: (10 In <, ≤ 20 In)  
 \*3 Except for 4 poles breaker.

Model		For DC										
		BH-D10										
Image												
Number of poles [P]		1	2									
Instantaneous tripping		Type B, C <sup>*4</sup>										
Rated insulation voltage $U_i$ [V]		250										
Rated current $I_n$ [A] at ambient temperature 30°C		0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63										
Rated short-circuit capacity [kA]	IEC60898-2 GB/T10963.2 (lcn)	DC	125V	10		-						
			250V	-		10						
		AC	230/400V	6		-						
400V	-		6									
Number of operating cycles		Without current		8,000								
		With current		4,000								
Dimensions [mm]				a	18		36					
				b	87							
				c	44							
				ca	70							
				Type of overcurrent release	Thermal-magnetic							
Mounting		IEC35mm rail										
Applicable wire size		1 to 25mm <sup>2</sup>										
Mass [kg]		0.15	0.3									
Accessories (optional)	Alarm switch (AL)		●									
	Auxiliary switch (AX)		●									
	Shunt trip (SHT)		●									
	Handle lock device (HL)		●									
Terminal connection		Solderless										
Based on standard		IEC 60898-2										
CE marking		EN 60898-2 : Self-declaration										
CCC		GB/T 10963.2										

Notes: \*4 Type B: (4 In <, ≤ 7 In), Type C: (7 In <, ≤ 15 In) for DC  
 Type B: (3 In <, ≤ 5 In), Type C: (5 In <, ≤ 10 In) for AC


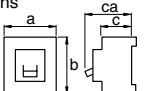



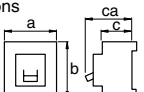
Model		RCCB		
		BV-D		
Image				
Number of poles [P]		$2(1+N)^{*1}$	$4(3+N)^{*1}^{*3}$	
Rated current [A] at ambient temperature 30°C		25, 40, 63		
Rated voltage [VAC]		230	230/400	
Rated current sensitivity $I\Delta n$ [mA]		30, 300		
Max. operating time at $5I\Delta n$ [s]		0.04		
Pulsating current sensitivity		Type AC		
Rated conditional short-circuit current [kA]		6		
Dimensions [mm] 		a	36	72
		b	85	
		c	44	
		ca	70	
Mass [kg]		0.2	0.35	
Rated making and breaking capacity $I_m$ [A]		500(In 25,40A), 630(In63A)		
Rated conditional short-circuit current $I_{nc}$ [kA]		6		
Rated residual making and breaking capacity $I_{\Delta m}$ [A]		500(In 25,40A), 630(In63A)		
Rated conditional residual short-circuit current $I_{\Delta c}$ [kA]		6		
Number of operating cycles	Without current	8,000		
	With current	8,000		
Type of overcurrent release		-		
Mounting		IEC35mm rail		
Applicable wire size		1 to 25mm <sup>2</sup>		
Terminal connection		Solderless		
Based on standard		IEC 61008-2-2		
CE marking		EN 61008-2-2 : Self-declaration		
CCC		GB/T 16916.22		

Notes: \*1 N pole is a switched neutral pole (without overcurrent release device).

\*2 Type C: (5 In <, ≤ 10 In)

\*3 For use to three phase 4-wire type. When wiring to three phase 4-wire, connect the neutral line to the neutral pole. Not available for use to three phase 3-wire type.

Model		RCBO	
		BV-DN	
Image			
Number of poles [P]		$2(1+N)^{*1}$	
Rated current [A] at ambient temperature 30°C		6, 10, 16, 20, 25, 32, 40	
Rated voltage [VAC]		230	
Rated current sensitivity $I\Delta n$ [mA]		30, 100, 300	
Max. operating time at $5I\Delta n$ [s]		0.04	
Pulsating current sensitivity		Type AC	
Breaking capacity [kA] sym. (IEC 61009)		4.5	
Tripping characteristics		Type C <sup>*2</sup>	
Dimensions [mm] 		a	36
		b	88
		c	44
		ca	70
Mass [kg]		0.19	
Rated residual making and breaking capacity $I_{\Delta m}$ [A]		500	
Automatic tripping device		Thermal, magnetic	
Number of operating cycles	Without current	20,000	
	With current	20,000 (In 6,10,16,20A) 15,000 (In 25A) 10,000 (In 32,40A)	
Type of overcurrent release		Thermal-magnetic	
Mounting		IEC35mm rail	
Applicable wire size		1 to 16mm <sup>2</sup>	
Terminal connection		Solderless	
Based on standard		IEC 61009-2-2	
CE marking		EN 61009-2-2 : Self-declaration	
CCC		GB/T 16917.22	

Model		Isolating switch				
		KB-D				
Image						
Number of poles [P]		1	2	3	$4(3+N)$	
Utilization category		AC-22A				
Rated current [A] at ambient temperature 30°C		32, 63, 80				
Rated voltage [VAC]		230	400			
Short time withstand current [A]		$20 \times I_n$ , 1s				
Short-circuit making capacity [A]		$20 \times I_n$				
Dimensions [mm] 		a	18	36	54	72
		b	87			
		c	44			
		ca	70			
Mass [kg]		0.09	0.18	0.27	0.36	
Number of operating cycles	Without current	20,000				
	With current	3,000				
Mounting		IEC35mm rail				
Applicable wire size		1 to 25mm <sup>2</sup>				
Terminal connection		Solderless				
Based on standard		IEC 60947-3				
CE marking		EN 60947-3 : Self-declaration				
CCC		GB/T 14048.3				
Marine use approval		CCS <sup>†</sup> , DNV-GL				

Notes: \*4 Except for 4 poles breaker.

## Accessories for Miniature Circuit Breakers

### Functions of Accessories

Internal accessory	Function
<b>AL</b> Alarm switch	Electrically indicates the trip status of the circuit breaker.
<b>AX</b> Auxiliary switch	Electrically indicates the On/Off status of the circuit breaker.
<b>SHT</b> Shunt trip	Electrically trips the circuit breaker from a remote location. Permissible working voltages are 70 to 110% of the AC rated voltage or 70 to 125% of the DC rated voltage.
<b>HL</b> Handle lock device	Device for locking the circuit breaker in the OFF position.

### Equipping of Accessories

Accessory \ Model	BH-D6	BH-D10	BH-DN, BV-DN, KB-D, BV-D
<b>AL</b>	○	○	-
<b>AX</b>	○	○	
<b>SHT</b>	○	○	
<b>HL</b>	○	○	

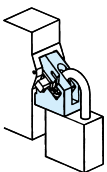
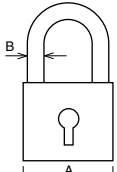
○: Accessory equipped  
-: Accessory not equipped

### Specifications

Type		AL	AX	AL+AX	AX+AX
		AL-05DLS	AX-05DLS	ALAX-05DLS	AX2-05DLS
Contact	Configuration	1C	1C	2C	2C
	Contact capacity	400VAC, 2A	230VAC, 5A	120VDC, 0.4A	48VDC, 1.5A
Function	Line	-	-	AX	AX
	Load	AL	AX	AL	AX
Connection		Screw terminal			
Compliance standard		IEC 60947-5-1			

Type	SHT		
	SHTA400-05DLS	SHTD048-05DLS	SHTD110-05DLS
Cut-off switch	Equipped		
Voltage	110-400VAC	24-48VDC	100-110VDC
Input power requirement	110VAC 60VA 230VAC 250VA 400VAC 750VA	24VDC 75VA 48VDC 300VA	100VDC 500VA 110VDC 500VA
Operating time [ms]	<20		
Connection	Solderless terminal		
Compliance standard	IEC 60947-2		

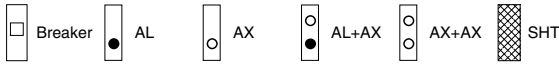
\* Secure a sufficient input power supply so that the voltage will not drop below the permissible lower working voltage (70% of the lowest rated voltage).  
\* The operating time denotes the time from when the rated voltage is applied to SHT until the time the main contact of the breaker starts to open.

Type	HL	Reference diagram	Padlock
	HLF-05BHD		

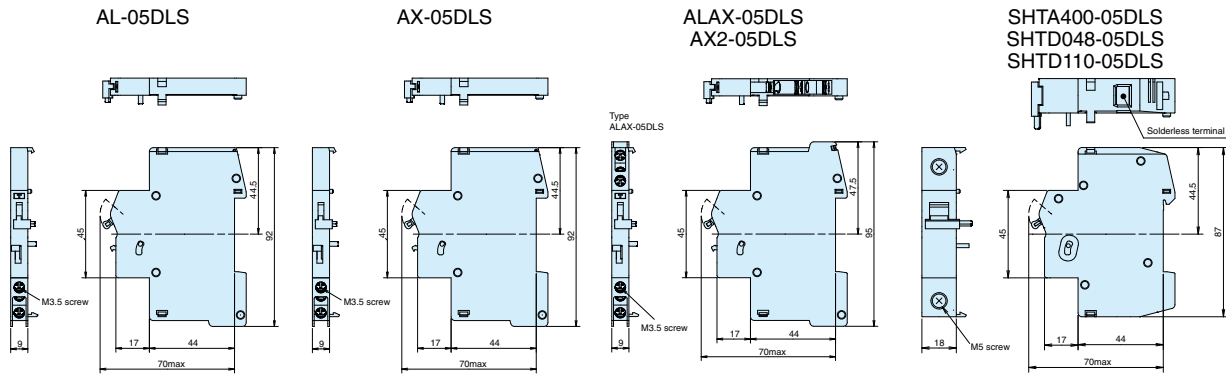
Please use on the left pole for 2 pole breaker, on the center pole for 3 pole breaker, on the second pole or third pole from the left for 4 pole breaker. (OFF lock only)  
This device can be also used as a lock cover that can prohibit operation to ON position readily without any lock. One lot contains 10 pieces.

## Combinations of Accessories

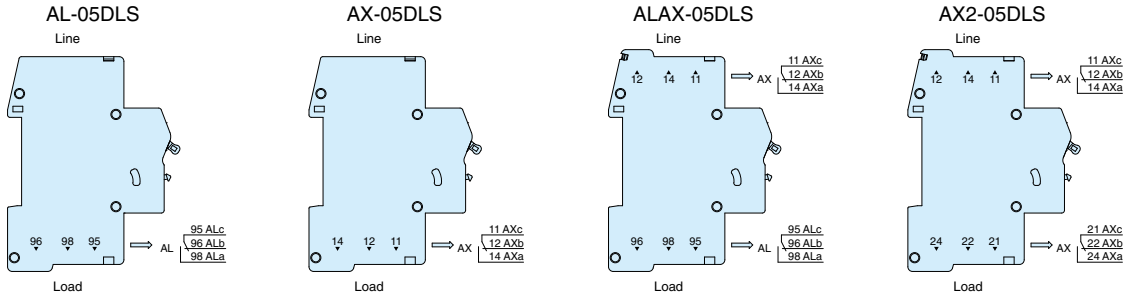
Accessory connection combinations	AL	
	AX	
	2AX	
	ALAX	
	SHT	
	AX+SHT	
	AL+SHT	
	2AX+SHT	
	ALAX+SHT	



## Outline Drawing

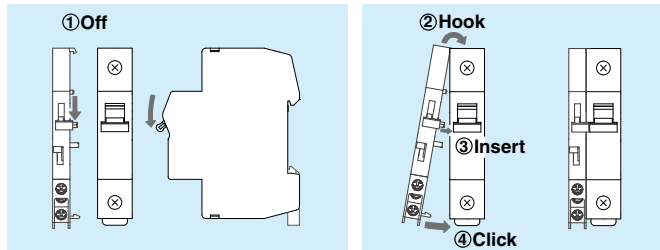


## Connection of Line and Load Side

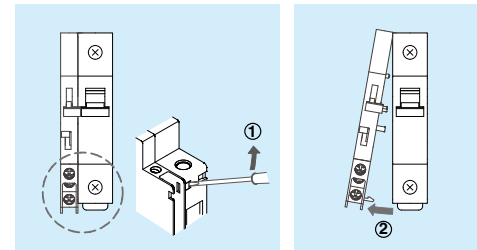





## Installation of Accessories (AX, AL, SHT)

### (1) Installation



### (2) Removal



Frame (A)		30									
Model		CP30-BA			CP-S			CP30-HU			
Image											
Number of poles		1	2	3	1	2	3	1	2	3	
Rated insulation voltage Ui (V)		250			250			250			
Rated impulse withstand voltage Uimp (kV)		2.5			2.5			2.5			
Rated current (A)		0.1 0.25 0.3 0.5 1 2 3 5 7 10 15 20 30			0.05 0.1 0.25 0.3 0.5 0.75 1 2 2.5 3 5 7 7.5 10 15 20 25 30			0.1 0.25 0.3 0.5 1 2 3 5			
Rated short-circuit capacity (kA)	UL 1077 CSA C22.2 No.235 (*11)	Rated voltage (V)	250			250			250		
		AC (V)	65			65			65		
	AC (V)	2.5kA at 250V			1.5kA at 250V			2.5			
		DC (V)	2.5kA at 65V	2.5kA at 125V	–	1kA at 65V	–	–	10kA at 65V	10kA at 125V	–
	IEC 60934 EN 60934 (Icn)	Rated insulation voltage Ui (V)	250			250			250		
		AC (V)	250			1.5kA at 230V 2.5kA at 120V			2.5kA at 230V 10kA at 120V		
	EN 60947-2 IEC 60947-2 (Icu/Ics)	DC (V)	2.5kA at 60V	2.5kA at 120V	–	1kA at 60V	1kA at 120V (1kA at 60V) (*7)	1kA at 60V	10kA at 65V	10kA at 120V	–
		Rated insulation voltage Ui (V)	250			–			250		
AC-DC common use	AC (V)	2.5/2.5kA at 230V			–			2.5/2.5kA at 230V 10/10kA at 120V			
	DC (V)	2.5/2.5kA at 60V	2.5/2.5kA at 120V	–	–			10/10kA at 60V	10/10kA at 120V	–	
Reverse connection	Available			–			Available				
Rated short time current (for switch only type)	–			AC250V 50/60Hz 1500A 0.02s AC125V 50/60Hz 2500A 0.02s DC65V 1000A 0.02s DC125V 1000A 0.02s			–				
Rated ambient temperature (°C)	40 (T40)			25 (T25)			40(T40)				
Operating characteristics	Instantaneous type (I): Medium type (M), (MD); Slow type (S), (SD); Fast type (F) (*2)			Instantaneous type (I): Medium type (M), (MD); Slow type (S), (SD); Fast type (F) (FD)			Instantaneous type(I); Medium type(M), (MD); Slow type(S)				
Mode of tripping	Instantaneous type (I): magnetic only [MO] Medium type (M), (MD) Slow type (S), (SD) : hydraulic-magnetic [HM] Fast type (F)			Instantaneous type (I): magnetic only [MO] Medium type (M), (MD) Slow type (S), (SD) : hydraulic-magnetic [HM] Fast type (F), (FD)			Instantaneous type(I): magnetic only(MO) Medium type(M),(MD) Slow type(S) :hydraulic-magnetic(HM)				
Method of operation	S-type (IEC 60934)										
Trip-free behaviour	Trip-free (IEC 60934)										
Mass (kg)	0.08	0.16	0.23	0.06	0.12	0.18	80	160	230		
Accessories	Retractable small terminal cover (TC-S)	●Standard IP20 (front, terminal covers closed) [Certified of TÜV] (*14)			–			●Standard IP20(front, terminal covers closed) [Certified of TÜV]			
	Inertial delay (ID)	● (Medium, Slow type: AC only)			● (Medium, Slow, Fast type: AC only)			●(Medium, slow type: AC only)			
	Alarm switch (AL)	● (1c) (*13)			● (1c) (*7)			●(1c)			
	Auxiliary switch (AX)	● (1c) (*13)			● (1c)			●(1c)			
	Shunt trip (SHT)	● (for relay type) (*3)			● (for parallel and relay type: AC only)			●(for relay type) (*3)			
	Large terminal cover (TC-L)	● (*6), (*14)			–			●(*6)			
	Flushpanel mounting brackets (FP)	● (*14)			–			●(*6)			
	Back facing wiring terminal (BT)	● (*4), (*6), (*14)			–			●(*6)			
	Lock cover (LC)	–			●			–			
	Accessory terminal cover (TC)	● (*6), (*14)			–			●(*6)			
Connection	Main body	20A or less : Screw terminal M4 30A : Screw terminal M5 Spring clamp terminal(SQ) (*12)			Male tub terminal 6.3mm (#250) [Screw terminal M4 (series type only)]			20A or less: Screw terminal M4 30A: Screw terminal M5			
	Alarm switch / Auxiliary switch	Screw terminal M3.5 Spring clamp terminal(SQ) (*13)			Male tub terminal 2.8mm (#110)			Screw terminal M3.5			
Main body mounting method	Surface, IEC rail mounting Flush panel mounting (option)			Panel mounting			Surface, IEC rail mounting Flush panel mounting(option)				
International standard	UL(cURus), CCC (*5), (*15)			UL(UR) (*9), (*10)			UL(cURus) (*5)				
CE Marking	EN 60934 : TÜV approval (*15) EN 60947-2 : Self-declaration (*5)			EN 60934 : TÜV approval(*10) ( Operating characteris is Medium type (M) only. The rated current, 0.3A, 2A, 3A and 7A are not applied.			EN 60934: TÜVapproval EN 60947-2: Self-declaration(*5)				

- Notes: \*1 The 3-pole products are for AC use only.  
\*2 Contact us for operating characteristics other than those mentioned above.  
\*3 In poles equipped with a shunt tripping mechanism, the overcurrent tripping element is not operative (switched shunt tripping).  
\*4 For back-face wiring terminals, specify if it will be used with 30A, or 20A or less.  
\*5 UL(cURus), CCC, and CE Marking are displayed on standard products.  
\*6 It is recognition of UL(cURus), CCC, and TÜV.  
\*7 In case of DC use, only DC65V is available.  
\*8 Specify if for DC use when ordering.  
\*9 Specify when ordering. (In case of CP-S UL, type name is CP-SU.)  
\*10 Connection is male tub terminal only.  
\*11 CP30-BA only.  
\*12 A spring clamp terminal is only available for current 0.1 to 20A.  
\*13 In case of spring clamp terminal for AX and AL, specify if it will be used with the normal open contact or the normal close contact.  
\*14 In case of spring clamp terminal, it is not available.  
\*15 In case of spring clamp terminal rated 20A, it is not available.

- Remarks: 1. Products for non-standard conditions are special order. (Low temperature, 1st and 2nd-degree moisture fungal treatment, corrosion-resistant)  
2. Although a buzzing sound may occur when an instantaneous type becomes 80% or more of the rated current for AC use, performance is not effected. Please take this point into consideration when selecting units for use in quiet environments.  
3. Please use in environments free of high temperatures, humidity, dust, corrosive gas, vibration, and impact.  
Also, do not use it in a circuit with inrush current or harmonics. Problems may result.

## Internal circuits and examples of application

Internal circuit	Available model	Operating characteristics								shunt trip
		Instantaneous type I	Fast type F		Medium type M		Slow type S			
Serial type	CP30-BA CP30-HU*1	●	●	-	●	●	●	●	●	-
Serial type with auxiliary switch	CP30-BA CP30-HU*1	●	●	-	●	●	●	●	●	-
Serial type with alarm switch	CP30-BA CP30-HU*1	●	●	-	●	●	●	●	●	-
Relay type shunt trip (with SHT)	CP30-BA CP30-HU*1	-	-	-	-	-	-	-	-	●
Parallel type shunt trip (with SHT)	CP-S	-	-	-	-	-	-	-	-	●
Relay type current trip	CP-S	●	●	●	●	●	●	●	●	-
Parallel type current trip	CP-S	●	●	●	●	●	●	●	●	-
Switch type	CP-S	-	-	-	-	-	-	-	-	-

\*1. CP30-HU is not available for fast type(F) and slow speed type(SD).

## Internal accessories

### Auxiliary switch (AX)

Operates in conjunction with the main circuit operating mechanism to electrically retrieve the ON/OFF status of protector.

### Alarm switch (AL)

Operates in conjunction with the main circuit operating mechanism to electrically retrieve the tripping status of protector.

Remarks (1) When the handle of CP30-BA is constrained in the ON status, it does not issue the alarm signal even if it is tripped.  
(2) The alarm switch will be reset when the body is reset or turned on.

### Shunt trip (SHT)

A parallel relay type protector, which can break the circuit instantaneously when receiving an external signal

### Inertial delay device

The inertial delay device is designed to avoid unnecessary operation caused by inrush current of transformer or lamp load. The device can withstand unrepeatd one pulse of crest value 20 times higher than the rated current (pulse time = 8 ms). It can be added to circuits having high, medium and low speed operating characteristics. (It cannot be added to instantaneous or DC types.)

Table 1 List of numbers of internal accessories which can be fitted

Type name	AX			AX More than one				AL			AL+AX			SHT			AL+SHT or AX+SHT			AL+AX+SHT	
	1P	2P	3P	1P	2P	3P	3P	1P	2P	3P	1P	2P	3P	1P	2P	3P	1P	2P	3P	3P	
CP30-BA CP30-HU	○	○	○	-	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CP-S	○	○	○	-	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Remark: 1. All accessories should be fitted on the internal accessory terminal block.

## Ratings of alarm switches (AL) and auxiliary switches (AX)

### (1) For CP30-BA

Classification	Voltage (V)	AC Current (A)		DC Current (A)	
		Resistive load	Inductive load	Resistive load	Inductive load
Ratings of items other than those shaded in Table 1	For general load	Max.	(250) 125	(1) 3	(0.5) 1
		Min.	0.1A/15VAC		0.1A/15VDC
	For minute load	Max.	125	0.5	-
		Min.	1mA/24VDC, 2mA/12VDC, 5mA/6VDC		
Ratings of items shaded in Table 1	For general load	Max.	(250) 125	(1) 3	(0.5) (1)
		Min.	0.1A/15VAC		0.1A/15VDC
	For minute load	Max.	125	(0.5), 0.1	-
		Min.	1mA/24VDC, 2mA/12VDC, 5mA/6VDC		

Remarks: 1. The switches having the ratings in parentheses are manufactured at the customer's request. (Specify the voltage). Such switches do not conform to UL (cURus), CCC or CE Marking requirements.

### (2) For CP-S

Voltage (V)	AC Current (A)		Voltage (V)	DC Current (A)	
	Resistive load	Inductive load		Resistive load	Inductive load
250	3	2	250	0.2	0.2
125	5	3	125	0.4	0.4
-	-	-	30	4	3
-	-	-	14	5	4

Remarks: 1. When using these switches to a circuit with a minute load (125VAC, 0.1A or 30VDC, 0.1A or less), designate the application as minute load.

## Ratings of shunt trip (SHT) coils

### (1) For CP30-BA

Rated operating voltage (V)		Time rating
100-200	Compatible with 100 to 200VAC and 100VDC	10 sec or less
24-48	Compatible with 24 to 48VDC	

Coil resistance, resistance and impedance (at25°C)

Voltage (V)	Impedance for AC (Ω)	DC resistance for DC (Ω)
24-48	-	160
100-200	2400	2100

Remarks: 1. The allowable range is 70 to 110% of the rated voltage for AC and 75 to 120% of the rated voltage for DC.

2. The time rating is 10 seconds or less. Configure the circuit on which voltage will not be applied for more than 10 seconds.

### (2) For CP-S

Rated operating voltage (V)		Time rating
100	Compatible with 100 to 120VAC (50/60Hz)	10 sec or less
200	Compatible with 200 to 240VAC (50/60Hz)	
24, 48, 100	24DC, 48DC, 100DC	

Coil resistance, resistance and impedance (at25°C)

Voltage (V)	Impedance for AC (Ω)	DC resistance for DC (Ω)
24	-	110
48	-	110
100	1100	400
200	1100	-

Remarks: 1. The allowable range is 70 to 110% of the rated voltage for AC and 75 to 120% of the rated voltage for DC.





2. The time rating is 10 seconds or less. Configure the circuit on which voltage will not be applied for more than 10 seconds.

## Operation of auxiliary switch and alarm switch

Protector status	Switch status	
	CP30-BA, CP30-HU, CP-S	
AX Off or trip		AXa (open) / ALa (closed) AXb (open) / ALb (closed) AXc / ALc
AL Off or ON		
AX ON		AXa (closed) / ALa (open) AXb (closed) / ALb (open) AXc / ALc
AL Trip		



## Installation and connection

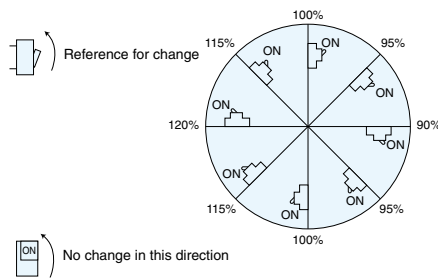
Installation method	With screws	On IEC rails	With embedded fittings	On panel
Appearance			 Circuit protectors with AL, AX and/or SHT cannot be installed by this method.	
CP30-BA	●	●	●*1	-
CP30-HU	●	●	●	-
CP-S	-	-	-	●

\*1. In case of spring clamp terminal, it is not available.

## Installation posture




The operating characteristics of electromagnetic (instantaneous) type circuit protectors are not affected by the installation posture. However, when installing a fluid electromagnetic (high, medium or low speed) type circuit protector, pay attention to the installation angle because the operating current value is changed under the influence of the gravity applied to the iron core in the oil dash pot.

Generally, it is recommended to use the circuit protectors in the vertical direction.



## Electric wires which can be connected and applicable screw terminals

CP30-BA, CP30-HU

Classification	Shape of terminal	Electric wire size used (mm <sup>2</sup> )	Applicable screw terminals	Tightening torque (N • m)
Body	Threaded terminal (standard specification) 	20 A or less M4	R1.25-4 R1.25-5	M4 1-1.4
		30A M5	R2-4 R2-5	
	Cross recessed or slotted 	30A M5	R5.5-4 R5.5-5	M5 1.8-2.2
		M3.5	*8-5NS (made by JST)	
Alarm and auxiliary switch terminals	Wire retaining screw (square washer) Cross recessed or slotted 	0.25-1.65	R1.25-3.5	0.7-0.9
		1.04-2.63	R2-3.5	

\*Use the screw terminal 8-5NS made by JST.

## Low Voltage Air Circuit Breakers (AE-SW Series)

Frame (A)	630	1000	1250	1600	2000	2000	2500	3200	4000
Model	AE630-SW	AE1000-SW	AE1250-SW	AE1600-SW	AE2000-SWA	AE2000-SW	AE2500-SW	AE3200-SW	AE4000-SWA
Image									
	AE1600-SW (Drawout type)				● See the catalog of Low Voltage Air Circuit Breakers, Y-0622, for the details.				
Rated current (CT rating) In (A)	630 (*1)	1000	1250	1600	2000	2000 (*1)	2500	3200	4000
Rated current setting Ir (A) (adjustable) (Rated ambient temperature 40°C) (For marine use 45°C)	315-346.5-378-409.5-441-472.5-504-535.5-567-598.5-630 (*1)	500-550-600-650-700-750-800-850-900-950-1000	625-687.5-750-812.5-875-937.5-1000-1062.5-1125-1187.5-1250	800-880-960-1040-1120-1200-1280-1360-1440-1520-1600	1000-1100-1200-1300-1400-1500-1600-1700-1800-1900-2000	1000-1100-1200-1300-1400-1500-1600-1700-1800-1900-2000 (*1)	1250-1375-1500-1625-1750-1875-2000-2125-2250-2375-2500	1600-1760-1920-2080-2240-2400-2560-2720-2880-3040-3200	2000-2200-2400-2600-2800-3000-3200-3400-3600-3800-4000
Number of poles					3, 4 (*2)				
Rated insulation voltage V					1000				
Current carrying capacity of neutral pole A	630	1000	1250	1600	2000	2000	2500	3200	4000
Rated breaking capacity (kA symmetrical RMS)	IEC 60947-2, EN 60947-2		690VAC				75		
	JIS C 8201-2-1 Ann.1 Ann.2		600VAC				75		
	NK, LR, DNV-GL, BV, ABS, DNV, CCS		240-500VAC				85		
Ics = % Icu					100%				
Rated short-time withstand current (kA symmetrical RMS)	1 second				65				
Suitability for isolation					Yes				
Reverse connection					Available				
Number of operating cycles	Without current		25000				20000		
	With current (690 V AC)		5000		1500		1500		1000 500
Utilization category					B				
Pollution degree					3				
EMC environment condition (environment A or B)					A				
Outline dimension (mm)	Fixed type		3-pole product 410x340x290				410x475x290		
	4-pole product		410x425x290				410x605x290		
Height (H) x width (W) x depth (D)	Drawout type		3-pole product 430x300x375				430x435x375		430x439x375
	4-pole product		430x385x375				430x565x375		430x569x375
Weight (kg) (Without Accessory)	Fixed type		3-pole product 35		35		35		44
	4-pole product		42		42		43		54
	Drawout type		3-pole product 56		56		56		62
	4-pole product		70		70		75		101
	Cradle only		3-pole product 24		24		27		33
	4-pole product		28		28		32		40
CE Marking					Self-declaration				
CCC recognition (☆:Certified)					☆				
Marine approval (☆:Certified)					☆ (NK, LR, DNV-GL, BV, ABS, CCS)				
Automatic tripping device					Electronic (effective value detection)				

● When the MCR is provided, the breaking capacity may be changed. See the catalog of Low Voltage Air Circuit Breakers, Y-0622.

● See the catalog of Low-voltage Air Circuit Breakers, Y-0622, for the details of the accessories.

Notes: \*1 AE630-SW and AE2000-SW having low rating types are available. See the catalog of Low Voltage Air Circuit Breakers, Y-0622, for the details.

\*2 The 4-pole products do not have obtained the marine approval.

\*3 4 (HN) means the neutral poles current capacity is 50% of the rated current, for 4poles.

4 (FN) means the neutral poles current capacity is 100% of the rated current, for 4poles.

\*4 ( ) shows the value for 4P FN type.

\*5 Marine approval value is 138kA.

\*6 85kA for 690VAC and 600VAC.

## Features

### ● Higher reliability by High operating durability (Mechanical)

### ● Increase of rated short-time withstand current

Combination of the Electronic trip relay (ETR) with MCR (\*1) enables increase of the choice coordination range.

### ● Applicability to increase and decrease of load and improvement of protection coordination

The electronic tripping system enables detailed setting of tripping characteristics. The system uses RMS detection resistant to distorted waves.

### ● More improved Electronic trip relay (ETR) and transmission functions

To flexibly meet various requirements, functions suitable for purposes can be selected effectively. In addition, improved measuring functions are provided, so that the circuit breakers are applicable to CC-Link, PROFIBUS-DP and MODBUS transmission and helpful in establishing various electrical circuit measurement monitoring systems and energy-saving systems in combination with measuring display unit breakers.

Notes: \*1 MCR is an abbreviation for marking current release. It has INST characteristic only when the circuit breaker in the OFF state turns ON (closes). The circuit breaker will lose the INST characteristic after closing, and it will have LTD and STD characteristics.

### ● Various connections

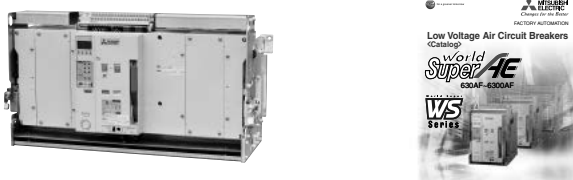
Various connections for panel structures are available. (See the following figure.)

### Connections

Connections	Horizontal	Vertical (*1) (VT)	Front (FT)	Vertical terminal adapter (VTA)	Front terminal adapter (FTA)
Fixed type (FIX)			-		
	(Standard)	FIX-VT		(FIX-VTA)	(FIX-FTA)
Drawout type (DR)					
	(Standard)	(DR-VT)	(DR-FT)	(DR-VTA)	(DR-FTA)

Notes: \*1 For AE2000-SWA, AE4000-SWA, AE4000-SW, AE5000-SW and AE6300-SW models, vertical terminal only is available.

## Low Voltage Air Circuit Breakers (AE-SW Series)

Frame (A)	4000	5000	6300
Model	AE4000-SW	AE5000-SW	AE6300-SW
Image (Reference)	 <p style="text-align: center;">AE6300-SW (Drawout type)</p> <p style="text-align: right;">● See the catalog of Low Voltage Air Circuit Breakers, Y-0622, for the details.</p>		
Rated current (CT rating) In (A)	4000	5000	6300
Rated current setting Ir (A) (adjustable) (Rated ambient temperature 40°C) (For marine use 45°C)	2000-2200-2400-2600-2800-3000-3200-3400-3600-3800-4000	2500-2750-3000-3250-3500-3750-4000-4250-4500-4750-5000	3150-3465-3780-4095-4410-4725-5040-5355-5670-5985-6300
Number of poles	3, 4 (HN, FN) (*3)		
Rated insulation voltage V	1000		
Current carrying capacity of neutral pole A	2000 (4000) (*4)		
Rated breaking capacity (asymmetrical RMS)	690VAC		
	600VAC		
	240-500VAC		
Ics = % Icu	85		
	130 (*5)		
Rated short-time withstand current (I <sub>s</sub> symmetrical RMS) 1 second	100%		
Suitability for isolation	100 (*6)		
Reverse connection	Yes		
Number of operating cycles	Available		
	10000 (3P) / 5000 (4P)		
Utilization category	1000		
Pollution degree	B		
EMC environment condition (environment A or B)	3		
Outline dimension (mm) Height (H) x width (W) x depth (D)	Fixed type	3-pole product	
	Drawout type	4-pole product	
	3-pole product	414x874x290	
		414x1004x290	
4-pole product	480x889x375		
	480x1019x375		
Weight (kg) (without Accessory)	Fixed type	3-pole product	
	Drawout type	4-pole product	
	3-pole product	141	
		159	
	4-pole product	194	
		223	
Cradle only	98		
	113		
CE Marking	Self-declaration		
CCC recognition (☆:Certified)	☆		
Marine approval (☆:Certified)	☆ (NK, LR, DNV-GL, BV, ABS)		
Automatic tripping device	Electronic (effective value detection)		

### Electronic trip relay (ETR) Type code

**● Main setting module**

WS1, WB1, WM1, WF1	AE630-1600-SW, AE2000-3200-SW, AE4000-SW
WS2, WB2, WM2, WF2	AE2000-SWA, AE4000-SWA, AE5000-SW
WS3, WB3, WM3, WF3	AE6300-SW

WS : General use  
WM : Generator protection use  
WB : INST/MCR only  
WF : Protective coordination use

**● Optional setting module**

G1: Ground fault protection  
N5: Neutral pole 50% protection  
E1: Earth leakage protection  
AP: 2nd Additional Pre-alarm  
NA: Without optional setting

**● ETR Auxiliary Equipment**

Temperature alarm(TAL)  
 MCR switch(MCR-SW)

For the details of the characteristics, alarm contact output and expanded functions of the ETR, see the catalog of Low Voltage Air Circuit Breakers, Y-0622.

**● Power supply**

P1: 100-240VAC-DC  
P2: 24-60VDC  
P3: 100-240VAC / 100-125VDC with output contact  
P4: 24-60VDC with output contact  
P5: 100-240VDC with output contact (SSR)

**Additional function**

Extension module(EX1)

Display(DP1)  
 Display onto panel board(DP2)  
 VT unit(VT)

**Network**

BIF-CC  
 BIF-PR  
 BIF-MD

**Wire system (when EX1 is specified)**

EX1

- 3φ3W
- 3φ4W
- Normal connection
- Reverse connection

Normal connection: Upper terminal is connected to power supply.  
Reverse connection: Lower terminal is connected to power supply.

\*The display is optional.



## Earth Leakage Relays

Model		Interchangeable leakage relays (*1)																	
		Electrical self-hold type				Mechanical self-hold type				Harmonic surge ready									
		NV-ZBA				NV-ZSA				NV-ZHA				NV-ZLA					
Model name of ZCT combined (*5)		Hole diameter mm		ZT15B		ZT15B		ZT15B		ZT15B		ZT15B		ZT15B					
		30		ZT30B		ZT30B		ZT30B		ZT30B		ZT30B		ZT30B					
		40		ZT40B		ZT40B		ZT40B		ZT40B		ZT40B		ZT40B					
		60		ZT60B		ZT60B		ZT60B		ZT60B		ZT60B		ZT60B					
		80		ZT80B		ZT80B		ZT80B		ZT80B		ZT80B		ZT80B					
		100		ZT100B		ZT100B		ZT100B		ZT100B		ZT100B		ZT100B					
Image																			
Phase line type		3φ4W, 3φ3W, 1φ3W, 1φ2W																	
Control voltage VAC		JIS		120 • 240 selectable				120 • 240 selectable 240 • 415 selectable				-							
		UL/JIS (*2) UL/CE (*3)		-				-				120 • 240 selectable 240 • 440 selectable				120 • 240 selectable 240 • 440 selectable 480			
JIS	High speed type	Rated sensitivity current mA		100 • 200 • 500 selectable		100 • 200 • 500 selectable		100 • 200 • 500 selectable		100 • 200 • 500 selectable		-		-					
		Max. operating time (s)		0.1				0.1				-							
	Delay type	Rated sensitivity current mA		100 • 200 • 500 selectable				100 • 200 • 500 selectable (200 • 500 • 1000 selectable)				-							
		Operating time (s) (*4)		0.3 • 0.8 • 1.6 selectable				0.3 • 0.8 • 1.6 selectable				-							
Inertial non-operating time (s) or longer than (s)		0.1 • 0.5 • 1.1				0.1 • 0.5 • 1.1				-									
UL/JIS	High speed type	Rated sensitivity current mA		-				-				30 50		30 50					
		Max. operating time (s)		-				-				0.1		0.1					
	High speed type	Rated sensitivity current mA		-				-				100 • 200 • 500 selectable		100 • 200 • 500 selectable					
		Max. operating time (s) (*4)		-				-				0.1 • 0.45 • 1.0 selectable		0.1 • 0.45 • 1.0 selectable					
Inertial non-operating time (s) or longer than (s)		-				-				- • 0.1 • 0.5		- • 0.1 • 0.5							
UL/CE	High speed type	Rated sensitivity current mA		-				-				30 • 50 • 100 selectable		30 • 50 • 100 selectable					
		Max. operating time (s) at 5IΔn		-				-				0.04		0.04					
	Delay type	Rated sensitivity current mA		-				-				100 • 300 • 500 selectable 300 • 500 • 1000 selectable		100 • 300 • 500 selectable 300 • 500 • 1000 selectable					
		Max. operating time (s) at 2IΔn (*4)		-				-				0.45 • 1.0 selectable		0.45 • 1.0 selectable					
Inertial non-operating time (s) at 2IΔn		-				-				0.1 • 0.5		0.1 • 0.5							
Earth leakage indication		Electric type (LED)				Mechanical type (button)				Electric type (LED)				Mechanical type (button)					
Resetting method		Push button or control power switch off				Push button (combined with earth leakage indicator)				Push button or control power switch off				Push button (combined with earth leakage indicator)					
Built-in contact	Configuration		1c				1a1c				1a1c				1a1c				
	Continuous current capacity A		5				5				5				5				
	Contact capacity A		cosφ=1		cosφ=0.4 L/R=0.007		cosφ=1		cosφ=0.4 L/R=0.007		cosφ=1		cosφ=0.4 L/R=0.007		cosφ=1		cosφ=0.4 L/R=0.007		
			120VAC		5 2		120VAC		5 3		120VAC		5 2		120VAC		5 3		
			240VAC		5 2		240VAC		3 2		240VAC		5 2		240VAC		3 2		
			415VAC		2 1		415VAC		2 1		24VDC		5 2		480VAC		1 1		
30VDC			4 3		30VDC		4 3		100VDC		0.4 0.4		30VDC		3 3				
200VDC		0.2 0.2		200VDC		0.2 0.2		Use auxiliary relay for 415VAC contact.											
Connection		Front		●Clamp terminal				●Clamp terminal				●Clamp terminal							
Rear		-				●Clamp terminal				●Clamp terminal				●Clamp terminal					
Standard attachment (Front connection)		Mounting screw																	
Mass kg		0.3				0.4				0.4				0.4					
External accessories		Terminal cover		● (TC-ZBA)				● (TC-ZSA)				● (TC-ZSA) (*6)				● (TC-ZSA) (*6)			
Mounting hook for IEC 35mm rail (DIN rail) Fixture		● (DIN-ZBA)				-				-				-					
Max. consumption VA		3																	
Conforming standard	US UL standard (UR certified)		-				-				UL1053 Recognized component (File No.E196562)				UL1053 Recognized component (File No.E196562)				
	Canada CSA standard		-				-				LR103083(Certified No.)				LR103083(Certified No.)				
	European CE marking		-				-				Declaration for conformity IEC 60947-2 AnnexB EN 60947-2 AnnexB				Declaration for conformity IEC 60947-2 AnnexB EN 60947-2 AnnexB				

Notes: \*1 Interchangeable leakage relays can be easily combined with other relays and our ZCT. However, products with 30mA sensitivity (excluding NV-ZHA/ZLA) can only be used in combination with ZT15B, ZT30B and ZT40B.

\*2 Indicates the UL-standard control voltage. UL, CSA and JIS standards are indicated together. For JIS voltage indications, 100-200V changeover is 120-240V changeover, 200-415V changeover is 240-440V changeover, and 460V and 480V are described together. When ordering, specify "UL/JIS".

\*3 Indicates the UL-standard control voltage. UL, CSA and CE standards are indicated together. For CE voltage indications, 120-230V changeover is 120-240V changeover, 230-440V changeover is 240-440V selectable, which are described together. When ordering, specify "UL/CE".

\*4 When operating times are 0.3 and 0.45sec, 0.8 and 1.0sec and 1.6sec, the relay operates between 0.15 and 0.45sec, 0.6 and 1.0sec and 1.2 and 2.0sec, respectively.

\*5 Can be combined with an interchangeable ZCT equipped with a primary conductor. Refer to the next page for details.

\*6 Not UL-certified.

Remarks: 1. Relays with rates shown in parentheses are special-order.

2. The relay complies with CE marking conformity declaration only when used with CE marking type MCCB with a voltage tripping device to interrupt current during ground fault.

3. NV-ZBA/ZSA

Control voltage	Available voltage range	Example of applicable circuit voltage
120V	80-126V	100 • 110V • 120V
240V	160-252V	200 • 220 • 240V
415V	320-484V	400 • 415 • 440V

### 4.NV-ZHA/ZLA

Control voltage	Available voltage range	Example of applicable circuit voltage
120V	80-132V	100 • 110 • 120V
240V	160-264V	200 • 220 • 230 • 240V
440V	304-484V	380 • 400 • 415 • 440V
480V	368-528V	460 • 480V

## Interchangeable ZCT

Type	ZT15B	ZT30B	ZT40B	ZT60B	ZT80B	ZT100B	
Aperture diameter (mm)	15	30	40	60	80	100	
Mass (kg)	0.2	0.4	0.6	2.0	2.6	3.3	
Rated short time current	50 (peak value)						
Dimensions (mm)	a	48	68	85	140	160	185
	b	52	52	52	90	90	90
	c	70	90	100	150	169	190
	d	25	50	50	100	100	100
	e	40	40	40	70	70	70

## ZCT aperture diameter and wire size

	ZCT aperture diameter (mm)	15	30	40	60	80	100
		Max. 600V rated wire size in mm <sup>2</sup> (current in amperes)					
1φ2w	Polyvinyl-chloride insulated wire	14 (88)	60 (217)	150 (395)	325 (650)	600 (992)	800 (1185)
	Cross-linked polyethylene insulated cable	2 (33)	38 (190)	60 (260)	250 (655)	400 (870)	600 (1140)
1φ3w 3φ3w	Polyvinyl-chloride insulated wire	8 (61)	38 (162)	100 (298)	250 (556)	500 (842)	725 (1095)
	Cross-linked polyethylene insulated cable	2 (33)	22 (135)	60 (260)	200 (560)	325 (760)	600 (1140)
3φ4w	Polyvinyl-chloride insulated wire	8 (61)	38 (162)	100 (298)	150 (395)	325 (650)	600 (992)
	Cross-linked polyethylene insulated cable	–	14 (105)	38 (190)	100 (365)	250 (655)	400 (870)

## Interchangeable ZCTs with primary conductors

Type	ZTA600A	ZTA1200A	ZTA2000A	
Number of poles	3			
Rated voltage (VAC)	600			
Rated short time current (kA)	100 (peak value)			
	a	227	227	360
	b	256	298	250
	ba	366	444	594
	c	42	78	79
	ca	125	176	214

## ELRs with a ZCT with primary conductors

Frame (A)	600	1200	2000	3200	
Type	ZBA	Interchangeable ELR and interchangeable ZCTs with primary conductors			NV-ZBA3200
	ZSA				NV-ZSA3200
	ZHA				NV-ZHA3200
	ZLA				NV-ZLA3200
Number of poles	3				
Rated voltage (VAC)	600				
Rated short time current (kA)	100 (peak value)				
	a	227	227	360	490
	b	256	298	250	320
	ba	366	444	594	868
	c	42	78	79	111
	ca	125	176	214	290
Mass (kg)	6.5	11	27	54	

Specification of ELRs	High-speed type	Control voltage (VAC)	Rated current sensitivity (mA)	Max. operating time (s)	Inertial non-operating time (s)
		ZBA	120 • 240 (*1)	100 • 200 • 500 (*1)	0.1
ZSA	120 • 240 (*1) 240 • 415 (*1)	100 • 200 • 500 (*1)			
Time-delay type (High-speed • Time-delay type)	ZBA	120 • 240 (*1)	100 • 200 • 500 (*1)	0.3 • 0.8 • 1.6 (*1)	0.1 • 0.5 • 1.1
	ZSA	120 • 240 (*1) 240 • 415 (*1)	100 • 200 • 500 (*1) (200 • 500 • 1000 (*1))	0.3 • 0.8 • 1.6 (*1)	0.1 • 0.5 • 1.1
	ZHA	120 • 240 (*1) 240 • 440 (*1)	100 • 200 • 500 (*1)	0.1 • 0.45 • 1.0 (*1)	– • 0.1 • 0.5
	ZLA	120 • 240 (*1) 240 • 440 (*1) 480	100 • 200 • 500 (*1) 100 • 300 • 500 (*1) 300 • 500 • 1000 (*1)	0.1 • 0.45 • 1.0 (*1) 0.45 • 1.0 (*1) (at 2IΔn)	0.1 • 0.5 (at 2IΔn)

Note: \*1 Selectable.



# 3

## Special-purpose Breakers

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## 1. Mag Only (Instantaneous Tripping Circuit Breakers)

Standard magnetic trip current

Fixed	NF32-SV	AC-DC	Rated current x 10 (AC) (DC)
	NF63-CV/SV/HV	AC-DC	
	NF125-CV/SV/HV	AC-DC	
	NF400-CW/SW NF630-CW/SW	AC-DC	
Adjustable	NF800-SEW	AC	High: Rated current x 10 Low: Rated current x 2
	NF800-SDW	DC	High: 8000A   Low: 3200A
	NF1000-SEW NF1250-SEW	AC	High: Rated current x 10 Low: Rated current x 2
	NF1600-SEW	AC	High: Rated current x 10 Low: Rated current x 2
	NF1250-SDW NF1600-SDW	DC	High: 8000A Low: 3200A

Remarks: 1. The size, weight, accessories, etc., are all identical to the same-designation C, S and H series breakers.

### Minimum and max magnetic trip current

Fixed

Model	Rated current(A)	Current	Instantaneous tripping current(A)		Model	Rated current(A)	Current	Instantaneous tripping current(A)	
			min-max	standard				min-max	standard
NF32-SV	3	AC-DC	9-300	30	NF250-CV NF250-SV	125	AC-DC	375-3150	1250
	5		15-300	50		150		450-3150	1500
	10		30-300	100		175		525-3150	1750
	15		45-300	150		200		600-3150	2000
	20		60-300	200		225		675-3150	2250
	30		90-300	300		250		750-3150	2500
	32		96-320	320		125		375-3150	1250
NF63-CV NF63-SV NF63-HV	10		30-500	100	NF250-HV	150		450-3150	1500
	15		45-500	150		175		525-3150	1750
	20		60-500	200		200		600-3150	2000
	30		90-500	300		225		675-3150	2250
	40		120-500	400		250		750-3150	2500
	50		150-500	500		250		900-4000	2500
	60		180-600	600		300		900-4000	3000
NF125-CV	63		189-630	630	NF400-CW	350		1050-4000	3500
	60		180-1600	600		400		1200-4000	4000
	75		225-1600	750		250		900-5600	2500
	100		300-1600	1000		300		900-5600	3000
	125		600-1600	1250		350		1050-5600	3500
NF125-SV	15		60-1600	150	NF630-CW	400		1200-5600	4000
	20		120-1600	200		500		2000-6300	5000
	30	120-1600	300	600		2400-6300	6000		
	40	200-1600	400	630		2520-6300	6300		
	50	200-1600	500	NF630-SW	500	2000-5000	5000		
	60	400-1600	600		600	2400-6000	6000		
	75	400-1600	750		630	2520-6300	6300		
	100	400-1600	1000						
NF125-HV	125	600-1600	1250						
	15	60-1600	150						
	20	120-1600	200						
	30	120-1600	300						
	40	200-1600	400						
	50	200-1600	500						
	60	400-1600	600						
	75	400-1600	750						
100	400-1600	1000							
125	600-1600	1250							

Adjustable(tripping current)

Model	Current	Max	Rated current(A)	Instantaneous tripping current(A)			
				Lo	2	3	Hi
NF800-SDW	DC	800	(700)	2800	4200	5600	7000
			800	3200	4800	6400	8000
NF1250-SDW	DC	1000	1000	3200	4800	6400	8000
NF1600-SDW		1250	1600				

Adjustable(rated current)

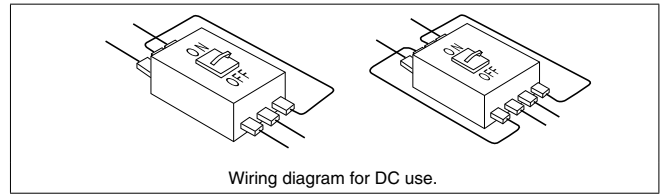
Model	Current	Rated current(A)	Instantaneous tripping current(%)
NF800-SEW	AC	400 450 500 600 700 800	200 250 300 350 400 500 600 700 800 1000
NF1000-SEW		500 600 700 800 900 1000	
NF1250-SEW		600 700 800 1000 1200 1250	
NF1600-SEW		800 1000 1200 1400 1500 1600	



## 2. DC MCCBs and DSN Switches

Breaking is more difficult with direct currents because the current value never reaches zero. While ordinary DC breakers are suitable for low voltages, special-voltage DC breakers are recommended for voltages in excess of 250VDC. Breakers for 550V are all 4-pole models. The size, shape, drilling plan, accessories, etc., are all identical to the S Series breakers with the same designations.

Wiring diagram for DC usage.



Remark: 1. The tripping characteristics will change if the wiring differs from the one shown here.

Model	NF63-SV		NF125-SV		NF250-SV		NF400-SW		NF630-SW		NF800-SDW		NF1250-SDW		NF1600-SDW	
Number of poles	3	4	3	4	3	4	3	4	3	4	3	4	3		3	4
Rated voltage (VDC)	400	550	440	550	500	600	500	600	500	600	500	600	500	600	500	600
Rated breaking capacity (kA) IEC 60947-2 (Icu/Ics)	2/2		10/10		20/20		40/40		40/40		40/40		40/20		40/20	

Remark: 1. Time constant: 10ms or below.  
2. NF1250-SDW 4P and NF1600-SDW 3P/4P are Mag Only (Instantaneous Tripping Circuit Breakers).

### ●DC side

These breakers are designed as thyristor-Leonard system DC side breakers. They protect the thyristor from short circuiting when there is a power or

communication failure (Mag Only breakers can also be used for this purpose). Use these breakers in combination with fast fuses for even greater protection.

Model	NF125-SV		NF250-SV		NF400-SW		NF630-SW		NF800-SDW		NF1250-SDW		NF1600-SDW	
Number of poles	2	3	2	3	2	3	2	3	2	3	2	3	2	3
Rated voltage (VDC)	250	440	300	500	250	480	250	480	250	480	250	480	250	480
Rated breaking capacity (kA) IEC 60947-2 (Icu/Ics)	40/40	10/10	20/20		20/20		20/20		20/20		20/20		20/20	
Instantaneous trip current min.)	3 times rated current		3 times rated current		900A		1000A		1400A		2500A		3200A	

### ●DSN switches

These are standard MCCBs without the automatic tripping element. The tripping capacity is about six times the rated current.

The appearance, size, drilling plan and available accessories are all identical to similar standard S and C Series MCCBs.

Model	DSN63-CV		DSN125-CV		DSN250-CV		DSN400-CW		DSN630-CW		DSN800-CW	
Rated current (A)	63		125		250		400		630		800	
Number of poles	2	3	2	3	2	3	2	3	3		3	
Rated voltage (AC/DC)	500/250		500/250		500/250		600/250		600/250		600/250	
Max. switching current (AC/DC)	378/155		750/310		1500/625		2400/1000		3780/1575		4800/2000	

Model	DSN32-SV	DSN63-SV	DSN125-SV	DSN125-SGV	DSN160-SGV	DSN250-SV	DSN250-SGV	DSN400-SW	DSN630-SW	DSN800-SW	DSN1000-SW	DSN1250-SW	DSN1600-SW
Rated current (A)	32	63	125	125	160	250	250	400	630	800	1000	1250	1600
Number of poles	2   3	2   3	2   3   4	2   3   4	2   3   4	2   3   4	2   3   4	2   3   4	3   4	3   4	3   4	3   4	3   4
Rated voltage (AC/DC)	500/250	500/250	690/250	690/300	690/300	690/250	690/300	690/250	690/250	690/250	690/250	690/250	690/250
Max. switching current (AC/DC)	192/80	378/155	750/310	750/315	960/400	1500/625	1500/625	2400/1000	3780/1575	4800/2000	6000/2500	7500/3125	9600/4000

## 3. 400Hz MCCBs

Standard MCCBs cannot be used in 400Hz circuits. When standard MCCBs are used in high-frequency circuits (eq. 400Hz), the instantaneous characteristics are shifted higher. The 400Hz MCCB is recommended for use in 400Hz circuits.

### ●Specifications

The appearance, size, rated interrupting capacity, drilling plan, accessories, etc., are all identical to the standard S and H Series breakers of the same designation.

Model	NF125-SV	NF125-HV	NF250-SV	NF250-HV	NF400-SW	NF400-SEW	NF630-SW (*)	NF630-SEW	NF800-SEW	NF1250-SEW	NF1600-SEW	
Rated current (A)	16, 20, 32, 40, 50, 63, 80, 100	16, 20, 32, 40, 50, 63, 80, 100	125, 150, 175, 200	125, 150, 175, 200	225, 250, 300, 350	200-350 adjustable	400, 500	300-500 adjustable	400-600 adjustable	600-800 adjustable	800-1200 adjustable	
Number of poles	2   3   4	2   3   4	2   3   4	2   3   4	2   3   4	3   4	3   4	3   4	3   4	3   4	3   4	
Rated insulation voltage (V)	690											
Rated breaking capacity (kA)	690VAC: 8/8 500VAC: 18/18 440VAC: 25/25 400VAC: 30/30 230VAC: 50/50	690VAC: 10/8 500VAC: 30/23 440VAC: 50/38 400VAC: 50/38 230VAC: 100/75	690VAC: 8/8 500VAC: 30/30 440VAC: 36/36 400VAC: 36/36 230VAC: 85/85	690VAC: 10/8 500VAC: 30/30 440VAC: 65/65 400VAC: 75/75 230VAC: 100/100	690VAC: 10/10 500VAC: 30/30 440VAC: 42/42 400VAC: 45/45 230VAC: 85/85	690VAC: 10/10 500VAC: 30/30 440VAC: 42/42 400VAC: 50/50 230VAC: 85/85	690VAC: 10/10 500VAC: 30/30 440VAC: 42/42 400VAC: 50/50 230VAC: 85/85	690VAC: 10/10 500VAC: 30/30 440VAC: 42/42 400VAC: 50/50 230VAC: 85/85	690VAC: 10/10 500VAC: 30/30 440VAC: 42/42 400VAC: 50/50 230VAC: 85/85	690VAC: 10/10 500VAC: 30/30 440VAC: 42/42 400VAC: 50/50 230VAC: 85/85	690VAC: 25/13 500VAC: 65/33 440VAC: 85/43 400VAC: 85/43 230VAC: 125/63	690VAC: 25/13 500VAC: 65/33 440VAC: 85/43 400VAC: 85/43 230VAC: 125/63

Note: \*1 Instantaneous trip current : Rated current x 14 (Fix)

## 4. ELCB for Special voltage

Standard ELCBs can be used up to 440V circuit. In case special voltage is required, ELCBs for special voltage are also available.

Frame(A)	30	32	50	60	63	50	60	63	100	125	100	125	100	225	250	225	250	225	250							
Model	NV32-SV		NV63-SV			NV63-HV			NV125-CV		NV125-SV		NV125-HV		NV250-CV		NV250-SV		NV250-HV							
Number of poles	3		3			3			3		3		3		3		3		3							
Rated operational voltage Ue(V)	380-550																									
Rated current In(A)	15	20		15	20		15	20		60	75	125	15	20		125	150	175	250	125	150	175	250			
Rated ambient temperature 40°C	30	(32)		30	40	50	60	(63)		40	50	60	(63)	60	75	100	125	150	175	200	225	125	150	175	200	225
High-speed type	30																									
	100 200 500 selectable																									
Maz. Operating time(s)	0.1																									
	0.04																									
Earth leakage protection characteristic	Type AC		Type AC			Type AC			Type AC		Type AC		Type AC		Type AC		Type AC		Type AC							
Rated short-circuit breaking capacities(kA) IEC 60947-2(lcu/lcs)	550VAC	1.5/1		5/2		7.5/4		5/2		10/5		15/4		7.5/4		10/5		15/8		30/8		25/19		36/36		75/75
	480VAC	2.5/1		5/2		10/5		7.5/4		15/8		30/8		10/5		15/8		30/8		30/8		30/8		30/8		30/8
	380VAC	5/5		7.5/7.5		10/8		10/5		30/30		50/38		25/19		36/36		75/75		75/75		75/75		75/75		75/75
Suitability for isolation	●																									
Reverse connection	—																									
Installation and connection	Front connection	(F) ● Screw terminal																								
	Rear	(B) ● Round stud									● Bar stud															
Cassette-type accessories	Alarm switch	(AL) ●																								
	Auxiliary switch	(AX) ●																								
	Shunt trip	(SHT) ●																								
	Under voltage trip	(UVT) ●																								
	With lead-wire terminal block	(SLT) ●																								
	Earth leakage alarm switch	(EAL) ● (*1)																								
	Test button module	(TBM) ● (*1)																								

Note: \*1 Standard type is SLT equipped.

## 5. MCCB and ELCB for special environment

Our MCCBs and ELCBs are manufactured based on the normal operating conditions. When using our MCCBs and ELCBs under different conditions, MCCBs and ELCBs for special environment are also available.

### ● Normal operating conditions

- Ambient temperature.....10°C~40°C  
Average temperature does not exceed 35°C in 24°C hours  
Current-temperature compensation ratio when exceeding 40°C  
50°C 0.9 times  
60°C 0.7 times
- Relative humidity.....Below 85% and no condensation
- Altitude.....Below 2,000m
- Atmosphere.....No excessive water vapor, oil vapor, smoke, dust, salt, corrosive substance, impact and vibration

Special environment		Special purpose	Specification	Model		
				MCCB	ELCB	Circuit protector
Low temp.	Cold storage warehouses	Low temp. breakers	Operation characteristics change under low temp. environment.	NF-C/S/H series (*1, *2)	NV32-SV NV63-CV/SV/HV NV125-CV/SV/HV NV250-CV/SV/HV	CP30-BA
High temp. High humid.	Chemical plants	Tropical treatment breakers	Under high humidity, withstand voltage and other electrical performance may be reduced. Moisture proof, mildew proof and corrosion resist breakers are available.	NF-C/S/H series (*3, *4, *5, *6, *7)	NF-C/S/H series (*3, *4, *5, *6, *7)	CP30-BA
Corrosive gas Salt	Petrochemical plants	Corrosion resist breaker	In case using breakers in environment filled with corrosive gas and salt, breaker with corrosion resisted boxes are recommended to use. If corrosion gas concentration is under standard value, corrosion resisted breaker can also be used. Gas concentration limit for standard breakers: H <sub>2</sub> S(0.01ppm), SO <sub>2</sub> (0.05ppm) HCl(0.05ppm), Cl <sub>2</sub> (0.01ppm) NH <sub>3</sub> (0.25ppm)	NF-C/S/H series (*3, *4, *5, *6, *7)	NF-C/S/H series (*3, *4, *5, *6, *7)	CP30-BA
Dust	Cement factory	Boxed breakers	In case dusty environment, boxed breakers are recommended to use. Refer to page 130. If breakers are to be installed in explosion proof case, use less ammonia molded breakers.			—

- Notes: \*1 SHT and UVT are not applicable.  
\*2 Electronic breakers are not applicable.  
\*3 250A frame electronic breakers are not applicable.  
\*4 AL, AX, SHT, UVT, EAL, TBL for 1000, 1200A frame ELCBs are not applicable.  
\*5 ELCBs for special voltage are not applicable.  
\*6 AL and AX for minute load are not applicable.  
\*7 UVT are not applicable.

# 4

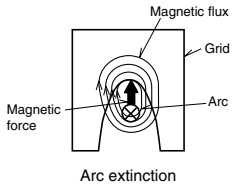
## Selection

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## 1. Construction of MCCB

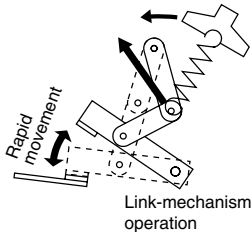
### ● Arc-Extinguishing Device

MCCBs feature excellent arc-extinguishing performance by virtue of the optimum combination of grid gap, shape, and material.



### ● Switching Mechanism

The contacts open and close rapidly, regardless of the moving speed of the handle, minimizing contact wear and ensuring safety.

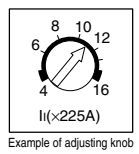


### ● Trip Button (Push to Trip)

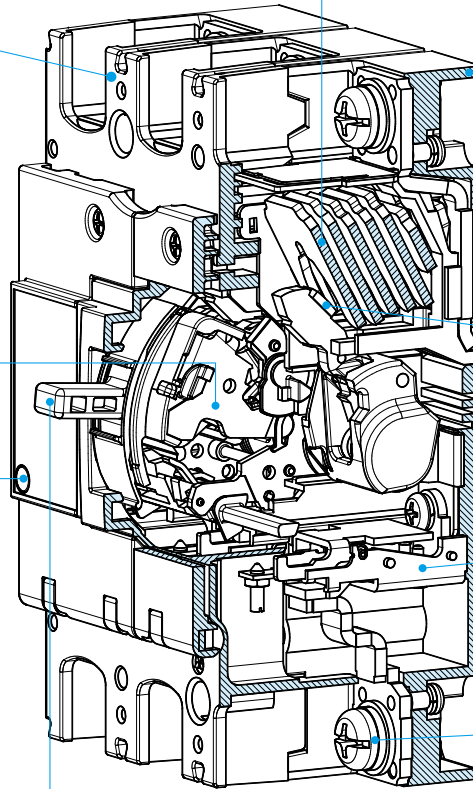
Enables tripping mechanically from outside, for confirming the operation of the accessory switches and the manual resetting function.

### ● Adjustable Instantaneous Tripping Current

On electronic molded case circuit breakers, the instantaneous tripping current can be adjusted only by turning the knob. Therefore, optimum characteristics for load can be obtained.



Molded case (Cover)



Molded case (Base)

Contact

### ● Overcurrent Tripping Device

Detects overcurrent and trips the circuit breaker.

Terminal

Fig. 4.1 Construction

### ● Handle

#### 1. Trip indication

The automatically tripped condition is indicated by the handle in the center position between ON and OFF, the yellow (or white) line cannot be seen in this position.

#### 2. Resetting

Resetting after tripping is performed by first moving the handle to the OFF position to engage the mechanism, then returning the handle to ON to reclose the circuit.

#### 3. Trip-Free

Even if the handle is held at ON, the breaker will trip if an overcurrent flows.



ON OFF Trip

Handle indication

#### 4. Contact On Mechanism

Even in the worst case in which welding occurs owing to an overcurrent, the breaker will trip and the handle will maintain to ON, indicating the energizing state.

## 4-pole Breaker

• The 4-pole breaker is designed for 3-phase 4-wire circuits. A neutral pole without an overcurrent tripping element is provided at the right end. The construction and operation are the same as class S, H and U breakers. (Electronic molded case circuit breakers with frame size of 1600A or less have overcurrent tripping elements on the neutral poles.)

• Since the four poles are simultaneously opened and closed, the user will not fail in turning on the neutral pole or carelessly open the pole. (The standard construction is designed to close the neutral pole earlier and open it later than the voltage pole.)

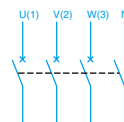


Fig. 4.2 4-pole Breaker (NF250-SV)

## ● 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. )

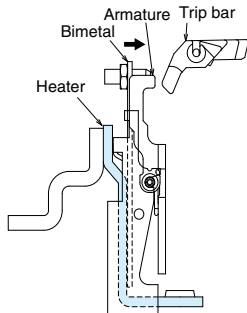


Fig. 4.3

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 armature is attracted and the trip bar actuated.

### Thermal-Magnetic Type (NF1250-SDW)

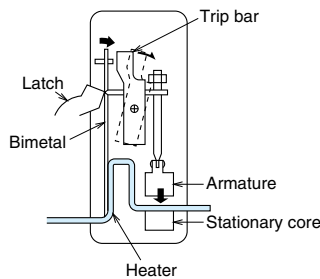


Fig. 4.4

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.)

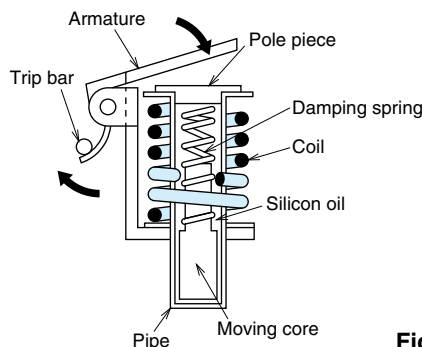


Fig. 4.5

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. )

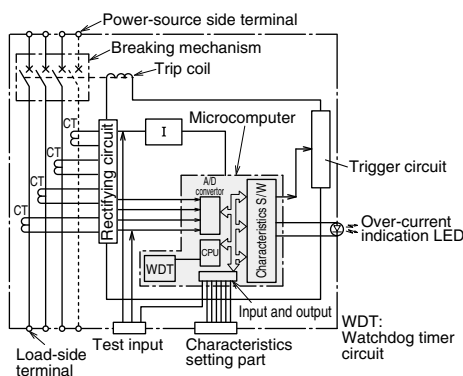


Fig. 4.6.1

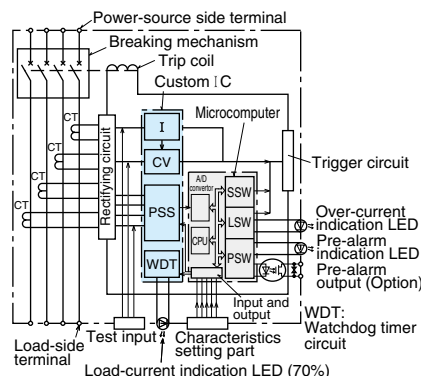


Fig. 4.6.2

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.

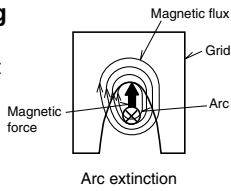
2 poles: 2P2E, 3 poles: 3P3E, 4 poles: 4P4E or 4P3E

(Some 4-pole models do not have overcurrent tripping devices for the neutral poles.)

## 2. Construction of ELCB

### ● Arc-Extinguishing Device

ELCBs feature excellent arc-extinguishing performance by virtue of the optimum combination of grid gap, shape, and material.



### ● Trip Button (Push to Trip)

Enables tripping mechanically from outside, for confirming the operation of the accessory switches and the manual resetting function.

### ● Overcurrent Tripping Device

The use of the proven mechanism of ELCBs ensures reliable detection of overcurrent.

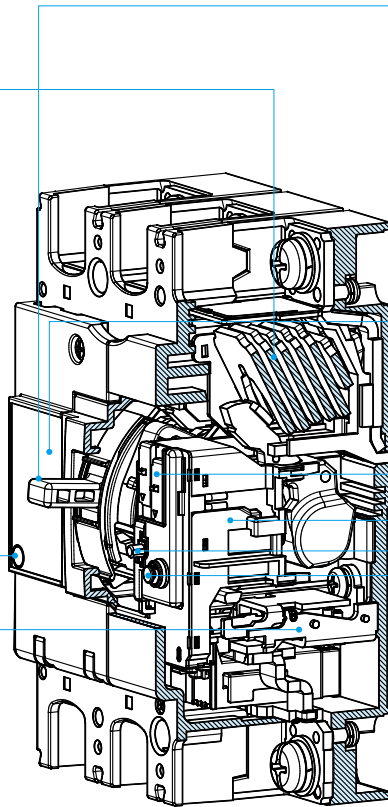


Fig. 4.7 Construction

### ● Switching Mechanism

The contacts open and close rapidly, regardless of the moving speed of the handle, minimizing contact wear and ensuring safety.

### ● Window Frame

Since the handle, trip button, test button, leakage display button and nameplate are located in one area, it is easy to cut the panel.

### ● Sensitivity Switching Device

The rated sensitivity current can be easily changed. A 3-stage switching device for 100, 200 and 500mA and a 2-stage switching device for 200 and 500mA are available.

### ● Leakage Display

Target type with display button. The display is automatically reset by the handle.

### ● Test Button

The button has excellent durability and performance to withstand inspection at start.

### ● Leakage Tripping Device

- The semiconductor circuit unit, which is the most important part of the device, is an electronic type using highly reliable ICs.
- For improvement of the function for removing harmonic and surge components, two filters are provided to prevent unnecessary operations.
- The ZCT detects any minute current. It is covered with a magnetic shield and never operates unnecessarily owing to motor starting current.

Rated operational voltage	Applicable circuit voltage	Available voltage range
100-240V	100/110/200/220/230/240V	80 to 264V
100-440V	100/110/200/220/240/254/265/380/400/415/440V	80 to 484V
200-440V	200/220/240/254/265/380/400/415/440V	160 to 484V
100-200-415V	100/110/200/220/240/254/265/380/400/415/440V	80 to 484V
200-415V	200/220/240/254/265/380/400/415/440V	160 to 484V

### ● Operation

1. When an earth fault occurs, voltage is induced on the secondary side of the ZCT.
2. Factors of unnecessary operations, i.e. surge and noise components, are removed from the induced voltage.
3. The signal level is discriminated, and, when the level exceeds the specified level, the electromagnetic device is excited to trip the circuit breaker body.

### Overload and short-circuit

The use of the proven mechanism of ELCBs ensures reliable detection of overcurrent and earth fault to break the circuit.

### Revision to EN and GB/T Standards

Products for European markets must conform to the CE Marking Directives. To affix the CE mark to a product, it is necessary that the product conforms to European Standard (EN Standard). Products for China must conform to Chinese GB/T Standard to affix the CCC mark.

The third edition (2003) of EN Standard for circuit breakers, EN 60947-2, and GB/T Standard GB/T 14048.2 (2008) prescribe that the functions of earth leakage circuit breakers should normally work even in open phase condition. Products based on the previous EN Standard (second edition) have not been approved since June, 2006. Products based on the previous GB/T Standard (2001) have not been approved since January, 2011.

☆WS-V Series Earth Leakage Circuit Breakers (conforming to CE and CCC Standards) and UL 489 Listed Molded Case Circuit Breakers with earth leakage protection conform to the third edition of EN 60947-2 and GB/T 14048.2 2008 as 3-phase power supply earth leakage circuit breakers.

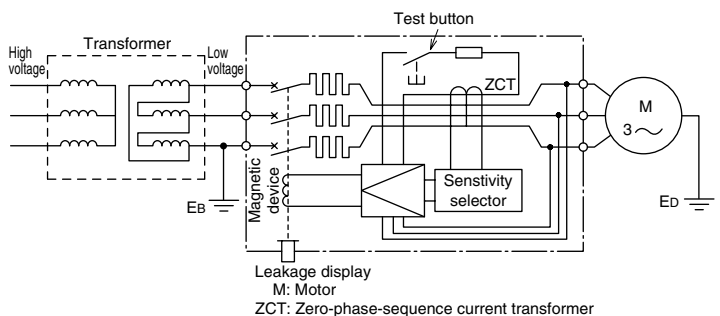


Fig. 4.8 Circuit configuration of ELCB (NV63-SV)

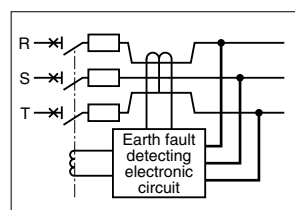


Fig. 4.9 Circuit diagram in 3-phase power supply ELCB

## 1. Selecting Procedure

### ■ MCCB (NF)

<b>Circuit used</b> <b>Applicable standard</b>	Phase and wire type, voltage, DC or AC, frequency, standard	<ul style="list-style-type: none"> <li>●Applicable phase and wire type 2 poles: 1-phase 2-wire 3 poles: 1-phase 2-wire, 1-phase 3-wire, 3-phase 3-wire 4 poles: 3-phase 4-wire</li> <li>●Specification list (pages 18 to 59)</li> <li>●List of received certifications (page 90)</li> </ul>
<b>Determination of rated current</b>	Kind and size of electric wire Kind and working conditions of load Selection conditions in internal standard and electrical equipment technical standards	<ul style="list-style-type: none"> <li>●Relationship between temperature and electric wire (page 72)</li> <li>●Selection of circuit breaker for motor branch circuit (page 77)</li> <li>●Selection of circuit breaker for electric lamp or electric heater circuit (page 75)</li> <li>●Selection of motor protection breaker (page 79)</li> <li>●Selection of circuit breaker for inverter circuit (page 80)</li> <li>●Selection of circuit breaker on transformer primary side (page 81)</li> </ul>
<b>Determination of interrupting capacity</b>	Transformer capacity Electric wire thickness and length	<ul style="list-style-type: none"> <li>●Application based on breaking capacity (page 74)</li> <li>●Table of combinations for cascade breaking (page 87)</li> </ul>
<b>Examination of coordination</b>	Selective breaking	<ul style="list-style-type: none"> <li>●Operating characteristic curve (pages 146 to 248)</li> <li>●Table of combinations for selective breaking (page 85)</li> </ul>
<b>Determination of model</b>	Use	●Circuit Breakers for special purpose (pages 61)
<b>Installation method</b>	Connection and molded case circuit breaker	<ul style="list-style-type: none"> <li>●Installation and connection (pages 98 to 106)</li> <li>●Boxed Circuit Breakers (page 137)</li> </ul>
<b>Accessories</b>	Internal accessories and external accessories Electric operation	<ul style="list-style-type: none"> <li>●Internal accessories (pages 108 to 122)</li> <li>●External accessories (pages 123 to 143)</li> <li>●Electrical Operated Circuit Breakers (pages 140 to 142)</li> </ul>

### ■ ELCB (NV)

<b>Circuit used</b> <b>Applicable standard</b>	Phase and wire type, voltage, DC or AC, frequency, standard	<ul style="list-style-type: none"> <li>●Specification list (pages 18 to 59)</li> <li>●List of received certifications (page 90)</li> </ul>
<b>Determination of rated current</b>	Kind and size of electric wire Kind and working conditions of load Selection conditions in internal standard and electrical equipment technical standards	<ul style="list-style-type: none"> <li>●Relationship between temperature and electric wire (page 72)</li> <li>●Selection of circuit breaker for motor branch circuit (page 77)</li> <li>●Selection of circuit breaker for electric lamp or electric heater circuit (page 75)</li> <li>●Selection of circuit breaker for inverter circuit (page 80)</li> <li>●Selection of circuit breaker on transformer primary side (page 81)</li> </ul>
<b>Determination of interrupting capacity</b>	Transformer capacity Electric wire thickness and length	<ul style="list-style-type: none"> <li>●Application based on breaking capacity (page 74)</li> <li>●Table of combinations for cascade breaking (page 87)</li> </ul>
<b>Determination of rated current sensitivity</b>	Purpose of protection Obligation of installation	<ul style="list-style-type: none"> <li>●Purpose of protection (page 92)</li> <li>●Selection of rated sensitivity current of circuit breaker for inverter circuit (page 80)</li> <li>●Method of switching between rated voltage and rated sensitivity current (page 262)</li> </ul>
<b>Examination of coordination</b>	Selective breaking Ground fault protection coordination	<ul style="list-style-type: none"> <li>●Operating characteristic curve (pages 146 to 248)</li> <li>●Table of combinations for selective breaking (page 85)</li> <li>●Combinations of ground fault protection coordination and devices (page 95)</li> </ul>
<b>Determination of model</b>	Use	●Circuit Breakers for special purpose (pages 61)
<b>Installation method</b>	Connection and molded case circuit breaker	<ul style="list-style-type: none"> <li>●Installation and connection (pages 98 to 106)</li> <li>●Boxed Circuit Breakers (page 137)</li> </ul>
<b>Accessories</b>	Internal accessories and external accessories Electric operation	<ul style="list-style-type: none"> <li>●Internal accessories (pages 108 to 122)</li> <li>●External accessories (pages 123 to 143)</li> <li>●Electrical Operated Circuit Breakers (pages 140 to 142)</li> </ul>

## 2. Features and Performance

### ■ Features of MCCB

#### ● Molded Case Circuit Breakers (NF)

##### ① Time-delay trip function

This function conforms to the allowable current and time characteristics of electric wire and prevents operation caused by the starting current of a load device. When the overcurrent is large, the operating time is short, and when the overcurrent is small, the operating time is long.

##### ● In the case of electronic type

The electronic time-delay trip function includes a long time limit trip function conforming to the allowable current and time characteristics of conductor and a short time limit trip function for selective breaking for branch NFB. The short time limit function operates after a delay of some cycles (0.06 to 0.3s) at overcurrent exceeding the short time limit tripping current. These functions can be adjusted by the knob.

##### ② Instantaneous trip function

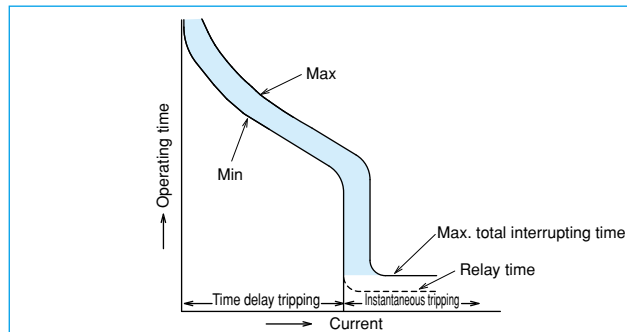
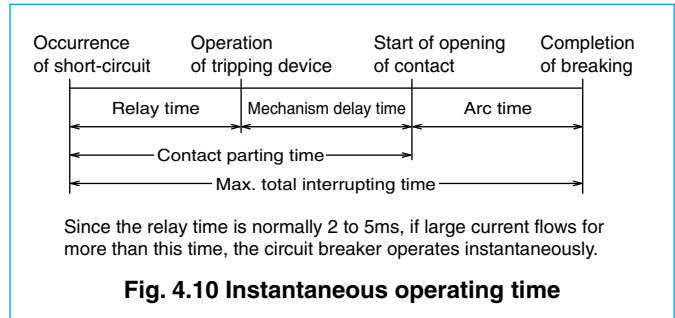
This function breaks the circuit immediately when short-circuit current flows. A circuit breaker on which the instantaneous tripping current is adjustable has the advantage that coordination in operation with other protective devices, such as electromagnetic switches and low-voltage air circuit breakers, can be easily obtained. The instantaneous operating time (total interrupting time) can be divided as shown in Fig. 4-10.

##### ③ Operating characteristic curve

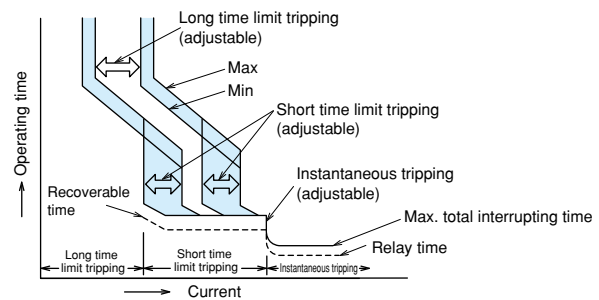
The operating characteristic curve indicates the relationship between magnitude of overcurrent and operating time. The maximum-minimum operating characteristic curve indicates that the operating time is in the range. Figs. 4-11 and 4-12 show examples of operating characteristic curves.

**Table 4-1 Overcurrent trip operating time (IEC 60947-2)**

Rated current of circuit breaker (A)	Operating time for 130% current
63 or less	Within 1hr.
Over 63	Within 2hrs.



**Fig. 4.11 Example of operating characteristic curve**



**Fig. 4.12 Example of operating characteristic curve of electronic type**

#### ● Motor Protection Breakers

- The motor protection breakers are circuit breakers to be used to protect general induction motors. They prevent motors being burnt not only by short-circuit current of circuits, but also by overcurrent caused by overload operation and locking of motors.
- The Motor Protection Breakers are finely classified according to rated current so that the breakers can be applied to various types of motors.
- Although their time-delay trip and instantaneous trip functions are almost the same as those of MCCB, they are designed to operate within 2 seconds to 30 seconds at 600% of the rated current in consideration of protection from motor starting current and locked current.

- There are many kinds of motors, and the motors have various allowable characteristics for overcurrent. Therefore, when applying a motor breaker, it is necessary to compare the allowable characteristics and the operating characteristics of the motor breaker. Note that, particularly, submersible motors may not be protected by ordinary motor breakers because their allowable locked time is short.
- When the motor starting current is large and the starting time is long and when the frequency of intermittent operation is high, motor breakers are unsuitable. In such a case, the use of a combination of an electromagnetic switch and MCCB (combination starter) is recommended.



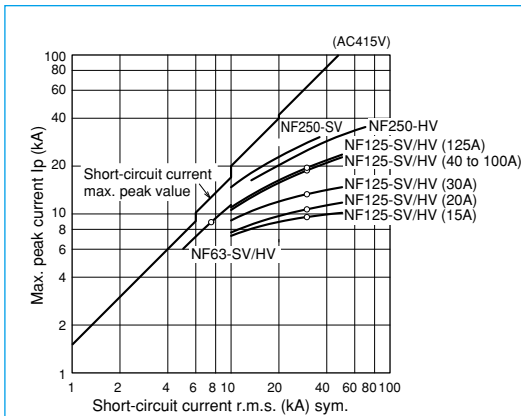
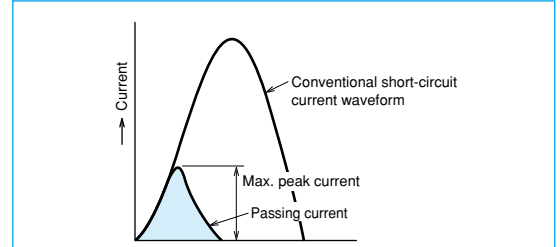
### ● Characteristics of MCCB for DC circuits

When a 2-pole MCCB (250VDC or less) is used on a DC circuit, connect the poles in series. When a 3- or 4-pole MCCB is used, refer to page 60 (for special DC voltage) or pages 14 to 21 (for DC).

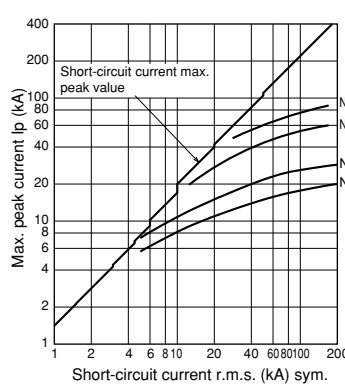
If the breaker is not connected as specified, its tripping characteristics and breaking performance will change, and it cannot be used.

### ● Current-limiting characteristic

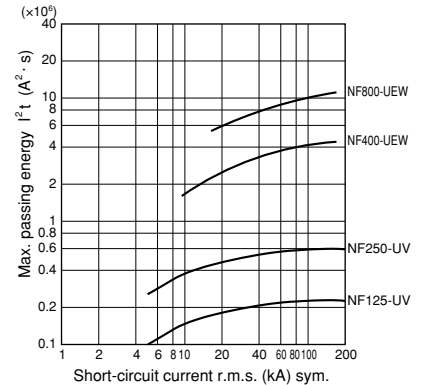
The current limiting refers to reduction of estimated short-circuit current depending on the circuit to prevent flow of the larger short-circuit current. The use of a class S, H or R which has excellent current-limiting characteristic or class U enables to reduce the passing energy at short-circuiting and protect the devices in the electric circuit from electromagnetic force and thermal stress.



**Fig. 4.13**  
Passing current peak value characteristic of classes S and H (415VAC)



**Fig. 4.14**  
Passing current peak value characteristic of classes U (415VAC)



**Fig. 4.15**  
Passing  $I^2t$  characteristic of class U (415VAC)

## ■ Performance

### ● Short-circuit breaking performance

Short-circuit current corresponding to the rated interrupting capacity is interrupted.

#### ● Outline of short-circuit test (IEC 60947-2)

- ① Rated limit short-circuit interrupting capacity (Icu)  
Operating duty: O – 3min – CO
- ② Rated service short-circuit interrupting capacity (Ics)  
Operating duty: O – 3min – CO – 3min – CO  
Upper limit of temperature rise of terminal after breaking: 80K or less  
O duty: The circuit breaker in the ON status carries and interrupts short-circuit current.  
CO duty: A shorted circuit is formed, and the circuit breaker is turned on to carry and interrupt short-circuit current.

### ● Opening/closing performance

Table 4-2 shows the durability against opening and closing. See the durability against opening and closing as reference when using a circuit breaker as a switchgear.

The durability against tripping by SHT (shunt tripping device), UVT (undervoltage tripping device) and trip button is 10% of the total durability against opening and closing.

Note: Opening and closing operations are regarded as one time.

If a circuit breaker is regularly used to trip, the life of the circuit breaker will be significantly reduced.

**Table 4-2 Durability of MCCB against opening and closing (IEC 60947-2)**

Rated current (A)	Frequency of opening and closing (times/hour)	Durability against opening and closing (times)		
		With current flow	Without current flow	Total
100 or less	120	1500	8500	10000
101 to 315	120	1000	7000	8000
316 to 630	60	1000	4000	5000
631 to 2500	20	500	2500	3000
2501 or more	10	500	1500	2000

## 3. Current-carrying Capacity and Operating Temperature

### ■ Operating current vs. ambient temperature

Rated current of circuit breakers is adjusted for the rated ambient temperature. This is because circuit breakers are often installed in a casing as a switchboard or a control board, and temperature of the installed place of the breaker becomes higher than ambient temperature of the wires. If temperature of the installation site of circuit breakers greatly differ from the rated ambient temperature, it is necessary to correct rated current according to the temperature correction curve (shown in the Paragraph of characteristics and outside shape in the catalog). Load current can be increased up to the rated current corrected according to ambient temperature.

However, set current rating with enough allowance while taking fluctuation of power voltage and load current into consideration so that maximum operating current may not exceed the rated current.

### (1) Cautionary instructions for using heat resistive wire

For using insulated wires of higher heat resistance than that of 600V PVC insulated wire (allowable temperature 60°C), it is necessary to take the following points into consideration.

For circuit breakers, size of test wire is stipulated by each test current in IEC60947-1

If size of connection wire is thinner than the test wire size, temperature of the breaker terminals increases and overcurrent tripping operation characteristic may change in some cases. (Operating time becomes shorter usually.)

At motor load, for example, influence of change in operation characteristic by difference in size of connection wire is insignificant and can be disregarded because the load current is far lower than the rated current of the circuit breaker.

**Table 4-3 Size of test wire**

Range of test current (A)	Conductor size (mm <sup>2</sup> )
0 < ≤ 8	1.0
8	1.5
12	2.5
15	2.5
20	4.0
25	6.0
32	10
50	16
65	25
85	35
100	35
115	50
130	50
150	70
175	95
200	95
225	120
250	150
275	185
300	185
350	240

## (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.

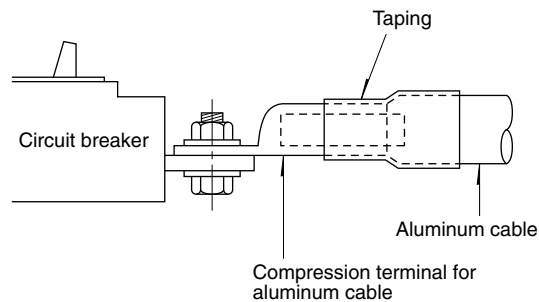


Fig. 4.16 Example of connection of aluminum conductor

## (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					80% of rated current
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			
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							

# 4 Selection 2 Selection of MCCB and ELCB

## 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	-										
Breaking capacity (kA) (sym)	2.5	5	7.5	10	15	25	30	35	36	50	85	100	125	150	170	200
Frame (A)	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-HEV	NF125-RGV		NF125-UV				
	225 • 250	NF250-CV				NF250-SV	NF250-SEV		NF250-HV	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	NF630-UEW						
	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										
Breaking capacity (kA) (sym)	1.5	2.5	7.5	10	15	20	25	30	35	36	50	65	85	125	200	
Frame (A)	30 • 32	NF30-CS	NF32-SV													
	50 • 60 • 63	NF63-CV	NF63-SV	NF63-HV												
	100 • 125	NF125-CV		NF125-SV	NF125-HV		NF125-SEV		NF125-HEV	NF125-RV		NF125-UV				
	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		NF630-UEW							
	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	-								
Breaking capacity (kA) (sym)	1.5	2.5	5	7.5	10	15	25	30	35	36	50	85	100	125
Frame (A)	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		NV400-REW		NV400-UEW			
	600 • 630	NV630-CW				NV630-SW/SEW	NV630-HEW		NV630-REW		NV630-UEW			
	800	NV800-SEW				NV800-HEW		NV800-REW		NV800-UEW				

\*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								
Breaking capacity (kA) (sym)	2.5	5	7.5	10	15	25	30	35	36	50	65	70	85	125
Frame (A)	30 • 32	NV32-SV												
	50 • 60 • 63	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		NV400-REW		NV400-UEW				
	600 • 630	NV630-CW			NV630-SW/SEW	NV630-HEW		NV630-REW		NV630-UEW				
	800	NV800-SEW			NV800-HEW		NV800-REW		NV800-UEW					

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-SV	NF125-SV	NF125-SV	NF125-HV	NF125-HV	NF125-RGV	NF125-UV			
16	20															
24	30															
32	40															
40	50															
48	60															
60	75															
80	100															
100	125															
120	150															
140	175															
160	200															
180	225															
200	250															
240	300															
280	350															
320	400															
400	500															
480	600															
560	700															
640	800															
800	1000															
960	1200															
1120	1400															
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-SV	NF125-HV	NF125-HV	NF125-RGV	NF125-UV			
16	20															
24	30															
32	40															
40	50															
48	60															
60	75															
80	100															
100	125															
120	150															
140	175															
160	200															
180	225															
200	250															
240	300															
280	350															
320	400															
400	500															
480	600															
560	700															
640	800															
800	1000															
960	1200															
1120	1400															
1280	1600															

# 4 Selection 2 Selection of MCCB and ELCB

## ELCB (NV)

Table 4-11 230VAC

Max. working current (A)	Rated current (A)	Breaking capacity (kA) 230VAC (Icu sym)											
		2.5	5	7.5	10	15	25	30	36	50	85	100	125
12	15	NV32-SV		NV32-SV		NV63-HV		NV125-HV					
16	20	NV32-SV		NV32-SV		NV63-HV		NV125-HV					
24	30	NV32-SV		NV32-SV		NV63-HV		NV125-HV					
32	40	NV32-SV		NV32-SV		NV63-HV		NV125-HV					
40	50	NV63-CV		NV63-SV		NV63-HV		NV125-HV		NV125-HV		NV125-HV	
48	60	NV63-CV		NV63-SV		NV63-HV		NV125-HV		NV125-HV		NV125-HV	
60	75	NV63-CV		NV63-SV		NV63-HV		NV125-HV		NV125-HV		NV125-HV	
80	100	NV125-CV		NV125-SV		NV125-SV		NV125-HV		NV125-HV		NV125-HV	
100	125	NV125-CV		NV125-SV		NV125-SV		NV125-HV		NV125-HV		NV125-HV	
120	150	NV250-CV		NV250-SV		NV250-SV		NV250-HV		NV250-HV		NV250-HV	
140	175	NV250-CV		NV250-SV		NV250-SV		NV250-HV		NV250-HV		NV250-HV	
160	200	NV250-CV		NV250-SV		NV250-SV		NV250-HV		NV250-HV		NV250-HV	
180	225	NV250-CV		NV250-SV		NV250-SV		NV250-HV		NV250-HV		NV250-HV	
200	250	NV250-CV		NV250-SV		NV250-SV		NV250-HV		NV250-HV		NV250-HV	
240	300	NV400-CW		NV400-SW		NV400-SW		NV400-HV		NV400-HV		NV400-HV	
280	350	NV400-CW		NV400-SW		NV400-SW		NV400-HV		NV400-HV		NV400-HV	
320	400	NV400-CW		NV400-SW		NV400-SW		NV400-HV		NV400-HV		NV400-HV	
400	500	NV630-CW		NV630-SW		NV630-SW		NV630-HV		NV630-HV		NV630-HV	
480	600	NV630-CW		NV630-SW		NV630-SW		NV630-HV		NV630-HV		NV630-HV	
560	700	NV800-SEW		NV800-SW		NV800-SW		NV800-HV		NV800-HV		NV800-HV	
640	800	NV800-SEW		NV800-SW		NV800-SW		NV800-HV		NV800-HV		NV800-HV	

Table 4-12 440VAC

Max. working current (A)	Rated current (A)	Breaking capacity (kA) 440VAC (Icu sym)												
		2.5	5	7.5	10	15	25	30	36	45	50	70	85	125
12	15	NV32-SV		NV63-SV		NV63-HV		NV125-SV		NV125-HV				
16	20	NV32-SV		NV63-SV		NV63-HV		NV125-SV		NV125-HV				
24	30	NV32-SV		NV63-SV		NV63-HV		NV125-SV		NV125-HV				
32	40	NV32-SV		NV63-SV		NV63-HV		NV125-SV		NV125-HV				
40	50	NV63-CV		NV63-SV		NV63-HV		NV125-SV		NV125-HV		NV125-HV		NV125-HV
48	60	NV63-CV		NV63-SV		NV63-HV		NV125-SV		NV125-HV		NV125-HV		NV125-HV
60	75	NV63-CV		NV63-SV		NV63-HV		NV125-SV		NV125-HV		NV125-HV		NV125-HV
80	100	NV125-CV		NV125-SV		NV125-SV		NV125-HV		NV125-HV		NV125-HV		NV125-HV
100	125	NV125-CV		NV125-SV		NV125-SV		NV125-HV		NV125-HV		NV125-HV		NV125-HV
120	150	NV250-CV		NV250-SV		NV250-SV		NV250-HV		NV250-HV				
140	175	NV250-CV		NV250-SV		NV250-SV		NV250-HV		NV250-HV				
160	200	NV250-CV		NV250-SV		NV250-SV		NV250-HV		NV250-HV				
180	225	NV250-CV		NV250-SV		NV250-SV		NV250-HV		NV250-HV				
200	250	NV250-CV		NV250-SV		NV250-SV		NV250-HV		NV250-HV				
240	300	NV400-CW		NV400-SW		NV400-SW		NV400-HV		NV400-HV				
280	350	NV400-CW		NV400-SW		NV400-SW		NV400-HV		NV400-HV				
320	400	NV400-CW		NV400-SW		NV400-SW		NV400-HV		NV400-HV				
400	500	NV630-CW		NV630-SW		NV630-SW		NV630-HV		NV630-HV				
480	600	NV630-CW		NV630-SW		NV630-SW		NV630-HV		NV630-HV				
560	700	NV800-SEW		NV800-SW		NV800-SW		NV800-HV		NV800-HV				
640	800	NV800-SEW		NV800-SW		NV800-SW		NV800-HV		NV800-HV				

4

2 Selection



# 4 Selection 2 Selection of MCCB and ELCB

## ELCB (NV)

Table 4-15 200/220VAC for 3-phase induction motor

For 4-pole motor	Electromagnetic contactor			Breaking capacity (kA) 230VAC (Icu sym)																			
	Output (kW)	Full-load current (A)	Model	2.5		7.5		15(*1)		25		30(*2)		50		85		100					
			Heater nominal (A)	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating				
Direct-to-line starting	0.1	0.7	N10-N21	0.7	NV30-CS	(5)	NV63-CV	(5)	NV32-SV	(15)	NV63-HV	(15)			NV125-SV	(15)			NV125-HV	(15)			
	0.2	1.2		1.3																			
	0.4	2.1	N10-N21	2.1	NV30-CS	5	NV63-CV	5	NV32-SV	(15)	NV63-HV	(15)			NV125-SV	(15)			NV125-HV	(15)			
	0.75	3.7	N10-N21	3.6	NV30-CS	10	NV63-CV	10	NV32-SV	(15)	NV63-HV	(15)			NV125-SV	(15)			NV125-HV	(15)			
	1.5	6.4	N10-N25	6.6	NV30-CS	15	NV63-CV	15	NV32-SV	15	NV63-HV	15			NV125-SV	15			NV125-HV	(15)			
	2.2	9.1	N10-N35	9	NV30-CS	20	NV63-CV	20	NV32-SV	20	NV63-HV	20			NV125-SV	20			NV125-HV	20			
	3.7	15	N18-N35	15	NV30-CS	30	NV63-CV	30	NV32-SV	30	NV63-HV	30			NV125-SV	30			NV125-HV	30			
	5.5	22	N25 • N35 • N50 • N65	22			NV63-CV	50	NV63-SV	50	NV63-HV	50			NV125-SV	50			NV125-HV	50			
	7.5	29	N35 • N50-N80	29			NV63-CV	60	NV63-SV	60	NV63-HV	60			NV125-SV	60			NV125-HV	60			
	11	44	N50-N95	42											NV125-CV	75	NV125-SV	75		NV125-HV	75		
	15	55	N65-N125	54											NV125-CV	100	NV125-SV	100		NV125-HV	100		
Y-Δ starting	5.5	22	-	22			NV63-CV	50	NV63-SV	50	NV63-HV	50			NV125-SV	50			NV125-HV	50			
	7.5	29	-	29			NV63-CV	60	NV63-SV	60	NV63-HV	60			NV125-CV	60	NV125-SV	60		NV125-HV	60		
	11	44	-	42											NV125-CV	75	NV125-SV	75		NV125-HV	75		
	15	55	-	54											NV125-CV	100	NV125-SV	100		NV125-HV	100		
	18.5	67	N80-N125	67											NV125-CV	100	NV125-SV	100		NV125-HV	100		
	22	85	N95-N150	82											NV250-CV	150			NV250-SV	150	NV250-HV	150	
	30	110	N125-N220	105											NV250-CV	175			NV250-SV	175	NV250-HV	175	
	37	130	N150-N220	125											NV250-CV	225			NV250-SV	225	NV250-HV	225	
	45	164	N180-N400	150													NV400-CW	400	NV400-SW	300	NV400-HEW	250	
	55	195	N220-N400	180													NV630-CW	500	NV400-SW	300	NV400-HEW	300	
	75	267	N300 • N400 • (N600)	250													NV630-CW	600	NV400-SW	400	NV400-HEW	400	
90	320	N300 • N400 • (N600 • N800)	330														NV630-SW	500	NV630-SEW	500	NV630-HEW	500	
110	385	N300 • N400 • (N600 • N800)	330															NV630-SW	600	NV630-SEW	600	NV630-HEW	600

Notes \*1 The breaking capacity of NV32-SV is 10kA. \*2 The breaking capacity of NV250-CV is 36kA.

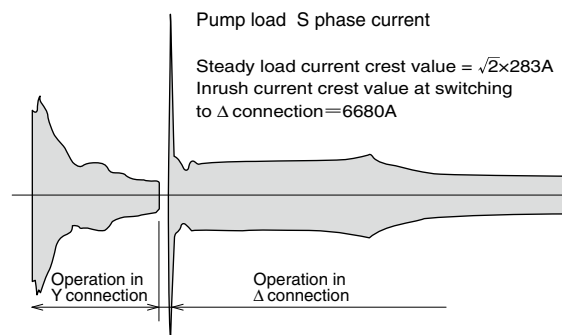
Table 4-16 400/440VAC for 3-phase induction motor

For 4-pole motor	Electromagnetic contactor			Breaking capacity (kA) 415VAC (Icu sym)																		
	Output (kW)	Full-load current (A)	Model	2.5		5		7.5		10		25		30(*1)		50(*2)		70				
			Heater nominal (A)	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating	Model	Rating			
Direct-to-line starting	0.2	0.6	N10-N21	0.7	NV63-CV	(5)	NV32-SV	(5)	NV63-SV	(5)	NV63-HV	(15)			NV125-SV	(15)	NV125-HV	(15)				
	0.4	1.1	N10-N21	1.3	NV63-CV	(5)	NV32-SV	(5)	NV63-SV	(5)	NV63-HV	(15)			NV125-SV	(15)	NV125-HV	(15)				
	0.75	1.9	N10-N21	1.7	NV63-CV	5	NV32-SV	5	NV63-SV	5	NV63-HV	(15)			NV125-SV	(15)	NV125-HV	(15)				
	1.5	3.2	N10-N21	3.6	NV63-CV	10	NV32-SV	10	NV63-SV	10	NV63-HV	(15)			NV125-SV	(15)	NV125-HV	(15)				
	2.2	4.6	N10-N21	5	NV63-CV	10	NV32-SV	10	NV63-SV	10	NV63-HV	(15)			NV125-SV	(15)	NV125-HV	(15)				
	3.7	7.5	N11-N35	6.6	NV63-CV	20	NV32-SV	20	NV63-SV	20	NV63-HV	20			NV125-SV	20	NV125-HV	20				
	5.5	11	N18-N35	11	NV63-CV	30	NV32-SV	30	NV63-SV	30	NV63-HV	30			NV125-SV	30	NV125-HV	30				
	7.5	15	N20-N35 • N50	15	NV63-CV	30	NV32-SV	30	NV63-SV	30	NV63-HV	30			NV125-SV	30	NV125-HV	30				
	11	22	N25 • N35 • N50 • N65	22	NV63-CV	50			NV63-SV	50	NV63-HV	50			NV125-SV	50	NV125-HV	50				
	15	28	N35 • N50-N80	28	NV63-CV	60			NV63-SV	60	NV63-HV	60			NV125-SV	60	NV125-HV	60				
	18.5	34	N50-N95	35											NV125-CV	60	NV125-SV	60	NV125-HV	60		
Y-Δ starting	22	42	N50-N95	42											NV125-CV	75	NV125-SV	75	NV125-HV	75		
	30	55	N65-N125	54											NV125-CV	100	NV125-SV	100	NV125-HV	100		
	37	65	N80-N150	67											NV125-CV	100	NV125-SV	100	NV125-HV	100		
	45	82	N95-N150	82											NV125-CV	100	NV125-SV	100	NV125-HV	100		
	5.5	11	-	11	NV63-CV	30	NV32-SV	30	NV63-SV	30	NV63-HV	30			NV125-SV	30	NV125-HV	30				
	7.5	15	-	15	NV63-CV	40			NV63-SV	40	NV63-HV	40			NV125-SV	40	NV125-HV	40				
	11	22	-	22	NV63-CV	50			NV63-SV	50	NV63-HV	50			NV125-SV	50	NV125-HV	50				
	15	28	-	28	NV63-CV	60			NV63-SV	60	NV125-CV	60			NV125-SV	60	NV125-HV	60				
	18.5	34	-	35							NV125-CV	60			NV125-SV	60	NV125-HV	60				
	22	42	-	42							NV125-CV	75			NV125-SV	75	NV125-HV	75				
	30	55	-	54							NV125-CV	100			NV125-SV	100	NV125-HV	100				
Direct-to-line starting	37	65	-	67						NV125-CV	100			NV125-SV	100	NV125-HV	100					
	45	82	-	82										NV250-CV	125	NV250-SV	125		NV250-HV	125		
	5.5	11	-	11											NV125-SV	30	NV125-HV	30				
	7.5	15	-	15											NV125-SV	40	NV125-HV	40				
	11	22	-	22											NV125-SV	50	NV125-HV	50				
	15	28	-	28											NV125-SV	60	NV125-HV	60				
	18.5	34	-	35											NV125-SV	60	NV125-HV	60				
	22	42	-	42											NV125-SV	75	NV125-HV	75				
	30	55	-	54											NV125-SV	100	NV125-HV	100				
	37	65	-	67											NV125-SV	100	NV125-HV	100				
	45	82	-	82											NV125-SV	100	NV125-HV	100				
55	96	N125-N220	105											NV250-CV	150			NV250-SV	150	NV250-HV	150	
75	134	N150-N220	125											NV250-CV	175			NV250-SV	175	NV250-HV	175	
90	160	N180-N400	150											NV250-CV	225			NV250-SV	225	NV250-HV	225	
110	192	N180-N400	180															NV250-SW	225		NV250-HEW	225
132	233	N220-N400	250																NV400-SW	350	NV400-HEW	300
160	290	N300 • N400 • (N600)	250																NV400-SW	400	NV400-HEW	400
200	360	N300 • N400 • (N600 • N800)	330																NV630-SW	500	NV630-HEW	500
																			NV630-SW	600	NV630-HEW	600

Notes \*1 The breaking capacity of NV250-SV and NV250-SEV is 36kA. \*2 The breaking capacity of NV400-SW is 45kA.

Remark: 1. For the selecting conditions, please refer to the remarks on page 73.

### Example of Y-Δ starting current waveform (crest value envelope)



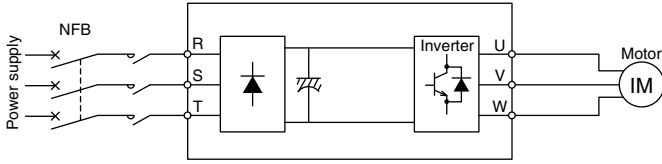




## 8. Selection of Circuit Breaker for Inverter Circuit

### ■ Selection of Circuit Breaker for Inverter Circuit

Since current containing harmonic components will flow, the rated current of circuit breaker must be approx. 1.4 times the inverter input current.



Install MCCB or ELCB on the primary side (power supply side) of the inverter. If it is installed on the secondary side, it may cause electronic circuit trouble or overheating.

Note The life cycle of the circuit breaker for the circuit on the inverter primary side will be reduced under the influence of transient inrush current. Install a switch.

**Table 4-18 3-phase 200V class**

Inverter input capacity kVA	Rated current of circuit breaker A	Inverter input capacity kVA	Rated current of circuit breaker A
5.5	30	41	175
9	40	52	225
12	50	66	300
17	75	80	350
20	100	100	500
28	125	110	500
34	150	132	600

### ■ Selection of rated sensitivity current of Earth Leakage Circuit Breaker for Inverter Circuit

Select the rated sensitivity current as stated below.

Circuit breakers for harmonics and surge: Rated sensitivity current  $I_{\Delta n} \geq 10 \times \{I_{g1} + I_{gn} + I_{g2} + I_{gm}\}$

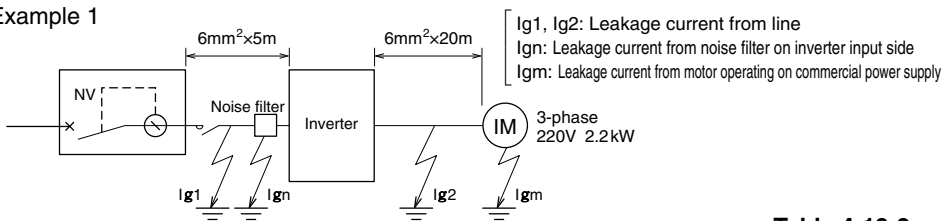
General circuit breakers: Rated sensitivity current  $I_{\Delta n} \geq 10 \times \{I_{g1} + I_{gn} + 3 \times (I_{g2} + I_{gm})\}$

**Table 4-19-1**

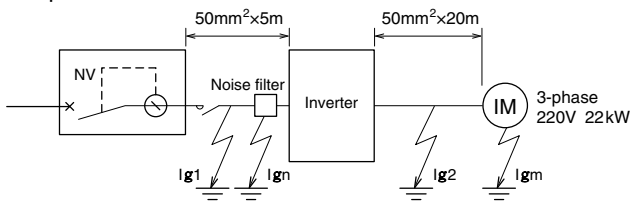
Examples of leakage current from line when IV cable is wired in close contact with ground (wiring in metallic conduit) (3-phase 220V 60Hz)

Wire size mm <sup>2</sup>	Leakage current/km mA
6	135
10	140
16	169
25	176
35	203
50	205
70	241
95	247

Example 1



Example 2



**Table 4-19-2**

Example of leakage current from 3-phase induction motor (220V 60Hz)

Motor output (kW)	Leakage current (mA)
2.2	0.2
3.7	0.29
5.5	0.32
7.5	0.42
11	0.55
15	0.63
18.5	0.72
22	0.8
30	0.96
37	1.1

### Example of selection 1

	Breaker for harmonics and surge	General breaker
Leakage current I <sub>g1</sub>	$135 \times \frac{5}{1000} = 0.675$	$135 \times \frac{5}{1000} = 0.675$
Leakage current I <sub>gn</sub>	0 (without noise filter)	
Leakage current I <sub>g2</sub>	$135 \times \frac{20}{1000} = 2.7$	$135 \times \frac{20}{1000} \times 3 = 8.1$
Leakage current I <sub>gm</sub>	0.18	$0.18 \times 3 = 0.54$
Total leakage current I <sub>g</sub>	3.555	11.465
Rated sensitivity current (> I <sub>g</sub> × 10)	100	200

### Example of selection 2

	Breaker for harmonics and surge	General breaker
Leakage current I <sub>g1</sub>	$205 \times \frac{5}{1000} = 1.025$	$205 \times \frac{5}{1000} = 1.025$
Leakage current I <sub>gn</sub>	0 (without noise filter)	
Leakage current I <sub>g2</sub>	$205 \times \frac{20}{1000} = 4.1$	$205 \times \frac{20}{1000} = 12.3$
Leakage current I <sub>gm</sub>	0.72	$0.72 \times 3 = 2.16$
Total leakage current I <sub>g</sub>	5.845	15.485
Rated sensitivity current (> I <sub>g</sub> × 10)	100	500

- Remarks:
- Circuit breakers for harmonics and surge can detect earth fault on the secondary side of inverter only when the operating frequency is 120Hz or less. In the case of star connection by neutral point grounding method, the sensitivity current for earth fault on the inverter secondary side is degraded. In this case, for protective ground for load device, apply Class C grounding (10Ω or less).
  - For general circuit breakers, the leakage current from the line between inverter and motor shall be calculated as three times the leakage current at the commercial frequency in consideration of harmonic content.
  - For the model names of circuit breakers for harmonics and surge, refer to the specification list in Section 2 of this document. Models not for harmonics and surge are general breakers.

## 9. Selection of Circuit Breaker for Transformer Primary Side

Notes 1. The life cycle of the circuit breaker for the circuit on the transformer primary side will be significantly reduced under the influence of excited inrush current. Install a switch to open and close the circuit.

2. Select a circuit breaker based on the example of excited inrush current of each transformer. When using a circuit breaker for a transformer, check the magnitude of excited inrush current with the transformer manufacturer.

### Single-phase 210V

Table 4-20-1 MCCB

Transformer capacity kVA	Rated primary current A	Example of transformer excited inrush current ①			Example of transformer excited inrush current ②			Example of transformer excited inrush current ③		
		Crest value of first wave (multiple)	Model	Rating A	Crest value of first wave (multiple)	Model	Rating A	Crest value of first wave (multiple)	Model	Rating A
5	23.8	45	NF125-CV(*1)	60	NF63-CV(*1)	50	24	NF63-CV(*1)	30	
			NF125-CV, NF125-SV, NF125-HV		NF125-CV(*1)			NF63-CV, NF63-SV		50
			NF125-SEV, NF125-HEV		NF125-CV, NF125-SV			NF125-CV(*2)		
7.5	35.7	45	NF250-CV, NF250-SV, NF250-HV	150	NF125-SEV	50	24	NF63-CV(*1)	50	
			NF250-SEV, NF250-HEV		NF125-CV(*1)			NF125-CV(*1)(*2)		60(50)
					NF250-CV, NF250-SV			NF125-CV, NF125-SV		
10	47.6	43	NF250-CV, NF250-SV, NF250-HV	200	NF125-CV(*1)	100	24	NF125-CV(*1)	60	
			NF250-SEV, NF250-HEV		NF250-CV, NF250-SV			NF125-CV, NF125-SV		100
					NF250-SEV					
15	71.4	43	NF400-CW	400	NF250-CV, NF250-SV	225	23	NF125-CV(*1)	100	
			NF400-SW		NF250-SEV			NF250-CV, NF250-SV		150
			NF400-SEW, NF400-HEW							
20	95.2	43	NF400-SW	400	NF400-SW	350	23	NF250-CV, NF250-SV	200	
			NF400-SEW, NF400-HEW		NF400-SEW			NF250-SEV		125
30	143	37	NF400-SEW, NF400-HEW	200	NF400-SEW	200	23	NF400-SW	300	
			NF630-SW					NF400-SEW		200
50	238	35	NF630-SEW(*1)	300	NF630-SEW	300	23	NF400-SEW(*1)	300	
			NF1000-SEW					NF630-SEW		300
75	357	30	NF800-SEW(*1)	400	NF800-SEW(*1)	400	22	NF630-SEW	400	
			NF1250-SEW							400
100	476	27	NF1000-SEW	800	NF1600-SEW	800	20	NF800-SEW(*1)	600	
150	714	24	-	-	-	-	19	NF1600-SEW	800	
200	952	21	-	-	-	-	19	-	-	
300	1429	17	-	-	-	-	16	-	-	
500	2381	-	-	-	-	-	-	-	-	

Table 4-20-2 ELCB

Transformer capacity kVA	Rated primary current A	Example of transformer excited inrush current ①			Example of transformer excited inrush current ②			Example of transformer excited inrush current ③		
		Crest value of first wave (multiple)	Model	Rating A	Crest value of first wave (multiple)	Model	Rating A	Crest value of first wave (multiple)	Model	Rating A
5	23.8	45	NV125-CV, NV125-SV, NV125-HV	100	NV125-CV, NV125-SV	75	24	NV63-CV, NV63-SV	50	
			NV125-SEV, NV125-HEV		NV125-SEV			NV125-CV		60
								NV125-SV		
7.5	35.7	45	NV250-CV, NV250-SV, NV250-HV	150	NV125-SEV	50	24	NV125-CV, NV125-SV	75	
			NV250-SEV, NV250-HEV		NV250-CV, NV250-SV			NV125-SEV		50
					NV250-SEV					
10	47.6	43	NV250-CV, NV250-SV, NV250-HV	200	NV250-CV, NV250-SV	150	24	NV125-CV, NV125-SV	100	
			NV250-SEV, NV250-HEV		NV250-SEV			NV250-CV, NV250-SV		125
15	71.4	43	NV400-CW	400	NV250-CV, NV250-SV	225	23	NV250-CV, NV250-SV	150	
			NV400-SW		NV250-SEV			NV250-SEV		125
			NV400-SEW, NV400-HEW							
20	95.2	43	NV400-SW	400	NV400-SW	350	23	NV250-CV, NV250-SV	200	
			NV400-SEW, NV400-HEW		NV400-SEW			NV250-SEV		125
30	143	37	NV400-SEW, NV400-HEW	200	NV400-SEW	200	23	NV400-SW	300	
			NV630-SEW					NV400-SEW		200
50	238	35	-	-	NV630-SEW	300	23	NV630-SEW	300	
								NV800-SEW		400
								NV630-SEW		
75	357	30	-	-	-	-	22	NV630-SEW	400	
100	476	27	-	-	-	-	20	-	-	
150	714	24	-	-	-	-	19	-	-	
200	952	21	-	-	-	-	19	-	-	
300	1429	17	-	-	-	-	16	-	-	
500	2381	-	-	-	-	-	-	-	-	

Notes \*1 Examples of selection of high-instantaneous circuit breakers (special models) for primary side of transformer.

\*2 The circuit breakers with rating in parentheses are special models.

Remarks: 1. For the circuit breakers whose rated current is adjustable, the rated current values are shown.

2. The crest value of the first wave of excited inrush current shall be calculated based on the multiple for the crest value of the first wave in the table, and the calculated value shall not exceed the lower limit crest value of instantaneous tripping current of circuit breaker. The circuit breakers are selected on condition that the transformer rated current value does not exceed 0.9 times the circuit breaker rated current. If the multiple for the crest value of the first wave is different from that shown in the table, a circuit breaker must be separately selected.

# 4 Selection 2 Selection of MCCB and ELCB

## Single-phase 420V

Table 4-21-1 MCCB

Transformer capacity kVA	Rated primary current A	Example of transformer excited inrush current ①			Example of transformer excited inrush current ②			Example of transformer excited inrush current ③		
		Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A
5	11.9	45	NF63-CV(*1)	30	NF32-SV	15	24	NF32-SV, NF63-CV, NF63-SV	15	
			NF63-CV, NF63-SV, NF63-HV	50	NF63-CV, NF63-SV	15		NF125-SV	15	
			NF125-CV, NF125-SV, NF125-HV	50	NF125-SV	15		NF125-SV	15	
7.5	17.9	45	NF63-CV(*1)	50	NF63-CV(*1)	40	24	NF32-SV, NF63-CV, NF63-SV	30	
			NF125-CV, NF125-SV, NF125-HV	75	NF63-CV, NF63-SV	60		NF125-SV	30	
10	23.8	43	NF125-CV(*1)	60	NF63-CV(*1)	50	24	NF63-CV, NF63-SV	30	
			NF125-CV, NF125-SV, NF125-HV	100	NF125-CV, NF125-SV	75		NF125-CV(*2)	(50)	
15	35.7	43	NF125-CV(*1)	100	NF125-CV(*1)	60	23	NF63-CV(*1)	50	
			NF250-CV, NF250-SV, NF250-HV	150	NF125-CV, NF125-SV	100		NF125-CV(*1)(*2)	60(50)	
20	47.6	43	NF250-CV, NF250-SV, NF250-HV	200	NF125-CV(*1)	100	23	NF125-CV(*1)	60	
			NF250-SEV, NF250-HEV	125	NF250-CV, NF250-SV	150		NF125-CV, NF125-SV	100	
30	71.4	37	NF250-SEV, NF250-HEV	125	NF250-CV, NF250-SV	225	23	NF125-CV(*1)	100	
			NF400-CW	350	NF250-SEV	125		NF250-CV, NF250-SV	150	
50	119	35	NF400-SW	400	NF400-SW	400	23	NF250-SEV	150	
			NF400-SEW, NF400-HEW	200	NF400-SEW	200				
75	179	30	NF400-SEW, NF400-HEW	200	NF400-SEW	200	22	NF400-SW	400	
			NF630-SW	500				NF400-SEW	200	
100	238	27	NF400-SEW(*1)	300	NF400-SEW(*1)	300	20	NF400-SEW	350	
			NF630-SW	600	NF630-SEW	300				
150	357	24	NF630-SEW(*1)	400	-	-	19	NF400-SEW(*1)	400	
								NF630-SEW	400	
200	476	21	NF800-SEW(*1)	600	NF800-SEW(*1)	600	19	NF800-SEW(*1)	600	
300	714	17	NF1250-SEW	800	NF1600-SEW	800	16	NF1250-SEW	800	
500	1190	-	-	-	-	-	-	-	-	

Table 4-21-2 ELCB

Transformer capacity kVA	Rated primary current A	Example of transformer excited inrush current ①			Example of transformer excited inrush current ②			Example of transformer excited inrush current ③		
		Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A
5	11.9	45	NV63-CV, NV63-SV, NV63-HV	50	NV32-SV	15	24	NV32-SV	15	
			NV125-CV	60	NV63-CV, NV63-SV	15		NV63-CV, NV63-SV	15	
			NV125-SV, NV125-HV	50	NV125-SV	15		NV125-SV	15	
7.5	17.9	45	NV125-CV, NV125-SV, NV125-HV	75	NV63-CV, NV63-SV	60	24	NV32-SV	30	
					NV125-CV, NV125-SV	60		NV63-CV, NV63-SV	30	
10	23.8	43	NV125-CV, NV125-SV, NV125-HV	100	NV125-CV, NV125-SV	75	24	NV63-CV, NV63-SV	50	
			NV125-SEV, NV125-HEV	50	NV125-SEV	50		NV125-CV	60	
15	35.7	43	NV250-CV, NV250-SV, NV250-HV	150	NV125-CV, NV125-SV	100	23	NV125-CV, NF125-SV	75	
			NV250-SEV, NV250-HEV	125	NV125-SEV	50		NV125-SEV	50	
20	47.6	43	NV250-CV, NV250-SV, NV250-HV	200	NV250-CV, NV250-SV	150	23	NV125-CV, NF125-SV	100	
			NV250-SEV, NV250-HEV	125	NV250-SEV	125		NV125-SEV	60	
30	71.4	37	NV250-SEV, NV250-HEV	125	NV250-CV, NV250-SV	225	23	NV250-SV, NV250-SV	150	
			NV400-CW	350	NV250-SEV	125		NV250-SEV	125	
50	119	35	NV400-SW	400	NV400-SW	400	23	NV250-SEV	150	
			NV400-SEW, NV400-HEW	200	NV400-SEW	200				
75	179	30	NV400-SEW, NV400-HEW	200	NV400-SEW	200	22	NV400-SW	400	
			NV630-SEW, NV630-HEW	300				NV400-SEW	200	
100	238	27	NV630-SEW, NV630-HEW	300	NV630-SEW	300	20	NV400-SEW	350	
			NV800-SEW, NV800-HEW	400	NV800-SEW	400				
150	357	24	-	-	-	-	19	NV630-SEW	400	
200	476	21	-	-	-	-	19	-	-	
300	714	17	-	-	-	-	16	-	-	
500	1190	-	-	-	-	-	-	-	-	

Notes \*1 Examples of selection of high-instantaneous circuit breakers (special models) for primary side of transformer.

\*2 The circuit breakers with rating in parentheses are special models.

Remarks: 1. For the circuit breakers whose rated current is adjustable, the rated current values are shown.

2. The peak value of the first wave of excited inrush current shall be calculated based on the multiple for the peak value of the first wave in the table, and the calculated value shall not exceed the lower limit peak value of instantaneous tripping current of circuit breaker. The circuit breakers are selected on condition that the transformer rated current value does not exceed 0.9 times the circuit breaker rated current. If the multiple for the peak value of the first wave is different from that shown in the table, a circuit breaker must be separately selected.

3-phase 210V

Table 4-21-3 MCCB

Transformer capacity kVA	Rated primary current A	Example of transformer excited inrush current ①			Example of transformer excited inrush current ②			Example of transformer excited inrush current ③		
		Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A
5	13.7	25	NF32-SV NF63-CV, NF63-SV, NF63-HV NF125-SV, NF125-HV	20 20 20	26	NF32-SV, NF63-CV, NF63-SV NF125-SV	20 20	18	NF32-SV, NF63-CV, NF63-SV NF125-SV	20 20
7.5	20.6	25	NF63-CV(*1) NF63-CV, NF63-SV, NF63-HV NF125-CV(*2) NF125-SV, NF125-HV	30 50 (50) 50	26	NF63-CV(*1) NF63-CV, NF63-SV NF125-CV, NF125-SV	30 50 50	18	NF32-SV, NF63-CV, NF63-SV NF125-CV(*2) NF125-SV	30 (50) 30
10	27.5	24	NF63-CV(*1) NF63-CV, NF63-SV, NF63-HV NF125-CV(*1) NF125-SV, NF125-HV	40 60 50 60	26	NF63-CV(*1) NF63-CV, NF63-SV NF125-CV, NF125-SV	40 60 60	18	NF63-CV, NF63-SV NF125-CV(*2) NF125-SV	50 (50) 50
15	41.2	24	NF63-CV(*1) NF125-CV, NF125-SV, NF125-HV	50 100	26	NF125-CV(*1) NF125-CV, NF125-SV	60 100	18	NF63-CV(*1) NF63-CV, NF63-SV NF125-CV, NF125-SV	50 60 60
20	55.0	20	NF125-CV(*1) NF125-CV, NF125-SV, NF125-HV	75 100	26	NF125-CV(*1) NF125-SEV NF250-CV, NF250-SV	75 75 125	18	NF125-CV(*1) NF125-CV, NF125-SV	75 100
30	82.5	20	NF125-CV(*1) NF250-CV, NF250-SV, NF250-HV NF250-SEV, NF250-HEV	100 150 125	26	NF250-CV, NF250-SV NF250-SEV	200 125	18	NF125-CV(*1) NF250-CV, NF250-SV	100 150
50	137	20	NF250-SEV, NF250-HEV NF400-CW NF400-SW	175 350 250	23	NF400-CW NF400-SW NF400-SEW	400 300 200	16	NF250-CV, NF250-SV NF250-SEV	200 175
75	206	21	NF400-SW NF400-SEW, NF400-HEW	400 250	18	NF400-SW NF400-SEW	350 250	14	NF400-SW NF400-SEW	300 250
100	275	21	NF400-SEW(*1) NF630-SW NF630-SEW, NF630-HEW	350 600 350	17	NF400-SEW	350	13	NF400-SW NF400-SEW	350 300
150	412	17	NF630-SEW, NF630-HEW	500	14	NF630-SEW	500	13	NF630-SW NF630-SEW	500 500
200	550	16	NF800-SEW(*1)	700	13	NF800-SEW	700	12	NF800-SEW	700
300	825	16	NF1600-SEW	1000	13	NF1250-SEW	1000	12	NF1000-SEW	1000
500	1375	-	-	-	11	NF1600-SEW	1600	11	NF1600-SEW	1600

Table 4-21-4 ELCB

Transformer capacity kVA	Rated primary current A	Example of transformer excited inrush current ①			Example of transformer excited inrush current ②			Example of transformer excited inrush current ③		
		Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A
5	13.7	25	NV32-SV NV63-CV, NV63-SV, NV63-HV NV125-SV, NV125-HV	20 20 20	26	NV32-SV NV63-CV, NV63-SV NV125-SV	20 20 20	18	NV32-SV NV63-CV, NV63-SV NV125-SV	20 20 20
7.5	20.6	25	NV63-CV, NV63-SV, NV63-HV NV125-CV NV125-SV, NV125-HV	50 60 50	26	NV63-CV, NV63-SV NV125-CV NV125-SV	50 60 50	18	NV32-SV NV63-CV, NV63-SV NV125-SV	30 30 30
10	27.5	24	NV63-CV, NV63-SV, NV63-HV NV125-CV, NV125-SV, NV125-HV	60 60	26	NV63-CV, NV63-SV NV125-CV, NV125-SV	60 60	18	NV63-CV, NV63-SV NV125-CV NV125-SV	50 60 50
15	41.2	24	NV125-CV, NV125-SV, NV125-HV NV125-SEV, NV125-HEV	100 50	26	NV125-CV, NV125-SV NV125-SEV	100 50	18	NV63-CV, NV63-SV NV125-CV, NV125-SV	60 60
20	55.0	20	NV125-CV, NV125-SV, NV125-HV NV125-SEV, NV125-HEV	100 75	26	NV125-SEV NV250-CV, NV250-SV	75 125	18	NV125-CV, NV125-SV NV125-SEV	100 75
30	82.5	20	NV250-CV, NV250-SV, NV250-HV NV250-SEV, NV250-HEV	150 125	26	NV250-CV, NV250-SV NV250-SEV	200 125	18	NV250-CV, NV250-SV NV125-SEV	150 125
50	137	20	NV250-SEV, NV250-HEV NV400-CW NV400-SW	175 350 250	23	NV400-CW NV400-SW NV400-SEW	400 300 200	16	NV250-CV, NV250-SV NV250-SEV	200 175
75	206	21	NV400-SW NV400-SEW, NV400-HEW	400 250	18	NV400-SW NV400-SEW	250 350	14	NV400-SW NV400-SEW	300 250
100	275	21	NV630-SEW, NV630-HEW NV800-SEW, NV800-HEW	350 400	17	NV400-SEW	350	13	NV400-SW NV400-SEW	350 300
150	412	17	NV630-SEW, NV630-HEW	500	14	NV630-SEW NV800-SEW	500 500	13	NV630-SEW NV800-SEW	500 500
200	550	16	-	-	13	-	-	12	NV800-SEW	700
300	825	16	-	-	13	-	-	12	-	-
500	1375	-	-	-	11	-	-	11	-	-

Notes \*1 Examples of selection of high-instantaneous circuit breakers (special models) for primary side of transformer.

\*2 The circuit breakers with rating in parentheses are special models.

Remarks: 1. For the circuit breakers whose rated current is adjustable, the rated current values are shown.

2. The peak value of the first wave of excited inrush current shall be calculated based on the multiple for the peak value of the first wave in the table, and the calculated value shall not exceed the lower limit peak value of instantaneous tripping current of circuit breaker. The circuit breakers are selected on condition that the transformer rated current value does not exceed 0.9 times the circuit breaker rated current. If the multiple for the peak value of the first wave is different from that shown in the table, a circuit breaker must be separately selected.

# 4 Selection 2 Selection of MCCB and ELCB

## 3-phase 420V

Table 4-21-5 MCCB

Transformer capacity kVA	Rated primary current A	Example of transformer excited inrush current ①			Example of transformer excited inrush current ②			Example of transformer excited inrush current ③		
		Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A
5	6.9	32	NF32-SV	10	26	NF30-CS	30	18	NF32-SV, NF63-CV, NF63-SV	10
			NF63-CV, NF63-SV, NF63-HV	10		NF32-SV, NF63-CV, NF63-SV	10		NF125-SV	15
			NF125-SV, NF125-HV	15						
7.5	10.3	32	NF32-SV	15	26	NF32-SV, NF63-CV, NF63-SV	15	18	NF32-SV, NF63-CV, NF63-SV	15
			NF63-CV, NF63-SV, NF63-HV	15		NF125-SV	15		NF125-SV	15
			NF125-SV, NF125-HV	15						
10	13.7	31	NF32-SV	20	26	NF32-SV	20	18	NF32-SV	20
			NF63-CV, NF63-SV, NF63-HV	20		NF63-CV, NF63-SV	20		NF63-CV, NF63-SV	20
			NF125-CV(*2)	(50)		NF125-SV	20		NF125-SV	20
15	20.6	31	NF63-CV(*1)	40	26	NF63-CV(*1)	30	18	NF32-SV, NF63-CV, NF63-SV	30
			NF63-CV, NF63-SV, NF63-HV	60		NF63-CV, NF63-SV	50		NF125-CV(*2)	(50)
			NF125-CV, NF125-SV, NF125-HV	60		NF125-CV, NF125-SV	50		NF125-SV	30
20	27.5	26	NF63-CV(*1)	40	26	NF63-CV(*1)	40	18	NF63-CV(*1)	40
			NF63-CV, NF63-SV, NF63-HV	60		NF63-CV, NF63-SV	60		NF63-CV, NF63-SV	50
			NF125-CV(*1)	50		NF125-CV, NF125-SV	60		NF125-CV, NF125-SV	50
30	41.2	24	NF63-CV(*1)	50	26	NF125-CV(*1)	60	18	NF63-CV(*1)	50
			NF125-CV(*1)	50		NF125-CV, NF125-SV	100		NF125-CV, NF125-SV	75
			NF125-CV, NF125-SV, NF125-HV	100						
50	68.7	22	NF125-CV(*1)	100	23	NF125-CV(*1)	100	16	NF125-CV, NF125-SV	100
			NF250-CV, NF250-SV, NF250-HV	150		NF250-CV, NF250-SV	150			
			NF250-SEV, NF250-HEV	125						
75	103	15	NF250-CV, NF250-SV, NF250-HV	150	18	NF250-CV, NF250-SV	175	14	NF250-CV, NF250-SV	150
			NF250-SEV, NF250-HEV	125		NF250-SEV	125			
100	137	15	NF250-CV, NF250-SV, NF250-HV	200	17	NF250-CV, NF250-SV	200	13	NF250-CV, NF250-SV	175
			NF250-SEV, NF250-HEV	175		NF250-SEV	175			
150	206	15	NF400-CW	400	14	NF400-SW	300	13	NF400-CW	400
			NF400-SW	300		NF400-SW	250		NF400-SW	250
			NF400-SEW, NF400-HEW	250		NF400-SEW	250		NF400-SEW	250
200	275	14	NF400-SW	350	13	NF400-SW/SEW	350/350	12	NF400-SW	350
			NF400-SEW, NF400-HEW	350					NF400-SEW	350
300	412	10	NF630-CW	600	13	NF630-SEW	500	12	NF630-SW	500
			NF630-SW	500					NF630-SEW	500
			NF630-SEW, NF630-HEW	500						
500	687	15	NF800-SEW(*1)	800	11	NF800-SEW	800	11	NF800-SEW	800
			NF1250-SEW	800						

Table 4-21-6 ELCB

Transformer capacity kVA	Rated primary current A	Example of transformer excited inrush current ①			Example of transformer excited inrush current ②			Example of transformer excited inrush current ③		
		Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A	Peak value of first wave (multiple)	Model	Rating A
5	6.9	32	NV32-SV	15 10	26	NV32-SV	15 10	18	NV32-SV	15 10
			NV63-CV, NV63-SV	15(10)		NV63-CV, NV63-SV	15(10)		NV63-CV, NV63-SV	15(10)
			NV63-HV	15		NV125-SV	15		NV125-SV	15
7.5	10.3	32	NV32-SV	15	26	NV32-SV	15	18	NV32-SV	15
			NV63-CV, NV63-SV, NV63-HV	15		NV63-CV, NV63-SV	15		NV63-CV, NV63-SV	15
			NV125-SV, NV125-HV	15		NV125-SV	15		NV125-SV	15
10	13.7	31	NV32-SV	20	26	NV32-SV	20	18	NV32-SV	20
			NV63-CV, NV63-SV, NV63-HV	20		NV63-CV, NV63-SV	20		NV63-CV, NV63-SV	20
			NV125-CV	50		NV125-SV	20		NV125-SV	20
15	20.6	31	NV63-CV, NV63-SV, NV63-HV	60	26	NV63-CV, NV63-SV	50	18	NV32-SV	30
			NV125-CV, NV125-SV, NV125-HV	60		NV125-CV	60		NV63-CV, NV63-SV	30
			NV125-SEV, NV125-HEV	50		NV125-SV	50		NV125-SV	30
20	27.5	26	NV63-CV, NV63-SV, NV63-HV	60	26	NV63-CV, NV63-SV	60	18	NV63-CV, NV63-SV	50
			NV125-CV, NV125-SV, NV125-HV	60		NV125-CV, NV125-SV	60		NV125-CV	60
									NV125-SV	50
30	41.2	24	NV125-CV, NV125-SV, NV125-HV	100	26	NV125-CV, NV125-SV	100	18	NV125-CV, NV125-SV	75
			NV125-SEV, NV125-HEV	50		NV125-SEV	50			
50	68.7	22	NV250-CV, NV250-SV, NV250-HV	150	23	NV250-CV, NV250-SV	150	16	NV125-CV, NV125-SV	100
			NV250-SEV, NV250-HEV	125		NV250-SEV	125			
75	103	15	NV250-CV, NV250-SV, NV250-HV	150	18	NV250-CV, NV250-SV	175	14	NV250-CV, NV250-SV	150
			NV250-SEV, NV250-HEV	125		NV250-SEV	125			
100	137	15	NV250-CV, NV250-SV, NV250-HV	200	17	NV250-CV, NV250-SV	200	13	NV250-CV, NV250-SV	175
			NV250-SEV, NV250-HEV	175		NV250-SEV	175			
150	206	15	NV400-CW	400	14	NV400-SW	300	13	NV400-CW	400
			NV400-SW	300		NV400-SW	250		NV400-SW	250
			NV400-SEW, NV400-HEW	250		NV400-SEW	250		NV400-SEW	250
200	275	14	NV400-SW	350	13	NV400-SW	350	12	NV400-SW	350
			NV400-SEW, NV400-HEW	350		NV400-SEW	350		NV400-SEW	350
300	412	10	NV630-CW, NV630-SW	600	13	NV630-SEW	500	12	NV630-SW	500
			NV630-SEW, NV630-HEW	500		NV800-SEW	500		NV630-SEW	500
500	687	15	-	-	11	-	-	11	-	-

Notes \*1 Examples of selection of high-instantaneous circuit breakers (special models) for primary side of transformer.

\*2 The circuit breakers with rating in parentheses are special models.

Remarks: 1. For the circuit breakers whose rated current is adjustable, the rated current values are shown.

2. The peak value of the first wave of excited inrush current shall be calculated based on the multiple for the peak value of the first wave in the table, and the calculated value shall not exceed the lower limit peak value of instantaneous tripping current of circuit breaker. The circuit breakers are selected on condition that the transformer rated current value does not exceed 0.9 times the circuit breaker rated current. If the multiple for the peak value of the first wave is different from that shown in the table, a circuit breaker must be separately selected.









# 4 Selection 2 Selection of MCCB and ELCB

Table 4-23-2 230VAC (IEC 60947-2)

sym.kA

Main breaker Rated ultimate short-circuit breaking capacity of each breaker	NF-S • NV-S • NF-H • NV-H																				NF-C • NV-C				NF-R • NF-U												
	NF125-SV, NV125-SV	NF125-SGV	NF125-LGV	NF125-HV, NV125-HV	NF125-HGV	NF160-SGV	NF160-LGV	NF160-HGV	NF250-SV, NV250-SV	NF250-SGV	NF250-LGV	NF250-HV, NV250-HV	NF250-HGV	NF400-SW, NV400-SW	NF400-HEW, NV400-HEW	NF400-REW	NF630-SW, NV630-SW	NF630-HEW, NV630-HEW	NF630-REW	NF800-SEW, NV800-SEW	NF800-HEW, NV800-HEW	NF800-REW	NF1000-SEW, NF1250-SEW, NF1600-SEW	NF250-CV, NV250-CV	NF400-CW, NV400-CW	NF630-CW, NV630-CW	NF800-CEW	NF125-RGV, NV125-RGV	NF125-UV	NF250-RGV	NF250-UV	NF400-UEW	NF800-UEW				
Branch breaker Icu(kA)	50	85	90	100	100	85	90	100	85	85	90	100	100	85	100	150	85	100	150	85	100	150	125	36	50	50	50	150	200	150	200	200	200	200			
NF32-SV	7.5	42	50	50	50	10	10	10	10	10	10	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
NV32-SV	10	42	50	50	50	35	35	35	35	35	35	35	35	14	14	14	14	14	14	-	-	-	-	25	14	14	-	125	200	35	50	-	-	-			
NF63-SV	15	42	85	85	85	35	35	35	35	35	35	35	35	30	30	30	30	30	30	-	-	-	-	25	-	-	-	125	200	85	125	-	-	-	-		
NV63-SV	15	42	85	85	85	35	35	35	35	35	35	35	35	-	-	-	-	-	-	-	-	-	-	25	-	-	-	125	200	85	125	-	-	-	-		
NF63-HV	25	50	85	90	100	100	50	50	50	50	50	50	50	50	50	50	50	50	50	-	-	-	-	-	-	30	30	-	125	200	85	125	-	-	-		
NV63-HV	25	50	85	90	100	100	50	50	50	50	50	50	50	50	50	50	50	50	50	-	-	-	-	-	-	30	30	-	125	200	85	125	-	-	-		
NF125-SV	50	-	85	90	100	100	85	85	85	-	85	85	85	85	85	85	85	85	85	-	-	-	-	-	-	-	-	-	125	200	125	200	200	125	-		
NV125-SV	50	-	85	90	100	100	85	85	85	-	85	85	85	85	85	85	85	85	85	-	-	-	-	-	-	-	-	-	125	200	125	200	200	125	-		
NF125-SGV	85	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	125	200	200	125	-		
NF125-LGV	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	125	200	200	125	-	-		
NF125-HV	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	125	200	200	125	-	-		
NV125-HV	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	125	200	200	125	-	-		
NF125-HGV	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	125	200	200	125	-	-		
NF160-SGV	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	200	200	125	-	-		
NF160-LGV	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	200	200	125	-	-		
NF160-HGV	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	200	200	125	-	-		
NF250-SV	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	200	200	125	-	-		
NV250-SV	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	200	200	125	-	-		
NF250-SGV	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	200	200	125	-	-		
NF250-LGV	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	200	200	125	-	-		
NF250-HV	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	200	200	125	-	-		
NV250-HV	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	200	200	125	-	-		
NF250-HGV	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	200	200	125	-	-		
NF400-SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
NF400-SEW	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	200	200	
NV400-SW	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	200	200	
NV400-SEW	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	200	200	
NF630-SW	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	200	200	
NF630-SEW	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	200	200
NV630-SW	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	200	200
NV630-SEW	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	200	200
NF63-CV	7.5	35	50	50	50	10	10	10	10	10	10	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	35	50	-	-	-	-		
NV63-CV	10	35	50	50	50	10	10	10	10	10	10	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	200	35	50	-	-	-	-		
NF125-CV	30	35	85	85	85	50	50	50	50	50	50	50	50	50	50	50	50	50	50	-	-	-	-	-	-	-	-	125	200	85	125	50	-	-	-		
NV125-CV	30	35	85	85	85	50	50	50	50	50	50	50	50	50	50	50	50	50	50	-	-	-	-	-	-	-	-	125	200	85	125	50	-	-	-		
NF250-CV	36	-	-	-	-	-	-	-	50	50	50	50	50	50	50	50	50	50	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	200	
NV250-CV	36	-	-	-	-	-	-	-	50	50	50	50	50	50	50	50	50	50	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	200	
NF400-CW	50	-	-	-	-	-	-	-	-	-	-	-	-	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	200	200
NV400-CW	50	-	-	-	-	-	-	-	-	-	-	-	-	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	200	200
NF630-CW	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	200	200
NV630-CW	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	200	200

Note Rated currents of main breakers are maximum values.

## 12. International Standard Conformance List

### 12.1 UL and CSA Approval Product

#### ● UL (Underwriter's Laboratories) Standards: UL 489, UL 1077

UL is an organization in the US which establishes safety standards, i.e. UL Standards, conducts safety verification test based on the UL Standards, issues the certificates to approved products and allows the manufacturers to attach the certification mark to the products. The UL certification mark has been spread widely in the US. Some states and cities oblige manufacturers to receive the UL certification. When devices, control panels and machines are exported to the US, these products must be UL certified. UL certified products have received UL Recognition or UL Listing in conformity to UL Standards (UL 489, UL1077) and allowed to be used in control panels and machines to be exported to the US.



#### UL Recognition

Refers to component certification for products designed to be built in other products and devices. UL recognized products can be used in control panels, machine tools and control units.



#### UL Listing

Refers to product certification for products which can be sold directly to end-users and used by end-users. These products can be used also as built-in components in control panels, machine tools and control units. Some models vary in external dimensions and terminal structure from standard models. Please refer to the page of UL listed products for details.

#### ● CSA (Canadian Standard Association) Standards: CSA C22.2 No.5-02

The CSA Standards are product safety standards established by CSA. In Canada, the safety of electric products is regulated by the state laws, and some state laws prescribe that circuit breakers shall be certified by the CSA Standards. Therefore, when devices, control panels and machines are exported to Canada, these products must be CSA certified. UL certified products have received CSA certification from the testing body UL and allowed to be used in control panels and machines to be exported to Canada. UL has been authorized as a testing, certification and quality certification body by SCC, and CSA certified products tested by UL have been approved by the safety regulations in all states of Canada. It is allowed to attach the following certification marks to products certified by both UL and CSA. (It is also allowed to attach the separate marks for the US and Canada as before.)



#### Recognition for US and Canada

UL and CSA recognition of components by testing body UL



#### Listing for US and Canada

UL and CSA recognition of components by testing body UL

### 12.2 CCC (China Compulsory Certification) Approval Product

Low-voltage circuit breakers are designated as products to be compulsorily certified in China. To export such products to China and sell them in China, it is necessary to obtain the CCC certification.



### 12.3 Corresponding to EC (European Community) Directive

#### ● Corresponding to LVD (Low Voltage Directive)

##### (1) When using a low voltage circuit breaker as a component and indicating conformity with the EC Directives

The CE Marking is required when a low voltage circuit breaker is distributed as a single device in EU. However, when the CE Mark is indicated on a machine tool or a control unit, it is unnecessary to affix the CE Mark to the low-voltage circuit breaker used as a built-in component. When the CE Mark is indicated on a machine tool or a control unit, it is recommended to use a product certified by a third party shown in Item (3) (TÜV certified product) as a low voltage circuit breaker.



##### (2) Measures for export of low voltage circuit breaker as single unit

When exporting a low-voltage circuit breaker as a single unit in EU, the circuit breaker is covered by the Low Voltage Directive. The certification of conformity with the Low Voltage Directive is self-declared as a rule. The applicable product standards are shown below.

EN 60947-2 Low-voltage switchgear and controlgear-Part 2: Circuit-breakers

EN 60934 Circuit-breakers for equipment (CBE)

##### (3) Models certified by third party (TÜV certified products)

When the CE Mark is indicated on a machine tool or a control unit, it is recommended to use a low voltage circuit breaker certified by a third party (TÜV certified product) as a built-in component.

#### ● Corresponding to EMC (Electromagnetic Compatibility) Directive

The Directive prescribes that products shall not emit high-intensity radio waves to the outside and shall not be affected by external electromagnetic waves. Molded case circuit breakers (electronic type) and earth leakage circuit breakers are covered by the EMC Directive. These products have been designed for environment A. Use of these products in environment B may cause unwanted electro magnetic disturbances in which case the user may be required to take adequate mitigation measures.

#### ● Corresponding to Machinery Directive

Low voltage circuit breakers are components used in equipment, such as machine tools and control units, and are not covered by any machinery directive. When the CE Mark is indicated on a machine tool or a control unit, it is recommended to use a low voltage circuit breaker certified by a third party (TÜV certified product) as a built-in component.

# 4 Selection 2 Selection of MCCB and ELCB

## ●Molded Case Circuit Breakers and Motor Protection Breakers

Specifications	Class	Applicable Models and Assignments	North American Safety Mark					Compulsory Mark		Third Party Mark	Classification Society (*1)
			UL Standards			CSA Standards		CCC	CE	TÜV Rheinland	NK
			USA			Canada		China	Europe	Germany	Japan
General	C	NF30-CS	-	-	-	-	-	●	●	●	●
		NF63-CV, NF125-CV	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF250-CV	-	-	-	-	-	●	●	●	●
		NF400-CW, NF630-CW, NF800-CEW	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF32-SV, NF63-SV, NF125-SV	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF125-SEV	-	-	-	-	-	●	●(Self Declaration)	-	●
	S	NF250-SV	-	-	-	-	-	●	●	●	●
		NF125-SGV, NF160-SGV, NF250-SGV, NF250-SEV	-	-	-	-	-	●	●(Self Declaration)	(Except for 4P)	-
		NF400-SW, NF630-SW	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF400-SEW, NF630-SEW	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF800-SEW, NF800-SDW	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF1000-SEW, NF1250-SEW	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF1600-SEW	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF1250-SDW, NF1600-SDW	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF63-HV	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF125-HV	-	-	-	-	-	●	●(Self Declaration)	-	●
	L/H/R	NF125-HEV	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF250-HV	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF125-LGV, NF125-HGV, NF160-LGV, NF250-LGV, NF250-HGV, NF250-HEV, NF125-RGV, NF250-RGV	-	-	-	-	-	●	●(Self Declaration)	-	-
		NF400-HEW, NF400-REW	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF630-HEW, NF630-REW	-	-	-	-	-	●	●(Self Declaration)	-	●
		NF800-HEW, NF800-REW	-	-	-	-	-	●	●(Self Declaration)	-	●
	U	NF125-UV	-	-	-	-	-	-	●(Self Declaration)	-	●
		NF250-UV, NF400-UEW	-	-	-	-	-	-	●(Self Declaration)	-	●
NF800-UEW		-	-	-	-	-	-	●(Self Declaration)	-	●	
Motor Protection	NF32-SV MB, NF63-CV MB, NF63-SV MB, NF125-SV MB	-	-	-	-	-	●	●(Self Declaration)	-	●	
	NF250-SV MB	-	-	-	-	-	●	●	●	●	
UL	UL 489 Listed	NF50-SMU	-	-	-	●	-	●	●(Self Declaration)	-	-
		NF50-SVFU, NF100-CVFU	-	-	-	●	-	●	●	-	-
		NF100-SRU	-	-	-	●	-	●	●	-	-
		NF100-HRU	-	-	-	●	-	●	●	-	-
		NF125-SVU, NF125-HVU	-	-	-	●	-	●	●	-	-
		NF250-CVU	-	-	-	●	-	●	●	-	-
		NF250-SVU, NF250-HVU	-	-	-	●	-	●	●	-	-
		NF400-SWU, NF400-HWU	-	-	-	●	-	●	●	-	-
		NF630-SWU, NF630-HWU	-	-	-	●	-	●	●	-	-

Note \*1 Except for 4 poles breaker.

Remark: 1. KC (Korea Certification) Mark and GOST-R (Russian Standards) approval products are prepared. Please inquire details.

## ●Earth Leakage Circuit Breakers

Specifications	Class	Applicable Models and Assignments	North American Safety Mark					Compulsory Mark		Third Party Mark	Classification Society
			UL Standards			CSA Standards		CCC	CE	TÜV Rheinland	NK
			USA			Canada		China	Europe	Germany	Japan
CE and CCC	C	NV63-CV, NV125-CV	-	-	-	-	-	●	●(Self Declaration)	-	-
		NV250-CV	-	-	-	-	-	●	●	●	-
		NV400-CW, NV630-CW	-	-	-	-	-	●	●(Self Declaration)	-	-
	S	NV32-SV, NV63-SV	-	-	-	-	-	●	●(Self Declaration)	-	-
		NV125-SV	-	-	-	-	-	●	●(Self Declaration)	-	-
		NV250-SV	-	-	-	-	-	●	●	●	-
		NV125-SEV, NV250-SEV, NV400-SW, NV400-SEW, NV630-SW, NV630-SEW, NV800-SEW	-	-	-	-	-	●	●(Self Declaration)	-	-
	H/R	NV63-HV	-	-	-	-	-	●	●(Self Declaration)	-	-
		NV125-HV	-	-	-	-	-	●	●(Self Declaration)	-	-
		NV125-HEV, NV250-HV, NV250-HEV	-	-	-	-	-	●	●(Self Declaration)	-	-
NV400-HEW, NV630-HEW, NV800-HEW	-	-	-	-	-	●	-	-	-		
UL	UL 489 Listed	NV50-SVFU, NV100-CVFU	-	-	-	●	-	●	●	●	-
		NV125-SVU, NV125-HVU	-	-	-	●	-	●	●	●	-
		NV250-CVU	-	-	-	●	-	●	●	●	-
		NV250-SVU, NV250-HVU	-	-	-	●	-	●	●	●	-
		NV400-SWU, NV400-HWU	-	-	-	●	-	●	●	●	-

Remark: 1. KC (Korea Certification) Mark and GOST-R (Russian Standards) approval products are prepared. Please inquire details.

## ●Miniature Circuit Breakers

Specifications	Class	Applicable Models	Compulsory Mark	
			CCC	CE
			China	Europe
General	DIN	BH-D6	●	●(Self Declaration)
		BH-D10	●	●(Self Declaration)
		BH-DN	●	●(Self Declaration)
		BV-D	●	●(Self Declaration)
		BV-DN	●	●(Self Declaration)
		KB-D	●	●(Self Declaration)

●Circuit Protectors

Specifications	Class	Applicable Models and Assignments	North American Safety Mark					Compulsory Mark		Third Party Mark	Classification Society
			UL Stgandards			CSA Standards		CCC	CE	TÜV Rheinland Germany	NK
			USA			Canada		China	Europe		
											Japan
General	CP	CP30-BA	-	-	●	-	-	●	●(EN 60934) ●(EN 60947-2) (Self-Declaration)	●(EN 60934)	-
		CP-S	-	-	-	-	-	-	-	-	-

Remark: 1. KC (Korea Certification) Mark and GOST-R (Russian Standards) approval products are prepared. Please inquire details.

●Air Circuit Breakers

Specifications	Class	Applicable Models	Assignments	North American Safety Mark					Compulsory Mark		Third Party Mark
				UL Stgandards			CSA Standards		CCC	CE	TÜV Rheinland Germany
				USA			Canada		China	Europe	
IEC	SW	AE630-SW, AE1000-SW AE1250-SW, AE1600-SW AE2000-SWA, AE2000-SW AE2500-SW, AE3200-SW AE4000-SWA, AE4000-SW AE5000-SW, AE6300-SW	IEC 60947-2 or JIS C 8201-2-1	-	-	-	-	-	-	●(Self Declaration)	-
CCC	SW	AE630-SW, AE1000-SW AE1250-SW, AE1600-SW AE2000-SWA, AE2000-SW AE2500-SW, AE3200-SW AE4000-SWA, AE4000-SW AE5000-SW, AE6300-SW	CCC	-	-	-	-	●	●(Self Declaration)	-	

Note \*1 Except for 4 poles breaker.

Remark: 1. EAC (Russian Standards) approval products are prepared. Please inquire details.

●Molded Case Circuit Breakers , Motor Protection Breakers, Air Circuit Breakers, Circuit Protectors and Miniature Circuit Breakers (Classification Society)

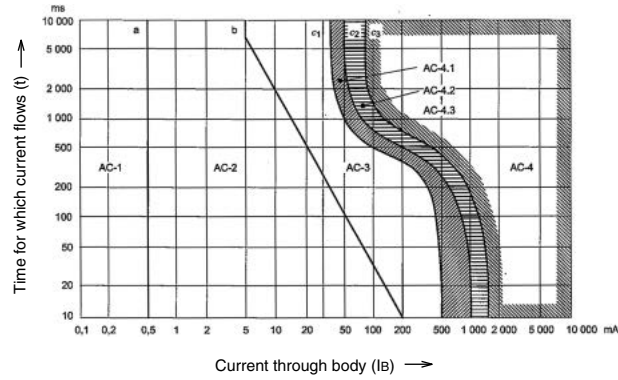
Specifications	Class	Applicable Models	Classification societies (Note)					
			NK	LR	ABS	BV	CCS	DNV-GL
			Japan	United Kingdom	USA	France	China	Norway
General	C	NF30-CS	●	●	●	-	-	-
		NF63-CV, NF125-CV	●	●	●	●	●	●
		NF250-CV	●	●	●	●	●	●
		NF400-CW, NF630-CW	●	●	●	●	-	-
		NF800-CEW	●	●	●	●	-	-
	S	NF32-SV, NF63-SV, NF125-SV	●	●	●	●	●	●
		NF250-SV	●	●	●	●	●	●
		NF400-SW, NF630-SW	●	●	●	●	●	-
		NF400-SEW, NF630-SEW	●	●	●	●	●	●
		NF800-SEW	●	●	●	●	●	●
	H/R	NF1000-SEW, NF1250-SEW	●	●	●	-	-	-
		NF63-HV, NF125-HV	●	●	●	●	●	●
		NF250-HV	●	●	●	●	●	●
		NF400-HEW, NF400-REW	●	●	●	●	●	●
		NF630-HEW, NF630-REW NF800-HEW, NF800-REW	●	●	●	●	(HEW)	-
	U	NF125-UV, NF250-UV	●	●	●	●	●	●
		NF400-UEW, NF800-UEW	●	●	●	●	●	●
	Motor Protection	NF32-SV MB, NF63-CV MB	●	●	●	●	●	●
		NF63-SV MB, NF125-SV MB	●	●	●	●	●	●
		NF250-SV MB	●	●	●	●	●	●
	AE	AE630-SW, AE1000-SW AE1250-SW, AE1600-SW AE2000-SWA, AE2000-SW AE2500-SW, AE3200-SW AE4000-SWA	●	●	●	●	●	●
		AE4000-SW, AE5000-SW, AE6300-SW	●	●	●	●	-	●
		CP30-BA	●	-	-	-	-	-
BH		-	-	-	-	●	●	
KB		-	-	-	-	●	●	

Remark: 1. 4 poles breakers does not acquire Classification Society approval.

## 1. Electric Shock Protection

The safety standards for current passing through the human body are determined based on physiological phenomena as shown below.

- In places where secondary accidents may be caused by electric shock: Area below the curve b
- In places where secondary accidents will not be caused by electric shock: Area below the curve c1



**Fig. 4.17 Influence of AC (15Hz to 100Hz) on human body (IEC/TS60479-1)**

## 2. ELCB Grounding Method

Select the rated sensitivity current based on the grounding method, purpose of protection and protection ground resistance value of load device. If the line is excessively long, the circuit breaker may operate unnecessarily owing to leakage current. Calculate the leakage current referring to Table 4-25. In this case, it is common to select sensitivity current approx. 10 times as high as the leakage current.

Table 4-24

Type of earthing system	TN system			TT system	IT system	
	TN-C system	TN-S system	TN-C-S system			
Typical arrangement						
Protective condition	The touch voltage is limited to 50V.					
	$Z_s \times I_a \leq 50V$ Zs: fault loop impedance (Ω) Ia: current causing the automatic operation of the disconnecting device within the time as below (A) Uo: nominal line to earth voltage (V)			$R_A \times I_{\Delta n} \leq 50V$ RA: sum of the resistances of the earth electrode and the protective conductor (Ω) IΔn: rated current sensitivity (A)		$I_d \times R_A \leq 50V$ RA: sum of the resistances of the earth electrode and the protective conductor (Ω) Id: first fault current (A)
Earth leakage protective device	Maximum disconnection times (sec)					
	Uo AC	Branch circuits rated 32A and less				Others
		120V	230V	400V	Over 400V	
	TN system	0.8	0.4	0.2	0.1	5
	TT system	0.3	0.2	0.07	0.04	1
	- MCCBs Not ELCBs	- MCCBs - ELCBs	- MCCBs - ELCBs (except in TN-C zone)		- ELCBs	- Insulation monitoring devices + ELCBs

Table 4-25 Leakage current when 600V vinyl insulated wire is laid on 1km Δ-connected 3-phase 3-wire 200V line

Distance from grounded part	Ⓐ 4m or more	Ⓑ 10cm or more	Ⓒ 1.5mm or more	Ⓓ In close contact
Wiring work	<ul style="list-style-type: none"> <li>Wiring on first floor ceiling of wooden building</li> <li>Wiring on second and higher floors of wooden building</li> <li>Aerial wiring</li> </ul> (Except Ⓒ and Ⓓ)	<ul style="list-style-type: none"> <li>Wiring in RC building</li> <li>Wiring with vinyl tube and exposed wiring in steel frames</li> </ul> (Except Ⓒ and Ⓓ)	<ul style="list-style-type: none"> <li>Vinyl tube burying</li> <li>Vinyl tube laying in close contact with steel frames in steel building</li> </ul>	<ul style="list-style-type: none"> <li>Wiring in metallic conduit</li> <li>Wiring in metallic duct</li> </ul>
Wire size				
8mm <sup>2</sup> or less	0.60mA/km	1.29mA/km	19.9mA/km	100mA/km
14	0.66	1.44	22.1	110
22	0.72	1.55	23.9	120
38	0.81	1.75	26.9	135
60	0.99	2.14	32.9	165
100	1.14	2.46	37.9	189
150	1.25	2.72	41.8	209
250	1.46	3.16	48.6	243
325	1.52	3.29	50.7	253
500	1.71	3.69	56.8	284

Notes \*1 The leakage current on rubber insulated wire (RB) is about 70% of the above values, and that on 3-core 600V cross-linked polyethylene insulated wire (CV) is about 50%.

\*2 At 50Hz, the values are 84% of the above values.

\*3 To obtain the leakage current on another line, multiply the values shown in Table 4-25 by the magnification shown in Table 4-26.

\*4 To determine the line length, add the length of all wires after ELCB installation point.

Table 4-26 Leakage current conversion table

Type of line	Magnification
Single-phase 100V line	0.3
Single-phase 3-wire 200V line	0.3
3-phase 415V line (Δ connection)	0.7

## 3. Rated Voltage and Number of Poles

Select the rated voltage and number of poles according to the circuit voltage and type. The following table shows the standard circuit voltage values. However, even at special voltage, if the voltage including the circuit voltage fluctuation is within the voltage range shown right, the leakage protection device will operate.

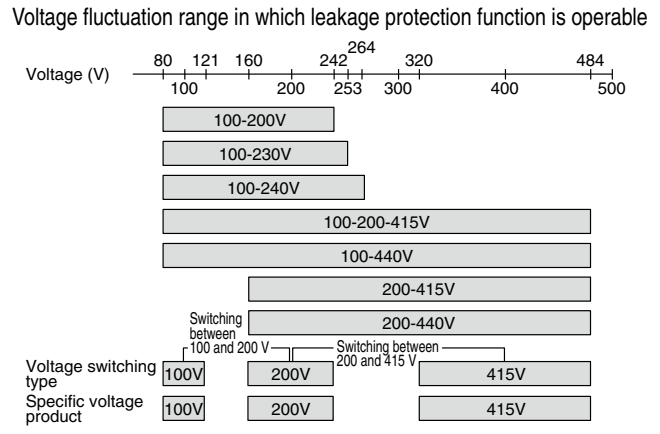


Table 4-27

Circuit type	Single-phase 2-wire 100 or 200V circuit	Single-phase 3-wire 100 and 200V circuit
Example of connection	<ul style="list-style-type: none"> <li>• 100-440V</li> <li>• 100-200-415V</li> <li>• 100-200V</li> <li>• 100-240V</li> <li>• 100-440V</li> <li>• 100-200-415V</li> <li>• 100-200V</li> <li>• 100-230V</li> <li>• 100V</li> <li>• 100-440V</li> <li>• 100-200-415V</li> <li>• 100-200V</li> <li>• 100-240V</li> <li>• 100-440V</li> <li>• 100-200-415V</li> <li>• 100-200V</li> <li>• 100-230V</li> <li>• 200-415V</li> <li>• 200-440V</li> </ul>	<ul style="list-style-type: none"> <li>• 100-200-415V</li> <li>• 100-200V</li> <li>• 200-415V</li> <li>• 100-230V</li> <li>• 100-440V</li> <li>• 200-440V</li> <li>• 100-200-415V</li> <li>• 100-200V</li> <li>• 100V</li> <li>• 200-415V</li> <li>• 100-240V</li> <li>• 100-230V</li> <li>• 100-440V</li> <li>• 100-440V</li> <li>• 100-200-415V</li> <li>• 100-200V</li> <li>• 100-240V</li> <li>• 100-230V</li> <li>• 100-440V</li> <li>• 200-440V</li> </ul>
Circuit type	3-phase 3-wire 200V circuit	3-phase 3-wire 415V circuit
Example of connection	<ul style="list-style-type: none"> <li>• 100-200-415V</li> <li>• 100-200V</li> <li>• 200-415V</li> <li>• 100-440V</li> <li>• 100-230V</li> <li>• 200-440V</li> <li>• 100-200-415V</li> <li>• 100-200V</li> <li>• 200-415V</li> <li>• 100-440V</li> <li>• 200-440V</li> </ul>	<ul style="list-style-type: none"> <li>• 100-200-415V</li> <li>• 200-415V</li> <li>• 415V</li> <li>• 100-440V</li> <li>• 200-440V</li> <li>• 100-200-415V</li> <li>• 200-415V</li> <li>• 415V</li> <li>• 100-440V</li> <li>• 200-440V</li> </ul>
Circuit type	3-phase 4-wire 415V circuit	
Example of connection	<ul style="list-style-type: none"> <li>• 100-200-415V</li> <li>• 200-415V</li> <li>• 100-440V</li> <li>• 200-440V</li> <li>• 100-200-415V</li> <li>• 200-415V</li> <li>• 415V</li> <li>• 100-440V</li> <li>• 200-440V</li> <li>• 100-200-415V</li> <li>• 200-415V</li> <li>• 415V</li> <li>• 100-240V</li> <li>• 100-440V</li> <li>• 200-440V</li> <li>• 100-200-415V</li> <li>• 200-415V</li> <li>• 415V</li> <li>• 100-440V</li> <li>• 200-440V</li> </ul>	

<Cautions when selecting and connecting>

(1) When a 3-pole circuit breaker is used as a 2-pole one, use the right and left poles.

(2) For the mains of a 3-phase 4-wire 415V circuit, use a 4-pole circuit breaker having a rated voltage of 415V or 440V, and connect the neutral pole to the N pole on the right side.



## 4. Earth Fault Protection Coordination and Combination of Devices

Table 4-28

Protection type	Details	Installation point	Combination
With selectivity only for earth fault breaking	●On general lines, the protection grounding resistance is relatively large and the earth fault current is small. In this case, install a time-delay relay on the main circuit and a high-speed relay on a branch circuit.	Main circuit	• Time-delay ELCB • Combination of MCCB and time-delay earth leakage relay
		Branch circuit	High-speed ELCB
With selectivity for earth fault breaking and cascade type of short-circuit breaking	●The selectivity for earth fault breaking is as stated above. ●Significant short-circuit fault very rarely occurs because of its nature (in most cases, circuits are broken at the early stage of earth fault). This protection is applied when the continuity of power supply is expendable. (Refer to the combination for cascade breaking on page 83.)	Main circuit	• Class S time-delay ELCB • Combination of MCCB (class U) and time-delay earth leakage relay
		Branch circuit	• Class C time-delay ELCB • Combination of MCCB (class C) and high-speed earth leakage relay
With selectivity for earth fault breaking and short-circuit breaking	●This protection is applied when selectivity is necessary in the entire area of fault. (Refer to the combination for selective breaking on page 81.)	Main circuit	Combination of electronic MCCB and time-delay earth leakage relay
		Branch circuit	• High-speed ELCB • Combination of MCCB and high-speed earth leakage relay

Remark: 1. "Time-delay or high-speed earth leakage relay" refers to NV-ZBA, NV-ZSA, NV-ZHA or NV-ZLA.

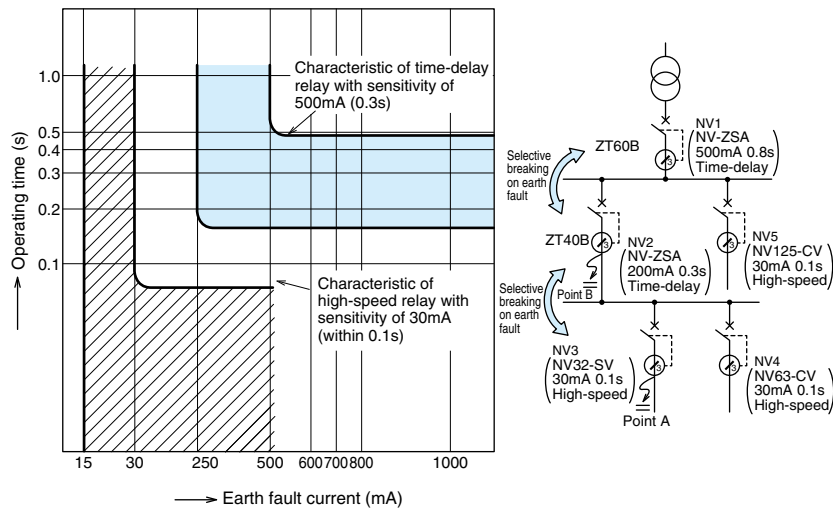


Fig. 4.18 Example of coordination of time-delay and high-speed relays for earth fault breaking






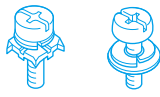



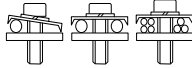
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## Installation and Connection

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## 1. Connection Types

Table 5-1 Connection

Connection type (Code address)		Front connection (F)				
		Screw terminal (AMP-N)	Busbar terminal (BAR)	Solderless (BOX) terminal (SL)		
Image						
		Please refer to page 104.				
MCCB	C	NF30-CS	●	-	-	
	S	NF32-SV • NF63-CV • NF63-SV • NF63-HV	●	● (*2)	-	
		NF125-CV • NF125-SV • NF125-HV	●	● (*2)	●	
		NF125-SEV • NF125-SGV • NF125-LGV • NF125-HEV • NF125-HGV	●	● (*2)	●	
		NF160-SGV • NF160-LGV • NF160-HGV • NF250-CV • NF250-SV • NF250-HV	●	● (*2)	●	
		NF250-SEV • NF250-HEV • NF250-SGV • NF250-LGV • NF250-HGV	●	● (*2)	●	
	H	NF400-SW • NF400-SEW • NF400-HEW • NF400-REW • NF400-CW	-	●	-	
		MB	NF630-SW • NF630-SEW • NF630-HEW • NF630-REW • NF630-CW	-	●	-
			NF800-SEW • NF800-HEW • NF800-REW • NF800-SDW • NF800-CEW	-	●	-
			NF1000-SEW • NF1250-SEW • NF1600-SEW	-	●	-
	R	NF125-UV	●	● (*2)	●	
		NF125-RGV • NF250-RGV • NF250-UV	●	●	●	
		NF400-U EW	-	●	-	
		NF800-U EW	-	●	-	
	FAFAU	NF30-FAU • NF50-FAU	●	-	-	
	FHU	NF50-FHU • NF100-FHU	●	-	-	
	UL	NF50-SVFU	●	●	-	
		NF100-CVFU	●	●	●	
		NF125-SVU	●	●	●	
		NF125-HVU	●	●	●	
NF250-CVU • NF250-SVU • NF250-HVU		●	●	●		
NF100-SRU • NF100-HRU		●	●	●		
NV32-SV • NV63-CV • NV63-SV • NV63-HV		●	● (*2)	-		
S	NV125-CV • NV125-SV • NV125-HV	●	● (*2)	-		
	NV125-SEV • NV125-HEV	●	● (*2)	-		
	NV250-CV/SV/HV • NV250-SEV/HEV	●	● (*2)	-		
	NV400-SW • NV400-SEW • NV400-HEW • NV400-CW	●	● (*2)	-		
	NV630-SW • NV630-SEW • NV630-HEW • NV630-CW	-	●	-		
H	NV800-SEW • NV800-HEW	-	●	-		
	FAFAU	NV30-FAU • NV50-FAU	●	-		
	FHU	NV50-FHU • NV100-FHU	●	-		
UL	NV100-SRU • NV100-HRU	●	●	●		
Kind of terminal screw (A)						
(Circuit breakers having frame size of 1000A and more are not provided with terminal screws (A).)						
Shape						
	Pan-head screw with clamp	Pan-head screw	Bolt (Hex-socket)	Bolt		
Screw size	M5	M8	M8	2xM8 M10		
Remarks	NF32-SV 63-CV 63-SV 63-HV 50-SVFU(*1) NF30-FAU 50-FAU 50-FHU	NV32-SV 63-CV 63-SV 63-HV 50-SVFU(*1) NV30-FAU 50-FAU 50-FHU	NF 63-CV(60, 63A) 63-SV(60, 63A) 63-HV(60, 63A) 125-CV 125-SV 125-HV 125-SEV 125-HEV 100-CVFU 125-SVU 125-HVU 125-UV	NV 63-CV(60, 63A) 63-SV(60, 63A) 63-HV(60, 63A) 125-CV 125-SV 125-HV 125-SEV 125-HEV	NF 125-SEV 125-HEV 125-RGV 125-SGV 125-LGV 125-HGV 160-SGV 160-LGV 160-HGV 250-CV 250-SV 250-HV 250-SEV 250-SGV 250-LGV 250-HGV 250-RGV 250-UV 250-CVU 250-SVU 250-HVU	
	NF 400-UEW(4P) 800-CEW 800-SEW 800-HEW 800-REW 800-UEW 800-SDW NV 800-SEW 800-HEW	NF 400-CW 400-SW 400-SEW 400-HEW 400-REW 400-UEW(3P) 630-CW 630-SW 630-SEW 630-HEW 630-REW NV 400-CW 400-SW 400-SEW 400-HEW 630-CW 630-SW 630-SEW 630-HEW				
Type	 In case of clamp connection (*1)					
	①When the wire size is 5.5mm <sup>2</sup> or more, divide the wires, and connect them. ②When connecting wires differing in size, for example, φ1.6 wires and 5.5mm <sup>2</sup> wires, connect the two kinds of wires together to a crimp terminal because the thinner wires easily come off. ③Do not tighten directly solid wires and cords consisting of thin copper wires used as strands, for example φ1.6 and 1.25mm <sup>2</sup> wires, together.					

Note \*1 It is impossible to directly connect the wires of 40 and 50A, NF/NV 50-SVFU.  
 \*2 It is possible to modify connection type with options.

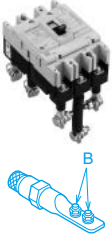
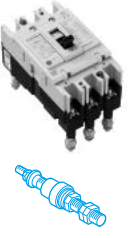


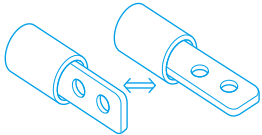
	Rear (B)		Plug-in (PM)	
	Bar stud (B-ST)	Round stud (B-ST)	Bar stud (PM)	Screw terminal (PM)
				
	-	●	-	-
	-	● (*2)	-	●
	● (*2)	-	-	●
	●	-	●	-
	●	-	●	-
	● (*2)	-	● (Except for NF1600-SEW)	-
	●	-	-	●(Except for 4P)
	●	-	●(Except for 4P)	-
	●	-	● (Except for NF800-UEW)	-
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	-	-	-
	-	● (*2)	-	●
	● (*2)	-	-	●
	● (*2)	-	●	-
	● (*2)	-	●	-
	-	-	-	-
	-	-	-	-
	-	-	-	-
	<p>With insulating base (tube) for installation of metallic board The bar stud installation position can be turned 90° on all models (except NF800-UEW). The current-carrying capacity of a vertically installed bus bar is larger than that of a horizontally installed bus bar even if the bus bars have the same dimensions.</p> 		<p>The circuit breaker can be connected only by pushing it onto the preliminarily wired terminal block. Install it tightening the supplied screws through the mounting holes.</p>	

Table 5-2 List of terminal screws (B)

Model		Connection type	Front	Rear	Plug-in	
MCCB	C	NF400-CW • NF400-SW • NF400-SEW • NF400-HEW • NF400-REW • NF630-CW • NF630-SW • NF630-SEW		M12 bolt		
	S	NF630-HEW • NF630-REW • NF800-CEW • NF800-SEW • NF800-HEW • NF800-REW • NF800-SDW		M12 bolt		
	H	NF1000-SEW • NF1250-SEW		M12 bolt		
	U		NF1600-SEW	M10 bolt		—
			NF400-UEW		M12 bolt	
	NF800-UEW		M12 bolt		—	
ELCB	Type C	NV400-SW • NV400-SEW • NV400-HEW • NV400-CW • NV630-SW • NV630-SEW • NV630-HEW • NV630-CW		M12 bolt		
		NV800-SEW • NV800-HEW		M12 bolt		

## 2. Connecting Parts

For the connection shown in the table on the previous page, the following parts are available as connecting parts.

**Table 5-3 Studs on rear surface (B-ST)**

Type name	Number of poles	Applicable models		Stud shape and major included parts	Remarks
		MCCB	ELCB		
ST-05SV2	2	NF32-SV, NF63-CV, NF63-SV NF63-HV	NV32-SV, NV63-CV	★Round studs ●Round studs (with insulating tube) (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Bolts and nuts	One set includes the parts for one unit. Please place an order for the number of circuit breakers.
ST-05SV3	3		NV63-SV, NV63-HV		
ST-05SV4	4	NF63-SV, NF63-HV	—		
ST-1SV2	2	NF125-CV, NF125-SV NF125-HV(3, 4P)	—	★Bar studs ●Bar studs (with insulating tube) (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Bolts and nuts	
ST-1SV3	3		NV125-CV, NV125-SV		
ST-1SV4	4		NV125-HV		
ST-1HV2	2		—		
ST-2SV2	2	NF125-SEV, NF125-HEV, NF125-RGV NF125-SGV, NF125-LGV, NF125-HGV NF160-SGV, NF160-LGV, NF160-HGV NF250-SGV, NF250-LGV, NF250-HGV	—	★Bar studs ●Bar studs (with insulating tube) (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Bolts and nuts	
ST-2SV3	3		—		
ST-2SV4	4		NV125-SEV, NV125HEV NV250-CV, NV250-SV NV250-HV, NV250-SEV NV250-HEV		
ST-4SW2	2	NF400-CW, NF400-SW NF400-SEW, NF400-HEW NF400-REW	—	★Bar studs ●Insulating bases (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Bar studs (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Mounting screws, bolts and nuts	
ST-4SW3	3		NV400-CW, NV400-SW NV400-SEW		
ST-4SW4	4		NV400-HEW		
ST-6SW2	2		—		
ST-6SW3	3	NF630-CW, NF630-SW NF630-SEW, NF630-HEW NF630-REW	NV630-CW, NV630-SW	★Bar studs ●Insulating base (2 pcs) ●Bar studs (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Mounting screws, bolts and nuts	
ST-6SW4	4		NV630-SEW, NV630-HEW		
ST-8SW2	2		—		
ST-8SW3	3	NF800-SDW, NF800-CEW NF800-SEW, NF800-HEW NF800-REW	NV800-SEW, NV800-HEW	★Bar studs ●Insulating base (2 pcs) ●Bar studs (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs) ●Mounting screws, bolts and nuts	
ST-8SW4	4				

**Table 5-4 Plug-in type terminal blocks (PM)**

Type name	Number of poles	Applicable models		Major included parts
		MCCB	ELCB	
PMDN-05SV2L	2P	NF32-SV NF63-CV/SV/HV (3A-50A)	—	Plug-in type terminal block (1 pc) Crip terminals (2-pole: 4pcs, 3-pole: 6 pcs, 4-pole: 8 pcs)
PMDN-05SV3L	3P		NV32-SV	
PMDN-05SV4L	4P	NF63-CV/SV/HV (3A-50A)	NV63-CV/SV/HV (5A-50A)	
PMDN-05SV2H	2P	NF63-CV/SV/HV (60A, 63A)	—	
PMDN-05SV3H	3P	NF63-CV/SV/HV (60A, 63A)	NV63-CV/SV/HV (60A, 63A)	
PMDN-05SV4H	4P			
PMDN-1SV2	2P	NF125-CV/SV	—	Plug-in type terminal block (1 pc) Crip terminals (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs)
PMDN-1HV2	2P	NF125-HV	—	
PMDN-1SV3	3P	NF125-CV/SV/HV	NV125-CV/SV/HV	
PMDN-1SV4	4P			
PMDN-1UV2	2P	NF125-UV	—	Plug-in type terminal block (2 pc) Crip terminals (2-pole: 4pcs, 3-pole: 6 pcs)
PMDN-1UV3	3P			
—	4P			
PMDN-2SV2	2P	NF125-SEV/HEV/SGV/LGV/HGV NF160-SGV/LGV/HGV NF250-CV/SV/HV/SEV/HEV/SGV/LGV/HGV	—	Plug-in type terminal block (1 pc) Plug-in type barriers (2-pole: 2 pcs, 3-pole: 4 pcs, 4-pole: 6 pcs) Tulip terminals (2-pole: 4 pcs, 3-pole: 6 pcs, 4-pole: 8 pcs)
PMDN-2SV3	3P		NV125-SEV/HEV	
PMDN-2SV4	4P		NV250-CV/SV/HV/SEV/HEV	
PMDN-2SV2	2P		—	
PMDN-2SV3	3P	NF125-RGV, NF250-RGV	—	Plug-in type terminal block (2 pc) Plug-in type barriers (2-pole: 2 pcs, 3-pole: 4 pcs) Tulip terminals (2-pole: 4pcs, 3-pole: 6 pcs)
PMDN-2UV2	2P	NF250-UV	—	
PMDN-2UV3	3P			
—	4P			
PMDN-4SW2	2P	NF400-CW/SW	—	Plug-in type terminal block (2 pcs) Plug-in type barriers (4 pcs) Tulip terminals (3-pole: 6 pcs)
PMDN-4SW3	3P	NF400-CW/SW/SEW	NV400-CW/SW/SEW	
	3P	NF400-HEW/REW	NV400-HEW	
PMDN-4SW4	4P	NF400-SW/SEW	NV400-SEW	
	4P	NF400-HEW	—	
PMDN-6SW3	3P	NF630-CW/SW/SEW/HEW/REW	NV630-CW/SW/SEW/HEW	Plug-in type terminal block (2 pcs) Tulip terminals (3-pole: 6 pcs)
PMDN-8SW2	2P	NF800-SDW	—	
PMDN-8SW3	3P	NF800-CEW/SEW	NV800-SEW	
	3P	NF800-HEW/REW	NV800-HEW	
PMDN-8SW4	4P	NF800-SEW	—	
	4P	NF800-HEW	—	

Note In addition to the circuit breakers shown above, 4-pole and 2-pole circuit breakers are available. We are ready to manufacture such circuit breakers to order. Please consult us.

### 3. Standard Tightening Torque

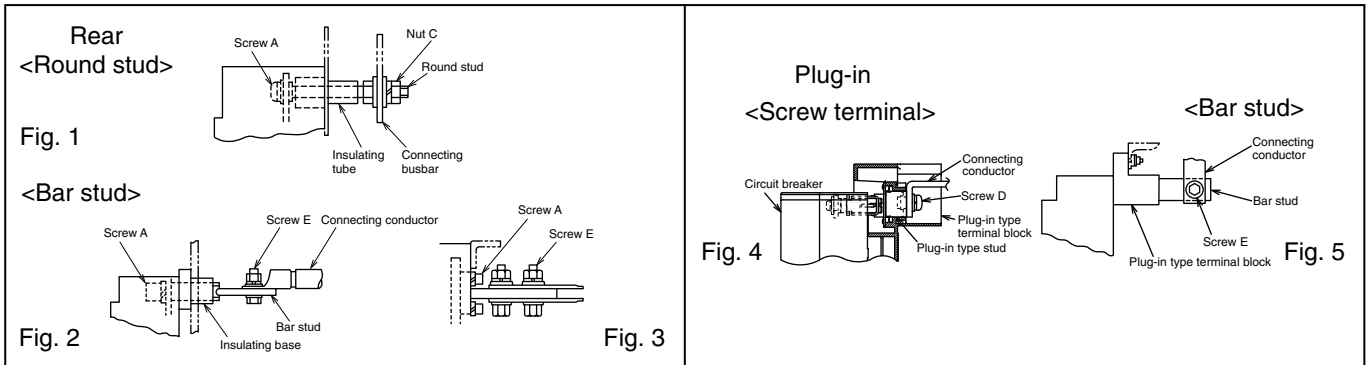


Table 5-5 Standard tightening torque (\*1)

Model		Connection type		Tightening torque N·m									
				Rear				Plug-in					
				Round stud		Bar stud		Screw terminal		Bar stud			
				Fig.1		Fig. 2, Fig.3		Fig.4		Fig.5			
MCCB	ELCB	Screw A		Nut C		Screw A		Screw E		Screw D		Screw E	
		Size	Tightening torque	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque
NF30-CS	-	M4x0.7	1	M6	2	-	-	-	-	-	-	-	-
NF32-SV, NF63-CV NF63-SV, NF63-HV	NV32-SV, NV63-CV NV63-SV, NV63-HV	M4x0.7	1	M6	2	-	-	-	-	M6	3	-	-
NF125-CV, NF125-SV NF125-HV, NF125-UV	NV125-CV, NV125-SV NV125-HV	-	-	-	-	M6	4	M8	12	M8	6	-	-
NF125-SEV, NF125-HEV, NF125-RGV NF250-CV, NF250-SV, NF250-HV, NF250-SEV NF250-HEV, NF250-RGV, NF250-UV NF250-LGV/HGV, NF250-RGV, NF125-SGV/HGV NF125-LGV, NF160-SGV, NF160-LGV/HGV NF125-SGV, NF125-LGV, NF125-HGV NF160-SGV, NF160-LGV, NF160-HGV NF250-SGV, NF250-LGV, NF250-HGV	NV125-SEV, NV125-HEV NV250-CV, NV250-SV NV250-HV, NV250-SEV NV250-HEV	-	-	-	-	M6	10	M8	12	-	-	M8	12
NF400-CW, NF400-SW, NF400-SEW NF400-HEW, NF400-REW NF400-UEW (3P)	NV400-CW, NV400-SW NV400-SEW, NV400-HEW	-	-	-	-	M8	20	M12	45	-	-	M12	45
NF400-UEW (4P)	-	-	-	-	-	M10	30	M12	45	-	-	M12	45
NF630-CW, NF630-SW, NF630-SEW NF630-HEW, NF630-REW	NV630-CW, NV630-SW NV630-SEW NV630-HEW	-	-	-	-	M8	20	M12	45	-	-	M12	45
NF800-CEW, NF800-SDW NF800-SEW, NF800-HEW, NF800-REW NF800-UEW (*2)	NV800-SEW NV800-HEW	-	-	-	-	M10	30	2-M12	45	-	-	2-M12	45
NF1000-SEW	-	-	-	-	-	4-M8	12	2-M12	45	-	-	2-M12	45
NF1250-SEW	-	-	-	-	-	4-M8	12	4-M10	25	-	-	-	-
NF1600-SEW	-	-	-	-	-	4-M8	12	4-M10	25	-	-	-	-

Notes \*1 The appropriate range of tightening torque is ±20% of each value (standard tightening torque) shown in the above table. Please refer to the supplied assembly manual and instruction manual for more information.

\*2 The plug-in type is not available.

## 4. Crimp Terminal Type

As the terminals in   , commercially available crimp terminals can be used. Please purchase the terminals at an electric material store.

For others, the crimp terminals for MCCB must be used. Place an order with us.

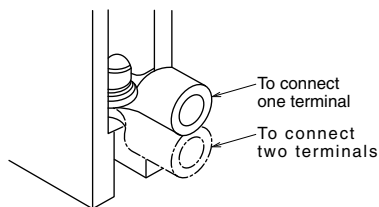
For the connection types shown in Fig. a and Fig. b, only crimp terminals will be delivered.

**Table 5-6 List of applicable crimp terminals**

Frame (A)	Nominal sectional area mm <sup>2</sup>		2	5.5	8	14	22	
	Allowable current (600V, IV wire at 30°C, not in conduit) (*4)		27A	49A	61A	88A	115A	
	Model		Size of mm <sup>2</sup>					
	MCCB	ELCB	1.04 to 2.63	2.63 to 6.64	6.64 to 10.52	10.52 to 16.78	16.78 to 26.66	
30	NF30-FAU	NV30-FAU	R-2-5	R-5.5-5	JST8-5NS			
50	NF50-FAU	NV50-FAU	R-2-5	R-5.5-5	JST8-5NS	JST14-5NS	JST22-5NS	
100	NF100-FHU	NV100-FHU			R-8-8	R-14-8	R-22-8	
30	NF30-CS, NF32-SV, NF50-FHU, NF63-CV* NF63-SV*, NF63-HV* *50A or below	NV32-SV, NV50-FHU, NV63-CV* NV63-SV*, NV63-HV* *50A or below	R-2-5	R-5.5-5	R-8-5	R-14-5	JST22-S5	
32			*(R-2-6)	*(R-5.5-6)			BH-22	(L330T459-23)
60	NF63-CV, NF63-SV, NF63-HV 60, 63A	NV63-CV, NV63-SV, NV63-HV 60, 63A	R-2-8	R-5.5-8	R-8-8	R-14-8	R-22-8	
63								
125	-	-	R-2-5	R-5.5-5	R-8-5	R-14-5	JST22-S5	
	NF125-CV, NF125-SV, NF125-HV, NF125-UV 60A or more	NV125-CV, NV125-SV, NV125-HV 60A or more	(R-2-6)	(R-5.5-6)			(L330T459-23)	
125	NF125-SEV, NF125-HEV, NF125-RGV NF250-CV, NF250-SV, NF250-HV, NF250-UV NF250-SEV, NF250-HEV, NF250-RGV NF125-SGV, NF160-SGV, NF250-SGV NF125-LGV, NF160-LGV, NF250-LGV NF125-HGV, NF160-HGV, NF250-HGV	NV125-SEV, NV125-HEV NV250-CV, NV250-SV, NV250-HV NV250-SEV, NV250-HEV				R-14-8	R-22-8	
225								
250								
400	NF400-CW, NF400-SW, NF400-SEW NF400-HEW, NF400-REW, NF400-UW NF630-CW, NF630-SW, NF630-SEW NF630-HEW, NF630-REW	NV400-CW, NV400-SW NV400-SEW, NV400-HEW NV630-CW, NV630-SW, NV630-SEW, NV630-HEW						
600								
630								
800	NF800-CEW, NF800-SEW, NF800-HEW NF800-REW, NF800-UW, NF800-SDW NF1000-SEW, NF1250-SEW	NV800-SEW, NV800-HEW						
1000								
1200								
1250								

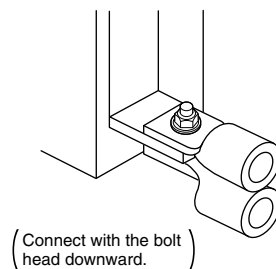
### Reference drawings of connection types

#### Method of connecting directly to terminal(s) of body

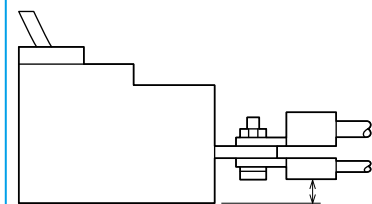


(Fig. a)

#### Method of connecting to front bar terminal



(Fig. b)



Carefully check the insulating distance between the connecting bus bar, crimp terminal and tightening bolt and the ground and the phase-to-phase insulating distance.



<Explanation of abbreviations> R.....Product specified by JIS  
 CB.....Product specified by JEM 1399  
 AMP.....Product made by Nippon AMP  
 JST.....Product made by J.S.T. Mfg. Co., Ltd.  
 NTK.....Product made by Nippon Tanshi Co., Ltd.  
 NTM.....Product made by Nichifu Co., Ltd.  
 DST.....Product made by Daido Solderless Terminal Mfg. Co., Ltd.

							Crimp terminal tightening screw			Remarks	Reference drawing of connection type
38	60	100	150	200	325	650A	Screw size	Tightening torque N·m	Shape		
162A	217A	298A	395A	469A	650A	650A	M5	2 to 3	M5•M6	When connecting two crimp terminals, set the terminals as shown below if the *-marked terminals are used.	(Fig. a)
26.66 to 42.42	42.42 to 60.57	96.3 to 117.2	117.2 to 152.05	192.6 to 242.27	242.27 to 325	242.27 to 325					
AMP #322870 JST 38-S8 NTK R38-8S	1AF-60 (L330T459-12) CB60-S8						M5	2 to 3	M5		
							M5	2 to 3	M5		
AMP #322870 JST 38-S8 NTK R38-8S	1AF-60 (L330T459-12) CB60-S8						M8	5 to 7	M8		
							M5	2 to 3	M5		
AMP #322870 JST 38-S8 NTK R38-8S	1AF-60 (L330T459-12) CB60-S8						M8	5 to 7	M8		
R-38-8	R-60-8	2AF (LN300T920-20) CB100-S8	2CR-150(*1) (LN300T920-21) (*1)CB150-S8				M8	8 to 13	M8	When using 2AF, use a crimp tool having a nominal size of 100.	
R-38-12	R-60-12	R-100-12	R-150-12	R-200-12	JST325-12		M12	40 to 50		Fit to a front type bar terminal. Up to two pieces can be fitted to one terminal.	(Fig. b)
R-38-12	R-60-12	R-100-12	R-150-12 RD150-12 SD150-12	R-200-12 RD200-12 SD200-12	JST325-12 RD325-12 SD325-12						

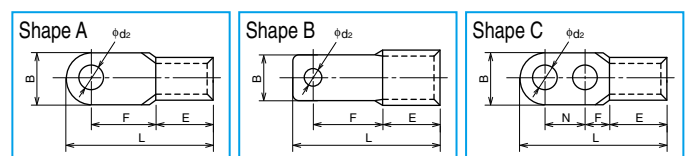
Notes \*1 When using 2CR-150 or CB150-S8, insulate it from TC-S with insulating tube or tape. When using CB150-S8 for a 2- or 3-pole circuit breaker, TCL-2SV3L is applicable.  
 \*2 On the power supply side, pan-head screws M5 are used.  
 \*3 When tightening a terminal screw without connecting a wire, crimp terminal or bar, tighten the screw to 20 to 30% of the torque shown in the above table (to prevent damage to the threads).  
 \*4 The table shows not the allowable current values of circuit breakers, but those of wires applicable to crimp terminals.  
 Remark: 1. For the crimp terminals for UL listed circuit breakers, refer to the page of the characteristics and external dimensions of UL 489 Listed Circuit Breakers.

● Dimensions of crimp terminals <extracted from catalog of JST>

Part number	Shape	Applicable screw size	External dimensions						Applicable wire mm <sup>2</sup>		
			φd2	B	L	F	E	Thickness			
R2-5	A	M5	5.3	9.5	16.8	7.3	4.8	0.8	1.04 to 2.63		
R2-6		M6	6.4	12.0	21.8	11.0			2.63 to 6.64		
R2-8		M8	8.4	12.0	21.8	11.0			6.64 to 10.52		
R5.5-5	A	M5	5.3	9.5	19.8	8.3	6.8	1.0	2.63 to 6.64		
R5.5-6		M6	6.4	12.0	25.8	13.0			6.64 to 10.52		
R5.5-8		M8	8.4	15.0	28.0	13.7			10.52 to 16.78		
R8-5	A	M5	5.3	12.0	23.8	9.3	8.5	1.2	6.64 to 10.52		
8-5NS		M5	5.3	9.0	22.3				9.3	10.52 to 16.78	
R8-6		M6	6.4	12.0	23.8				13.3	16.78 to 26.66	
R8-8	A	M8	8.4	15.0	29.8	13.8	10.5	1.5	16.78 to 26.66		
8-5SC-9		M5	5.3	9	23.8	9.3			8.5	1.2	6.64 to 10.52
R14-5		M5	5.3	12.0	29.8	13.3			10.5	1.5	10.52 to 16.78
14-5NS	M5	5.3	9.0	28.3	13.3		10.52 to 16.78				
R14-6	M6	6.4	12.0	29.8	14.5		16.78 to 26.66				
R14-8	A	M8	8.4	16.0	32.8	14.5	12.0	1.8	26.66 to 42.42		
L330T459-23		M5	5.3	12.0	30.0	12.0			1.8	26.66 to 42.42	
22-5NS		M5	5.3	9.5	28.7					12.0	26.66 to 42.42
22-S6	M6	6.4	12.0	30.0	13.5		26.66 to 42.42				
R22-8	A	M8	8.4	16.5	33.7	13.5	14.0	1.8	42.42 to 60.57		
R22-12		M12	13.0	22.0	42.5	19.5			26.66 to 42.42		
38-S8		M8	8.4	15.5	38.0	16.0			26.66 to 42.42		
R38-8	A	M8	8.4	22.0	42.7	17.7	18.0	2.0	42.42 to 60.57		
R38-12		M12	13.0	22.0	42.7	17.7			60.57 to 96.3		
L330T459-12		M8	8.4	16.0	46.7	20.7			96.3 to 117.2		
R60-8	A	M8	8.4	22.0	49.7	20.7	21.0	2.6	96.3 to 117.2		
R60-12		M12	13.0	28.5	55.6	20.4			117.2 to 152.05		
LN300T920-20		B	M8	8.4	22.5	51.0			20.0	21.0	2.6
R100-12	A	M12	13.0	28.5	55.6	20.4	21.0	2.6	96.3 to 117.2		

Part number	Shape	Applicable screw size	External dimensions						Applicable wire mm <sup>2</sup>
			φd2	B	L	F	E	Thickness	
LN300T920-21	B	M8	8.4	22.5	70.0	33.0	27.0	3.2	117.2 to 152.05
L330T402-8		M8	8.4	25.3	61.5	23.0			117.2 to 152.05
R150-12		A	M12	13.0	36.0	66.0			21.0
R200-12	A	M12	13.0	44.0	78.0	24.5	31.5	4.0	192.6 to 242.27
325-12		M12	13.0	50.5	88.0	33.5	35.5	4.5	242.27 to 325
CB60-S8		B	M8	8.4	16.0	46.7	20.7	18.0	2.0
CB100-S8	8.4			22.0	52.5	20.5	21.0	2.6	96.3 to 117.2
CB150-S8	8.4			22.0	61.0	23.0	27.0	3.2	117.2 to 152.05

Part number	Shape	Applicable screw size	External dimensions							Applicable wire mm <sup>2</sup>	
			φd2	B	L	F	E	N	Thickness		
RD60-12	C	M12	14.0	22.0	89.0	20.0	18.0	40	2.0	42.42 to 60.57	
RD100-12			14.0	28.5	95.5	20.3	21.0			2.6	96.3 to 117.2
RD150-12			14.0	36.0	106.0	21.0	27.0			3.2	117.2 to 152.05
RD200-12			14.0	44.0	116.5	23.0	31.5			4.0	192.6 to 242.27
RD325-12	C	M12	14.0	50.5	123.8	23.0	35.5	32	4.5	242.27 to 325	
SD150-12			36.0	107.0	29.0	28.0	3.2			117.2 to 152	
SD200-12			44.0	108.0	36.0	32.0	4.0			192.6 to 242.2	
SD325-12			50.5	125.0	38.0	37.0	4.5			242.2 to 325	



## 5. Busbar

The size of the conductor that can be connected is shown on the outline drawing of each model. The following special busbars are available. Use them as needed. When using any busbar, isolate it from the bare busbar on the circuit breaker power supply side with an insulating barrier.

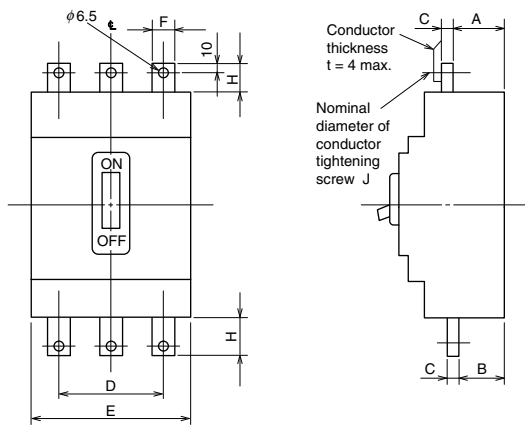


Fig. 1

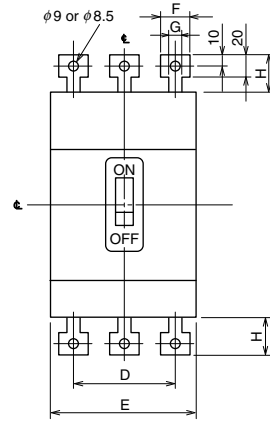


Fig. 2

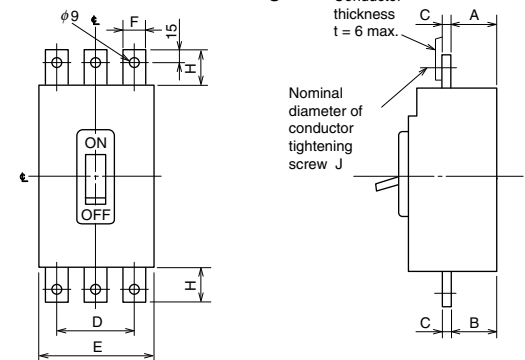


Fig. 3

Table 5-7 Table of variable dimensions

Type name	Applicable models		Outline and dimensions	Busbar									
	MCCB	ELCB		Fig.	A	B	C	D	E	F	G	H	J
FB-05SV	NF32-SV NF63-CV (50A or below) NF63-SV (50A or below) NF63-HV (50A or below)	NV32-SV NV63-CV (50A or below) NV63-SV (50A or below) NV63-HV (50A or below)		1	24	24	2	50	75	11.5	-	25	M5x0.8
FB-1SV	NF125-CV, NF125-SV NF125-HV, NF125-UV	NV125-CV NV125-SV NV125-HV		2	24	24	4	60	90	18	15	29	M8
FB-2SV	NF125-SEV NF125-HEV, NF125-RGV NF250-CV, NF250-SV, NF250-HV NF250-UV, NF250-SEV NF250-HEV, NF250-RGV NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV	NV125-SEV NV125-HEV NV250-CV, NV250-SV NV250-HV, NV250-SEV NV250-HEV		3	24	24	6	70	105	20	-	37	M8

## 6. Insulation Distance on Power Source Side

### ●Basic concept

#### Insulation distance (distance indicated in standards)

Be sure to at least secure the insulation distances (spatial distance and creeping distance) specified by the codes and standards of the relevant equipment and facilities where the circuit breakers are installed.  
It is recommended that insulation barriers and insulation tape be used to enhance the electrical insulation between bare-live parts and between bare-live parts and ground to avoid accidents otherwise caused by a loose metal piece, conductive dust, abnormal surge voltage in the circuit or a similar event so as to improve the reliability of panels.

#### Arc Space (insulation space)

At the exhaust outlet side of breaker, arc space is necessary. When the actual load circuit is opened, especially when a large current such as overload or short-circuit is interrupted, ionized gas is emitted from the exhaust outlet. This gas can cause a short circuit between bare, live parts such as busbars, and also can cause grounding faults between conductive installation metal panels.  
Therefore, it is important to secure enough arc space at the exhaust outlet side of the breaker and to strengthen insulation of parts exposed to the gas. In addition, securing enough space at the front of the exhaust outlet is necessary, because when the gas emission is blocked, failures such as deterioration of breaking performance can be caused.

### ●Insulation required part

With regard to insulation of bare, live parts of the line side of the breaker, please make sure to insulate at least C part C indicated in the diagram above with insulation tape, a tube or a terminal cover.

- ①A : Distance from the circuit breaker to the ceiling plate
- ②B1 : Distance from the circuit breaker to the uncovered conducting part of the upper circuit breaker terminal (front connection)
- ③B2 : Distance from the lower circuit breaker to the end face of the upper circuit breaker (rear connection)
- ④D1 : Distance from the side of the breaker to the side plate
- ⑤C : Insulated length of the power source terminal of the circuit breaker (front connection)

Please secure insulation using insulating tape, insulating tubing, insulation barrier, or a terminal cover, between bare charge parts within this size range. Please refer to a table a necessary size must.

◇When using insulation tape and insulation tubing together with insulation barriers and terminal covers, make them overlap with the other by at least 10mm.

◇For the models with insulation barriers supplied as standard, please make sure to use the barriers.

a : clearance specified in standard

⑥D2 : Side-to-side spacing of breakers

While the circuit breakers can basically be installed together without a clearance in between, be sure to observe the following instructions.

◇It is desirable to install an insulation barrier between the adjacent circuit breakers or insulate the bare-live parts considering the effect of cutoff gas.

◇Be sure to secure the insulation distance (dimension a) as the minimum, indispensable requirement.

◇With a leakage circuit breaker and a leakage alarm circuit breaker installed in close contact with the other, a current of 2,500A or higher flowing through one of the circuit breakers could cause the other to operate falsely.

Be sure to secure a distance of at least 50mm in between.

◇A circuit breaker of 400 ampere frame or larger with an SHT or a UVT could operate falsely if a current of 50kA or higher flows through the adjacent circuit breaker.  
Be sure to secure a distance of at least 50mm in between.

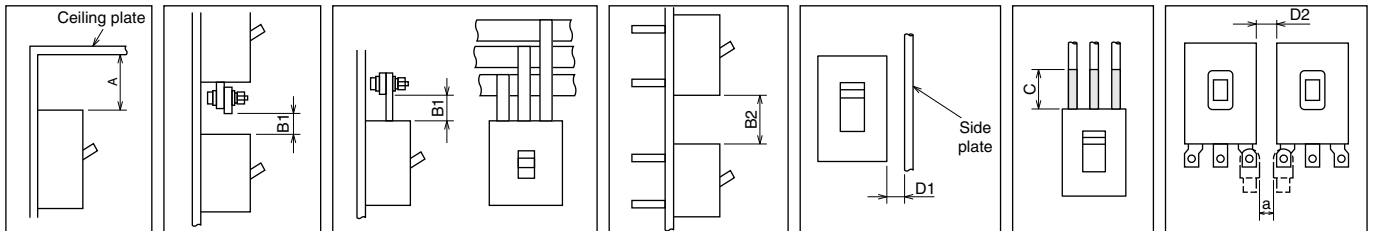


Table 5-8 Insulation distance (mm) (440VAC or below) \*Figures in parentheses are for 230VAC or below.

Class Series	Model		Ceiling plate			Vertical spacing		C	Horizontal spacing D1
	MCCB	ELCB	A		B1, B2				
			Uncovered metal Plate Without terminal cover	Insulated plate, coated plate With terminal cover	Without terminal cover	With terminal cover			
C S H R MB	NF30-CS, NF30-FAU, NF50-FAU, NF50-FHU, NF100-FHU	NV30-FAU, NV50-FAU, NV50-FHU, NV100-FHU	10	10	10	20	20	(*)1	20
	NF32-SV, NF63-CV	NV63-CV	5	5	5	20	20	(*)1	20
	NF63-SV, NF63-HV	NV32-SV, NV63-SV, NV63-HV	10	10	10	30	30	30	25
	NF125-CV	NV125-CV	50(30)	40(30)	10	50	50	(*)1	25
	NF125-SV	NV125-SV	50(10)	30(10)	10	50	50	50	25
	NF125-HV	NV125-HV	50	40	40	80	80	80	40
	NF250-CV	NV250-CV	40	40	40	50	50	50	50
	NF125-SEV, NF250-SV, NF250-SEV	NV125-SEV, NV250-SV, NV250-SEV	70(40)	40	40	70(50)	50	70(50)	50
	NF125-SGV, NF160-SGV, NF250-SGV								
	NF125-HEV, NF250-HV, NF250-HEV	NV125-HEV, NV250-HV, NV250-HEV	80	60	60	80	80	80	60
	NF125-LGV, NF160-LGV, NF250-LGV								
	NF125-HGV, NF160-HGV, NF250-HGV								
	NF400-CW	NV400-CW	60	60	60	60	60	60	40
	NF400-SW, NF400-SEW	NV400-SW, NV400-SEW	70	70	70	70	70	70	70
	NF400-HEW, NF400-REW	NV400-HEW	200	200	200	200	200	200	150
NF630-SW, NF630-SEW, NF630-CW	NV630-CW, NV630-SW, NV630-SEW	70	70	70	70	70	70	70	
NF630-HEW, NF630-REW	NV630-HEW	200	200	200	200	200	200	150	
NF800-SEW, NF800-CEW	NV800-SEW	80	80	80	80	80	80	80	
NF800-HEW, NF800-REW	NV800-HEW	200	200	200	200	200	200	150	
NF1000-SEW, NF1250-SEW		100	100	100	100	100	100	100	
R U	NF125-RGV, NF250-RGV		30 (*6)	30 (*6)	30 (*6)	50 (*9)	50 (*9)	50	5
	NF125-UV, NF250-UV		(*)1	(*)1	(*)1	(*)1	(*)1	(*)1	25
	NF400-UEW		70	70	70	70	70	70	70
	NF800-UEW		80	80	80	80	80	80	80
UL	NF50-SMU		(10)	(10)	(10)	(20)	(20)	(20)	(10)
	NF100-SRU	NV100-SRU	30(10)(*6)	30(10)(*6)	10(*6)	50(*7)	50(*7)	50(*7)	10
	NF100-HRU(*4)	NV100-HRU(*4)	60(10)(*6)(*7)	60(10)(*6)(*7)	10(*6)	70(*6)(*7)	70(*6)(*7)	70(*6)(*7)	10
	NF50-SVFU		10 (*6)	10 (*6)	10 (*6)	20 (*7)	20 (*7)	30	10
	NF250-CVU	NV250-CVU	(40)	(40)	(40)	(50)	(50)	(50)	(20)
	NF100-CVFU		50(25)	40(25)	10	50	50	50	25(15)
	NF125-SVU(*4)		40(10)	30(10)	10	50	50	50	25(20)
	NF125-HVU(*5)		40	40	40	80	80	80	25(20)
	NF250-SVU(*4)		40	40	40	70(50)	50	70(50)	50(20)
	NF250-HVU(*5)		40	40	40	80	80	80	50(20)
	NF400-SWU, NF400-HWU(*5)		70	70	70	70	70	70	70
	NF630-SWU, NF630-HWU(*5)		70	70	70	70	70	70	70

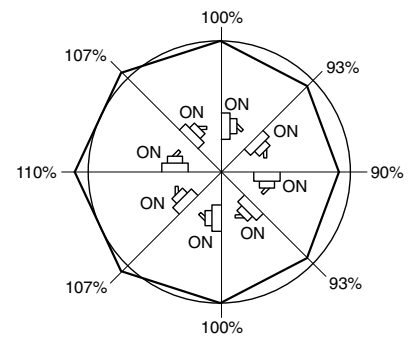
Remark: 1. The table shows the dimensions in the case of the use of a large terminal cover (TC-L).  
Notes \*1 It is not necessary to provide an insulation distance (an arc space) on the power supply side. However, if a grounding metal piece or the like comes in close contact with the terminal, be sure to completely insulate the terminals or the bare-live parts of the cable conductors.  
\*2 At more than 440VAC, the distance shall be 10mm.  
\*3 For 480Y/277VAC.  
\*4 For 480VAC.  
\*5 For 600Y/347VAC.  
\*6 An exhaust port is provided also on the circuit breaker load side. Secure the dimension A both on the power supply side and on the load side.  
\*7 When any of the circuit breakers NF125-RGV to NF250-RGV is used on the upstream side, an exhaust port is provided also on the circuit breaker load side. Secure the larger distance of the dimension B1 of NF125-RGV, NF250-RGV or NF50-SVFU and the dimension B1 of the downstream circuit breaker.

## 7. Effect of Installation Orientation

Installation orientation does not affect the operating characteristics of circuit breakers of electronic or thermo-magnetic operation types. However, the installation orientation affects the operating current of fully magnetic type circuit breakers as the iron core in the oil dash pot is under gravitational force. It is generally suggested they be installed vertically.

### ●Hydraulic-magnetic (The same applies to other models of hydraulic-magnetic type.)

MCCB		ELCB	
Class	Model	Class	Model
C	NF30-CS	C	—
S-H	NF100-SRU, NF100-HRU	S-H	NV100-SRU, NV100-HRU
FH	NF50-FHU, NF100-FHU	FH	NV50-FHU, NV100-FHU



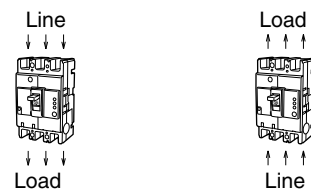
Rate of change of rated current by mounting angle

## 8. Connection of Line and Load

The standard wiring of line and load on the circuit breaker is as shown in (a) normal connection on the right.

Avoid the wiring shown in (b) reverse connection. This may lead to a decrease in breaking performance.

However, the reverse connection is allowed for the following models (excluding MDU breakers).



(a) Normal connection (b) Reverse connection

### Connection methods

NF-C, NF-S, NF-H, NF-R and NF-U class CP30-BA, NV-C, S, H and R class of 400 to 800AF, NF100-CVFU, NF125-SVU, NF125-HVU, NF250-SVU, NF250-HVU	Reverse connection is allowed for the standard models.
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# 6

## Accessories

### **1 Internal Accessories** **108**

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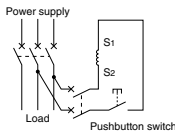
## 1. Internal Accessories

The accessories to be installed in circuit breakers include the followings. For the numbers of the accessories which can be installed, refer to the tables on pages 110 to 114. The standard internal accessories have lead wires (450mm long) drawn out. (However, some of Models UVT and TBM have vertical lead wire terminal blocks as standard.)

When circuit breakers are installed side by side, keep a space of 8mm or more for lead wires between the circuit breakers. (Models with lead wires drawn out toward load and models with lead wire grooves in the side faces can be installed in close contact.)

### SHT (Shunt trip)

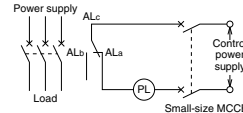
Device to electrically trip a circuit breaker from a distance. The allowable operating voltage range is 70 to 110% of the rated voltage. (JIS C 8201-2-1 Ann.1, Ann.2)



Connection diagram

### AL (Alarm switch)

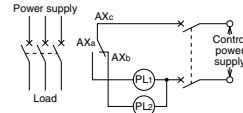
Switch to electrically display the tripping status of circuit breaker



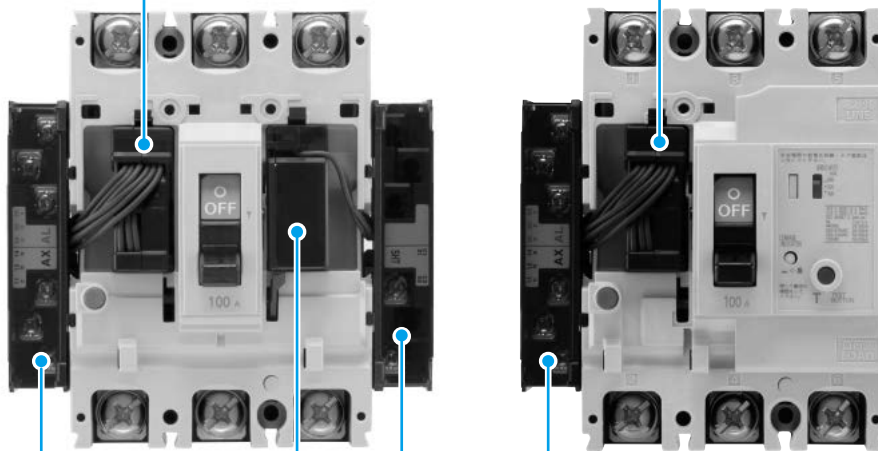
Connection diagram

### AX (Auxiliary switch)

Switch to electrically display the ON-OFF status of circuit breaker



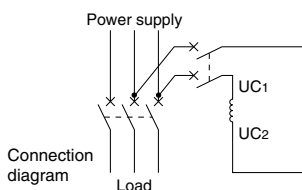
Connection diagram



### UVT (Undervoltage trip)

Device to automatically trip a circuit breaker when the voltage drops. The operating voltage is 70 to 35% of the UVT rated voltage. (JIS C 8201-2-1 Ann.1)

When the voltage recovers at least to 85% or more, the circuit breaker can be turned on after the device is manually reset.



Connection diagram

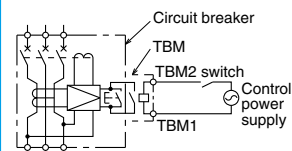
### SLT (Lead wire terminal block)

Terminals for connecting with internal accessories. The terminal block will be manufactured to order. For the detailed dimensions, refer to pages 120 and 121. (The dimensions of SLT slightly vary depending on the number of installed accessories and the model.)

However, circuit breakers with a frame size of 400A and above having an electrical operation device are normally provided with SLT.

### TBM (Test button module)


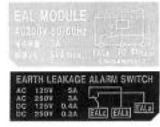



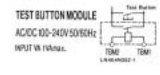
Unit to perform test under voltage from a distance. TBMs can be connected in parallel. (The standard TBMs are provided with SLT. In the case of the flush plate type, the external dimensions are partially different from those of the standard type.)



TBM circuit diagram

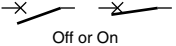
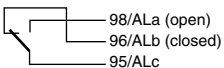
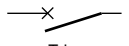
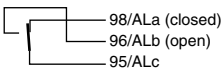
## 2. Kinds of Internal Accessories

Table 6-1

Accessory name	Nameplate (sample)	Accessory name	Nameplate (sample)
<b>AL</b> Alarm switch		<b>EAL</b> Earth leakage trip alarm switch	
<b>AX</b> Auxiliary switch			
<b>SHT</b> Shunt tripping device			
<b>UVT</b> Undervoltage tripping device		<b>TBM</b> Test button module	

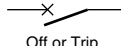
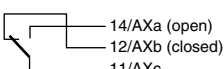
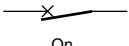
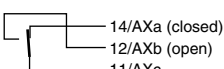
## 3. Operations and Ratings of Switches

Table 6-2 Operations of AL switch

Status of circuit breaker	Contact status of AL switch
 Off or On	
 Trip	

\* The terminal numbers 98/ALa, 96/ALb and 95/ALc may vary depending on the number of installed switches and the installation poles.

Table 6-3 Operations of AX switch

Status of circuit breaker	Contact status of AX switch
 Off or Trip	
 On	

\* The terminal numbers 14/AXa, 12/AXb and 11/AXc may vary depending on the number of installed switches and the installation poles.

Table 6-4 Operations of EAL switch

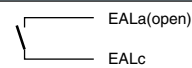
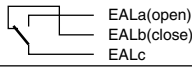
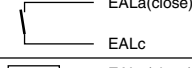
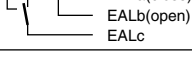
Status of circuit breaker	Contact status of EAL switch	
Overload/ short-circuit trip ON/OFF	250A frame or less	
	400A frame or more	
earth fault trip	250A frame or less	
	400A frame or more	

Table 6-5 Operations of MG switch

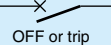
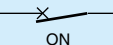
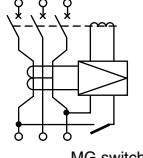
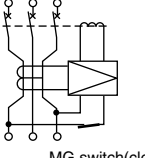
Status of circuit breaker	 OFF or trip	 ON
Status of MG switch	 MG switch(open)	 MG switch(closed)

Table 6-6 Ratings of AL and AX switches

Applied switch	AC		DC			
	Voltage V	Current A		Voltage V	Current A	
		Resistive load	Inductive load		Resistive load	Inductive load
A	(250)	(1)	(0.5)	(50)	(1)	(0.5)
	125	3	(1)	30	(2)	(1)
	460	—	—	250	0.2	0.2
S	250	3	2	125	0.4	0.4
	125	5	3	30	4	3
	460	5	2	250	0.3	0.3
V	250	10	10	125	0.6	0.6
	125	10	10	30	10	6

Remarks: 1. The ratings in parentheses do not conform to UL.  
2. For the applied switches, refer to Tables 6-9-1 to 6-14-1.

Table 6-7 Ratings of corrosion resist AL and AX switches

Corrosion resist switch	AC		DC			
	Voltage V	Current A		Voltage V	Current A	
		Resistive load	Inductive load		Resistive load	Inductive load
ST	460	—	—	250	0.2	0.2
	250	3	2	125	0.4	0.4
	125	5	3	30	4	3
VT	460	1	0.5	250	0.3	0.3
	250	5	4	125	0.4	0.4
	125	5	4	30	5	3

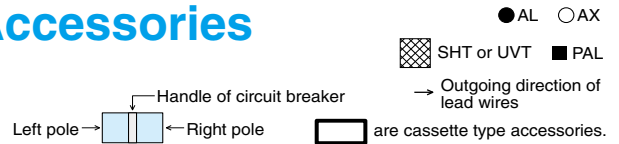
Table 6-8 Ratings of small loads AL-AX-EAL(EAL for 400A frame or moer)

Switch	AC		DC			
	Voltage V	Current A		Voltage V	Current A	
		Resistive load	Inductive load		Resistive load	Inductive load
AB	125	0.1	—	30	(0.1)	—
SB	125	0.1	—	30	0.1	—
VB	125	0.1	—	30	0.1	—

## 4. Maximum Number of Internal Accessories

### MCCB and Motor Protection Breakers

Table 6-9 Table of maximum number of internal accessories



Model	C	NF30-CS	NF63-CV NF125-CV	NF63-CV NF125-CV NF250-CV		NF400-CW NF630-CW	NF800-CEW	
	S		NF32-SV NF63-SV NF125-SV	NF32-SV NF63-SV NF125-SV NF160-SGV NF250-SV NF250-SGV	NF125-SEV NF250-SEV	NF400-SW NF400-SEW NF630-SW NF630-SEW	NF800-SEW NF800-SDW	NF1000-SEW NF1250-SEW NF1600-SEW
L • H • R			NF63-HV	NF63-HV NF125-HV NF125-LGV NF125-HGV NF125-RGV NF160-LGV NF160-HGV NF250-HV NF250-LGV NF250-HGV NF250-RGV	NF125-HEV NF250-HEV	NF400-HEW NF400-REW NF630-HEW NF630-REW	NF800-HEW NF800-REW	
U				NF125-UV NF250-UV		NF400-UEW(3P)	NF400-UEW(4P) NF800-UEW	
HDV HDW HDVA			NF63-HDV	NF63-HDV(3P) NF125-HDV(3P) NF250-HDV(3P) NF125-HDVA(3P, 4P) NF250-HDVA(3P, 4P)		NF400-HDW(3P, 4P)	NF800-HDW(3P, 4P)	
Number of poles AL and AX (standard) switches		2 or 3 poles	2 poles	2, 3 or 4 poles	3, 4 poles	2, 3 or 4 poles	2, 3 or 4 poles	2, 3 or 4 poles
Accessory		S						V
AL								
AX								
SHT or UVT								
AL + AX	 3-pole product only							
SHT + UVT								
AL + SHT or UVT								
AX + SHT or UVT								
AL + AX + SHT or UVT								
PAL (contact output)								

Notes \*1 When UVT is provided, the UVT voltage module will come in the vertical lead wire terminal block type. (SHT does not have a voltage module.)  
 \*2 The second AX can be installed in place of the AL on the left pole side. When placing an order, specify the incorporation of the switches in the body.  
 \*3 Although the lead wires are normally drawn out laterally, those with lead wires drawn out toward load are available. (Only for front connection type)  
 \*4 PAL (contact output) can be installed together with AL and AX on the left pole side. (It cannot be installed together with SHT or UVT.)  
 The standard type is provided with SLT. PAL control voltage (compatible with 100 to 200VAC) is necessary.  
 \*5 SHT and UVT can be installed on the left side.  
 \*6 SHT and UVT are normally installed on the right pole side. If you intend to install them on the left pole side, specify so. (The non-reset type UVT must be installed on the left pole side.)  
 \*7 In the case where three or more accessories are installed on the left pole side and AL, AX or AL and AX are installed on the pole on which SLT, SHT or UVT is installed, the SLT will be manufactured to order.  
 \*8 When AL, AX or AL and AX are installed on the pole on which UVT is installed, the UVT voltage module must be installed separately.  
 \*9 SLT is provided as standard. A control power supply (100 to 200VAC) is required. (In this case, other internal accessories cannot be installed on the right pole side.)

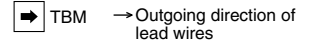
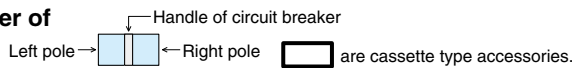
Remarks: 1. For electrically operated automatic reset type circuit breakers having a frame size of 400A or above, the numbers of AL switches which can be installed are smaller by 1 than the values shown above.  
 2. The encircled numbers indicate the order of installation.



**ELCB**

● AL ○ AX  SHT or UVT

**Table 6-10 Table of maximum number of internal accessories**



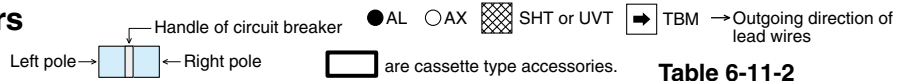
Model	C	NV63-CV NV125-CV NV250-CV	NV400-CW NV630-CW	
	S	NV32-SV NV63-SV NV125-SV NV125-SEV NV250-SV NV250-SEV	NV400-SW NV400-SEW NV630-SW NV630-SEW	NV800-SEW
H • R		NV63-HV NV125-HV NV125-HEV NV250-HV NV250-HEV	NV400-HEW NV630-HEW	NV800-HEW
Number of poles Switch		2, 3, or 4 poles	3 poles	
Accessory		S		
AL				(*6)
AX				(*6)
AL + AX				(*6)
SHT or UVT				(*5)
SHT or UVT + AL				(*4) (*5) (*6)
SHT or UVT + AX				(*4) (*5) (*6)
SHT or UVT + AL + AX				(*4) (*5) (*6)
TBM				(*1)

- Notes \*1 The standard type is provided with SLT. Only in the case of 24VDC, specify the control voltage.  
 \*2 The second AX can be installed in place of the AL on the left pole side. When placing an order, specify the incorporation of the switches in the body.  
 \*3 When UVT is provided, the UVT voltage module will come in the vertical lead wire terminal block type. (SHT does not have a voltage module.)  
 \*4 When AL, AX or AL and AX are installed on the pole on which UVT is installed, the UVT voltage module must be separately installed.  
 \*5 When the accessory is provided with UVT, the UVT voltage module has a vertical lead wire terminal block. The UVT is not provided with a cassette.  
 \*6 SLT to be used when three or more accessories are installed on the left pole is manufactured to order.

- Remarks: 1. The encircled numbers indicate the order of installation.  
 2. TBM can be installed regardless of the number of installed AL, AX, SHT and UVT.

# 6 Accessories 1 Internal Accessories

## UL 489 Listed Circuit Breakers



**Table 6-11-1 Table of maximum number of internal accessories**

Model	MCCB	NF30-FAU NF50-FAU	NF50-FHU NF100-FHU(3P)	NF100-SRU NF100-HRU		NF50-SVFU NF100-CVFU	NF50-SVFU NF100-CVFU	NF125-SVU NF125-HVU NF250-SVU NF250-HVU NF250-CVU	NF400-SWU NF400-HWU	NF630-SWU NF630-HWU
		2, 3 poles	2, 3 poles	2 poles	3 poles	2 poles	3 poles	2 or 3 poles	3 poles	3 poles
Number of poles AL and AX (standard) switches		A	S	A		S				
Accessory										
AL			(*9)	(*10)	(*9)					(*4)
AX			(*9)	(*10)	(*9)					(*4)
SHT or UVT		(*8)	(*8) (*9)	(*10) (*11)	(*8) (*9) (*11)	(*1) (*6)	(*1) (*3) (*6)	(*1) (*3)	(*1) (*3)	(*1) (*3)
AL + AX		Only 3 poles	Only 3 poles (*9)	(*10)	(*9)		(*2)	(*2)	(*6)	(*6)
AL + SHT or UVT		Only 3 poles (*8)	Only 3 poles (*8) (*9)	(*10) (*11)	(*8) (*9) (*11)	(*1) (*6)	(*1)	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)
AX + SHT or UVT				(*10) (*11)	(*8) (*9) (*11)	(*1) (*6)	(*1)	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)
AL + AX + SHT or UVT				(*10) (*11)	(*8) (*9) (*11)	(*1) (*6)	(*1)	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)	(*1) (*3) (*4) (*5)

**Table 6-11-2 Table of maximum number of accessories**

Model	NF	NF50-SMU
		1, 2, 3 poles
Number of poles AL and AX (standard) switches		-
Accessory		
AL		
AX		
SHT		
AL + AX		
AL + SHT		
AX + SHT		
AL + AX + SHT		

Model	ELCB	NV30-FAU NV50-FAU	NV50-FHU NV100-FHU(3P)	NV100-SRU NV100-HRU(3P)	NV50-SVFU	NV50-SVFU NV100-CVFU	NV125-SVU NV125-HVU NV250-SVU NV250-HVU
		2, 3 poles	2, 3 poles	2, 3 poles	2 poles	3 poles	3 poles
Number of poles AL and AX (standard) switches		A	S	A	S		
Accessory							
AL			(*9)	(*9) (*10)			
AX			(*9)	(*9) (*10)			
SHT or UVT					(*1) (*6)	(*1)	(*1)
AL + AX		Only 3 poles	Only 3 poles (*9)	(*9) (*10)	(*2)	(*2)	(*2)
AL + SHT or UVT				(*9) (*10) (*11)			
AX + SHT or UVT				(*9) (*10) (*11)			
AL + AX + SHT or UVT				(*9) (*10) (*11)			
TBM				(*7)	(*7)	(*7)	(*7)

**Notes**

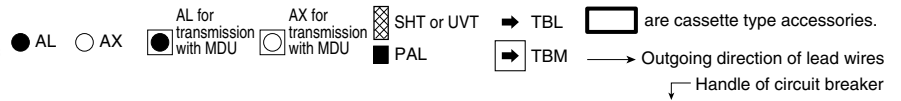
- \*1 When UVT is provided, the UVT voltage module will come in the vertical lead wire terminal block type. (SHT does not have a voltage module.)
- \*2 SHT cannot be installed.
- \*3 SHT and UVT are normally installed on the right pole side. If you intend to install them on the left pole side, specify so.
- \*4 In the case where three or more accessories are installed on the left pole side and AL, AX or AL and AX are installed on the pole on which SLT, SHT or UVT is installed, the SLT will be manufactured to order.
- \*5 When AL, AX or AL and AX are installed on the pole on which UVT is installed, the UVT voltage module must be installed separately.
- \*6 UVT of NF50-SVFU and NV50-SVFU are not provided with cassettes.
- \*7 The standard type is provided with SLT. Only in the case of 24VDC, specify the control voltage.
- \*8 UVT cannot be installed.
- \*9 Lead drawing is standard. Lead drawing is also available.
- \*10 Lead drawing is not available.
- \*11 Left pole SHT and UVT are mounted on the side of circuit breaker.

**Remarks:**

1. The encircled numbers indicate the order of installation.
2. AL and AX for minute load can be manufactured to order. (These switches have been certified only by UL and CSA. They have not been certified by TÜV.)

## MDU Breakers

**Table 6-12-1 Table of maximum number of internal accessories**



The numbers in ○ indicate the mounting order.

Model	NF250-SEV with MDU NF250-HEV with MDU
Number of poles	3, 4 poles
Switch	S
AL	*1
AX	*1
AL+AX	*1 *2
SHT	*1 *3
	*1 *3
UVT	*4
AL+SHT	*1
AX+SHT	*1
AL+AX+SHT	*1
AL+UVT	*4
AX+UVT	*4
AL+AX+UVT	*4

Model	NF250-SEV with MDU NF250-HEV with MDU
Number of poles	3, 4 poles
Switch	S
PAL	*5 <small>With PAL contact</small>
AL for transmission with MDU *6	*6
AX for transmission with MDU *6	*6
AL+AX for transmission with MDU *6	*6
AL+AX+AL for transmission with MDU *6	*1
AL+AX+AX for transmission with MDU *6	*1
AL+AX+AL+AX for transmission with MDU *6	*1

- \*1 The right pole SLT specification is built into the main unit (not included with the cassette).  
When MDU specification is "Breaker mounting", "Breaker mounting unit separates".
- \*2. The second AX can be mounted in place of the AL on the left pole side. Please order with the built-in body.
- \*3. Left pole mounting is also possible.
- \*4. The UVT voltage module is a vertical lead wire terminal block type. UVT is not included with the cassette.

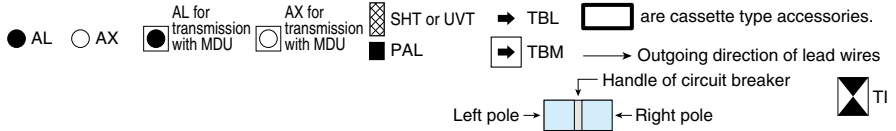
MDU installation type	UVT specification	Remarks
Breaker mounting	· UVT voltage module separate installation is standard. · In the case of separate display unit, UVT voltage module body mounting is also available.	Left pole mounting is also possible. (Reset type UVT can not be mounted on the left)
Breaker mounting unit separate installation		
External mounting	· UVT voltage module body mounting is standard.	
Panel mounting	· A separate UVT voltage module can also be manufactured.	

- \*5. It comes with a terminal block specification.  
A control power supply (100-240VAC/DC common) is required (In this case, other internal accessories can not be mounted on the right pole).  
When MDU specification is "Breaker mounting", "Breaker mounting unit separates".
- \*6. When transmitting AL, AX, AL + AX, AL and AX for MDU transmission are left pole mounted.  
In this case, AL and AX for MDU transmission installed on the left pole side can not be used for lead wire extraction and terminal block installation to the outside.

# 6 Accessories 1 Internal Accessories

## MDU Breakers

Table 6-12-2 Table of maximum number of internal accessories



The numbers in ○ indicate the mounting order.

Model	NF400-SEW with MDU NF400-HEW with MDU	NF800-SEW with MDU NF800-HEW with MDU
Number of poles	3, 4 poles	
Switch	S	
AL		*1
AX		*1
SHT	*2	
UVT	*3 *4	
AL+AX	*1	
AL+SHT	*2	*1 *2
AX+SHT	*2	*1 *2
AL+AX+SHT	*1 *2	*1 *2
AL+UVT	*3 *4 *5	*1 *3 *4 *5
AX+UVT	*3 *4 *5	*1 *3 *4 *5
AL+AX+UVT	*1 *3 *4 *5	*1 *3 *4 *5

Model	NF400-SEW with MDU NF400-HEW with MDU	NF800-SEW with MDU NF800-HEW with MDU
Number of poles	3, 4 poles	
Switch	S	
PAL	*6	
TI	*6 With PAL: OAL contact	
AL for transmission with MDU *7		
AX for transmission with MDU *7		
AL+AX for transmission with MDU *7		
AL+AX+AL for transmission with MDU *7		
AL+AX+AX for transmission with MDU *7		
AL+AX+AL+AX for transmission with MDU *7		

\*1 When mounting 3 or more accessories on the left pole, SLT is manufactured upon order.

\*2 The right pole mounting is standard for SHT. Please specify for left pole installation.

\*3 The UVT voltage module is a vertical lead wire terminal block type. UVT is not included with the cassette. With embedded UVT, "UVT voltage module separate" Please specify

\*4 UVT is standard with right pole mounting. Please specify for left pole installation. (The reset prevention type UVT has a left pole mounting)

\*5 When mounting AL, AX, AL + AX on the same pole as UVT, the UVT voltage module is separate.

\*6 It comes with a terminal block specification. Control power supply (100-240VAC/DC shared) 5VA is required.

(In this case, other internal accessories can not be mounted on the right pole)

\*7 When transmitting AL, AX, AL + AX, AL and AX for MDU transmission are left pole mounted.

In this case, AL and AX for MDU transmission installed on the left pole side can not be used for lead extraction and terminal block installation to the outside.

MDU installation type	UVT specification	Remarks
Breaker mounting	<ul style="list-style-type: none"> <li>UVT voltage module separate installation is standard.</li> <li>In the case of separate display unit, UVT voltage module body mounting is also available.</li> </ul>	Left pole mounting is also possible. (Reset type UVT can not be mounted on the left)
Breaker mounting unit separate installation		
External mounting		
Panel mounting	<ul style="list-style-type: none"> <li>UVT voltage module body mounting is standard.</li> <li>A separate UVT voltage module can also be manufactured.</li> </ul>	

## 5. Cassette Type Accessories

The internal accessories for major models having a frame size from 30 to 800A come in cassettes, and they can be installed to and removed from circuit breakers by the user.

Some cassette type accessories have lead wires drawn out, and others have vertical lead wire terminal blocks (SLT). (These parts are supplied by 10 pieces for frame size from 30 to 250A or by 1 piece for frame size from 400 to 800A.)

### ■ Applicable models and kinds of cassette type accessories

	Model	Alarm switch (AL)	Auxiliary switch (AX)	Shunt tripping device (SHT)	Undervoltage tripping device (UVT)
MCCB	NF100-SRU, NF100-HRU NF63-CV~NF250-CV, NF32-SV~NF250-SV NF63-HV~NF250-HV NF125-SGV~NF250-SGV, NF125-LGV~NF250-LGV NF125-HGV~NF250-HGV NF125-SEV, NF250-SEV, NF125-HEV, NF250-HEV NF125-RGV, NF250-RGV, NF125-UV, NF250-UV NF100-CVFU, NF125-SVU/HVU, NF250-CVU/SVU/HVU	○	○	○	○
	NF50-SVFU, NF400-CW, NF630-CW, NF800-CEW NF400-SW, NF630-SW, NF400-SEW~NF800-SEW NF800-SDW, NF400-HEW~NF800-HEW NF400-REW~NF800-REW, NF400-UEW, NF800-UEW NF400-SWU/HWU, NF630-SWU/HWU	○	○	○	-
ELCB	NV100-SRU, NV100-HRU NV63-CV~NV250-CV, NV32-SV~NV250-SV NV63-HV~NV250-HV NV125-SEV, NV250-SEV, NV125-HEV, NV250-HEV NV100-CVFU, NV125-SVU/HVU, NV250-CVU/SVU/HVU	○	○	○	○
	NV50-SVFU, NV400-CW, NV630-CW NV400-SW, NV630-SW, NV400-SEW~NV800-SEW NV400-HEW~NV800-HEW	○	○	○	-

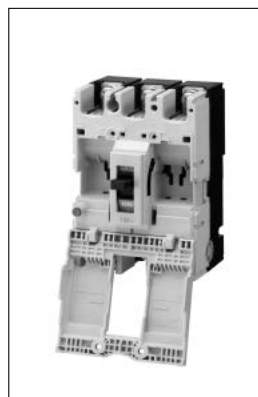
### ■ Procedure for installing cassette type accessories



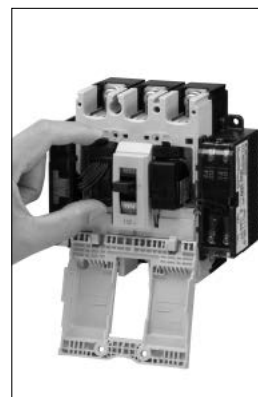
1. Press the trip button (PTT) to trip the circuit breaker. (\*1)



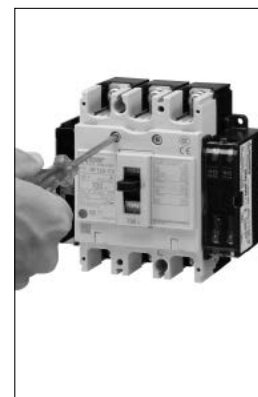
2. Loosen the cover screws.



3. Open the cover.



4. Install the cassette type accessory. (\*2)



5. Close the cover, and tighten the screws.

Notes \*1. When installing any cassette type accessory, set the circuit breaker to the tripped state.

\*2. If the inner lid or another accessory has been installed, remove it before installing the accessory.

When any circuit breaker supplied with the inner lid is used without an accessory, fit the inner lid without fail.

Failure to do so may affect the short-circuiting performance.

Models with inner lid: NF125-SV, NF125-HV, NF125-UV

NV125-SV, NV125-HV

NF250-SV, NF250-HV, NF250-CVU

NV250-SV, NV250-HV, NV250-CVU

NF125-SVU, NF125-HVU, NV125-SVU, NV125-HVU

NF250-SVU, NF250-HVU, NV250-SVU, NV250-HVU

NF250-SEV, NF250-HEV, NF250-UV

NV250-HEV

NF125-SEV, NF125-HEV

NV125-SEV, NV125-HEV

NF400-REW, NF400-UEW

NF630-REW

NF800-HEW, NF800-REW, NF800-UEW

NV800-HEW

NF630-SWU, NF630-HWU

### Cautions when installing

Before installing or removing any cassette type accessory, set the circuit breaker and accessories to the no-voltage state.

Never install a cassette type accessory while the handle is in the ON or OFF position. Doing so may damage the accessory.

When installing an accessory with lead wires drawn out, apply the supplied nameplate to the circuit breaker side face.

When installing an accessory with lead wires drawn out for a frame size of 400 to 800A, secure the lead wires along the circuit breaker side face with the supplied lead wire retainers.

## Type name

Table 6-13-1

Model		Installation pole	AL	AX	AL+AX	SHT	UVTN or UVTS	
MCCB	ELCB							
NF50-SVFU	NV50-SVFU	For right pole	AL-03SVU AL-03SVURS	AX-03SVU AX-03SVURS	ALAX-03SVU ALAX-03SVURS	SHTA240-03SVUR SHTA440-03SVUR SHTD100-03SVUR SHTA240-03SVURS SHTA440-03SVURS SHTD100-03SVURS	-	
		For left pole	AL-03SVU AL-03SVULS	AX-03SVU AX-03SVULS	ALAX-03SVU ALAX-03SVULS	SHTA240-03SVUL SHTA440-03SVUL SHTD100-03SVUL SHTA240-03SVULS SHTA440-03SVULS SHTD100-03SVULS	-	
NF32-SV, NF63-CV, NF63-SV, NF63-HV NF125-CV, NF125-SV, NF125-HV NF125-SGV, NF125-LGV, NF125-HGV NF160-SGV, NF160-LGV, NF160-HGV NF125-SEV, NF125-HEV NF125-RGV, NF125-UV NF250-CV, NF250-SV, NF250-HV NF250-SGV, NF250-LGV, NF250-HGV NF250-SEV, NF250-HEV NF250-RGV, NF250-UV		For right pole	AL-05SV AL-05SVRS	AX-05SV AX-05SVRS	ALAX-05SV ALAX-05SVRS	SHTA240-05SVR SHTA550-05SVR SHTD125-05SVR SHTA240-05SVRS SHTA550-05SVRS SHTD125-05SVRS	UVTNAD130-05SVR UVTNA250-05SVR UVTNA480-05SVR UVTNAD130-05SVRS UVTNA250-05SVRS UVTNA480-05SVRS	UVTSAD130-05SVR UVTSA250-05SVR UVTSA480-05SVR UVTSAD130-05SVRS UVTSA250-05SVRS UVTSA480-05SVRS
		For left pole	AL-05SV AL-05SVLS	AX-05SV AX-05SVLS	ALAX-05SV ALAX-05SVLS	SHTA240-05SVL SHTA550-05SVL SHTD125-05SVL SHTA240-05SVLS SHTA550-05SVLS SHTD125-05SVLS	UVTNAD130-05SVL UVTNA250-05SVL UVTNA480-05SVL UVTNAD130-05SVLS UVTNA250-05SVLS UVTNA480-05SVLS	UVTSAD130-05SVL UVTSA250-05SVL UVTSA480-05SVL UVTSAD130-05SVLS UVTSA250-05SVLS UVTSA480-05SVLS
NF100-CVFU NF125-SVU/HVU NF250-CVU/SVU/HVU	NV100-CVFU NV125-SVU/HVU NV250-CVU/SVU/HVU	For right pole	AL-05SVU AL-05SVURS	AX-05SVU AX-05SVURS	ALAX-05SVU ALAX-05SVURS	SHTA240-05SVUR SHTA550-05SVUR SHTD125-05SVUR SHTA240-05SVURS SHTA550-05SVURS SHTD125-05SVURS	UVTNAD130-05SVUR UVTNA250-05SVUR UVTNA480-05SVUR UVTNAD130-05SVURS UVTNA250-05SVURS UVTNA480-05SVURS	UVTSAD130-05SVUR UVTSA250-05SVUR UVTSA480-05SVUR UVTSAD130-05SVURS UVTSA250-05SVURS UVTSA480-05SVURS
		For left pole	AL-05SVU AL-05SVULS	AX-05SVU AX-05SVULS	ALAX-05SVU ALAX-05SVULS	SHTA240-05SVUL SHTA550-05SVUL SHTD125-05SVUL SHTA240-05SVULS SHTA550-05SVULS SHTD125-05SVULS	UVTNAD130-05SVUL UVTNA250-05SVUL UVTNA480-05SVUL UVTNAD130-05SVULS UVTNA250-05SVULS UVTNA480-05SVULS	UVTSAD130-05SVUL UVTSA250-05SVUL UVTSA480-05SVUL UVTSAD130-05SVULS UVTSA250-05SVULS UVTSA480-05SVULS
NF100-SRU NF100-HRU	NV100-SRU NV100-HRU	For right pole	AL-05SRU AL-05SRURS	AX-05SRU AX-05SRURS	ALAX-05SRU ALAX-05SRURS	SHTA240-05SRU SHTA480-05SRU SHTD125-05SRU SHTA240-05SRURS SHTA480-05SRURS SHTD125-05SRURS	-	
		For left pole	AL-05SRU AL-05SRULS	AX-05SRU AX-05SRULS	ALAX-05SRU ALAX-05SRULS	SHTA110-05SRULS SHTA127-05SRULS SHTA220-05SRULS SHTA240-05SRULS SHTD024-05SRULS SHTD110-05SRULS	UVTNA110-05SRULS UVTNA127-05SRULS UVTNA220-05SRULS UVTNA240-05SRULS UVTND024-05SRULS UVTND110-05SRULS	
NF400-CW, NF400-SW, NF400-SEW NF400-HEW, NF400-REW, NF400-UEW NF630-CW, NF630-SW, NF630-SEW NF630-HEW, NF630-REW NF800-CEW, NF800-SDW, NF800-SEW NF800-HEW, NF800-REW, NF800-UEW		For right pole (2, or 3 poles)	-	AX-4SW AX-4SWRS AX2-4SWRS	-	SHT-4SW SHT-4SWRS	-	
		For right pole (4 poles)	-	-	-	SHT-4SWRFS SHT-8SWRFS	-	
		For left pole (2, 3 or 4 poles)	AL-4SWL AL-4SWLS AL2-4SWLS	AX-4SW AX-4SWLS AX2-4SWLS	ALAX-4SWL ALAX-4SWLS	SHT-4SW SHT-4SWLS	-	
NF400-SWU, NF400-HWU NF630-SWU, NF630-HWU		For right pole	-	AX-4SWU AX-4SWURS AX2-4SWURS	-	SHT-4SWU SHT-4SWURS	-	
		For left pole	AL-4SWU	AX-4SWU	ALAX-4SWU	SHT-4SWU	-	

- Remarks:
- For the possibility of installation of accessories and the installation pole, refer to the tables of maximum numbers on pages 110 to 114.
  - AL and AX for minute load can be manufactured to order.
  - Corrosion-proof cassette type AL and AX are not available. When the circuit breaker body is exposed to class 1 tropicalization, class 2 tropicalization, reinforced corrosion resistance treatment or class 2 heat resistance treatment, place an order for the circuit breaker including the accessories.
  - Cassette type accessories with SLT for right pole cannot be installed to 4-pole circuit breakers. Accessories with SLT for right pole to be used in 4-pole circuit breakers are manufactured to order.
  - Cassette type accessories with SLT cannot be installed to flush plate type circuit breakers.
  - Cassette type accessories (AL, AX and SHT) cannot be installed to circuit breakers with MG.
  - It is impossible to install a combination of a cassette type accessory with lead wires drawn out and that with SLT or a combination of cassette type accessories with SLT on the same pole.
  - It is impossible to install the cassette type AL or AX to the pole to which UVT has been installed.
  - AX and SHT with lead wires drawn out for frame size from 400 to 800A can be installed to any of the right and left poles.
  - When installing more than one AL or AX with lead wires drawn out for frame size from 400 to 800A to one side, install the necessary number of the accessories for one piece. The lead wires from the circuit breaker vary in length depending on the installation position.
  - Install the cassette accessories for frame size from 400 to 800A starting from the outside of the installation positions. For the installation positions, see the installation positions shown in the following table.
  - When three pieces of more of AL and AX are installed on a circuit breaker with a frame size 400 to 800A, the AL and AX with SLT are manufactured to order.

### Installation positions of cassette type accessories for 400 to 800A frames

#### Installation positions

Table 6-13-2 Installation positions of cassette type accessories

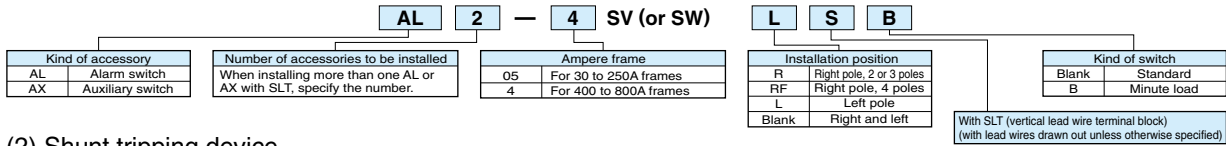
Frame (A)	400 • 600 • 630					800							
	L1	L2	L3	R2	R1	L1	L2	L3	L4	R4	R3	R2	R1
Accessory													
AL	○	○	-	-	-	○	○	○	-	-	-	-	-
AX	○	○	-	○	○	○	○	○	○	-	-	○ <sup>(*)</sup>	○
AL + AX	○	○	-	-	-	○	○	-	-	-	-	-	-
SHT	-	-	○	-	○	-	-	○	-	-	○ <sup>(*)</sup>	-	-

\* Accessories only for Earth Leakage Circuit Breakers (NV-C, S and H), Earth Leakage Alarm Breakers (NF-Z) and single-phase 3-wire circuits (NF-N and NV-N) cannot be installed to R1, R2, R3 or R4.

Note \*1 It is impossible to simultaneously install AX on R2 and SHT on R3 or R4.

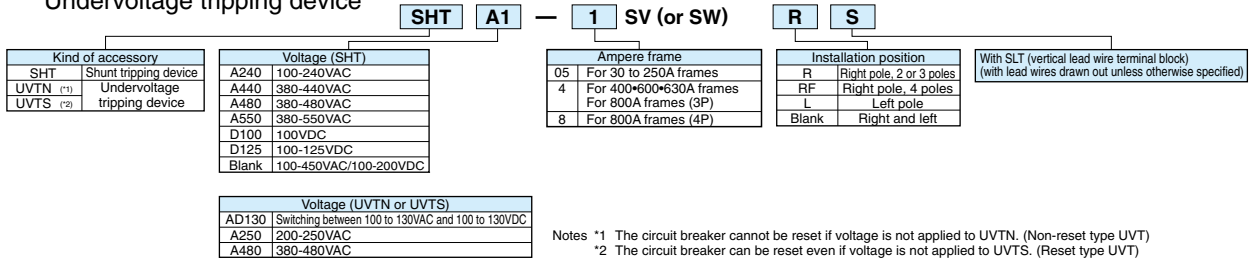
Interpretation of type name

(1) Alarm switch • Auxiliary switch



(2) Shunt tripping device

Undervoltage tripping device



## 6. Shunt Trip (SHT)

### Coil ratings (standard)

Table 6-14-1

Model	Provision of coil burnout preventing switch	Voltage	Input (VA) (*)		Operating time (ms) (*)		
			AC	DC			
NF30-FAU NF50-FAU	Provided	100-120VAC 200-240VAC	120	—	5-20		
NF50-FHU NF100-FHU		100-120VAC 200-240VAC 100VDC			50	5-15	
NF50-SVFU NV50-SVFU		100-240VAC 380-440VAC 100VDC			60	15 or less	
NF32-SV, NF63-CV/SV/HV, NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV, NF125-CV/SV/HV/SEV/HEV/RGV/UV NF250-CV/SV/HV/SEV/HEV/RGV/UV NF250-SGV/LGV/HGV NV32-SV, NV63-CV/SV/HV NV125-CV/SV/HV/SEV/HEV, NV250-CV/SV/HV/SEV/HEV NF100-CVU, NF125-SVU/HVU, NF250-CVU/SVU/HVU NV100-CVU, NV125-SVU/HVU, NV250-CVU/SVU/HVU		100-240VAC 380-550VAC 100-125VDC			50		
NF100-SRU/HRU (*)		100-240VAC 380-480VAC 100-125VDC			100V 20 200V 50 380V 120 450V 170		100V 10
NF400-CW/SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW NF800-CEW/SDW/SEW/HEW/REW/UEW NV400-CW/SW/SEW/HEW NV630-CW/SW/SEW/HEW NV800-SEW/HEW, NF400-SWU/HWU, NF630-SWU/HWU		Compatible with 100 to 450VAC and 100 to 200VDC				200V 35	
NF100-SRU/HRU NV100-SRU/HRU	Not provided	100-110VAC, 110-127VAC 200-220VAC, 220-240VAC 24VDC, 100-110VDC	10	—	15 or less		
NF1000-SEW, NF1250-SEW/SDW NF1600-SEW/SDW	Provided	100-120VAC 200-240VAC 380-450VAC 100VDC	200	70	7-15		
			300	100	15-25		

Notes \*1 Ensure that the voltage of the operating power supply for SHT is not dropped below the allowable operating voltage (70% of the rated minimum voltage value) by the input power.  
\*2 The operating time is the time from when the rated voltage is applied to the shunt tripping device until the main contact of the circuit breaker starts opening.  
\*3 Available for right pole.

Remark: 1. The accessory is usable at 50 Hz and 60 Hz.

### Coil ratings (list of available special voltage coils)

Table 6-14-2

Model	VAC										VDC										Compatible with AC/DC		
	24	25-27	24-48	48	50-55	60	440-480	380-550	440-550	500-550	12	24	24-36	36	36-48	48	60	110	125	220		200-250	220-250
NF32-SV, NF63-CV/SV/HV NF125-CV/SV/HV/SEV/HEV/RGV/UV NF125-SGV/LGV/HGV, F160-SGV/LGV/HGV NF250-CV/SV/HV/SEV/HEV/RGV/UV NF250-SGV/LGV/HGV NV32-SV, NV63-CV/SV/HV NV125-CV/SV/HV/SEV/HEV NV250-CV/SV/HV/SEV/HEV NF100-CVU, NF125-SVU/HVU, NF250-CVU/SVU/HVU NV100-CVU, NV125-SVU/HVU, NV250-CVU/SVU/HVU	-	-	○	-	-	-	-	-	-	○	-	○	-	○	-	-	-	-	-	-	○	-	-
NF100-SRU/HRU (*)	-	-	○	-	-	○	-	-	-	○	-	○	-	○	-	○	-	-	-	-	-	○	-
NF400-CW/SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW NF800-CEW/SDW/SEW/HEW/REW/UEW NV400-CW/SW/SEW/HEW/REW NV630-CW/SW/SEW/HEW NV800-SEW/HEW, NF400-SWU/HWU, NF630-SWU/HWU	-	-	-	-	-	-	○	-	-	○	-	-	-	-	-	-	-	-	-	-	-	-	○
NF1000-SEW, NF1250-SEW/SDW NF1600-SEW/SDW	○	-	-	○	-	-	○	-	-	○	○	-	○	-	○	-	○	○	-	-	-	-	-

Notes \*1 Available for right pole.

## 7. Undervoltage Trip (UVT)

### (1) Specifications for UVT and coil ratings

Table 6-15

Model	Specification		Coil ratings			
	Reset type	Non-reset type	Voltage (V)		Input (VA)	Operating time <sup>(*)2</sup> (ms)
			Standard voltage	Special voltage <sup>(*)1</sup>		
NF50-SVFU NV50-SVFU	–	○		24VAC/DC 48VAC/DC	5	30 or less
NF32-SV, NF63-CV/SV/HV/HRV NF125-CV/SV/HV/RGV/SEV/HEV/UV NF125-SGV/LGV/HGV, NF160-SGV/LGV/HGV NF250-CV/SV/HV/RGV/SEV/HEV/UV NF250-SGV/LGV/HGV NV32-SV, NV63-CV/SV/HV NV125-CV/SV/HV/SEV/HEV NV250-CV/SV/HV/SEV/HEV NF100-CVFU, NF125-SVU/HVU, NF250-CVU/SVU/HVU NV100-CVFU, NV125-SVU/HVU, NV250-CVU/SVU/HVU	○	○	100-130VAC/DC 200-250VAC 380-480VAC	24VAC/DC 48VAC/DC 500-600VAC		
NF400-CW/SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW NF800-CEW/SDW/SEW/HEW/REW/UEW NV400-CW/SW/SEW/HEW NV630-CW/SW/SEW/HEW NV800-SEW/HEW	○ <sup>(*)4</sup>	○ <sup>(*)5</sup>	<sup>(*)3</sup> Switching between 100 to 110 and 120 to 130VAC Switching between 200 to 220 and 230 to 250VAC Switching between 380 to 415 and 440 to 480VAC Switching between 100 and 110VDC	<sup>(*)3</sup> Switching between 24/48VAC Switching between 500 to 550/600VAC Switching between 24/48VDC Switching between 110/125VDC	5	5-30
NF1000-SEW, NF1250-SEW NF1600-SEW	○	○				5-35
NF400-SWU/HWU, NF630-SWU/HWU	○ <sup>(*)4</sup>	–				5-30
NF100-SRU/HRU, NV100-SRU/HRU	–	○	100-110VAC 110-127VAC 200-220VAC 220-240VAC 24VDC 100-110VDC	–	10	30 or less

Notes <sup>(\*)1</sup> Some special voltage models vary in voltage range.

<sup>(\*)2</sup> The operating time is the time from when the undervoltage tripping device is set to the no-voltage state until the main contact starts opening.

<sup>(\*)3</sup> The accessory is usable at 50Hz and 60Hz.

<sup>(\*)4</sup> If UVT is turned on without excitation, the circuit breaker instantaneously opens and immediately trips.

<sup>(\*)5</sup> Only for installation on the left pole

### (2) Reset type and non-reset type UVT

#### ■ Reset type (Refer to Table 6-16.)

The reset type UVT has a structure which does not trip a circuit breaker even if the UVT coil is not excited when the circuit breaker handle is in the OFF or reset position. Therefore, it keeps the circuit breaker in the reset state even if the coil is not excited when the breaker is reset electrically.

When the coil in the unexcited state is turned on, the circuit breaker is normally tripped. However, the major contacts of some models of circuit breakers may instantaneously close, or, on circuit breakers with AX, the AX switches may instantaneously change over. For electrical interlock, use a non-reset type UVT.

#### ■ Non-reset type (Refer to Table 6-16.)

When the UVT coil is not excited, the circuit breaker cannot be set to the off state even if the circuit breaker is tried to be reset from the tripped state. When the coil exciting voltage restores to the reference voltage or more, the circuit breaker can be reset to the off state.

### (3) Time delay UVT

- This type of UVT has a time delay in operation.
- It can prevent operation upon occurrence of instantaneous power failure.

Table 6-16

UVT module type name	Time delay	Voltage (V)	
		Standard voltage	Special voltage
U-05W	Switching among 0.1, 0.3 and 0.5s	24/48AC	380-450/460-550/600-690AC (Compatible with 50Hz and 60Hz) 24/48DC
		100-120/200-240/380-450AC 220-250/380-450/460-550AC (Compatible with 50Hz and 60Hz) 100-110DC	
U-30W	Switching among 0.5, 1 and 3s	100-120/200-240/380-450AC 220-250/380-450/460-550AC (Compatible with 50Hz and 60Hz)	–

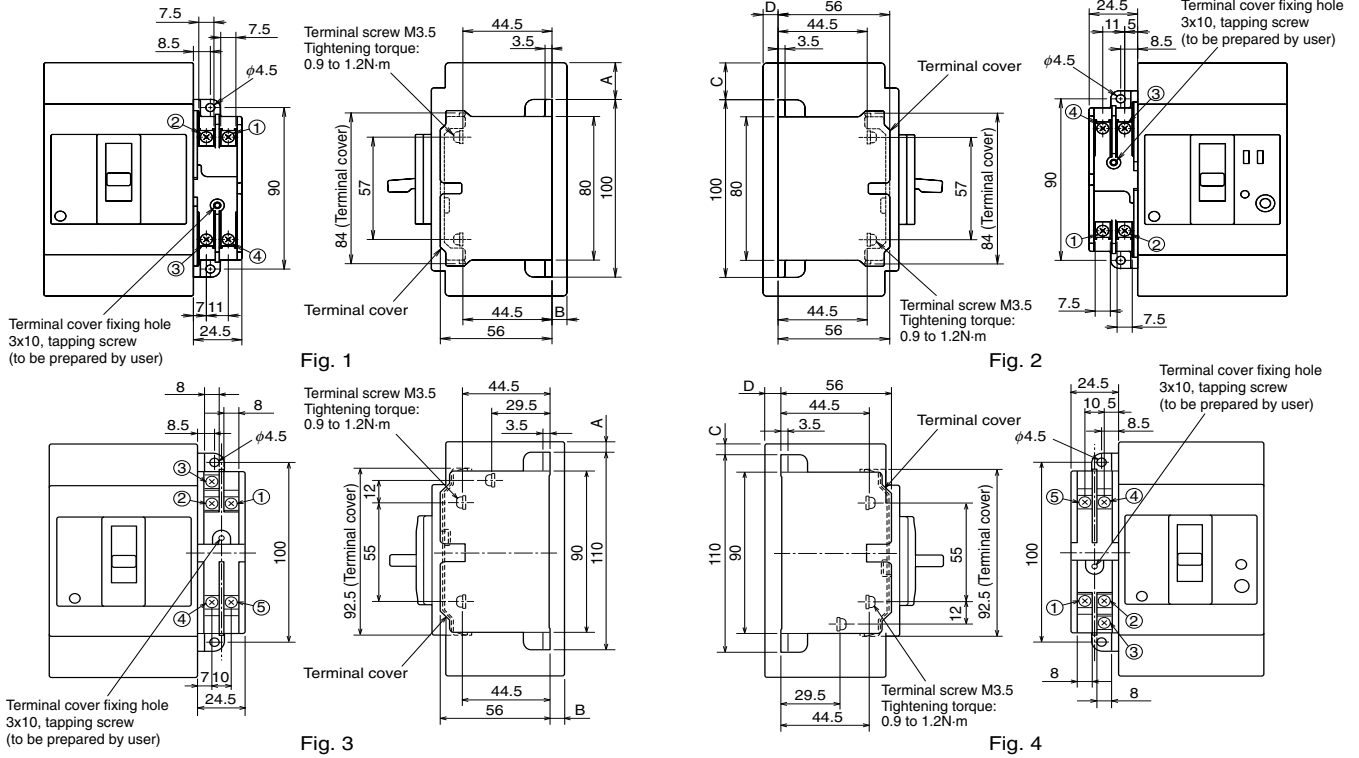


### (4) Structure of UVT

The UVT mechanical unit is installed in a circuit breaker, and the UVT voltage module is installed on the outside of the circuit breaker. When the voltage drops, the UVT voltage module detects the voltage drop, and the UVT mechanical unit trips the circuit breaker.

The UVT voltage module has a vertical lead wire terminal block and is normally installed on the body. The external module will be manufactured to order.

#### ●Outline drawing



#### ●Examples of connection

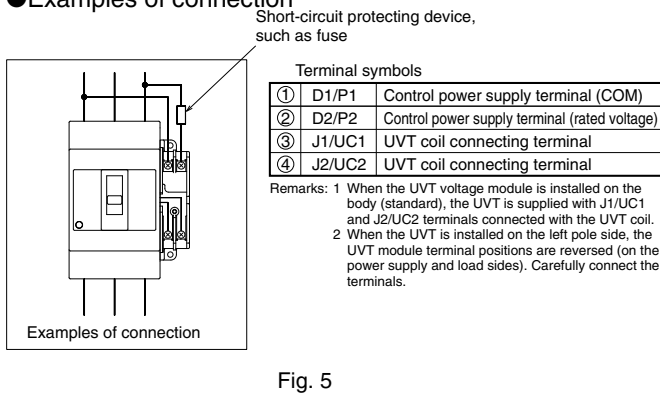


Fig. 5

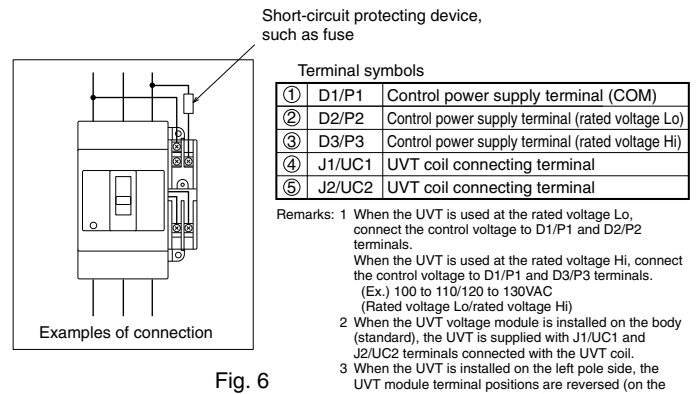


Fig. 6

Table 6-17 Installation on right pole side

Model	Reference drawing	Variable dimensions	
		A	B
NF50-SVFU	Fig. 1 Fig. 5	11	7.5
NF32-SV, NF63-CV/SV/HV		20.5	7.5
NF100-CVFU		20.5	7.5
NF125-CV/SV/HV		20.5	7.5
NF125-SVU/HVU		41.5	7.5
NF125-UV		81.5	7.5
NF125-SEV/HEV/RGV, NF250-CV/SV/HV/RGV/SEV/HEV		38	7.5
NF125-SGV/LGV/HGV, NF160-SGV/LGV/HGV			
NF250-SGV/LGV/HGV			
NF250-CVU/SVU/HVU		48	7.5
NF250-UV	113	7.5	
NF400-CW/SW/SEW/HEW/REW	Fig. 3 Fig. 6	67.5	41.5
NF630-CW/SW/SEW/HEW/REW, NF400-SWU/HWU		107.5	138.5
NF400-UEW(3P)			
NF800-CEW/SDW/SEW/HEW/REW, NF630-SWU/HWU		76.5	41.5
NF400-UEW(4P), NF800-UEW		123.5	138.5
NF1000-SEW, NF1250-SEW, NF-1600-SEW		161	63

Table 6-18 Installation on left pole side

Model	Reference drawing	Variable dimensions		
		C	D	
NV50-SVFU	Fig. 2 Fig. 5	11	7.5	
NV32-SV, NV63-CV/SV/HV		20.5	7.5	
NV100-CVFU		30.5	7.5	
NV125-CV/SV/HV		20.5	7.5	
NV125-SVU/HVU		41.5	7.5	
NV125-SEV/HEV, NV250-CV/SV/HV/SEV/HEV		38	7.5	
NV250-CVU/SVU/HVU		48	7.5	
NF400-CW/SW/SEW/HEW/REW		Fig. 4 Fig. 6	67.5	41.5
NF630-CW/SW/SEW/HEW/REW				
NV400-CW/SW/SEW/HEW			107.5	138.5
NV630-CW/SW/SEW/HEW				
NF400-ZCW/ZSW/ZEW	76.5		41.5	
NF400-SWU/HWU	123.5		138.5	
NF400-UEW(3P)				
NF800-CEW/SDW/SEW/HEW/REW				
NV800-SEW/HEW, NF630-SWU/HWU				
NF400-UEW(4P), NF800-UEW				

## 8. Lead Wire Drawing

### Lead wire lateral drawing ... Available to all models

Note \*1 Except for BH-D6, BH-D10, BH-DN, BV-D, BV-DN and KB-D.

Remark: 1. Although the following models are applicable to lead wires drawn laterally, they are normally applicable to installation in close contact with the circuit breaker side faces. (The circuit breaker side faces have grooves.)

### Lead wires drawing to load

Table 6-19

Model applicable to lead wire drawing to load (only front connection type)
NF30-CS

### Specifications for lead wires

Table 6-20

Applicable model	Kind of lead wire	Lead wire thickness	Lead wire length	Example of ring mark
NF30-CS	Heat-resistant wire	0.4mm <sup>2</sup>	450mm	98/ALa (Red), 96/ALb (Blue) 95/ALc (Gray), 14/AXa (Brown) 12/AXb (Black), 11/AXc (White)
1000A frame or above		0.75mm <sup>2</sup>		C1/S1 (Red), C2/S2 (Red) J1/UC1 (White), J2/UC2 (White)
30 to 800A frames except above models		0.5mm <sup>2</sup>		A terminal symbol is indicated on each lead wire with a ring mark.

NF32-SV, NF63-CV/SV/HV~NF250-CV/SV/HV/UV  
 NF125-SEV/HEV, NF250-SEV/HEV, NF125-RGV  
 NF250-RGV, NF125-SGV/LGV/HGV~NF250-SGV/LGV/HGV  
 NV32-SV, NV63-CV/SV/HV~NV250-CV/SV/HV  
 NV125-SEV/HEV, NV250-SEV/HEV  
 NF50-SVFU, NF100-CVFU, NF125-SVU/HVU,  
 NF250-CVU/SVU/HVU, NV100-CVFU, NV125-SVU/HVU  
 NV250-CVU/SVU/HVU

(When a 4-pole model among the above models has accessories installed on the right pole side, the lead wires are 400mm long.)

## 9. Lead Wire Terminal Block

### (1) Vertical lead wire terminal block (SLT)

The lead wire terminal blocks for plug-in terminal blocks are available (P-LT). The drilling size of these terminal blocks differs from the standard size. Consult us for details.

For a flush plate type circuit breaker, a terminal block will be installed on the circuit breaker rear face. (Specify as FP-LT.)

Note \*1 When the circuit breaker body is equipped with internal accessories and electrical operation device of motor-driven type (2) or spring charge type (2), the circuit breaker is normally provided with a lead wire terminal block.

### MCCB

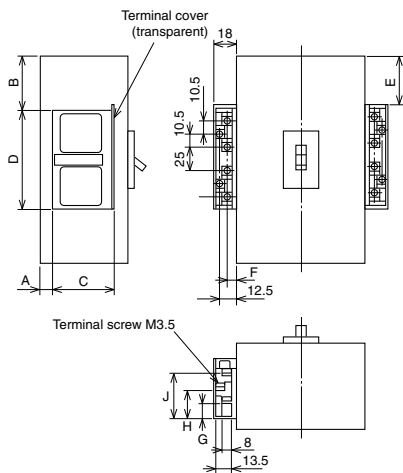


Table 6-21-1 Table of variable dimensions

Model	A	B	C	D	E	F	G	H	J
NF30-FAU, NF50-FAU	(*) 7	1.5	44.5	69	-	9	10.5	22.5	34.5
NF30-CS	(*) 4	4.5	44.5	86.5	4.5	7	10	22	34
NF100-SRU	(*) 16	16.5	44.5	86.5	16.5	6	10.5	22.5	34.5
NF100-HRU	(*) 22	16.5	44.5	86.5	16.5	6	10.5	22.5	34.5
NF50-SVFU	16.5	17	44.5	86.5	17	6	10.5	22.5	34.5
NF32-SV, NF63-CV/SV/HV	7	26.5	54	86.5	26.5	7	14	26	38
NF63-HDV, NF125-HDV									
NF100-CVFU	7	36.5	54	86.5	36.5	7	14	26	38
NF125-CV/SV/HV	7	26.5	54	86.5	26.5	7	14	26	38
NF125-SVU/HVU	7	47.5	54	86.5	47.5	7	14	26	38
NF125-UV	7	87.5	54	86.5	87.5	7	14	26	38
NF250-UV	7	119	54	86.5	119	7	14	26	38
NF125-SEV/HEV/HDVA	7	44	54	86.5	44	7	14	26	38
NF250-CV/SV/HV/SEV/HEV/HDV/HDVA									
NF125-RV, NF250-RV	7	28.5	54	86.5	28.5	7	14	26	38
NF250-CVU/SVU/HVU	7	54	54	86.5	54	7	14	26	38
NF400-CW/SW/SEW/HEW/REW, NF400-SWU/HWU	41	79.5	54	86.5	79.5	7	14	26	38
NF630-CW/SW/SEW/HEW/REW									
NF800-CEW/SDW/SEW/HEW/REW, NF630-SWU/HWU	62.5	173	54	86.5	173	7	14	26	38
NF1000-SEW, NF1250-SEW/SDW, NF1600-SEW/SDW									
NF400-UEW(3P)	138	119.5	54	86.5	119.5	7	14	26	38
NF400-UEW(4P), NF800-UEW									
NF50-FHU	14	5	44.5	86.5	5	7	10	22	34
NF100-FHU	14	7	44.5	86.5	-4	7	10	22	34
NF400-HDW	47	79.5	54	86.5	79.5	7	14	26	38
NF800-HDW	47	88.5	54	86.5	88.5	7	14	26	38

Note \*1 The terminal positions are different from those shown in the left figure. Consult us for details.

Remark: 1. Terminal screw tightening torque: M3.5 ... 0.9 to 1.2N·m



## 11. Pre-Alarm Module (PAL)

The pre-alarm is a function to output an alarm when the load current exceeds the preset current value. It is helpful in securing continuous power supply and preventive maintenance.

It can be fitted to electronic circuit breakers with a frame size from 125 to 1600A.

### ■ 125 and 250A frames

#### ● Pre-alarm module (PAL module)

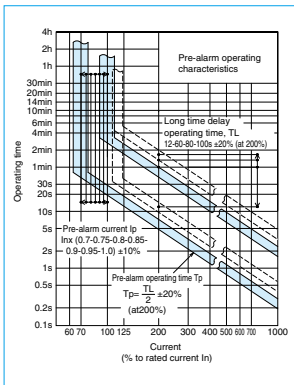
The standard modules have SLT. Other internal accessories cannot be installed on the right pole side.

A control power supply (compatible with 100 to 240VAC and DC) is necessary. The control power supply voltage range is 85 to 246VAC/DC, and the required volt-ampere is 5VA.

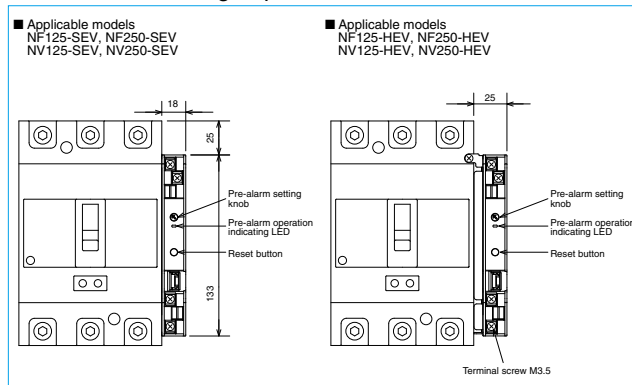
**Table 6-23-1**

Model	Switching capacity	Contact output (1a)	Resetting method
NF125-SEV NF125-HEV NF250-SEV NF250-HEV NV125-SEV NV125-HEV NV250-SEV NV250-HEV	125VAC 2A 250VAC 2A	30VDC 2A 100VDC 0.3A	Press the reset button, or turn off the control power supply.

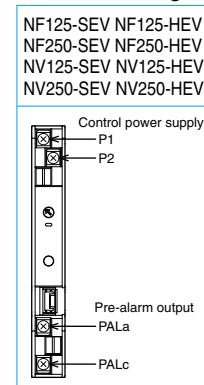
### Pre-alarm characteristics



### Dimensional drawing of pre-alarm module



### Terminal arrangement



#### ● Pre-alarm LED indication

When the load current exceeds the preset current value, the LED lamp on the pre-alarm module front panel starts blinking. When the pre-alarm output is given, the lamp stops blinking and turns on.

#### ● Pre-alarm current setting (IP setting)

The pre-alarm current can be set to the rated current  $I_n \times 0.7, 0.75, 0.8, 0.85, 0.9, 0.95$  or  $1.0$  with the knob on the pre-alarm module front panel.

#### ■ 400A frame or above

#### ● Solid state relay (SSR) output (PAL lead)

The lead wires are drawn out. On the right pole side, only internal accessories with lead wires drawn out can be installed. A control power supply is unnecessary.

**Table 6-23-2**

Model	Switching capacity	Resetting method
NF400-SEV NF400-HEV NF400-REW NF400-UWV NF630-SEV NF630-HEV NF630-REW NF800-CEW NF800-SEW NF800-HEW NF800-REW NF800-UWV NF1000-SEW NF1250-SEW NF1600-SEW NV400-SEV NV400-HEV NV630-SEV NV630-HEV NV800-SEV NV800-HEV	Solid state relay (SSR) – Non-contact output 24 to 240VAC/DC 20mA	When the load current becomes lower than the preset current value, the alarm is reset.

#### ● Pre-alarm module (PAL module)

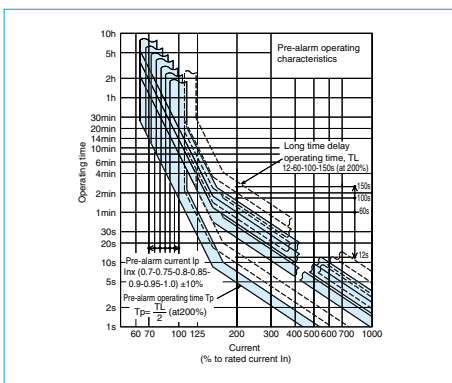
The standard modules have SLT. Other internal accessories cannot be installed on the right pole side.

A control power supply (compatible with 100 to 200VAC) is necessary. The control power supply voltage range is 80 to 242VAC, and the required volt-ampere is 10VA.

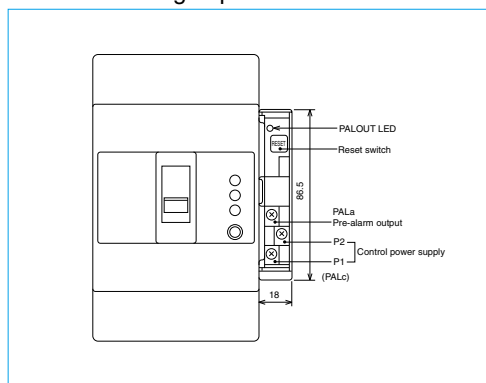
**Table 6-23-3**

Model	Switching capacity	Contact output (1a)	Resetting method
NF400-SEV NF400-HEV NF400-REW NF400-UWV NF630-SEV NF630-HEV NF630-REW NF800-CEW NF800-SEW NF800-HEV NF800-REW NF800-UWV NF1000-SEW NF1250-SEW NF1600-SEW NV400-SEV NV400-HEV NV630-SEV NV630-HEV NV800-SEV NV800-HEV	100VAC or 200VAC, 2A		Press the reset button, or turn off the control power supply.

### Pre-alarm characteristics



### Detailed drawing of pre-alarm module



### Pre-alarm module output rating

Voltage V	Current (A)	
	Resistive load	Inductive load
200	3	2
100	3	2

A control power supply (compatible with 100 to 200VAC) is necessary. For the wiring method, see the following figure. (The control power supply voltage range is 80 to 242VAC.) The required volt-ampere is 10VA.

#### ● Pre-alarm LED display (standard device)

When the load current exceeds the preset current value, the LED lamp on the circuit breaker front panel starts blinking. When the pre-alarm output is given, the lamp stops blinking and turns on.

#### ● Pre-alarm current setting (IP setting)

The pre-alarm current can be set to the rated current  $I_n \times 0.7, 0.75, 0.8, 0.85, 0.9, 0.95$  or  $1.0$  with the knob on the circuit breaker front panel.

## 1. F-Type Operating Handle Operating handle of breaker mount type to be installed to circuit breaker body

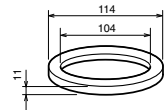
### ● Appearance (Color: Munsell N1.5)



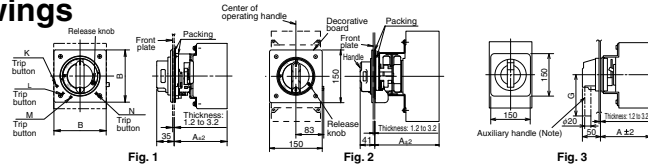
- The handle provides an isolating function in combination with the circuit breaker body (except F10SW and above).
- It has a safety device which prevents the circuit breaker turning on while the door is open.
- It can be locked in the OFF position. (Up to 3 commercially available padlocks (35mm and 40mm) can be fitted. A type which can be locked in the ON or OFF position can be manufactured. Specify the type if required.) On circuit breakers with a frame size of 1000A or above, the handle can be locked in the ON or OFF position. (If it is necessary to lock the handle only in the OFF position, specify so.)
- It is in protection class IP54 (IEC 60529). (For circuit breakers with a frame size of 1000A or above, the protection class (IEC 60529) is IP3X (IP5X when dust-proof packing is provided).

### Dust-proof packing (optional)

Type name	Operating handle type name	Delivery category
PFL	F10SW-F120UR	●

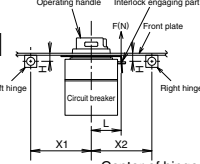


### ● Outline drawings



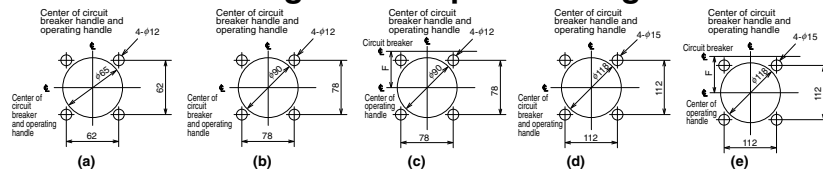
Note Auxiliary handles are provided with F10SW, F10SW4P and F120UR as standard. Auxiliary handles (F-HT) are provided for F-4S - F-6SUL as option.

### ● Center of hinge and breaker

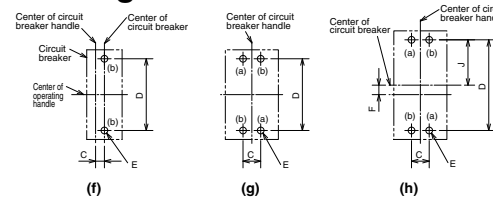


- The right drawing shows the relationship between the hinges and circuit breaker viewed from the load side of the circuit breaker.

### ● Dimensional drawings of front plate drilling



### ● Dimensional drawings of circuit breaker mounting holes



### ● Door lock withstand load

	F(N)	L(mm)
F-05-F-2	500	50
F-4-F-8		68

- Remarks: 1. The handle is opened and closed in the projection area of the handle and does not run over the projection area of the circuit breaker (except when the auxiliary handle is provided).  
2. When the operating handle is fitted to NV, the test button cannot be pressed easily. If necessary, use a circuit breaker with TBL or TBM. When using an Earth Leakage Alarm Breaker, use the externally resetting type (ECA-SLT RST) or automatically resetting type (ARS).

Table 6-24 Summary of dimensions

Type name	Door opening position		Applicable model				Reference drawing		Dimensions (mm)										Mounting screw	
	OFF position	Reset position	MCCB	Number of poles	ELCB	Number of poles	Dimensional drawing	Drilling plan	A (*1)	B	C	D	E	F	G	J	Trip button position (*4)			
F-05SV2	-	○	NF32-SV	2P	-	-	Fig. 1	f	105	104	13	111	M4 screw or φ5	-	-	-	-	N		
F-05SVE2	-	○	NF63-CV, NF63-SV, NF63-HV	2P	-	-		f	105		25								L	
F-05SV	-	○	NF32-SV	3P • 4P	NV32-SV	2P • 3P		g	105		15								N	
F-05SVE	-	○	NF63-CV, NF63-SV, NF63-HV	3P • 4P	NV63-CV, NV63-SV, NV63-HV	2P • 3P		f	105		30								L	
F-1SV2, F-1SVE2	-	○	NF125-CV, NF125-SV	2P	-	-		g	105		172								L	
F-1SV	-	○	NF125-CV, NF125-SV	3P • 4P	NV125-CV, NV125-SV, NV125-HV	3P • 4P		g	105		31								86	
F-1SVE	-	○	NF125-HV	2P • 3P • 4P	-	-		c	h		38								L	
F-1UV, F-1UVE	-	○	NF125-UV	2P • 3P • 4P	-	-		c	h		86								L	
F-2SV	-	○	NF125-SEV, NF125-HEV, NF125-RV	2P • 3P • 4P	NV125-SEV, NV125-HEV	3P • 4P		b	f		107								201	K
F-2SVE	-	○	NF125-SGV, NF125-LGV, NF125-HGV	2P • 3P • 4P	NV250-CV, NV250-SV, NV250-HV	3P • 4P		f	107		30								123	L
F-2SVUL	-	○	NF160-SGV, NF160-LGV, NF160-HGV	2P • 3P • 4P	NV250-CV, NV250-SV, NV250-HV	3P • 4P	c	h	105	35	126	6	100.5	K						
F-2SVE	-	○	NF250-SGV, NF250-LGV, NF250-HGV	2P • 3P • 4P	NV250-SEV, NV250-HEV	3P • 4P	c	h	105	35	126	6	61.5	L						
F-2SVUL	-	○	NF250-CVU, NF250-SVU, NF250-HVU	3P	NV250-CVU, NV250-SVU, NV250-HVU	3P	g	107	110	0	92	-	-	-	-	-	-	K		
F-05SRUL2	-	○	NF100-SRU	2P	NV100-SRU	2P	b	f	110	25	92	-	-	-	-	-	-	-	-	
F-05SRUL	-	○	NF100-HRU	2P	-	-	g	116	110	25	92	-	-	-	-	-	-	-	-	
F-05SRUL	-	○	NF100-SRU	3P	NV100-SRU	3P	g	110	110	25	92	-	-	-	-	-	-	-	-	
F-03SVUL2	-	○	NF50-SVFU	2P	NV50-SVFU	2P	a	f	105	80	9	82.5	M6 screw or φ7	-	-	-	-	-	-	
F-03SVUL	-	○	NF50-SVFU	3P	NV50-SVFU	3P	g	105	18	111	23.5	M								
F-05SVUL2	-	○	NF100-CVFU	2P	-	-	b	f	105	13	111	N								
F-05SVUL	-	○	NF100-CVFU	3P	NV100-CVFU	3P	g	105	25	111	L									
F-4S	-	○	NF400-CW, SW, SEW, HEW, REW	2P, 3P, 4P	NV400-CW, SW, SEW, HEW	3P, 4P	Fig. 2	d	g	183	44	194	M6 screw or φ7	-	-	-	-	-	-	
F-4SE	-	○	NF630-CW, SW, SEW, HEW, REW	2P, 3P, 4P	NV630-CW, SW, SEW, HEW	3P, 4P		g	183	44	234	20								
F-4U	-	○	NF400-UEW	3P	-	-		e	h	280	70	243								-
F-4UE	-	○	NF400-UEW	3P	-	-		e	h	280	70	290								23.5
F-8S	-	○	NF800-CEW, SDW, SEW	2P, 3P, 4P	NV800-SEW, HEW	3P	d	g	183	44	194	M8 screw or φ10	-	-	-	-	-	-	-	
F-8SE	-	○	NF800-CEW, SDW, SEW	2P, 3P, 4P	NV800-SEW, HEW	3P	g	183	44	243	200									
F-8U	-	○	NF800-UEW	3P, 4P	-	-	e	h	280	44	194									-
F-8UE	-	○	NF400-UEW(4P)	3P, 4P	-	-	d	g	183	70	243	-								
F-4SUL	-	○	NF400-SWU/HWU	3P	-	3P	d	g	183	70	375	-	200	-	-	-	-	-	-	
F-6SUL	-	○	NF630-SWU/HWU	3P	-	-	d	g	183	70	375	-	200	-	-	-	-	-	-	
F10SW (*3)	-	○	NF1000-SEW	2P, 3P	-	-	Fig. 3	d	g	221	70	375	M8 screw or φ10	-	200	-	-	-	-	
F10SW4P (*3)	-	○	NF1250-SEW/SDW	4P	-	-		d	g	221	70	375	M8 screw or φ10	-	200	-	-	-	-	

- Notes \*1 The dimensions for the front connection type are shown. On some models of the rear connection type and plug-in type, the reference surface for mounting the circuit breaker may change.  
\*2 For the 4-pole plug-in type, a special handle is required. Consult us for details.  
\*3 If a handle which can be locked only in the OFF position is required, specify so.  
\*4 The circuit breaker can be tripped by operating the trip button while the door is open.  
\*5 Do not remove the sponge packing used to secure the protection class IP51. Fit the supplied packing without fail.  
\*6 The handle cannot be used when the circuit breaker is installed on IEC 35mm rails.

- Remarks: 1. The handles with E in their model names are designed for emergency stop devices.  
2. The standard handles are Reset Open Type which can open the doors only when they are reset to open. OFF Open type handles which can open the doors when they are in the OFF position can be manufactured to order.  
3. A handle which can be operated and can indicate the ON and OFF positions in the same manner as the standard models even if the circuit breaker is installed horizontally can be manufactured to order.  
4. F10SW and higher models do not conform to the isolation function.  
5. Handles which are opened and closed in the OFF position can be opened also in the reset position.

## ● Installation procedure For details, please refer to Operating Handle Installation Manual supplied with the product.

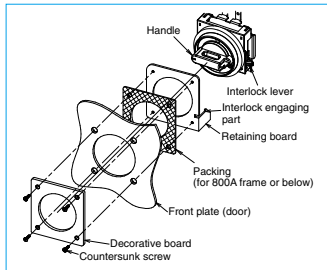
### ① Installation to a breaker Install the operating handle to the circuit breaker in accordance with the following procedure.

	250A frame and below		400 to 1600A frames
Installation procedure	<p style="text-align: center;">Center of operating handle and center of circuit breaker</p> <p style="text-align: center;">2 poles 3 poles 4 poles</p> <p style="text-align: center;">Installation position of operating handle with respect to circuit breaker (Note 1)</p> <p style="text-align: center;">(In the case of F-05SV2, F-1SV2, F-05SRUL2, F-05SUL2 and F-1SUL2)</p> <p style="text-align: center;">Tighten the circuit breaker and operating handle together with the supplied two operating handle mounting screws.</p>		<p style="text-align: center;">Circuit breaker cover screws (Remove.)</p> <p style="text-align: center;">Circuit breaker mounting screw (supplied with body)</p> <p style="text-align: center;">Spacer for installation of operating section (supplied)</p> <p style="text-align: center;">Handle</p> <p style="text-align: center;">Operating section mounting screw (supplied)</p> <p style="text-align: center;">Circuit breaker cover screws (Remove.)</p> <p style="text-align: center;">Power supply side</p> <p style="text-align: center;">Load side</p> <p style="text-align: center;">(In the case of F-4S to F-6SUL) The operating handle mounting screws are tapping screws without washers or spring washers.</p>
	<p style="text-align: center;">(Installation procedure)</p> <p>① Install the circuit breaker on the panel with the two circuit breaker mounting screws through the holes (a).</p> <p>② Install the operating handle with the supplied two operating handle mounting screws through the holes (b).</p>		<p style="text-align: center;">(Installation procedure)</p> <p>① Remove the circuit breaker cover screws in the same positions as the operating handle mounting holes.</p> <p>② Install the circuit breaker with the four circuit breaker mounting screws.</p> <p>③ Fit the spacer(s) for installation of operating handle between the circuit breaker and operating handle. (The number of the spacers varies depending on the model.)</p> <p>④ Install the operating handle with the supplied operating handle mounting screws.</p>

Note \*1 In the case of F-05SRUL2, the center of the operating handle is the same as the center of the circuit breaker.

### ② Installation of decorative board and retaining board

Drill holes in the door according to the drilling size shown on the previous page, and tighten the decorative board and retaining board with the supplied countersunk screws. In the case of 800A frame or below, fit the supplied packing to the position shown right.



### ● Door locking mechanism

The panel door can be opened only when the operating handle is opened (reset). (On F-4S to F10SW, the door lock is held in the released state even if the handle is returned to OFF.) The door can be opened when the handle is in the ON position if the release knob is operated with a tool.

### ● Operation locking mechanism

Circuit breakers with a frame size of 800A or below can be locked by setting the handle in the OFF position. (Operating handles which can lock circuit breakers in the ON or OFF position can be manufactured.) Operate the locking part, and lock the handle with padlocks. Up to three padlocks can be fitted.

Lockout hasps (scissors locks) can be used.

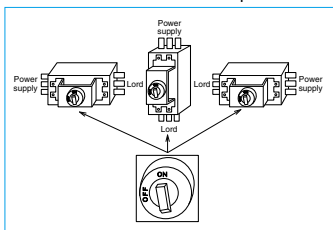
If the circuit breaker trips even when the operating handle is locked in the ON position, also the operating handle indicates that it has tripped.

[ F-2SUL or below: Only when one 35mm padlock (weighing 70g or less) is used ]  
 [ F-4S or above: Only when one 40mm padlock (weighing 100g or less) is used ]  
 To 800A frame or below, padlocks with dimension C of 3mm to 8mm can be applied.

For 1000A or above, padlocks with dimension of 3mm to 6mm can be applied. (When using padlocks of 3mm or less, please consult us.)

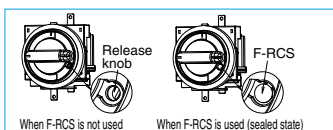
### ● Circuit breaker installation direction (except UL 489 listed circuit breakers)

We can supply circuit breakers on which the handles and their ON and OFF positions are in the same directions as on vertically installed circuit breakers even when they are installed horizontally. The door drilling size is identical. If you intend to install an operating handle on a horizontally installed circuit breaker, specify "Y" (horizontal installation with power supply on the left) or "Z" (horizontal installation with power supply on the right) at the end of the model name. (Ex.: F-4S Y)



### ● Sealing of release knob

The use of an optional part, Release Protection "F-RCS", can prevent the panel door being opened by operating the release knob. (800A frame or below)



### ● Operation Lock Devices

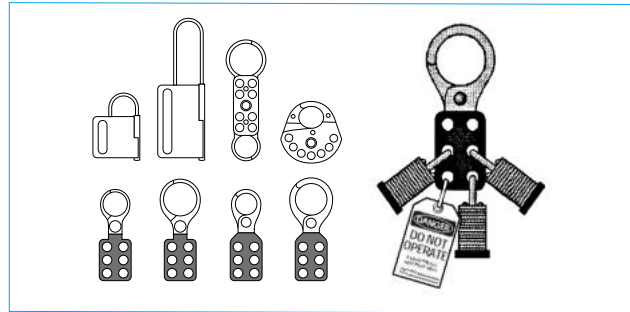
#### (1) Padlock

(mm)

Applicable model	Padlock Dimensions		
	A (Nominal size)	B	C
All models	35	19	5
	40	22 or 23	5.5

Dimension C: Maximum 8mm.

#### (2) Lockout Devices (Scissors Lock)



### ● How to order

For 800A frame or below, specify the following specification symbols together with the model name.

- Operation lock: LF ..... Lock in OFF position
- Operation lock: LN ..... Lock in ON or OFF position
- Door opening: DR ..... Reset to open
- Operation lock: DF ..... Open in OFF position
- Installation direction: Blank ... Power supply upward
- Installation direction: Y ..... Power supply on left
- Operation lock: Z ..... Power supply on right

For a standard product with a frame size of 1000A or above, specify the model name. When it is required to enable the operation lock only in the OFF position, specify the model name and "only lock in OFF position."

If you intend to seal the release knob, place an order for the release protection. (Lot: 10 pcs.)

### ● Interpretation of model name

(1) For 800A frame or below

F - 1 SV UL E 2  
 1) 2) 3) 4) 5) 6)

- 1) F: Operating handle type name
- 2) 1: Circuit breaker group (0.5, 1, 2, 4, 6 or 8)
- 3) SV: Classification of circuit breaker (S, SV, H, U, UV, SR or SG)
- 4) UL: Blank...General product UL...UL 489 listed product
- 5) E: Blank...Standard E...For emergency stop
- 6) 2: Blank...3P or 4P 2...2P

(2) For 1000A frame or above

F 10 SW 4P  
 1) 2) 3) 4)

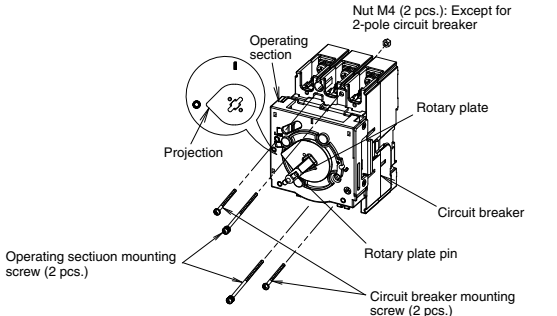
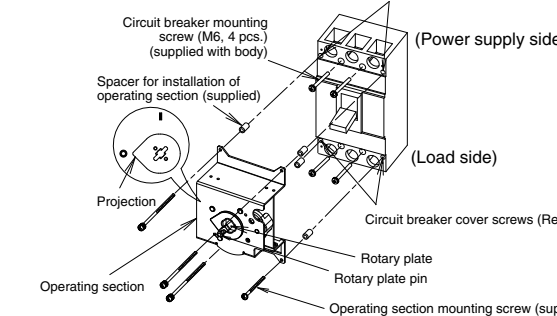
- 1) F: Operating handle type name
- 2) 4: Circuit breaker A frame (10 or 120)
- 3) SW: Series name
- 4) 4P: Number of poles (4P) \* Not indicated for 3P



# 6 Accessories 2 External Accessories

● **Installation procedure** For details, please refer to Operating Handle Installation Manual supplied with the product.

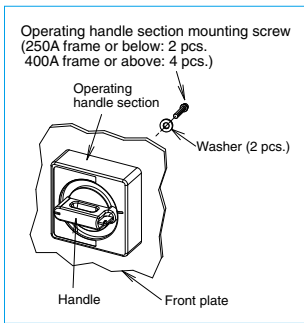
① **Installation to a breaker** Install the operating handle to the circuit breaker in accordance with the following procedure.

	250A frame and below	400 to 800A frames
Installation procedure	<p><b>(Installation procedure)</b></p> <p>① Operating handle for 3- or 4-pole circuit breaker Set the rotary plate of the operating section to the OFF (symbol O) position, and fit the plate to the circuit breaker with the supplied operating section mounting screws and nuts. Install the circuit breaker to the panel with the circuit breaker mounting screws (2 pcs.).</p> <p>② Operating handle for 2-pole circuit breaker Install the operating section together with the circuit breaker to the panel with the supplied operating section mounting screws (2 pcs.).</p> 	<p><b>(Installation procedure)</b></p> <p>① Remove the circuit breaker cover screws (4 pcs.) in the same positions as the operating handle mounting holes.</p> <p>② Install the circuit breaker with the circuit breaker mounting screws (4 pcs.).</p> <p>③ Fit the supplied operating section mounting spacers (4 pcs.) between the circuit breaker and operating handle.</p> <p>④ Set the rotary plate to the OFF (symbol O) position, and install the operating section to the circuit breaker with the supplied operating section mounting screws.</p> 

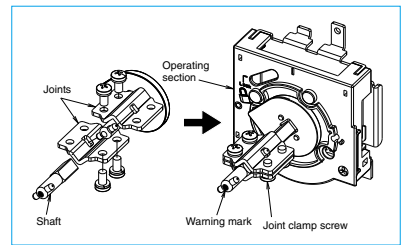
② **Installation of operating handle section**

Drill a hole in the door according to the dimensional drawing for front plate drilling given on the previous page, and install the operating handle section in accordance with the following procedure.

- Tighten the operating handle section from the back of the front plate. Temporarily tighten the screws to center the section in the hole.
- Set the handle of the operating handle section to the OFF state, tighten the front plate, and make sure that the handle can be smoothly turned to the ON and OFF positions. Turn the handle to the right and left in the OFF state, and make sure that OFF is displayed. If OFF is not displayed, move the operating handle section up and down and to the right and left for adjustment. (Take care that the operating handle section is in parallel with the circuit breaker.) Then, open the front plate, and finally tighten the screws.

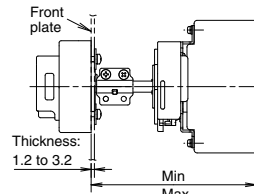


**Note** The adjusting unit is not applicable to 2-pole external type circuit breakers. If it is used on a 2-pole external type circuit breaker, the positions may not be correctly displayed.

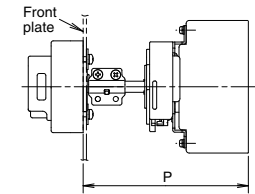


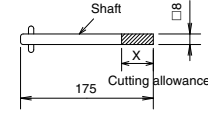
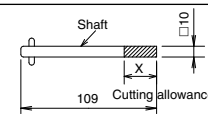
Make adjustments with the adjusting unit as stated below.

① **External dimension drawing**



② **Calculation of shaft cutting allowance**



Type name	Dimensions (mm)		Cutting allowance	Calculation
	Min	Max		
V-05SV V-05SVUL	162	300		(Cutting allowance)(P max)(panel size) $X = 300 \text{ mm} - P$
V-1SV V-1SVUL V-1SUL				
V-2SV V-2SVUL V-2SUL				
V-2SGUL				
V-4S	233	300		
V-8S				
V-4SUL V-6SUL				

Note The unit is applicable to operating handles for emergency stop (E).

● **Padlocks**

The user must prepare padlocks.

The dimensions of the padlocks are the same as those shown on page 134.

● **How to order**

Specify the model name of the operating handle.  
For adjustable type, place an order for the adjustment unit.  
(One lot includes 1 pc.)  
250A frame or below: V-AD3S  
400 to 800A frames: V-AD3L

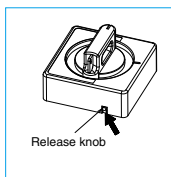
● **Interpretation of model name**

(1) For 800A frame or below

$$\frac{V}{1) - \frac{1}{2) - \frac{S}{3) - \frac{UL}{4) - \frac{E}{5) - \frac{2}{6)}}$$

- 1) V: Operating handle type name
- 2) 1: Circuit breaker group (0.5, 1, 2, 4, 6 or 8)
- 3) S: Classification of circuit breaker (S, SV, H, U, UV)
- 4) UL: Blank...General product UL...UL 489 listed product
- 5) E: Blank...Standard E...For emergency stop
- 6) 2: Blank...3P or 4P 2...2P

● **Door locking mechanism**  
The operating handle is provided with an interlock mechanism to prevent the door opening in the ON and TRIP positions. In the OFF position, the door can be opened. However, the door can be opened in the ON or TRIP position by pressing the release knob in the arrow direction with a tool (3mm wide and 1.8mm thick).



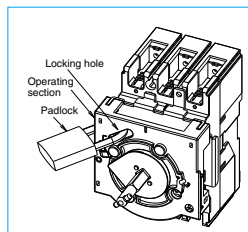
● **Operation locking mechanism**

① **Operating handle section**

Operation lock can be set only in the OFF Position. Up to three commercially available padlocks (A = 35 or 40mm) can be fitted. Lockout hasps (scissors locks) can be used. When the operating handle section is locked with padlocks, also the door is locked.

② **Operating section**

The operating section can be locked so that the circuit breaker will not be turned on carelessly when the inside of the panel is inspected with the panel door open. Fit a padlock through the hole in the operating section of the operating handle.



● **Adjusting unit**

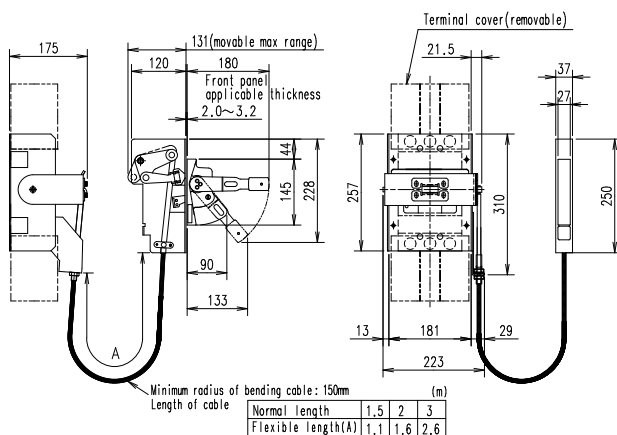
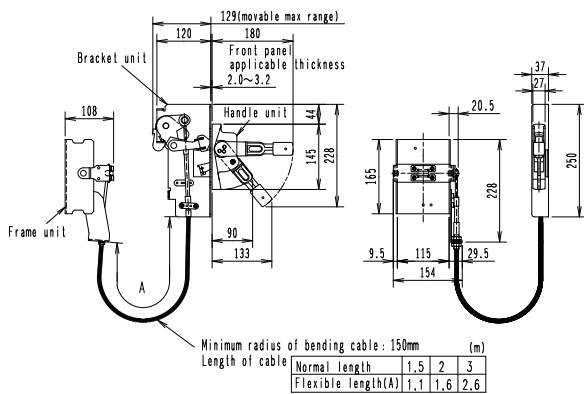
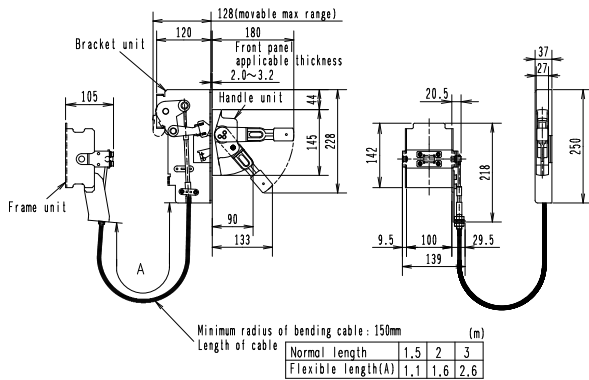
The height from the circuit breaker mounting surface to the panel door can be adjusted by fitting the optional adjusting unit V-AD3S or V-AD3L. Cut the shaft of the adjusting unit according to the height.



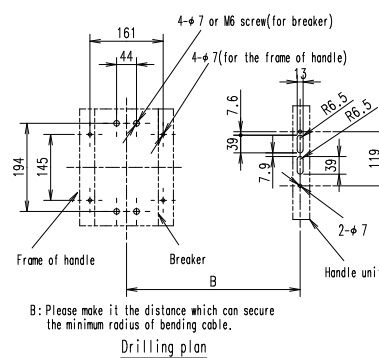
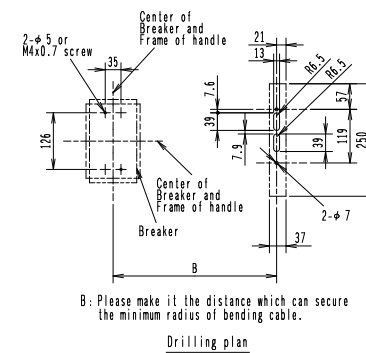
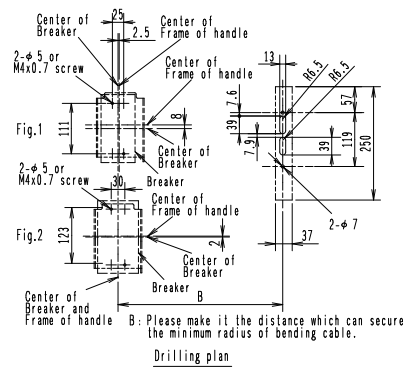
### 3. C-type Operating Handle

- The panel door can only be opened in the OFF position.
- It has a safety device which prevents the circuit breaker turning on while the door is open.
- The handle can be locked only in the OFF position with up to three commercially available padlocks.
- The panel door can be opened in the ON position by turning the release knob.
- Protection class (IEC 60529) IP23 as standard.
- The handle does not provide an isolation function.

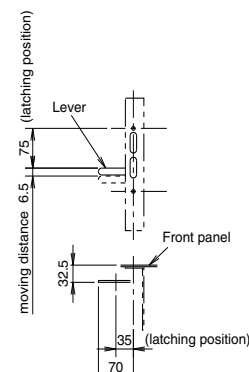
#### ● Outline drawings



#### ● Dimensional drawings of circuit breaker mounting holes



#### ● Door interlock drawing



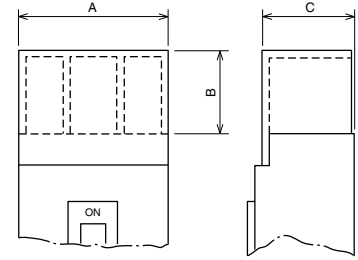
Type name	Applicable model		Number of poles	Reference drawing	
	MCCB	ELCB		Dimensional drawing	Drilling plan
C1SVU	NF100-CVFU	NV100-CVFU	3P	Fig.1	a
	NF125-SVU/HVU	NV125-SVU/HVU		Fig.2	b
C2SVU	NF250-CVU/SVU/HVU	NV250-CVU/SVU/HVU		Fig.3	c
C4SWU	NF400-SWU/HWU	NV400-SWU/HWU			

## 4. Terminal Covers

The terminal covers are used to avoid exposure of live parts. Many kinds of terminal covers, including large terminal covers (TC-L), small terminal covers (TC-S), transparent terminal covers (TTC), rear terminal covers (BTC) and plug-in terminal covers (PTC), for various models and applications are available, and they are helpful. (The terminal covers cannot be fitted to electrically operated circuit breakers of spring charged type (2) and motor-drive type (2). The standard terminal covers can be used for the spring charged type (1). For the motor-drive type, special terminal covers can be manufactured. Consult us for details.)

### ● Quick terminal covers

These covers are very convenient because they can be fitted only by inserting them into the mounting holes in the circuit breaker body. To remove the terminal cover, shift the projections of the terminal cover with the tip of a slotted screwdriver or finger, and draw it out.



TC-L TC-S TTC

### ● Table of variable dimensions

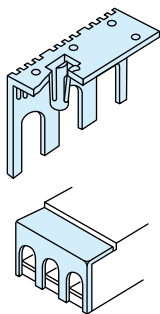
Table 6-26 Large terminal covers (TC-L)

Type name	Color	Number of poles of circuit breaker	Applicable model		Dimensions (mm)			Contents			Appearance	Remarks
			MCCB	ELCB	A	B	C	Number of covers	Cover mounting screw	Sealing plate		
TCL-03CS2W	White	2	NF30-CS	-	43.5	25	30.5	2	-	2	<p>Quick type The cover can be sealed with the sealing plate.</p>	
TCL-03CS3W	White	3	-	-	67	25	30.5	2	-	2		
TCL-05FH2	White	2	NF50-FHU	NV50-FHU	50	27	55.5	2	-	-		
TCL-05FH3	White	3	-	-	75	27	55.5	2	-	-		
TCL-05SV2 (*2)(*8)	White	2	NF32-SV NF63-CV/SV/HV	-	50	25	65.5	2	-	2		
TCL-05SV2L (*2)(*9)	White	2	NF32-SV NF63-CV/SV/HV	-	50	40	65.5	2	-	2		
TCL-05SV3 (*3)(*8)	White	3	NF32-SV NF63-CV/SV/HV	NV32-SV, NV63-HV	75	25	65.5	2	-	2		
TCL-05SV3L (*3)(*9)	White	3	NF32-SV NF63-CV/SV/HV	NV32-SV, NV63-HV	75	40	65.5	2	-	2		
TCL-05SV4 (*3)	White	4	NF63-SV/HV	NV63-CV/SV	100	25	65.5	2	-	2		
TCL-1SV2 (*2)	White	2	NF125-CV/SV	-	60	40	65.5	2	-	2		
TCL-1SV3 (*3)	White	3	NF125-CV/SV	NV125-CV/SV/HV	90	40	65.5	2	-	2		
TCL-1SV4 (*3)	White	4	NF125-SV/HV/UV	NV125-SV/HV	120	40	65.5	2	-	2		
TCL-1FH3	White	3	NF100-FHU	NV100-FHU	75	42	55.5	2	-	2		
TCL-2SV3 (*3)(*10)	White	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	40	65.5	2	-	2	<p>Screw type</p>	
TCL-2SV3L (*3)(*11)	White	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	50	65.5	2	-	2		
TCL-2SV4 (*3)(*5)	White	4	NF250-SV/HV/UV NF250-SEV/HEV NF125-SEV/HEV	NV250-SV/HV NV250-SEV/HEV NV125-SEV/HEV	140	40	65.5	2	-	2		
TCL-4SW3 (*3)	White	2, 3	NF400-CW/SW/SEW NF630-CW/SW/SEW	NV400-CW/SW/SEW NV630-CW/SW/SEW	171	110	99.5	2	-	2		
TCL-4SW4 (*3)	White	4	NF400-SW/SEW/HEW NF630-SW/SEW NF400-SW with MDU (*7)	NV400-SW/HEW NV630-SW	240	110	105	2	6	-		
TCL-8SW3 (*3)	White	2, 3	NF800-CEW/SDW/SEW/HEW/REW	NV800-SEW/HEW	224	155	103.5	2	4	-		
TCL-8UW3	Transparent	3	NF800-SEW with MDU/HEW with MDU (*7)	-	220	155	146/194.5	2	4	-		
TCL-8SW4 (*3)	White	4	NF800-SEW/HEW NF800-SEW with MDU/HEW with MDU (*7)	-	294	155	103.5	2	6	-		
TCL-8UW4	Transparent	4	NF400-UEW, NF800-UEW (*4)	-	290	155	146/194.5	2	6	-		
TCL-10SW3	Transparent	3	NF1000-SEW NF1250-SEW/SDW	-	220	150	139	2	4	-		
TCL-10SW4	Transparent	4	NF1000-SEW NF1250-SEW/SDW	-	290	150	139	2	4	-		
TCL-05SRU2 (*3)	White	2	NF100-SRU NF100-HRU	NF100-SRU	50	40	66 72	2	4	-		
TCL-05SRU3 (*3)	White	3	NF100-SRU NF100-HRU	NF100-SRU NF100-HRU	75	40	66 72	2	-	-		
TCL-03SVU2 (*3)	White	2	NF50-SVFU	NV50-SVFU	36	30	65.5	2	-	-		
TCL-03SVU3 (*3)	White	3	NF50-SVFU	NV50-SVFU	54	30	65.5	2	-	-		
TCL-05SVU2 (*2)(*8)	White	2	NF100-CVFU	-	50	25	65.5	2	2	-		
TCL-05SVU2L (*2)(*9)	White	2	NF100-CVFU	-	50	40	65.5	2	2	-		
TCL-05SVU3 (*3)(*8)	White	3	NF100-CVFU	NV100-CVFU	75	25	65.5	2	2	-		
TCL-05SVU3L (*3)(*9)	White	3	NF100-CVFU	NV100-CVFU	75	40	65.5	2	2	-		
TCL-1SVU3 (*3)	White	2, 3	NF125-SVU NF125-HVU	NV125-SVU/HVU	90	40	65.5	2	2	-		
TCL-2SVU3 (*3)(*10)	White	3	NF250-CVU/SVU/HVU	NV250-CVU/SVU/HVU	105	40	65.5	2	2	-		
TCL-2SVU3L (*3)(*11)	White	3	NF250-CVU/SVU/HVU	NV250-CVU/SVU/HVU	105	50	65.5	2	2	-		
TCL-4SWU	White	3	NF400-SWU/HWU	-	171	110	99.5	2	-	2		
TCL-6SWU	Transparent	3	NF630-SWU/HWU	-	224	155	103.5	2	4	-		

Notes \*1 For 2-pole NV, use TC-L for 3-pole circuit breaker.  
 \*2 For a circuit breaker with F or V type operating handle, specify the model name with F at the end.  
 (F or V type operating handle dedicated models, screws are used for fixing.)  
 \*3 The standard models can be used in combination with F and V Type Operating Handles.  
 \*4 The dimension C is the size on the power supply side and load side.  
 \*5 When a crimp terminal applicable to wires with a size of 117.2 to 152.05mm<sup>2</sup> (Model 2CR-150 or CB150-S8) is used, TC-L cannot be fitted. Insulate the terminal from TC-S with insulating tube or taping.  
 \*6 In the case of installation on the body, specify the model name with-MDU at the end.  
 \*7 It cannot be installed in the case of installation on the body.

\*8 Applicable to circuit breakers with rating of 75A or less (max. wire size 25mm<sup>2</sup>)  
 \*9 Applicable to circuit breakers with rating of 125A or less (max. wire size 60mm<sup>2</sup>)  
 \*10 Applicable to circuit breakers with rating of 200A or less (max. wire size 100mm<sup>2</sup>)  
 \*11 Applicable to circuit breakers with rating of 250A or less (max. wire size 150mm<sup>2</sup>)  
 (Applicable to UL wire 300MCM)  
 Remarks 1. The wire sizes shown in the above notes \*8 to \*11 are those of the 600V vinyl insulated wires.  
 2. Insulate the exposed live parts of crimp terminals with insulating tape or the like.  
 3. When protection from the power supply and load sides is necessary, separately consult us.

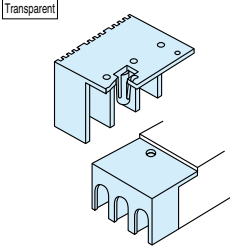
**Table 6-27 Small terminal covers (TC-S)**

Type name	Color	Number of poles of circuit breaker	Applicable model		Dimensions (mm)			Contents			Appearance	Remarks
			MCCB	ELCB	A	B	C	Number of covers	Cover mounting screw	Sealing plate		
TCS-03CS2W	White	2	NF30-CS	-	43.5	5	30.5	2	-	2	 <p>Quick type The cover can be sealed with the sealing plate.</p>	
TCS-03CS3W	White	3		-	67	5	30.5	2	-	2		
TCS-05FA2	White	2	NF30-FAU, NF50-FAU	NV30-FAU, NV50-FAU	40	7	55	2	-	-		
TCS-05FA3	White	3			60	7	55	2	-	-		
TCS-05FH2	White	2	NF50-FHU	NV50-FHU	50	5	55.5	2	-	-		
TCS-05FH3	White	3			75	5	55.5	2	-	-		
TCS-05SV2 (*1)	White	2	NF32-SV, NF63-CV/SV/HV	-	50	5	65.5	2	-	2		
TCS-05SV3	White	3	NF32-SV, NF63-CV/SV/HV	NV32-SV, NV63-HV	75	5	65.5	2	-	2		
	(*2)	White										
TCS-05SV4	White	4	NF63-SV/HV	-	100	5	65.5	2	-	2		
TCS-1SV2 (*2)	White	2	NF125-CV/SV	-	60	6.5	65.5	2	-	2		
TCS-1SV3 (*3)	White	3	NF125-CV/SV	NV125-CV/SV/HV	90	6.5	65.5	2	-	2		
	White	2, 3									NF125-HV/UV	-
TCS-1SV4	White	4	NF125-SV/HV/UV	NV125-SV/HV	120	6.5	65.5	2	-	2		
TCS-1FH3	White	3	NF100-FHU	NV100-FHU	75	5	55.5	2	-	2		
TCS-2SV3	White	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	6.5	65.5	2	-	2		
TCS-2SV4	White	4	NF125-SEV/HEV	NV125-SEV/HEV	140	6.5	65.5	2	-	2		
			NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV	-								
			NF250-SV/HV/UV	NV250-SV/HV								
			NF250-SEV/HEV NF250-SGV/LGV/HGV	-								
TCS-05SRU2	White	2	NF100-SRU	NV100-SRU	50	5	66	2	-	2		
	(*2)						White				NF100-HRU	-
TCS-05SRU3	White	3	NF100-SRU	NV100-SRU	75	5	66	2	-	2		
	(*2)						White				NF100-HRU	NV100-HRU

Notes \*1 For a circuit breaker with F type operating handle, specify the model name with F at the end.  
(F type operating handle dedicated models, screws are used for fixing.)  
\*2 The standard models can be used in combination with F and V Type Operating Handles.

Remark 1. Insulate the exposed live parts of crimp terminals with insulating tape or the like.

**Table 6-28 Transparent terminal covers (TTC)**

Type name	Number of poles of circuit breaker	Applicable model		Dimensions (mm)			Contents			Appearance	Remarks
		MCCB	ELCB	A	B	C	Number of covers	Cover mounting screw	Sealing plate		
TTC-03CS2	2	NF30-CS	-	43.5	25	30.5	2	-	2	 <p>Transparent</p> <p>Quick type The cover can be sealed with the sealing plate.</p>	
TTC-03CS3	3		-	67	25	30.5	2	-	2		
TTC-05SV2 (*1)	2	NF32-SV NF63-CV/SV/HV	-	50	25	65.5	2	-	2		
TTC-05SV3	3	NF32-SV NF63-CV/SV/HV	NV32-SV, NV63-HV	75	25	65.5	2	-	2		
	(*2)										
TTC-05SV4	4	NF63-SV/HV	-	100	25	65.5	2	-	2		
TTC-1SV2 (*1)	2	NF125-CV/SV	-	60	40	65.5	2	-	2		
TTC-1SV3 (*2)	3	NF125-CV/SV	NV125-CV/SV/HV	90	40	65.5	2	-	2		
	2, 3										
TTC-1SV4	4	NF125-SV/HV/UV	NV125-SV/HV	120	40	65.5	2	-	2		
TTC-2SV3	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	40	65.5	2	-	2		
TTC-2SV4	4	NF125-SEV/HEV	NV125-SEV/HEV	140	40	65.5	2	-	2		
		NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV	-								
		NF250-SV/HV/UV	NV250-SV/HV								
		NF250-SEV/HEV NF250-SGV/LGV/HGV	-								
TTC-4SW3	2, 3	NF400-CW/SW/SEW NF400-HEW/REW NF630-CW/SW/SEW NF630-HEW/REW	NV400-CW/SW/SEW NV400-HEW NV630-CW/SW/SEW NV630-HEW	171	110	104.5	2	4	-		
	3	NF400-SEW with MDU/HEW with MDU (*4)	-								
TTC-4SW4	4	NF400-SW/SEW/HEW NF630-SW/SEW/HEW NF400-SEW with MDU/HEW with MDU (*4)	NV400-SEW/HEW NV630-SEW	240	110	104.5	2	6	-		
TTC-8SW3	2, 3	NF800-CEW/SDW/SEW NF800-HEW/REW	NV800-SEW/HEW	224	155	103.5	2	4	-		
	3									NF800-SEW with MDU/HEW with MDU (*4)	-
TTC-8SW4	4	NF800-SEW/HEW NF800-SEW with MDU/HEW with MDU (*4)	-	294	155	103.5	2	6	-		

Notes \*1 For a circuit breaker with F type operating handle, specify the model name with F at the end.  
(F type operating handle dedicated models, screws are used for fixing.)  
\*2 The standard models can be used in combination with F and V Type Operating Handles.

\*3 When a crimp terminal applicable to wires with a size of 117.2 to 152.05mm<sup>2</sup> (Model 2CR-150 or CB150-SB) is used, TTC cannot be fitted.  
Use TCL-2SV3L. Or insulate the terminal from TC-S with insulating tube or taping.  
\*4 In the case of installation on the body, specify the model name with •MDU at the end.  
\*5 Applicable to circuit breakers with rating of 200A or less (max. wire size 100mm<sup>2</sup>)

# 6 Accessories 2 External Accessories

<BTC>

Fig. 1

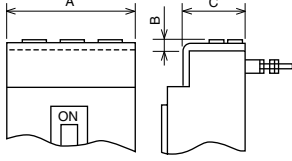
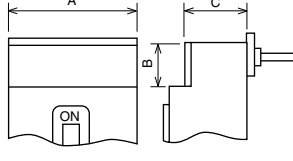


Fig. 2



<PTC>

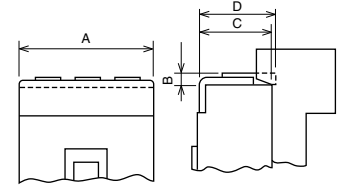


Table 6-29 Rear terminal cover (BTC)

Type name	Color	Number of poles of circuit breaker	Applicable model		Dimensions (mm)			Contents			Appearance	Remarks
			MCCB	ELCB	A	B	C	Number of covers	Cover mounting screw	Sealing plate		
BTC-03CS2W	White	2	NF30-CS	-	43.5	6.5	30.5	2	-	2		Cover for connection block in the case of simple rear connection
BTC-03CS3W	White	3	-	-	67	6.5	30.5	2	-	2		
BTC-05SV2	White	2	NF32-SV NF63-CV/SV/HV	- (*1)	50	5	65.5	2	-	2		
BTC-05SV3	White	3	NF32-SV NF63-CV/SV/HV	NV32-SV, NV63-HV	75	5	65.5	2	-	2		
	White	2, 3	-	NV63-CV/SV								
BTC-05SV4	White	4	NF63-SV/HV	-	100	5	65.5	2	-	2		
BTC-1SV2	White	2	NF125-CV/SV	-	60	6.5	65.5	2	-	2		
BTC-1SV3	White	3	NF125-CV/SV	NV125-CV/SV/HV	90	6.5	65.5	2	-	2		
	White	2, 3	NF125-HV/UV	-								
BTC-1SV4	White	4	NF125-SV/HV/UV	NV125-SV/HV	120	6.5	65.5	2	-	2		
BTC-2SV3	White	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	6.5	65.5	2	-	2		
			NF125-SEV/HEV	NV125-SEV/HEV								
BTC-2SV4	White	4	NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV	-	140	6.5	65.5	2	-	2		
			NF250-SV/HV/UV	NV250-SV/HV								
			NF250-SEV/HEV NF250-SGV/LGV/HGV	-								
			NF250-SEV/HEV	-								
BTC-4SW3	White	2, 3	NF400-CW/SW/SEW NF630-CW/SW/SEW	NV400-CW/SW/SEW NV630-CW/SW/SEW	140	42 (*2)	99.5	2	-	2		Quick type The cover can be sealed with the sealing plate.
	White	3	NF400-SEP with MDU (*5)	- (*5)								
BTC-4SW4	(*3) Transparent	4	NF400-SW/SEW/HEW NF630-SW/SEW/HEW NF400-SEW with MDU/HEW with MDU (*5)	NV400-SEW/HEW NV630-SEW	185	42 (*2)	97.5	2	6	-		
	Transparent	2, 3	NF800-CEW/SDW/SEW/HEW/REW NF800-SEW with MDU/HEW with MDU (*5)	NV800-SEW/HEW								
BTC-8SW3	(*3) Transparent	3	NF800-UEW (*4)	-	210	32 (*2)	146/ 194.5	2	4	-		
	Transparent	3	NF800-UEW (*4)	-								
BTC-8SW4	(*3) Transparent	4	NF800-SEW/HEW NF800-SEW with MDU/HEW with MDU (*5)	- (*5)	280	32 (*2)	97.5	2	10	-		
	Transparent	4	NF400-UEW, NF800-UEW (*4)	-								

Notes \*1 For 2-pole ELCB, use BTC for 3-pole circuit breaker.  
 \*2 Dimension B in Fig. 2  
 \*3 The covers can be used for plug-in type circuit breakers. Other models are designed only for rear connection type.  
 \*4 The dimension C is the size on the power supply side and load side.  
 \*5 In the case of installation on the body, it can be fitted only on the power supply side.

Remarks 1.PTC-4SW3 can be used as the back terminal covers for NF400-HEW/REW, NF630-HEW/REW, NV400-HEW and NV630-HEW.  
 2.For terminal covers for 4-pole circuit breakers not listed above, consult us.

Table 6-30 Plug-in terminal covers (PTC)

Type name	Color	Number of poles of circuit breaker	Applicable model		Dimensions (mm)				Contents			Appearance	Remarks
			MCCB	ELCB	A	B	C	D	Number of covers	Cover mounting screw	Sealing plate		
PTC-05SV2	White	2	NF32-SV NF63-CV/SV/HV	-	50	6.5	65.5	72	2	2	-		Cover for stud connection block in the case of plug-in type
PTC-05SV3	White	3	NF32-SV NF63-CV/SV/HV	NV32-SV, NV63-HV	75	6.5	65.5	72	2	2	-		
	White	2, 3	-	NV63-CV/SV									
PTC-05SV4	White	4	NF63-SV/HV	-	100	6.5	65.5	72	2	2	-		
PTC-1SV2	White	2	NF125-CV/SV	-	60	6.5	65.5	-	2	4	-		
PTC-1SV3	White	3	NF125-CV/SV	NV125-CV/SV/HV	90	6.5	65.5	-	2	4	-		
	White	2, 3	NF125-HV/UV	-									
PTC-1SV4	White	4	NF125-SV/HV	NV125-SV/HV	120	6.5	65.5	-	2	2	-		
PTC-2SV3	White	2, 3	NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV NV250-SEV/HEV NV125-SEV/HEV	105	6.5	65.5	78.5	2	4	-		
			NF125-SEV/HEV	NV125-SEV/HEV									
PTC-2SV4	White	4	NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV	-	140	6.5	65.5	78.5	2	2	-		
			NF250-SV/HV/UV	NV250-SV/HV									
			NF250-SEV/HEV NF250-SGV/LGV/HGV	-									
			NF250-SEV/HEV	-									
PTC-4SW3	(*2) Transparent	2, 3	NF400-CW/SW/SEW NF630-CW/SW/SEW	NV400-CW/SW/SEW NV630-CW/SW/SEW	140	42	97.5	-	2	4	-		Same as screw type of BTC
			NF400-HEW/REW (*1) NF630-HEW/REW (*1)	NV400-HEW (*1) NV630-HEW (*1)									

Notes \*1 The covers can be used as back terminal covers.  
 \*2 See Fig. 2 of BTC.

**Table 6-31 List of terminal covers applicable to F and V Type Operating Handles**

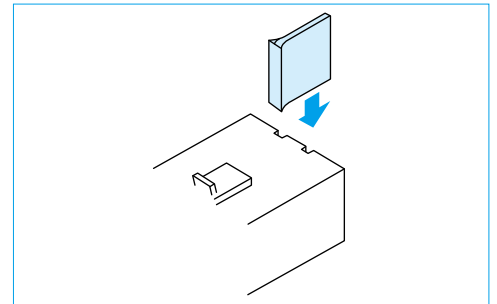
Type name			Applicable operating handles	Number of poles of circuit breaker	Applicable model	
Large terminal covers (TC-L)	Small terminal covers (TC-S)	Transparent terminal covers (TTC)			MCCB	ELCB
TCL-05SV2F (*2)(*3) TCL-05SV2LF (*2)(*4)	TCS-05SV2F (*2)	TTC-05SV2F (*2)	F-05SV2, V-05SV2	2	NF32-SV, NF63-CV/SV/HV	– (*1)
TCL-05SV3 (*3) TCL-05SV3L (*4)	TCS-05SV3	TTC-05SV3	F-05SV, V-05SV	3 2, 3	NF32-SV, NF63-CV/SV/HV –	NV32-SV, NV63-HV NV63-CV/SV
TCL-05SV4	–	–	–	4	NF32-SV, NF63-CV/SV/HV	–
TCL-1SV2F (*2)	TCS-1SV2F (*2)	TTC-1SV2F (*2)	F-1SV2, V-1SV2	2	NF125-CV/SV	–
TCL-1SV3	TCS-1SV3	TTC-1SV3	F-1SV, V-1SV	3 2, 3	NF125-CV/SV NF125-HV/UV	NV125-CV/SV/HV –
TCL-1SV4	–	–	–	4	NF125-CV/SV/HV/UV	NV125-CV/SV/HV
TCL-2SV3 (*5) TCL-2SV3L (*6)	TCS-2SV3	TTC-2SV3	F-2SV, V-2SV	2, 3	NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV, NV250-SEV/HEV NV125-SEV/HEV
TCL-2SV4	–	–	–	4	NF250-CV/SV/HV/UV, NF250-SEV/HEV NF125-SEV/HEV	NV250-CV/SV/HV, NV250-SEV/HEV NV125-SEV/HEV
TCL-4SW3 TCL-4SP3W	–	TTC-4SW3	F-4S V-4S	2, 3	NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW NV630-CW/SW/SEW/HEW
TCL-4SW4	–	TTC-4SW4	–	4	NF400-SW/SEW/HEW NF630-SW/SEW/HEW	NV400-SEW/HEW NV630-SEW
TCL-8SW3	–	TTC-8SW3	F-8S V-8S	2, 3	NF800-CEW/SDW/SEW/HEW/REW	NV800-SEW/HEW
TCL-8SW4	–	TTC-8SW4	–	4	NF800-SEW/HEW	–

Notes \*1 For 2-pole NV, use a terminal cover for 3-pole circuit breaker.  
 \*2 Only for F and V Type Operating Handles (screw type)  
 \*3 Applicable to circuit breakers with rating of 75A or less (max. wire size 25mm<sup>2</sup>)  
 \*4 Applicable to circuit breakers with rating of 125A or less (max. wire size 60mm<sup>2</sup>)  
 \*5 Applicable to circuit breakers with rating of 200A or less (max. wire size 100mm<sup>2</sup>)  
 \*6 Applicable to circuit breakers with rating of 250A or less (max. wire size 150mm<sup>2</sup>)

Remark: 1. The terminal covers for UL 489 Listed Circuit Breakers can be normally combined with F Type Operating Handles.

## 5. Insulating Barriers

The insulating barrier enhances the insulation between the phases of circuit breaker terminals. It also prevents accidents due to conductive foreign matter and dust, and secondary accidents when isolating a fault current.



● The insulating barrier is available for the models listed in the table below.

**Table 6-32**

(“●” denotes optional)

Applicable model		Connecting method			
MCCB	ELCB	Front	Rear	Flush plate	Plug-in
NF32-SV, NF63-CV NF125-CV, NF100-CV-FU NF100-SRU	NV32-SV, NV63-CV NV125-CV, NV100-CV-FU NV100-SRU	●	–	–	–
NF63-SV/HV NF125-SV/HV NF100-HRU	NV63-SV/HV NV125-SV/HV NV100-HRU	Standard attachment	–	–	–
NF125-SEV/HEV, NF125-ZEV NF250-CV/SV/HV/SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NF250-SEV/HEV/ZEV with MDU	NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV NV250-SEV/HEV with MDU	Standard attachment	–	–	Standard attachment
NF125-SVU NF125-HVU NF250-SVU NF250-HVU NF250-CVU	NV125-SVU NV125-HVU NV250-SVU NV250-HVU NV250-CVU	Standard attachment	–	–	–
NF400-CW/SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW NV630-CW/SW/SEW/HEW	Standard attachment	●	●	Standard attachment
NF400-UEW(4P) NF800-CEW/SEW/HEW/REW/SDW	NV800-SEW/HEW	Standard attachment	●	●	●
NF800-UEW	–	Standard attachment	●	●	–
NF400-SWU/HWU NF630-SWU/HWU	–	Standard attachment	–	–	–
NF1000-SEW, NF1250-SEW/SDW	–	Standard attachment	–	–	Standard attachment
NF1600-SEW/SDW	–	Standard attachment	–	–	–

Always mount the insulating barrier when it comes with the circuit breaker.

## ● Insulating Barrier-Front (BA-F)

**Table 6-33 Summary of dimensions**

Type name	Applicable model		Dimensions (mm)		Quantity per breaker			Reference diagram
	MCCB	ELCB	A	B	2P	3P	4P	
BAF-05SRU	NF100-SRU/HRU	NV100-SRU/HRU	50	59.5	1	2	-	
BAF-05SV	NF32-SV NF63-CV NF125-CV	NV32-SV NV63-CV NV125-CV	50	59.5	1 (*2)	2	3	
	NF63-SV/HV NF125-SV/HV/UV	NV63-SV/HV NV125-SV/HV						
BAF-2SV	NF125-SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV/UV/SEV/HEV NF250-SGV/LGV/HGV/RGV NF250-SEV/HEV/ZEV with MDU	NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV NV250-SEV/HEV with MDU	100	59.5	2	4	6	
BAF-05SVU	NF100-CVUFU	NV100-CVUFU	50	59.5	2	4	-	
	NF125-SVU NF125-HVU	NV125-SVU NV125-HVU						
BAF-2SVU	NF250-SVU NF250-HVU NF250-CVU	NV250-SVU NV250-HVU NV250-CVU	100	59.5	-	4	-	
BAF-4SW	NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW NV630-CW/SW/SEW/HEW	110	98.5	2	4	6	
BAF-4UW (*1)	NF400-UEW(3P)	-	110	132/ 98.5	-	4	-	
BAF-8SW	NF800-CEW/SEW/SDW/HEW/REW	NV800-SEW/HEW	110	98.5	1	2	3	
BAF-10SW	NF400-UEW(4P) NF800-UEW, NF1000-SEW NF1250-SEW/SDW	-	110	132	1	2	3	
	NF400-SWU/HWU	-	110	98.5	-	4	-	
BAF-4SWU	NF630-SWU/HWU(less than 600A)	-	110	98.5	-	2	-	
	NF630-SWU/HWU(630A)	-	150	98.5	-	4	-	
BAF-16SW	NF1600-SEW/SDW	-	185	132	1	2	3	

Notes \*1 The barriers BAF-4UW for the power supply and load sides vary in the dimension B.  
\*2 Not supplied with ELCB.

## ● Insulating Barrier-Rear (BA-B)

**Table 6-34 Summary of dimensions**

Type name	Applicable model		Dimensions (mm)		Quantity per breaker			Reference diagram
	MCCB	ELCB	A	B	2P	3P	4P	
BAB-4SW	NF400-CW/SW/SEW/HEW/REW NF400-UEW(3P) NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW NV630-CW/SW/SEW/HEW	140	74.5	-	4	6	
BAB-8SW	NF800-CEW/SEW/SDW/HEW/REW NF400-UEW(4P) NF800-UEW	NV800-SEW/HEW	140	74.5	-	4	6	

Drilling size for use of BA-B (in the case of 3-pole circuit breaker)

NF400-CW, NF400-SW, NF400-SEW, NF400-HEW, NF400-REW, NF400-UEW NV400-CW, NV400-SW, NV400-SEW, NV400-HEW NF630-CW, NF630-SW, NF630-SEW, NF630-HEW, NF630-REW NV630-CW, NV630-SW, NV630-SEW, NV630-HEW		NF800-CEW, NF800-SEW, NF800-HEW, NF800-REW, NF800-UEW NV800-SEW, NV800-HEW	
Power supply side Note The dimensions in brackets are those for NF400-UEW.		Note The dimensions in brackets are those for NF800-UEW.	
Load side			

The drilling size drawings show the dimensions viewed from the rear side.

## ● Insulating Barrier-Plug-in (BA-P)

Table 6-35 Summary of dimensions

Type name	Applicable model		Dimensions (mm)		Quantity per breaker			Reference diagram
	MCCB	ELCB	A	B	2P	3P	4P	
BAP-2SV	NF125-SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV NF250-SGV/LGV/HGV/RGV NF250-SEV/HEV	NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV	172	74.5	4			
BAP-4SW	NF400-CW/SW NF400-SEW/HEW/REW/UEW NF630-CW/SW NF630-SEW/HEW/REW	NV400-CW/SW NV400-SEW/HEW NV630-CW/SW NV630-SEW/HEW	178	74.5		4	6	
BAP-8SW	NF800-CEW/SEW NF800-HEW/REW	NV800-SEW/HEW	172	74.5	-			
	NF1000-SEW NF1250-SEW	-	215	74.5				

## ● Earth fault preventing barriers (BA-G)

Table 6-36 Summary of dimensions

Type name	Applicable model		Dimensions (mm)		Quantity per breaker	Reference diagram
	MCCB	ELCB	A	B		
BAG-05SV3	NF32-SV NF63-CV/SV/HV	NV32-SV NV63-CV/SV/HV	30	75	1	<p>Earth fault preventing barrier (3 poles)</p>
BAG-1SV3	NF125-CV/SV/HV	NV125-CV/SV/HV	40	90		
BAG-2SV3	NF125-SEV/HEV NF250-CV/SV/HV/SEV/HEV NF250-SEV/HEV/ZEV with MDU	NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV NV250-SEV/HEV with MDU	63	105		
BAG-4SW3	NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW	NV400-CW/SW/SEW/HEW NV630-CW/SW/SEW/HEW	63	164		
BAG-4UW3	NF400-UEW	-	63	164		
BAG-8SW3	NF800-CEW/SEW/SDW/HEW/REW	NV800-SEW/HEW	110	210		
BAG-8UW3	NF800-UEW	-	110	210		
BAG-10SW3	NF1000-SEW NF1250-SEW/SDW	-	98	210		
BAG-16SW3	NF1600-SEW/SDW	-	150	300		

Also the earth fault preventing barriers for 2- and 4-pole circuit breakers are available.

## 6. Handle Lock Devices, Lock Covers, Auxiliary Handles, Card Holders

### (1) Handle Lock Devices (HL and HL-S)

These devices are used to lock the circuit breakers in the ON or OFF position. If overcurrent flows while the circuit breaker is locked, it will trip. Model HL (red resin moldings) to be fitted to handles and Model HL-S to be secured on circuit breaker covers are available. (Use a commercially available padlock having the nominal size shown in the right table. If a padlock in another size is used, the device may not lock correctly.)

Padlock size (mm)

Application	A (Nominal size)	B
a	25	4 or less
b	35	5 or less
c	40	6 or less

Table 6-37 HL

Type name	Applicable model		Reference diagram	Padlock
	MCCB	ELCB		
HL-05FH	NF30-CS	-	Fig. 4	a
HL-05FA	NF30-FA/FAU, NF50-FA/FAU	NV30-FA/FAU, NV50-FA/FAU		
HLF-05BHD	BH-D6, BH-D10	-	Fig. 5	
HLF-05SMU (*1)	NF50-SMU	-		
HLF-05SRU	NF100-SRU/HRU	NV100-SRU/HRU	-	
HLN-05SV	NF32-SV, NF63-CV/SV/HV	NV32-SV, NV63-CV/SV/HV	Fig. 1	
	NF125-CV/SV/HV/UV, NF125-SEV/HEV			
	NF125-SGV/LGV/HGV/RGV			
	NF160-SGV/LGV/HGV			
	NF250-CV/SV/HV/UV, NF250-SEV/HEV			
HLF-05SV	NF32-SV, NF63-CV/SV/HV	NV32-SV, NV63-CV/SV/HV	Fig. 1	
	NF125-CV/SV/HV/UV, NF125-SEV/HEV			
	NF125-SGV/LGV/HGV/RGV			
	NF160-SGV/LGV/HGV			
	NF250-CV/SV/HV/UV, NF250-SEV/HEV			
HLF-05SVU	NF125-SVU/HVU	NV125-SVU/HVU	Fig. 2	
	NF250-SVU/HVU/CVU			NV250-SVU/HVU/CVU
HL-4CW (*1)	NF400-CW	NV400-CW	Fig. 2	c
HL-4SW (*1)	NF400-SW/SEW/HEW/REW/UEW	NV400-SW/SEW/HEW		
	NF630-CW/SW/SEW/HEW/REW			
HL-4SWU	NF800-CW/SDW/SEW/HEW/REW/UEW	NV800-SEW/HEW		
HL (*2)	NF400-SWU/HWU, NF630-SWU/HWU	-	Fig. 3	
HL	NF1000-SEW, NF1250-SEW/SDW, NF1600-SEW/SDW	-	Fig. 3	

Notes \*1 When a padlock is not used, the device can be used as a lock cover (LC). \*2 Place an order for a circuit breaker body combined with the device.

Remarks 1. One lot of HL-4CW and HL-4SW contains one piece, and one lot of others contains 10 pieces. 2. HLF types are used for OFF lock, and HLN types for ON lock.

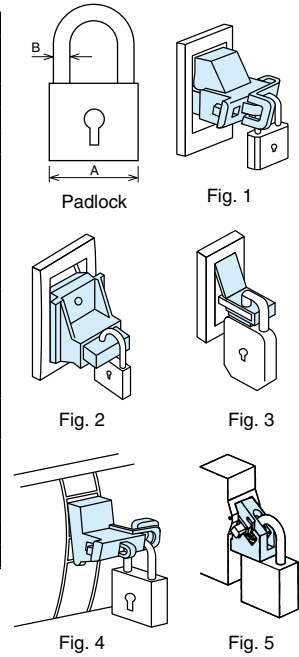


Table 6-38 HL-S

Type name	Applicable model				Dimensions (mm)						Reference diagram	Padlock		
	MCCB	Number of poles	ELCB	Number of poles	A	B	C	D	E	F				
HLS-05SV2 (*1)	NF32-SV, NF63-CV, NF63-SV	2P	-	-	32	75	50	-	32	-				
	NF63-HV	2P	-	-			57							
HLS-05SV (*1)	NF125-CV, NF125-SV	2P	-	-			62.5	84			75	23	63	32
	NF32-SV, NF63-CV, NF63-SV	3P	NV32-SV, NV63-HV	3P							86	-		
	NF63-HV	4P	-	-										
	NF63-SV, NF63-HV	4P	-	-							28			
	NF125-CV, NF125-SV	3P	NV125-CV, NV125-SV, NV125-HV	3P								-		
	NF125-HV	2P, 3P	-	-							1.5			
	NF125-SV, NF125-HV	4P	NV125-SV, NV125-HV	4P								-		
NF125-UV	2P, 3P	-	-	-										
	4P	-	-		28									
HLS-2SV (*1)	NF125-SGV/LGV/HGV/RGV	2P	NV125-SEV, NV125-HEV	3P	32	84	100	-	63	32				
	NF160-SGV/LGV/HGV													
	NF250-CV, NF250-SV, NF250-HV													
	NF250-SGV/LGV/HGV/RGV													
	NF125-SEV, NF125-HEV													
NF125-SGV/LGV/HGV/RGV	3P	NV250-CV, NV250-SV, NV250-HV	4P	69.5	-									
NF160-SGV/LGV/HGV														
NF250-CV, NF250-SV, NF250-HV	4P	NV250-SEV, NV250-HEV	-	33										
NF250-SGV/LGV/HGV/RGV														
NF250-UV	2P, 3P	-	-	-										
	4P	-	-		33									
HLS-03SVU (*1)	NF50-SVFU	2P, 3P	NV50-SVFU	2P, 3P	-	-	-	-	-	-	Fig. 8			
HLS-05SVU2 (*1)	NF100-CVFU	2P	-	-	32	75	50	-	32	-	Fig. 5			
HLS-05SVU (*1)	NF100-CVFU	3P	NV100-CVFU	3P			75							
	NF125-SVU/HVU	2P, 3P	NV125-SVU/HVU	3P			86							
HLS-05SVU (*2)	NF125-SVU/HVU	2P, 3P	NV125-SVU/HVU	3P	32	75	86	-	32	Fig. 5				
HLS-2SVU (*1)	NF250-SVU/HVU/CVU	3P	NV250-SVU/HVU/CVU	3P	32	84	100	-	32	Fig. 5				
HLS-4SW (*3)	NF400-CW/SW/SEW/HEW/REW	2P, 3P, 4P	NV400-CW/SW/SEW/HEW	3P, 4P	-	-	-	-	-	-	Fig. 6			
	NF630-CW/SW/SEW/HEW/REW		NV630-CW/SW/SEW/HEW											
HLS-4UW (*3)	NF400-UEW	3P	-	-	-	-	-	-	-	-				
HLS-8SW (*3)	NF800-CEW/SDW/SEW/HEW/REW	2P, 3P, 4P	NV800-SEW/HEW	3P, 4P	-	-	-	-	-	-	Fig. 7			
	NF400-UEW	4P	-	-										
HLS-8UW (*3)	NF400-UEW	4P	-	-	-	-	-	-	-	-				
	NF800-UEW	3P, 4P	-	-	-	-	-	-	-	-				

Notes \*1 For locking in OFF position \*2 A, B, C and D in Figs. 5 and 6 are drilling sizes in front plate. \*3 Terminal covers cannot be fitted.



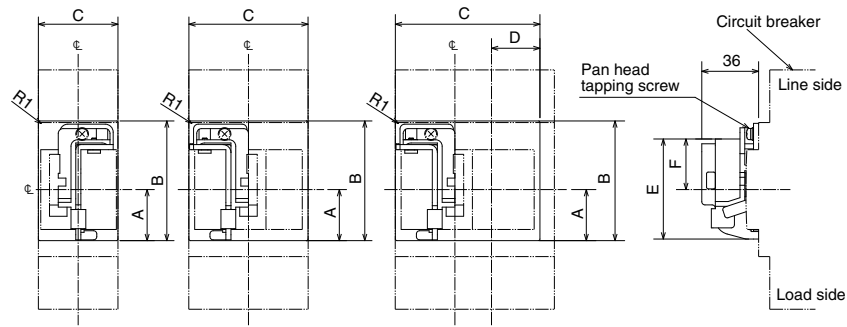


Fig. 5

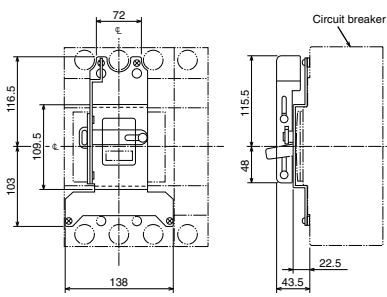


Fig. 6

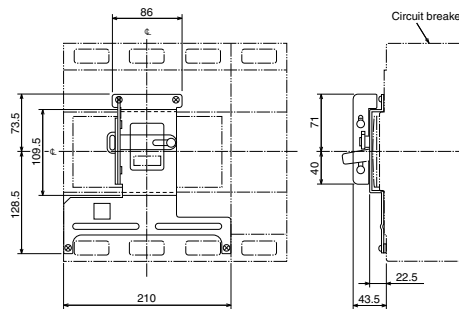


Fig. 7

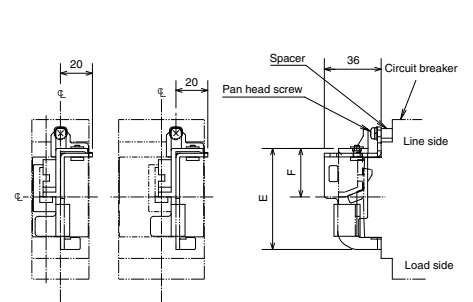
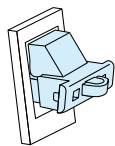


Fig. 8

## (2) Lock Covers (LC)

Lock Cover is a plug-in lock for indicating easily without using padlocks that it is prohibited to operate the circuit breaker. A "Caution" tag can be hung on it. The covers are red resin moldings.



LC03CS to LC-05SV

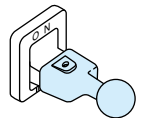
Table 6-39 LC

Type name	Applicable model	
	MCCB	ELCB
LC03CS	NF30-CS NF50/100-FHU	NV50/100-FHU
LC-05SV	NF32-SV NF63-CV/SV/HV NF125-CV/SV/HV/UV NF125-SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV/UV NF250-SEV/HEV NF250-SGV/LGV/HGV/RGV	NV32-SV NV63-CV/SV/HV NV125-CV/SV/HV NV125-SEV/HEV NV250-CV/SV/HV NV250-SEV/HEV
LC05FA	NF30-FAU NF50-FAU	NV30-FAU NV50-FAU

Remark: 1. One lot of and LC-NVL contains 50 pieces, and one lot of other models contains 10 pieces.

## (3) Auxiliary Handles (HT)

These handles facilitate opening and closing circuit breakers.



Auxiliary Handles

Table 6-40 HT

Type name	Applicable model	Dimensions					Outline dimension drawing
		A	B	C	D	E	
HT-4CW (*1)	NF400-CW, NV400-CW		77.5				
HT-4SW (*1) (*2)	NF400-SW/SEW/HEW/REW/UEW NF630-CW/SW/SEW/HEW/REW NF800-CEW/SDW/SEW/HEW NF800-REW/UEW NV400-SW/SEW/HEW NV630-CW/SW/SEW/HEW NV800-SEW/HEW	59	81	32	38	M4	
HT-10SW (*3)	NF1000-SEW NF1250-SEW/SDW NF1600-SEW/SDW	62	118	34	45	M4	

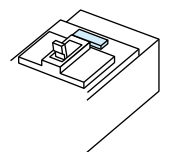
Notes \*1 HT can be supplied separately. The user can fit it to the circuit breaker. (One lot contains 1 piece.)

\*2 4-pole circuit breakers with 800A frame and 4-pole NF400-UEW come with auxiliary handles as standard accessories.

\*3 HT is standard accessory.

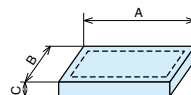
## (4) Card Holders (CH)

Cards showing the circuit breaker name and circuit number can be inserted to the card holder.



Fit the card holder to the circuit breaker body or the flush plate in the flush frame. (Although a card holder is supplied with each circuit breaker body, the card holder is available as an optional part.)

Table 6-41 Card holder size (mm)



Applicable model	Type name	A	B	C	Card size
NF250-SV or below NV250-SV or below	CH-P No.5	44	12	5	39x9
NF400-SW or above NV400-SW or above	CH-P No.3	38	22	5	33x20

## 7. Mechanical Interlocks (MI)

This mechanical interlock device is used to enable one of two circuit breakers to turn on. Install the device on the panel. Mechanical interlocks to be installed directly to circuit breaker bodies can be manufactured. Consult us for details.

### ● Front, rear and plug-in types

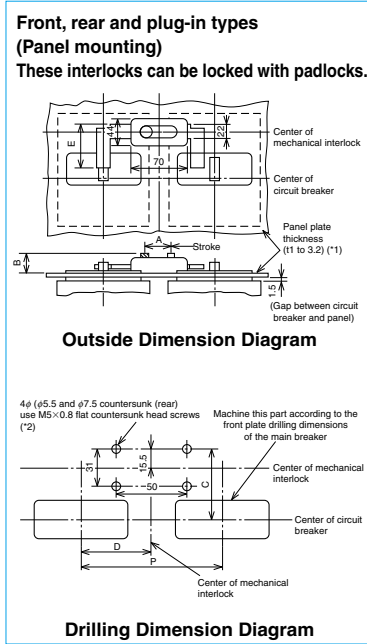


Fig. 1

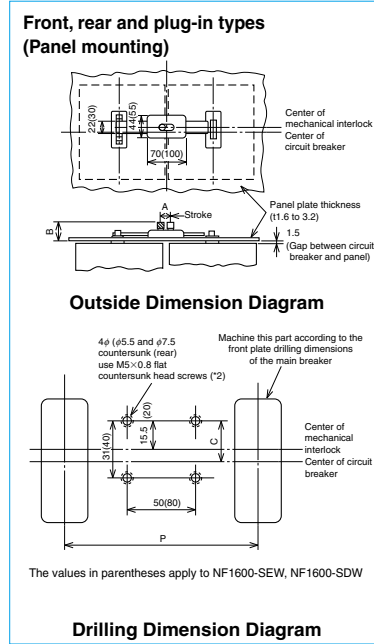


Fig. 2

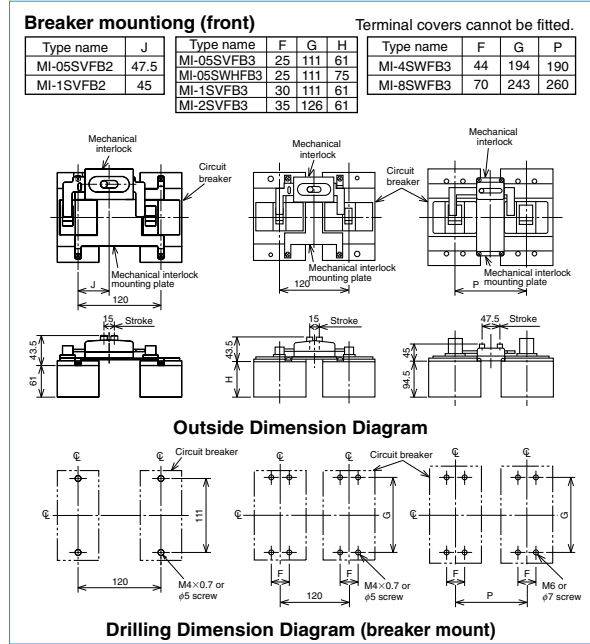


Fig. 3

Notes \*1 For 400A frame or above, use a panel 1.6 to 3.2 thick.  
\*2 When the panel is 2.3 or more thick, countersink the panel (rear side) in φ9.5 for the four φ5.5 holes.

Table 6-42 Table of variable dimensions

Applicable model		Pitch (P) (*1)				Dimensions (mm)					Reference diagram	Breaker mount (*3)	Reference diagram (*3)		
MCCB	ELCB (*6)	Standard		Semi-standard	Standard		t	A	B	C				D	E
		Type name	2P	3P	3P	Type name									
NF32-SV, NF63-CV/SV/HV	-	MI-05SV3	120	-	-	-	-	15	33	63	47.5	58	MI-05SVFB2	(Fig. 3)	
NF32-SV, NF63-CV/SV/HV	NV32-SV, NV63-CV/SV/HV		-	120	-	130		MI-05SV4	120 (*4)	15	33	63			-
NF125-CV/SV	-	MI-05SV3	120	-	-	-	-	15	33	63	45	58	MI-1SVFB2	(Fig. 3)	
NF125-CV/SV/HV	NV125-CV/SV/HV		-	120	130	150		MI-1SV4	130 (*4)	15	33	63			-
NF125-UV	-	MI-05SV3	120 (*4)	150	180	MI-2SV4	150 (*4)	-	15	33	63	-	58	MI-2SVFB3	(Fig. 3)
NF125-SEV/HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV, NF250-SEV/HEV NF250-SGV/LGV/HGV/RGV	NV125-SEV/HEV NV250-CV/SV/HV NV250-SEV/HEV														
NF250-UV	-	MI-4SW3	190	-	210	MI-4SW4	250	-	47.5	33	83.5	-	74	MI-4SWFB3	(Fig. 3)
NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW NF400-UEW (3P)	NV400-CW/SW/SEW/HEW NV630-CW/SW/SEW/HEW														
NF800-CEW/SDW/SEW/HEW/REW NF400-UEW (4P) NF800-UEW	NV800-SEW/HEW	MI-8SW3	220	-	240	MI-8SW4	290	-	47.5	33	60	-	74	MI-8SWFB3	(Fig. 3)
NF1000-SEW, NF1250-SEW/SDW	-														
NF1600-SEW/SDW	-	MI-16SW3	315	-	-	MI-16SW4	426	2.3 (*5)	65	54.5	39	-	-	-	(Fig. 2)




Notes \*1 Specify the circuit breaker mounting pitch (P).  
\*2 No need to specify the panel thickness (t). (Usable panel thickness range: t = 1~3.2mm. Above 400AF, use panel thickness t = 1.6~3.2mm)  
\*3 Terminal covers cannot be fitted. (However, TCL-4SW3 can be fitted.)  
\*4 When UVT is provided, separately install the module.  
\*5 If the thickness is not 2.3, specify the panel thickness (t).  
\*6 For NV with TBL, use a circuit breaker with MG.

Remarks 1. When a mechanical interlock is installed on the panel, screw type terminal covers cannot be installed.  
2. These devices do not provide an isolation function. However, 400, 600, 630 and 800A frame circuit breakers can be made conforming to it. (See Note 3.)  
3. On a 2-pole circuit breaker obtained by removing the neutral pole conductor from a 3-pole circuit breaker, the mechanical interlock can be installed in the same manner as on a 3-pole circuit breaker.

## 8. Boxes for Circuit Breakers and Boxed Circuit Breakers

### (1) Kinds and specifications

Table 6-43

		Closed type (S)	Dust-proof type (I)	Water-proof type (W)	
Appearance		 (*1)			
MCCB (*2)	NF30-CS	2, 3P	NFS-03CS	—	
	NF32-SV, NF63-CV/SV/HV	2P	NFS-05SV2 (*5)	NFI-05SV	—
		3P	NFS-05SV		NFW-05SV
	NF125-CV/SV	2P	NFS-1SV2 (*5)	NFI-1SV	—
		3P	NFS-1SV		NFW-1SV
	NF125-HV	2, 3P			NFW-1HV
	NF125-SGV/LGV	2, 3P	NFS-2SV	NFI-2SV	NFW-2SV
	NF160-SGV/LGV				
	NF250-SGV/LGV				
	NF250-CV/SV, NF125/250-SEV				
	NF125/160/250-HGV				
	NF250-HV, NF125/250-HEV				
	NF400-CW				
	NF400-SW/SEW				
NF630-CW/SW/SEW					
NF800-CEW/SDW/SEW					
ELCB (*2)	NV32-SV, NV63-CV/SV/HV	2P	NFS-05SV	NFI-05SV	—
		3P	NFS-05SV		NFW-05SV
	NV125-CV/SV	3P	NFS-1SV	NFI-1SV	NFW-1SV
	NV250-CV/SV, NV125/250-SEV	3P	NFS-2SV	NFI-2SV	NFW-2SV
	NV250-HV, NV125/250-HEV				
	NV400-CW	—	NFI-4CW	NFW-4CW	
	NV400-SW/SEW	—	NFI-4SW	NFW-4SW	
	NV630-CW/SW/SEW	—	NFI-6SW	NFW-6SW	
	NV800-SEW	—	NFI-8SW	NFW-8SW	
	Operating method		Direct operation of circuit breaker handle	Operation through operating handle mechanism	
Standard paint color		Box: Munsell 5Y7/1 Operating handle: Munsell N1.5			
Protection class (IEC 60529)		IP3X	IP4X (*3)	IP65 (*4)	

- Notes \*1 The window frame varies depending on the model.  
 \*2 For 1-pole circuit breakers, boxes are not manufactured.  
 \*3 The protection class of NFI-1SV and NFI-2SV is IP3X.  
 \*4 The protection class of NFW-4CW, NFW-4SW, NFW-6SW and NFW-8SW is IP54.  
 \*5 The circuit breaker body is a 2-pole external type.

- Remarks: 1. Only internal accessories with lead wires drawn out can be fitted. (However, LT and SLT can be fitted on the right pole side.)  
 2. The dust-proof type (I) models do not provide an isolation function.

#### ● Selection of rated current

When selecting the rated current of circuit breaker, it is necessary to consider the temperature in the box. When the rated current is carried, the temperature in the box increases by 10 to 20K. Correct the rated current with the temperature correction curve.

Determine the maximum working current to be 80% or less of the rated current.

#### ● Locking

Type I and W boxed circuit breakers can be provided with locks in the following parts. Locking can prevent unnecessary operation.

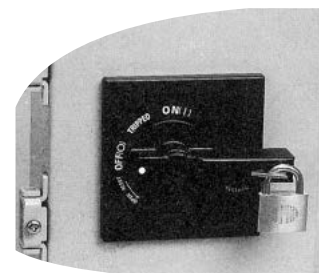
- ① Cover and case
- ② ON or OFF position of operating handle  
 ( Padlocks must be prepared by the user.  
 ( The dimensions of the padlocks are shown )  
 on page 116. )

#### ● Interlock (only for Dust-proof type)

The cover cannot be opened while the circuit breaker is in the ON state. However, if the interlock release screw is turned, the cover is released from the locked state and can be opened even in the ON state.

#### ● Handle operation and display

The ON, OFF or trip state of the body is displayed on each position on the decorative board.



Example of Type I operating handle block

# 6 Accessories 2 External Accessories

## (2) External dimensions

### MCCB

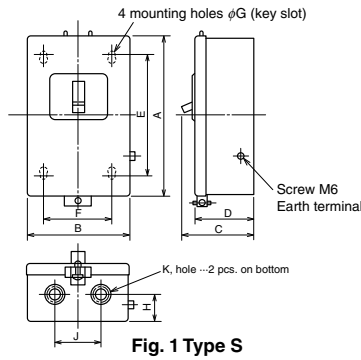


Fig. 1 Type S

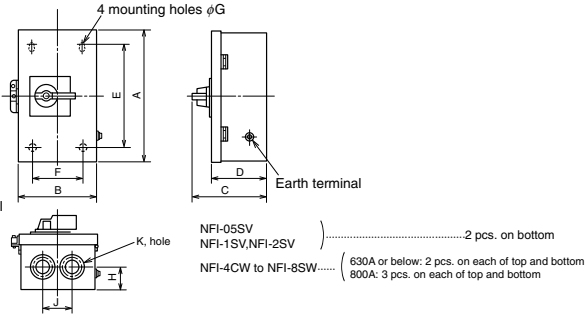


Fig. 3 Type I

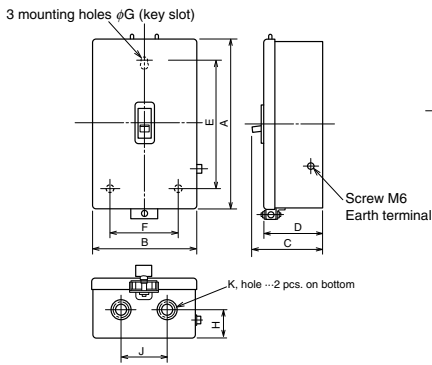


Fig. 2 Type S

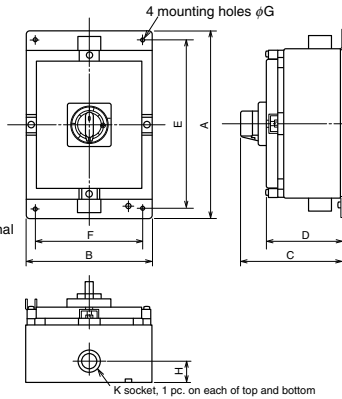


Fig. 4 Type W

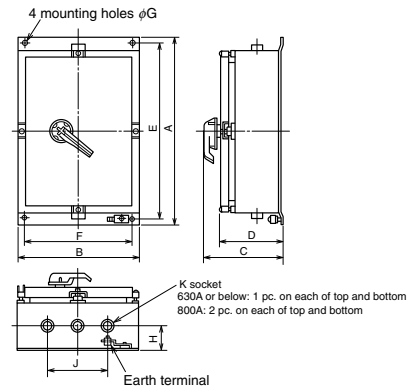


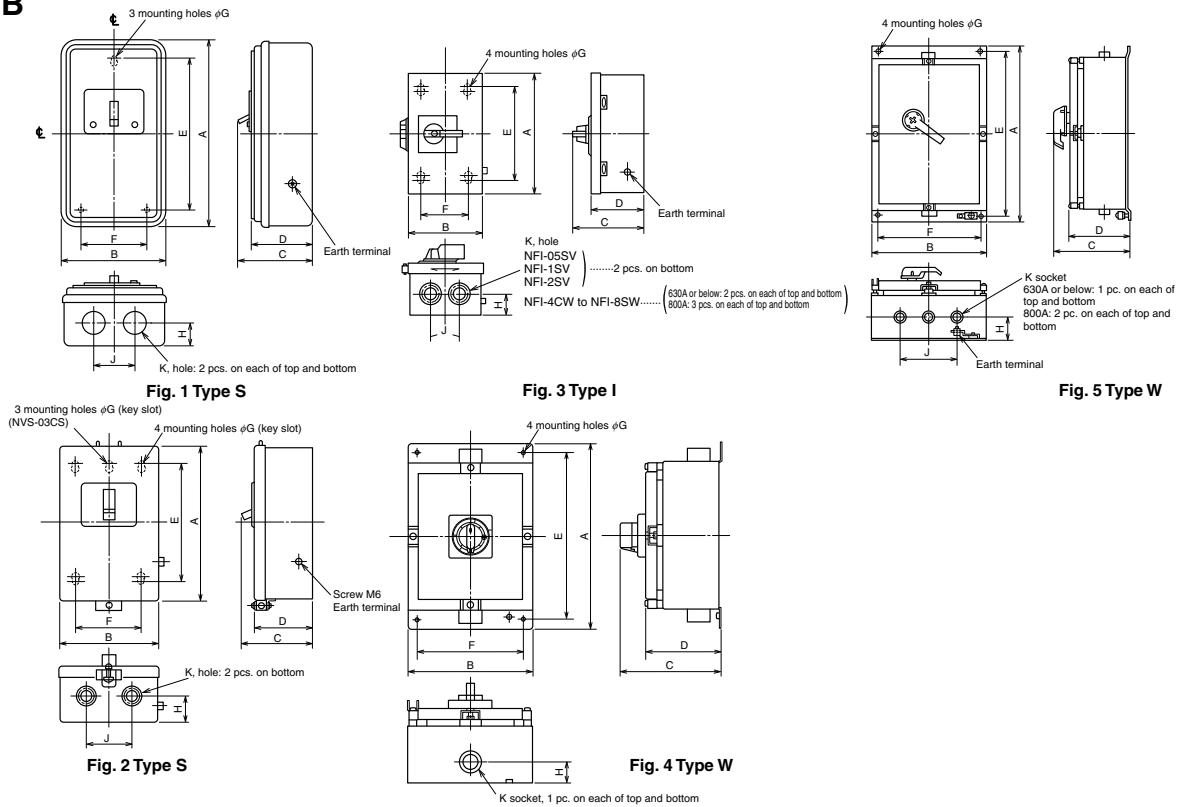
Fig. 5 Type W

Table 6-44 Table of variable dimensions (Boxes for 4-pole circuit breakers are not manufactured.)

Note) The sockets are applicable to thick steel duct (JIS C 8305) and conduit tube thread.

Box type	Type name	Applicable Model	Fig.	Variable dimensions										
				A	B	C	D	E	F	G	H	J	K	
S	NFS-03CS	NF30-CS	2	188	158	69	58	150	78	6	25	100	20, 28	
	NFS-05SV2	NF32-SV, NF63-CV/SV/HV	1	260	178	98	78	202	100	7	34	100	28, 35, 44	
	NFS-05SV													
	NFS-1SV2	NF125-CV/SV	1	310	178	98	78	252	100	7	34	100	28, 35, 44	
	NFS-1SV	NF125-CV/SV/HV												
I	NFS-2SV	NF250-CV/SV, NF125/250-SEV NF125-SGV/LGV NF160-SGV/LGV NF250-SGV/LGV	1	440	247	137	116	373	170	9	52	120	50, 62, 78	
	NFI-05SV	NF32-SV, NF63-CV/SV/HV	3	350	186	155.5	117	286	120	7	42	100	28, 35, 44	
	NFI-1SV	NF125-CV/SV/HV	3	352	188	155.5	118	286	120	7	42	100	28, 35, 44	
	NFI-2SV	NF250-CV/SV/HV, NF125/250-SEV/HEV NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV	3	442	248	162	124	373	170	9	54	120	50, 62, 78	
	NFI-4CW	NF400-CW	3	730	320	244	191	650	240	11	87	120	50, 62, 78	
	NFI-4SW	NF400-SW/SEW	3	730	320	244	191	650	240	11	65	120	50, 62, 78	
	NFI-6SW	NF630-CW/SW/SEW	3	940	433	260	207	856	350	15	90	150	92	
	NFI-8SW	NF800-CEW/SDW/SEW	3	1353	543	304	251	1270	460	15	90	320	104	
	W	NFW-05SV	NF32-SV, NF63-CV/SV/HV	4	390	265	214	160	350	225	9.5	45	-	28
		NFW-1SV	NF125-CV/SV	4	390	265	214	160	350	225	9.5	50	-	36
NFW-1HV		NF125-HV	4	480	265	239	186	440	225	9.5	60	-	36	
NFW-2SV		NF250-CV/SV/HV, NF125/250-SEV/HEV NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV	4	550	355	264	210	510	315	11	75	-	54	
NFW-4CW		NF400-CW	5	800	355	257	220	760	315	11	85	-	70	
NFW-4SW		NF400-SW/SEW	5	800	355	257	220	760	315	11	85	-	70	
NFW-6SW		NF630-CW/SW/SEW	5	800	355	257	220	760	315	11	85	-	82	
NFW-8SW		NF800-CEW/SDW/SEW	5	1435	550	339	265	1395	515	15	100	180	104	

**ELCB**



**Table 6-45 Table of variable dimensions (Boxes for 4-pole circuit breakers are not manufactured.)**

Note) The sockets are applicable to thick steel duct (JIS C 8305) and conduit tube thread.

Box type	Type name	Applicable Model	Fig.	Variable dimensions									
				A	B	C	D	E	F	G	H	J	K
S	NFS-05SV2	NV32-SV, NV63-CV/SV/HV	2	260	178	98	78	202	100	7	34	100	28, 35, 44
	NFS-05SV												
	NFS-1SV2	NV125-CV/SV	2	310	178	98	78	252	100	7	34	100	28, 35, 44
	NFS-1SV	NV125-CV/SV/HV											
	NFS-2SV	NV250-CV/SV, NV125/250-SEV	2	440	247	137	116	373	170	9	52	120	50, 62, 78
I	NFI-05SV	NV32-SV, NV63-CV/SV/HV	3	350	186	155.5	117	286	120	7	42	100	28, 35, 44
	NFI-1SV	NV125-CV/SV/HV	3	352	188	155.5	118	286	120	7	42	100	28, 35, 44
	NFI-2SV	NV250-CV/SV/HV, NV125/250-SEV/HEV	3	442	248	162	124	373	170	9	54	120	50, 62, 78
	NFI-4CW	NV400-CW	3	730	320	244	191	650	240	11	87	120	50, 62, 78
	NFI-4SW	NV400-SW/SEW	3	730	320	244	191	650	240	11	65	120	50, 62, 78
	NFI-6SW	NV630-CW/SW/SEW	2	940	433	260	207	856	350	15	90	150	92
	NFI-8SW	NV800-SEW	3	1353	543	304	251	1270	460	15	90	320	104
	W	NFW-05SV	NV32-SV, NV63-CV/SV/HV	4	390	265	214	160	350	225	9.5	45	-
NFW-1SV		NV125-CV/SV	4	390	265	214	160	350	225	9.5	50	-	36
NFW-1HV		NV125-HV	4	480	265	239	186	440	225	9.5	60	-	36
NFW-2SV		NV250-CV/SV/HV, NV125/250-SEV/HEV	4	550	355	264	210	510	315	11	75	-	54
NFW-4CW		NV400-CW	5	800	355	257	220	760	315	11	85	-	70
NFW-4SW		NV400-SW/SEW	5	800	355	257	220	760	315	11	85	-	70
NFW-6SW		NV630-CW/SW/SEW	5	800	355	257	220	760	315	11	85	-	82
NFW-8SW		NV800-SEW	5	1435	550	339	265	1395	515	15	100	180	104

## 9. Electrical Operated Circuit Breakers and Electrical Operation Devices



Spring charge type (1)



Spring charge type (2)  
Standard paint color: Munsell 5Y7/1



Motor-drive type (2)  
Standard paint color: Munsell 5Y7/1

### (1) Specifications

#### ● Electrically operated circuit breakers

Table 6-46

Specify the electrical operation device together with the circuit breaker body.

Electrically operating method		Spring charge type (1)	Spring charge type (2)		Motor-drive type (2)		
MCCB	Class S, H and R	NF125-SV, NF125-HV NF125-SEV, NF125-HEV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SV, NF250-HV NF250-SEV, NF250-HEV NF250-SGV/LGV/HGV/RGV NF125-RV, NF250-RV	NF400-SW, NF400-SEW NF400-HEW, NF400-REW NF630-SW, NF630-SEW NF630-HEW, NF630-REW NF800-SDW, NF800-SEW NF800-HEW, NF800-REW	NF1000-SEW NF1250-SEW NF1250-SDW NF1600-SEW NF1600-SDW	NF400-SW, NF400-SEW NF400-HEW, NF400-REW NF630-SW, NF630-SEW NF630-HEW, NF630-REW NF800-SDW, NF800-SEW NF800-HEW, NF800-REW	NF1000-SEW NF1250-SEW NF1250-SDW NF1600-SEW NF1600-SDW	
	Class C	NF125-CV NF250-CV	NF400-CW NF630-CW NF800-CEW	-	NF400-CW NF630-CW NF800-CEW	-	
	Class U	NF125-UV NF250-UV	NF400-UEW NF800-UEW	-	NF400-UEW NF800-UEW	-	
	Motor breakers	NF125-SV, NF250-SV	-	-	-	-	
ELCB	Class S, H and R	NV125-SV, NV125-HV NV125-SEV, NV125-HEV NV250-SV, NV250-HV NV250-SEV, NV250-HEV	NV400-SW, NV400-SEW NV400-HEW NV630-SW, NV630-SEW NV630-HEW, NF800-SEW NV800-HEW	-	NV400-SW, NV400-SEW NV400-HEW NV630-SW, NV630-SEW NV630-HEW, NF800-SEW NV800-HEW (*3)	-	
	Class C	NV125-CV NV250-CV	NV400-CW NV630-CW	-	NV400-CW(*3) NV630-CW	-	
	Motor breakers	NV125-SV, NV250-SV	-	-	-	-	
Rated operating voltage (V) (Allowable operating voltage range: 85 to 110%)		Compatible with 100 to 240VAC and 100 to 250VDC 24VDC, 48 to 60VDC (*1)	100-110VDC, 100-110VAC 200-220VAC(125VDC, 240VAC)		100-110VDC, 100-110VAC, 200-220VAC (125VDC, 240VAC)		
Operating current (Ams) Values in ( ): Starting current	DC	100/110V	ON	8	10	3.0(8.0)	5.0(13.5)
			OFF	1.0 (3.0)	1.0 (4.0)		
	AC	100/110V	ON	10	10	4.0(8.0)	5.0(10.0)
			OFF	1.0 (3.0)	1.0 (3.0)		
	200/220V	ON	8	8	2.0(4.5)	3.5(7.0)	
		OFF	0.5 (1.5)	0.5 (1.5)			
Operating time s	ON	0.05~0.1(*2)	0.05	0.07	0.3 or less (self-holding type)		
	OFF	0.6 or less (self-holding type)	3 or less (self-holding type)		-	-	
	Charge	1.2 or less (self-holding type)			-	-	
Required transformer capacity VA		150	700		400	700	
Endurance voltage		1500V			1500V		

Notes \*1 When the rated operating voltage is 24VDC or 48 to 60VDC, specify the voltage. If the voltage is not specified, the circuit breaker will be manufactured for 100 to 240VAC and 100 to 250VDC.

\*2 For 24VDC circuit breakers, the operating time at a voltage of 100% or more is shown.

\*3 Models for special voltage (125VDC or 240VAC) are not provided with the test button.

- Remarks
1. Flush plate type circuit breakers can be manufactured to order.
  2. The models with voltage in parentheses are special voltage products.
  3. For the spring charge type (1), use an ON-OFF operating switch for minute load.
  4. For the spring charge type (1) The circuit breaker of 3 pole can be used TC-S, TC-L, TTC, BTC and PTC.  
In case of 125A frame 4 pole can be used only TC-L.  
In case of 250A frame 4 pole can be used TC-S, TC-L, TTC, BTC and PTC.
  5. When the body of the spring charge type (1) breaker is an earth leakage alarm breaker, the reset button cannot be pressed. Provide such a circuit breaker with an external reset or automatic reset system (except for the electronic type).
  6. When the body of the motor-drive type (2) or spring charge type (2) has internal accessories, they are normally provided with lead wire terminal blocks.
  7. The types other than the spring charge type (1) do not provide an isolation function.
  8. When placing an order for a CE marked product of the spring charge type (1) or spring charge type (2), specify the model name with CE.
  9. The switching durability of electrically operated circuit breakers conforms to JIS.

#### ● Electrical operation devices

The following models of Electrical Operation Devices are supplied also as separate devices. The user can install them to the circuit breaker body.  
(Front connection, rear connection and plug-in types)  
(When requiring a motor breaker or a CE marked product, place an order for it together with the circuit breaker body.)

Table 6-47

Electrically operating method	Spring charge type (1)				
Applicable models	NF125-CV/SV/HV	NV125-CV/SV/HV	NF125-SEV/HEV/SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-CV/SV/HV/UV/SEV/HEV/SGV/LGV/HGV/RGV NF250-UV	NV250-CV/SV/HV	NV125-SEV/HEV NV250-SEV/HEV
Compatible to 100-240VAC/100-250VDC	MDSAD240-NF1SVE	MDSAD240-NV1SVE	MDSAD240-NF2SVE	MDSAD240-NV2SVE	MDSAD240-NVE2SVE
24VDC	MDSAD024-NF1SVE	MDSAD024-NV1SVE	MDSAD024-NF2SVE	MDSAD024-NV2SVE	MDSAD024-NVE2SVE
48-60VDC	MDSAD060-NF1SVE	MDSAD060-NV1SVE	MDSAD060-NF2SVE	MDSAD060-NV2SVE	MDSAD060-NVE2SVE

**● Cautions**

- All electrical operations are based on intermittent rating. Avoid operating any device continuously 10 times or more (ON and OFF operations are counted as one time).
- Operate any device at 85 to 110% of the rated operating voltage.
- The dielectric strength of electrical operation circuits is 1500 V. When performing dielectric strength test of any of these devices and other devices, if the test voltage exceeds the rated value (1500V), disconnect the operation power supply terminal.
- When collectively operating more than one electrical operation device, isolate the devices connecting a relay to each device.  
If the control terminals are directly connected in parallel, a circuit will be formed, and the devices may not normally function.

**● Automatic reset (optional)**

The automatic reset type has a built-in alarm switch in the circuit breaker and is connected in such a way that the OFF operation circuit is closed when the circuit breaker trips. Therefore, when the circuit breaker trips, it is automatically reset.  
However, when the circuit breaker thermally trips, it may not be automatically reset.  
If an automatic reset spring charge type (1) is required, the user must wire the device in accordance with the external connection diagram shown in Fig. 1 in "Cautions for use" in (3).

**(2) Installation and connection  
(List of manufacturable)**

Table 6-48

Frame (A)	Installation and connection method	Front connection type	Rear connection type	Plug-in type (*1)
50-250		○	○	○ (*2)
400-800		○	○	○
1000, 1250		○	○	○
1600		○	○	-

Notes \*1 For ELCB, only 3-pole circuit breakers with a frame size of 125 to 400 A can be manufactured.  
\*2 In the case of 4-pole 125 A frame circuit breakers and U class, the circuit breakers are supplied as special models. Consult us for details.  
Remarks: 1. All models of the front connection type are provided with bar terminals (except the spring charge type (1)).  
2. 2-pole circuit breakers of all models are obtained by removing the neutral pole conductors from 3-pole circuit breakers.

**(3) Structure and operation**

**■ Spring charge type (1)**

**● Electrical operation**

- When the ON operation switch is closed, the relay will operate, the motor will be driven, the latch mechanism will be released, and the closing spring force will instantaneously turn on the circuit breaker.
- When the OFF operation switch is closed, the relay will operate, the motor will be driven, the circuit breaker will be turned off (reset), and, at the same time, the closing spring will be charged.

Note: The charge may not be completed because the circuit protective function operates.

**● Manual operation**

- After turning the MANUAL/AUTO selection switch on the cover upper surface to MANUAL, press the ON button, and the latch mechanism will be released, and the closing spring force will instantaneously turn on the circuit breaker.
- After turning the MANUAL/AUTO selection switch on the cover upper surface to MANUAL, draw out the manual handle, and move it upward and downward about 10 to 14

times. Then, the circuit breaker will be turned off (reset), and, at the same time, the closing spring will be charged. Although the circuit breaker can be turned off even if the switch is not turned to MANUAL, the selection switch should be set to MANUAL because remote operation may be accepted.

- After turning the changeover switch to MANUAL, draw out the OFF lock plate, and lock the circuit breaker in the OFF state with padlocks (to be prepared by the user). Up to three padlocks can be fitted.  
φ5 to φ8 padlocks can be fitted.

Note: After the completion of manual operation (on-site operation), return the selection switch to AUTO without fail. If it is not returned, electrical operation (remote operation) cannot be performed.

**● Display of tripping state**

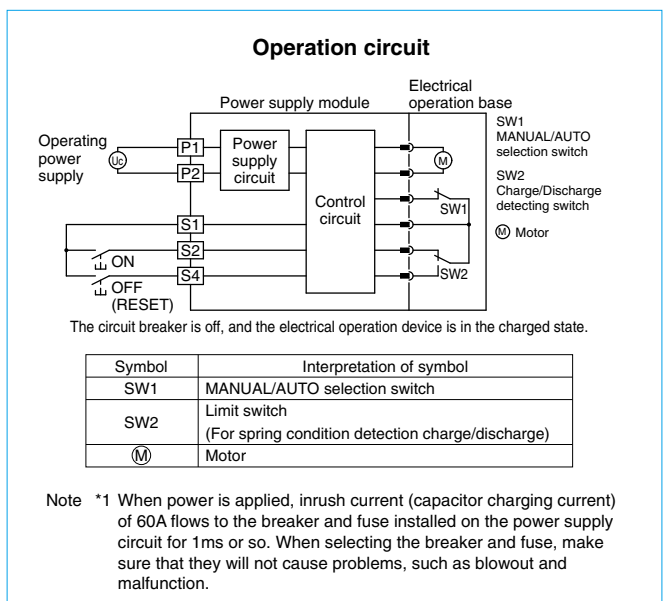
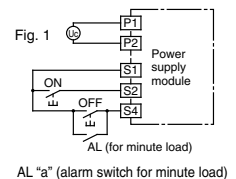
When the circuit breaker trips in the ON state, the tripping state is displayed. When it trips in the OFF state, the OFF state is kept displayed.

Note: When it trips in the OFF state, signals from AL will not be output.

**● Cautions for use**

- ① To the ON or OFF operation switch (to be prepared by the user), current only of 24VDC and 15 to 30mA flows. Use a switch for minute load.
- ② Operate the operation switch for 0.1s or more to turn on and for 20ms or more to turn off. If it is operated for less than the time, it may not function.  
The wire to the operation switch shall be less than 100m.
- ③ The power supply module has a built-in switching power supply. Therefore, it may interfere with communication devices near the module. In such a case, install a noise filter on the input side.
- ④ For the automatic reset type, purchase a circuit breaker with alarm switch (for minute load), and connect the signal circuit (among the terminal numbers S1, S2 and S4) as shown in Fig. 1.

If the circuit breaker in the OFF state is tripped by UVT-N or the like, it cannot be automatically reset. To reset it, it is necessary to turn it on under no current. After this operation, it will be automatically reset.



# 6 Accessories 2 External Accessories

## Motor-drive type (2)

### Electrical operation

Forward and reverse motor rotation is changed by ball screw to switch the breaker ON and OFF (reset).

### Manual operation

The manual operation handle can be used to switch the breaker ON and OFF directly.

### Cautions for use

① In the case of a circuit breaker with UVT, if the circuit breaker trips owing to the operation of UVT, the procedure for re-closing the circuit breaker varies depending on the condition of the electrical operation device before the circuit breaker trips.

- Tripping in ON state: Reset (OFF). → Turn on.
- Tripping in OFF state: Turn on (idle tripping). → Reset (OFF). → Turn on.

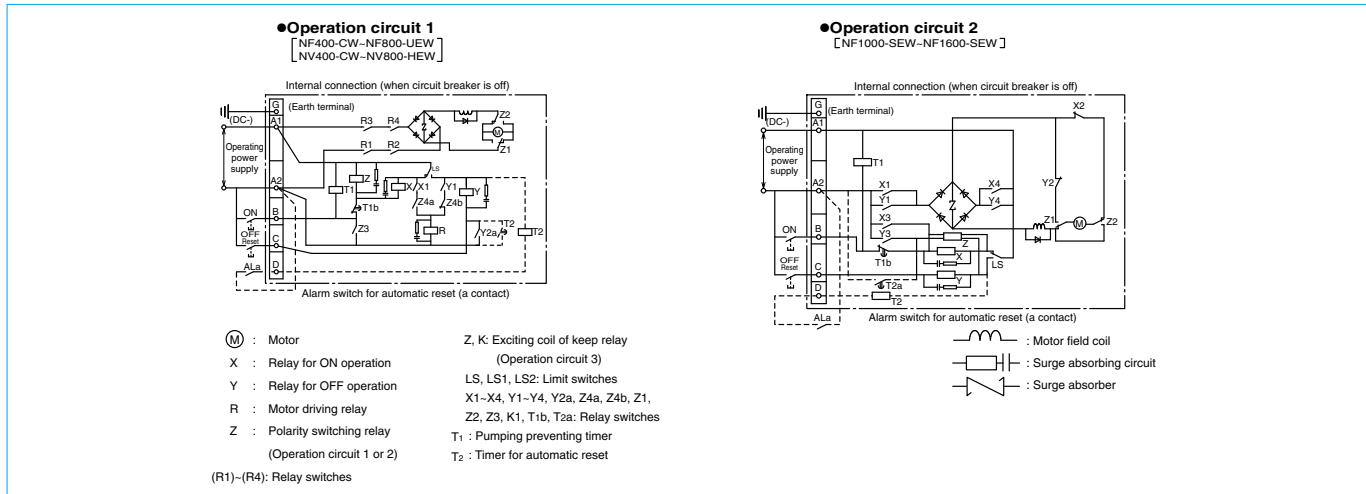
(If the circuit breaker cannot be turned on (idle tripping), reset (OFF) it, and turn on.)

- When an automatic reset system is configured on a non-reset type circuit breaker with UVT, if UVT is set to the no-voltage state, the operations to turn off (reset), trip, turn off (reset) and trip are repeated.

Therefore, configure the circuit in such a way that power is disconnected from the electrical operation device before the circuit breaker is tripped by the non-reset type UVT.

- ② Current of about 0.2A will flow to the ON-OFF switch. Use an appropriate switch.
- ③ Do not apply ON and OFF operation signals continuously. An interval of 0.5 sec or more is necessary between ON and OFF signals.
- ④ In the case of the automatic reset type device, it will perform the reset operation with an interval of 0.5 sec after NFB performs the tripping action.
- ⑤ The electrical operation device has a built-in pumping preventing circuit. Therefore, it can operate to turn off the circuit breaker while the ON operation switch is held in the closing state, but it cannot turn on continuously after turning off. To turn on, once turn off the ON operation switch, and turn on the switch. Do not apply the ON operation signal continuously.
- ⑥ The manual operating handle moves at a high speed during electrical operation. Pay attention to the handle. Keep the operation circuit power supply off during manual operation.
- ⑦ In the manual operation, surely turn the manual operating handle to the position indicated on the nameplate.

● Operation circuit .... For the automatic reset type, the connections indicated with the dashed lines are added.



## Spring charge type (2)

### Electrical operation

When the ON operation switch is closed, the closing coil will be excited to release the latch mechanism, and the closing spring force will instantaneously turn on the circuit breaker. When the OFF operation switch is closed, the relay will operate to start the motor, turn off (reset) the circuit breaker and, at the same time, charge the closing spring.

### Manual operation

- Press the ON button, and the latch mechanism will be released, and the closing spring force will instantaneously turn on the circuit breaker.

### Turning off (resetting)

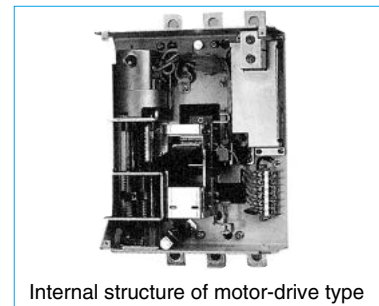
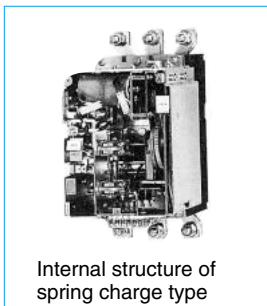
Push the leaf spring, bring out the manual handle, and move the handle upward and downward more than ten times. Then, the circuit breaker will be turned off (reset), and, at the same time, the closing spring will be charged.

### Cautions for use

① In Before installing or removing the electrical operation device to or from the circuit breaker, trip the circuit breaker, and discharge the electrical operation device. After the device is installed to the circuit breaker, the device will not trip the circuit breaker in the OFF state even if the trip button is pressed. This is not a trouble.

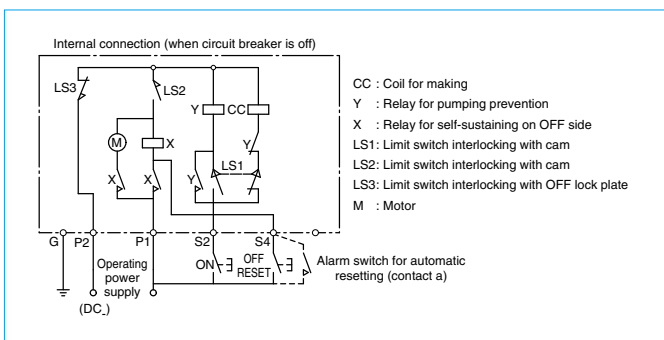
The electrical operation device takes 3 seconds to turn off the circuit breaker. To open the circuit immediately by remote operation, use a circuit breaker with SHT or UVT.

- The device has a built-in pumping preventing relay.
- ② Current of about 9A and 0.2A will flow to the ON and OFF switches, respectively. Use appropriate switches.



### Operation circuit

For the automatic reset type, the field connections indicated with the dashed lines are added.





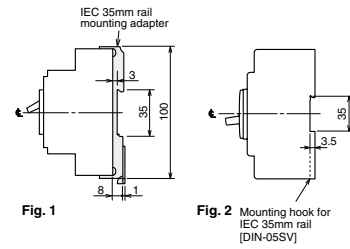
## 10. IEC 35mm Rail Mounting Adapters

Table 6-49

Type name	Number of poles of circuit breaker	Applicable model		Fig.
		MCCB	ELCB	
DIN-03CS	2, 3	NF30-CS	–	Fig. 1
(Note1) DIN-05SV	2, 3	NF32-SV NF63-CV/SV/HV	NV32-SV NV63-CV/SV/HV	Fig. 2

Remark: 1. Place an order in units of 10 pieces.

### ● External dimension





# 7

## Characteristics and Dimensions

### **1 Molded Case Circuit Breakers 146**

• NF30-CS .....	146
• NF32-SV, NF63-CV/SV/HV .....	148
• NF125-CV/SV/HV .....	150
• NF125-UV .....	152
• NF250-CV/SV/HV .....	154
• NF250-UV .....	156
• NF125-SGV/LGV/HGV/RGV, NF160-SGV/LGV/HGV, NF250-SGV/LGV/HGV/RGV .....	158
• NF125-SEV/HEV, NF250-SEV/HEV .....	160
• NF400-CW/SW .....	162
• NF400-SEW/HEW/REW .....	164
• NF400-UEW .....	166
• NF630-CW/SW .....	168
• NF630-SEW/HEW/REW .....	170
• NF800-CEW/SEW/HEW/REW .....	172
• NF800-SDW .....	174
• NF800-UEW .....	176
• NF1000-SEW, NF1250-SEW .....	178
• NF1250-SDW .....	180
• NF1600-SEW .....	182
• NF1600-SDW .....	184

### **2 Earth Leakage Circuit Breakers 186**

• NV32-SV, NV-63CV/SV/HV .....	186
• NV125-CV/SV/HV .....	188
• NV250-CV/SV/HV .....	190
• NV125-SEV/HEV, NV250-SEV/HEV .....	192
• NV400-CW/SW .....	194
• NV400-SEW/HEW .....	196
• NV630-CW/SW .....	198
• NV630-SEW/HEW .....	200
• NV800-SEW/HEW .....	202

### **3 UL 489 Listed Circuit Breakers 204**

• NF50-SMU .....	204
• NF50-SVFU, NV50-SVFU .....	206
• NF100-CVFU, NV100-CVFU .....	208
• NF100-SRU/HRU, NV100-SRU/HRU .....	210
• NF125-SVU/HVU, NV125-SVU/HVU .....	212
• NF250-CVU/SVU/HVU, NV250-CVU/SVU/HVU .....	214
• NF400-SWU/HWU .....	216
• NF630-SWU/HWU .....	218
• NF30-FAU, NF50-FAU, NV30-FAU, NV50-FAU .....	220
• NF50-FHU, NF100-FHU, NV50-FHU, NV100-FHU .....	222

### **4 Measuring Display Unit Breakers 224**

• NF250-SEV/HEV with MDU .....	224
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• NF630-SEW/HEW with MDU, NF800-SEW/HEW with MDU ...	228

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• NF125-HDVA, NF250-HDVA .....	234
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• BH-D6, BH-D10 .....	238
• BH-DN .....	239
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• CP30-BA/HU .....	243
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### **8 Electrical Operated Circuit Breakers 244**

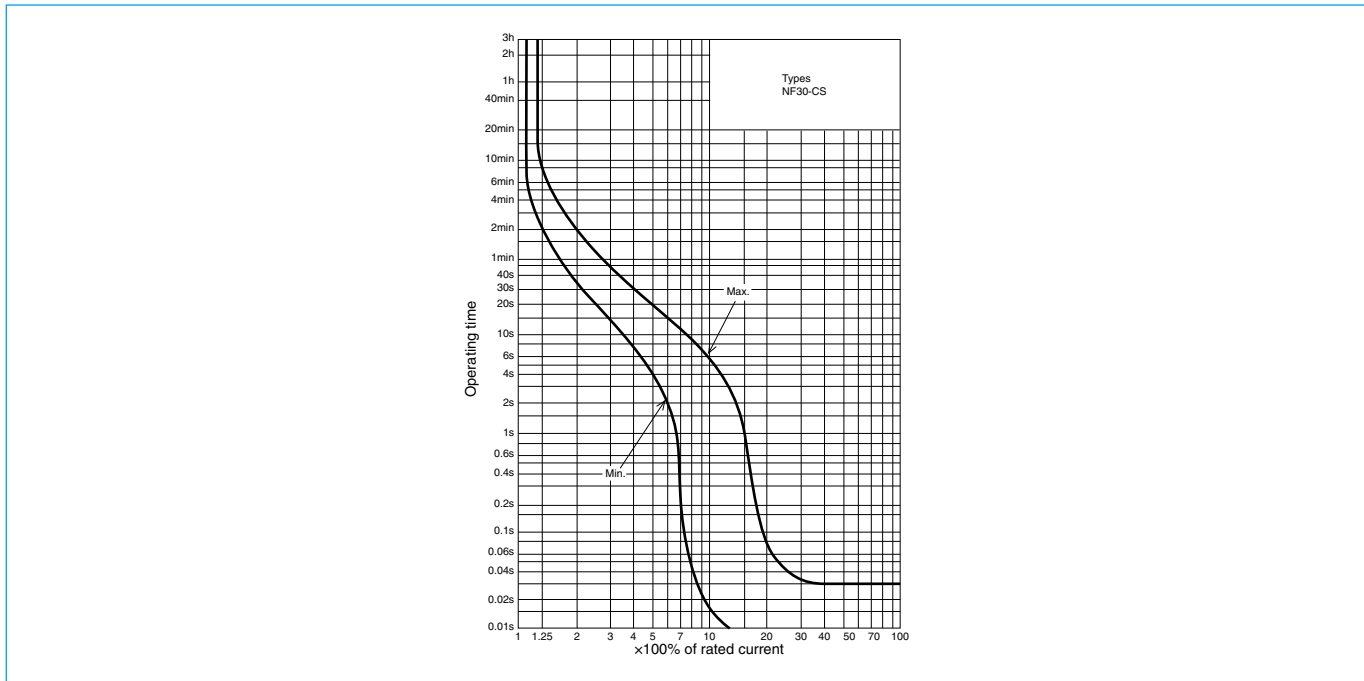
## NF30-CS



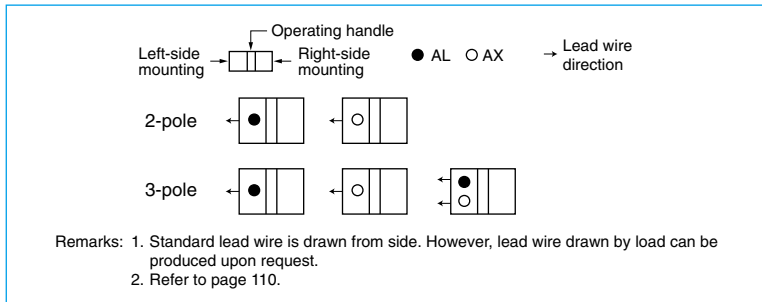
NF30-CS

Model		NF30-CS		
Rated current In (A)		3, 5, 10, 15, 20, 30		
Number of poles		2	3	
Rated insulation voltage Ui (V)		500		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	-
			500V	-
			415V	1.5/1.5
			380V	1.5/1.5
			240V	2.5/2
Standard Attached Parts (Front connection)			Mounting screw: M4x0.7x20 (2pcs)	

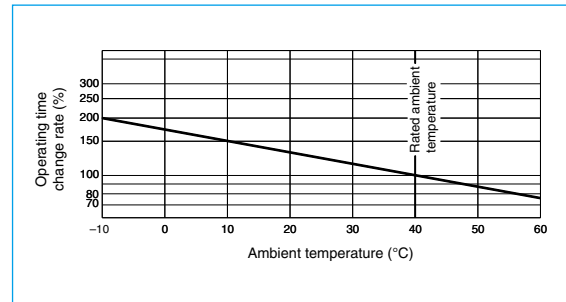
### Operating Characteristics



### Internal Accessories



### Temperature Characteristics Curve



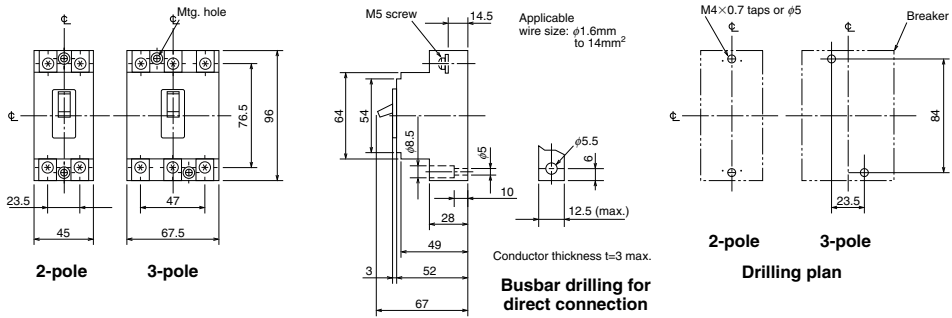
### External Accessories

Accessories		Type name	Reference page
Terminal cover	Small	(TC-S) TCS-03CS3W (*1)	128
	Large	(TC-L) TCL-03CS3W (*1)	
	Rear	(BTC) BTC-03CS3W (*1)	
	Skeleton	(TTC) TTC-03CS (*1)	
Handle lock		(HL) HL-05FH	134
Lock cover		(LC) LC03CS	135
IEC 35mm rail mounting adapter		(DIN) DIN-03CS	143

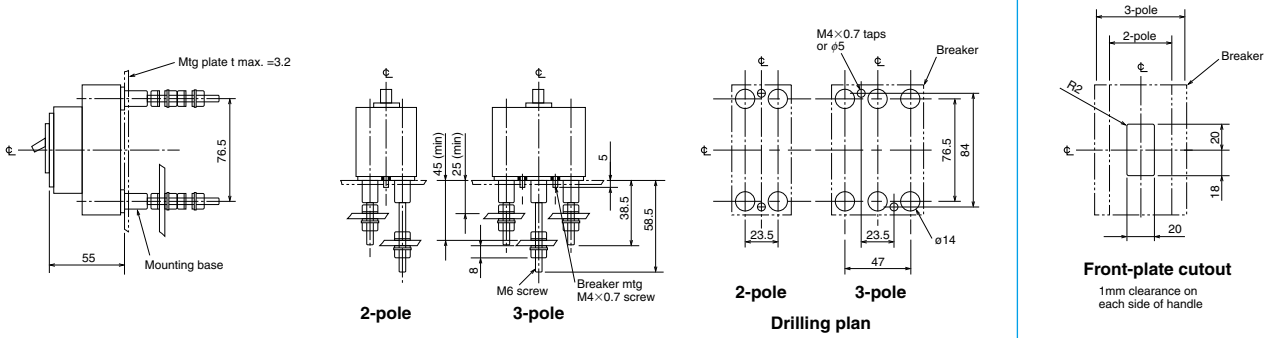
Note \*1 The designation depends on the number of poles. Refer to the reference page.

Outline Drawing

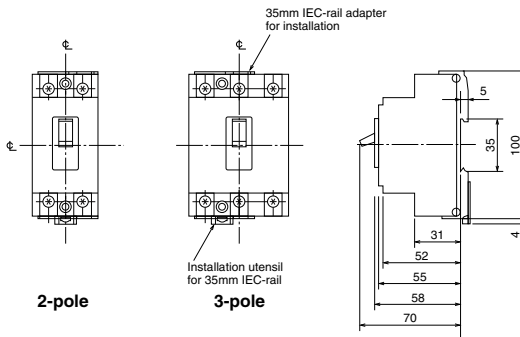
Front connection



Rear connection



IEC Rail Mounting Adapter



# 7 Characteristics and Dimensions 1

## Molded Case Circuit Breakers

NF32-SV  
NF63-CV  
NF63-SV  
NF63-HV

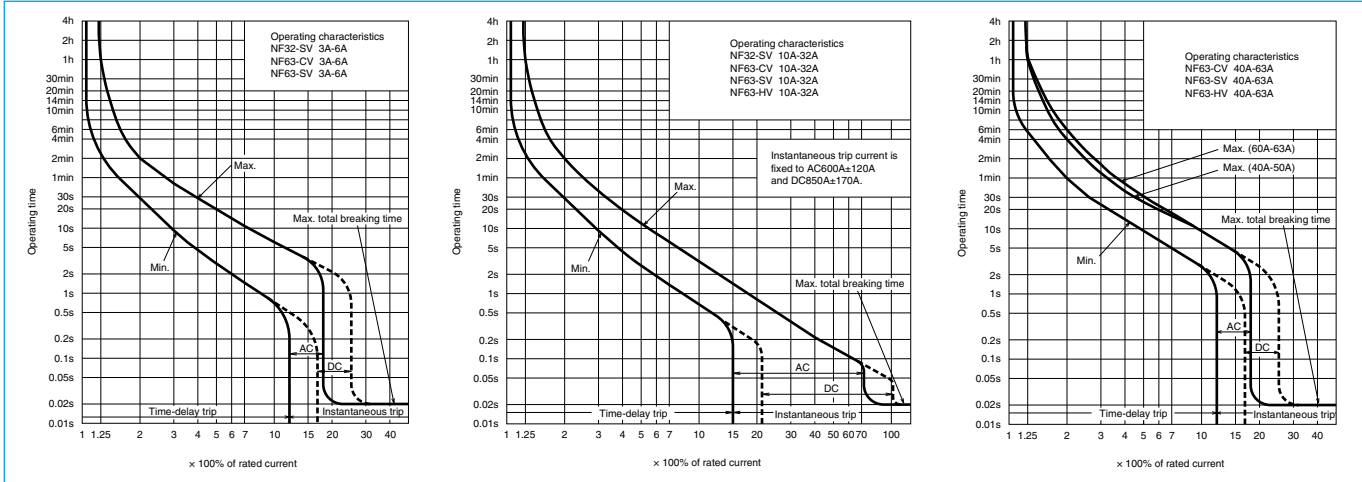


NF63-SV

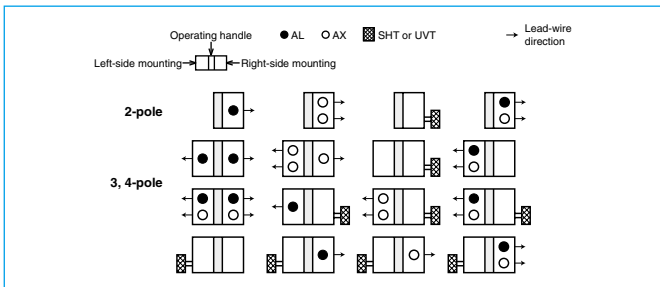
Model		NF32-SV	NF63-CV	NF63-SV	NF63-HV		
Rated current In (A)		3 4 (5) 6 10 (15) 16 20 25 (30) 32	3 4 (5) 6 10 (15) 16 20 25 (30) 32 40 50 (60) 63	3 4 (5) 6 10 (15) 16 20 25 (30) 32 40 50 (60) 63	10 (15) 16 20 25 (30) 32 40 50 (60) 63		
Number of poles		2 3	2 3	2 3 4	2 3 4		
Rated insulation voltage Ui (V)		600		600	690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	-	-	2.5/2.5	
			500V	2.5/2.5	2.5/2.5	7.5/7.5	7.5/7.5
			440V	2.5/2.5	2.5/2.5	7.5/7.5	10/8
			415V	2.5/2.5	2.5/2.5	7.5/7.5	10/8
			400V	5/5	5/5	7.5/7.5	10/8
			380V	5/5	5/5	7.5/7.5	10/8
			230V	7.5/7.5	7.5/7.5	15/15	25/19
DC	250V (*1)	2.5/2.5	2.5/2.5	7.5/7.5	7.5/7.5		
Standard attached parts (front connection)		Mounting screw: M4x0.7x55 (2 and 3P: 2pcs, 4P: 4pcs) Insulation barrier: (2P: 1pc, 3P: 2pcs, 4P: 3pcs) (*2)					

Notes \*1 Use two poles for three- and four-pole products. Not available for use with connection as shown at the bottom of page 18.  
\*2 Supplied with NF63-SV and NF63-HV.

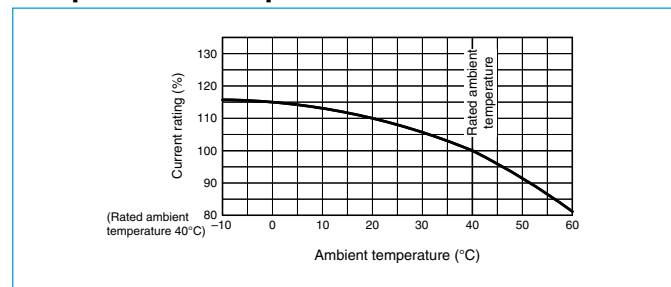
### Operating Characteristics



### Internal Accessories



### Temperature Compensation Curve

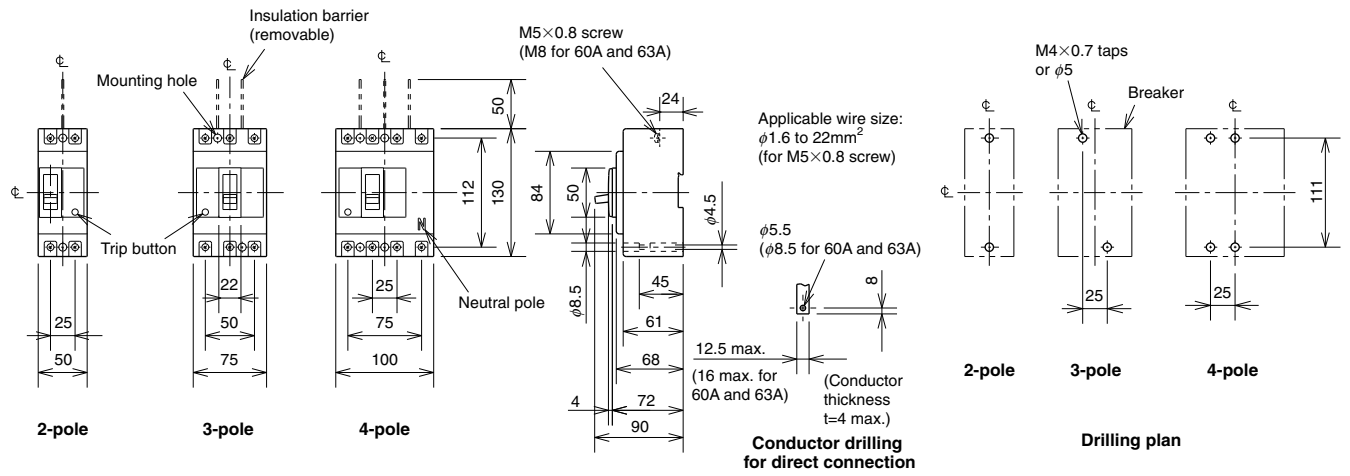


### External Accessories

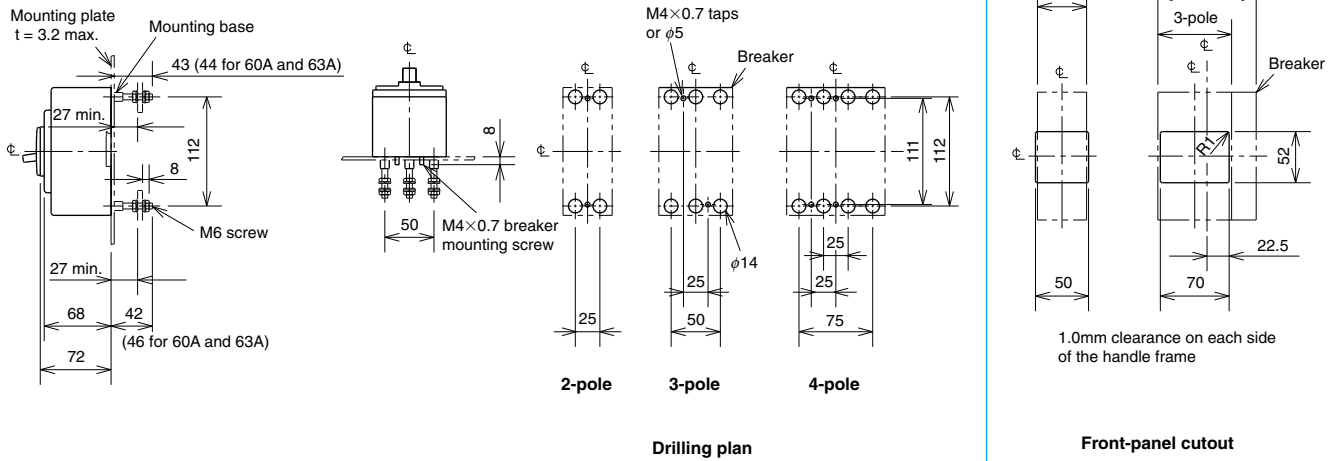
Accessories		Type name	Reference page	Accessories		Type name	Reference page		
Operating handle	F	2P F-05SV2	123	Terminal cover	Small	2P TCS-05SV2	128		
	3, 4P F-05SV	3P TCS-05SV3							
	V	2P V-05SV2	4P TCS-05SV4						
	3, 4P V-05SV	2P TCL-05SV2							
Handle lock device	LC	LC-05SV	134		Large	TC-L		2P TCL-05SV2L	
	HL(*1)	HLF-05SV						3P TCL-05SV3L	
	HLN-05SV	4P TCL-05SV4							
HL-S	HLS-05SV	2P TTC-05SV2							
Mechanical interlock	MI	2, 3P MI-05SV3	136	Skeleton	TTC	3P TTC-05SV3			
	4P MI-05SV4	4P TTC-05SV4							
Note *1 HLF types are used for OFF lock and HLN types for ON lock.						Rear		BTC	2P BTC-05SV2
									3P BTC-05SV3
				4P BTC-05SV4					
				2P PTC-05SV2					
				Plug-in	PTC	3P PTC-05SV3			
						4P PTC-05SV4			
				IEC 35mm rail mounting adapters		DIN-05SV	143		

Outline Drawing

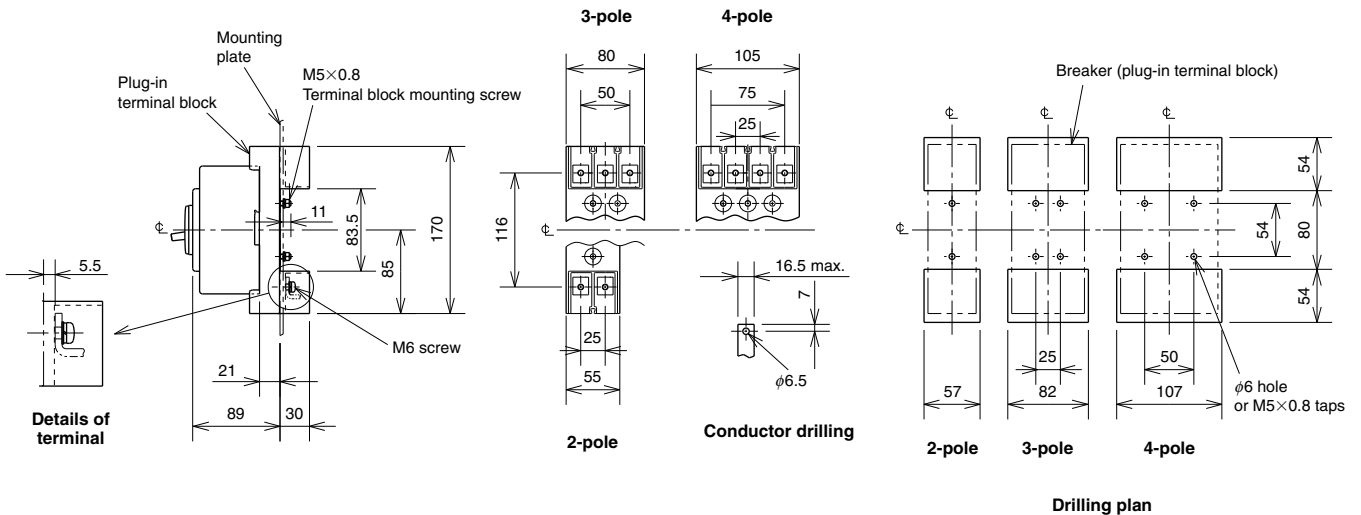
Front connection



Rear connection



Plug-in



Remark: 1. Only 2-pole and 3-pole models are available for NF32-SV and NF63-CV.

## NF125-CV NF125-SV NF125-HV

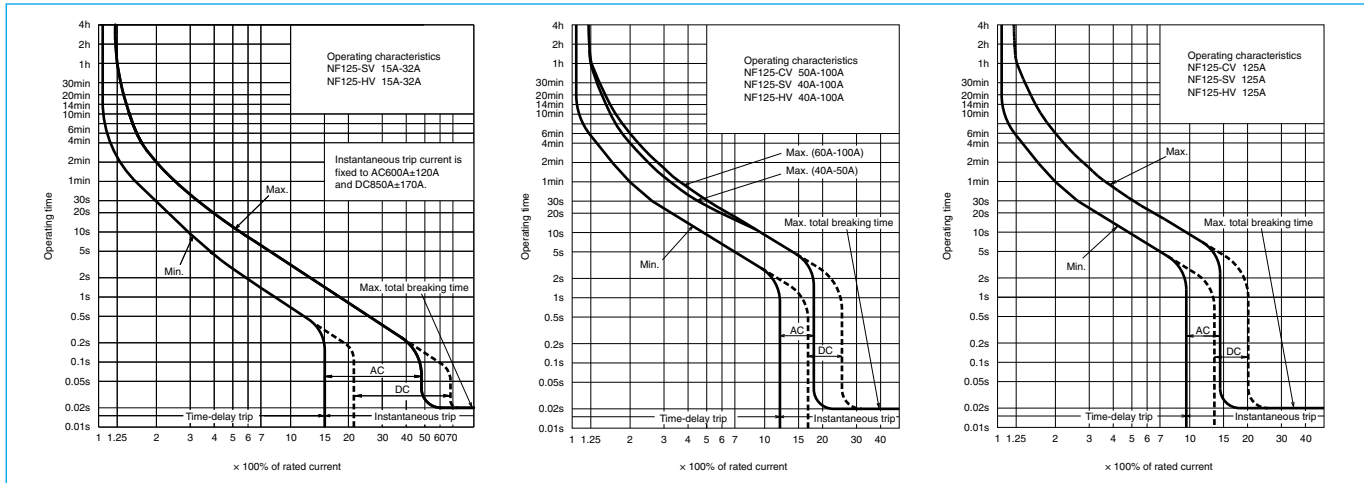


NF125-SV

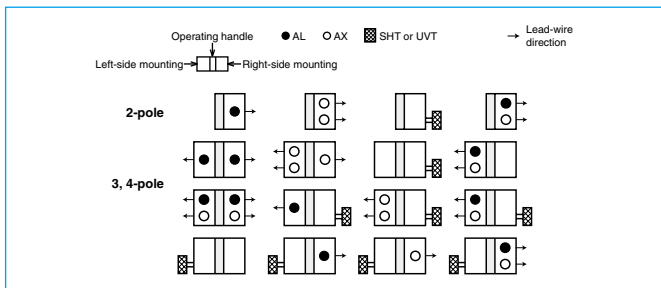
Model		NF125-CV					NF125-SV			NF125-HV					
Rated current In (A)		50 (60) 63 (75) 80 100 125					(15) 16 20 (30) 32 40 50 (60) 63 (75) 80 100 125			(15) 16 20 (30) 32 40 50 (60) 63 (75) 80 100 125					
Number of poles		2		3			2	3		4		2	3	4	
Rated insulation voltage Ui (V)		600					690			690					
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V		-					8/8			10/8		
			500V		7.5/4					18/18			30/23		
			440V		10/5					25/25			50/38		
			415V		10/5					30/30			50/38		
			400V		10/5					30/30			50/38		
			380V		10/5					30/30			50/38		
			230V		30/15					50/50			100/75		
Standard attached parts (front connection)		DC	250V (*1)		7.5/4					40/40			-		
				Mounting screw: M4x0.7x55 (2 and 3P: 2pcs, 4P: 4pcs) (*2) Insulation barrier: (2P: 1pc, 3P: 2pcs, 4P: 3pcs)											

Notes \*1 Use two poles for 3- and 4-pole products.  
If wired as shown at the bottom on page 18, 3- and 4-poles can be used for up to 400 and 500VDC, respectively.  
\*2 Supplied with NF125-SV and NF125-HV.

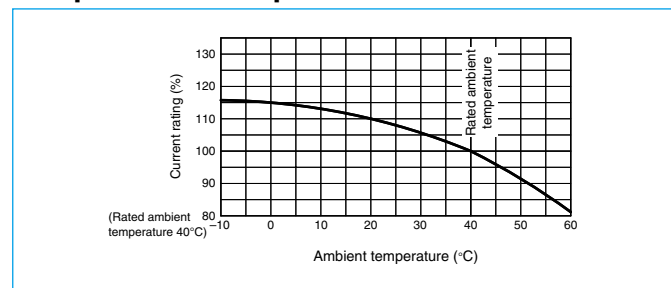
## Operating Characteristics



## Internal Accessories



## Temperature Compensation Curve



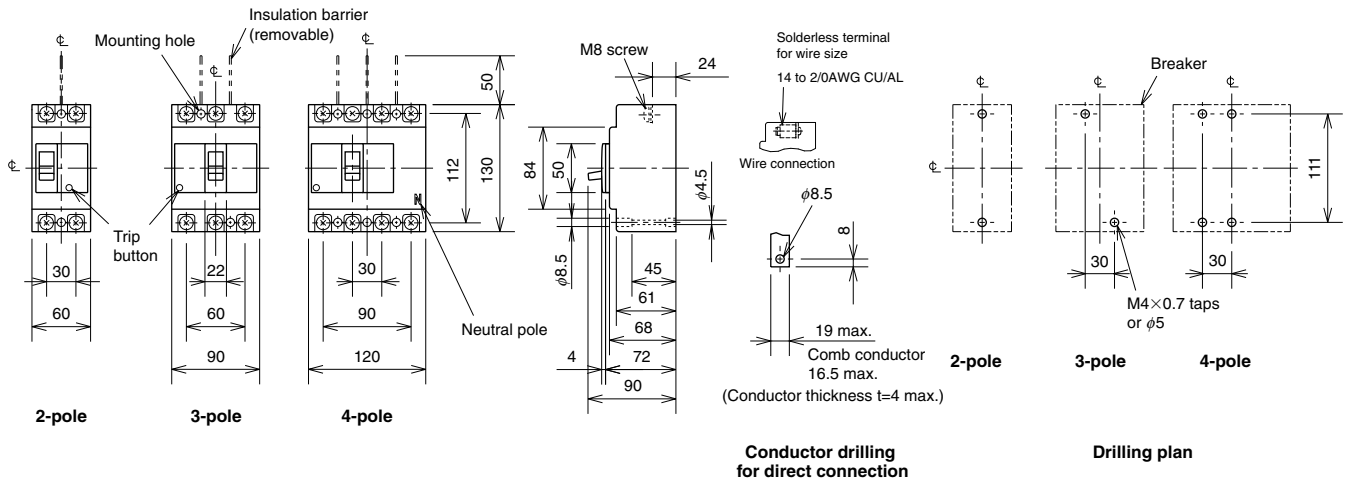
## External Accessories

Accessories				Type name	Reference page	Accessories				Type name	Reference page
Operating handle	F	2P	F-1SV2	123	Mechanical interlock	MI	2, 3P	MI-05SV3	136		
		3, 4P	F-1SV				4P	MI-05SV4			
	V	2P	V-1SV2	125	Small	TC-S	2P	TCS-1SV2			
3, 4P	V-1SV	3P	TCS-1SV3								
Handle lock device	HL(*1)	LC	LC-05SV	134	Large	TC-L	2P	TCL-1SV2			
		HLF(*1)	HLF-05SV				3P	TCL-1SV3			
		HLN-05SV	4P				TCL-1SV4				
		HLS-S	HLS-05SV				2P	TTC-1SV2			
Notes	*1 HLF types are used for OFF lock and HLN types for ON lock. *2 Specify the working voltage. Refer to the reference page for type name.				Terminal cover	TTC	3P	TTC-1SV3	128		
							4P	TTC-1SV4			
							Rear	BTC		2P	BTC-1SV2
							3P	BTC-1SV3			
Electrical operation device					Plug-in	PTC	2P	PTC-1SV2	140		
							3P	PTC-1SV3			
							4P	PTC-1SV4			
							(*2)				

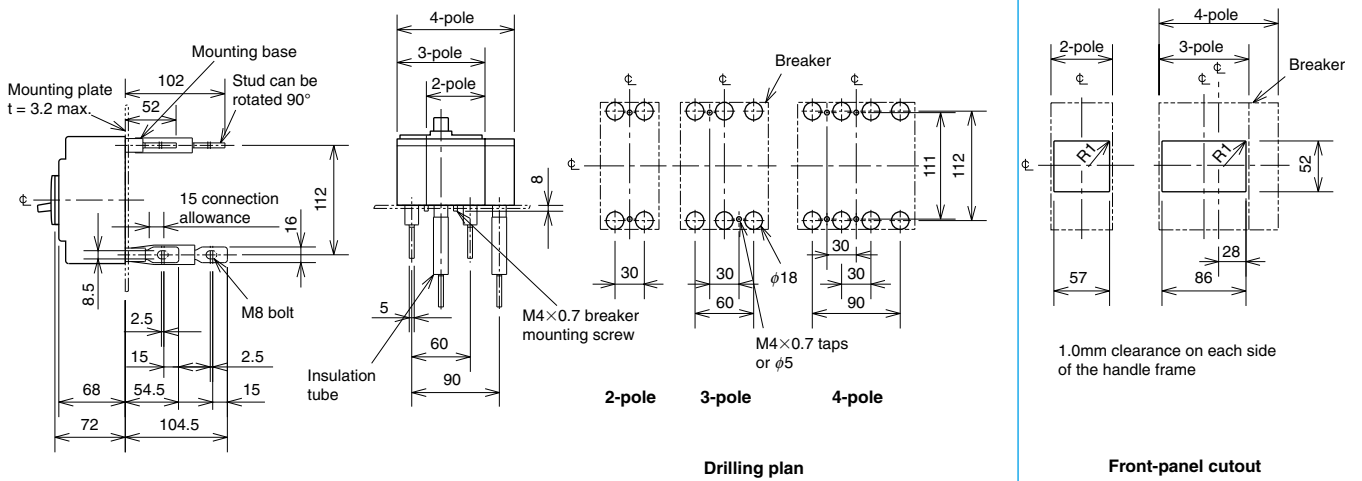


Outline Drawing

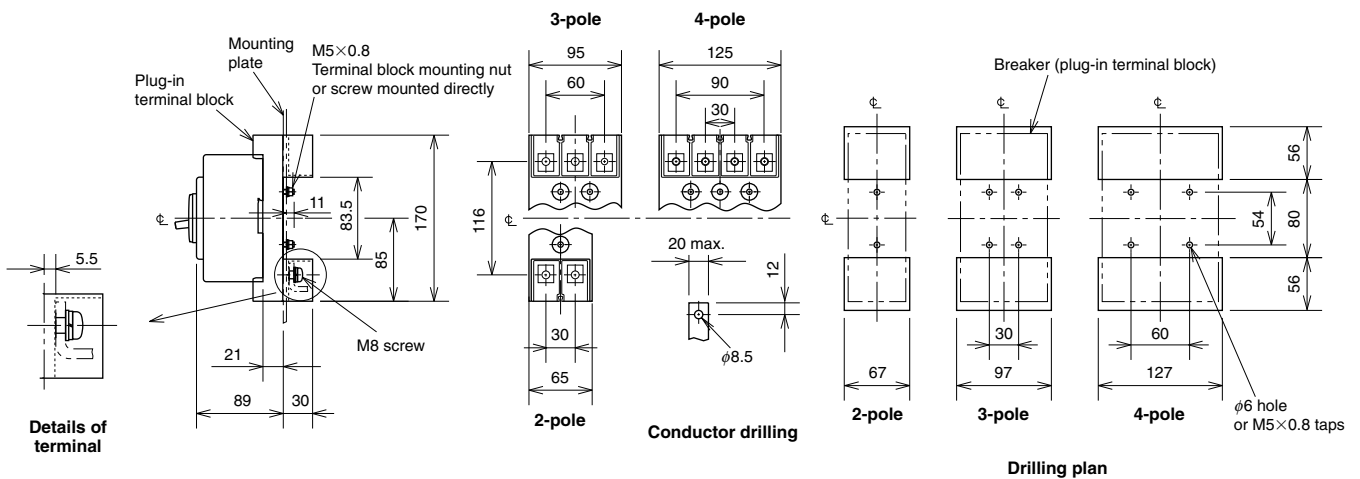
Front connection



Rear connection



Plug-in



Remarks: 1. The 2-pole models of NF125-HV are 3-pole models with the central pole removed.  
 2. Only 2-and 3-pole models are available for NF125-CV.

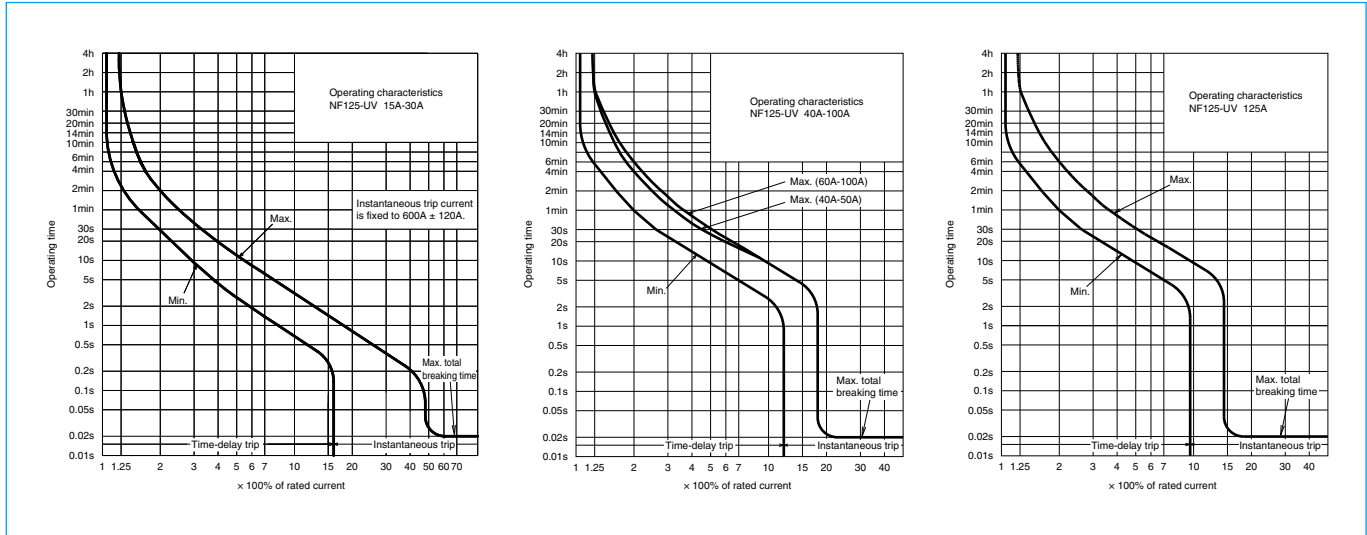
## NF125-UV



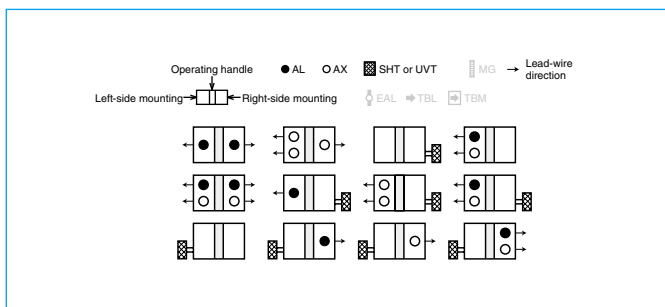
NF125-UV

Model		NF125-UV		
Rated current I <sub>n</sub> (A)		15	20	30 40 50
Number of poles		2	3	4
Rated insulation voltage U <sub>i</sub> (V)		690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (lcu/lcs)	AC	690V	10/10
			500V	200/200
			440V	200/200
			415V	200/200
			400V	200/200
			380V	200/200
		DC	250V	200/200
Standard attached parts (front connection)		Mounting screw: M4×0.7×55 (2 and 3P: 2pcs, 4P: 4pcs) M4×0.7×73 (2 and 3P: 2pcs)		

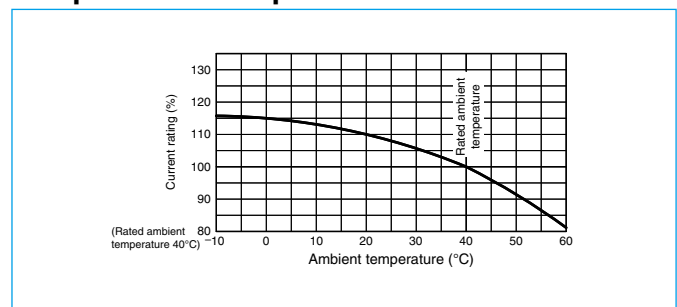
### Operating Characteristics



### Internal Accessories



### Temperature Compensation Curve



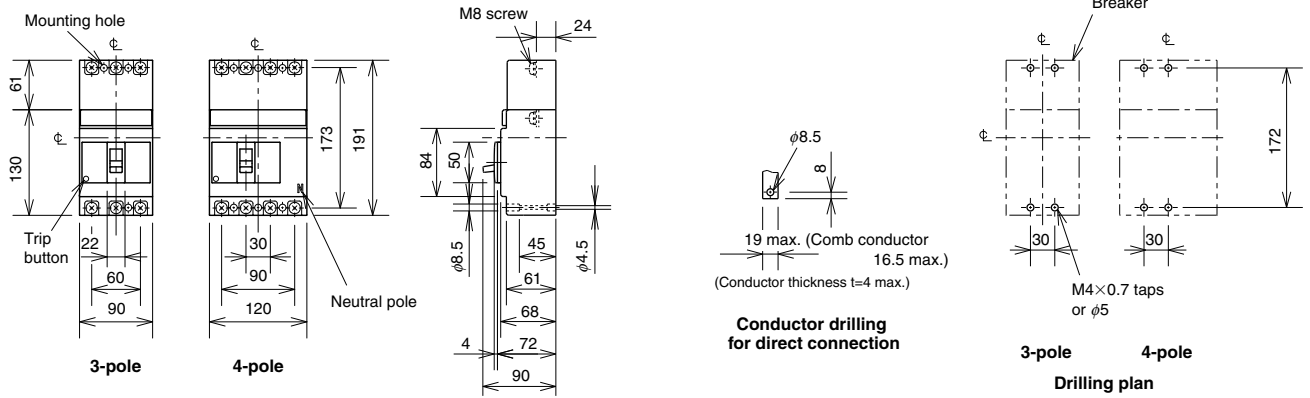
### External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page	
Operating handle	F F-1UV	123	Mechanical interlock	MI 2, 3P MI-05SV3	136	
Lock cover	V V-1UV	125		MI 4P MI-05SV4		
Handle lock device	LC LC-05SV	134	Terminal cover	Small 3P TCS-1SV3	128	
	HL (*1) HLF-05SV			Small 4P TCS-1SV4		
	HLN-05SV			Large 3P TCL-1SV3		
HL-S HLS-05SV	Large 4P TCL-1SV4					
				Skeleton 3P TTC-1SV3		128
				Skeleton 4P TTC-1SV4		
			Rear 3P BTC-1SV3			
			Rear 4P BTC-1SV4			
			Plug-in 3P PTC-1SV3	140		
			Plug-in 4P PTC-1SV4			
Electrical operation device			(*2)		140	

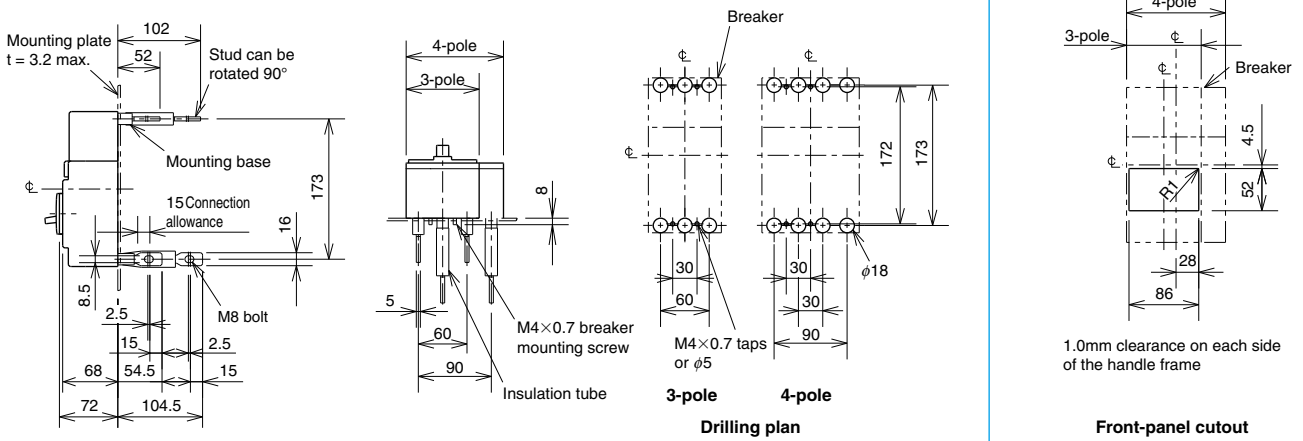
Notes \*1 HLF types are used for OFF lock and HLN types for ON lock.  
\*2 Specify the working voltage. Refer to the reference page for type name.

Outline Drawing

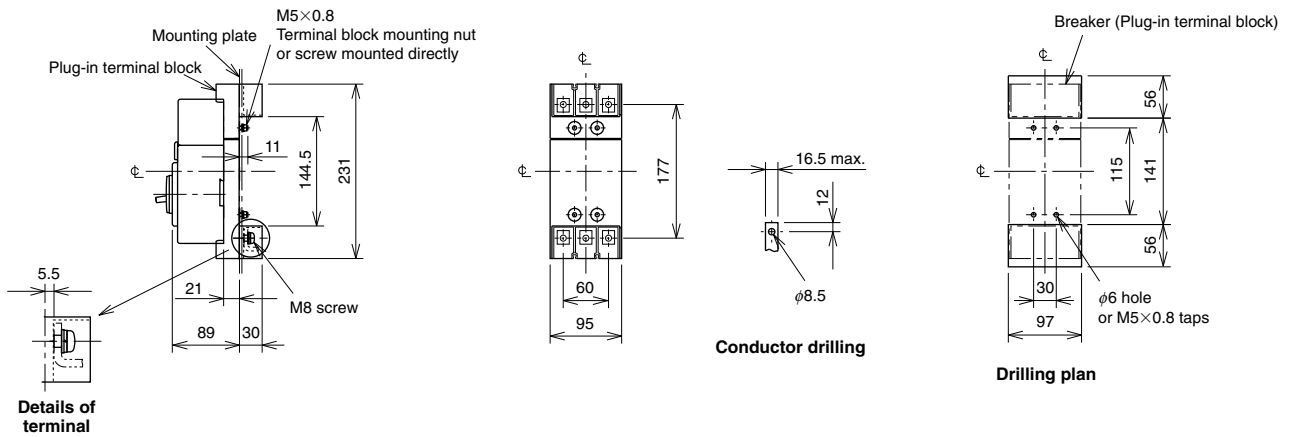
Front connection



Rear connection



Plug-in



Remark: 1. 2-pole models are 3-pole models with the central pole removed.

## NF250-CV NF250-SV NF250-HV

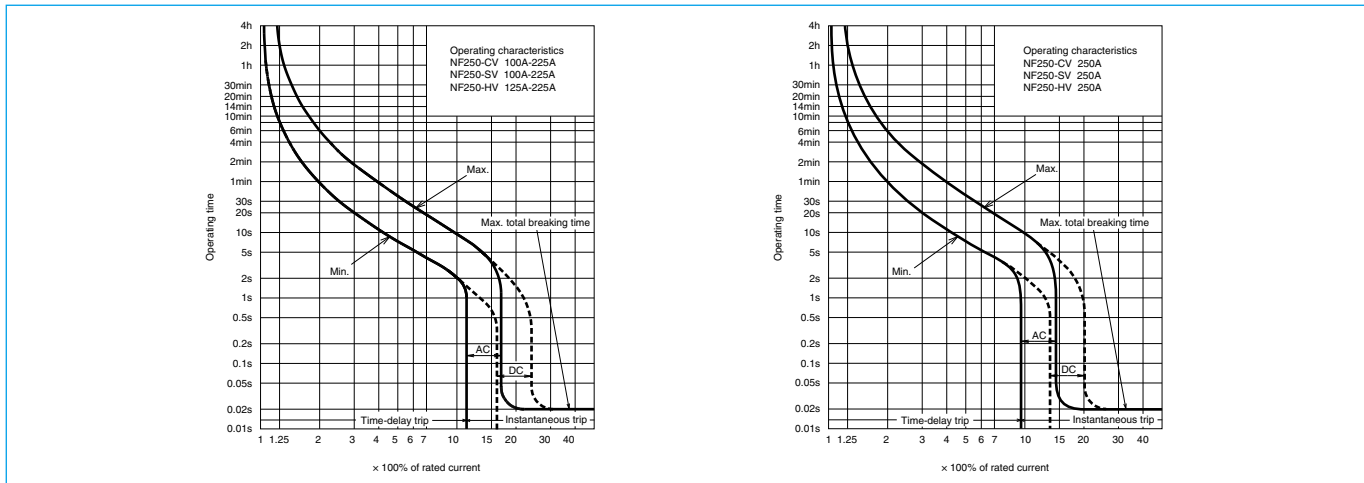


NF250-SV

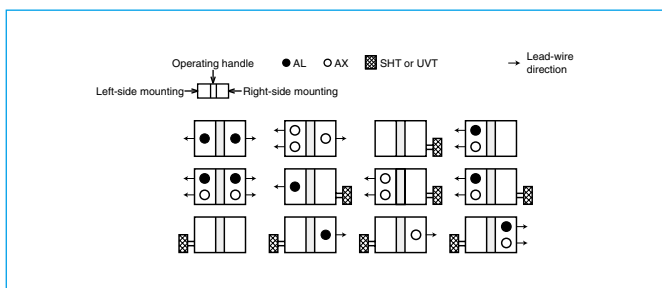
Model		NF250-CV		NF250-SV			NF250-HV		
Rated current In (A)		(100) 125 150 175 200 225 250		(100) 125 150 160 175 200 225 250			125 150 160 175 200 225 250		
Number of poles		2 3		2 3 4			2 3 4		
Rated insulation voltage Ui (V)		600		690			690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	-			8/8		
			500V	10/8			30/30		
			440V	15/12			36/36		
			415V	25/19			36/36		
			400V	25/19			36/36		
			380V	25/19			36/36		
			230V	36/27			85/85		
		DC (*1)	250V	15/12			20/20 (300V)		
Standard attached parts (front connection)		Mounting screw: M4x0.7x55 (2 and 3P: 2pcs, 4P: 4pcs) Insulation barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)							

Note \*1 Use two poles for 3- and 4-pole products. In this case, do not use the neutral pole of the 4-pole products.  
If wired as shown at the bottom of page 18, 3-pole NF250-CV can be used for up to 400VDC, 3-pole NF250-SV and NF250-HV up to 500VDC and 4-pole products up to 600VDC.

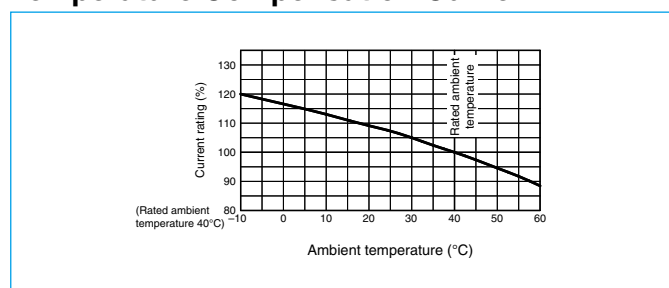
## Operating Characteristics



## Internal Accessories



## Temperature Compensation Curve



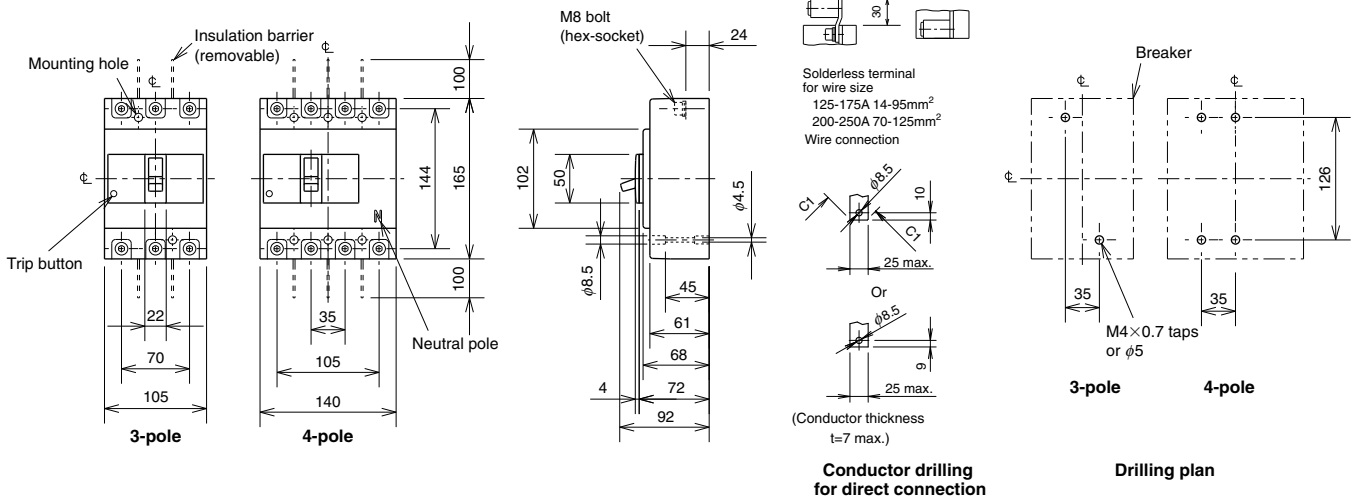
## External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page	
Operating handle	F	F-2SV	123	Mechanical interlock	2, 3P	MI-05SV3	136	
	V	V-2SV	125		4P	MI-2SV4		
Handle lock device	LC	LC-05SV	134	Terminal cover	Small	2, 3P	TCS-2SV3	128
	HL(*1)	HLF-05SV				4P	TCS-2SV4	
		HLN-05SV			2, 3P	TCL-2SV3		
HL-S	HLS-2SV	4P	TCL-2SV3L					
	Skeleton	TTC	2, 3P		TTC-2SV3			
4P			TTC-2SV4					
Rear	BTC	2, 3P	BTC-2SV3					
		4P	BTC-2SV4					
Plug-in	PTC	2, 3P	PTC-2SV3					
		4P	PTC-2SV4					
Electrical operation device				(*2)		140		

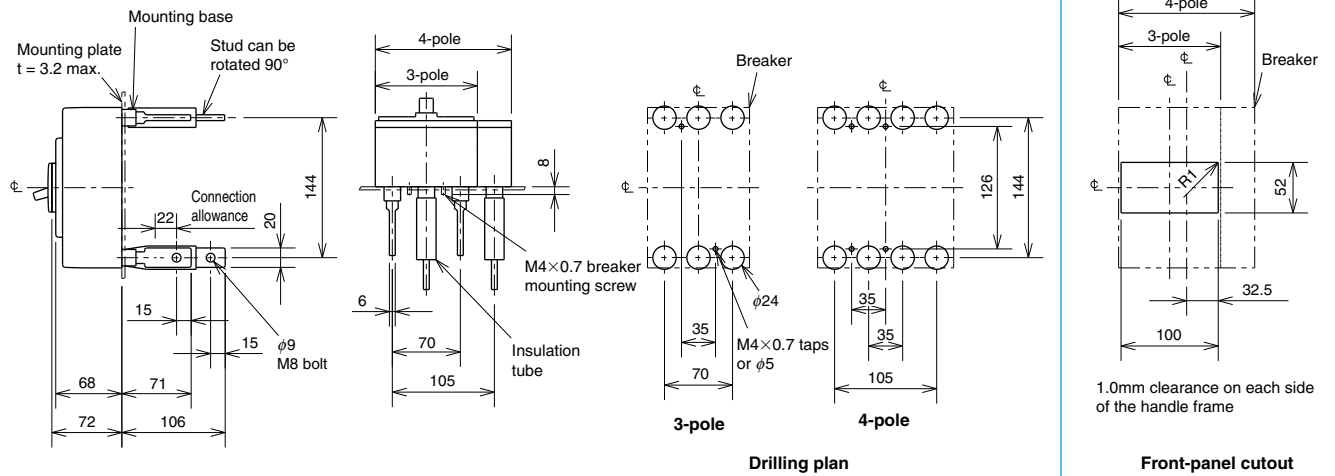
Notes \*1 HLF types are used for OFF lock and HLN types for ON lock.  
\*2 Specify the working voltage. Refer to the reference page for type name.

Outline Drawing

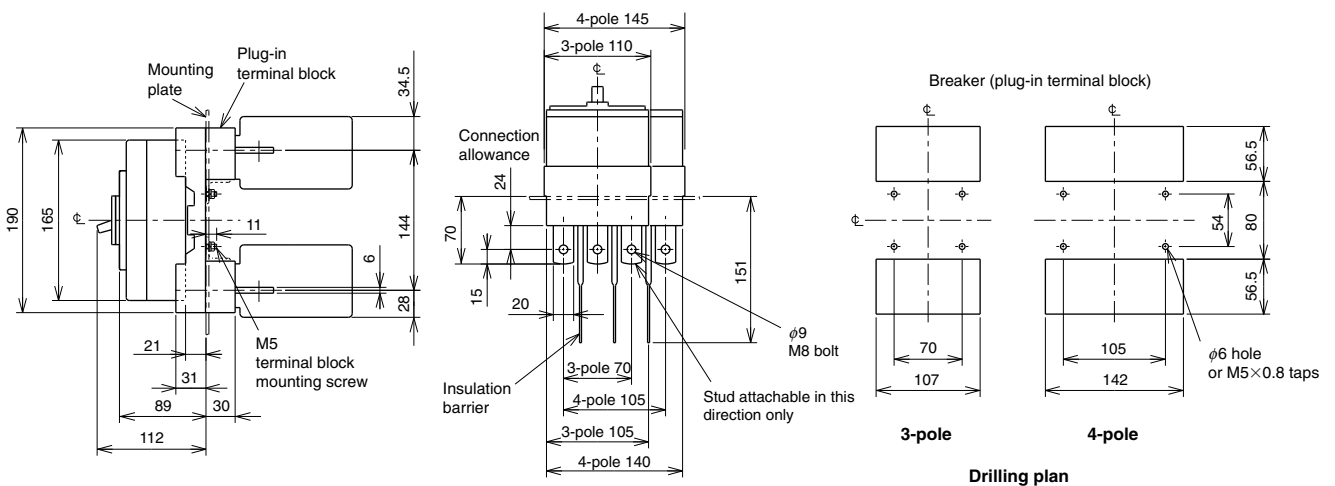
Front connection



Rear connection



Plug-in



Remarks: 1. 2-pole models are 3-pole models with the central pole removed.  
 2. Only 2-pole and 3-pole models are available for NF250-CV.

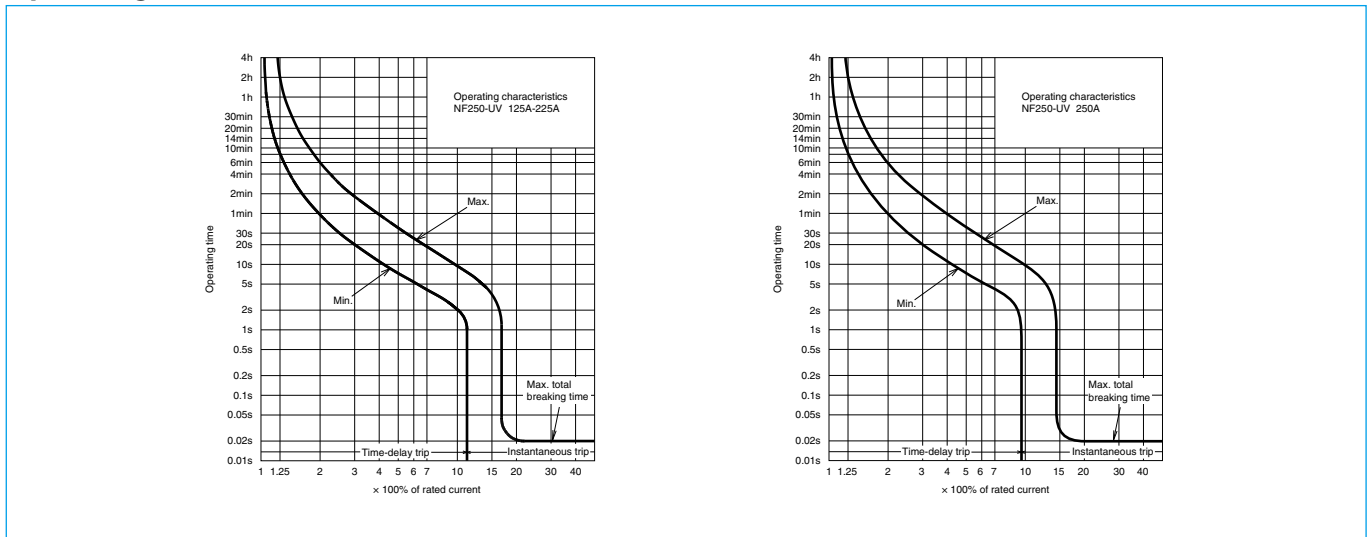
## NF250-UV



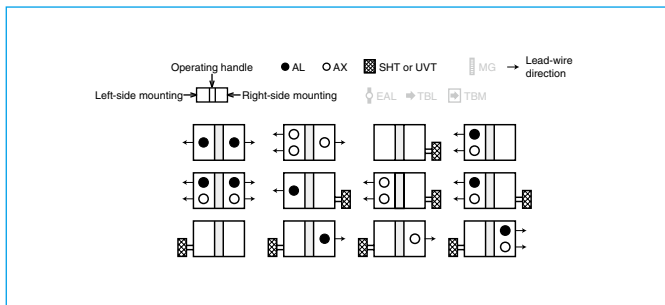
NF250-UV

Model		NF250-UV		
Rated current In (A)		125 150 175 200 225 250		
Number of poles		2	3	4
Rated insulation voltage Ui (V)		690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (lcu/lcs)	AC	690V	15/15
			500V	200/200
			440V	200/200
			415V	200/200
			400V	200/200
			380V	200/200
			230V	200/200
		DC	250V	-
Standard attached parts (front connection)		Mounting screw: M4×0.7×55 (2 and 3P: 2pcs, 4P: 4pcs) Mounting screw: M4×0.7×73 (2 and 3P: 2pcs) Insulation barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)		

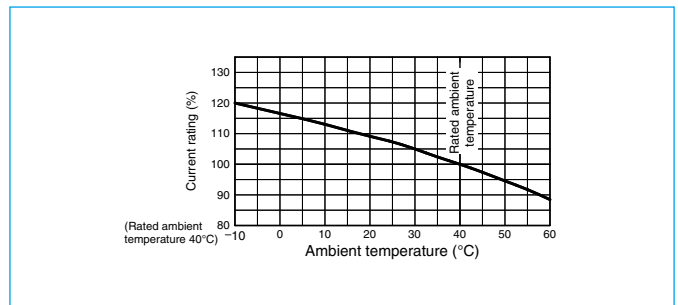
### Operating Characteristics



### Internal Accessories



### Temperature Compensation Curve



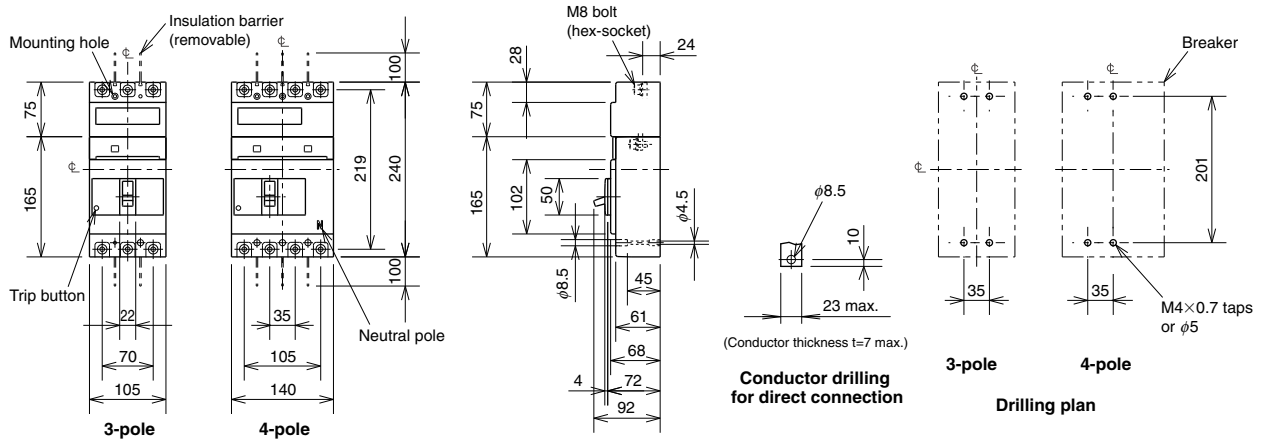
### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page		
Operating handle	F	F-2UV	123	Mechanical interlock	MI	2, 3P MI-05SV3	136		
	V	V-2UV	125					4P MI-2SV4	
Handle lock device	LC	LC-05SV	134	Terminal cover	Small	TC-S	2, 3P TCS-2SV3	128	
	HL(*1)	HLF-05SV				4P TCS-2SV4			
	HL-S	HLN-05SV			2, 3P TCL-2SV3	Large	TC-L		4P TCL-2SV3L
		HLS-2SV			4P TCL-2SV4				
		2, 3P TTC-2SV3	Skeleton		TTC	4P TTC-2SV4			
		2, 3P BTC-2SV3				Rear	BTC		4P BTC-2SV4
		2, 3P PTC-2SV3	Plug-in		PTC				4P PTC-2SV4
Electrical operation device						(*2)	140		

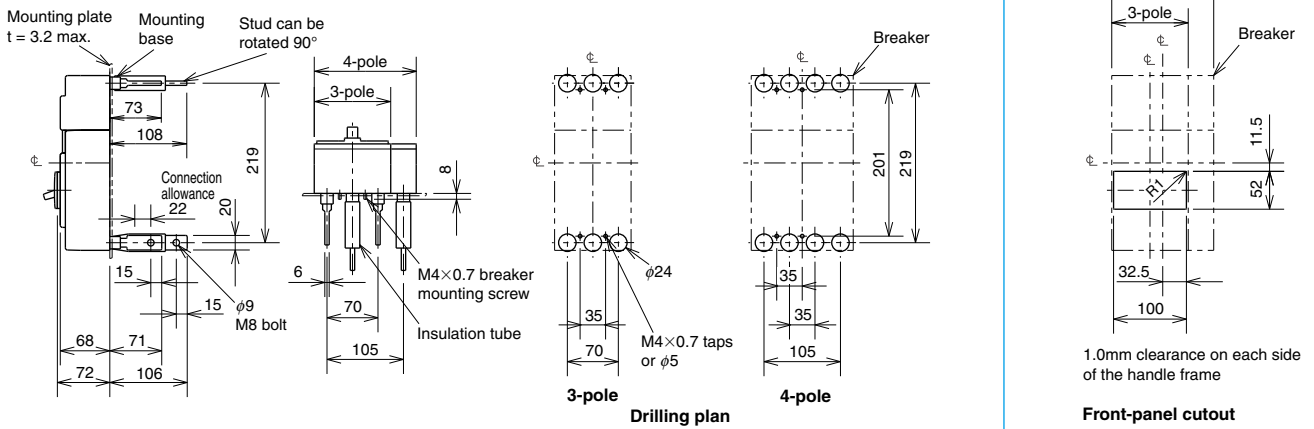
Notes \*1 HLF types are used for OFF lock and HLN types for ON lock.  
\*2 Specify the working voltage. Refer to the reference page for type name.

Outline Drawing

**Front connection**



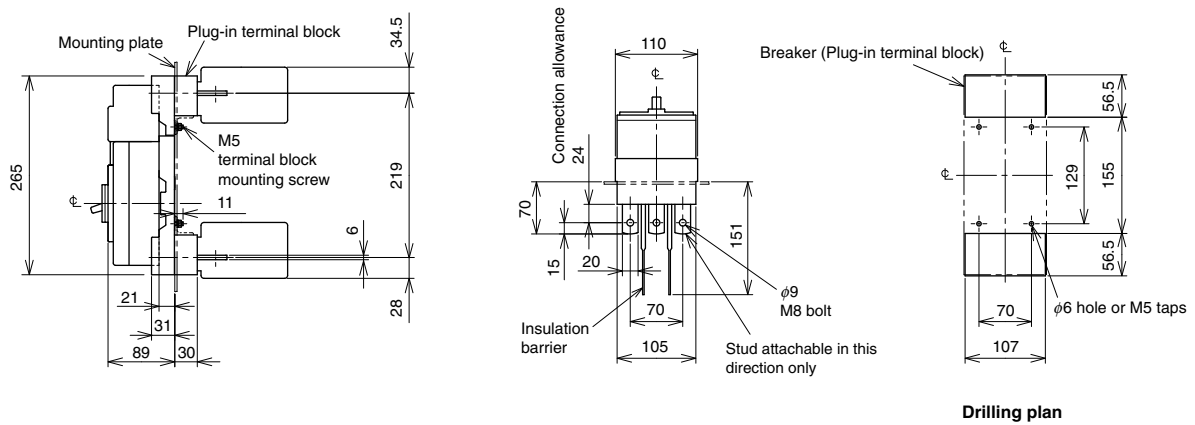
**Rear connection**



1.0mm clearance on each side of the handle frame

**Front-panel cutout**

**Plug-in**



Remark: 1. 2-pole models are 3-pole models with the central pole removed.

# 7 Characteristics and Dimensions 1

# Molded Case Circuit Breakers

NF125-SGV NF160-SGV  
 NF250-SGV NF125-LGV  
 NF160-LGV NF250-LGV  
 NF125-HGV NF160-HGV  
 NF250-HGV NF125-RGV  
 NF250-RGV



NF250-SGV

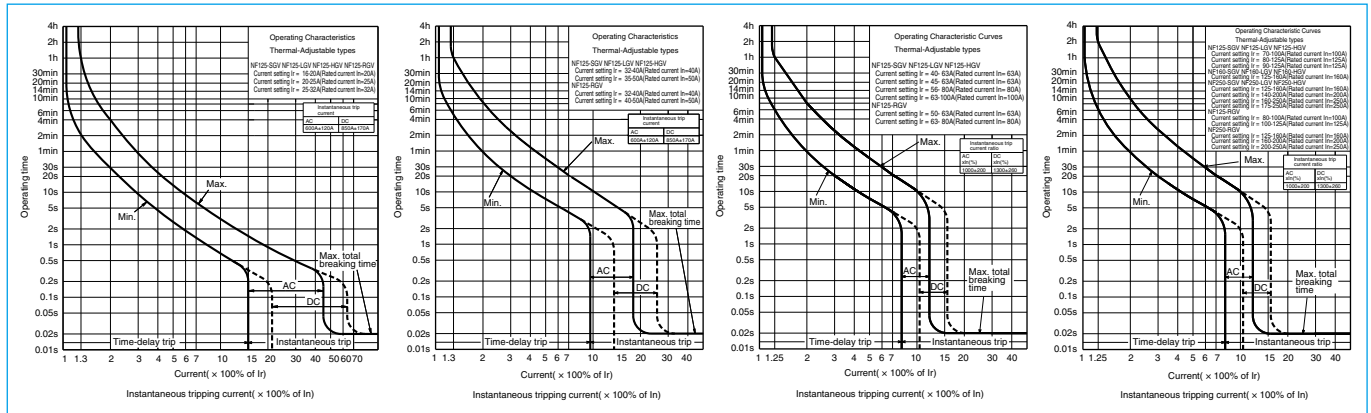
Model	NF125-SGV	NF160-SGV	NF250-SGV	NF125-LGV	NF160-LGV	NF250-LGV	
Rated current In (A)	16-20, 20-25, 25-32 32-40, 35-50, 45-63 56-80, 70-100, 90-125	125-160	125-160 140-200 175-250	16-20, 20-25, 25-32 32-40, 35-50, 45-63 56-80, 70-100, 90-125	125-160	125-160 140-200 175-250	
Number of poles	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	2 3 4	
Rated insulation voltage Ui (V)	690	690	690	690	690	690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	8/8	8/8	8/8	8/8
			500V	30/30	30/30	36/36	36/36
			440V	36/36	36/36	36/36	50/50
			415V	36/36	36/36	36/36	50/50
			400V	36/36	36/36	36/36	50/50
			380V	36/36	36/36	36/36	50/50
			230V	85/85	85/85	90/90	90/90
			200V	85/85	85/85	90/90	90/90
DC (*)	300V	20/20	20/20	20/20	20/20	20/20	
Standard attached parts (front connection)	Mounting screw: M4x0.7x55 (2 and 3P: 2pcs, 4P: 4pcs) Insulation barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)						

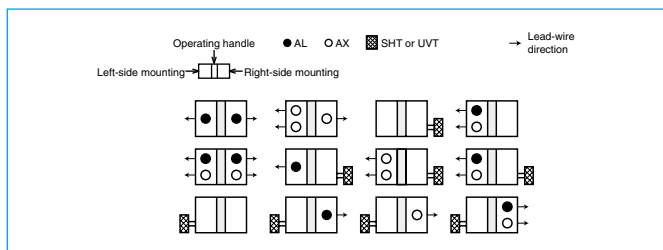
Model	NF125-HGV	NF160-HGV	NF250-HGV	NF125-RGV	NF250-RGV	
Rated current In (A)	16-20, 20-25, 25-32 32-40, 35-50, 45-63 56-80, 70-100, 90-125	125-160	125-160 140-200 175-250	16-20, 20-25, 25-32 32-40, 40-50, 50-63 63-80, 80-100, 100-125	125-160 160-200 200-250	
Number of poles	2 3 4	2 3 4	2 3 4	2 3	2 3	
Rated insulation voltage Ui (V)	690	690	690	690	690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	10/8	10/8	—
			500V	50/38	50/38	—
			440V	65/65	65/65	125/125
			415V	70/70	70/70	150/150
			400V	75/75	75/75	150/150
			380V	75/75	75/75	150/150
			230V	100/100	100/100	150/150
			200V	100/100	100/100	150/150
DC (*)	300V	40/40	40/40	—	—	
Standard attached parts (front connection)	Mounting screw: M4x0.7x55 (2 and 3P: 2pcs, 4P: 4pcs) Insulation barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)					

Note \*1 When wired as shown at the bottom of page 18, 3-pole models can be used for up to 500VDC, and 4-pole models for up to 600VDC.

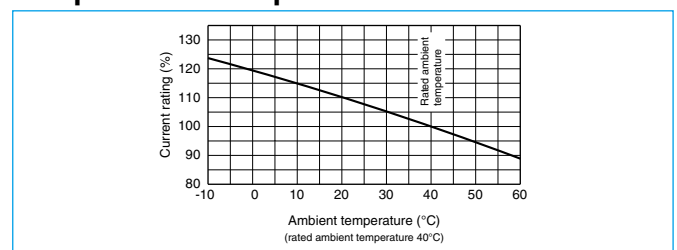
## Operating Characteristics



## Internal Accessories



## Temperature Compensation Curve



## External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page	
Operating handle	F	F-2SV	Mechanical interlock	MI	2, 3P MI-05SV3	
	V	V-2SV		4P MI-2SV4	136	
Handle lock device	LC	LC-05SV	Terminal cover	Small	2, 3P TCS-2SV3	
	HL(*1)	HLF-05SV			4P TCS-2SV4	128
	HL-S	HLN-05SV		2, 3P TCL-2SV3	4P TCL-2SV3L	
		HLS-2SV		4P TCL-2SV4	2, 3P TTC-2SV3	
Electrical operation device				Rear	2, 3P BTC-2SV3	140
					4P BTC-2SV4	
				Plug-in	2, 3P PTC-2SV3	140
					4P PTC-2SV4	

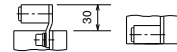
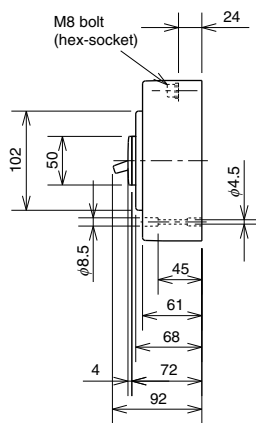
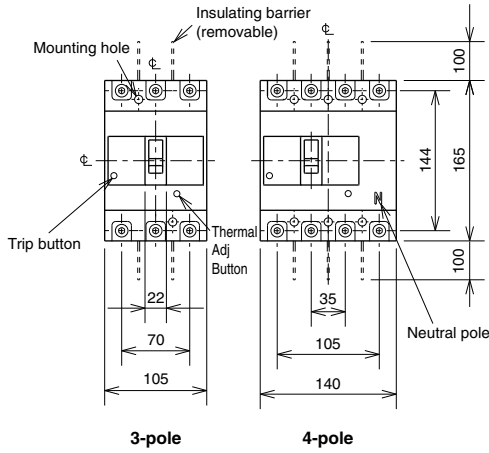
Notes \*1 HLF types are used for OFF lock and HLN types for ON lock.  
 \*2 Specify the working voltage. Refer to the reference page for type name.

7 Characteristics and Dimensions

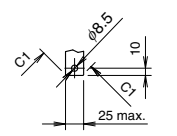


Outline Drawing

Front connection

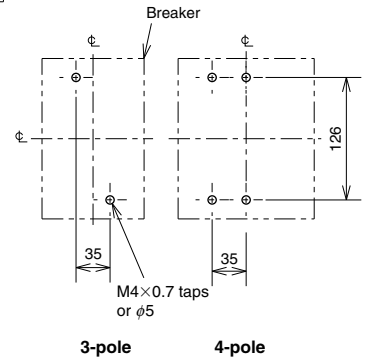


Solderless terminal for wire size  
125-175A 14-95mm<sup>2</sup>  
200-250A 70-125mm<sup>2</sup>  
Wire connection



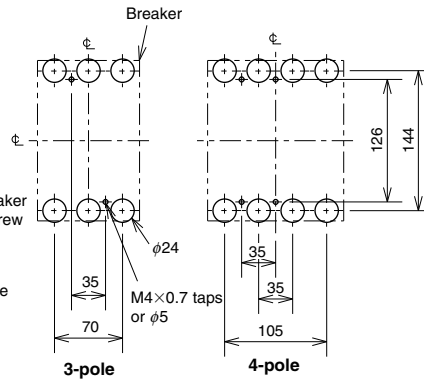
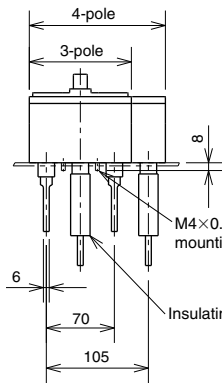
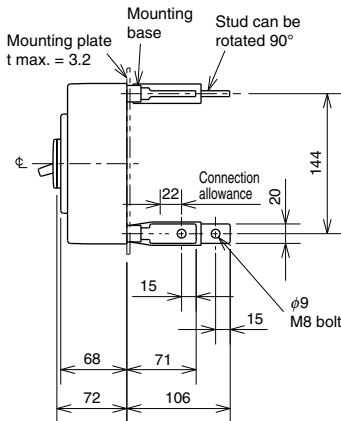
(Conductor thickness t=7 max.)

Conductor drilling for direct connection

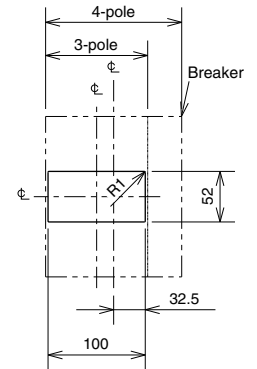


Drilling plan

Rear connection



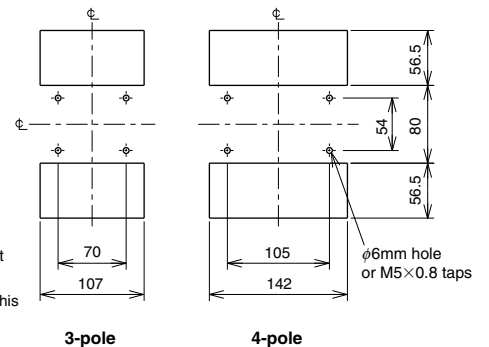
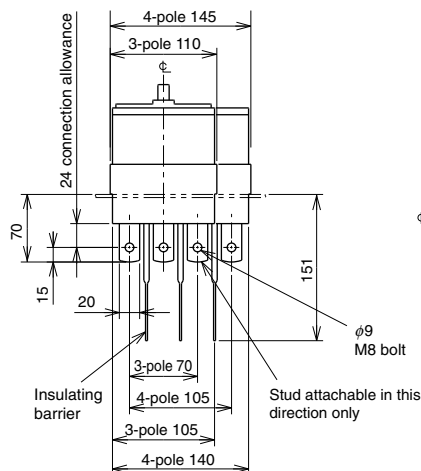
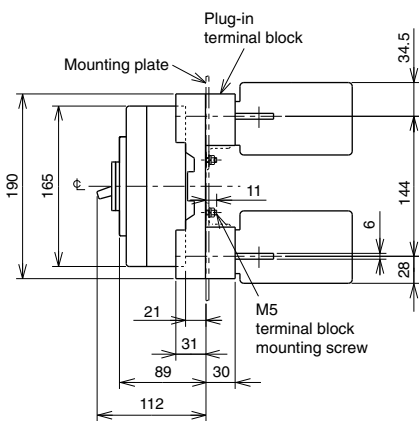
Drilling plan



1mm clearance on each side of the handle frame

Front-panel cutout

Plug-in



Drilling plan

Remark: 1. 2-pole models are 3-pole models with the central pole removed.

# 7 Characteristics and Dimensions 1

## Molded Case Circuit Breakers

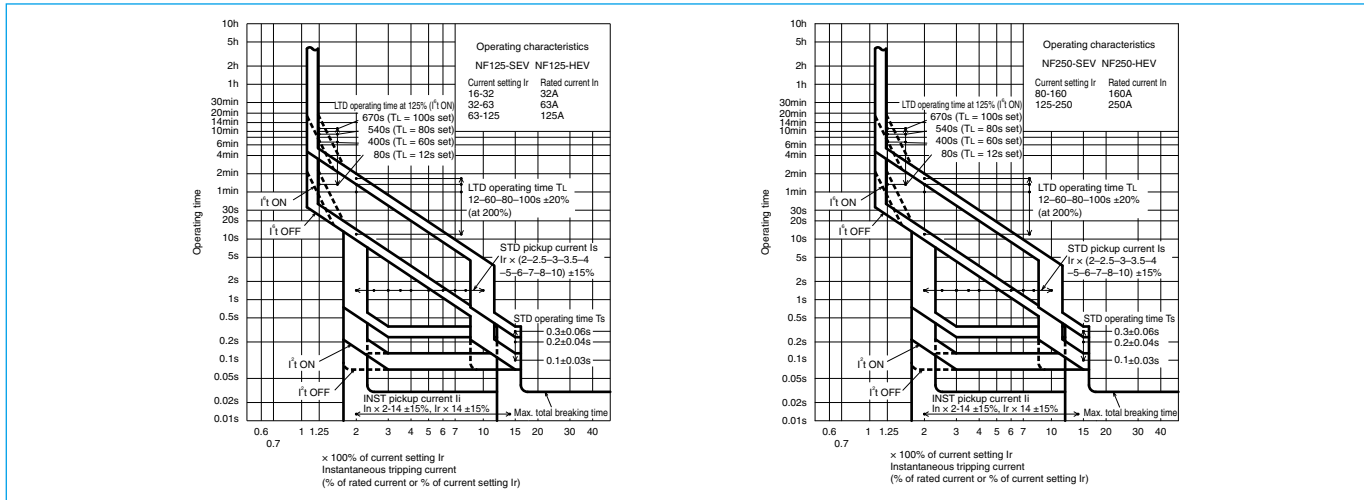
NF125-SEV  
NF125-HEV  
NF250-SEV  
NF250-HEV



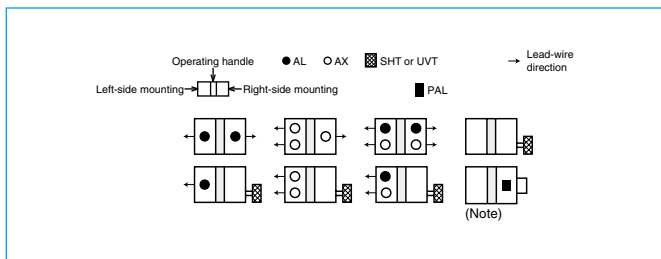
NF125-SEV

Model		NF125-SEV		NF125-HEV		NF250-SEV		NF250-HEV	
Rated current In (A)		32 63 125		32 63 125		160 250		160 250	
Current setting Ir (A)		16-32 32-63 63-125		16-32 32-63 63-125		80-160 125-250		80-160 125-250	
Number of poles		3 4		3 4		3 4		3 4	
Rated insulation voltage Ui (V)		690		690		690		690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	8/8	10/8	8/8	10/8		
			500V	30/30	50/38	30/30	50/38		
			440V	36/36	65/65	36/36	65/65		
			415V	36/36	70/70	36/36	70/70		
			400V	36/36	75/75	36/36	75/75		
			380V	36/36	75/75	36/36	75/75		
DC	250V	-	-	-	-	-			
		-	-	-	-	-			
Standard attached parts (front connection)		Mounting screw: M4x0.7x55 (3P: 2pcs, 4P: 4pcs) Insulation barrier: (3P: 4pcs, 4P: 6pcs)							

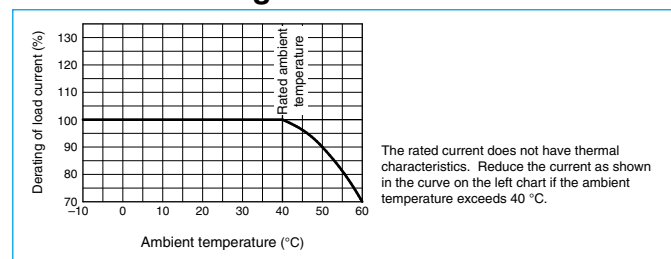
### Operating Characteristics



### Internal Accessories



### Current Reducing Curve



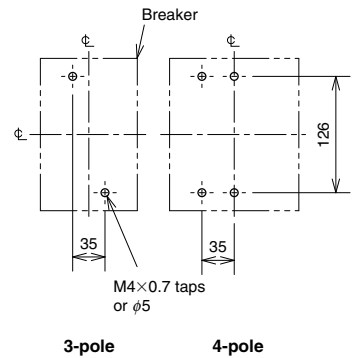
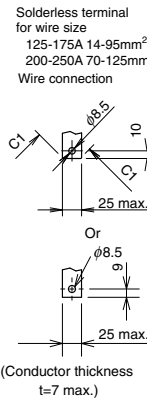
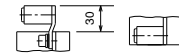
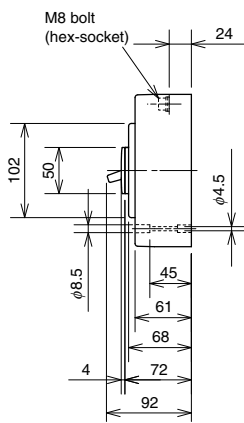
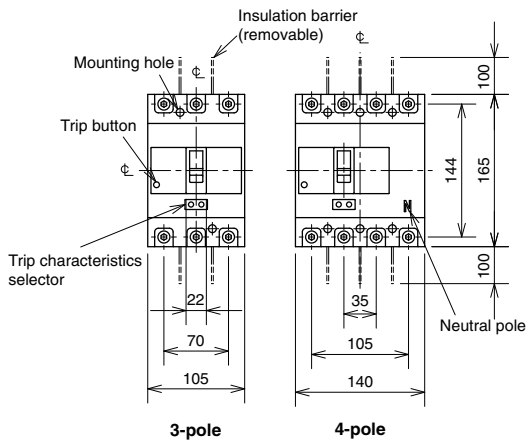
### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page
Operating handle	F	F-2SV	123	Mechanical interlock	MI	3P MI-05SV3	136
	V	V-2SV	125		4P MI-2SV4		
Handle lock device	LC	LC-05SV	134	Terminal cover	Small	3P TCS-2SV3	128
	HL(*1)	HLF-05SV				4P TCS-2SV4	
	HLN-05SV	3P TCL-2SV3					
HL-S	HLS-2SV	4P TCL-2SV3L					
			4P TCL-2SV4				
			3P TTC-2SV3				
			4P TTC-2SV4				
			3P BTC-2SV3				
			4P BTC-2SV4				
			3P PTC-2SV3				
			4P PTC-2SV4				
Electrical operation device				(*2)			140

Notes \*1 HLF types are used for OFF lock and HLN types for ON lock.  
\*2 Specify the working voltage. Refer to the reference page for type name.

Outline Drawing

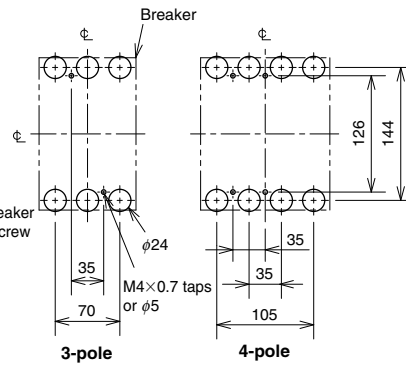
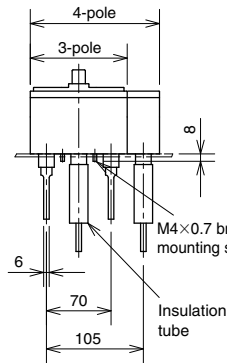
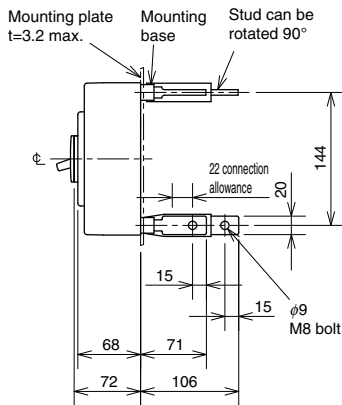
Front connection



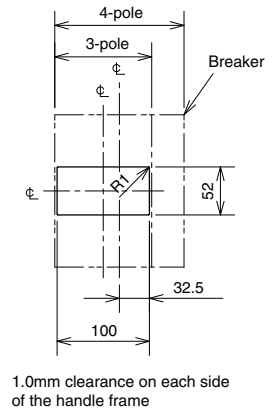
Conductor drilling for direct connection

Drilling plan

Rear connection



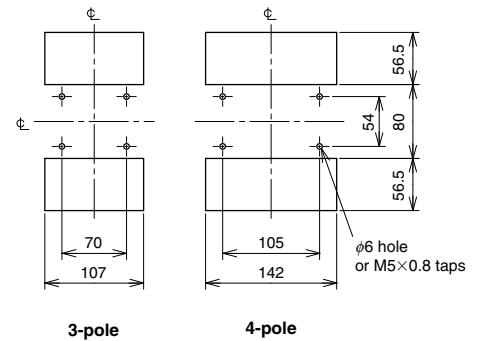
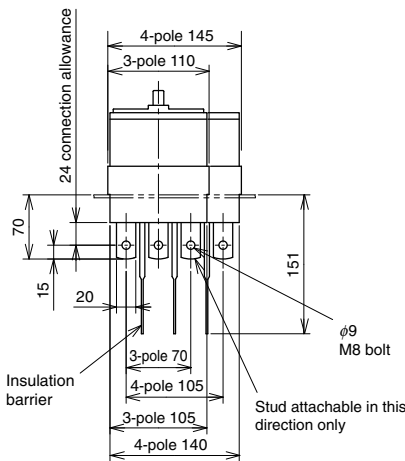
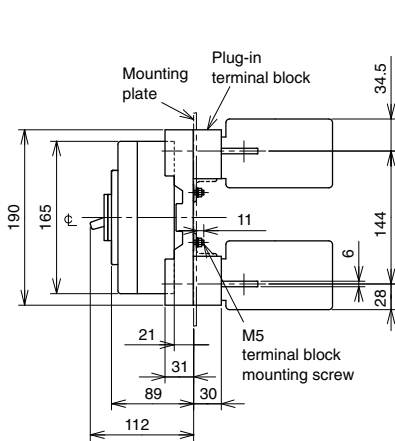
Drilling plan



1.0mm clearance on each side of the handle frame

Front-panel cutout

Plug-in



Drilling plan

## NF400-CW NF400-SW

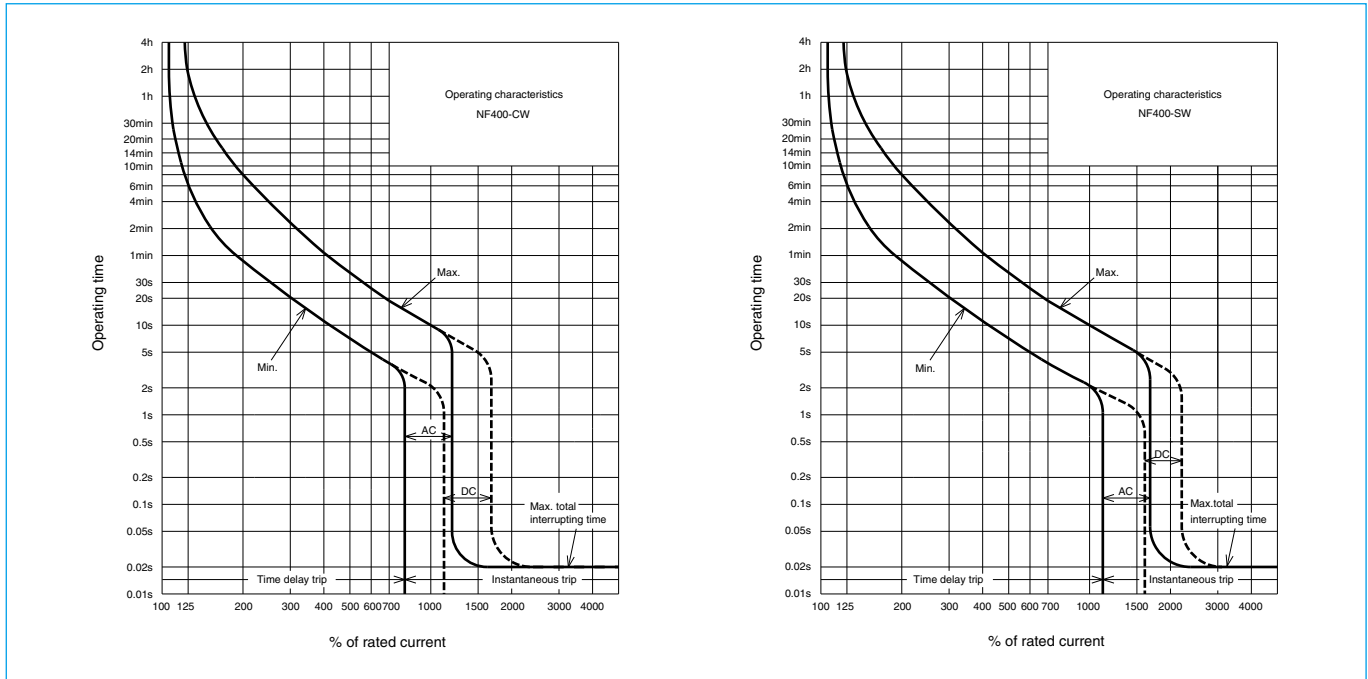


NF400-SW

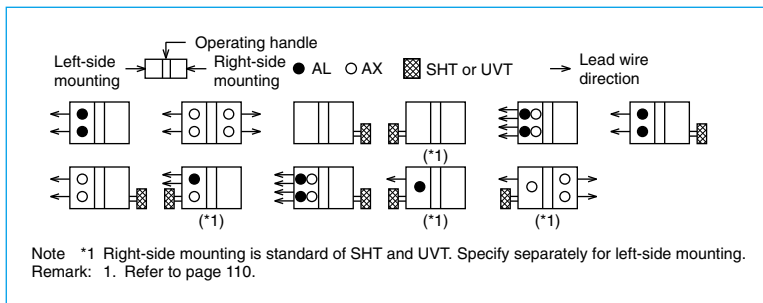
Model		NF400-CW		NF400-SW		
Rated current In (A)		250	300	350	400	
Number of poles		2	3	2	3	4
Rated insulation voltage Ui (V)		690		690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	-		
			500V	15/8	30/30	
			440V	25/13	42/42	
			400V	36/18	45/45	
			230V	50/25	85/85	
		DC (*1)	250V	20/10	40/40	
Standard attached parts		Front connection	Mounting screw: M6x60 (4pcs) Insulating barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)			
		Rear connection	Mounting screw: M6x72 (4pcs)			

Note \*1 When wired as shown at the bottom of page 18, 3-pole models can be used for up to 400VDC, and 4-pole models for up to 500VDC.

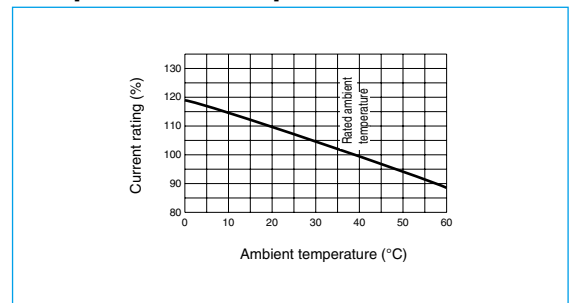
### Operating Characteristics



### Internal Accessories



### Temperature Compensation Curve



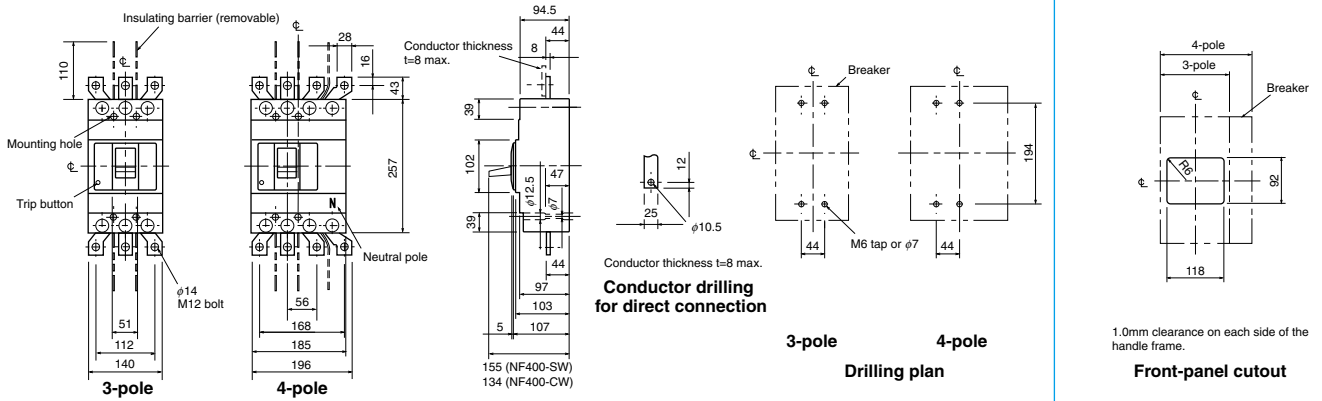
### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page		
Operating handle	F	F-4S	123	Terminal cover	Large	TC-L	2, 3P 4P	TCL-4SW3 TCL-4SW4	128
	V	V-4S	125			Skeleton	TTC	2, 3P 4P	
Mechanical interlock	MI	2, 3P	MI-4SW3		Rear		BTC	2, 3P 4P	
		4P	MI-4SW4			136			
Auxiliary handle	HT	HT-4CW, HT-4SW	135	Handle lock device		HL	HL-4CW, HL-4SW		134
						HL-S	HLS-4SW		
				Electrical operation device	NFM	3P	(*1)		140
						4P			

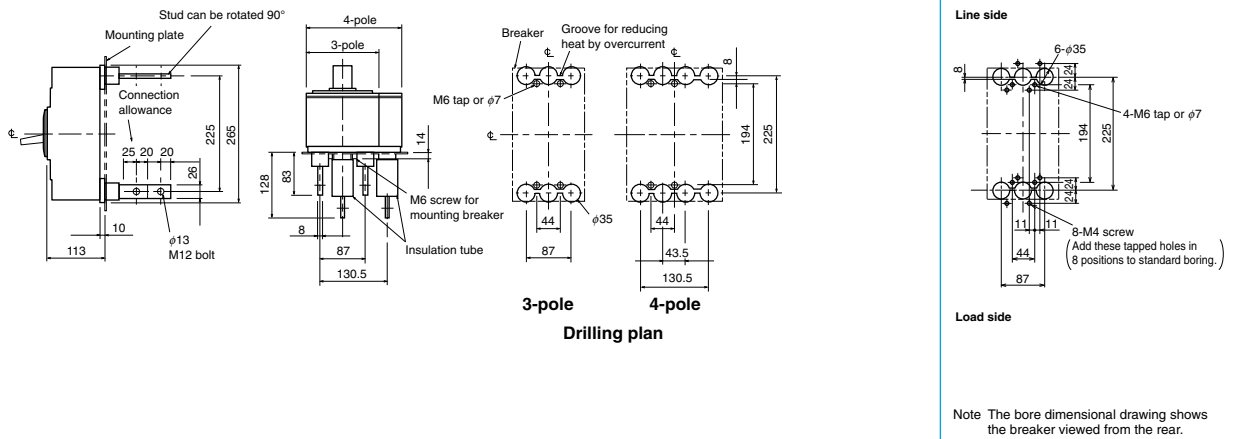
Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing

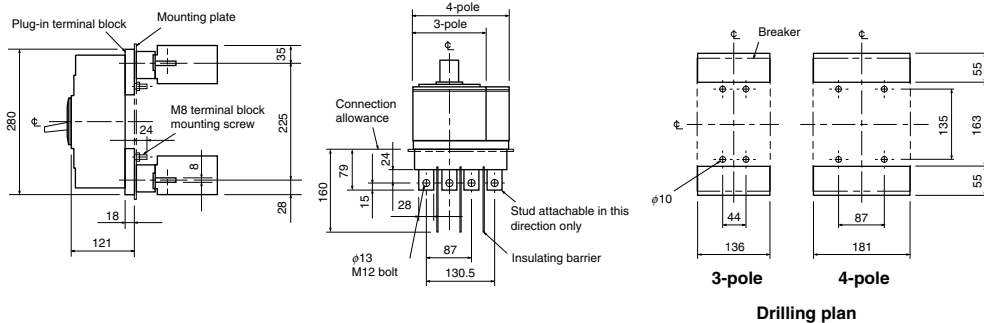
Front connection



Rear connection



Plug-in



Remark: 1. 2-pole models are 3-pole models with the central pole removed.

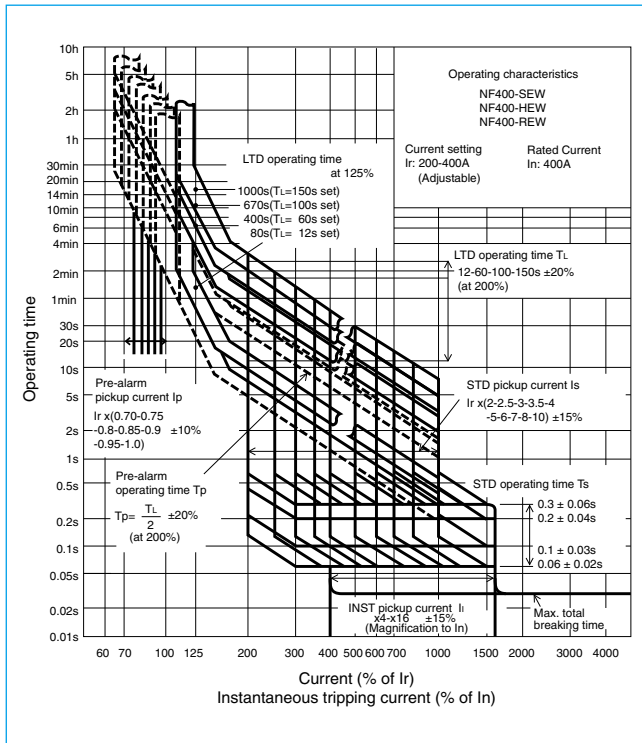
## NF400-SEW NF400-HEW NF400-REW



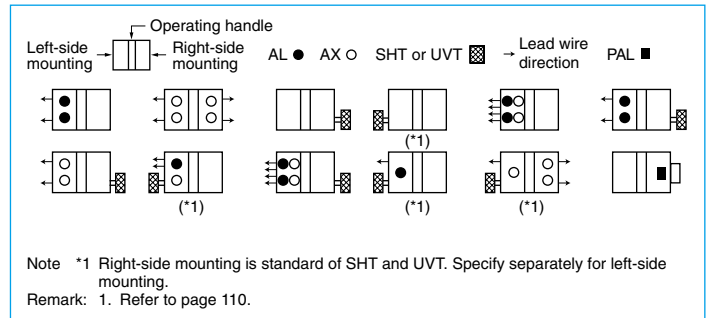
NF400-SEW

Model		NF400-SEW	NF400-HEW	NF400-REW		
Rated current In (A)		200-400 adjustable				
Number of poles		3	4	3		
Rated insulation voltage Ui (V)		690	690	690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	10/10	35/18	-
			500V	30/30	50/50	70/35
			440V	42/42	65/65	125/63
			400V	50/50	70/70	125/63
			230V	85/85	100/100	150/75
Standard attached parts		Front connection	Mounting screw: M6x72 (4pcs) Insulating barrier: (3P: 4pcs, 4P: 6pcs)			
		Rear connection	Mounting screw: M6x85 (4pcs)			

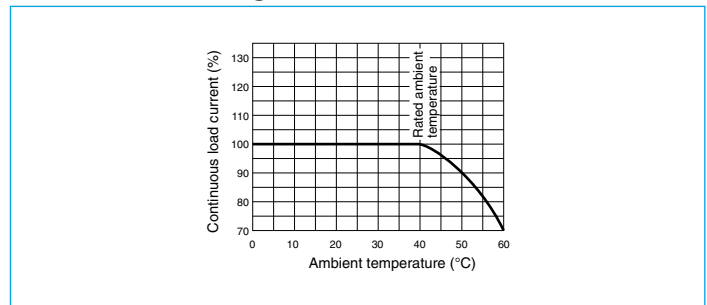
### Operating Characteristics



### Internal Accessories



### Current Reducing Curve



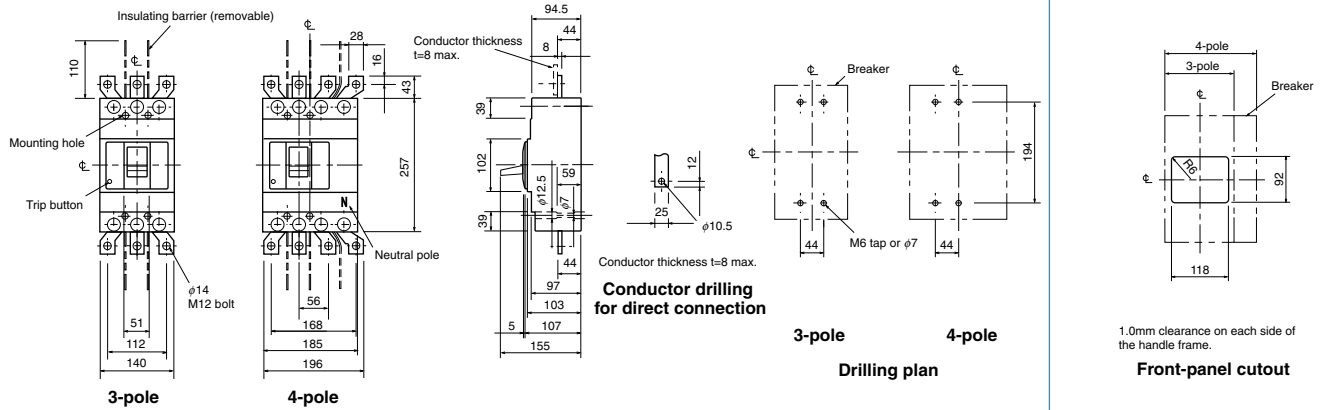
### External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page			
Operating handle	F	F-4S	Terminal cover	Large	TC-L	3P	TCL-4SW3 (*2)	128
	V	V-4S				4P	TCL-4SW4 (*3)	
Mechanical interlock	MI	3P		Skeleton	TTC	3P	TTC-4SW3	
		4P				4P	TTC-4SW4	
Auxiliary handle	HT	3P	Rear	BTC	3P	BTC-4SW3 (*4)	134	
		4P			4P	BTC-4SW4 (*3)		
			Handle lock device		HL	HL-4SW	134	
					HL-S	HLS-4SW		
			Electrical operation device		NFM	3P	(*1)	140
						4P		

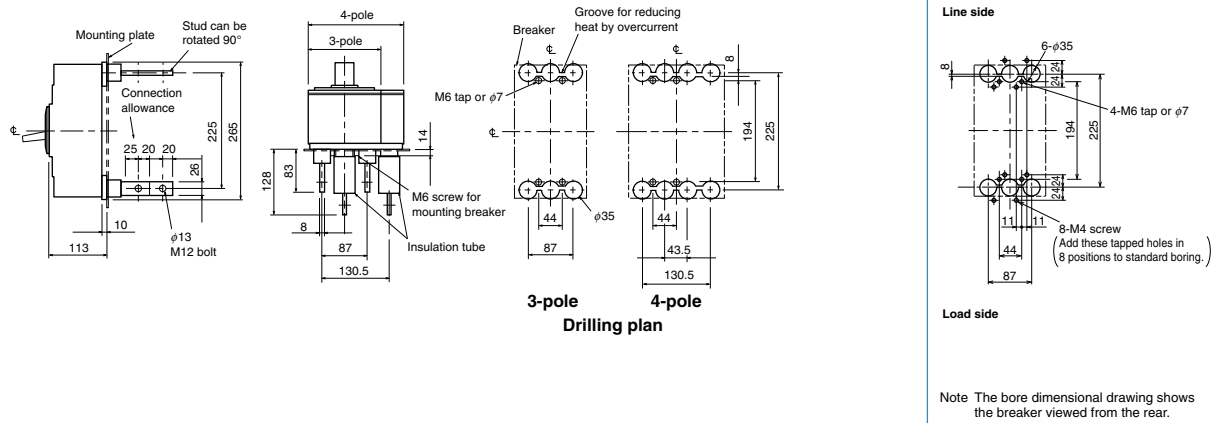
Notes \*1 Specify the operation method and voltage. Order in combination with the breaker unit.  
\*2 This is for NF400-SEW.  
\*3 This is for NF400-SEW/HEW.  
\*4 This is for NF400-SEW. For rear terminal cover of NF400-HEW/REW, use PTC-4SW3.

Outline Drawing

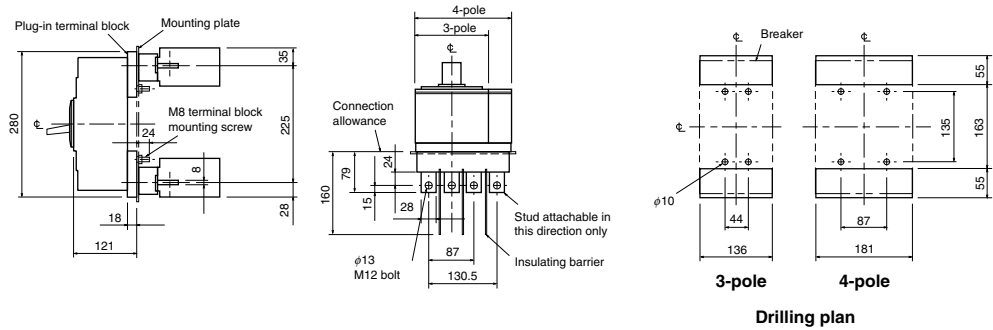
Front connection



Rear connection



Plug-in



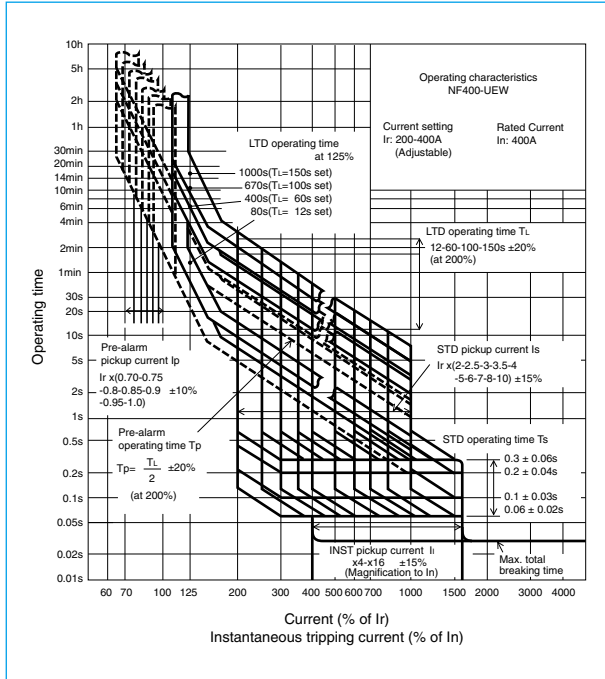
## NF400-UEW



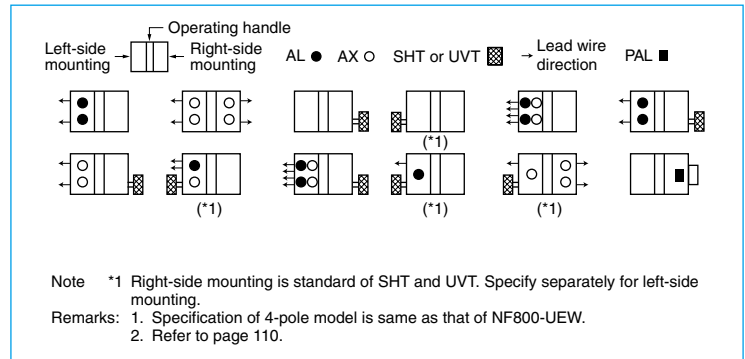
NF400-UEW

Model		NF400-UEW		
Rated current $I_n$ (A)		200-400 adjustable		
Number of poles		3	4	
Rated insulation voltage $U_i$ (V)		690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	-
			500V	170/170
			440V	200/200
			400V	200/200
			230V	200/200
Standard attached parts (4-pole models are provided with auxiliary handle.)		Front connection	Mounting screw: M6x65 (2pcs), M6x174 (2pcs) Insulating barrier: (3P: 4pcs)	
		Rear connection	Mounting screw: M6x72 (2pcs), M6x181 (2pcs)	

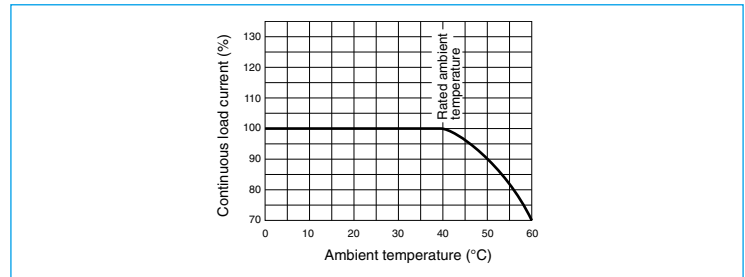
### Operating Characteristics



### Internal Accessories



### Current Reducing Curve



### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page
Operating handle	F	F-4U	123	Terminal cover	Large	TC-L 3P	TCL-4SW3
	V	V-4U	125		Skeleton	TTC 3P	-
Mechanical interlock	MI	MI-4SW3	136		Rear	BTC 3P	BTC-4SW3
Auxiliary handle	HT	HT-4SW	135	Handle lock device	HL	HL-4SW	134
					HL-S	HLS-4UW	
				Electrical operation device	(*)		140

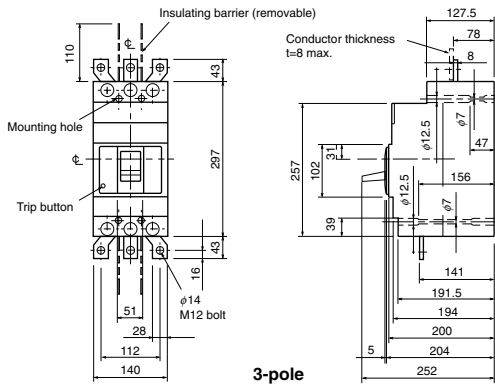
Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

Remark \*1 Specification of 4-pole model is same as that of NF800-UEW.

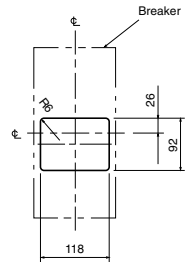
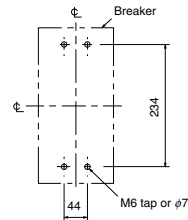


Outline Drawing

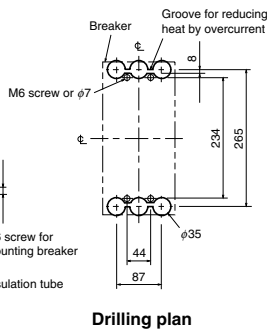
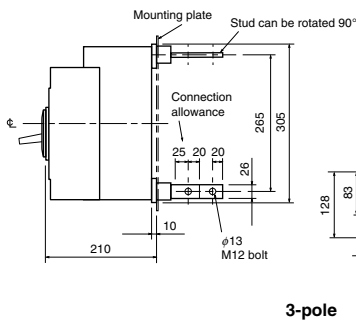
Front connection



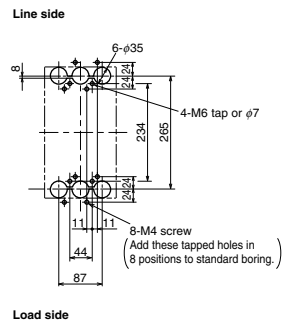
Conductor thickness  $t=8$  max.  
**Conductor drilling for direct connection**



Rear connection

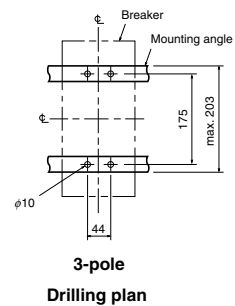
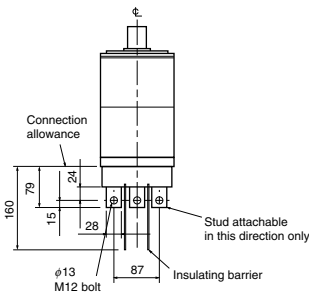
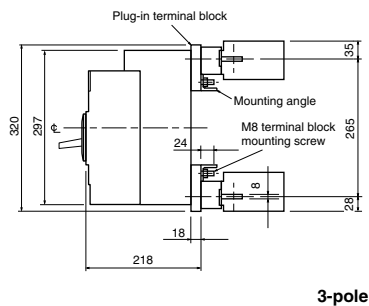


Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

Plug-in



# 7 Characteristics and Dimensions 1

## Molded Case Circuit Breakers

### NF630-CW NF630-SW

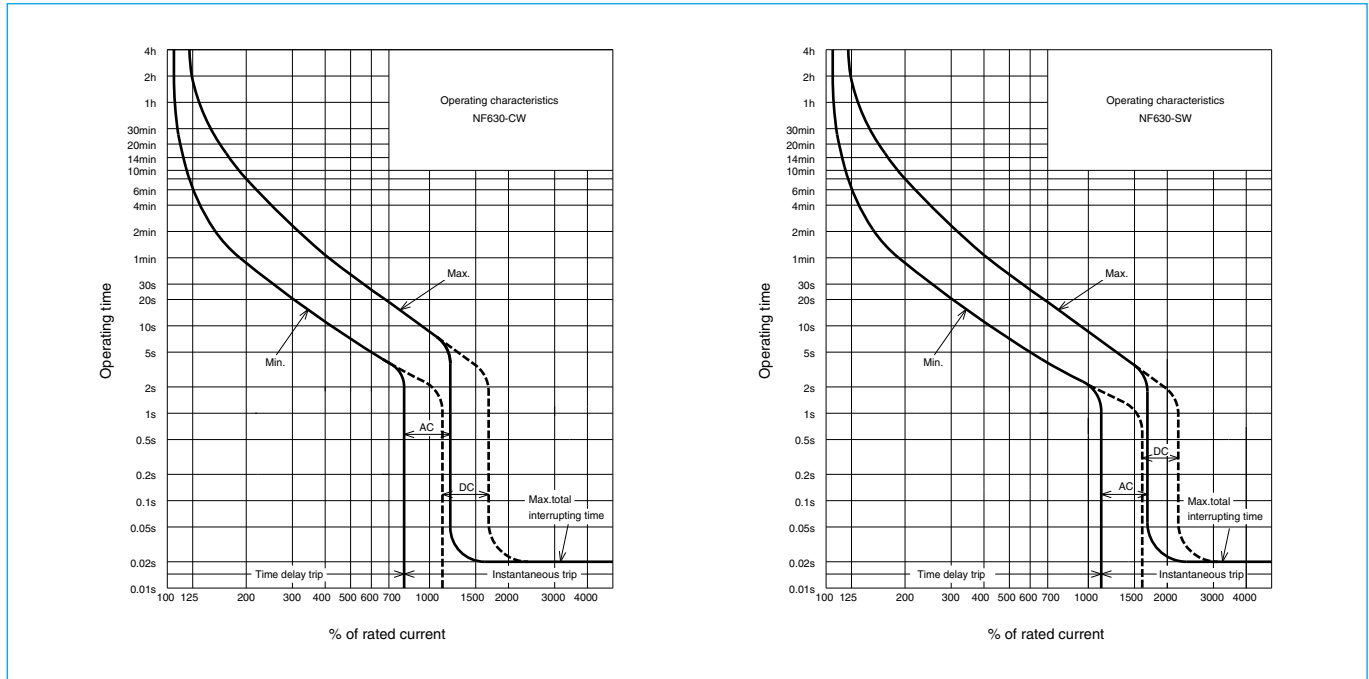


NF630-SW

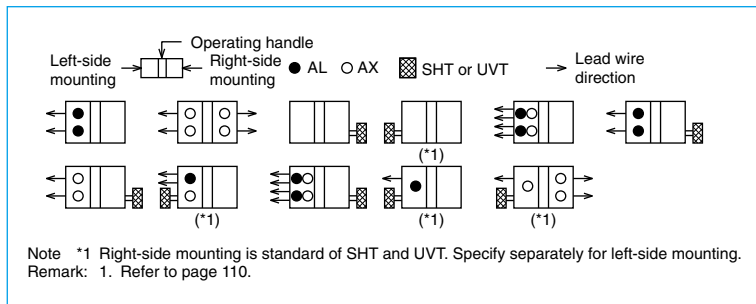
Model		NF630-CW			NF630-SW			
Rated current In (A)		500 600 630						
Number of poles		2	3		2	3	4	
Rated insulation voltage Ui (V)		690			690			
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	-			10/10	
			500V	18/9			30/30	
			440V	36/18			42/42	
			400V	36/18			50/50	
		DC (*1)	230V	50/25			85/85	
		250V	20/10			40/40		
Standard attached parts		Front connection	Mounting screw: M6x72 (4pcs) Insulating barrier: (2P: 2pcs, 3P: 4pcs, 4P: 6pcs)					
		Rear connection	Mounting screw: M6x85 (4pcs)					

Note \*1 When wired as shown at the bottom of page 18, 3-pole models can be used for up to 400VDC, and 4-pole models for up to 500VDC.

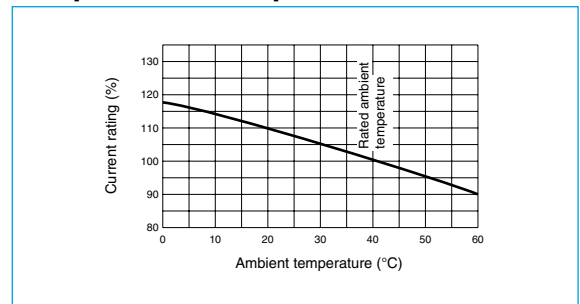
### Operating Characteristics



### Internal Accessories



### Temperature Compensation Curve



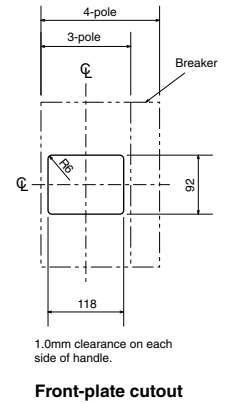
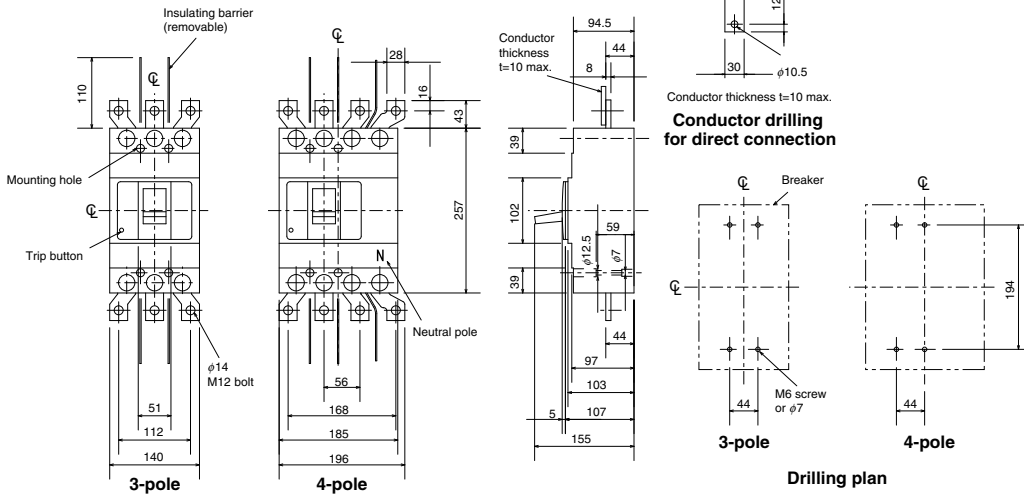
### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page
Operating handle	F	F-4S	123	Terminal cover	Large	TC-L 2, 3P	TCL-4SW3
	V	V-4S	125			TC-L 4P	TCL-4SW4
Mechanical interlock	MI	2, 3P	136		Skeleton	2, 3P	TTC-4SW3
		4P				TTC-4SW4	
Auxiliary handle	HT	135		Rear	2, 3P	BTC-4SW3	
					4P	BTC-4SW4	
Handle lock device				HL	HL-4SW		134
				HL-S	HLS-4SW		
Electrical operation device				NFM	3P	(*1)	140
					4P		

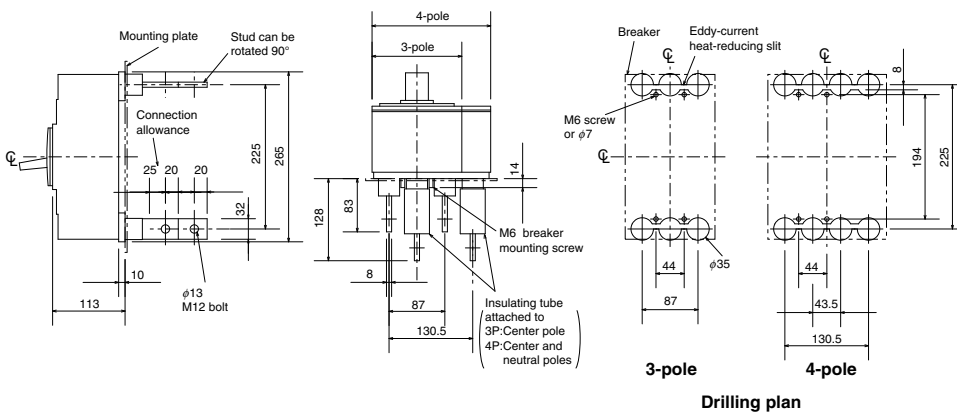
Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing

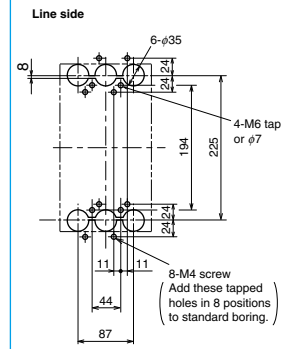
Front connection



Rear connection

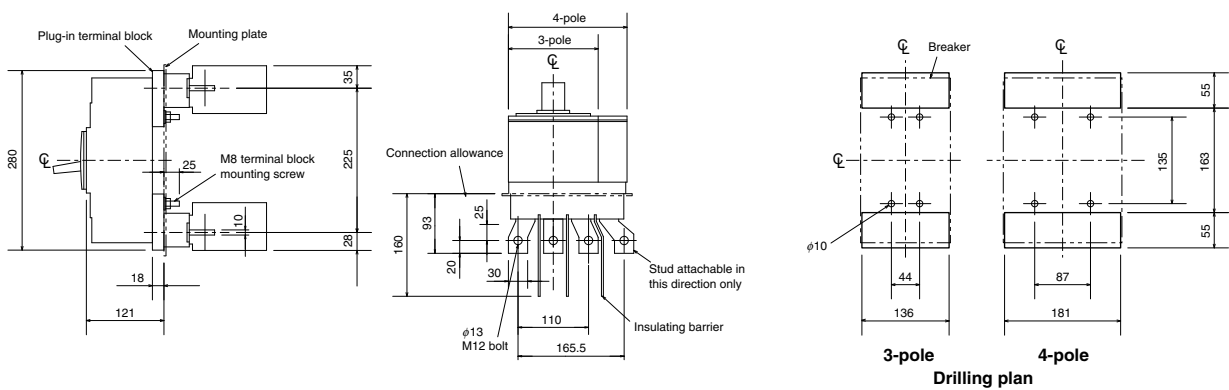


Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

Plug-in



Remark: 1. 2-pole models are 3-pole models with the central pole removed.

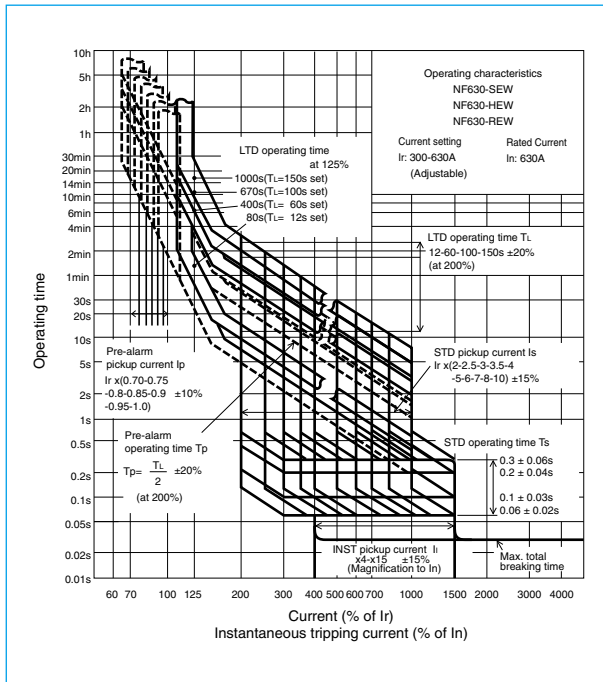
## NF630-SEW NF630-HEW NF630-REW



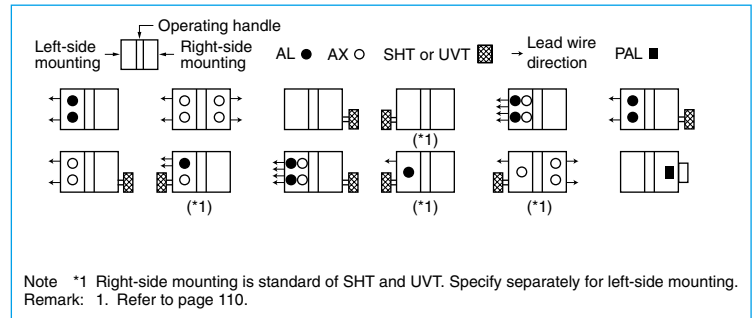
NF630-SEW

Model		NF630-SEW	NF630-HEW	NF630-REW		
Rated current I <sub>n</sub> (A)		300-630 adjustable				
Number of poles		3	4	3		
Rated insulation voltage U <sub>i</sub> (V)		690	690	690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	10/10	35/18	-
			500V	30/30	50/50	70/35
			440V	42/42	65/65	125/63
			400V	50/50	70/70	125/63
			230V	85/85	100/100	150/75
Standard attached parts		Front connection	Mounting screw: M6×72 (4pcs) Insulating barrier: (3P: 4pcs, 4P: 6pcs)			
		Rear connection	Mounting screw: M6×85 (4pcs)			

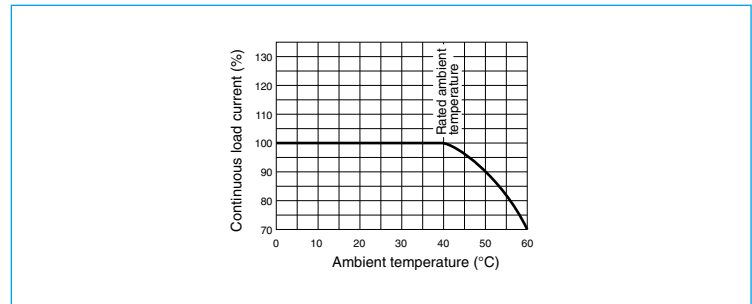
### Operating Characteristics



### Internal Accessories



### Current Reducing Curve



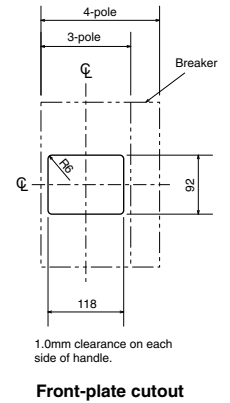
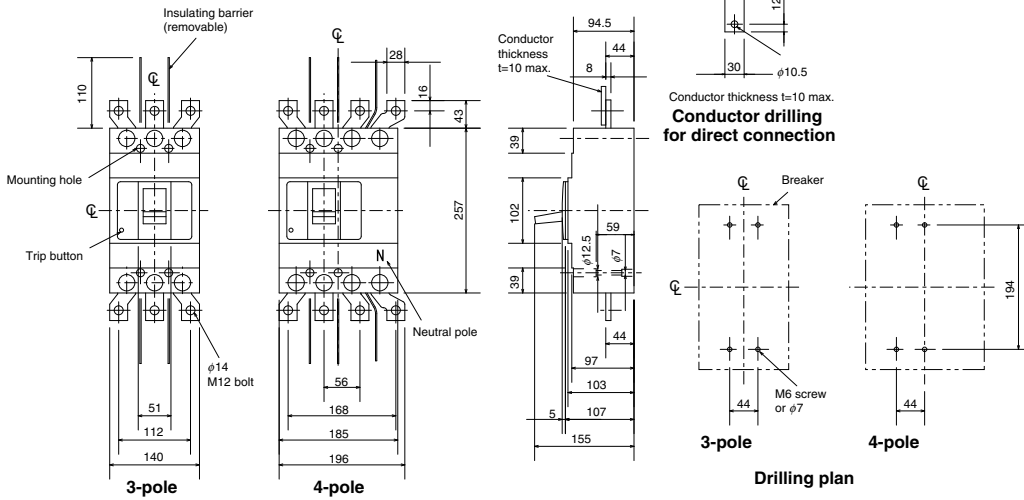
### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page	
Operating handle	F	F-4S	123	Terminal cover	Large	3P	TCL-4SW3 (*2)	
	V	V-4S	125			4P	TCL-4SW4 (*3)	
Mechanical interlock	MI	3P	MI-4SW3		Skeleton	TTC	3P	TTC-4SW3
		4P	MI-4SW4				4P	TTC-4SW4
Auxiliary handle	HT	HT-4SW			Rear	BTC	3P	BTC-4SW3 (*2)
							4P	BTC-4SW4 (*3)
Handle lock device				HL		HL-4SW		
				HL-S		HLS-4SW		
Electrical operation device				NFM	3P	(*1)		
					4P			

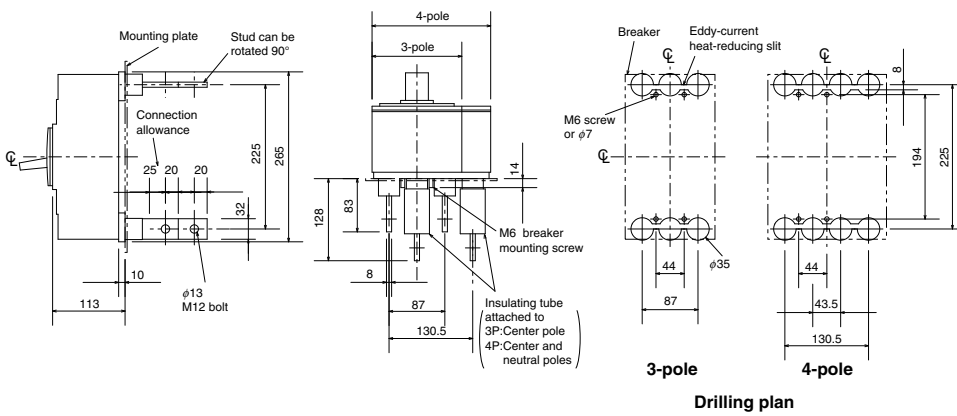
Notes \*1 Specify the operation method and voltage. Order in combination with the breaker unit.  
\*2 This is for NF630-SEW. For rear terminal cover of NF630-HEW/REW, use PTC-4SW3.  
\*3 This is for NF630-SEW/HEW.

Outline Drawing

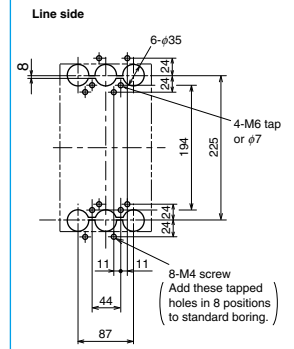
Front connection



Rear connection

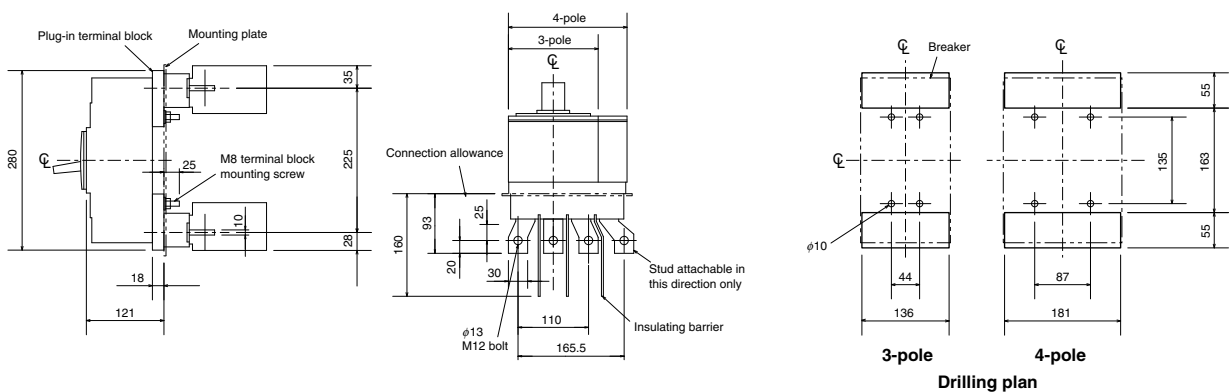


Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

Plug-in



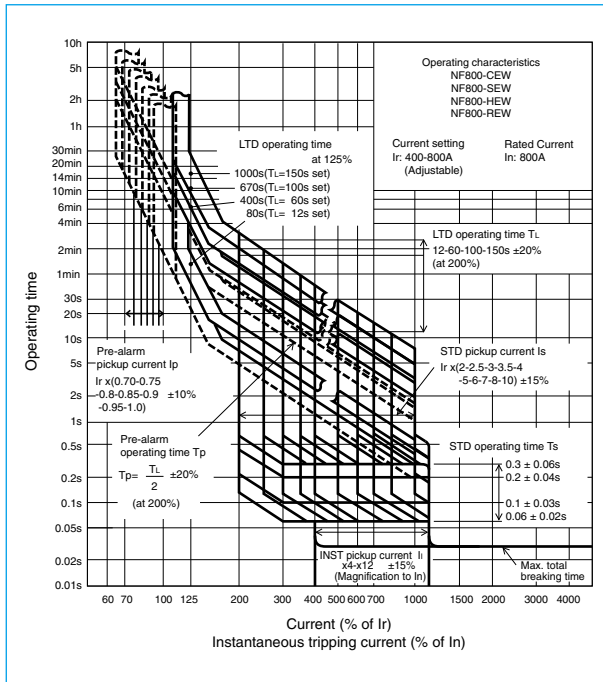
## NF800-CEW NF800-SEW NF800-HEW NF800-REW



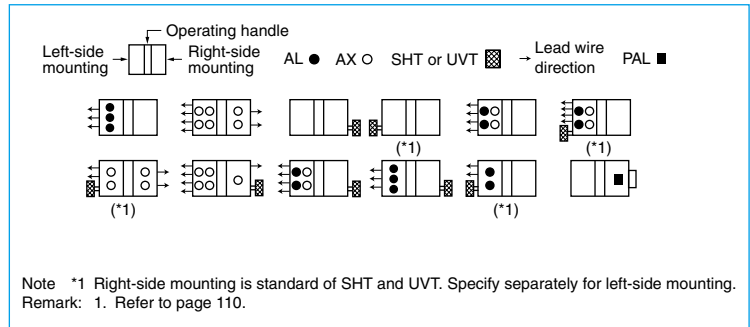
NF800-SEW

Model		NF800-CEW	NF800-SEW	NF800-HEW	NF800-REW		
Rated current In (A)		400-800 adjustable					
Number of poles		3	3, 4	3, 4	3		
Rated insulation voltage Ui (V)		690	690	690	690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/lcs)	AC	690V	-	10/10	15/15	-
			500V	18/9	30/30	50/50	70/35
			440V	36/18	42/42	65/65	125/63
			400V	36/18	50/50	70/70	125/63
			230V	50/25	85/85	100/100	150/75
Standard attached parts (4-pole models are provided with auxiliary handle.)		Front connection		Mounting screw: M6x35 (4pcs) Insulating barrier: (3P: 2pcs, 4P: 3pcs)			
		Rear connection		Mounting screw: M6x40 (4pcs)			

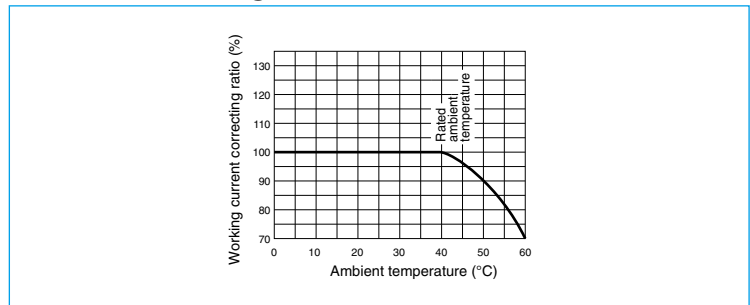
### Operating Characteristics



### Internal Accessories



### Current Reducing Curve



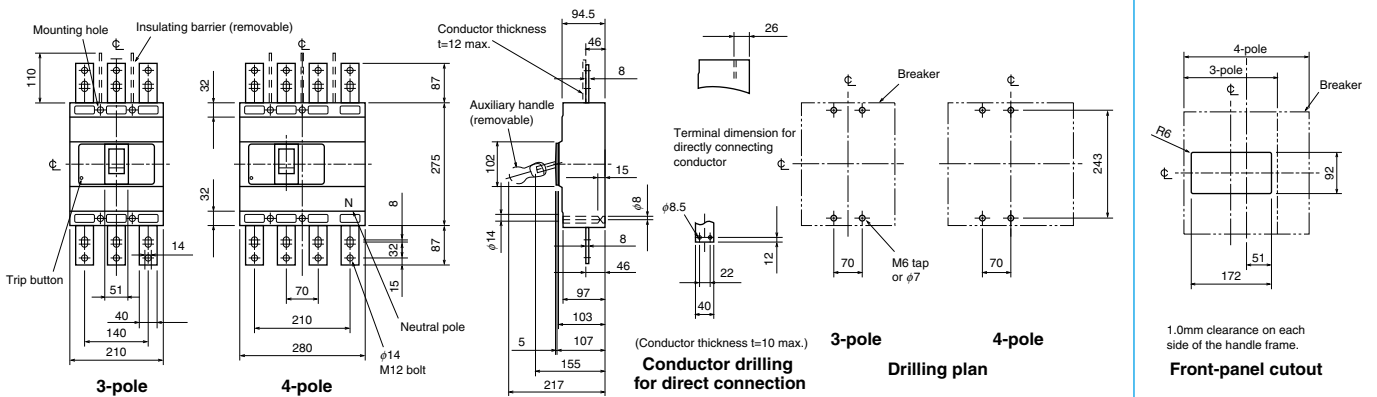
### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page	
Operating handle	F	F-8S	123	Terminal cover	Large	TC-L 3P	TCL-8SW3	
	V	V-8S	125			TC-L 4P	TCL-8SW4	
Mechanical interlock	MI	3P	136		Skeleton	TTC	3P	TTC-8SW3
		4P					4P	TTC-8SW4
Auxiliary handle	HT	HT-4SW 135			Rear	BTC	3P	BTC-8SW3
							4P	BTC-8SW4
Handle lock device				HL		HL-4SW	134	
						HL-S		HLS-8SW
Electrical operation device				NFM	3P	(*1)	140	
					4P			

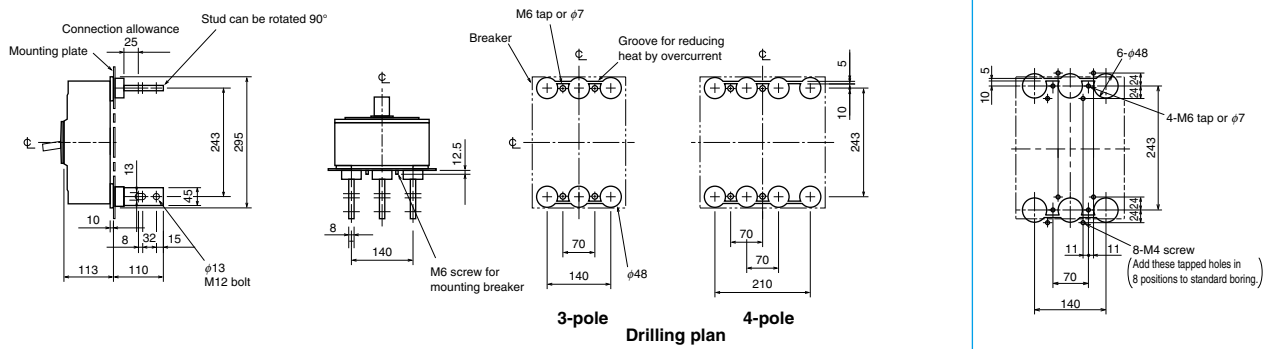
Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing

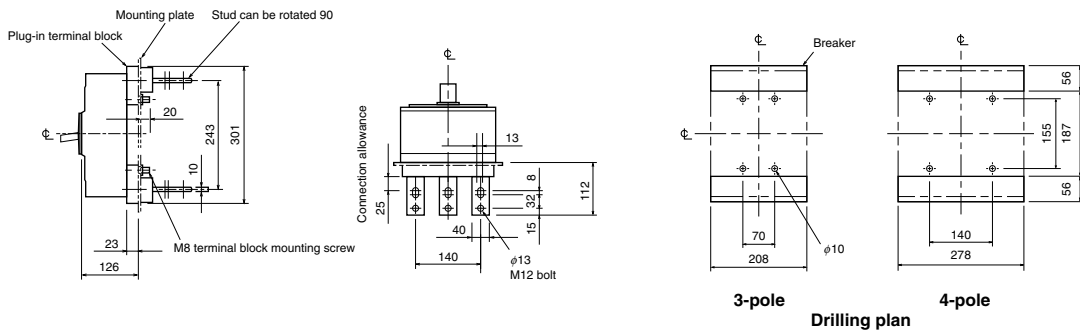
Front connection



Rear connection



Plug-in



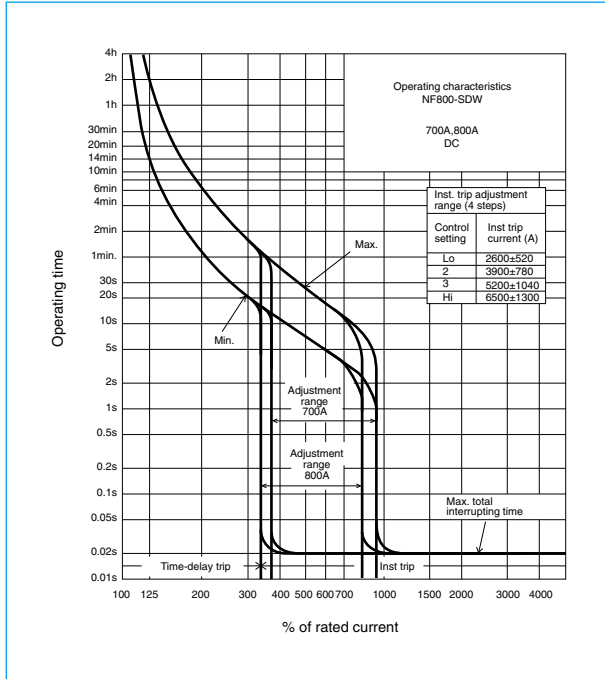
## NF800-SDW



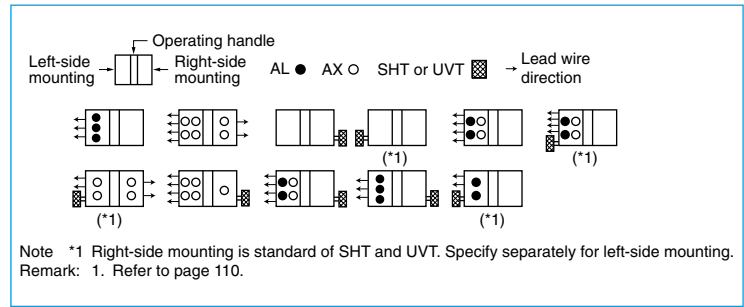
NF800-SDW

Model		NF800-SDW	
Rated current In (A)		(700), 800	
Number of poles		2	
Rated insulation voltage Ui (V)		690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	DC	250V
	Time constant not larger than 10ms		
Standard attached parts (4-pole models are provided with auxiliary handle.)		Front connection	Mounting screw: M6x35 (4pcs) Insulating barrier: (2P: 1pc, 3P: 2pcs, 4P: 3pcs)
		Rear connection	Mounting screw: M6x40 (4pcs)

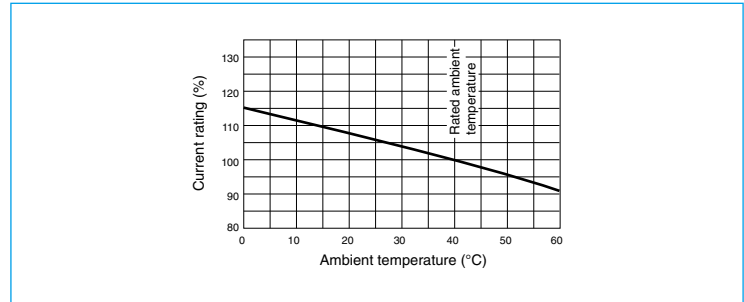
### Operating Characteristics



### Internal Accessories



### Temperature Compensation Curve



## 7 External Accessories

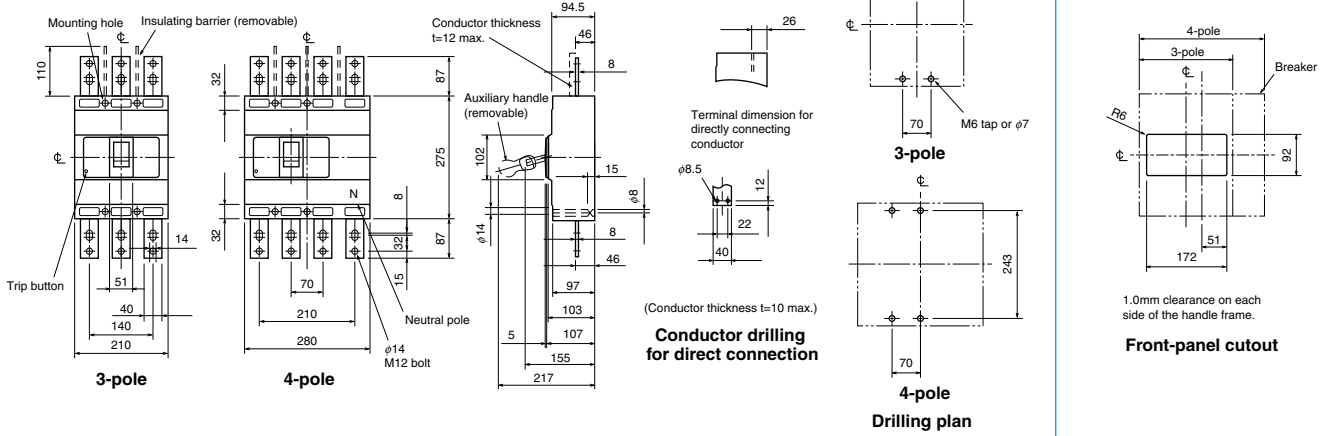
Accessories		Type name	Reference page	Accessories		Type name	Reference page	
Operating handle	F	F-8S	123	Terminal cover	Large	TC-L 2, 3P	TCL-8SW3	
	V	V-8S	125			TC-L 4P	TCL-8SW4	
Mechanical interlock	MI	2, 3P	136		Skeleton	TTC	2, 3P	TTC-8SW3
		4P					4P	TTC-8SW4
Auxiliary handle	HT	135		Rear	BTC	2, 3P	BTC-8SW3	
						4P	BTC-8SW4	
Handle lock device				HL		HL-4SW	134	
						HL-S		HLS-8SW
Electrical operation device				NFM		2, 3P	(*1)	
						4P		

Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

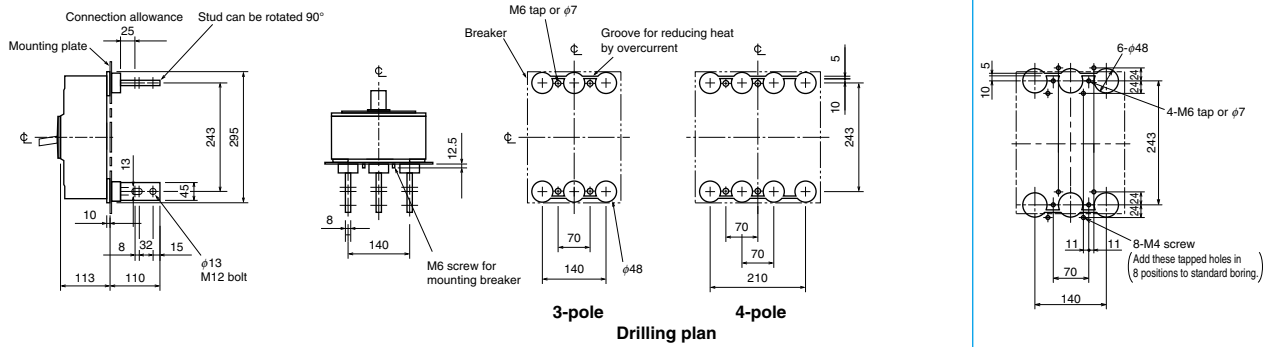


Outline Drawing

Front connection

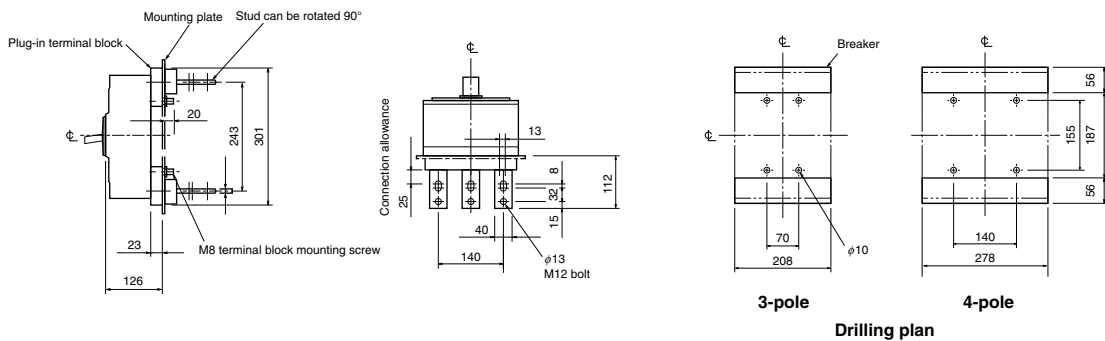


Rear connection



Boring dimensions for rear connection type barriers (3-pole)

Plug-in



Remarks: 1. Standard specification of NF800-SDW is 2-pole model. 3-pole and 4-pole models are available for DC special voltage.  
 2. 2-pole models are 3-pole models with the central pole removed.

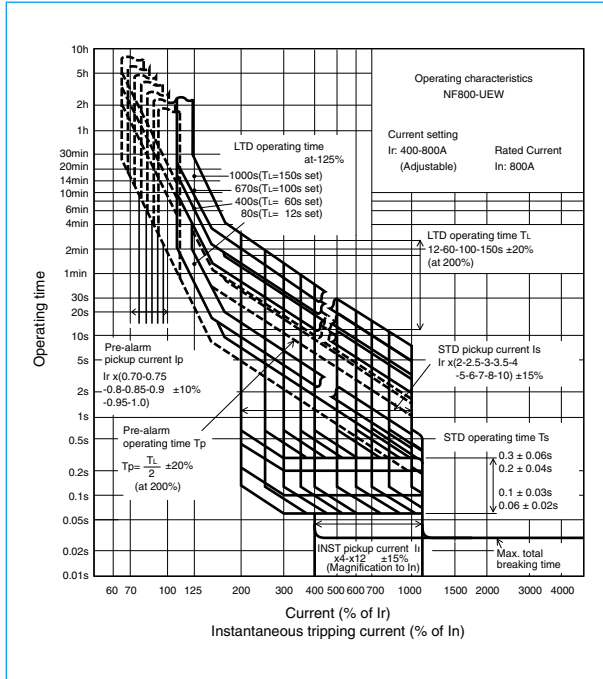
## NF800-U EW



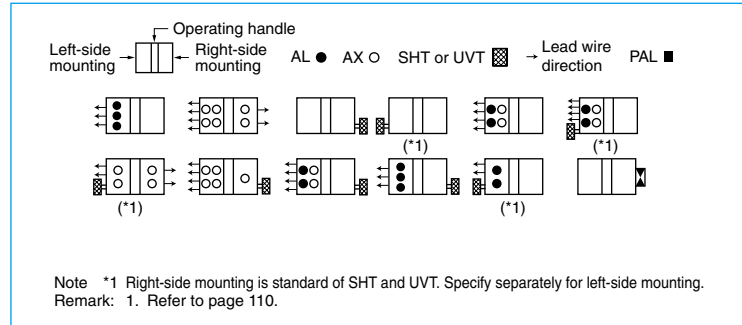
NF800-U EW

Model		NF800-U EW		
Rated current I <sub>n</sub> (A)		400-800 adjustable		
Number of poles		3	4	
Rated insulation voltage U <sub>i</sub> (V)		690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (I <sub>cu</sub> /I <sub>cs</sub> )	AC	690V	35/35
			500V	170/170
			440V	200/200
			400V	200/200
			230V	200/200
Standard attached parts (4-pole models are provided with auxiliary handle.)		Front connection	Mounting screw: 3P: M6×35, M6×132 (2pcs each) 4P: M6×35 (3pcs), M6×132 (2pcs) Insulating barrier: (3P: 2pcs, 4P: 3pcs)	
		Rear connection	Mounting screw: 3P: M6×40, M6×137 (2pcs each) 4P: M6×40 (3pcs), M6×137 (2pcs)	

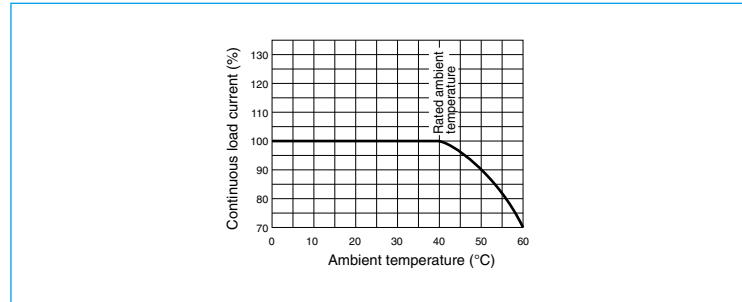
### Operating Characteristics



### Internal Accessories



### Current Reducing Curve



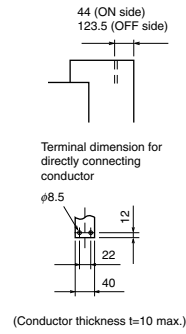
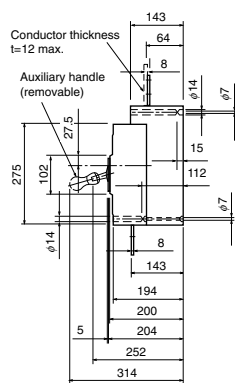
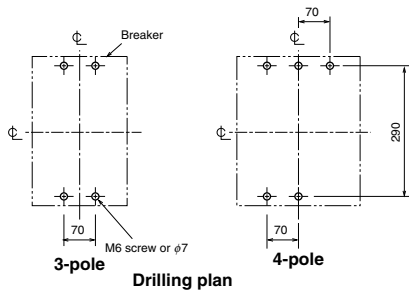
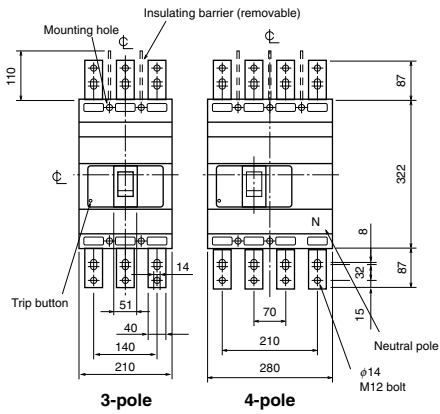
### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page	
Operating handle	F	F-8U	123	Terminal cover	Large	3P	TCL-8UW3	
	V	-	125			4P	TCL-8UW4	
Mechanical interlock	MI	3P	MI-8SW3		Skeleton	TTC	3P	-
		4P	MI-8SW4				4P	-
Auxiliary handle	HT	HT-4SW	135	Rear	BTC	3P	BTC-8SW3	
						4P	BTC-8SW4	
Handle lock device	HL	HL-4SW	134	Electrical operation device	(*1)	HL-S	HLS-8UW	
		HLS-8UW				140		

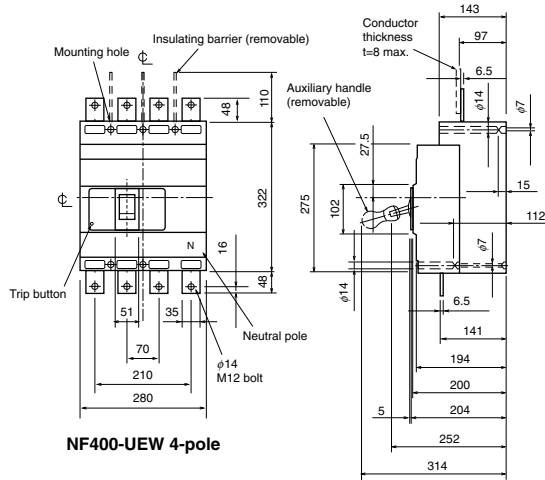
Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing

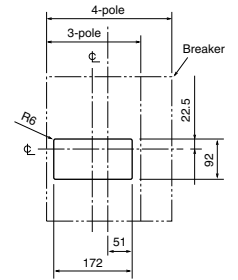
Front connection



Conductor drilling for direct connection

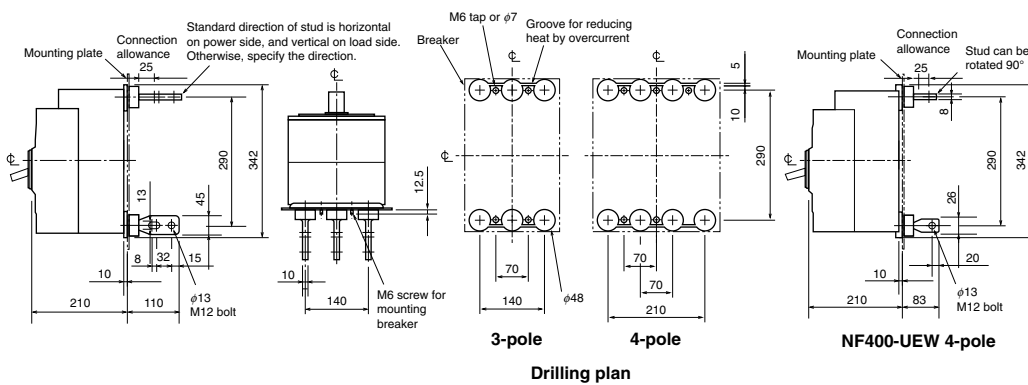


NF400-UEW 4-pole



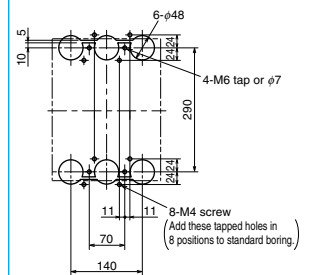
Front-panel cutout

Rear connection



Drilling plan

Boring dimensions for rear connection type barriers (3-pole)



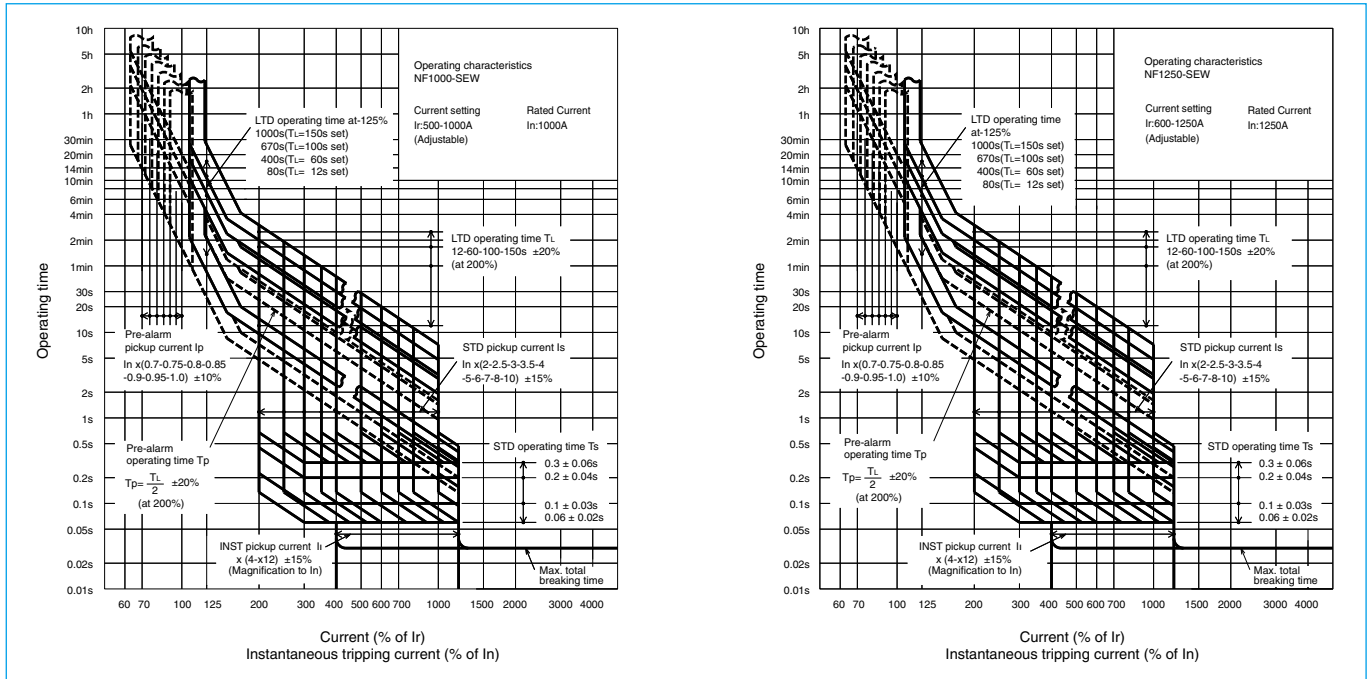
## NF1000-SEW NF1250-SEW



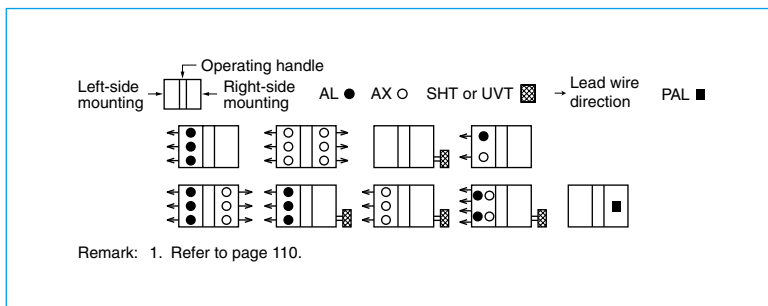
NF1250-SEW

Model		NF1000-SEW	NF1250-SEW		
Rated current In (A)		500-1000 Adjustable	600-1250 Adjustable		
Number of poles		3   4	3   4		
Rated insulation voltage Ui (V)		690	690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	25/13	25/13
			500V	65/33	65/33
			440V	85/43	85/43
			400V	85/43	85/43
			230V	125/63	125/63
Standard attached parts		Front connection	Mounting screw: M8x40 (4pcs) Insulating barrier: (3P: 2pcs, 4P: 3pcs) Auxiliary handle: (1pc)		
		Rear connection	Mounting screw: M8x40 (4pcs) Insulating barrier: (3P: 2pcs, 4P: 4pcs) Auxiliary handle: (1pc)		

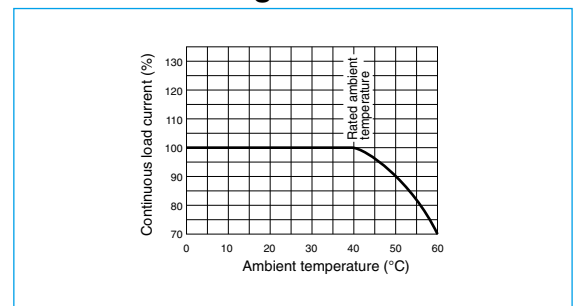
### Operating Characteristics



### Internal Accessories



### Current Reducing Curve



### External Accessories

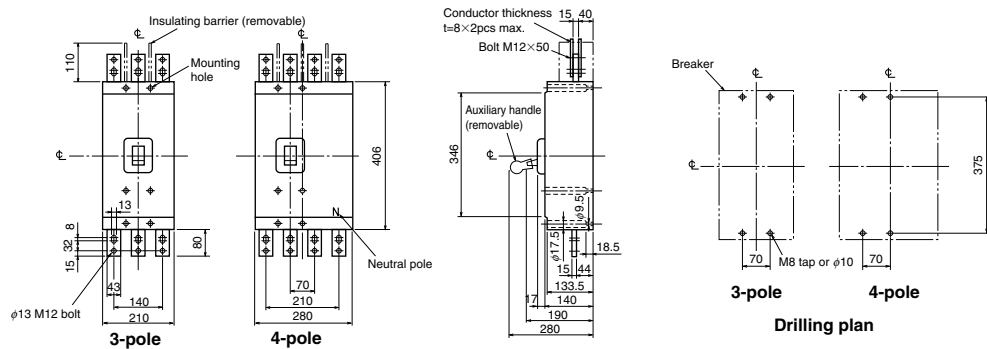
(An order for ☆ should be placed at the same time as an order of circuit breaker main body.)

Accessories	Type name	Reference page	Accessories	Type name	Reference page
Operating handle	F 3P	F10SW	Auxiliary handle	HT	HT-10SW
	4P	F10SW4P		Handle lock device	HL
Mechanical interlock	MI 3P	MI-10SW3	Large terminal cover		TC-L 3P
	4P	MI-10SW4		TC-L 4P	TCL-10SW4
			Electrical operation device	NFM 3P	140
				4P	

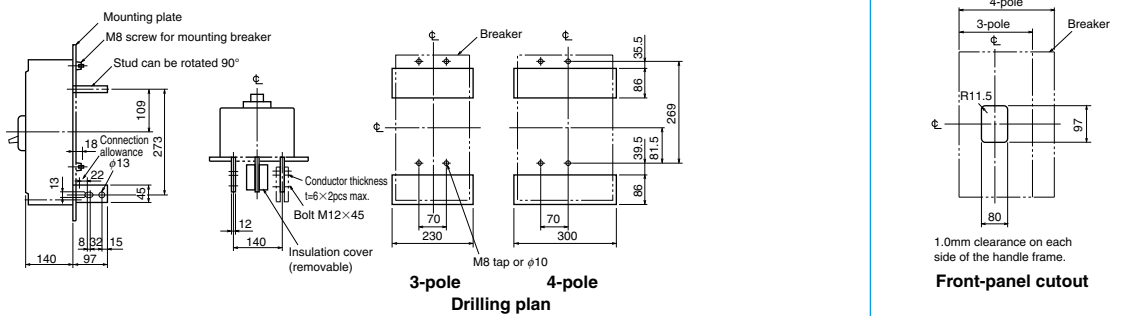
Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing

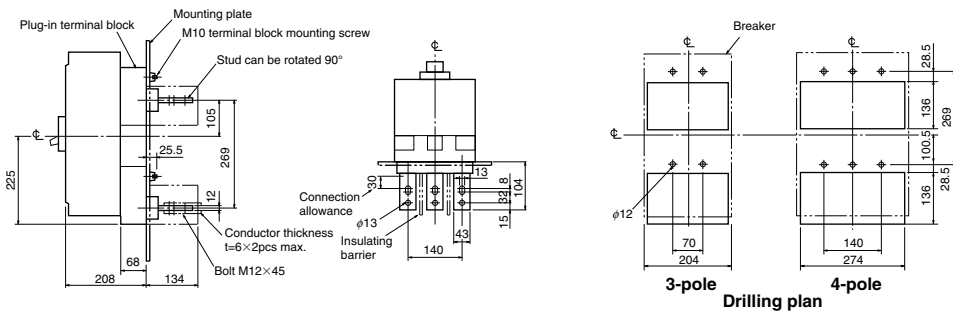
Front connection



Rear connection



Plug-in



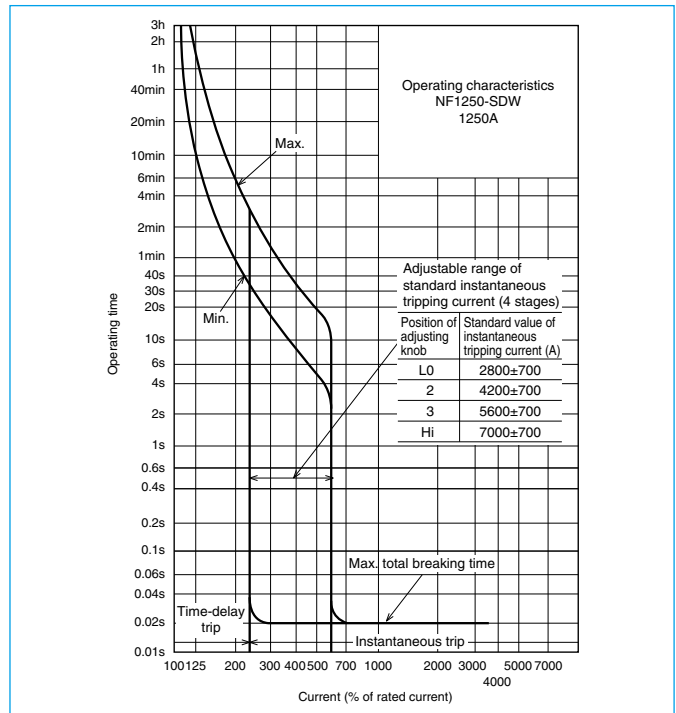
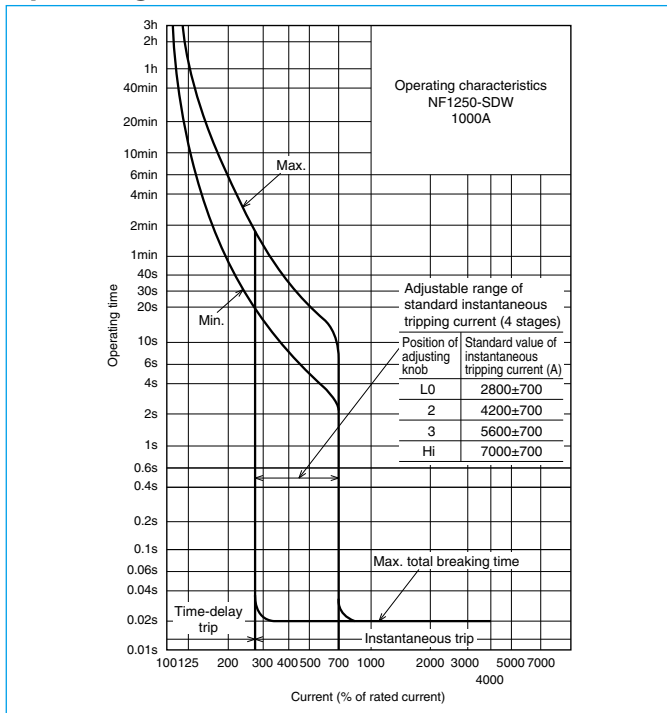
## NF1250-SDW



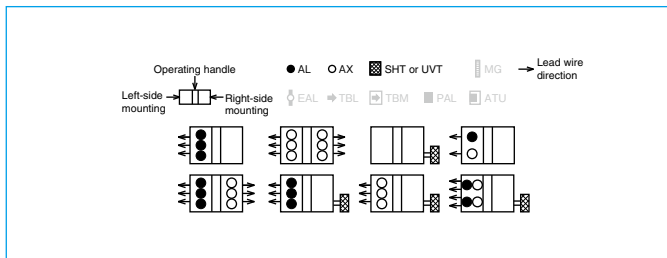
NF1250-SDW

Model				NF1250-SDW	
Rated current In (Amp.)				1000, 1250	
Number of poles				2	
Rated insulation voltage Ui (V)				690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics) Time constant not large than 10ms	DC	250V	40/20	
Standard Attached parts			Front connection	Mounting screw: M8x40 (4pcs) Insulating barrier: (2P: 1pc, 3P: 2pcs, 4P: 3pcs) Auxiliary handle: (1pc)	
			Rear connection	Mounting screw: M8x40 (4pcs) Insulating barrier: (3P: 2pcs, 4P: 4pcs) Auxiliary handle: (1pc)	

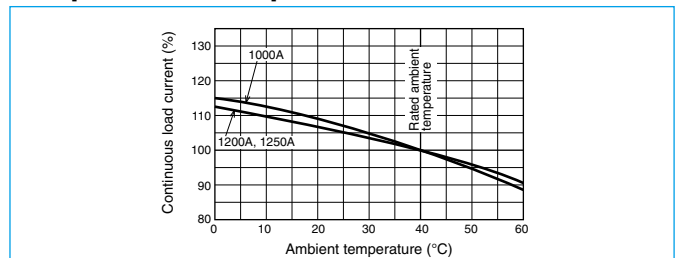
### Operating Characteristics



### Internal Accessories



### Temperature Compensation Curve



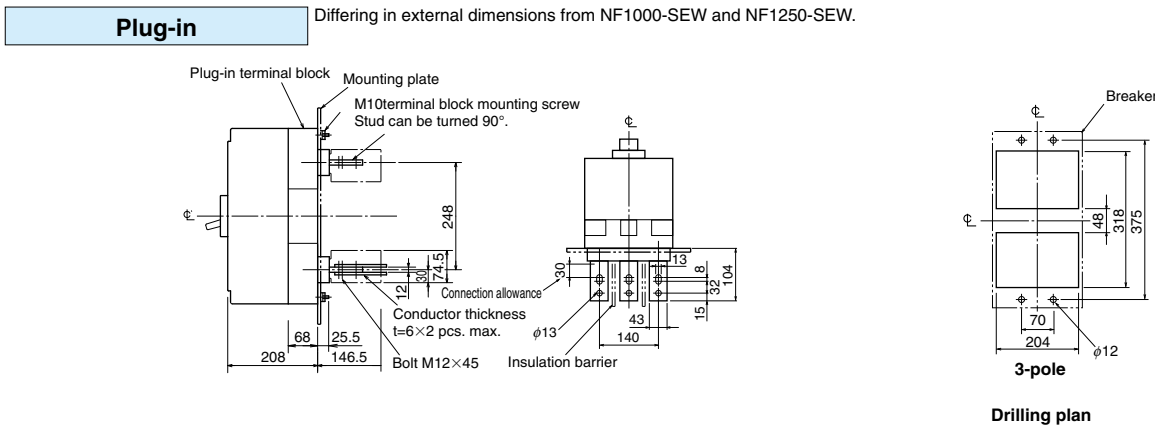
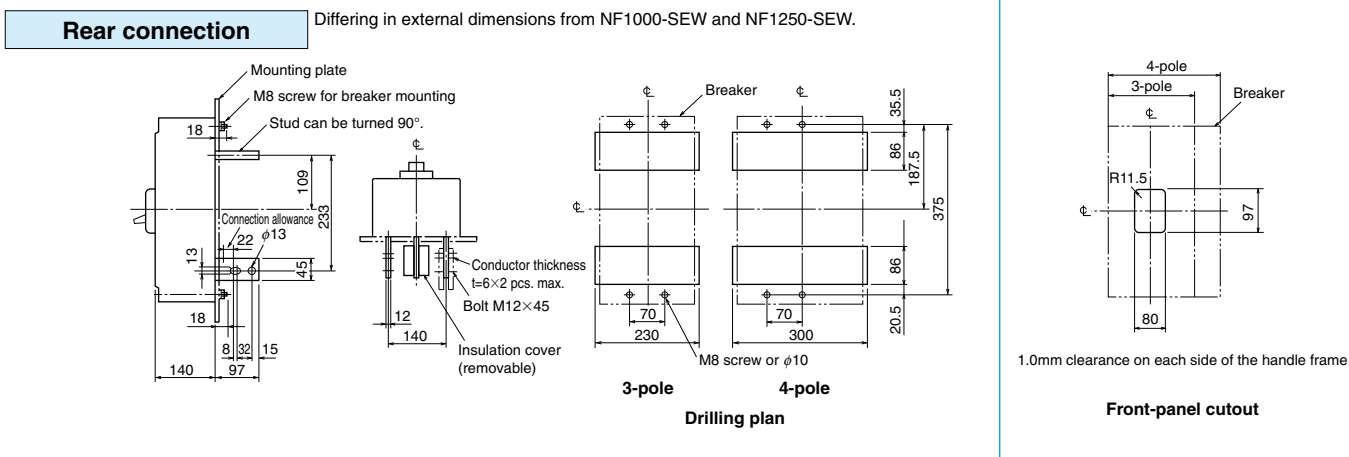
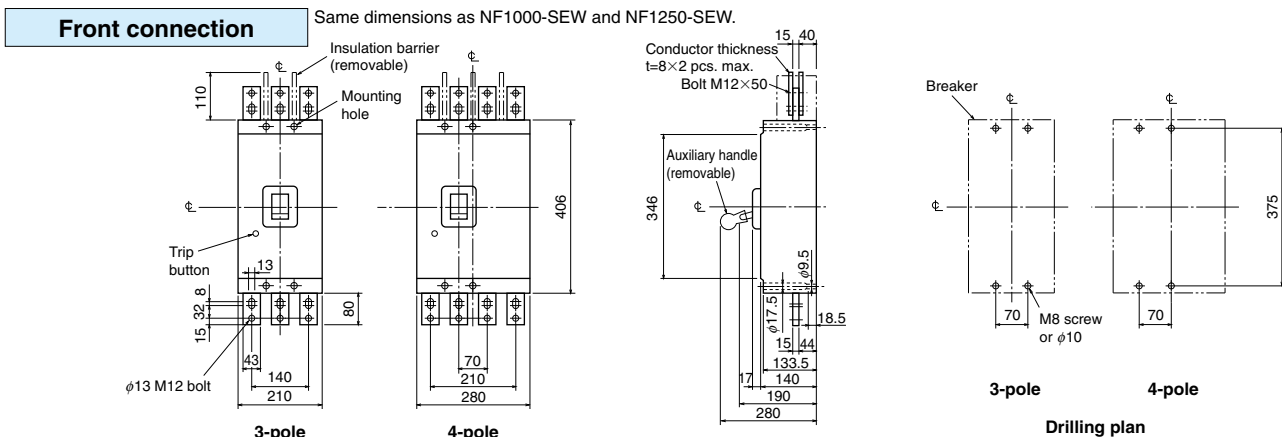
### External Accessories

(An order for ☆ should be placed at the same time as an order of circuit breaker main body.)

Accessories			Type name	Reference page	Accessories			Type name	Reference page
Operating handle	F	2, 3P	F10SW	123	Auxiliary handle	HT	HT-10SW	135	
		4P	F10SW4P		Handle lock device	HL	HL (☆)	134	
Mechanical interlock	MI	2, 3P	MI-10SW3	136	Large terminal cover	TC-L	2, 3P	TCL-10SW3	128
		4P	MI-10SW4				4P	TCL-10SW4	
					Electrical operation device	NFM	2, 3P	(*1)	140
							4P		

Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing



Remarks: 1. Standard specification of NF1250-SDW is 2-pole model. 3-pole and 4-pole models are available for DC special voltage.  
2. 2-pole models are 3-pole models with the central pole removed.

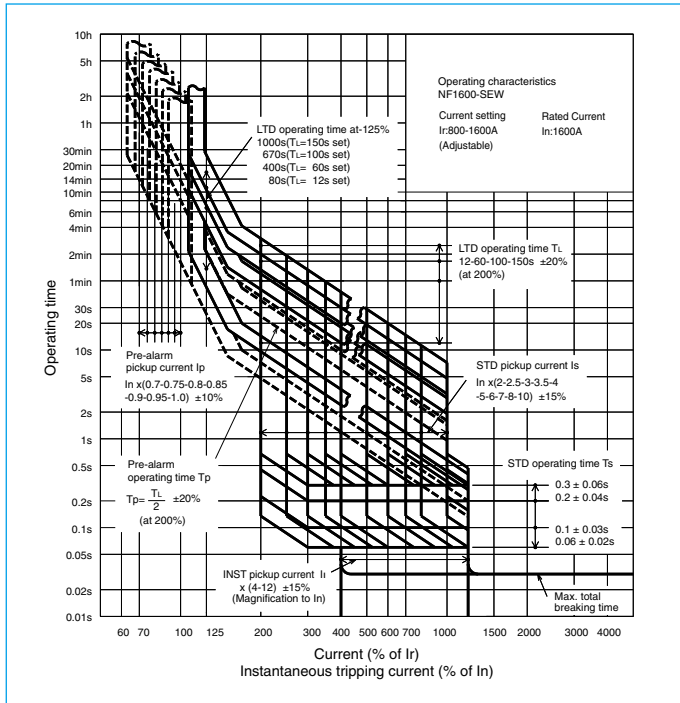
## NF1600-SEW



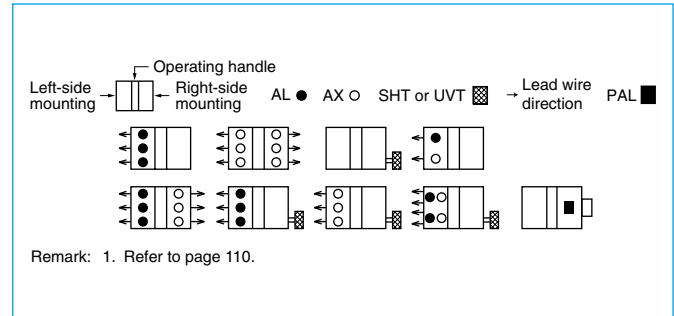
NF1600-SEW

Model		NF1600-SEW		
Rated current In (A)		Adjustable 800-1600		
Number of poles		3	4	
Rated insulation voltage Ui (V)		690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	25/13
			500V	65/33
			440V	85/43
			400V	85/43
			230V	125/63
Standard attached parts		Front connection	Mounting screw: M8 × 40 (4pcs) Insulating barrier: (3P: 2pcs, 4P: 3pcs) Auxiliary handle: (1pc)	
		Rear connection	Mounting screw: M8 × 40 (4pcs) Auxiliary handle: (1pc)	

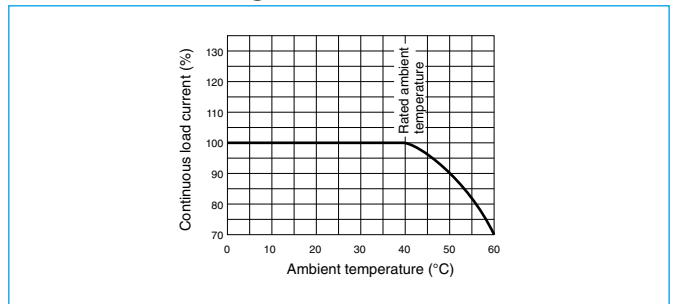
### Operating Characteristics



### Internal Accessories



### Current Reducing Curve



### External Accessories

(An order for ☆ should be placed at the same time as an order of circuit breaker main body.)

Accessories		Type name	Reference page	Accessories		Type name	Reference page
Operating handle	F	3P F10SW	123	Auxiliary handle	HT	HT-10SW	135
		4P F10SW4P		Handle lock device	HL	HL (☆)	134
Mechanical interlock	MI	3P MI-16SW3	136	Electrical operation device	NFM	3P (*1)	140
		4P MI-16SW4					

Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.





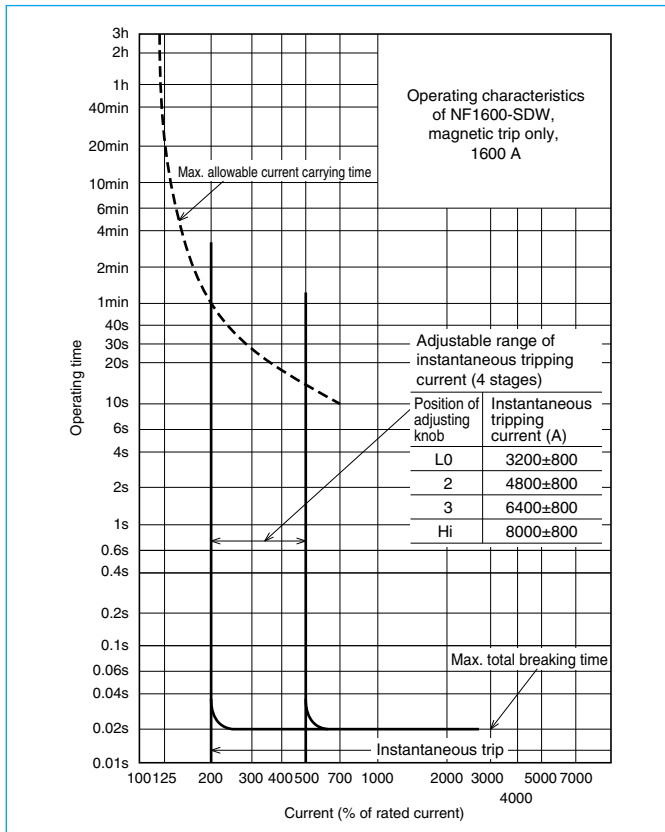
## NF1600-SDW



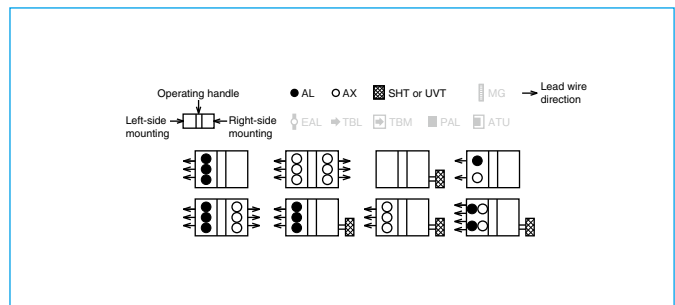
NF1600-SDW

Model				NF1600-SDW
Rated current In (Amp.)				1600
Number of poles				2
Rated insulation voltage Ui (V)				690
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics) Time constant not large than 10msec	DC	250V	40/20
Standard Attached parts		Front connection	Mounting screw: M8×40 (4pcs) Insulating barrier: (2P: 1pc, 3P: 2pcs, 4P: 3pcs) Auxiliary handle: (1pc)	
		Rear connection	Mounting screw: M8×40 (4pcs) Auxiliary handle: (1pc)	

### Operating Characteristics



### Internal Accessories



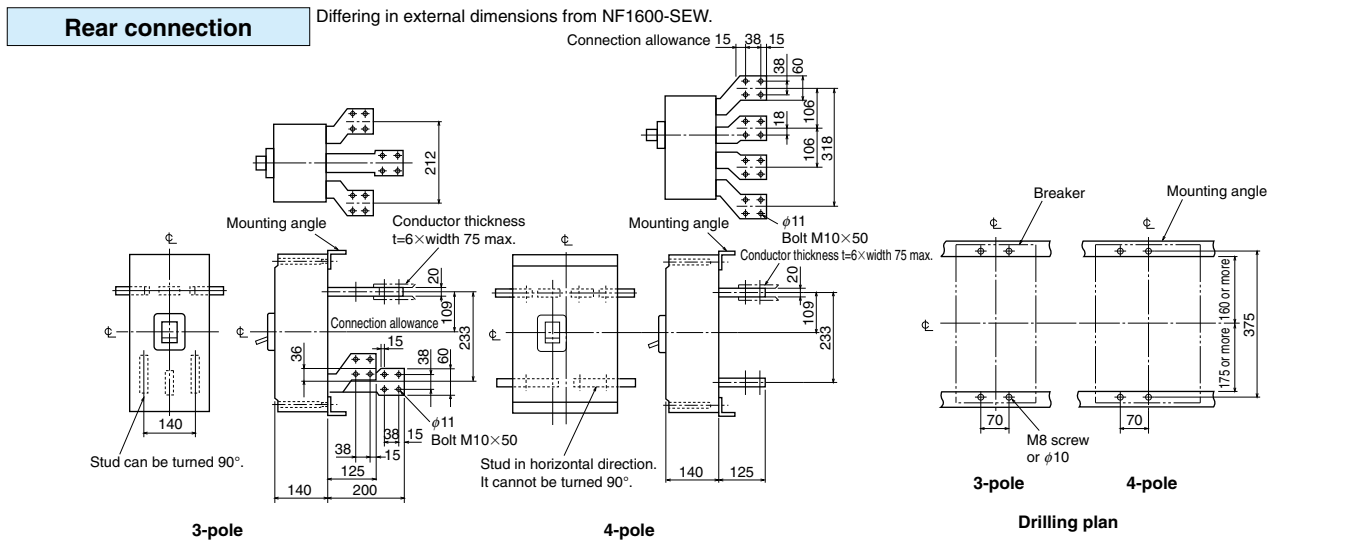
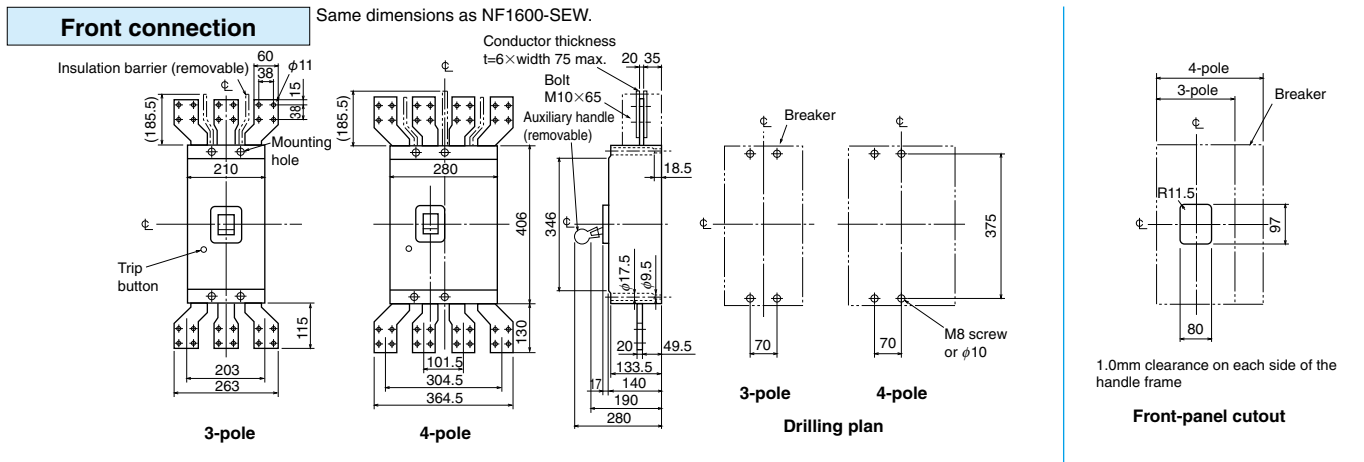
### External Accessories

(An order for ☆ should be placed at the same time as an order of circuit breaker main body.)

Accessories	Type name	Reference page	Accessories	Type name	Reference page
Operating handle	F 2, 3P	F10SW	Auxiliary handle	HT	HT-10SW
	4P	F10SW4P		Handle lock device	HL
Mechanical interlock	MI 2, 3P	MI-16SW3	Electrical operation device	NFM	2, 3P 4P
	4P	MI-16SW4			

Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

Outline Drawing



Remarks: 1. Standard specification of NF1600-SDW is 2-pole model. 3-pole and 4-pole models are available for DC special voltage.  
 2. 2-pole models are 3-pole models with the central pole removed.

**NV32-SV**  
**NV63-CV**  
**NV63-SV**  
**NV63-HV**

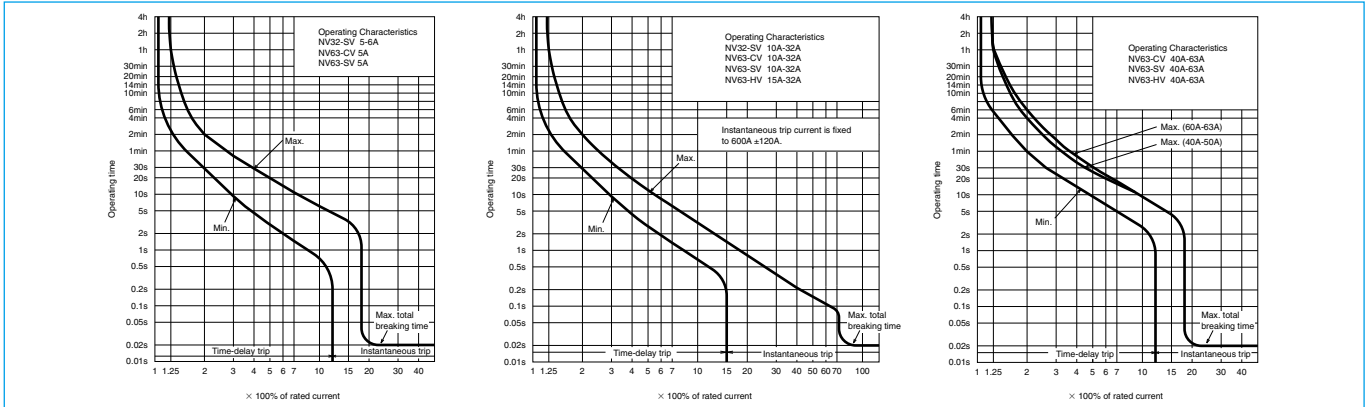


**NV63-SV**

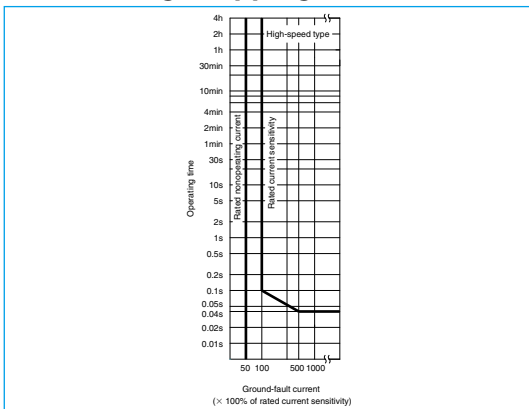
Model		NV32-SV	NV63-CV	NV63-SV	NV63-HV			
Rated current I <sub>n</sub> (A)		(5) 6 10 (15) 16 20 25 (30) (32)	(5) (10) (15) 16 20 25 (30) 32 40 50 (60) 63	(5) (10) (15) 16 20 25 (30) 32 40 50 (60) 63	(15) 16 20 25 (30) 32 40 50 (60) 63			
Number of poles		3	2	3	3			
Phase line		3φ3W, 1φ3W, 1φ2W	1φ2W	3φ3W, 1φ3W, 1φ2W	3φ3W, 1φ3W, 1φ2W			
Rated operational voltage U <sub>e</sub> (V)		AC 100-440	100-240	100-440	100-440			
High-speed type	Rated current sensitivity (mA)	30 100/200/500 selectable	30	30 100/200/500 selectable	30 100/200/500 selectable			
	Max operating time (s)	at Δn 0.1 at 5Δn 0.04	0.1 0.04	0.1 0.04	0.1 0.04			
Time-delay type	Rated current sensitivity (mA)	-	-	-	-			
	Max operating time (s)	-	-	-	-			
Inertial operating time (s) (or more)		-	-	-	-			
Earth-leakage indication system		Mechanical type (button)	Mechanical type (button)	Mechanical type (button)	Mechanical type (button)			
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	5/5	-	2.5/2.5	7.5/7.5	10/8
			415V	5/5	-	2.5/2.5	7.5/7.5	10/8
			400V	5/5	-	5/5	7.5/7.5	10/8
			230V	10/10	-	7.5/7.5	15/15	25/19
			200V	10/10	-	7.5/7.5	15/15	25/19
			100V	10/10	-	7.5/7.5	15/15	25/19
Standard attached parts (Front connection)		Mounting screw: M4×0.7×55 (2pcs) (*1)		Insulation barrier: (2P: 1pc, 3P: 2pcs)				

Note \*1 Attached to NV63-SV and NV63-HV.

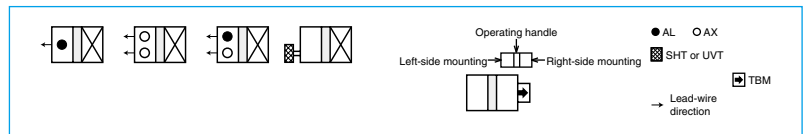
## Operating Characteristics



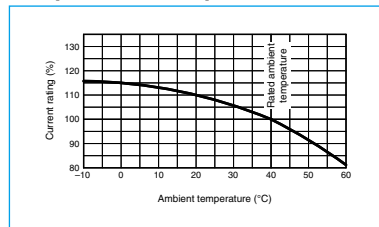
## Earth leakage Tripping Characteristics



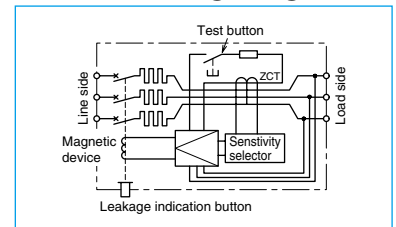
## Internal Accessories



## Temperature Compensation Curve



## Internal Wiring Diagram



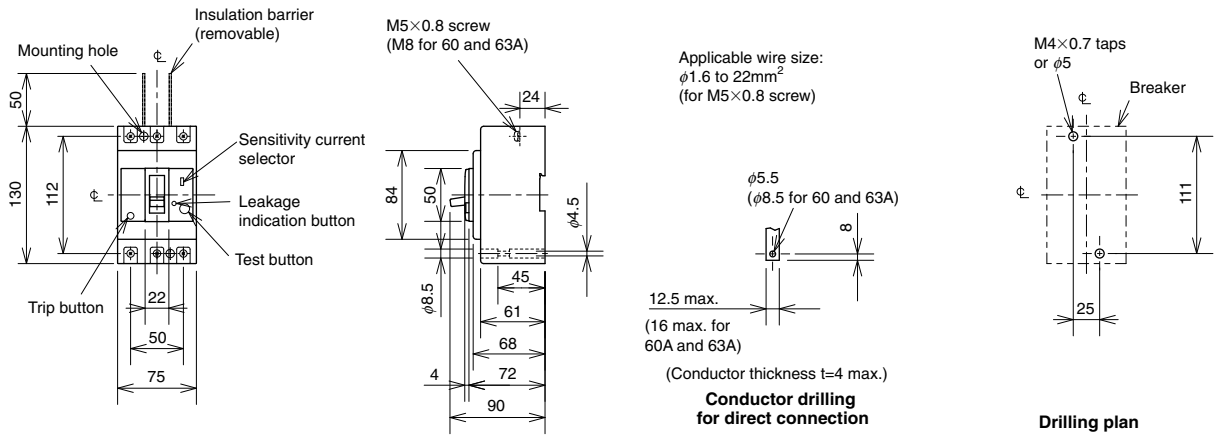
## External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page
Operating handle	F F-05SV	123	Mechanical interlock	MI MI-05SV3	136
	V V-05SV	125	Terminal cover	Small TC-S	TCS-05SV3
Handle lock device	LC LC-05SV	134		Large TC-L	TCL-05SV3
	HL (*1) HLF-05SV			Skeleton TTC	TTC-05SV3
	HLN-05SV			Rear BTC	BTC-05SV3
	HLS-05SV			Plug-in PTC	PTC-05SV3
		IEC 35mm rail mounting adapters	DIN-05SV	143	

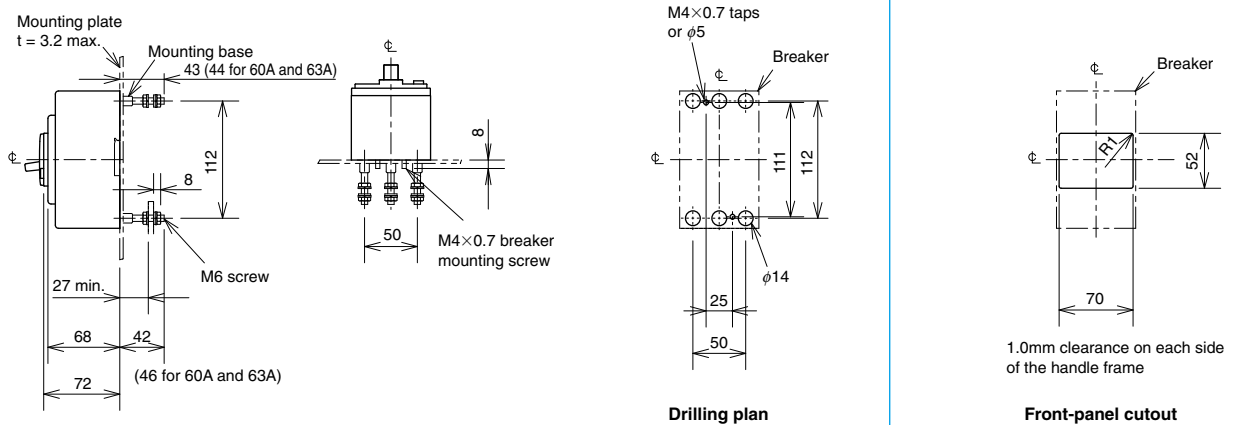
Note \*1 HLF types are used for OFF lock and HLN types for ON lock.

Outline Drawing

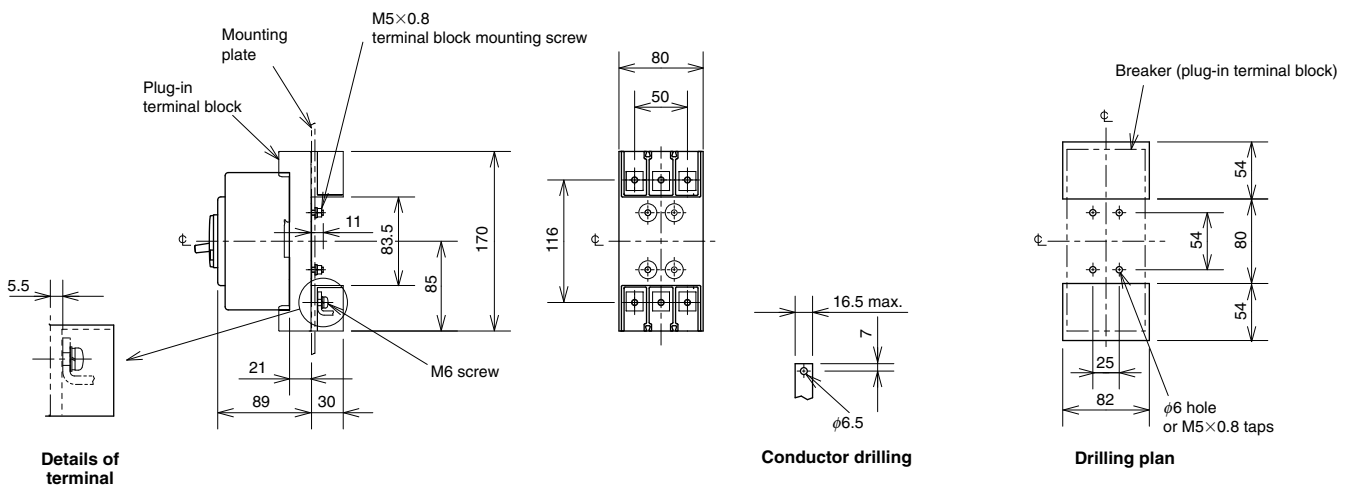
**Front connection**



**Rear connection**



**Plug-in**



Remark: 1. 2-pole models are 3-pole models with the central pole removed.

## NV125-CV NV125-SV NV125-HV

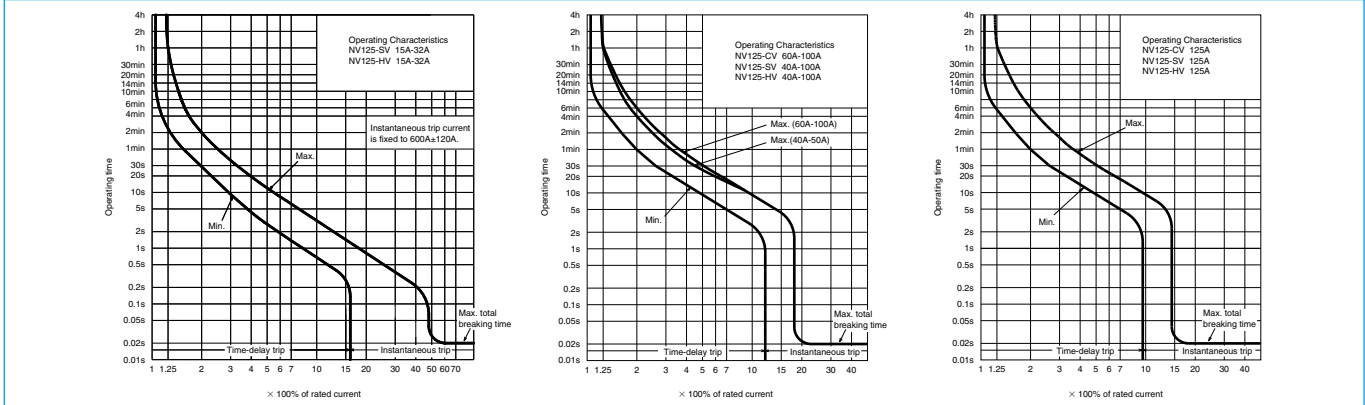


NV125-SV

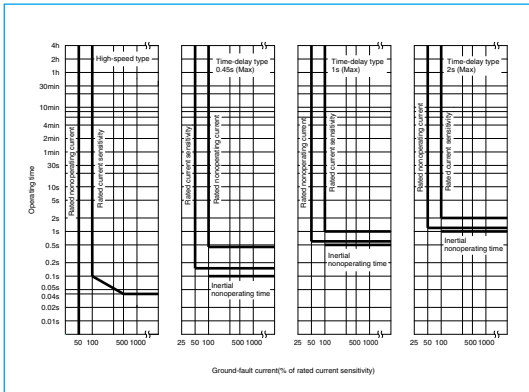
Model		NV125-CV			NV125-SV		NV125-HV		
Rated current I <sub>n</sub> (A)		(60) 63 (75) 80 100 125			(15) 16 20 30 32 40 50 (60) 63 (75) 80 100 125 (*2)		(15) 16 20 (30) 32 40 50 (60) 63 75 80 100 125 (*2)		
Number of poles		3			3	4	3	4	
Phase line		3φ3W, 1φ3W, 1φ2W			3φ3W, 1φ3W, 1φ2W	3φ4W	3φ3W, 1φ3W, 1φ2W	3φ4W	
Rated operational voltage U <sub>e</sub> (V)		AC 100-440			100-440	200-440	100-440	200-440	
High-speed type	Rated current sensitivity (mA)	30 100/200/500 selectable			30 100/200/500 selectable		30 100/200/500 selectable		
	Max operating time (s)	at IΔn	0.1			0.1		0.1	
		at 5IΔn	0.04			0.04		0.04	
Time-delay type	Rated current sensitivity (mA)	(100/200/500 selectable)			(100/200/500 selectable)		(100/200/500 selectable)		
	Max operating time (s)	(0.45/1.0/2.0 selectable)			(0.45/1.0/2.0 selectable)		(0.45/1.0/2.0 selectable)		
	Inertial operating time (s) (or more)	(0.1/0.5/1.0)			(0.1/0.5/1.0)		(0.1/0.5/1.0)		
Earth-leakage indication system		Mechanical type (button)			Mechanical type (button)		Mechanical type (button)		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	10/5	25/25		50/38		
			415V	10/5	30/30		50/38		
			400V	10/5	30/30		50/38		
			230V	30/15	50/50		100/75		
			200V	30/15	50/50		100/75		
			100V	30/15	50/50	-	100/75	-	
Standard attached parts (Front connection)				Mounting screw: M4×0.7×55 (3P: 2pcs, 4P: 4pcs) (*1) Insulation barrier: (3P: 2pcs, 4P: 3pcs)					

Note \*1 Attached to NV125-SV and NV125-HV.  
\*2 In case of time delay type, rated current is produced with 20amp. or more.

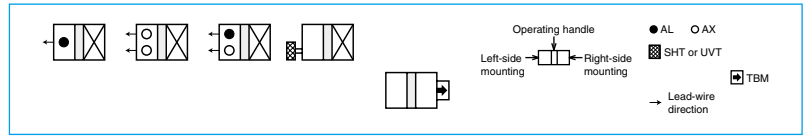
### Operating Characteristics



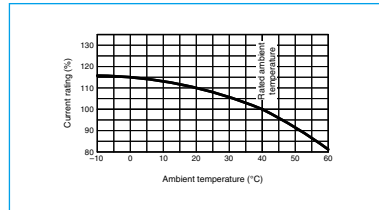
### Earth leakage Tripping Characteristics



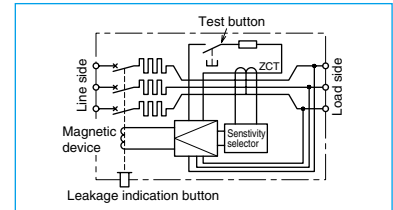
### Internal Accessories



### Temperature Compensation Curve



### Internal Wiring Diagram



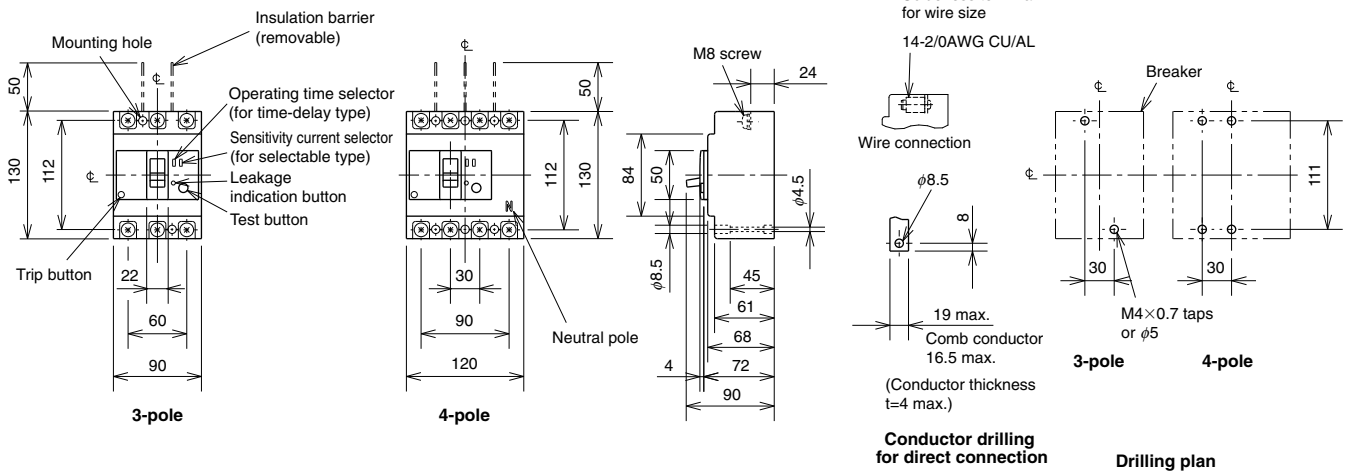
### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page
Operating handle	F	F-1SV	123	Mechanical interlock	MI	3P MI-05SV3	136
	V	V-1SV	125		4P MI-1SV4		
Handle lock device	LC	LC-05SV	134	Terminal cover	Small	3P TCS-1SV3	128
	HL (*1)	HLF-05SV				4P TCS-1SV4	
	HL-S	HLN-05SV			3P TCL-1SV3		
		HLS-05SV			4P TCL-1SV4		
Rear	3P TTC-1SV3	4P TTC-1SV4					
	3P BTC-1SV3		4P BTC-1SV4				
Plug-in	3P PTC-1SV3	4P PTC-1SV4					
	4P PTC-1SV4						
Electrical operation device				(*2)		140	

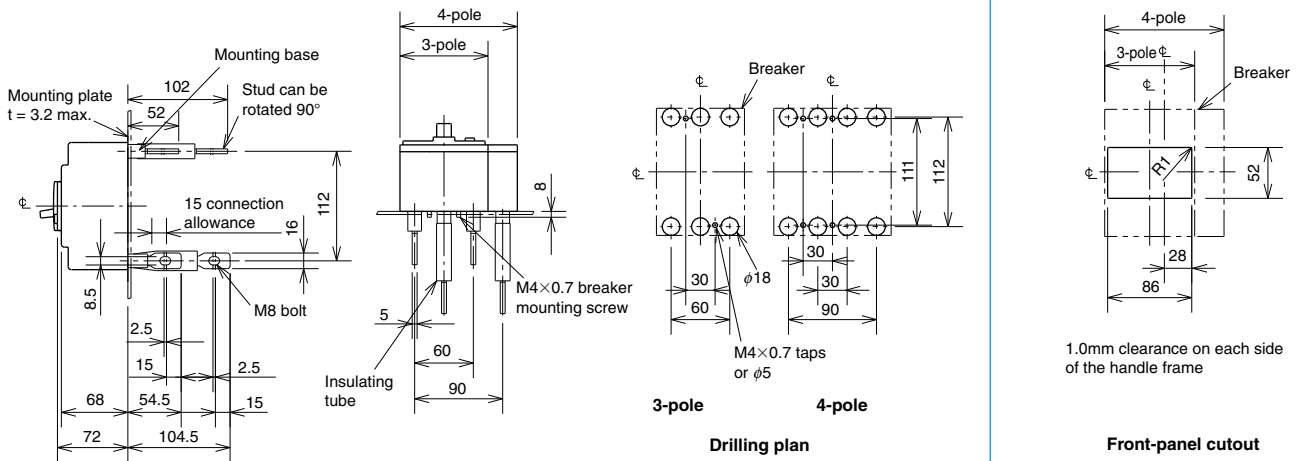
Notes \*1 HLF types are used for OFF lock and HLN types for ON lock.  
\*2 Specify the working voltage. Refer to the reference page for type name.

Outline Drawing

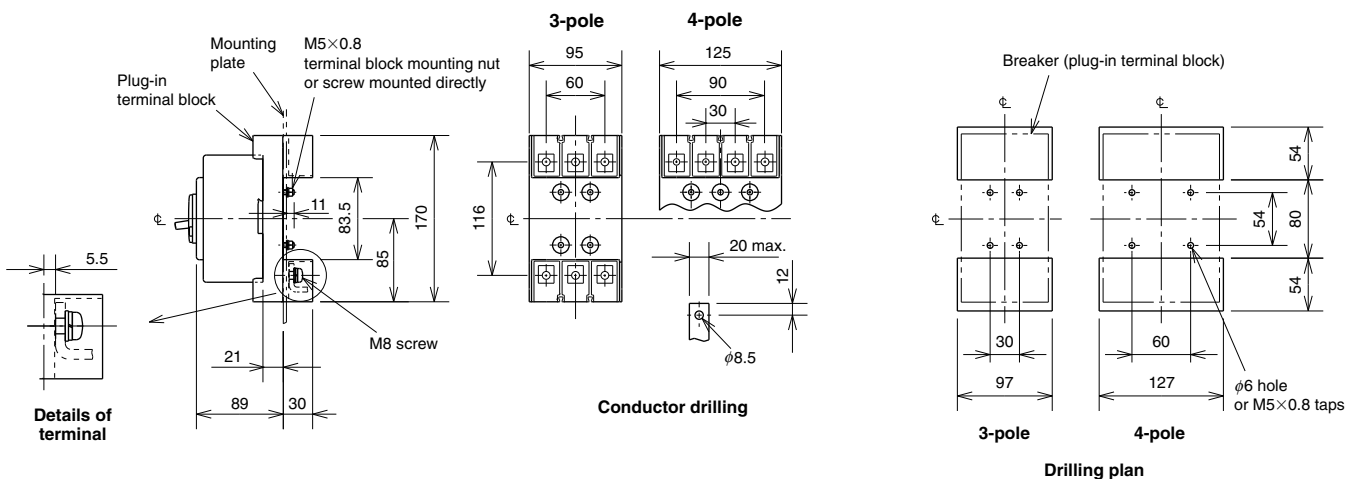
Front connection



Rear connection



Plug-in



Remark: 1. Only 3-pole models are available for NV125-CV.

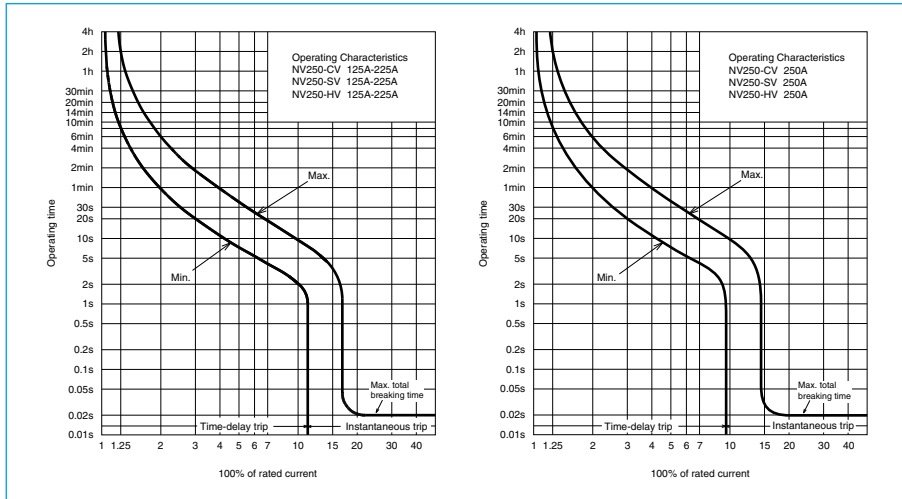
## NV250-CV NV250-SV NV250-HV



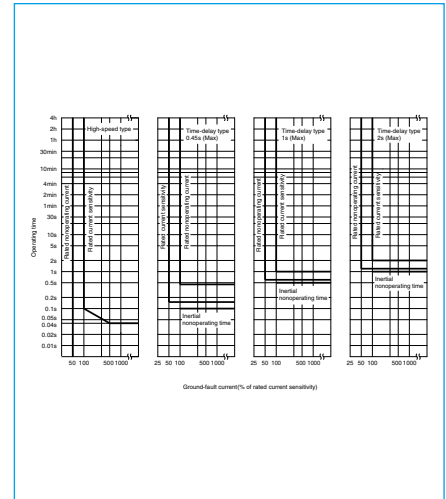
NV250-CV

Model		NV250-CV		NV250-SV		NV250-HV	
Rated current I <sub>n</sub> (A)		125 150 175	200 225 250	125 150 175	200 225 250	125 150 175	200 225 250
Number of poles		3		3	4	3	4
Phase line		3φ3W, 1φ3W, 1φ2W		3φ3W, 1φ3W, 1φ2W	3φ4W	3φ3W, 1φ3W, 1φ2W	3φ4W
Rated operational voltage U <sub>e</sub> (V)		AC 100-440		100-440	200-440	100-440	200-440
High-speed type	Rated current sensitivity (mA)	30 100/200/500 selectable		(30) 100/200/500 selectable		30 100/200/500 selectable	
	Max operating time (s)	at IΔn 0.1 at 5IΔn 0.04		0.1 0.04		0.1 0.04	
Time-delay type	Rated current sensitivity (mA)	(100/200/500 selectable)		(100/200/500 selectable)		(100/200/500 selectable)	
	Max operating time (s)	(0.45/1.0/2.0 selectable)		(0.45/1.0/2.0 selectable)		(0.45/1.0/2.0 selectable)	
	Inertial operating time (s) (or more)	(0.1/0.5/1.0)		(0.1/0.5/1.0)		(0.1/0.5/1.0)	
Earth-leakage indication system		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	15/12	36/36	65/65	
			415V	25/19	36/36	70/70	
			400V	25/19	36/36	75/75	
			230V	36/27	85/85	100/100	
			200V	36/27	85/85	100/100	
100V	36/27	85/85	100/100	–			
Standard attached parts (Front connection)		Mounting screw: M4×0.7×55 (3P: 2pcs, 4P: 4pcs)		Insulation barrier: (3P: 4pcs, 4P: 6pcs)			

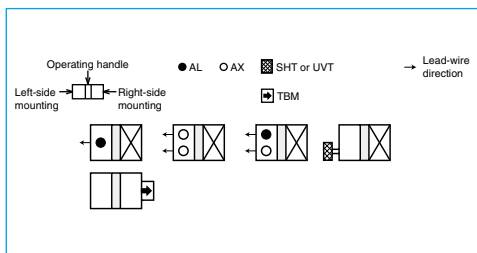
### Operating Characteristics



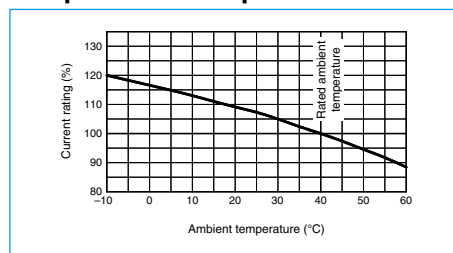
### Earth leakage Tripping Characteristics



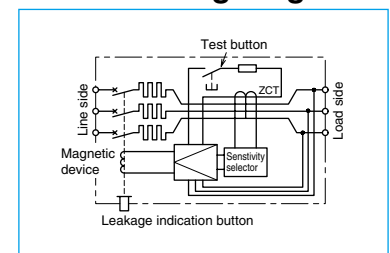
### Internal Accessories



### Temperature Compensation Curve



### Internal Wiring Diagram



### External Accessories

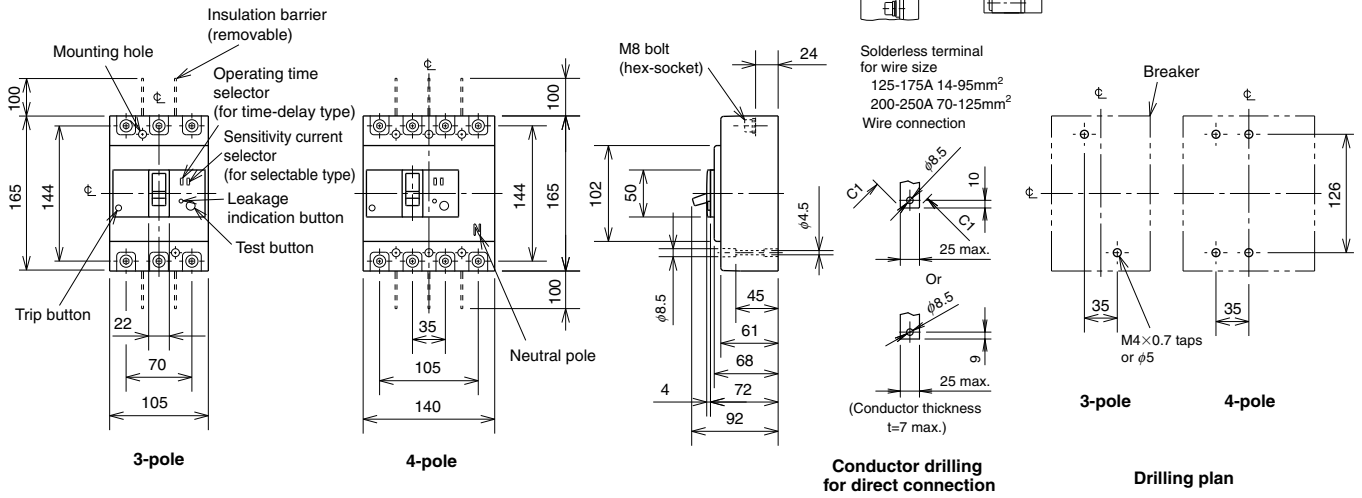
Accessories	Type name	Reference page	Accessories	Type name	Reference page
Operating handle	F	F-2SV	Mechanical interlock	3P	MI-05SV3
	V	V-2SV		4P	MI-2SV4
Handle lock device	LC	LC-05SV	Terminal cover	3P	TCS-2SV3
	HL (*1)	HLF-05SV		4P	TCS-2SV4
	HL-S	HLS-2SV		3P	TCL-2SV3
		4P		TCL-2SV3L	
		4P		TCL-2SV4	
		3P		TTC-2SV3	
		4P		TTC-2SV4	
		3P		BTC-2SV3	
		4P		BTC-2SV4	
		3P		PTC-2SV3	
		4P		PTC-2SV4	
Electrical operation device				(*2)	

Notes \*1 HLF types are used for OFF lock and HLN types for ON lock.  
\*2 Specify the working voltage. Refer to the reference page for type name.

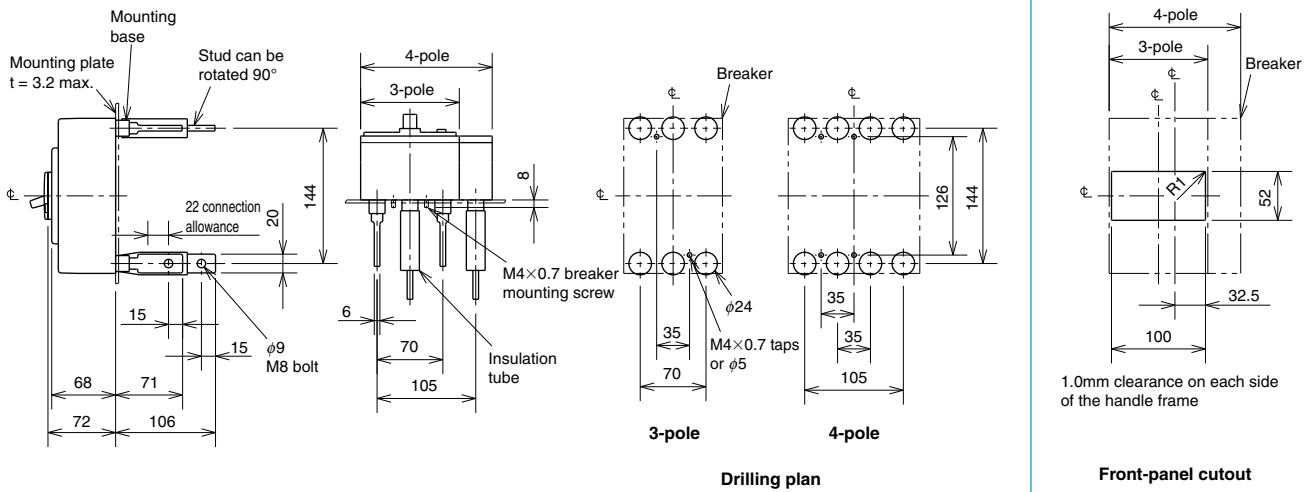


Outline Drawing

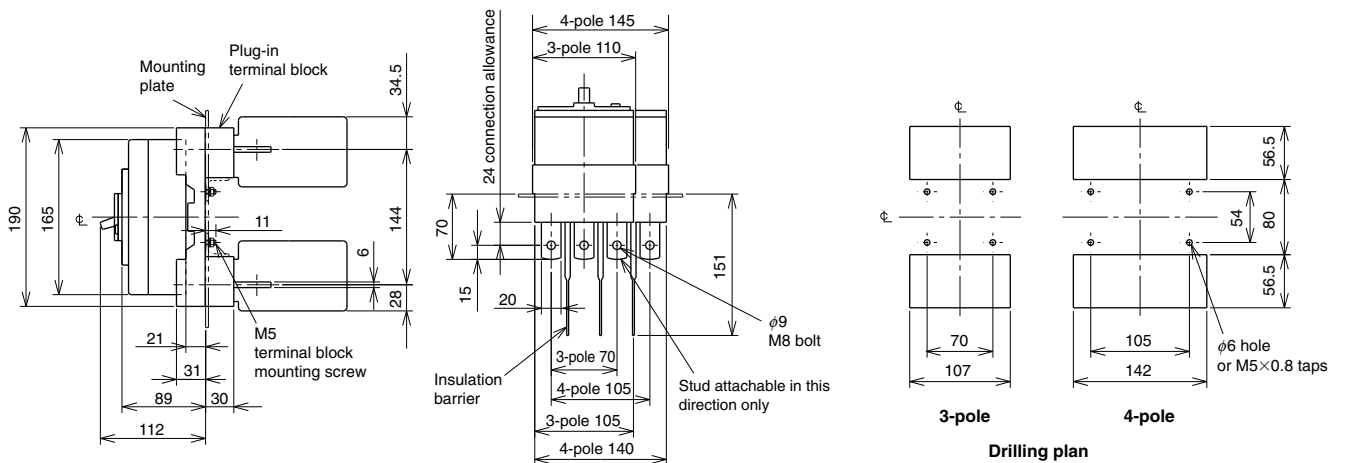
**Front connection**



**Rear connection**



**Plug-in**



Remark: 1. Only 3-pole models are available for the model of NV250-CV.

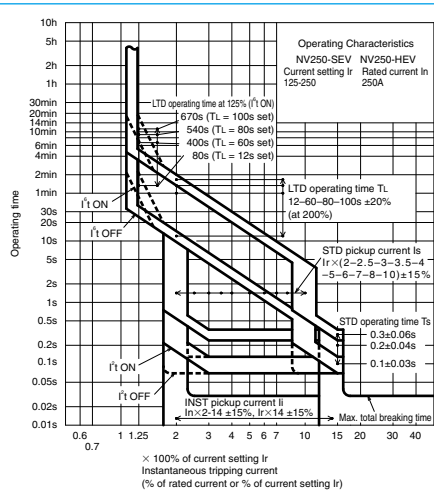
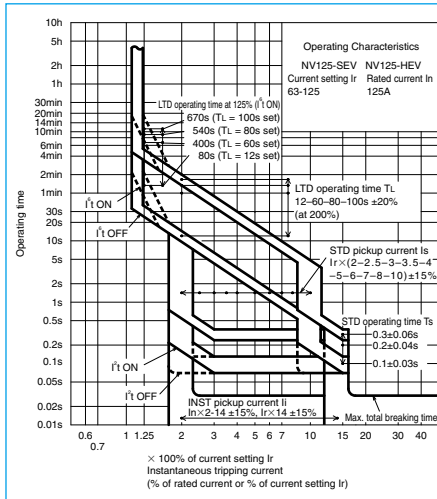
## NV125-SEV NV125-HEV NV250-SEV NV250-HEV



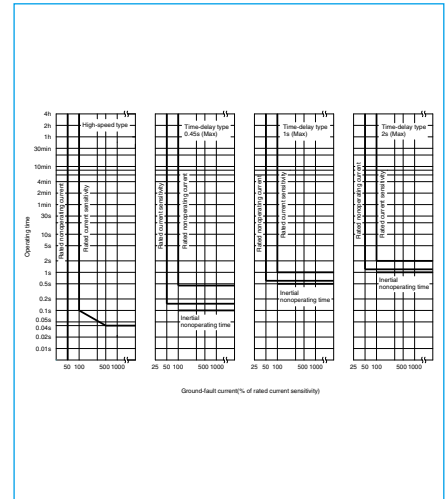
NV250-SEV

Model		NV125-SEV		NV125-HEV		NV250-SEV		NV250-HEV		
Rated current In (A)		125		125		250		250		
Current setting Ir (A)		63-125		63-125		125-250		125-250		
Number of poles		3		4		3		3		
Phase line type		3φ3W, 1φ2W		3φ4W		3φ3W, 1φ2W		3φ4W		
Rated operational voltage Ui		V		440		440		440		
Rated operational voltage Ue (V)		AC		100-440		100-440		100-440		
High-speed type	Rated current sensitivity (mA)	(30)		(30)		(30)		(30)		
	Max operating time (s)	at IΔn	100/200/500 selectable		100/200/500 selectable		100/200/500 selectable		100/200/500 selectable	
		at 5IΔn	0.1		0.1		0.1		0.1	
Time-delay type	Rated current sensitivity (mA)	(100/200/500 selectable)		(100/200/500 selectable)		(100/200/500 selectable)		(100/200/500 selectable)		
	Max operating time (s)	at IΔn	0.04		0.04		0.04		0.04	
		at 5IΔn	0.1		0.1		0.1		0.1	
Inertial operating time (s) (or more)		(0.1/0.5/1.0)		(0.1/0.5/1.0)		(0.1/0.5/1.0)		(0.1/0.5/1.0)		
Earth-leakage indication system		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)		Mechanical type (button)		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	36/36	65/65	36/36	65/65			
			415V	36/36	70/70	36/36	70/70			
			400V	36/36	75/75	36/36	75/75			
			230V	85/85	100/100	85/85	100/100			
			200V	85/85	100/100	85/85	100/100			
			100V	85/85	100/100	85/85	100/100			
Standard attached parts (Front connection)				Mounting screw: M4×0.7×55 (3P: 2pcs, 4P: 4pcs)		Insulation barrier: (3P: 4pcs, 4P: 6pcs)				

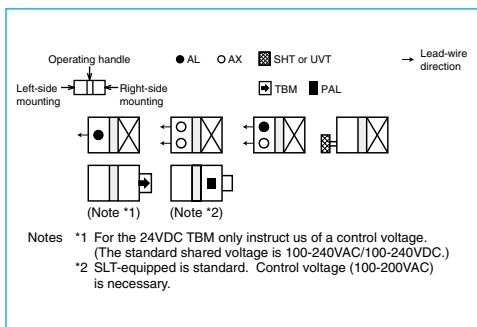
### Operating Characteristics



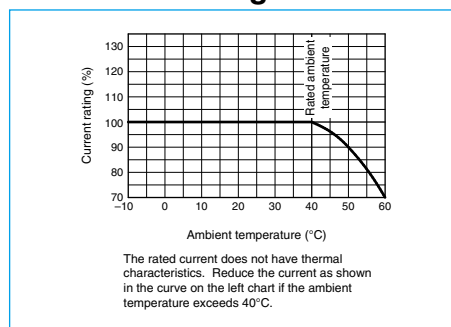
### Earth leakage Tripping Characteristics



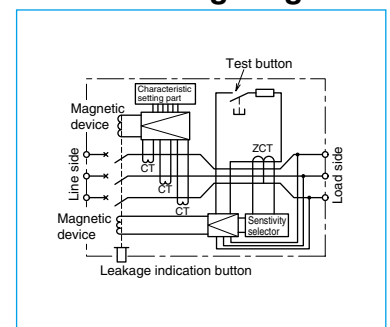
### Internal Accessories



### Current Reducing Curve



### Internal Wiring Diagram

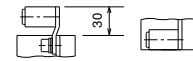
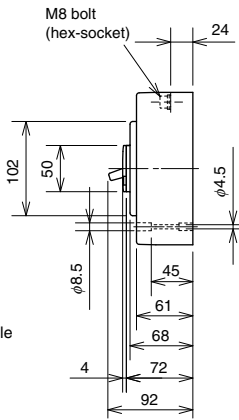
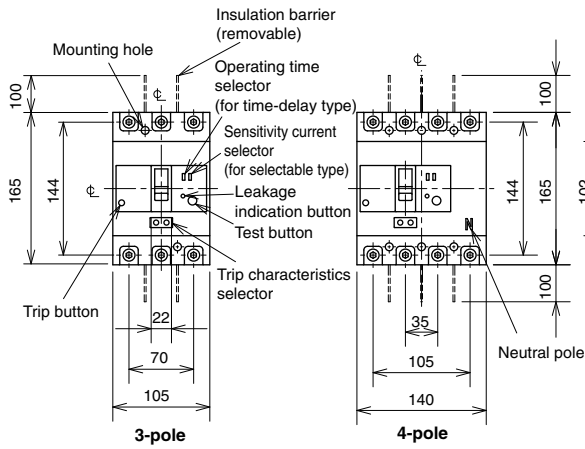


### External Accessories

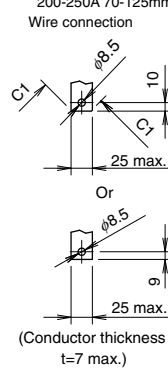
Accessories	Type name	Reference page	Accessories	Type name	Reference page
Operating handle	F	F-2SV	Mechanical interlock	3P	MI-05SV3
	V	V-2SV		4P	MI-2SV4
Handle lock device	LC	LC-05SV	Small	3P	TCS-2SV3
	HL (*1)	HLF-05SV		4P	TCS-2SV4
	HL-S	HLN-05SV	Large	3P	TCL-2SV3
	HL-S	HLS-2SV		4P	TCL-2SV4
Terminal cover	134	134	Skeleton	3P	TTC-2SV3
				4P	TTC-2SV4
			Rear	3P	BTC-2SV3
				4P	BTC-2SV4
			Plug-in	3P	PTC-2SV3
				4P	PTC-2SV4
Electrical operation device			(*2)	140	

Outline Drawing

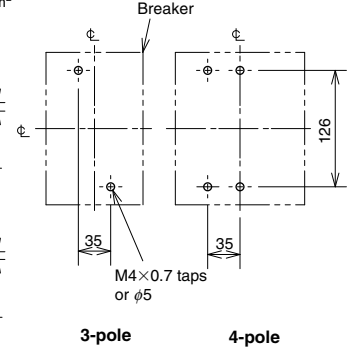
Front connection



Solderless terminal for wire size  
 125-175A 14-95mm<sup>2</sup>  
 200-250A 70-125mm<sup>2</sup>  
 Wire connection

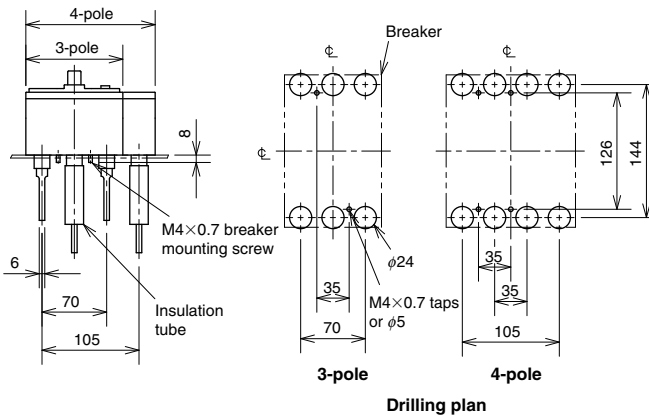
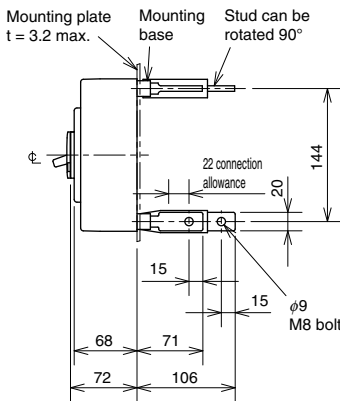


Conductor drilling for direct connection

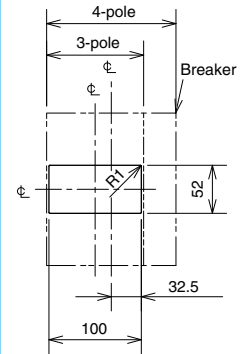


Drilling plan

Rear connection

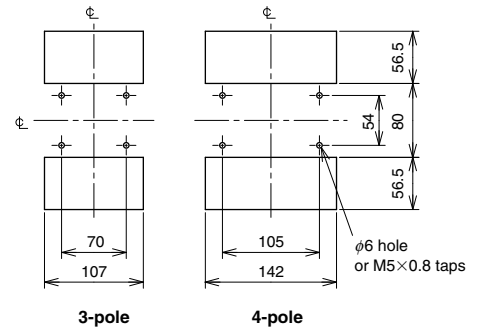
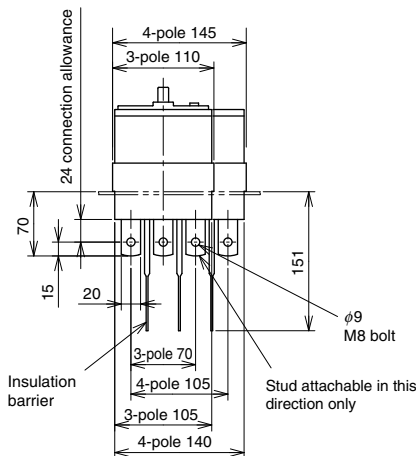
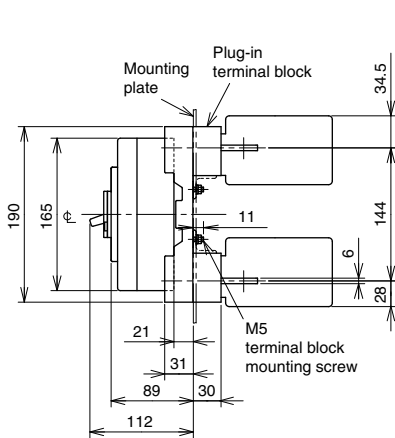


Drilling plan



Front-panel cutout

Plug-in



Drilling plan

Remark: 1. Only 3-pole models are available for the model of NV250-SEV and NV250-HEV.

## NV400-CW NV400-SW

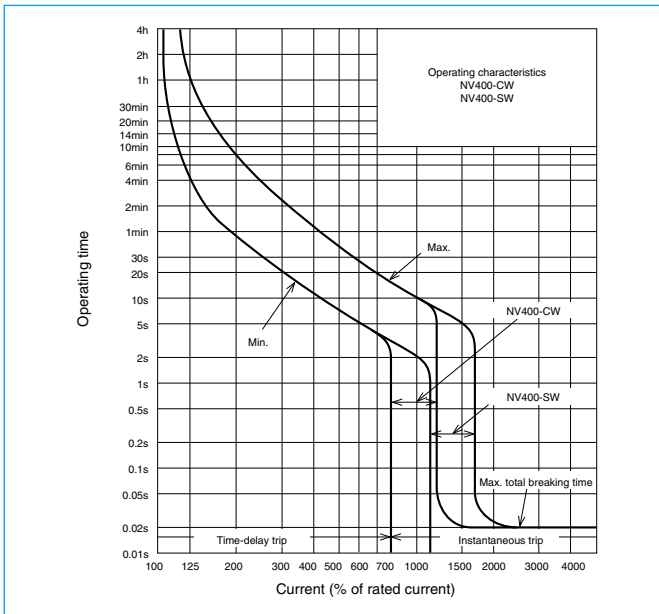


NV400-SW

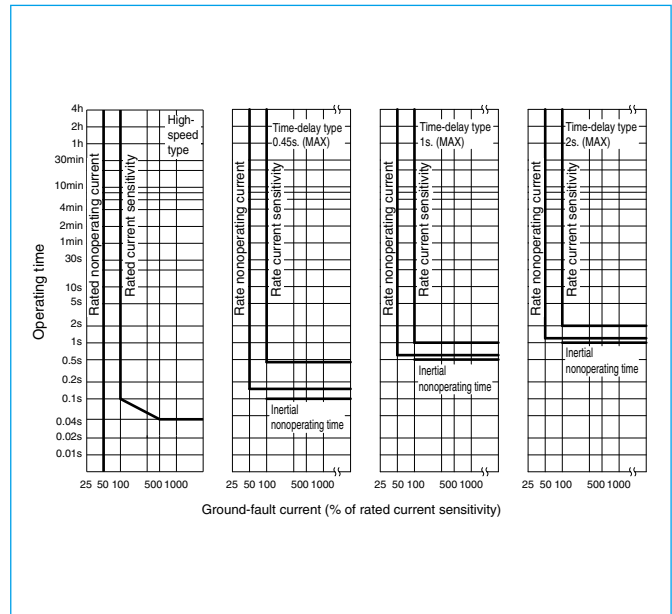
Model		NV400-CW	NV400-SW
Number of poles		3	
Rated operational voltage Ue (VAC) (*1)		100-440 Multi-voltage type	
Rated current In (A)		250 300 350 400	
High-speed type	Rated current sensitivity IΔn (mA)	(30) 100 · 200 · 500 Selectable	
	Max. operating time at 5IΔn (s)	0.04	
Time-delay type	Rated current sensitivity IΔn (mA)	(100 · 200 · 500 Selectable)	
	Max. operating time at 2IΔn (s)	(0.45 · 1.0 · 2.0 Selectable)	
	Inertial non-operating time at 2IΔn (s)	(0.1 · 0.5 · 1.0)	
Earth-leakage indication system		Button	
Rated short-circuit breaking capacity (kA) IEC 60947-2 (Icu/Ics) EN 60947-2	AC	440V	25/13
		400V	36/18
		230V	50/25
Standard attached parts (Front connection)		Mounting screw: M6×60 (4pcs) Insulation barrier: (4pcs)	

Note \*1 Rated operational voltage of time-delay type is for 200-440V.

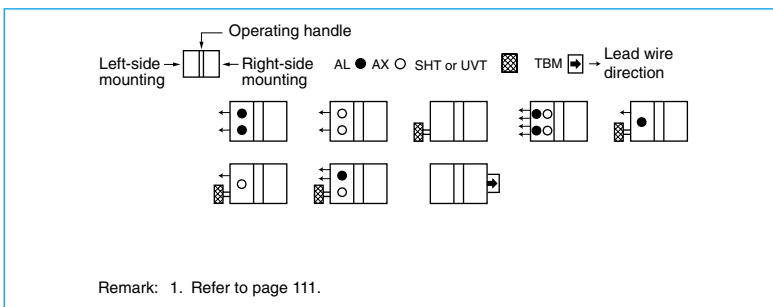
### Operating Characteristics



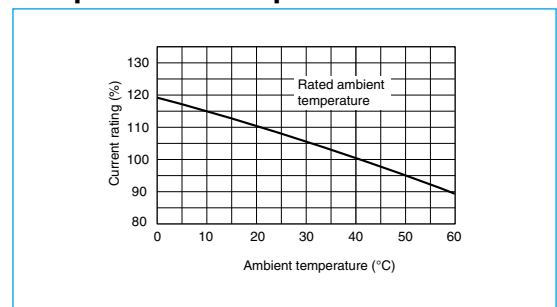
### Earth Leakage Tripping Characteristics



### Internal Accessories



### Temperature Compensation Curve

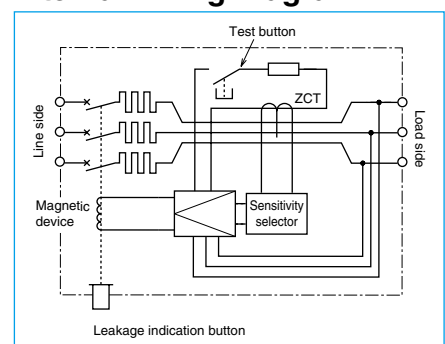


### External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page			
Operating handle	F	F-4S	123	Auxiliary handle	HT	HT-4CW, HT-4SW	135	
	V	V-4S	125	Terminal cover	Large	TC-L	TCL-4SW3	128
Mechanical interlock	MI	MI-4SW3	136		Skeleton	TTC	TTC-4SW3	
	Rear	BTC	BTC-4SW3		128	Handle lock device	HL	
				HL-S	HLS-4SW	134		
				Electrical operation device	(*1)	140		

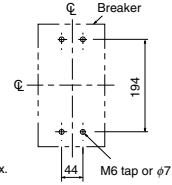
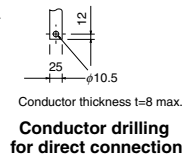
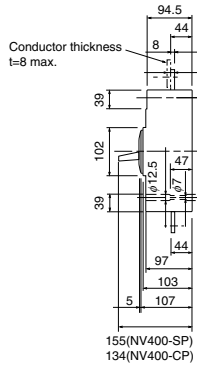
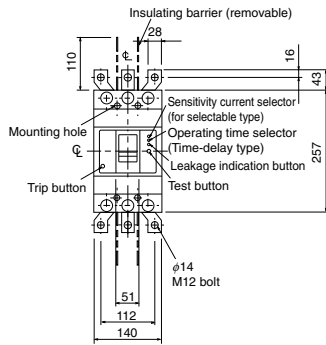
Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

### Internal Wiring Diagram

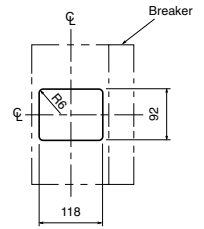


Outline Drawing

Front connection



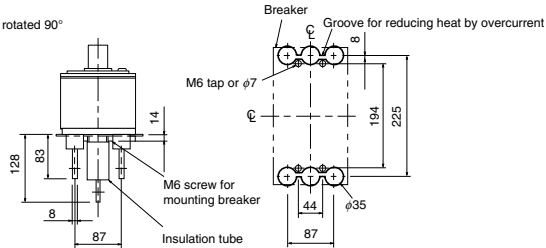
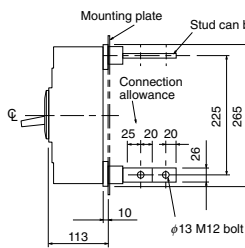
Drilling plan



1.0mm clearance on each side of the handle frame.

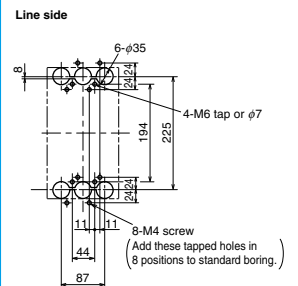
Front-panel cutout

Rear connection



Drilling plan

Boring dimensions for rear connection type barriers (3-pole)



Load side

Note The bore dimensional drawing shows the breaker viewed from the rear.

## NV400-SEW NV400-HEW

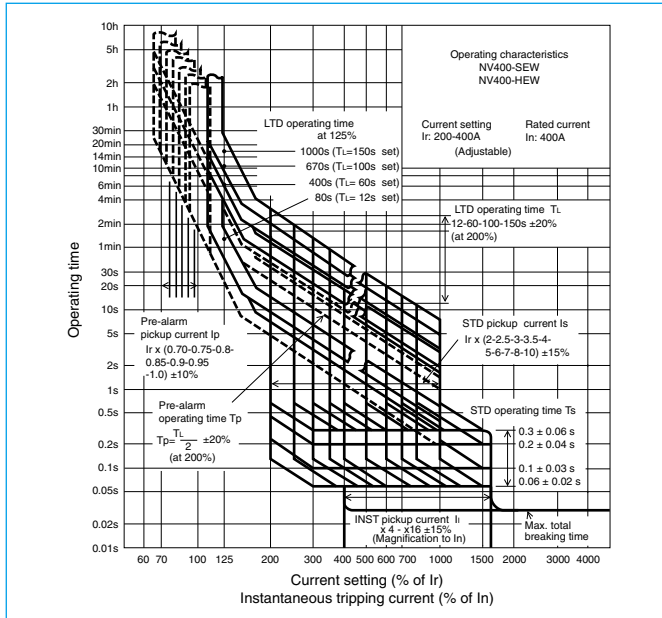


NV400-SEW

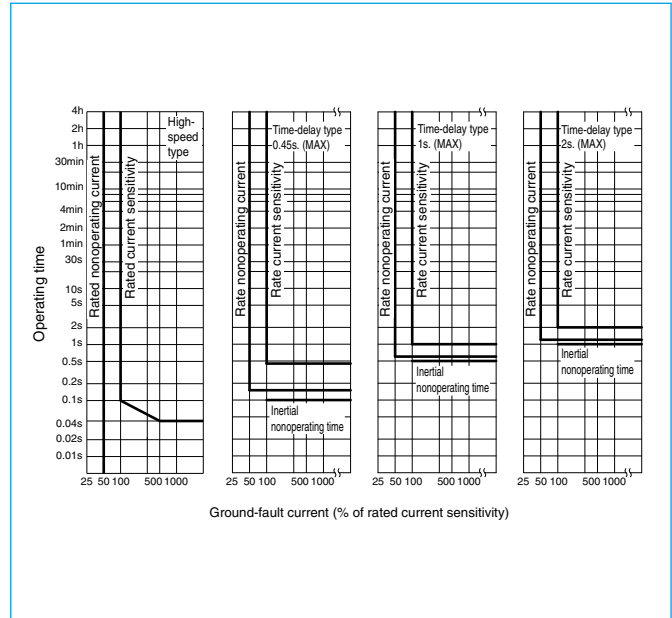
Model		NV400-SEW		NV400-HEW	
Number of poles		3	4	3	4
Rated operational voltage Ue (VAC) (*1)		100-440 Multi-voltage type			
Rated current In (A)		200-400 adjustable			
High-speed type	Rated current sensitivity $I\Delta n$ (mA)	(30) 100 · 200 · 500 Selectable			
	Max. operating time at $5I\Delta n$ (s)	0.04			
Time-delay type	Rated current sensitivity $I\Delta n$ (mA)	(100 · 200 · 500 Selectable)			
	Max. operating time at $5I\Delta n$ (s)	(0.45 · 1.0 · 2.0 Selectable)			
	Max. inertial non-operating time at $2I\Delta n$ (s)	(0.1 · 0.5 · 1.0)			
Earth-leakage indication system		Button			
Rated short-circuit breaking capacity (kA) IEC 60947-2 (Icu/Ics) EN 60947-2	AC	440V	42/42	65/65	
		400V	50/50	70/70	
		230V	85/85	100/100	
Standard attached parts (Front connection)		Mounting screw: M6x72 (4pcs) Insulation barrier: (3P: 4pcs, 4P: 6pcs)			

Note \*1 Rated operational voltage of time-delay type is for 200-440V.

### Operating Characteristics



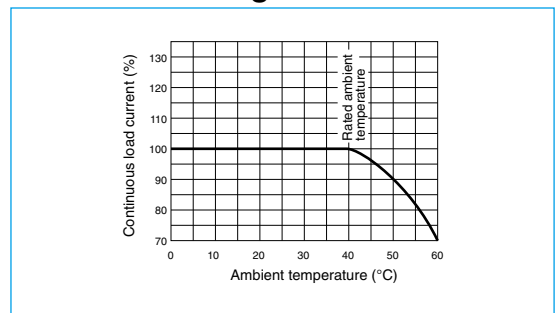
### Earth Leakage Tripping Characteristics



### Internal Accessories

Remarks: 1. Instead of TBM, pre-alarm module (PAL) can be attached.  
2. Refer to page 111.

### Current Reducing Curve

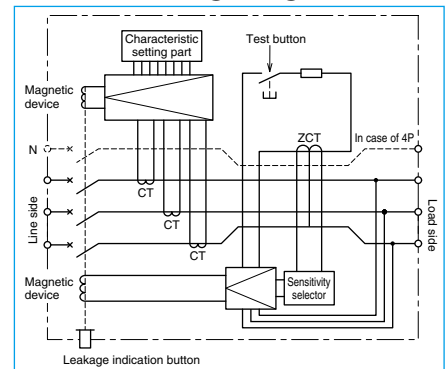


### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page
Operating handle	F	F-4S	123	Auxiliary handle	HT	HT-4SW	135
	V	V-4S	125	Terminal cover	Large	3P	TCL-4SW3 (*1)
Mechanical interlock	MI	3P	MI-4SW3			4P	TCL-4SW4 (*1)
		4P	MI-4SW4		3P	TTC-4SW3	
Skeleton	TTC	3P	TTC-4SW4		4P	TTC-4SW4	
		Rear	BTC		3P	BTC-4SW3 (*2)	4P
Handle lock device	HL				HL-4SW	HL-4SW	
		Electrical operation device	NVM	3P	(*3)	140	
4P							

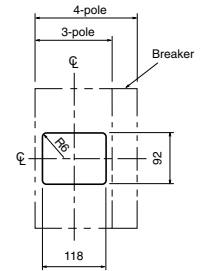
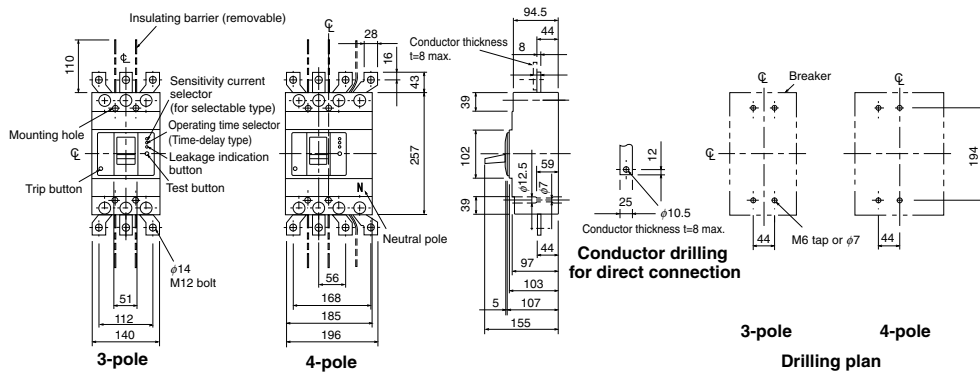
Notes \*1 This is for NV400-SEW.  
\*2 This is for NV400-SEW. For rear terminal cover of NV400-HEW, use PTC-4SW3.  
\*3 Specify the operation method and voltage. Order in combination with the breaker unit.

### Internal Wiring Diagram



Outline Drawing

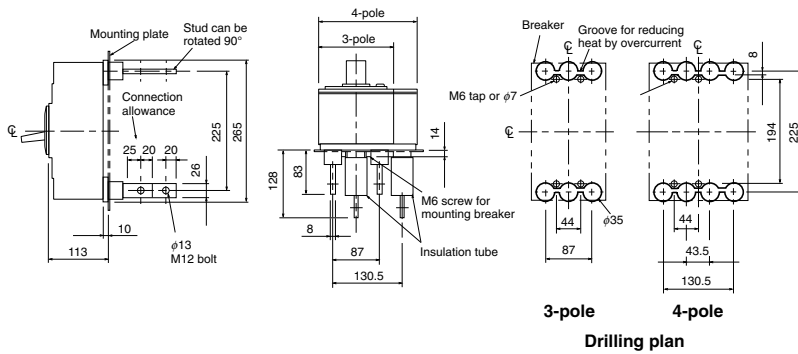
Front connection



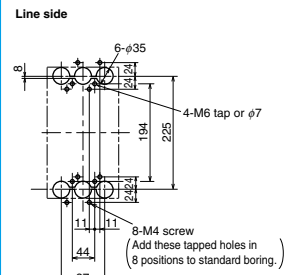
1.0mm clearance on each side of the handle frame.

Front-panel cutout

Rear connection



Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

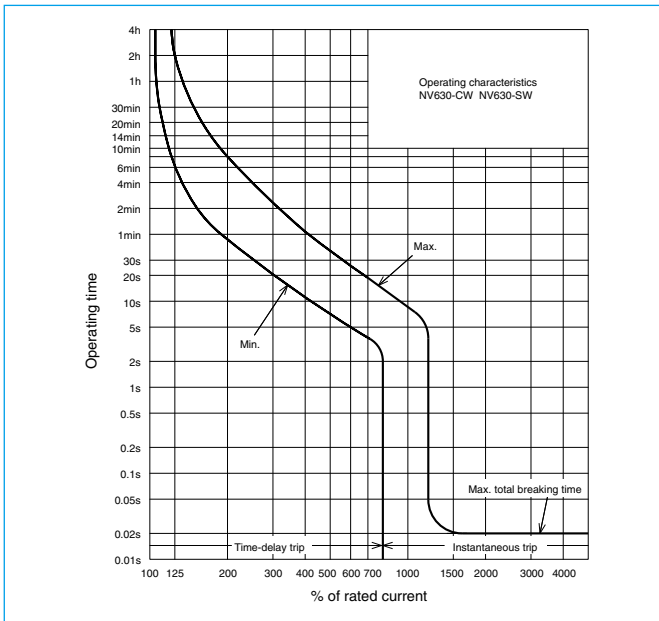
## NV630-CW NV630-SW



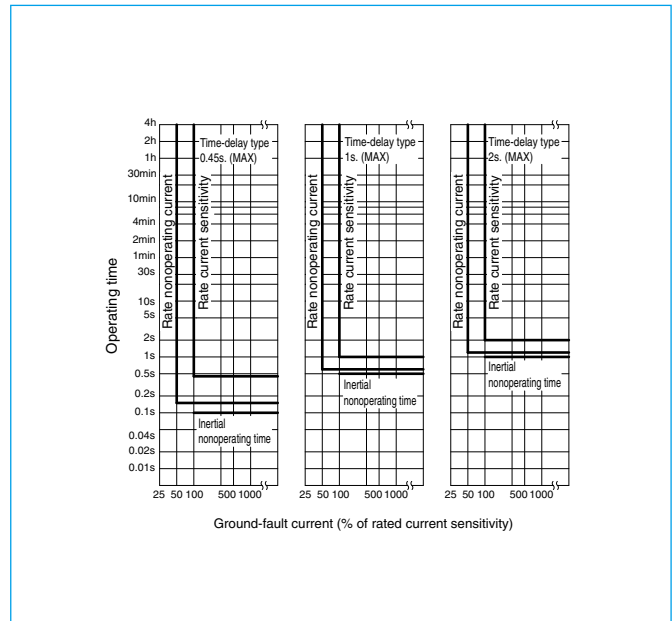
NV630-SW

Model		NV630-CW	NV630-SW
Number of poles		3	
Rated operational voltage Ue (VAC)		100-440 Multi-voltage type	
Rated current In (A)		500 600 630	
High-speed type	Rated current sensitivity IΔn (mA)	-	
	Max. operating time at 5IΔn (s)	-	
Time-delay type	Rated current sensitivity IΔn (mA)	100 · 200 · 500 Selectable	
	Max. operating time at 5IΔn (s)	0.45 · 1.0 · 2.0 Selectable	
	Max. inertial non-operating time at 2IΔn (s)	0.1 · 0.5 · 1.0	
Earth-leakage indication system		Button	
Rated short-circuit breaking capacity (kA) IEC 60947-2 (Icu/Ics) EN 60947-2	AC	440V	36/18 42/42
		400V	36/18 50/50
		230V	50/25 85/85
Standard attached parts (Front connection)		Mounting screw: M6×72 (4pcs) Insulation barrier: (4pcs)	

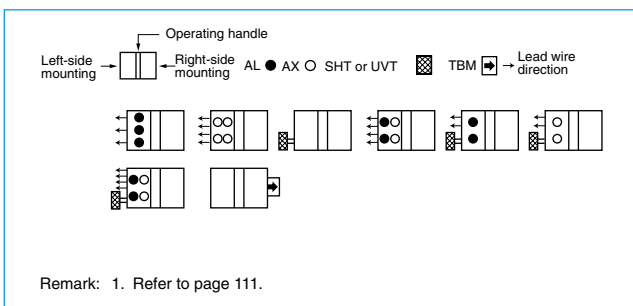
### Operating Characteristics



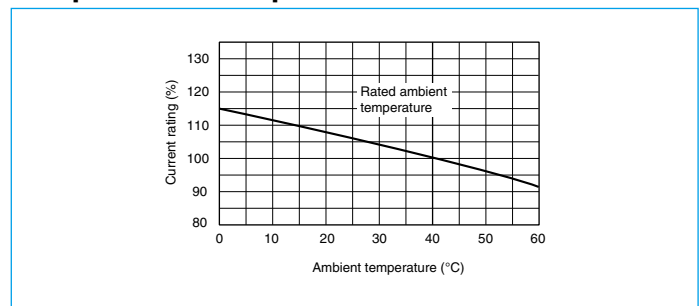
### Earth Leakage Tripping Characteristics



### Internal Accessories



### Temperature Compensation Curve

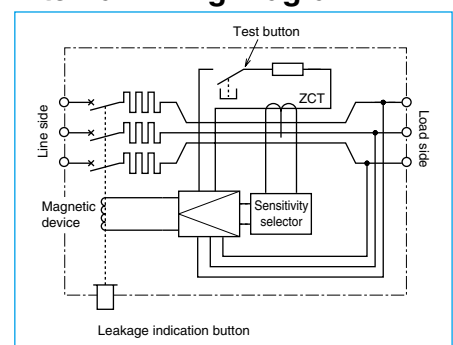


### External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page			
Operating handle	F	F-4S	123	Auxiliary handle	HT	HT-4SW	135	
	V	V-4S	125	Terminal cover	Large	TC-L	TCL-4SW3	128
Mechanical interlock	MI	MI-4SW3	136		Skeleton	TTC	TTC-4SW3	
	Handle lock device	HL	HL-4SW		134	Rear	BTC	
HL-S		HLS-4SW	Electrical operation device	(*1)		140		

Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

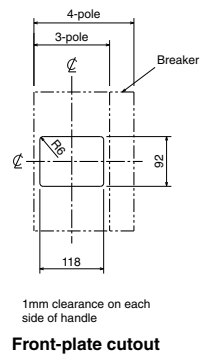
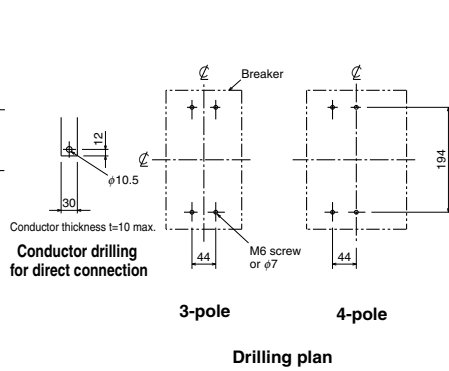
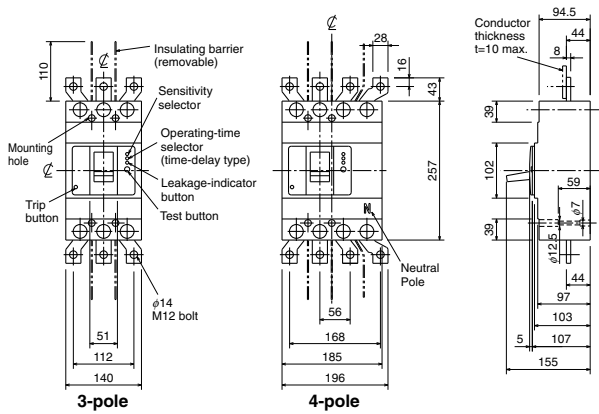
### Internal Wiring Diagram



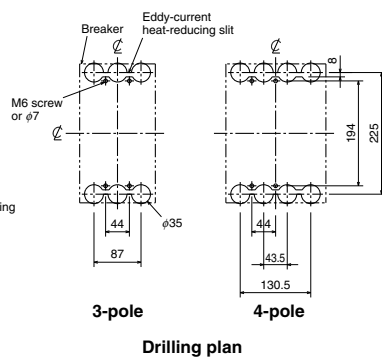
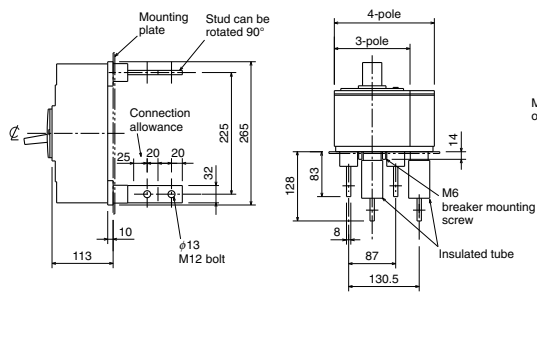


Outline Drawing

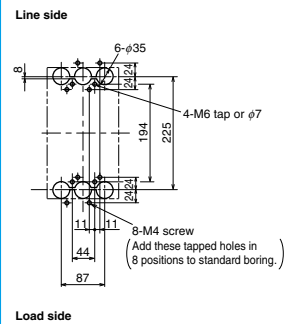
Front connection



Rear connection



Boring dimensions for rear connection type barriers (3-pole)



Note The bore dimensional drawing shows the breaker viewed from the rear.

## NV630-SEW NV630-HEW

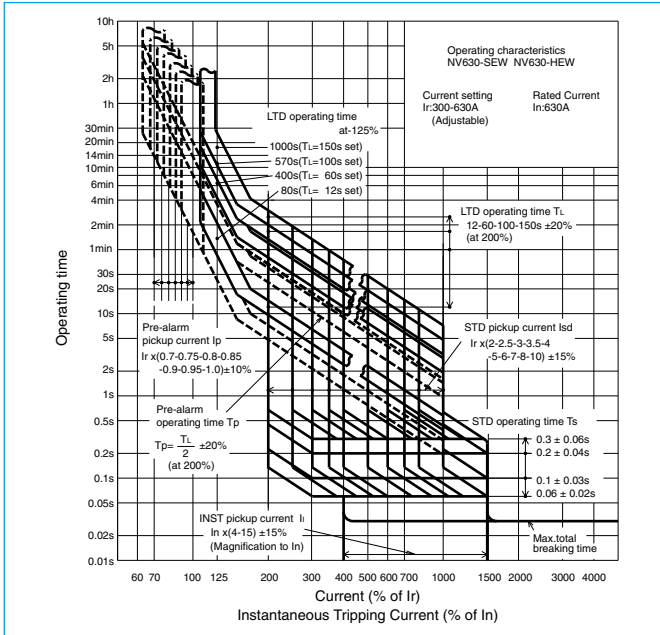


NV630-SEW

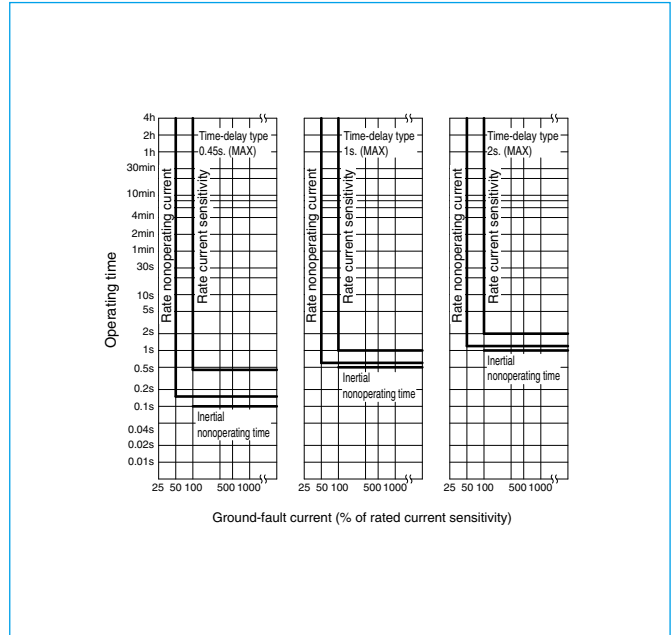
Model		NV630-SEW	NV630-HEW
Number of poles		3	4
Rated operational voltage Ue (VAC) (*1)		100-440 Multi-voltage type	
Rated current In (A)		300-630 adjustable	
High-speed type	Rated current sensitivity $I\Delta n$ (mA)	-	
	Max. operating time at $5I\Delta n$ (s)	-	
Time-delay type	Rated current sensitivity $I\Delta n$ (mA)	(100 · 200 · 500 Selectable)	
	Max. operating time at $5I\Delta n$ (s)	(0.45 · 1.0 · 2.0 Selectable)	
	Max. inertial non-operating time at $2I\Delta n$ (s)	(0.1 · 0.5 · 1.0)	
Earth-leakage indication system		Button	
Rated short-circuit breaking capacity (kA) IEC 60947-2 (Icu/Ics) EN 60947-2	AC	440V	42/42
		400V	50/50
		230V	85/85
Standard attached parts (Front connection)		Mounting screw: M6x72 (4pcs) Insulation barrier: (3P: 4pcs, 4P: 6pcs)	

Note \*1 Rated operational voltage of time-delay type is for 200-440V.

### Operating Characteristics



### Earth Leakage Tripping Characteristics



### Internal Accessories

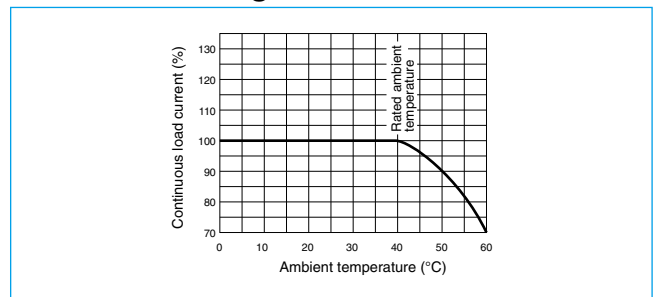
Operating handle    ● AL    ○ AX    ■ SHT or UVT    □ TBM    → Lead wire direction

Left-side mounting    Right-side mounting    ■ PAL

Remarks:

1. Instead of TBM, pre-alarm module (PAL) can be attached.
2. Refer to page 111.

### Current Reducing Curve



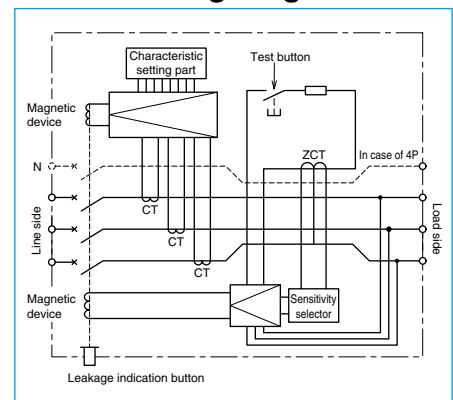
### External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page			
Operating handle	F	F-4S	123	Auxiliary handle	HT	HT-4SW	135	
	V	V-4S	125	Terminal cover	Large	TC-L	3P	TCL-4SW3 (*1)
Mechanical interlock	MI	3P	MI-4SW3			4P	TCL-4SW4 (*1)	
		4P	MI-4SW4		3P	TTC-4SW3	134	
Handle lock device	HL	HL-4SW	134		4P	TTC-4SW4		
		HL-S			HLS-4SW	Rear	BTC	3P
Electrical operation device	NVM	3P	140		4P		BTC-4SW4	
		4P		(*3)				

Notes

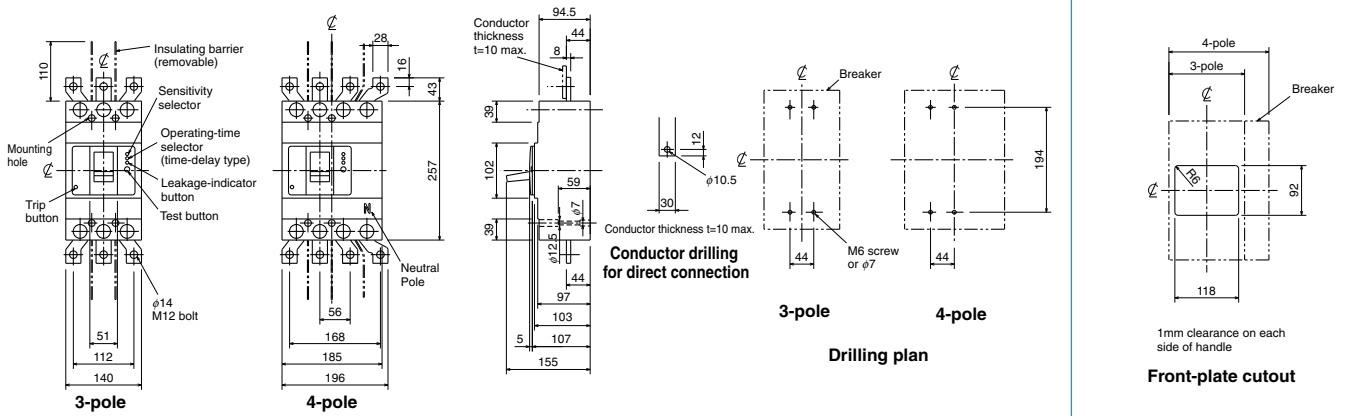
- \*1 This is for NV630-SEW.
- \*2 This is for NV630-HEW. For rear terminal cover of NV630-HEW, use PTC-4SW3.
- \*3 Specify the operation method and voltage. Order in combination with the breaker unit.

### Internal Wiring Diagram

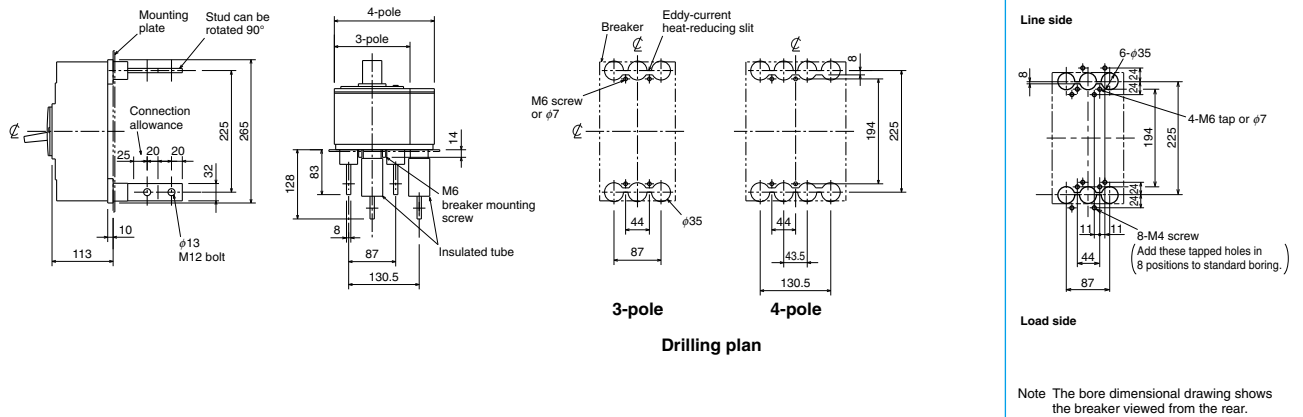


Outline Drawing

Front connection



Rear connection



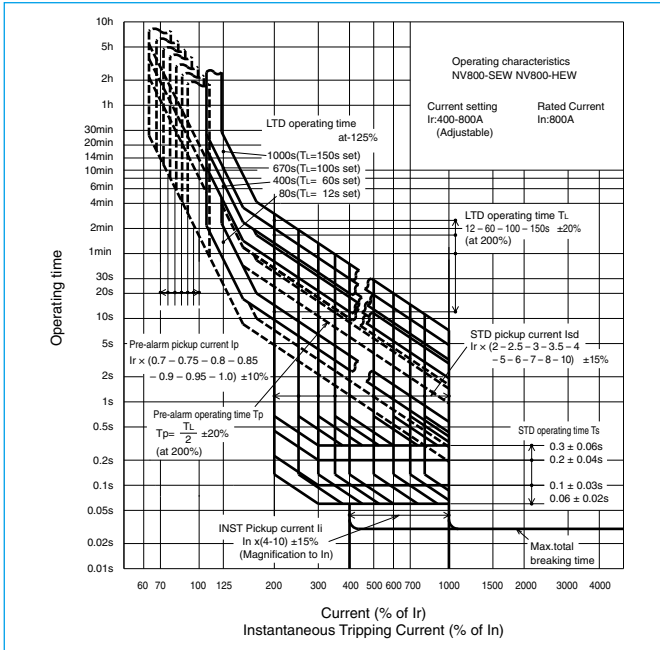
## NV800-SEW NV800-HEW



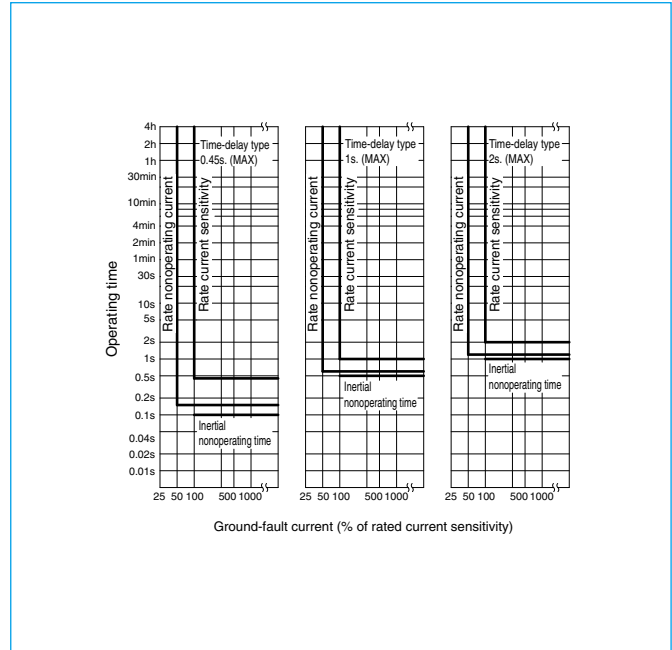
NV800-SEW

Model		NV800-SEW	NV800-HEW
Number of poles		3	
Rated operational voltage Ue (VAC)		100-440 Multi-voltage type	
Rated current In (A)		400-800 adjustable	
High-speed type	Rated current sensitivity IΔn (mA)	-	
	Max. operating time at 5IΔn (s)	-	
Time-delay type	Rated current sensitivity IΔn (mA)	100 · 200 · 500 Selectable	
	Max. operating time at 5IΔn (s)	0.45 · 1.0 · 2.0 Selectable	
	Max. inertial non-operating time at 2IΔn (s)	0.1 · 0.5 · 1.0	
Earth-leakage indication system		Button	
Rated short-circuit breaking capacity (kA) IEC 60947-2 (Icu/Ics) EN 60947-2	AC	440V	42/42
		400V	50/50
		230V	85/85
Standard attached parts (Front connection)		Mounting screw: M6x35 (4pcs) Insulation barrier: (2pcs)	

### Operating Characteristics



### Earth Leakage Tripping Characteristics



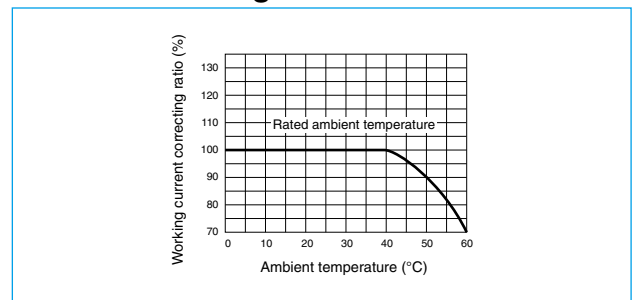
### Internal Accessories

Operating handle ● AL ○ AX ■ SHT or UVT ⊕ TBM → Lead wire direction

Left-side mounting      Right-side mounting

Remarks: 1. Instead of TBM, pre-alarm module (PAL) or trip indicator (TI) can be attached.  
2. Refer to page 111.

### Current Reducing Curve

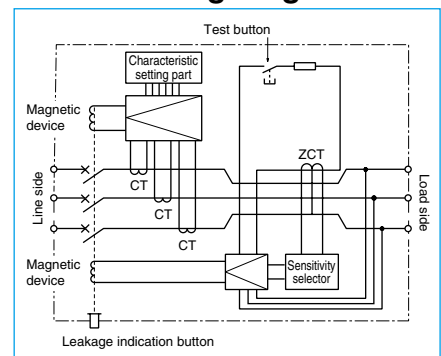


### External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page			
Operating handle	F	F-8S	123	Auxiliary handle	HT	HT-4SW	135	
	V	V-8S	125	Terminal cover	Large	TCL-L	128	
Mechanical interlock	MI	MI-8SW3	136		Skeleton	TTC		TTC-8SW3
					Rear	BTC		BTC-8SW3
				Handle lock device	HL	HL-4SW	134	
					HL-S	HLS-8SW		
				Electrical operation device		(*1)	140	

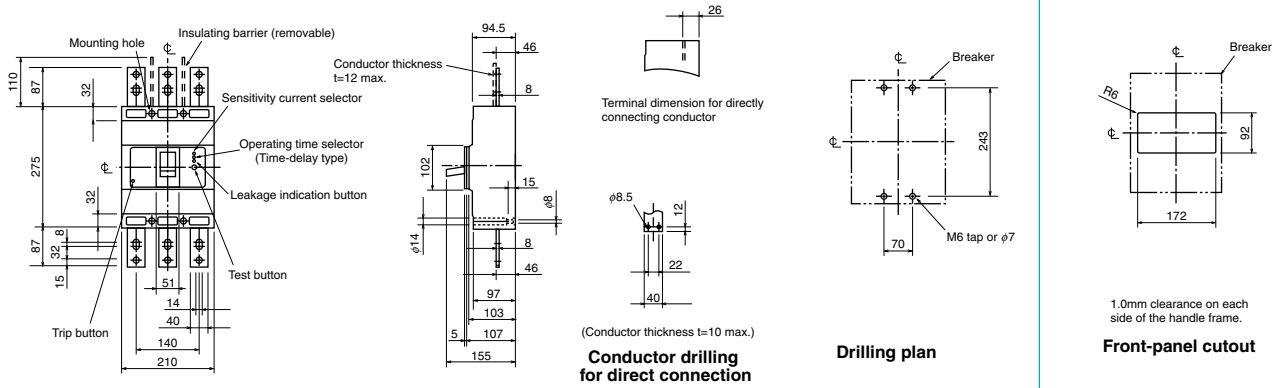
Note \*1 Specify the operation method and voltage. Order in combination with the breaker unit.

### Internal Wiring Diagram

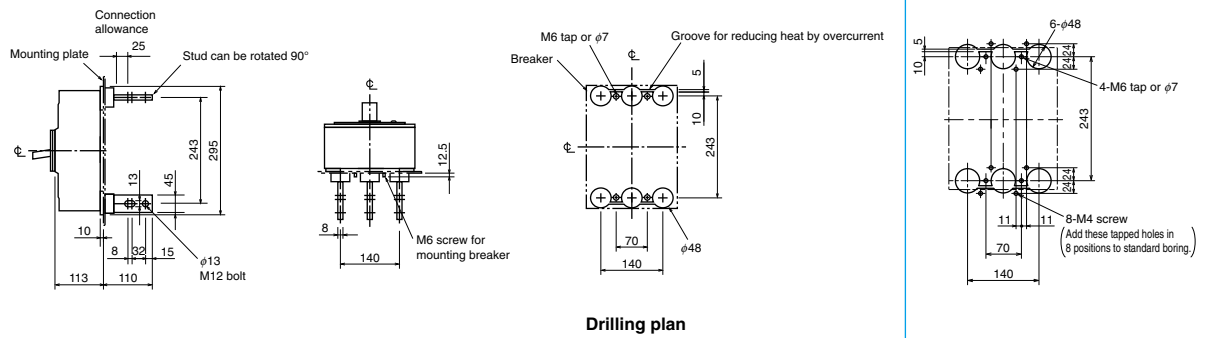


Outline Drawing

Front connection



Rear connection



Note The bore dimensional drawing shows the breaker viewed from the rear.

## NF50-SMU



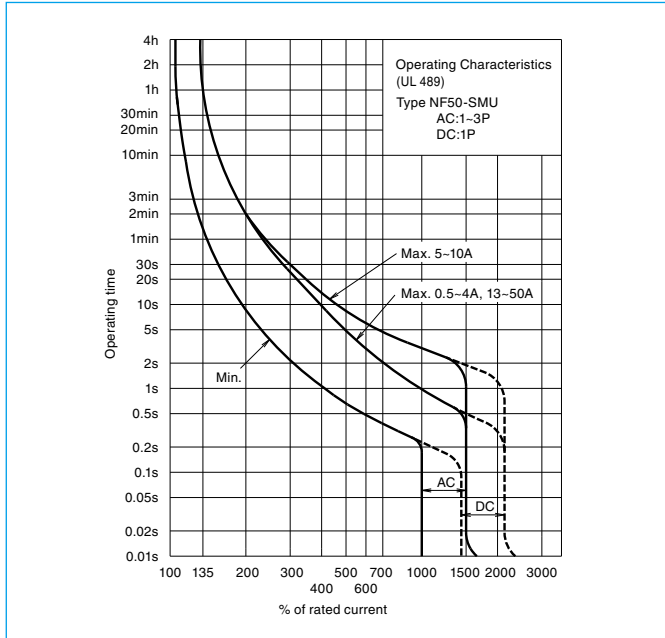
NV50-SMU

Model			NF50-SMU			
Rated current In (A)			0.5 1 1.5 2 3 4 5 6 7 8 10 13 15 20 25 30 35 40 50			
Number of poles			1	2	3	
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	AC	240V	5	10	
			120V	10	-	
		DC	60V	10	-	
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage UI V				440
		AC	400V	-	10/7.5	-
			230V	10/7.5	-	-
	DC	60V	10/7.5	-	-	

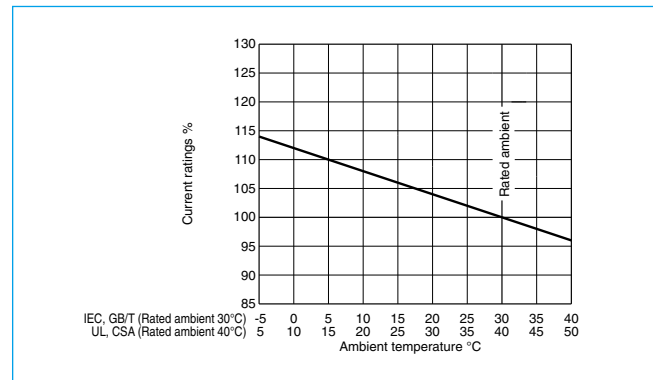
Note \*1 The handle does not indicate the trip position due to automatic reset structure.

### Operating Characteristics

(The CE and CCC characteristics are noted differently. Contact us for more information.)



### Temperature Compensation Curve

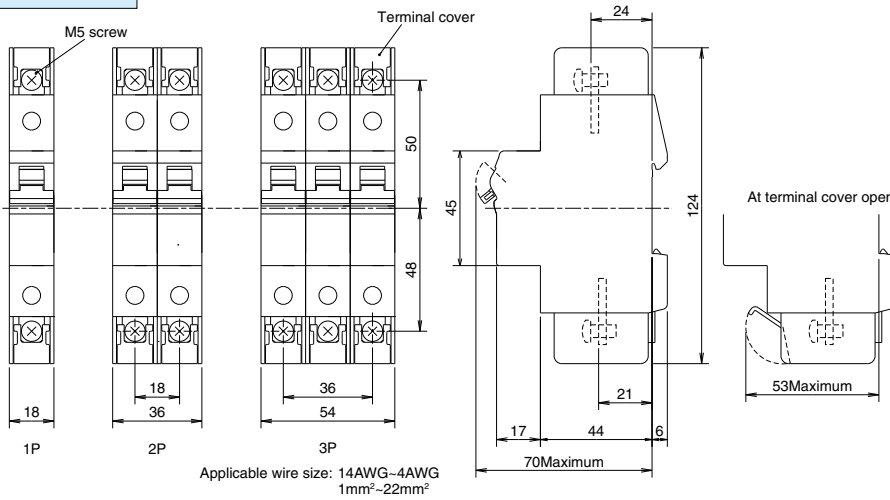


### External Accessories

Accessories	Type name	Reference page
AL	AL-05SMU	205
AX	AX-05SMU	
SHT	SHT024-05SMU SHTA130-05SMU SHT048-05SMU SHTA277-05SMU SHTD130-05SMU	205
HL	HLF-05SMU	134

Outline Drawing

Front connection

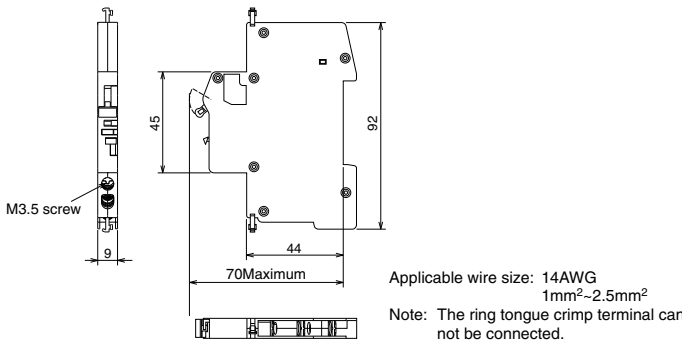


Applicable crimp terminal torque 18 lb-in. (2N-m)

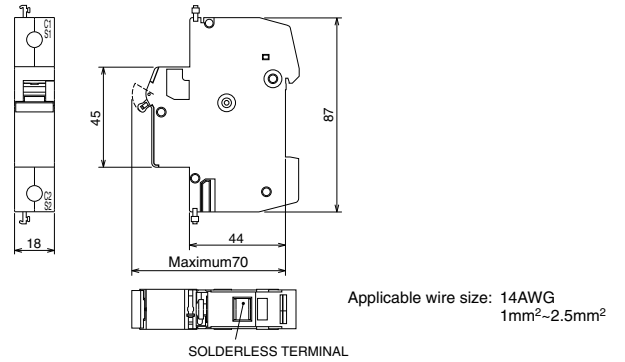
mm <sup>2</sup>	AWG (#) (75°C)	Crimp terminal model (*1)	
		JST	NTM
0.65-1.65	18-16	R1.25-5	R1.25-5
1.04-2.63	16-14	R2-5	R2-5
		2-M5	R2-5M
		V2-5	
2.63-4.6	12	-	R3.5-5S R3.5-5L
2.63-6.64	12-10	R5.5-5	R5.5-5
		V5.5-5	R5.5-5S R5.5-5N
6.64-10.52	8	R8-5	R8-5 R8-5S
10.52-16.78	6	R14-5	R14-5
16.78-26.66	4	14-NK5	R14-5S
		-	R22-5S

Note \*1 When using in wire connection use crimp terminal in the table.

AL/ AX



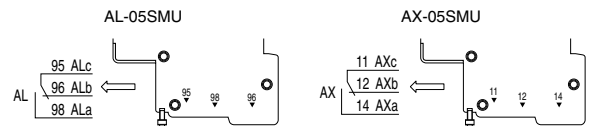
SHT



Type Name	Alarm switch (AL)	Auxiliary switch (AX)
	AL-05SMU	AX-05SMU
Configuration	1c	1c
Contact capacity	AC277V 3A AC240V 6A DC130V 1A DC48V 2A DC24V 6A	3A 6A 1A 2A 6A
Terminal	Load side (OFF side)	
Terminal connection	Clamp terminal M3.5 (*1)	
Dimension (mm)	a	9
	b	92
	c	44
	ca	70
Mass (kg)	0.05	

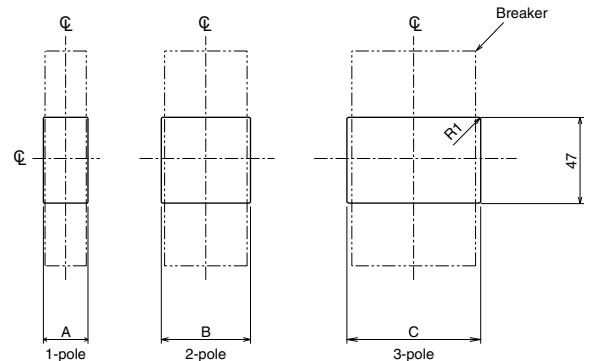
Note \*1 Ring tongue crimp terminal can not be connected.

Terminal Symbol



Type Name	Shunt trip device (SHT)					
	SHT024-05SMU	SHTA130-05SMU	SHT048-05SMU	SHTA277-05SMU	SHTD130-05SMU	
Voltage V	AC24/DC24	AC48-130	AC48/DC48	AC220-277	DC110-130	
Input power requirement (VA) (*2)	60	200	70	70	105	
Operating time (ms) (*3)	20 or less					
Terminal connection	Solderless					
Dimension (mm)	a	18				
	b	87				
	c	44				
	ca	70				
Mass (kg)	0.1					

Note \*2 Secure a sufficient input power so that the voltage will not drop below the permissible lower working voltage (70% of the lowest rated voltage).  
 \*3 The operating time denotes the time from when the rated voltage is applied to SHT until when the main contact of the breaker starts to open.



Drilling plan

Pole	Width	Accessory					
		No accessory	AL or AX	AL or 2 pcs AX	SHT1	AL or AX with SHT	AL or 2 pcs AX with SHT
1	A	20	29	38	38	47	56
2	B	38	47	56	56	65	74
3	C	56	65	74	74	83	92

## NF50-SVFU NV50-SVFU



NV50-SVFU

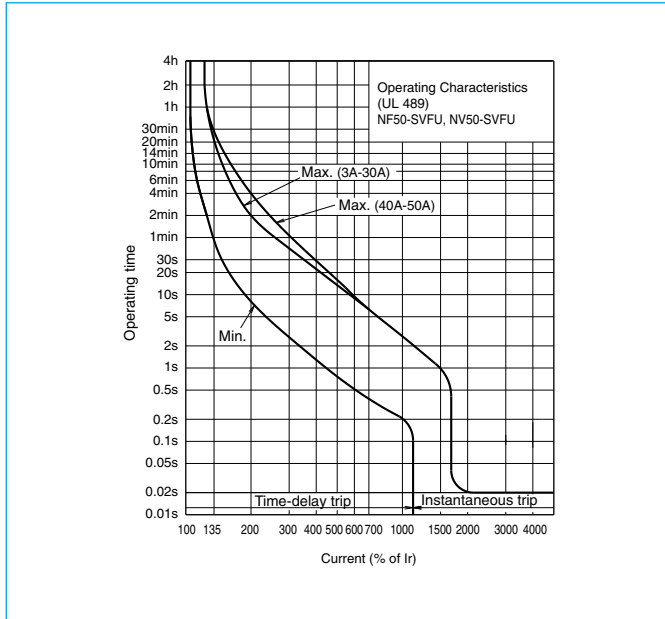
Model		NF50-SVFU		Model		NV50-SVFU		
Rated current In (A) Rated ambient temperature 40°C		(3) 5 10 15 20 30 40 50		Rated current In (A) Rated ambient temperature 40°C		(5) (10) 15 20 30 40 50		
Number of poles		2 3		Number of poles		2 3		
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage VAC	240	Rated voltage VAC	UL 489	120-240		
		600Y/347V	-		IEC 60947-2	100-240	100-440	
		480V	-		EN 60947-2			
		AC 480Y/277V	-		Rated current sensitivity IΔn mA	30 50	30 50 100	
		240V	14		High-speed type	Pick-up current UL 1053	75% of IΔn	
120V	-	Rated insulation voltage UI V	440	Operating time (sec) within AT 5IΔn	0.04 (*1)			
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	690V	-	Earth-leakage indication system		Indicator window		
		500V	-	UL 489 CSA C22.2 No.5-02	AC	480V	-	
		440V	7.5/4			240V	14	
		415V	10/5			120V	14	
		400V	10/5	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	-	7.5/4
		380V	10/5			400V	-	10/5
		230V	15/8			230V	15/8	15/8
230V	15/8	100V	15/8			15/8		
Standard attached parts (Front connection)		IEC35 rail mounting claws		Standard attached parts (Front connection)		IEC35 rail mounting claws		

Note \*1 0.1 for UL1053.

Remark: 1. The mounting screws must be prepared by the user. (Recommended size: M4×0.7×65 (2 pcs).)

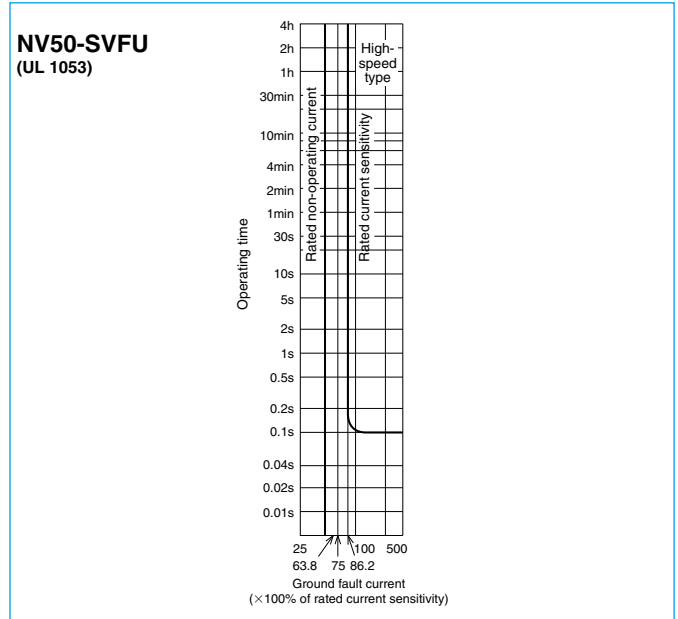
### Operating Characteristics

(The CE and CCC characteristics are noted differently. Contact us for more information.)

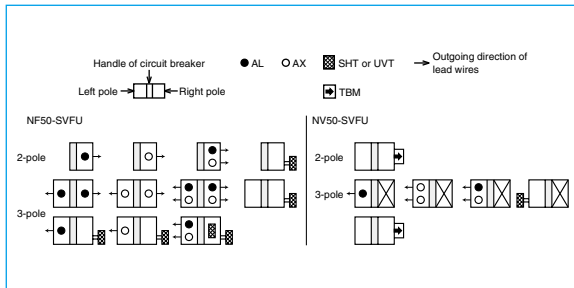


### Earth Leakage Tripping Characteristics

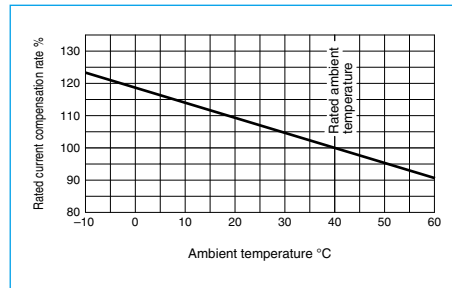
(The CE and CCC characteristics are noted differently. Contact us for more information.)



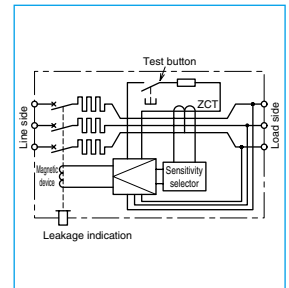
### Internal Accessories



### Temperature Compensation Curve



### Internal Wiring Diagram



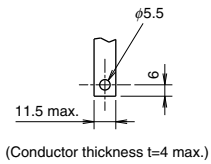
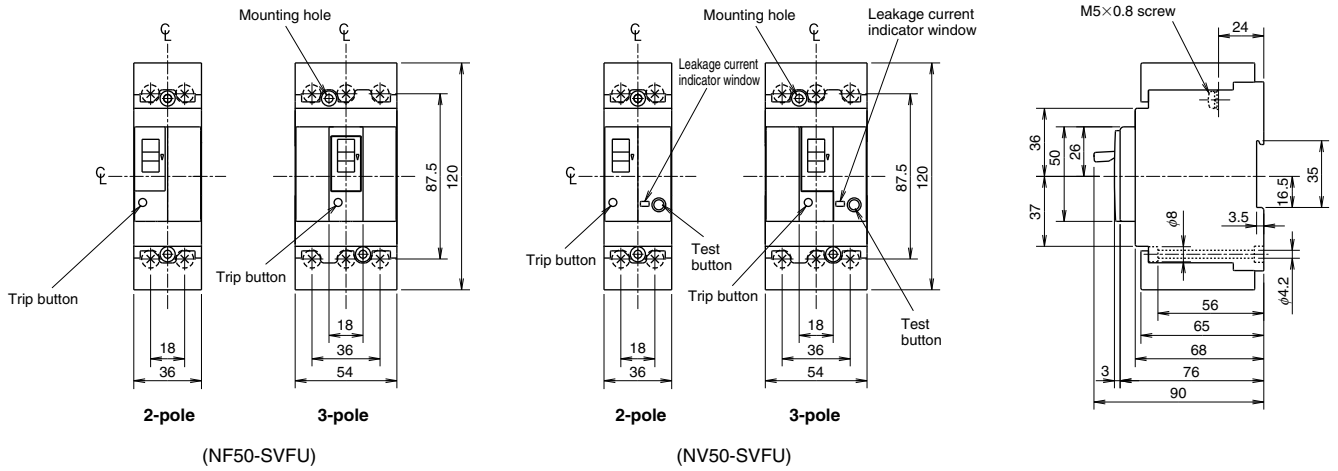
### External Accessories

Accessories		Type name	Reference page	Accessories		Type name	Reference page
Operating handle	F	2P F-03SVUL2	123	Terminal cover	Large	2P TCL-03SVU2	128
		3P F-03SVUL				3P TCL-03SVU3	
	V	2P V-03SVUL2	125				
		3P V-03SVUL					
Handle lock device	HL	HLF-03SVU	134				
	HL-S	HLS-03SVU					



Outline Drawing

Front connection



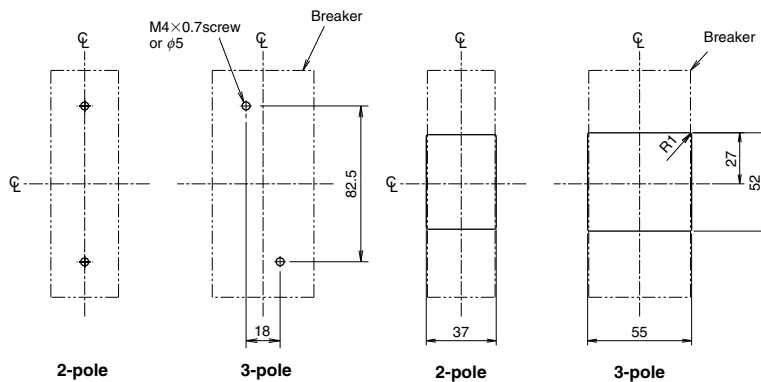
Conductor drilling for direct connection

Remarks: 1. The mounting screws are not enclosed with the breaker.  
 2. The wires cannot be connected directly.

Compatible crimp terminals Tightening torque 22lb-in (2.5N·m)

Applicable wire range (*1)	Crimp terminal type (*2)		
	mm <sup>2</sup>	AWG (#) (60°C/75°C)	
1.04-2.63	16-14	JST R2-5 2-M5	R2-5
		V2-5 V2-M5	R2-5M
2.63-4.6	12	-	R3.5-5S R3.5-5L
2.63-6.64	12-10	R5.5-5	R5.5-5
		V5.5-5	R5.5-5S R5.5-5N
6.64-10.52	8	R8-5	R8-5 R8-5S
10.52-16.78	6	R14-5	R14-5
		14-NK5	R14-5S
16.78-26.66	4	22-S5 22-S6	R22-5S

JST: Japan Solderless Terminal Mfg. Co.  
 NTM: Nichifu Co., Ltd.  
 Notes \*1 14AWG or larger to comply with UL Standards.  
 \*2 When using with a wire connection, use the crimp terminal combination shown above.



Drilling plan

Front panel drilling plan

The drilling dimensions have a 1.0mm clearance on each side of breaker window frame.

## NF100-CVFU NV100-CVFU



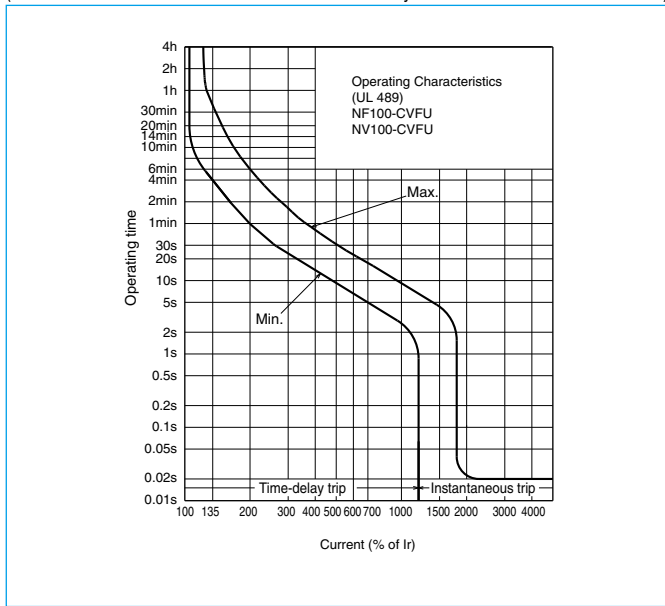
NF100-CVFU

Model		NF100-CVFU		Model		NV100-CVFU			
Rated current In (A) Rated ambient temperature 40°C		60 (70) 75 (80) (90) 100		Rated current In (A) Rated ambient temperature 40°C		60 (70) 75 (80) (90) 100			
Number of poles		2 3		Number of poles		3			
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage VAC	240	Rated voltage VAC	UL 489	120-240			
		600Y/347V	-		IEC 60947-2 EN 60947-2	100-440			
		480V	-		Phase line				
		480Y/277V	-		3φ3W 1φ2W				
		240V	14		High-speed type				
120V	-	Rated current sensitivity IΔn mA			30 50 100/200/500 selectable				
Rated short-circuit breaking capacity (kA)	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage UIV	600	Pick-up current UL 1053		75% of IΔn			
		690V	-	Operating time (sec) within AT 5IΔn		0.04 (*1)			
		500V	7.5/4	Earth-leakage indication system				Mechanical button	
		440V	10/5	Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	AC	480V	-	
		415V	10/5				240V	14	
		400V	10/5				120V	14	
		380V	10/5				440V	10/5	
230V	15/8	400V	10/5						
230V	15/8	300V	15/8						
100V	15/8	Standard attached parts (Front connection)			IEC35 rail mounting claws, Insulating barrier (4pcs) (Only for type with bar terminal) Mounting screw M4×0.7×55 (2 screws)				

Note \*1 0.1 for UL1053.

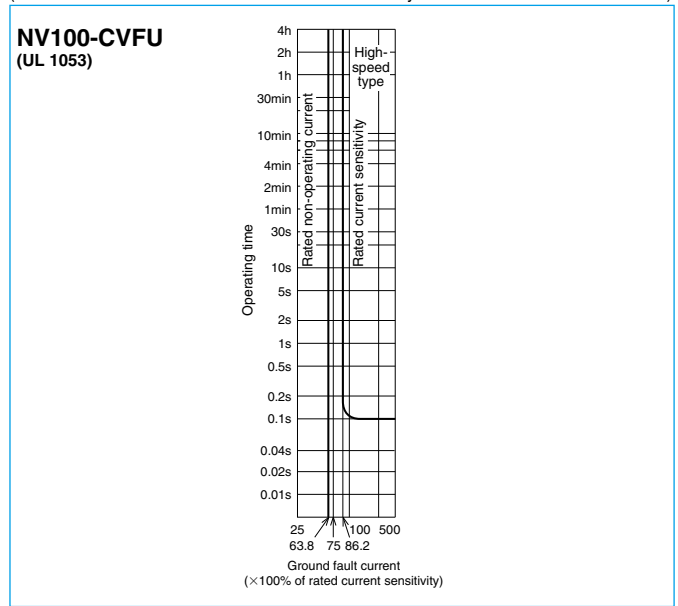
### Operating Characteristics

(The CE and CCC characteristics are noted differently. Contact us for more information.)

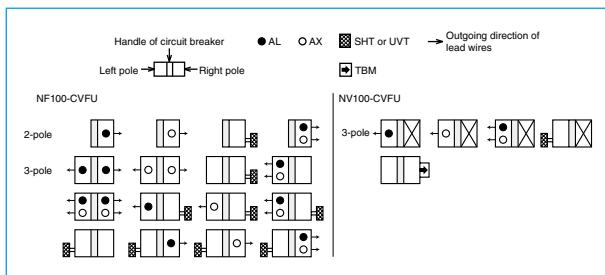


### Earth Leakage Tripping Characteristics

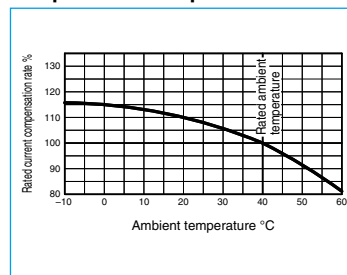
(The CE and CCC characteristics are noted differently. Contact us for more information.)



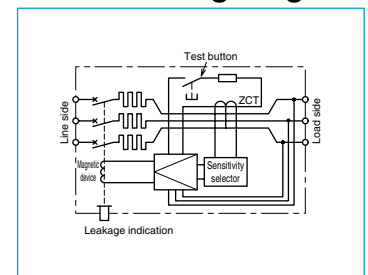
### Internal Accessories



### Temperature Compensation Curve



### Internal Wiring Diagram

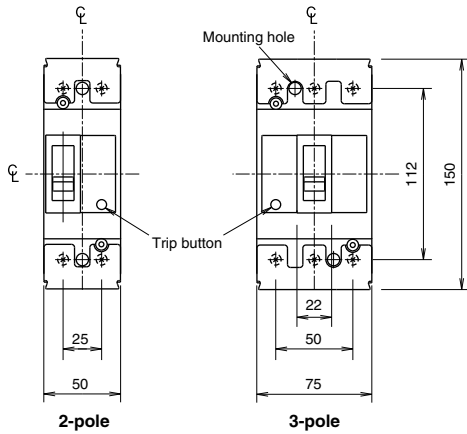


### External Accessories

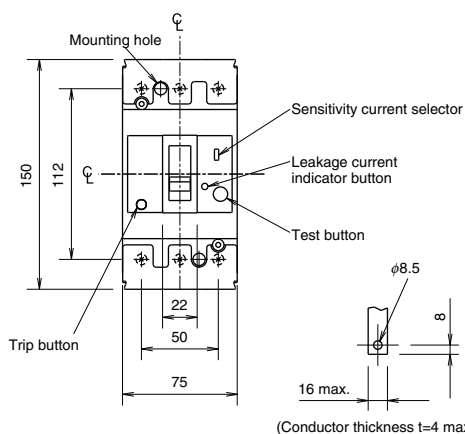
Accessories		Type name	Reference page	Accessories		Type name	Reference page
Operating handle	F	2P F-05SVUL2	123	Terminal cover	Large	TC-L	2P TCL-05SVU2
		3P F-05SVUL					2P TCL-05SVU2L
	V	2P V-05SVUL2	125				3P TCL-05SVU3
		3P V-05SVUL					3P TCL-05SVU3L
Handle lock device	HL	HLF-05SVU	134				
	HL-S	2P HLS-05SVU2					
		3P HLS-05SVU					

Outline Drawing

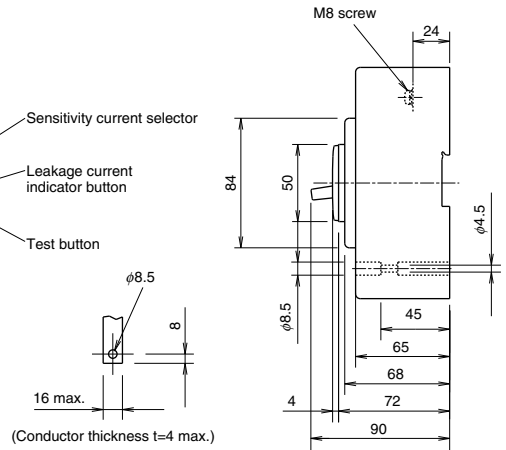
Front connection



(NF100-CVFU)



(NV100-CVFU)



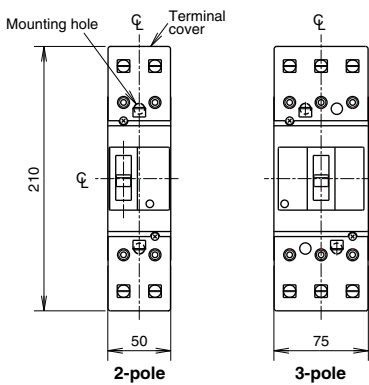
Conductor drilling for direct connection  
 (Conductor thickness t=4 max.)

Compatible crimp terminals Tightening torque 54lb-in (6N·m)

Applicable wire range	Crimp terminal type (*1)	
	mm <sup>2</sup>	AWG (#) (60°C/75°C)
2.5-2.63	14	R2-8 / R2-8
2.63-6.64	12-10	R5.5-8 / R5.5-8
6.64-10.52	8	R8-8 / R8-8
10.52-16.78	6	R14-8 / R14-8
16.78-26.66	4	R22-8 / R22-8S
26.66-42.42	2	38-S8 / R38-8S
42.42-60.57	1/0	60-2BA / 60-S8
		CB60-8

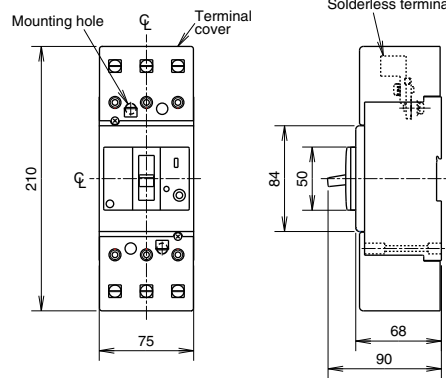
JST: Japan Solderless Terminal Mfg. Co.  
 NTM: Nichifu Co., Ltd.  
 Note \*1 When using with a wire connection, use the crimp terminal combination shown above.

Front connection(solderless terminal)

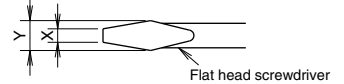


2-pole

3-pole

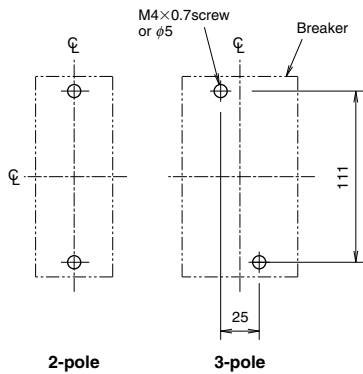


Size of screwdriver with bolting  
 Please bolt with flat head screwdriver.  
 The length of X : 6mm-7mm  
 The length of Y : 9.5mm



Wire size 60°C/75°C CU ONLY	Number of strands
14AWG	7
12-10AWG	7
8AWG	7
6-4AWG	7
2AWG	7
1-1/0AWG	19

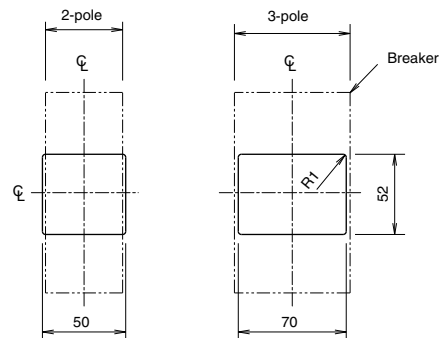
The tightening torque is different according to connected wire.  
 Refer to instruction manual for details.  
 Remark: Periodical retightening prevents overheating by the setting of twisted strands or the stress of heating and cooling.



2-pole

3-pole

Drilling plan



The drilling dimensions have a 1.0mm clearance on each side of breaker window frame.

Front panel drilling plan

# 7 Characteristics and Dimensions 3

## UL 489 Listed Circuit Breakers

NF100-SRU  
NF100-HRU  
NV100-SRU  
NV100-HRU



NF100-HRU 3P

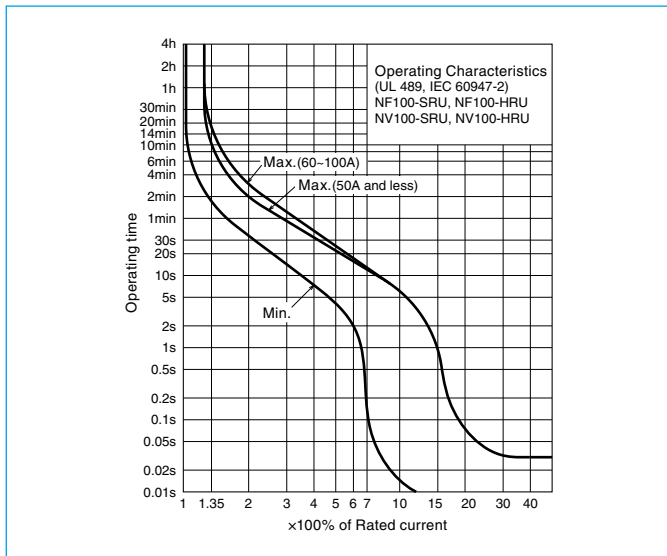
Model		NF100-SRU				NF100-HRU					
Rated current In (A)		1	2	3	5	10	1	2	3	5	10
		15	20	25	30	40	40	50	60	70	75
Number of poles		2		3		2		3			
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	AC	480V	-				18(10) (*1)			
			240V	35(25) (*1)				50(25) (*1)			
	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	690V	-				-			
			500V	10/5		18/9(10/5) (*1)		-		-	
			440V	15/8		25/13(15/8) (*1)		-		-	
			415V	15/8		25/13(15/8) (*1)		-		-	
			400V	15/8		25/13(15/8) (*1)		-		-	
			230V	35/18(25/13) (*1)		50/25(25/13) (*1)		-		-	
	DC	250V	-				-				

Notes \*1 Rated short-circuit breaking capacity parenthesized are applied to below rated current 15A.  
\*2 In case of UL1053, operating time is 0.1s.

Model		NV100-SRU		NV100-HRU			
Phase line		1φ2W	3φ3W, 1φ2W	3φ3W, 1φ2W			
Number of poles		2	3	3			
Rated operational voltage(UL489)(VAC)		120-240		120-240-480			
Rated operational voltage(IEC60947-2)(VAC)		100-230		100-230-440			
Rated current In (A)		5 10 15 20 25 30 40 50	5 10 15 20 25 30 40 50 60 70 75 80 90 100	5 10 15 20 25 30 40 50 60 70 75 80 90 100	5 10 15 20 25 30 40 50 60 70 75 80 90 100		
Rated current sensitivity IΔn (mA)		30 50		30 50 100/300/500 selectable			
Pickup current UL1053		IΔn × 75%		IΔn × 75%			
Max. operating time (s) at 5 IΔn		0.04 (*2)		0.04 (*2)			
Leakage detection characteristics		Type A		Type A			
Earth-leakage indication system		Mechanical button		Mechanical button			
Rated short-circuit breaking capacity (kA)	UL 489	AC	480V	-		18(10) (*1)	
			240V	35(25) (*1)		50(25) (*1)	
			120V	35(25) (*1)		50(25) (*1)	
	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	-		25/13(15/8) (*1)	
			400V	-		25/13(15/8) (*1)	
			230V	35/18(25/13) (*1)		50/25(25/13) (*1)	
			100V	35/18(25/13) (*1)		50/25(25/13) (*1)	

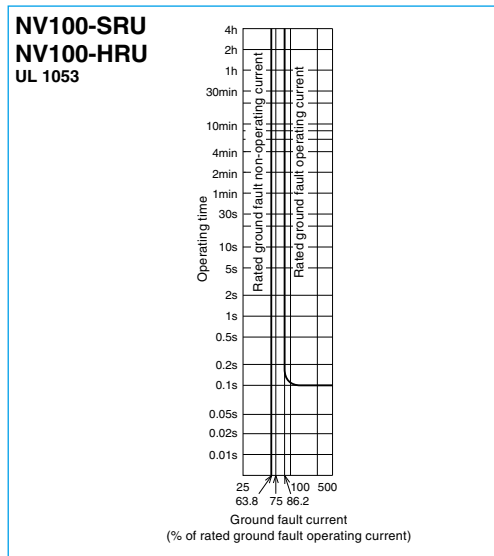
### Operating Characteristics

(The CE and CCC characteristics are noted differently. Contact us for more information.)

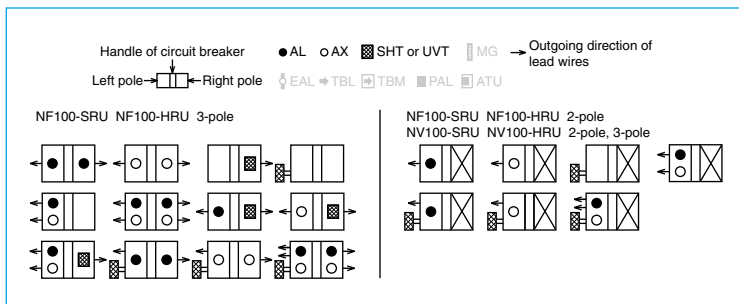


### Ground fault Tripping Characteristics

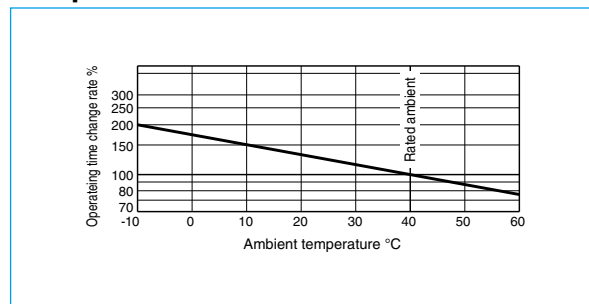
(The CE and CCC characteristics are noted differently. Contact us for more information.)



### Internal Accessories



### Temperature Characteristics



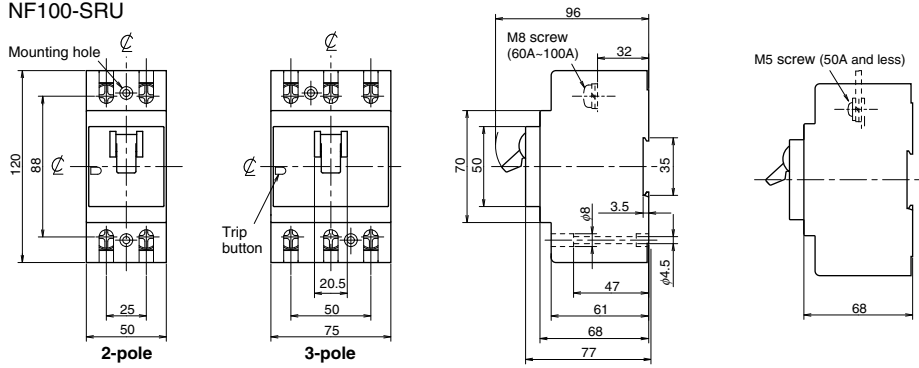
### External Accessories

Accessories		Type name	Reference page
Operating handle	F	2P F-05SRUL2	123
		3P F-05SRUL	
	V	2P V-05SRUL2	125
		3P V-05SRUL	
Handle lock device	HL	HLF-05SRU	134
	HL-S	2P HLS-05SRU2	
		3P HLS-05SRU3	
	Terminal cover	Small TC-S	
3P TCS-05SRU3			
Large TC-L		2P TCL-05SRU2	
	3P TCL-05SRU3		

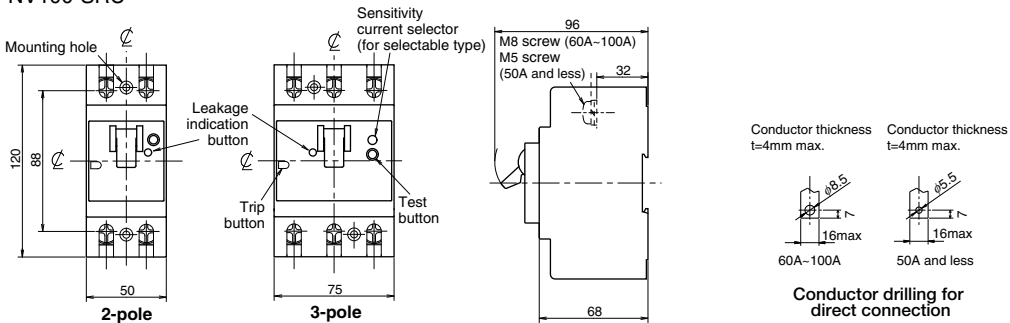
Outline Drawing

Front connection

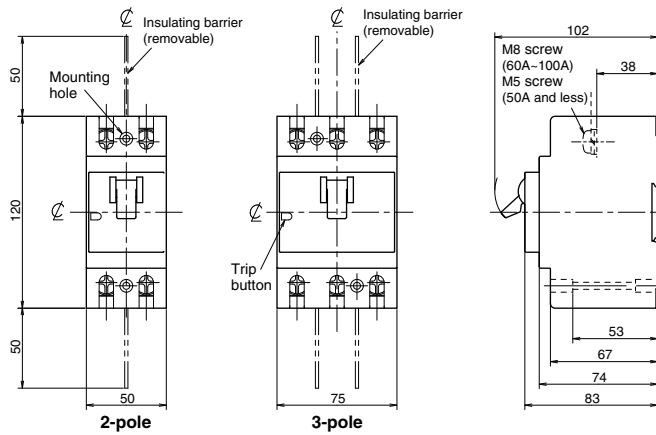
NF100-SRU



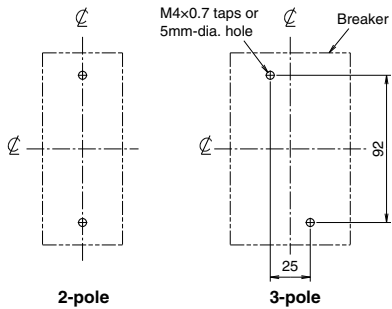
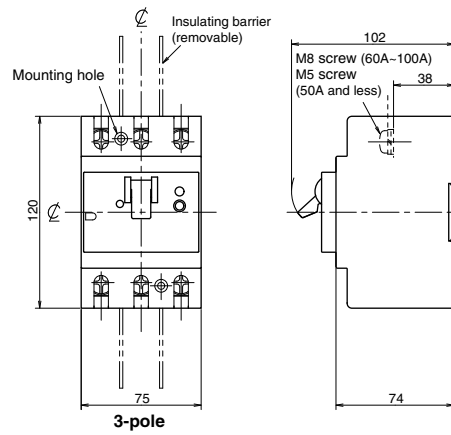
NV100-SRU



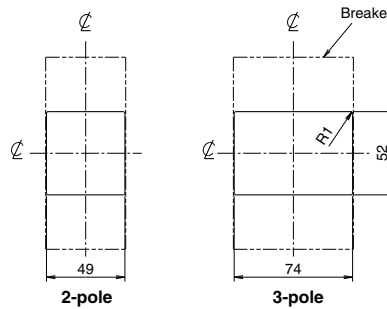
NF100-HRU



NV100-HRU



Drilling plan



1.0mm clearance on each side of the handle frame.

Front-panel cutout

## NF125-SVU NF125-HVU NV125-SVU NV125-HVU

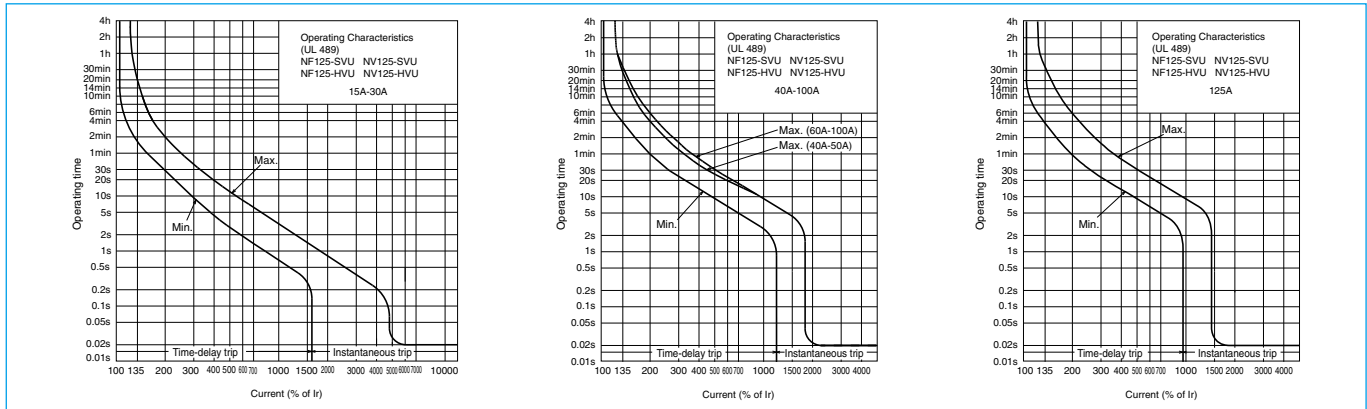


NF125-HVU

Model		NF125-SVU		NF125-HVU		Model		NV125-SVU		NV125-HVU			
Rated current In (A) Rated ambient temperature 40°C		15	20	30	15	20	30	15	20	30	15	20	30
		40	50	60	40	50	60	40	50	60	40	50	60
		(70)	75	(80)	(70)	75	(80)	(70)	75	(80)	(70)	75	(80)
		(90)	100		(90)	100		(90)	100		(90)	100	
Number of poles		2	3	2	3	3	3	Number of poles		3	3	3	3
Rated short-circuit breaking capacity (kA)		UL 489 CSA C22.2 No.5-02		UL 489 CSA C22.2 No.5-02		UL 489 CSA C22.2 No.5-02		UL 489 CSA C22.2 No.5-02		UL 489 CSA C22.2 No.5-02		UL 489 CSA C22.2 No.5-02	
		Rated voltage VAC		Rated voltage VAC		Rated voltage VAC		Rated voltage VAC		Rated voltage VAC		Rated voltage VAC	
		600Y/347V		600Y/347V		600Y/347V		600Y/347V		600Y/347V		600Y/347V	
		480V		480V		480V		480V		480V		480V	
		240V		240V		240V		240V		240V		240V	
		120V		120V		120V		120V		120V		120V	
		Rated insulation voltage UI/V		Rated insulation voltage UI/V		Rated insulation voltage UI/V		Rated insulation voltage UI/V		Rated insulation voltage UI/V		Rated insulation voltage UI/V	
		690V		690V		690V		690V		690V		690V	
		500V		500V		500V		500V		500V		500V	
		440V		440V		440V		440V		440V		440V	
		415V		415V		415V		415V		415V		415V	
		400V		400V		400V		400V		400V		400V	
		380V		380V		380V		380V		380V		380V	
		230V		230V		230V		230V		230V		230V	
Standard attached parts (Front connection)		Mounting screw M4×0.7×55 (2 screws), Insulating barrier (2P: 2pcs, 3P: 4pcs)		Mounting screw M4×0.7×55 (2 screws), Insulating barrier (2P: 2pcs, 3P: 4pcs)		Mounting screw M4×0.7×55 (2 screws), Insulating barrier (2P: 2pcs, 3P: 4pcs)		Mounting screw M4×0.7×55 (2 screws), Insulating barrier (2P: 2pcs, 3P: 4pcs)		Mounting screw M4×0.7×55 (2 screws), Insulating barrier (2P: 2pcs, 3P: 4pcs)		Mounting screw M4×0.7×55 (2 screws), Insulating barrier (4pcs)	

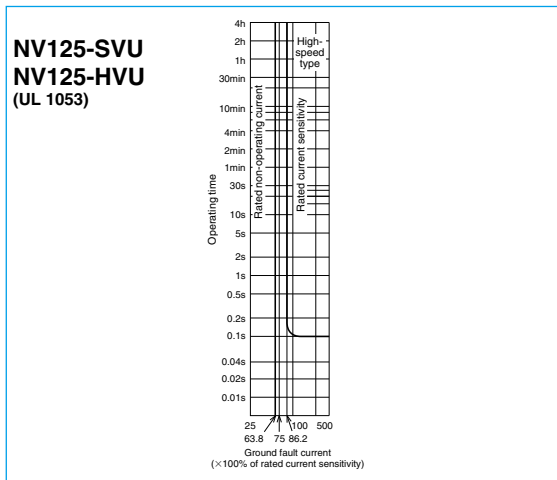
Note \*1 0.1 for UL1053.

## Operating Characteristics (The CE and CCC characteristics are noted differently. Contact us for more information.)

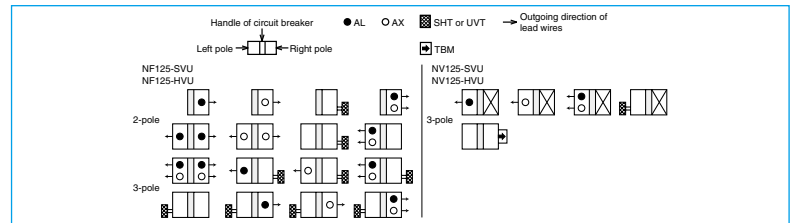


## Earth Leakage Tripping Characteristics

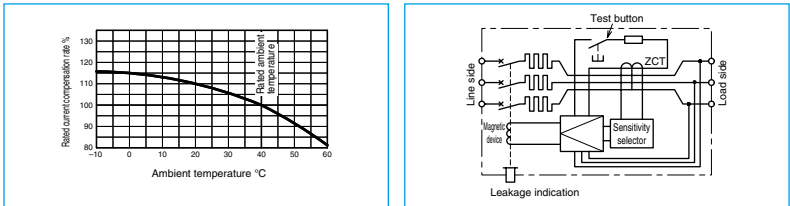
(The CE and CCC characteristics are noted differently. Contact us for more information.)



## Internal Accessories



## Temperature Compensation Curve Internal Wiring Diagram

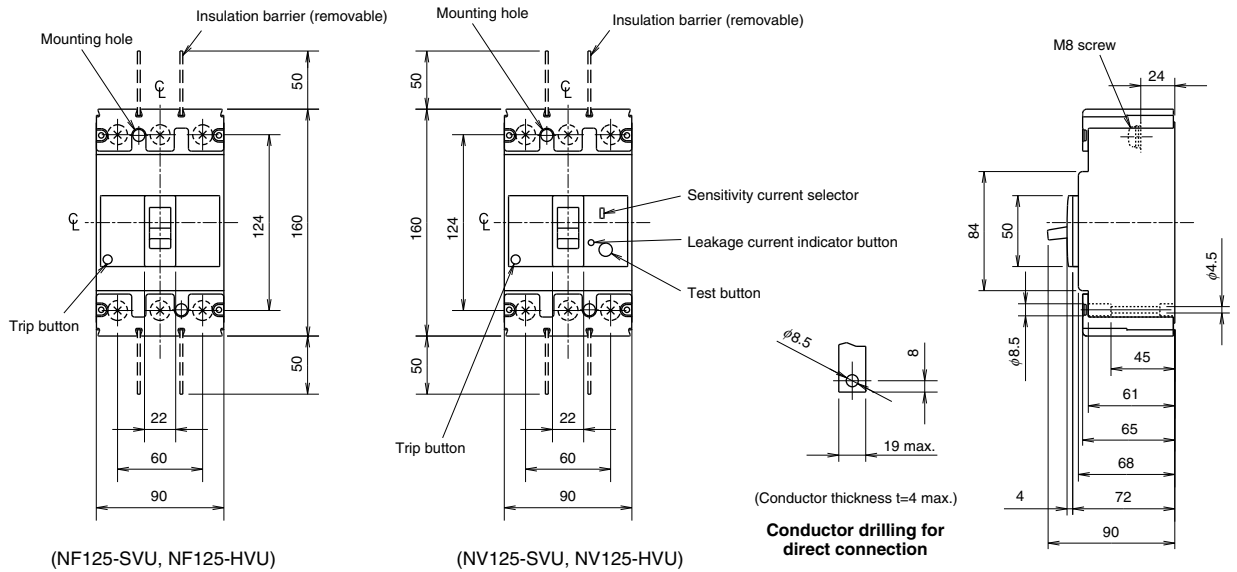


## External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page
Operating handle	F	F-1SVUL	Terminal cover	Large	TC-L
	V	V-1SVUL		TCL-1SVU3	128
Handle lock device	HL	HLF-05SVU			
	HL-S	HLS-05SVU			

Outline Drawing

Front connection



(NF125-SVU, NF125-HVU)

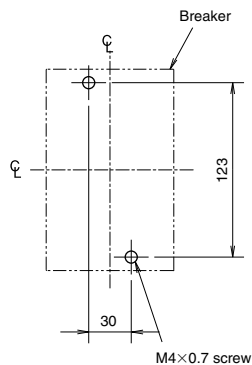
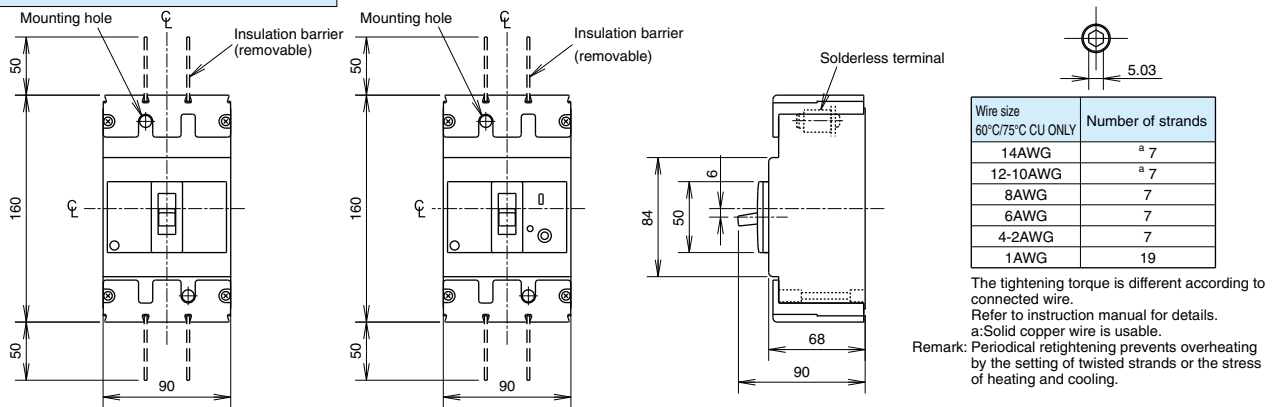
(NV125-SVU, NV125-HVU)

Compatible crimp terminals Tightening torque 54lb-in (6N-m)

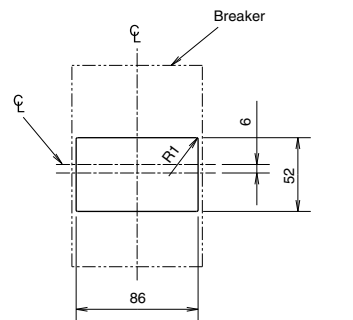
Applicable wire range		Crimp terminal type (*1)	
mm <sup>2</sup>	AWG (#) (60°C/75°C)	JST	NTM
2.5-2.63	14	R2-8	R2-8
2.63-6.64	12-10	R5.5-8	R5.5-8
6.64-10.52	8	R8-8	R8-8
10.52-16.78	6	R14-8	R14-8 R14-8S
16.78-26.66	4	R22-8	R22-8S
26.66-42.42	2	38-S8	R38-8S
42.42-60.57	1/0	60-2BA 60-S8	CB60-8

JST: Japan Solderless Terminal Mfg. Co.  
 NTM: Nichifu Co., Ltd.  
 Note \*1 When using with a wire connection, use the crimp terminal combination shown above.

Front connection (solderless terminal)



Drilling plan



Front panel drilling plan

The drilling dimensions have a 1.0mm clearance on each side of breaker window frame.

Remark: 1. 2-pole models are 3-pole with the central pole conductor removed.

## NF250-CVU NF250-SVU NF250-HVU NV250-CVU NV250-SVU NV250-HVU

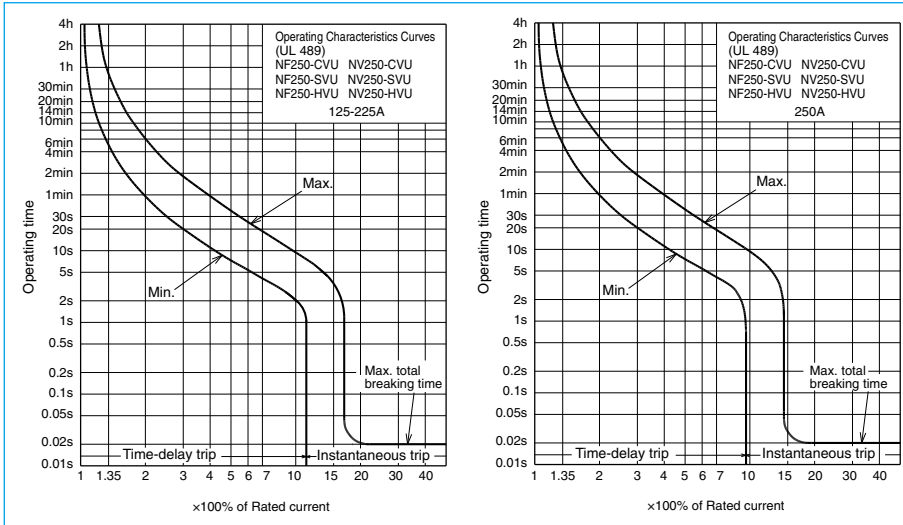


NF250-HVU

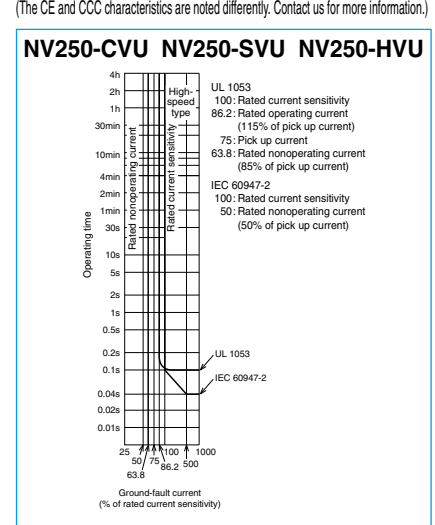
Model		NF250-CVU	NF250-SVU	NF250-HVU	Model		NV250-CVU	NV250-SVU	NV250-HVU
Rated current I <sub>n</sub> (A) Rated ambient temperature 40°C		125 150 175 200 225	125 150 175 200 225	125 150 175 200 225	Rated current I <sub>n</sub> (A) Rated ambient temperature 40°C		125 150 175 200 225	125 150 175 200 225	125 150 175 200 225
	Number of poles	3	3	3	Number of poles		3	3	3
Rated short-circuit breaking capacity (kA)	UL 489 CSA C22.2 No.5-02	240	240	480	Rated voltage VAC		240	240	480
	IEC 60947-2 EN 60947-2 (Icu/Ics)	600Y/347V	600Y/347V	600Y/347V	600Y/347V		600Y/347V	600Y/347V	600Y/347V
Standard attached parts (Front connection)	Rated insulation voltage U <sub>i</sub> V	600	600	690	Rated short-circuit breaking capacity (kA)		480V	35	35
	Mounting screw M4×0.7×55 (2 screws), Insulating barrier (4pcs)	690V	500V	440V	UL 489 CSA C22.2 No.5-02	AC	240V	35	35
Standard attached parts (Front connection)	Rated short-circuit breaking capacity (kA)	690V	500V	440V	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	440V	15/12	15/12
	Mounting screw M4×0.7×55 (2 screws), Insulating barrier (4pcs)	415V	400V	380V	UL 489 CSA C22.2 No.5-02	AC	120V	35	35
Standard attached parts (Front connection)	Rated short-circuit breaking capacity (kA)	230V	230V	230V	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	400V	25/19	25/19
	Mounting screw M4×0.7×55 (2 screws), Insulating barrier (4pcs)	230V	230V	230V	UL 489 CSA C22.2 No.5-02	AC	230V	36/27	36/27

Note \*1 0.1 for UL1053.

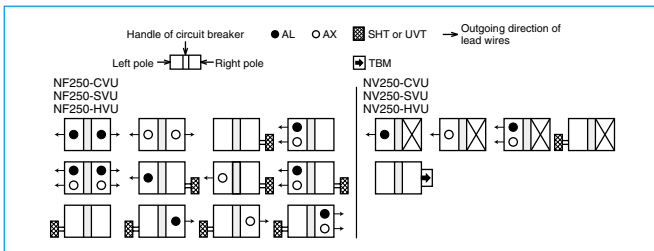
### Operating Characteristics (The CE and CCC characteristics are noted differently. Contact us for more information.)



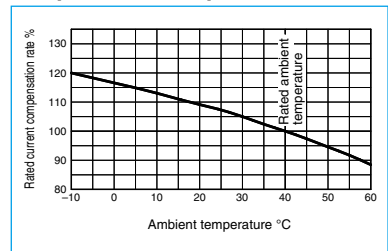
### Earth Leakage Tripping Characteristics (The CE and CCC characteristics are noted differently. Contact us for more information.)



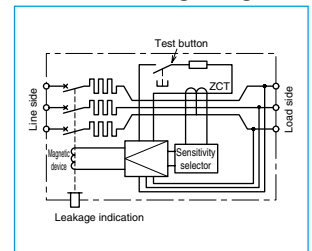
### Internal Accessories



### Temperature Compensation Curve



### Internal Wiring Diagram



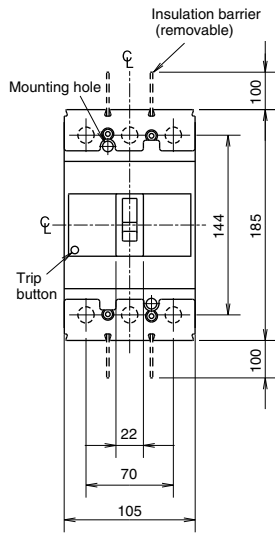
### External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page
Operating handle	F F-2SVUL	123	Terminal cover	Large TC-L	128
	V V-2SVUL	125			
Handle lock device	HL HLF-05SVU	134			
	HL-S HLS-2SVU				

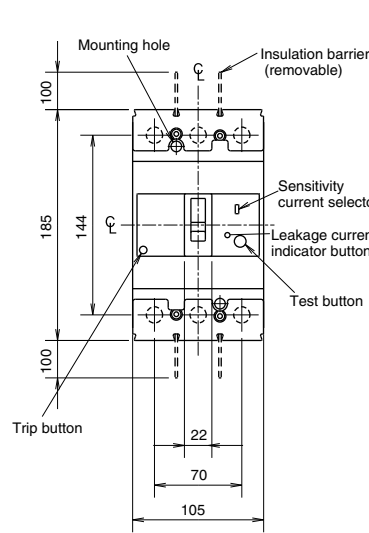


Outline Drawing

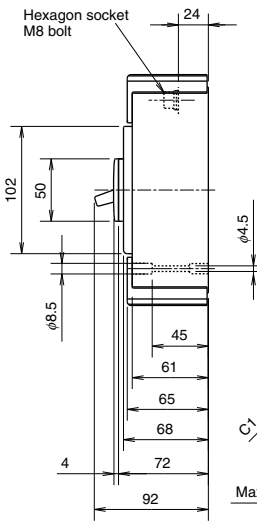
Front connection



(NF250-CVU, NF250-SVU, NF250-HVU)



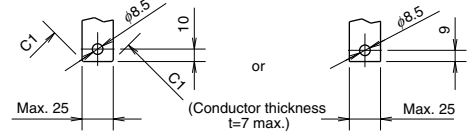
(NV250-CVU, NV250-SVU, NV250-HVU)



Compatible crimp terminals Tightening torque 90lb-in (10N.m)

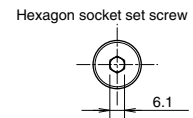
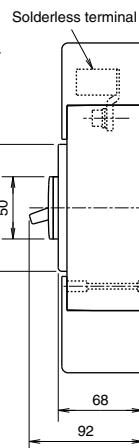
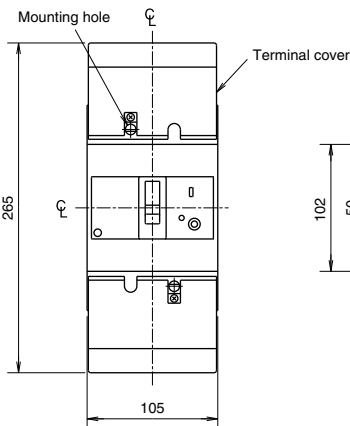
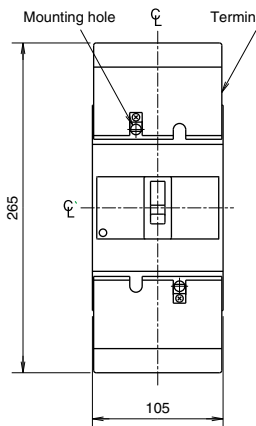
Applicable wire range	Crimp terminal type (*2)	
	mm <sup>2</sup>	AWG (#) (60°C/75°C)
16.78-26.66	4	R22-8 22-S8
26.66-42.42	2	R38-8 38-S8
42.42-60.57	1/0	R60-8 60-2BA CB60-S8
60.57-76.28	2/0	70-8
76.28-96.3	3/0	80-3BA CB80-S8
96.3-117.2	4/0	100-3BA CB100-S8
117.2-152.05	250/300MCM	CB150-S8 (*1)

JST: Japan Solderless Terminal Mfg. Co.  
NTM: Nichifu Co., Ltd.  
Notes \*1 TCL-2SVU3L can be mounted when using CB150-S8.  
\*2 When using with a wire connection, use the crimp terminal combination shown above.



Conductor drilling for direct connection

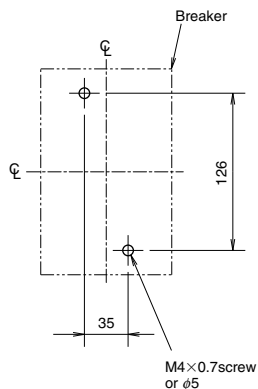
Front connection (solderless terminal)



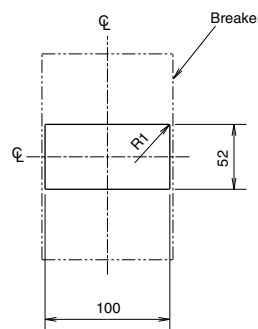
Wire size 60°C/75°C CU ONLY	Number of strands
4-2AWG	7
1-1/0AWG	19
3/0-4/0AWG	19
250-350MCM	37

The tightening torque is different according to connected wire. Refer to instruction manual for details.

Remark: Periodical retightening prevents overheating by the setting of twisted strands or the stress of heating and cooling.



Drilling plan



The drilling dimensions have a 1.0mm clearance on each side of breaker window frame.

Front panel drilling plan

## NF400-SWU NF400-HWU

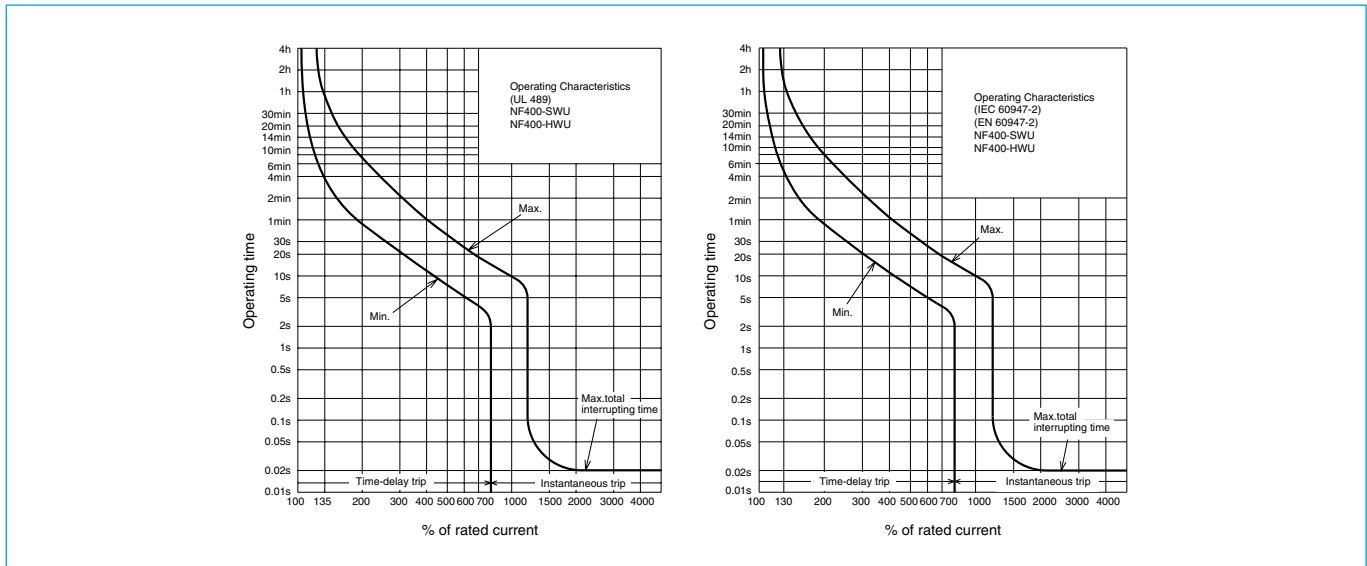


NF400-SWU

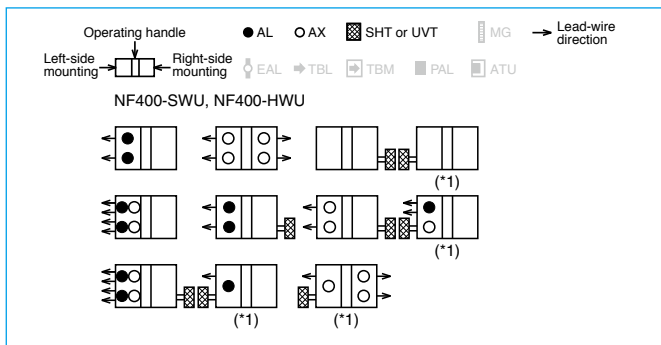
Model		NF400-SWU	NF400-HWU		
Rated current In (A) at ambient temperature 40°C		250 300 350 400	250 300 350 400		
Number of poles		3	3		
Rated short-circuit breaking capacities (kA)	UL 489	Rated voltage (VAC)			
		AC	600Y/347V	20	25
			480V	35	65
	240V	65	100		
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)		690	690
		AC	690V	10/10(5/5) (*1)	15/10
500V			30/30(25/25) (*1)	42/42	
440V			42/42(36/36) (*1)	65/65	
400V	45/45(36/36) (*1)		70/70		
230V	85/85(65/65) (*1)	100/100			
Standard attached parts		Mounting screw: M6×60 (4screws) Insulating plate (1pce) Insulating barrier (4pcs) (Only for type with bar terminals)	Mounting screw: M6×60 (4screws) Insulating plate (1pce) Insulating barrier (4pcs) (Only for type with bar terminals)		

Note \*1 In case of solderless terminal, interrupting capacity reduces: (/).  
\*2 0.1 for UL1053.

### Operating Characteristics

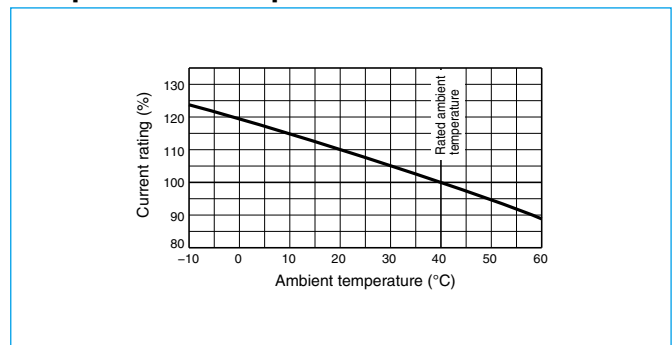


### Internal Accessories



Note \*1 Right-side mounting is standard of SHT and UVT. Specify separately for left-side mounting.

### Temperature Compensation Curve

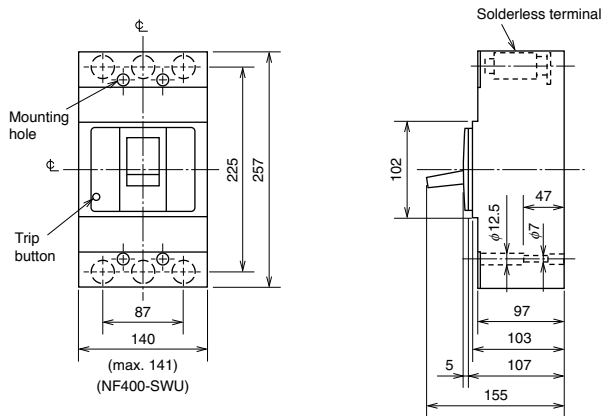


### External Accessories

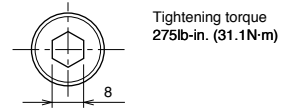
Accessories	Type name	Reference page	Accessories	Type name	Reference page
Operating handle	F	F-4SUL	Terminal cover	Large	TC-L
	V	V-4SUL		TCL-4SWU	128
Handle lock device	HL	HL-4SWU			

Outline Drawing

Front connection (Solderless terminal)



Hexagon socket set screw



UL

Ampere ratings	Wire size	Number of strands
250A, 300A	250-350kcmil CU	37
250A	350kcmil AL	
350A, 400A	(2) 3/0AWG CU	19

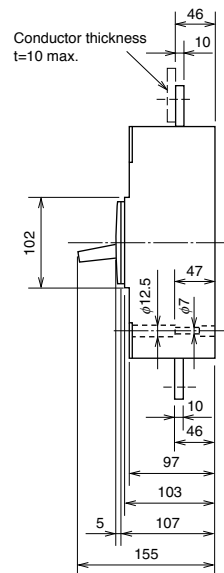
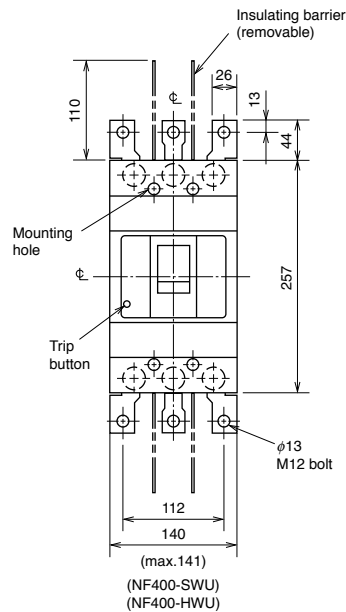
IEC

Ampere ratings	Wire size (IEC 60228)	
	Class 2	Class 5
250A, 300A	70-185mm <sup>2</sup>	95-185mm <sup>2</sup>
350A, 400A	150-240mm <sup>2</sup>	150-185mm <sup>2</sup>

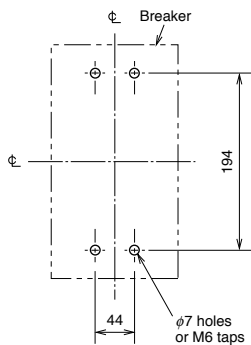
- Use a wire size that can carry the rated current.
- When using IEC Class 5 (multi-core wire), pay attention to strand breakage and pinching, etc., while tightening.
- The NF400-HWU does not have a solderless terminal.

- Remarks:
- Do not remove solderless terminal in any case.
  - When using the solderless terminals, conduct periodic inspections and tightening as the wires may wear down over use.

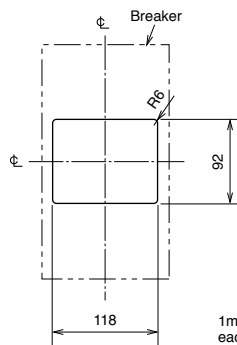
Front connection (Busbar terminal)



Remark: Do not remove busbar terminal in any case.



Drilling plan

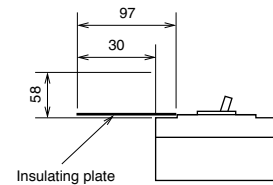


Front-panel cutout

1mm clearance on each side of handle.

CAUTION

When mounted in steel or cast box cover must be insulated as shown. 58mm air gap to cover or 0.8mm fibre insulating plate extending 12.7mm out from each side of breaker.



(Line)

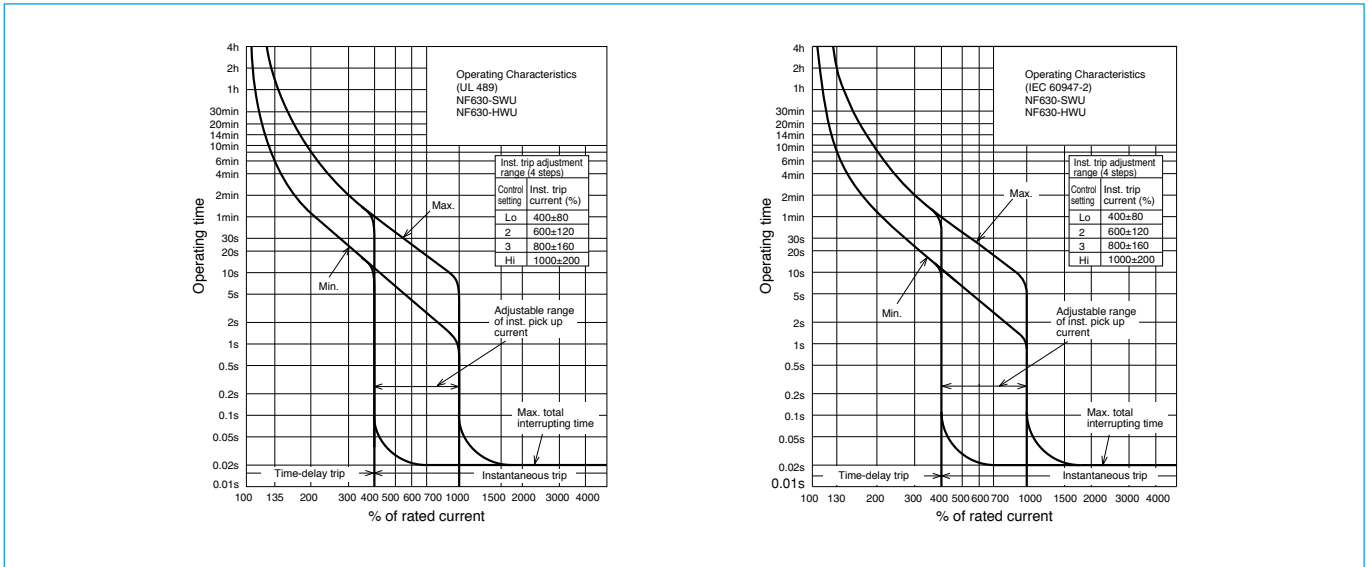
## NF630-SWU NF630-HWU



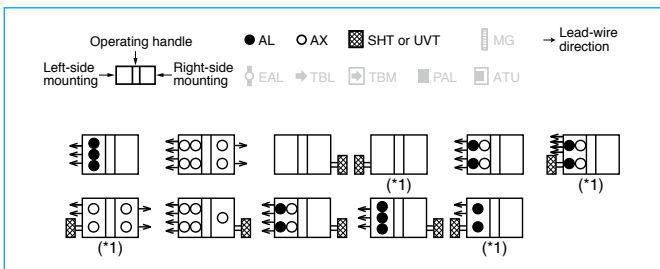
NF630-SWU

Model		NF630-SWU	NF630-HWU		
Rated current I <sub>n</sub> (A) at ambient temperature 40°C		500 600 630	500 600 630		
Number of poles		3	3		
Rated short-circuit breaking capacities (kA)	UL 489 CSA C22.2 No.5-02	Rated voltage (VAC)	600Y/347		
		AC	600Y/347V	20	25
			480V	35	65
	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	240V	85	100
Rated insulation voltage U <sub>i</sub> (V)			690	690	
690V			10/10	15/10	
500V			30/30	42/42	
440V			42/42	65/65	
400V	45/45	70/70			
230V	85/85	100/100			
Standard attached parts		Mounting screw: M6×35 (4pcs) Insulating plate (1pce) Insulating barrier (500A,600A: 2pcs, 630A: 4pcs) (Only for type with bar terminals)	Mounting screw: M6×35 (4pcs) Insulating plate (1pce) Insulating barrier (500A,600A: 2pcs, 630A: 4pcs) (Only for type with bar terminals)		

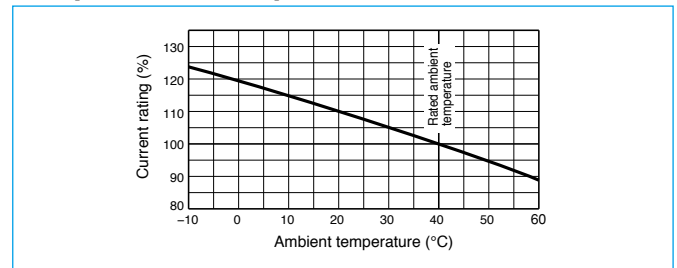
### Operating Characteristics



### Internal Accessories



### Temperature Compensation Curve

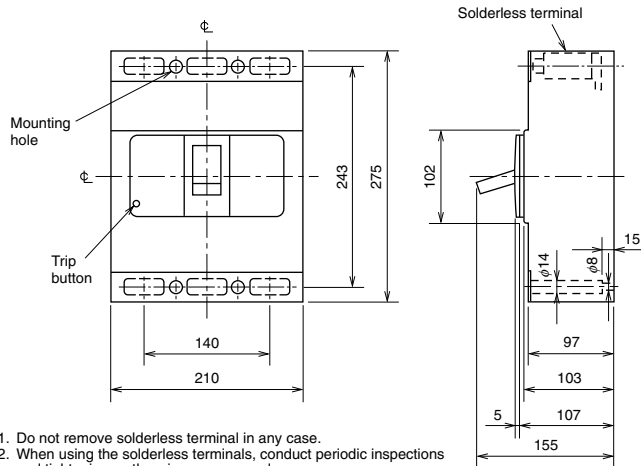


### External Accessories

Accessories	Type name	Reference page	Accessories	Type name	Reference page
Operating handle	F	F-6SUL	Terminal cover	Large	TC-L
	V	V-6SUL		TCL-6SWU	128
Handle lock device	HL	HL-4SWU			

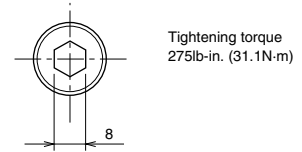
Outline Drawing

**Front connection (Solderless terminal)**



Remarks: 1. Do not remove solderless terminal in any case.  
 2. When using the solderless terminals, conduct periodic inspections and tightening as the wires may wear down over use.

**Hexagon socket set screw**



**UL**

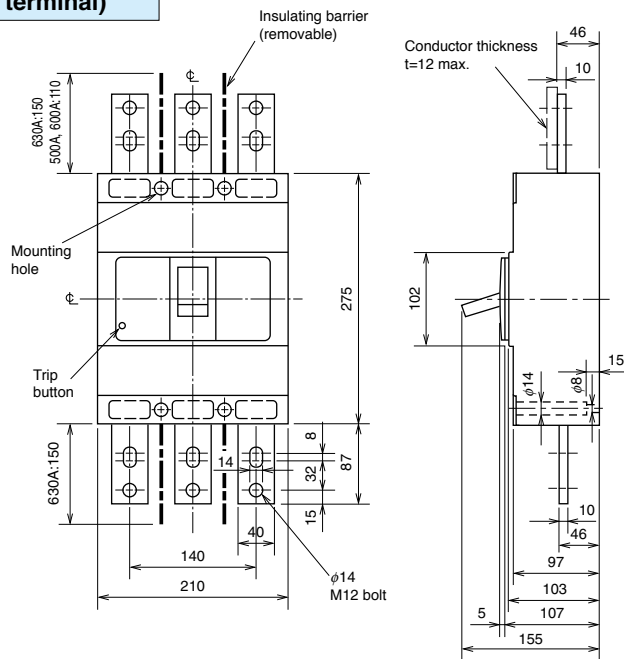
Ampere ratings	Wire size	Number of strands
500A, 600A	(2) 250-350kcmil CU ONLY	37

**IEC**

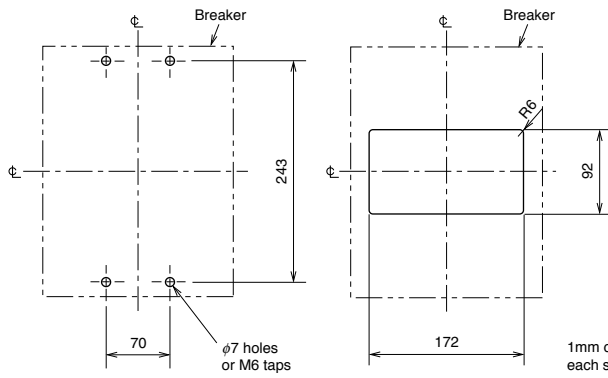
Ampere ratings	Wire size (IEC 60228)	
	Class 2	Class 5
500A, 600A	(2) 95-185mm <sup>2</sup>	(2) 120-185mm <sup>2</sup>

- Use a wire size that can carry the rated current.
- When using IEC Class 5 (multi-core wire), pay attention to strand breakage and pinching, etc., while tightening.
- The 630A and NF630-HWU does not have a solderless terminal.

**Front connection (Busbar terminal)**



Remark: Do not remove busbar terminal in any case.

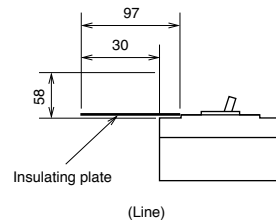


Drilling plan

Front-panel cutout

**CAUTION**

When mounted in steel or cast box cover must be insulated as shown. 58mm air gap to cover or 0.8mm fibre insulating plate extending 12.7mm out from each side of breaker.



(Line)

## NF30-FAU NF50-FAU NV30-FAU NV50-FAU

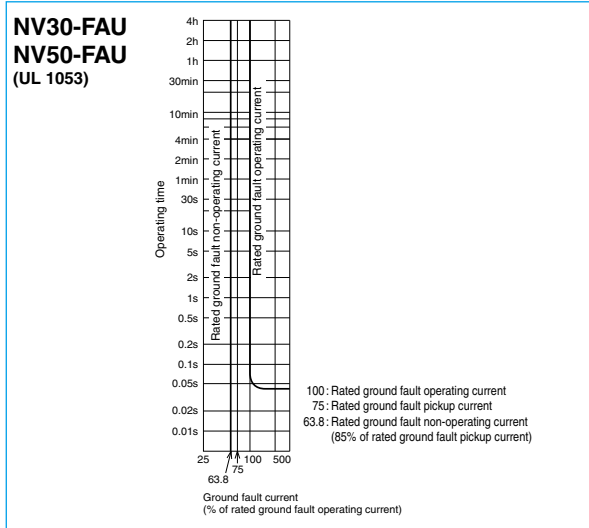


NF30-FAU



NV30-FAU

### Earth Leakage Tripping Characteristics



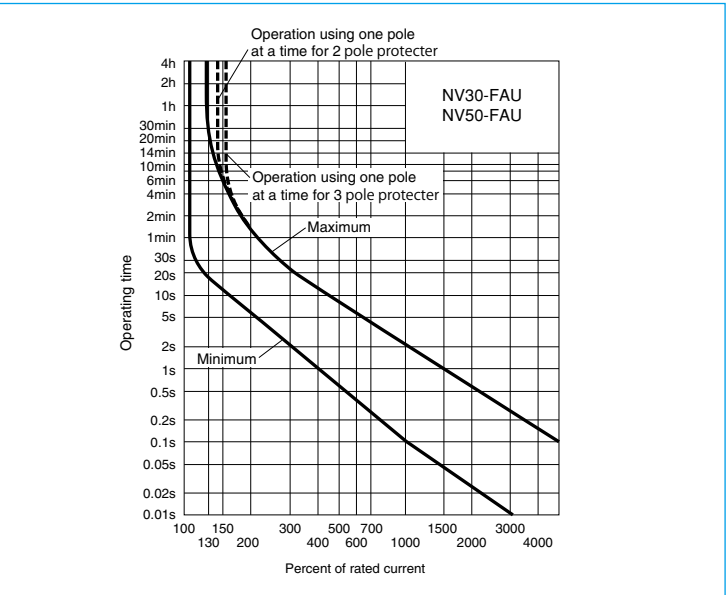
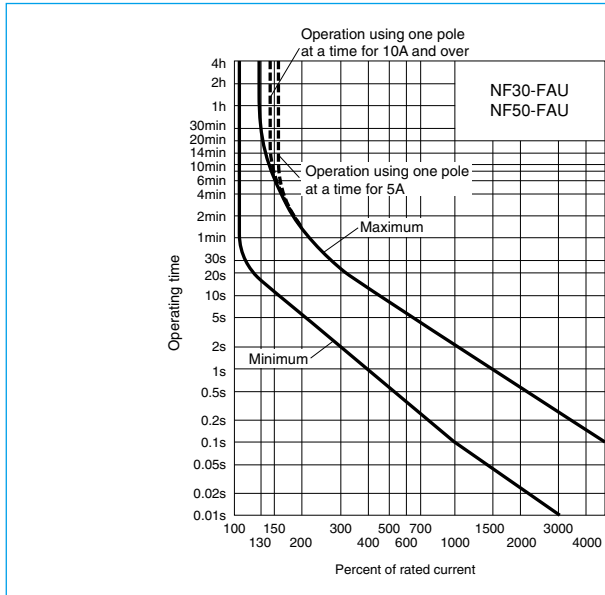
Model				NF30-FAU		NF50-FAU	
Rated current In (A) at ambient temperature 40°C				5 10 15 20 30		5 10 15 20 30 40 50	
Number of poles				2 3		2 3	
Rated short-circuit breaking capacities (kA)	UL 1077 CSA 22.2 No.235	AC	240V	2.5 (*1)			
		DC	60V	1.5			
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage Ui (V)		250			
		AC	230V	2.5/1 (*2)			
	DC	60V	1.5/1				
Standard attached parts				IEC35 rail mounting claws			

Notes \*1 Rated short-circuit breaking capacity of rated current 5A is 1.5kA.  
\*2 Rated short-circuit breaking capacity of rated current 5A is 1.5/1kA.

Model				NV30-FAU		NV50-FAU	
Rated current In (A)				5 10 15 20 30		5 10 15 20 30 40 50	
Number of poles				2 3		2 3	
Phase line				1φ2W 3φ3W 1φ2W		1φ2W 3φ3W 1φ2W	
Rated current sensitivity (mA)				30			
Pick-up current UL 1053				75% of IΔn			
Operating time (sec) within at 5IΔn				0.04 (at 5IΔn)			
Earth leakage indication system				Mechanical type (button)			
Rated short-circuit breaking capacities (kA)	UL 1077 CSA 22.2 No.235	AC	240V	2.5 (*1)			
		AC	230V	2.5/1 (*2)			
Standard attached parts				IEC35 rail mounting claws			

Notes \*1 Rated short-circuit breaking capacity of rated current 5A is 1.5kA.  
\*2 Rated short-circuit breaking capacity of rated current 5A is 1.5/1kA.

### Operating Characteristics (The CE and CCC characteristics are noted differently. Contact us for more information.)



### Internal Accessories

Type	NF30-FAU, NF50-FAU		NV30-FAU, NV50-FAU	
	2P	3P	2P	3P
AL				
AX				
AL+AX				
SHT				
AL+SHT				

Left-side mounting    Operating handle    Right-side mounting

● AL    ○ AX

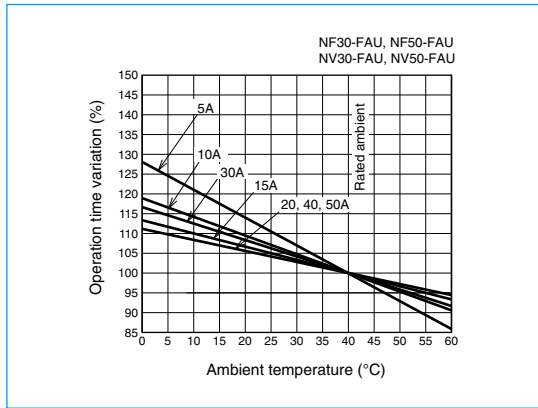
▣ SHT or UVT

▤ MG    ⊕ EAL    ⊕ TBL

▤ TBM    ▤ PAL    ▤ ATU

→ Lead-wire direction

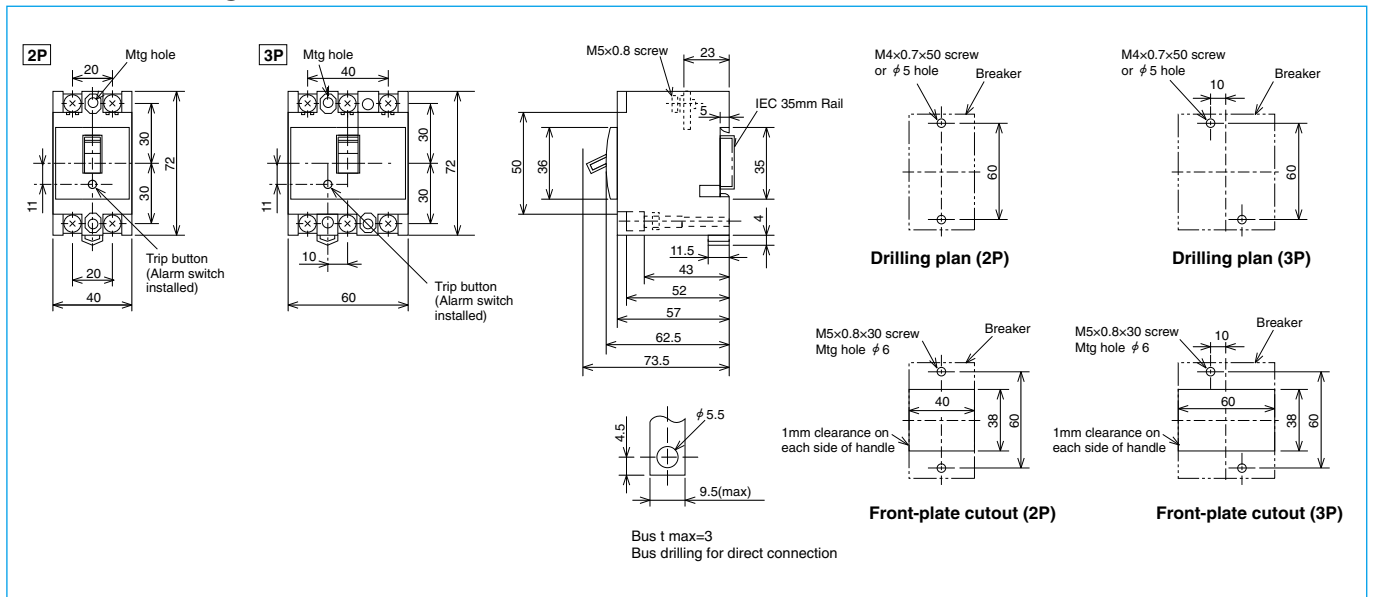
### Temperature Compensation Curve



### External Accessories

Accessories	Type name		Reference page
	Small	TC-S	
Terminal cover	TC-S	TCS-05FA2	128
	RTC	TCS-05FA3	
Lock cover	LC	LC05FA	135
Handle lock device	HL	HL-05FA	134

### Outline Drawing



## NF50-FHU NF100-FHU NV50-FHU NV100-FHU



NF100-FHU



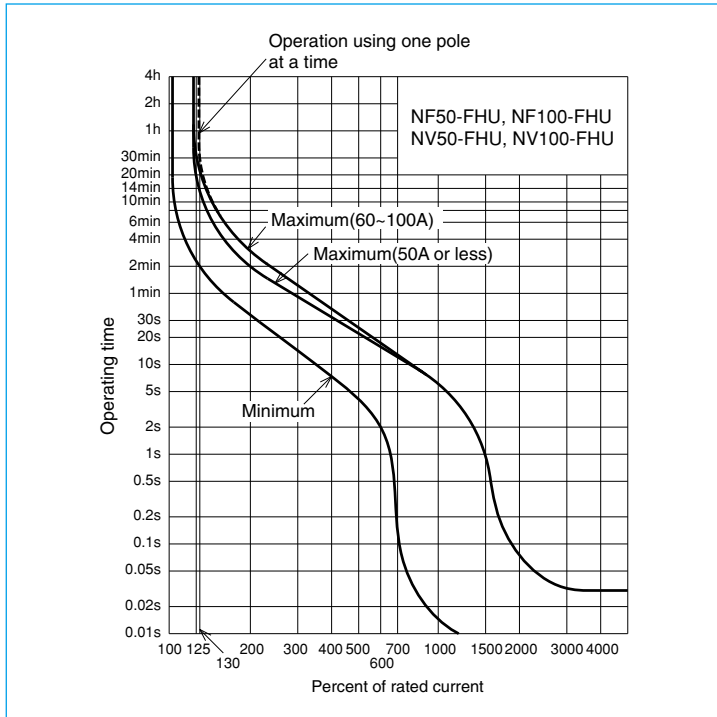
NV100-FHU

Model				NF50-FHU		NF100-FHU	
Rated current I <sub>n</sub> (A) at ambient temperature 40°C				3 5 10 15 20 30 40 50		60 75 100	
Number of poles				2		3	
Rated short-circuit breaking capacities (kA)	UL 1077 CSA 22.2 No.235	AC	240V	5		5	
	IEC 60947-2 EN 60947-2 (Icu/Ics)	Rated insulation voltage U <sub>i</sub> (V)		500			
		AC	400V	1.5/1		-	
			230V	5/2		5/2	
Standard attached parts				IEC35 rail mounting claws			

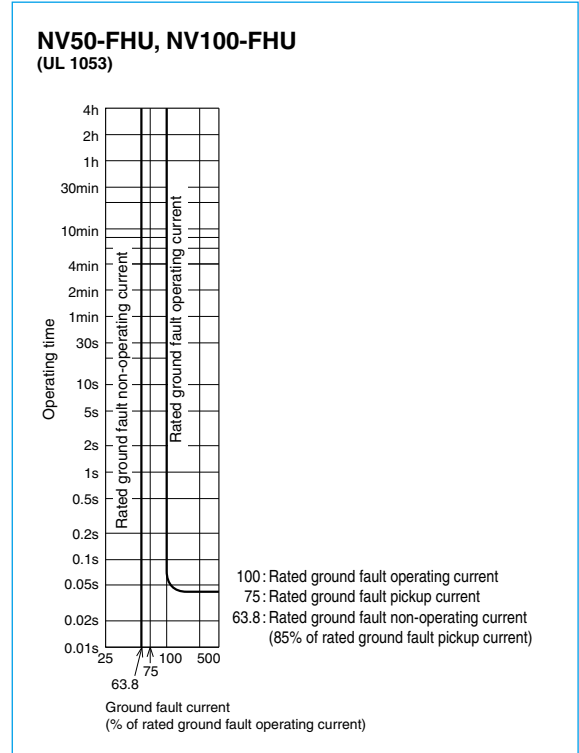
Model				NV50-FHU		NV100-FHU	
Rated current I <sub>n</sub> (A)				5 10 15 20 30 40 50		60 75 100	
Number of poles				2		3	
Phase line				1φ2W		3φ3W 1φ2W 1φ3W	
Rated current sensitivity (mA)				30 50 100			
Pick-up current UL 1053				75% offI <sub>Δn</sub>			
Operating time (sec) within at 5I <sub>Δn</sub>				0.04 (at 5I <sub>Δn</sub> )			
Earth leakage indication system				Mechanical type (button)			
Rated short-circuit breaking capacities (kA)	UL 1077 CSA 22.2 No.235	AC	240V	5			
	IEC 60947-2 EN 60947-2 (Icu/Ics)	AC	230V	5/2			
Standard attached parts				IEC35 rail mounting claws			

### Operating Characteristics

(The CE and CCC characteristics are noted differently. Contact us for more information.)



### Earth Leakage Tripping Characteristics (UL 1053)







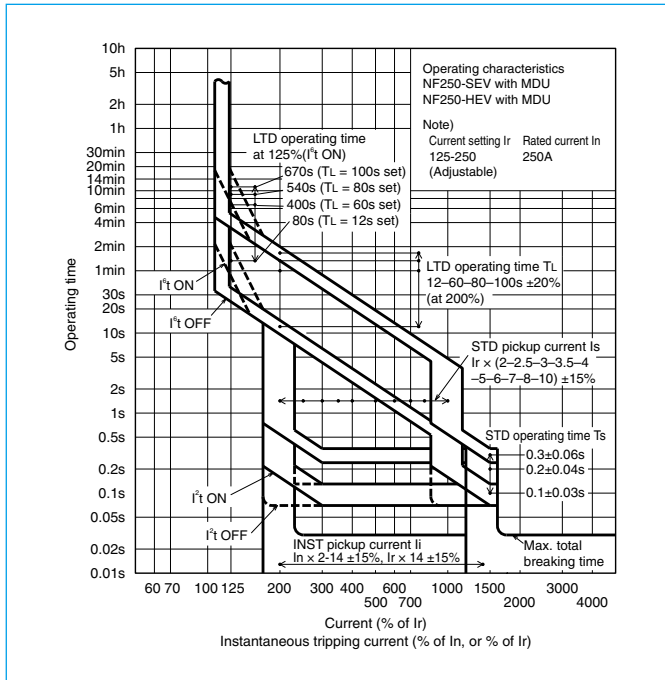
### NF250-SEV with MDU NF250-HEV with MDU



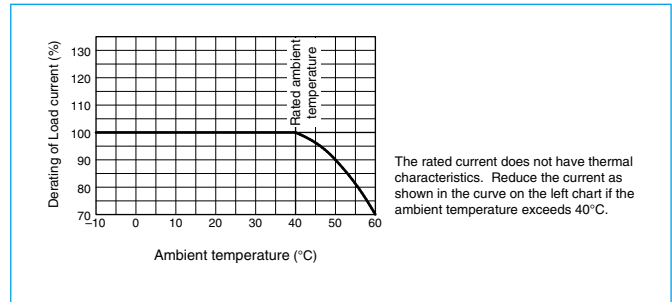
Model		NF250-SEV with MDU	NF250-HEV with MDU	
Rated current I <sub>n</sub> (A)		250	250	
Rated ambient temperature 40°C				
Current setting I <sub>r</sub> (A)		125-250	125-250	
Number of poles		3 4	3 4	
Rated insulation voltage U <sub>i</sub> (V)		690	690	
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC 690V	8/8	10/8
		500V	18/18	30/23
		440V	36/36	50/50
		415V	36/36	70/70
		400V	36/36	75/75
		380V	36/36	75/75
		230V	85/85	100/100
		DC 250V	-	-
Standard attached parts (Front connection)		Mounting screw M4 × 0.7 × 55 (3P: 2psc, 4P: 4psc) Insulation barrier (3P: 4psc, 4P: 6psc)		
MDU accessories	External mounting	MDU, Mounting plate, Mounting plate screw, MDU mounting screw		
	Breaker mounting	MDU, Connection cable (for breaker mounting)		
	Panel mounting	MDU, Panel mounting bracket, Panel mounting screw, Connection cable (for panel mounting)		

NF250-SEV with MDU (Breaker mounting)    NF250-SEV with MDU (External mounting)

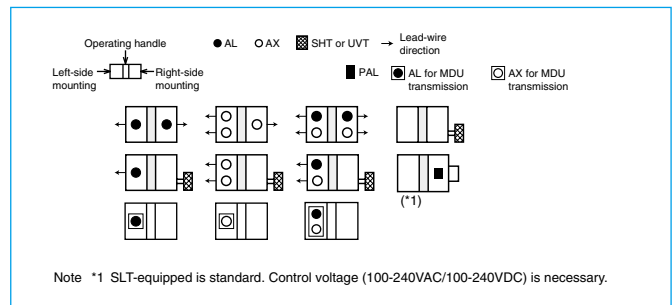
### Operating Characteristics



### Current Reducing Curve



### Internal Accessories



### External Accessories

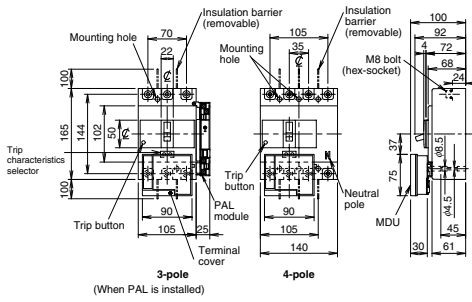
Accessories	Type name	Reference page	Accessories	Type name	Reference page
Operating handle (*1)	F	F-2SV	Mechanical interlock	MI (*3)	3P MI-05SV3
	V	V-2SV		4P MI-2SV4	136
Handle lock device	LC	LC-05SV	Terminal cover	Small	3P TCS-2SV3 (*5)
	HL (*2)	HLF-05SV			4P TCS-2SV4
	HLN-05SV	HLN-05SV		3P TCL-2SV3 (*5)	
				4P TCL-2SV3L (*5)	
HL-S (*1)	HLS-2SV	4P TCL-2SV4			
		3P TTC-2SV3 (*5)			
		4P TTC-2SV4			
		3P TTC-2SV3 (*5)			
		4P TTC-2SV4			
		3P BTC-2SV3 (*5)			
		4P BTC-2SV4			
		Electrical operation device (*1)	(*4)	140	

Notes \*1 Available only for the MDU panel mounting type.  
\*2 HLF types are used for OFF lock and HLN types for ON lock.  
\*3 When selecting the MDU breaker mounting, only the MI panel mounting can be manufactured.  
\*4 Specify the working voltage.  
\*5 In the case of the MDU breaker mounting type, specify the model name with MP at the end.

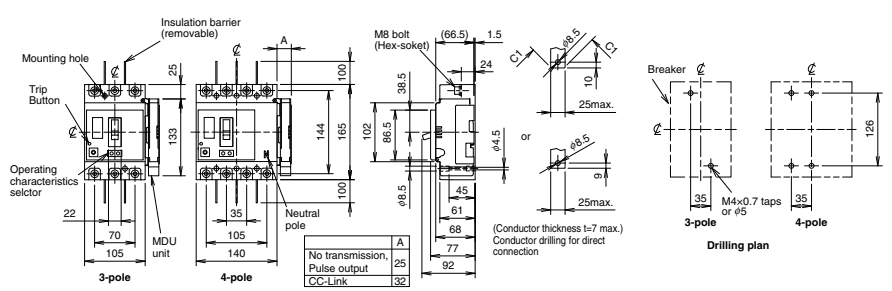
Outline Drawing

Front connection

MDU external mounting

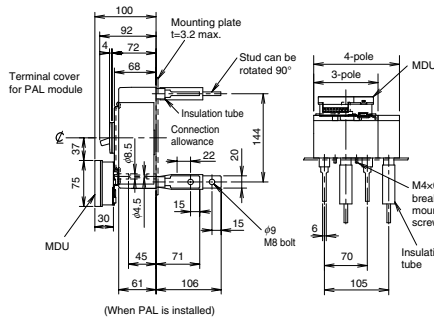


MDU breaker mounting

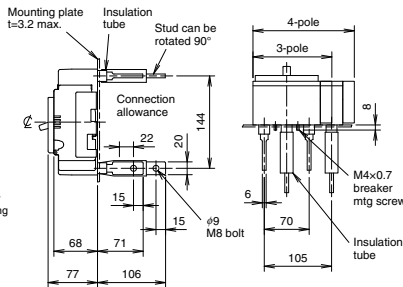


Rear connection

MDU external mounting

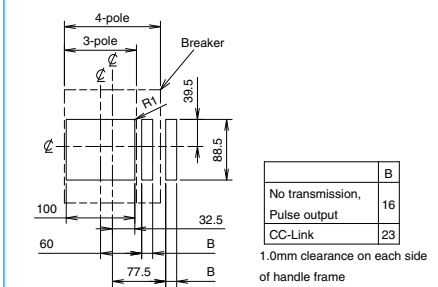


MDU breaker mounting

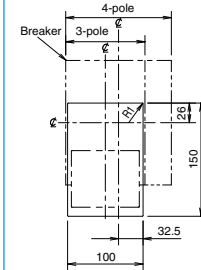


Front-plate cutout

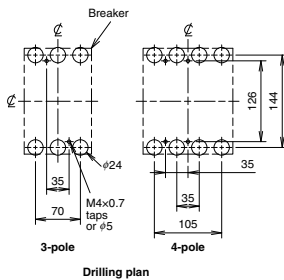
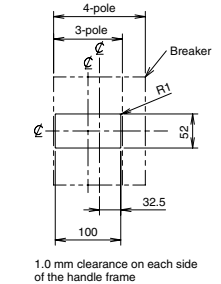
MDU breaker mounting



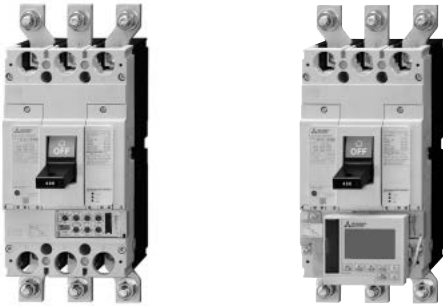
MDU external mounting



MDU panel mounting



### NF400-SEW with MDU NF400-HEW with MDU

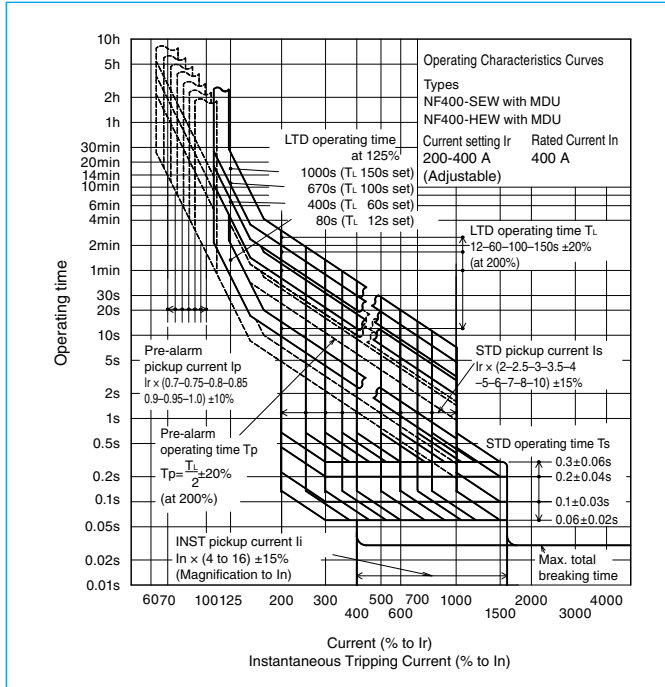


Model		NF400-SEW with MDU	NF400-HEW with MDU	
Rated current In (A) Rated ambient temperature 40°C		200 225 250 300 350 400 Adjustable		
Number of poles		3	4	
Rated operational voltage Ue V		690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	10/10
			500V	30/30
			440V	42/42
			415V	50/50
			400V	50/50
			380V	50/50
			230V	85/85
			200V	85/85
Standard attached parts (Front connection)		Breaker	Mounting screw M6 × 60 (4pcs) Insulation barrier (3P: 4pcs, 4P: 6pcs)	
MDU accessories		External mounting	MDU, Mounting plate, Mounting plate screw, Connection cable, MDU mounting screw	
		Breaker mounting	MDU, Connection cable (for breaker mounting)	
		Panel mounting	MDU, Panel mounting bracket, Panel mounting screw, Connection cable (for panel mounting)	

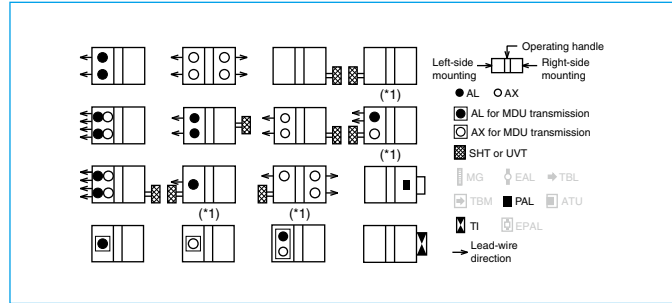
NF400-SEW with MDU  
(Breaker mounting)

NF400-SEW with MDU  
(External mounting)

### Operating Characteristics

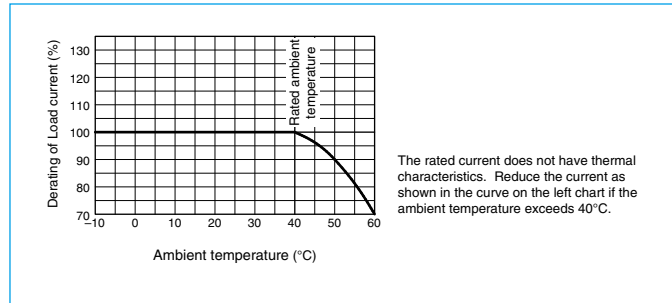


### Internal Accessories



Note \*1 Right side mounting is standard of SHT and UVT. Specify separately for left side mounting.

### Current Reducing Curve



### 7 External Accessories

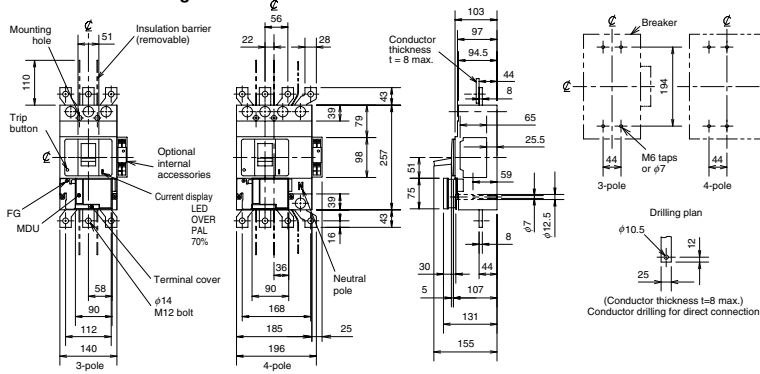
Accessories	Type name		Reference page	Accessories	Type name		Reference page			
	Breaker mounting	Panel mounting			Breaker mounting	Panel mounting				
Operating handle	F	-	F-4S	Large	TC-L	3P	-	TCL-4SW3 (*1)	128	
	V	-	V-4S			4P	-	TCL-4SW4 (*1)		
Handle lock device	HL	HL-4SW	HL-4SW	Skeleton	TTC	3P	TTC-4SW3-MDU	TTC-4SW3		
	HL-S	-	HLS-4SW			4P	TTC-4SW4-MDU	TTC-4SW4		
Mechanical interlock	MI	3P	MI-4SW3	Rear	BTC	3P	BTC-4SW3 (*1)	BTC-4SW3 (*4)		
	(*2)	4P	MI-4SW4			4P	BTC-4SW4	BTC-4SW4		
Auxiliary handle	HT	HT-4SW	HT-4SW	Electrical operation device	NFM	3P	-	(*3)		140
						4P				

Notes  
\*1 For NF400SEW with MDU.  
\*2 When selecting the MDU breaker mounting, only the MI panel mounting can be manufactured.  
\*3 Specify the operation method and voltage. Order in combination with the breaker unit.  
\*4 This is for NF400-SEW with MDU. For rear terminal cover of NF400-HEW with MDU, use PTC-4SW3.

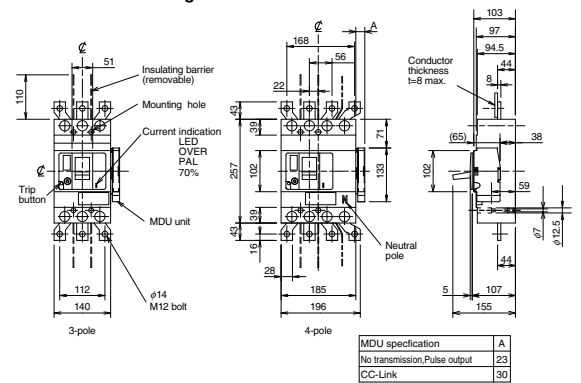
Outline Drawing

Front connection

MDU external mounting

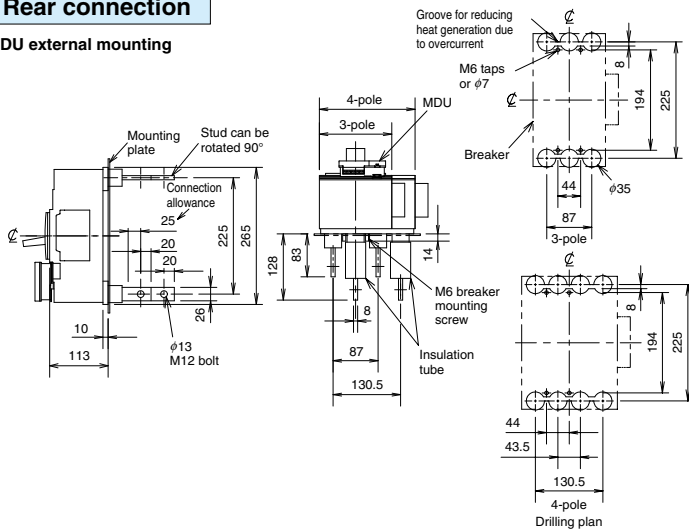


MDU breaker mounting

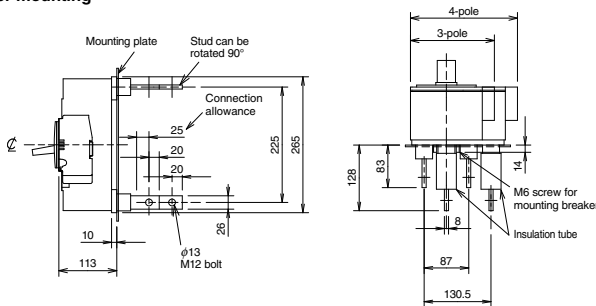


Rear connection

MDU external mounting



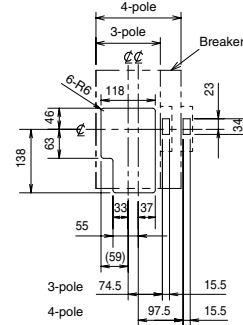
MDU breaker mounting



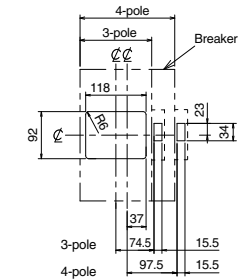
Note: When the insulating barrier for rear connection is used, mounting holes are added.

Front-plate cutout

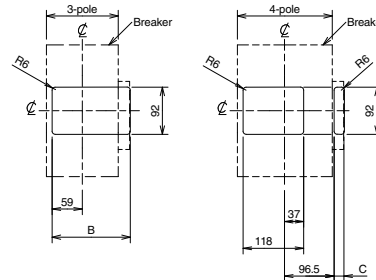
MDU external mounting



MDU panel mounting



MDU breaker mounting



MDU specification	B	C
No transmission, Pulse output	153	20
CC-Link	160	27

### NF630-SEW with MDU NF630-HEW with MDU NF800-SEW with MDU NF800-HEW with MDU



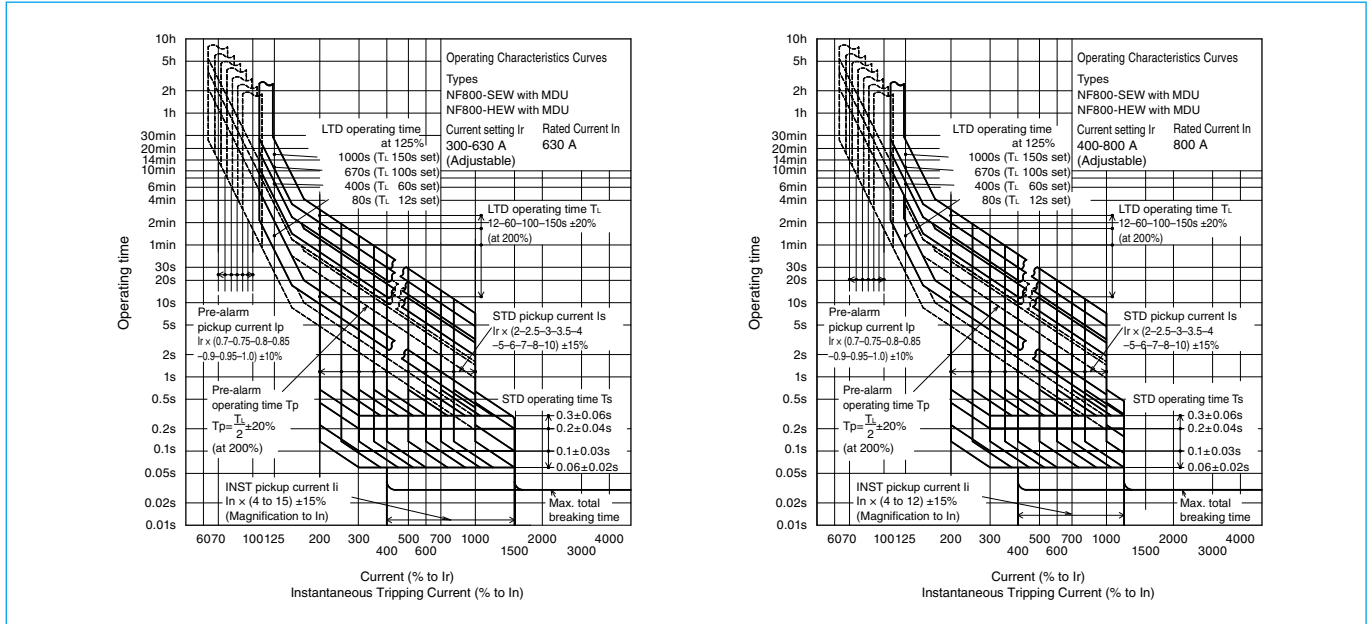
NF630-SEW with MDU  
(Breaker mounting)

NF630-SEW with MDU  
(External mounting)

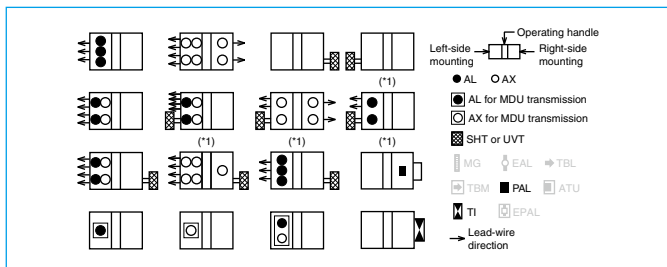
Model		NF630-SEW with MDU	NF630-HEW with MDU	NF800-SEW with MDU	NF800-HEW with MDU		
Rated current In (A) Rated ambient temperature 40°C		300 350 400 500 600 630	Adjustable	400 450 500 600 700 800	Adjustable		
Number of poles		3 4	3 4	3 4	3 4		
Rated operational voltage Ue V		690		690	690		
Rated short-circuit breaking capacity (kA)	IEC 60947-2 (Icu/Ics)	AC	690V	10/10	15/15	10/10	15/15
			500V	30/30	50/50	30/30	50/50
			440V	42/42	65/65	42/42	65/65
			415V	50/50	70/70	50/50	70/70
			400V	50/50	70/70	50/50	70/70
			380V	50/50	70/70	50/50	70/70
			230V	85/85	100/100	85/85	100/100
			200V	85/85	100/100	85/85	100/100
Standard attached parts (Front connection) (*1)	Breaker	Mounting screw M6 × 35 (4pcs) Insulation barrier (3P: 2pcs, 4P: 3pcs)					
MDU accessories	External mounting	MDU, Mounting plate, Mounting plate screw, Connection cable, MDU mounting screw					
	Breaker mounting	MDU, Breaker mounting plate, Mounting screw for breaker mounting plate, Connection cable (for breaker mounting), MDU Mounting screw					
	Panel mounting	MDU, Panel mounting bracket, Panel mounting nut, Connection cable (for panel mounting), MDU Mounting screw					
	Panel mounting	MDU, Panel mounting bracket, Panel mounting nut, Connection cable (for panel mounting), MDU Mounting screw					

Note \*1 4-pole models are provided with auxiliary handle.

### Operating Characteristics

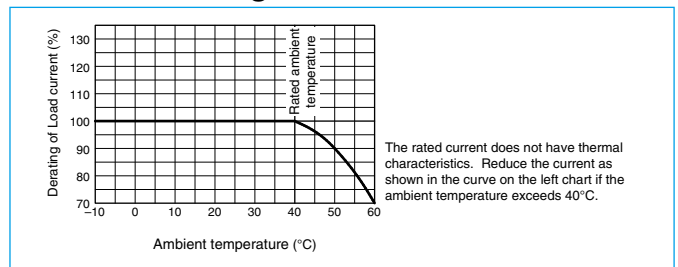


### Internal Accessories



Note \*1 Right side mounting is standard of SHT and UVT. Specify separately for left side mounting.

### Current Reducing Curve



### External Accessories

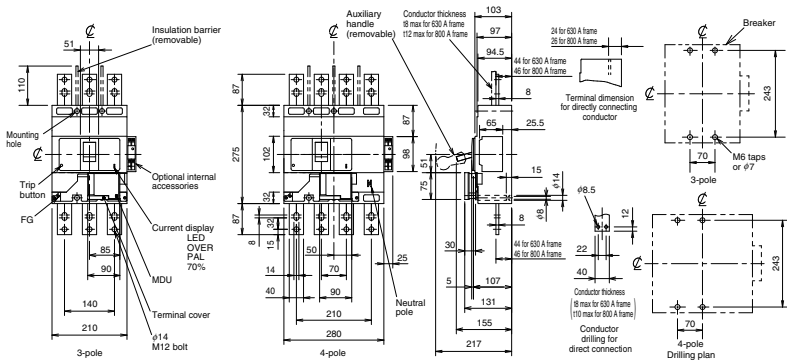
Accessories	Type name		Reference page	Accessories	Type name		Reference page		
	Breaker mounting	Panel mounting			Breaker mounting	Panel mounting			
Operating handle	F	-	F-8S	Large	TC-L	3P	-	TCL-8SW3	128
	V	-	V-8S			4P	-	TCL-8SW4	
Handle lock device	HL	HL-4SW	HL-4SW	Skeleton	TTC	3P	TTC-8SW3-MDU	TTC-8SW3	
	HL-S	-	HLS-8SW			4P	TTC-8SW4-MDU	TTC-8SW4	
Mechanical interlock	MI	3P	MI-8SW3	Rear	BTC	3P	BTC-8SW3	BTC-8SW3	
	(*1)	4P	MI-8SW4			4P	BTC-8SW4	BTC-8SW4	
Auxiliary handle	HT	HT-4SW	HT-4SW	Electrical operation device	NFM	3P	-	(*2)	140
						4P			

Notes \*1 When selecting the MDU breaker mounting, only the MI panel mounting can be manufactured.  
\*2 Specify the operation method and voltage. Order in combination with the breaker unit.

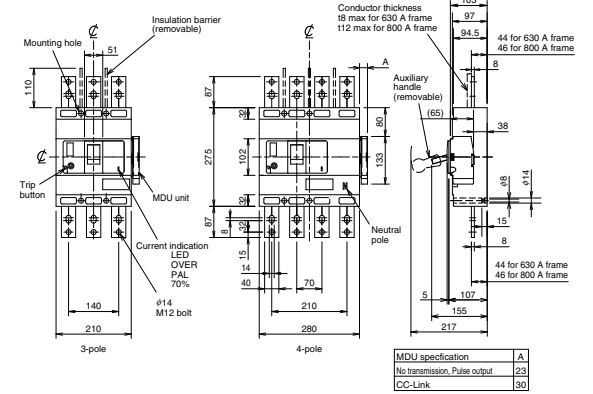
Outline Drawing

Front connection

MDU external mounting

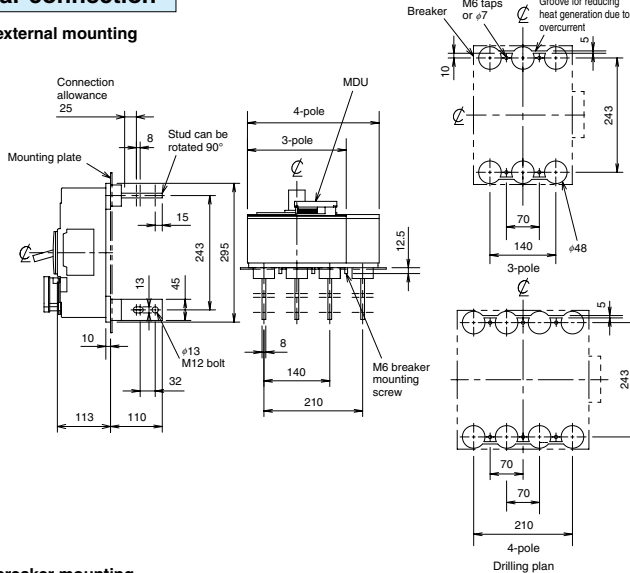


MDU breaker mounting



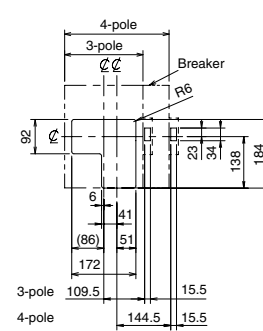
Rear connection

MDU external mounting

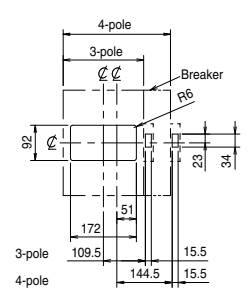


Front-plate cutout

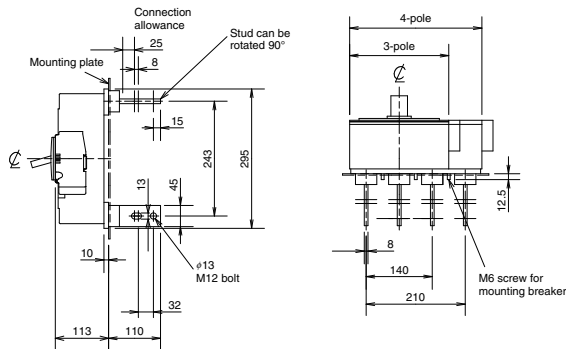
MDU external mounting



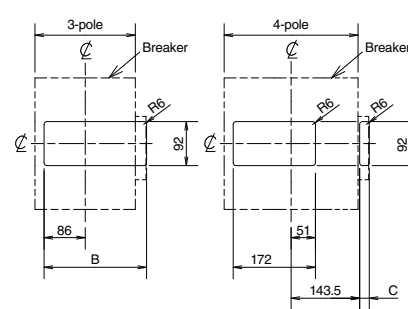
MDU panel mounting



MDU breaker mounting



MDU breaker mounting



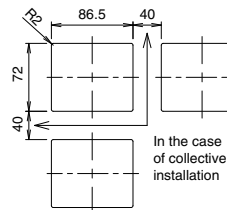
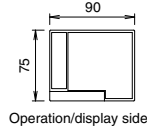
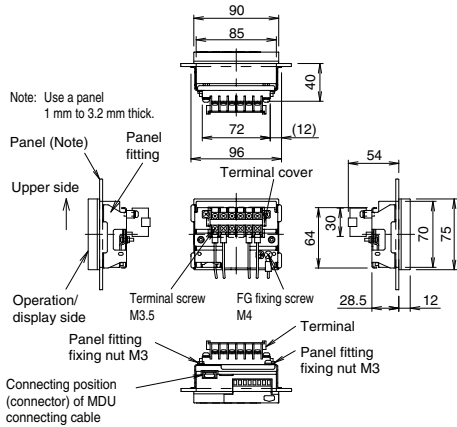
MDU specification	B	C
No transmission, Pulse output	215	20
CC-Link	222	27

Note: When the insulating barrier for rear connection is used, mounting holes are added.

### MDU-BN (No transmission), MDU-BP (Pulse output)

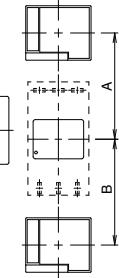
#### Panel mounting

When installing, ensure a distance larger than the following size, and keep a space of 10 cm or more from the distribution line.



Front-panel cutout

Model	A	B
NF250-SEV with MDU	198	158
NF250-HEV with MDU	208	158
NF400-SEV with MDU	244	205
NF400-HEV with MDU	374	205
NF800-SEV with MDU(N:630)	253	221
NF800-SEV with MDU	263	221
NF800-HEV with MDU	383	221

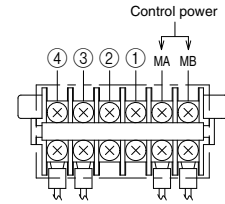


MDU panel mounting position (rear connection)

Note: In the case of front connection, keep a sufficient distance from the connecting wires and insulating barrier.

#### Terminal arrangement

Secure the wires with cable clamps, etc.

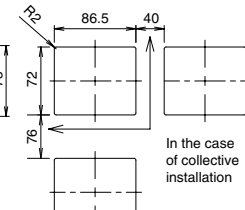
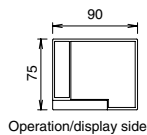
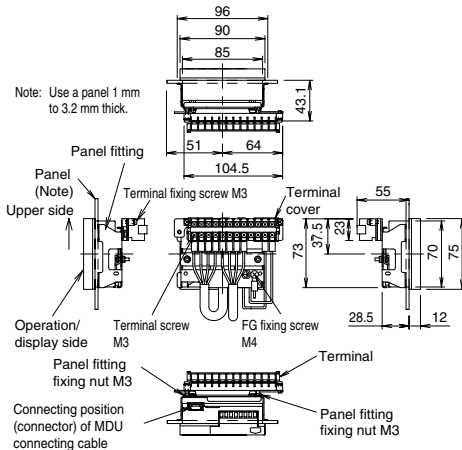


MDU model	Spec.	①	②	③	④
MDU-BN	No transmission	—	—	—	—
MDU-BP	Pulse output	—	—	Cb	Ca

### MDU-BC (CC-Link), MDU-BM (MODBUS)

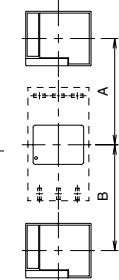
#### Panel mounting

When installing, ensure a distance larger than the following size, and keep a space of 10 cm or more from the distribution line.



Front-panel cutout

Model	A	B
NF250-SEV with MDU	218	158
NF250-HEV with MDU	228	158
NF400-SEV with MDU	263	205
NF400-HEV with MDU	393	205
NF800-SEV with MDU(N:630)	272	221
NF800-SEV with MDU	282	221
NF800-HEV with MDU	402	221

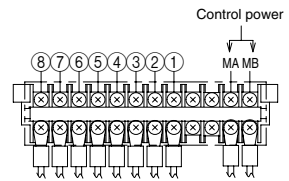


MDU panel mounting position (rear connection)

Note: In the case of front connection, keep a sufficient distance from the connecting wires and insulating barrier.

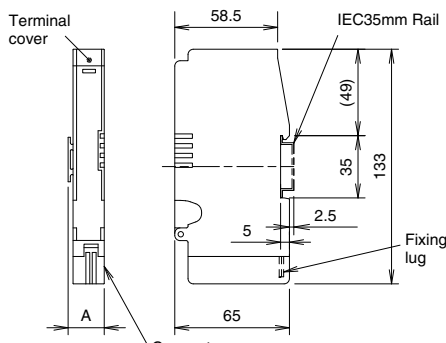
#### Terminal arrangement

Secure the wires with cable clamps, etc.



MDU model	Spec.	①	②	③	④	⑤	⑥	⑦	⑧
MDU-BC	CC-Link	SLD	DG	DB	DA	SLD	DG	DB	DA
MDU-BM	MODBUS	SLD	485 <sup>+</sup>	485 <sup>-</sup>	Ter	SLD	485 <sup>+</sup>	485 <sup>-</sup>	Ter

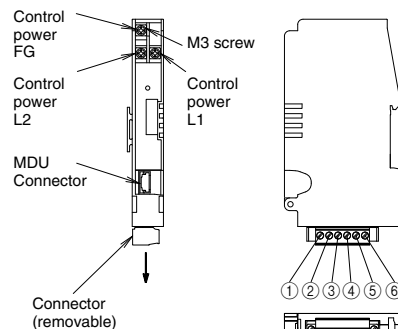
#### Breaker mounting



	A
No transmission, Pulse output	21
CC-Link	28

#### Terminal arrangement

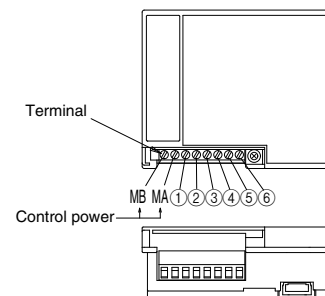
Figure is removed the terminal cover.



	①	②	③	④	⑤	⑥
No transmission	—	—	—	—	—	—
Pulse output	—	—	—	—	Cb	Ca
CC-Link	—	SLD	—	DG	DB	DA

#### MDU terminal arrangement

In the figure below the terminal cover is removed. Secure the wires with cable clamps, etc.



Model	Spec.	①	②	③	④	⑤	⑥
MDU-BN	No transmission	—	FG	—	—	—	—
MDU-BP	Pulse output	—	FG	—	—	Cb	Ca
MDU-BC	CC-Link	—	FG	SLD	DG	DB	DA
MDU-BM	MODBUS	—	FG	SLD	485 <sup>+</sup>	485 <sup>-</sup>	Ter





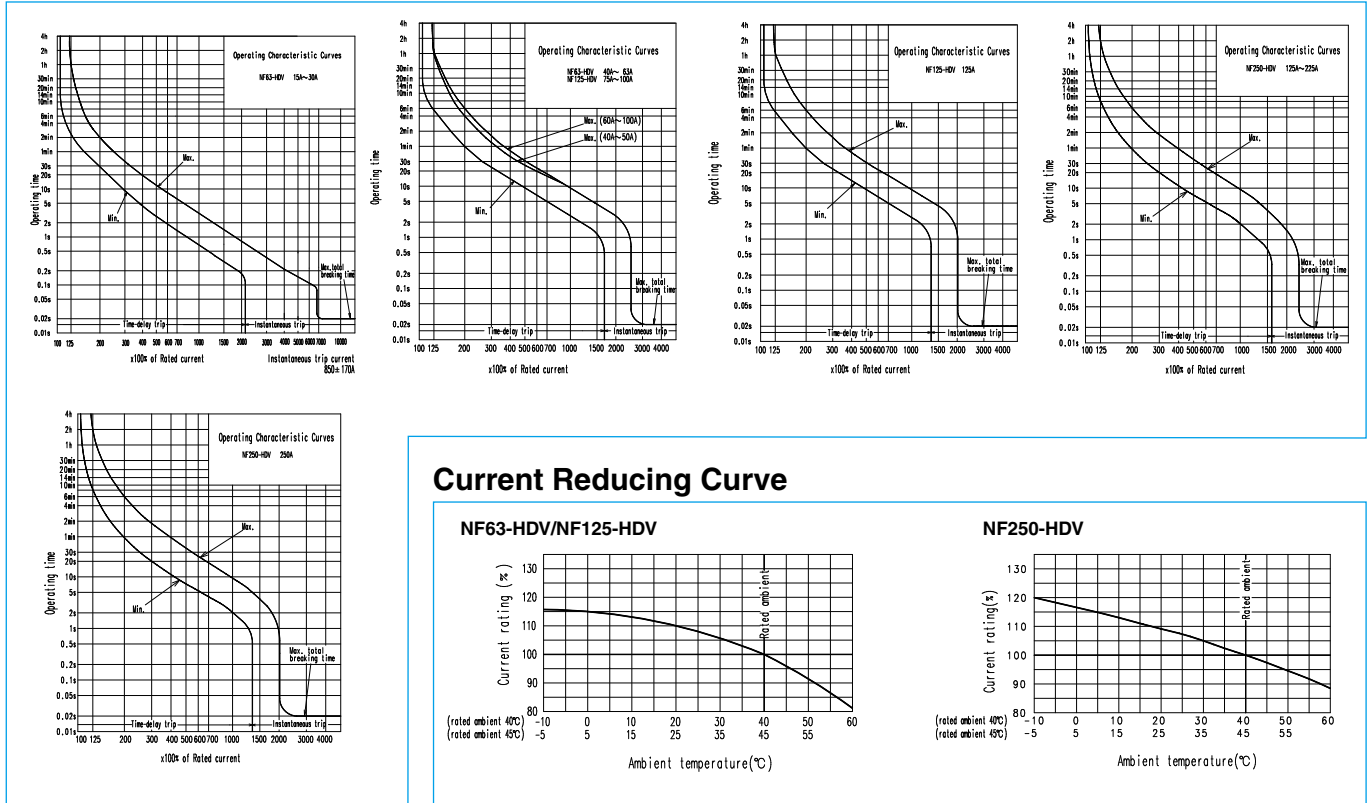
## NF63-HDV NF125-HDV NF250-HDV



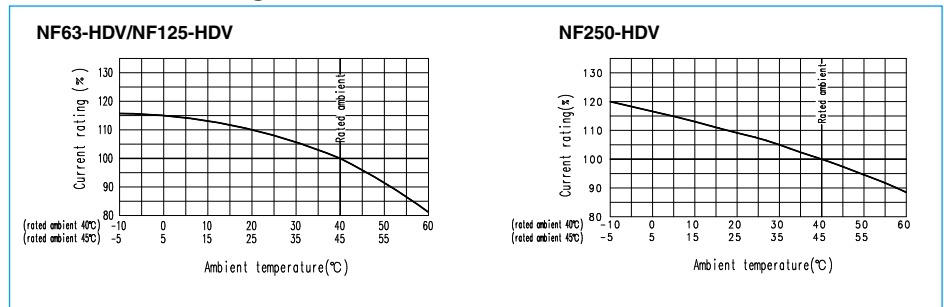
NF250-HDV

Model		NF63-HDV		NF125-HDV		NF250-HDV	
Rated current I <sub>n</sub> (A)		15 20 30 40 50	60 63	75 100	125	125 150 175 200 225	250
Number of poles		2		3		3	
Rated insulation voltage U <sub>i</sub> (V)		600		690		690	
Rated short-circuit breaking capacity(I <sub>k</sub> )	IEC 60947-2 (I <sub>cu</sub> /I <sub>cs</sub> )	DC 400V 10/5		-		-	
		600V - 5/5		-		-	
Standard attached parts (front connection)		Mounting screw: M4×0.7×55(2P and 3P: 2pcs) Insulation barrier: (2P: 1pcs, 3P: 2pcs)				Mounting screw: M4×0.7×55(3P: 2pcs) Insulation barrier: (3P: 4pcs)	

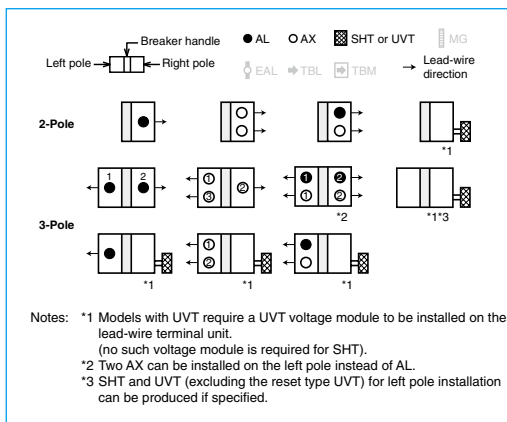
### Operating Characteristics



### Current Reducing Curve



### Internal Accessories



### External Accessories

NF63-HDV/NF125-HDV									
Accessories		Type name	Reference page	Accessories		Type name	Reference page		
Operating handle	F	2P F-05SV2	123	Terminal cover	Small	2P TCS-05SV2	128		
		3P F-05SV				3P TCS-05SV3			
	V	2P V-05SV2	125		Large	2P TCL-05SV2			
		3P V-05SV				2P TCL-05SV2L			
Lock cover	LC	LC-05SV	135		Rear	BTC		3P TCL-05SV3	
Handle lock device	HL(*1)	HLF-05SV	134					3P TCL-05SV3L	
		HLN-05SV			2P BTC-05SV2				
		HL-S			3P BTC-05SV3				
				Plug-in	PTC	2P PTC-05SV2			
				IEC35mm rail mounting adapters				DIN-05SV	143

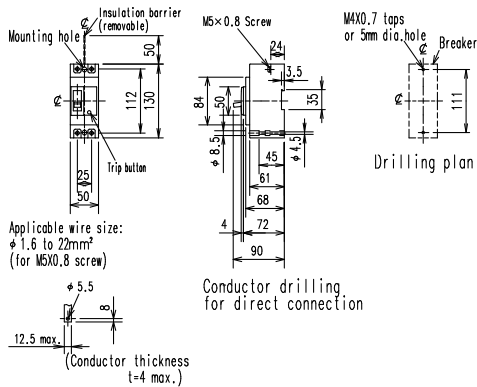
  

NF250-HDV							
Accessories		Type name	Reference page	Accessories		Type name	Reference page
Operating handle	F	F-2SV	123	Terminal cover	Small	3P TCS-2SV3	128
	V	V-2SV	125			Large	
Lock cover	LC	LC-05SV	135	Rear	BTC		3P TCL-2SV3L
Handle lock device	HL(*1)	HLF-05SV	134			Note *1 HLF types are used for OFF lock and HLN types for ON lock.	
		HLN-05SV					
		HL-S		HLS-2SV			

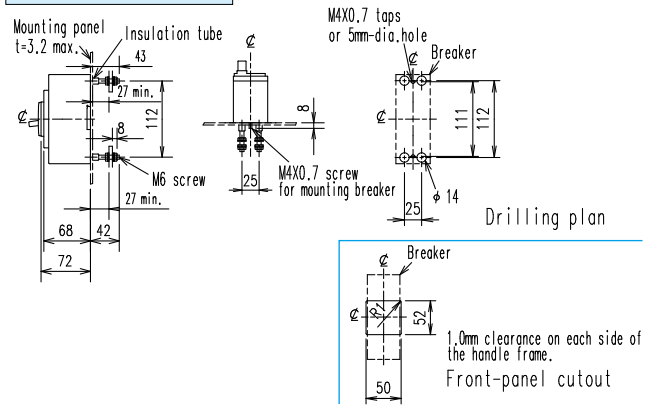
Outline Drawing

NF63-HDV 2P

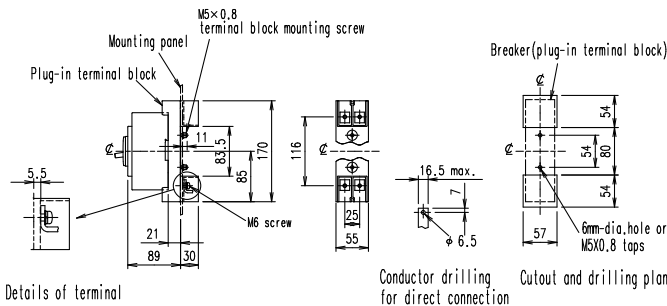
Front connection



Rear connection

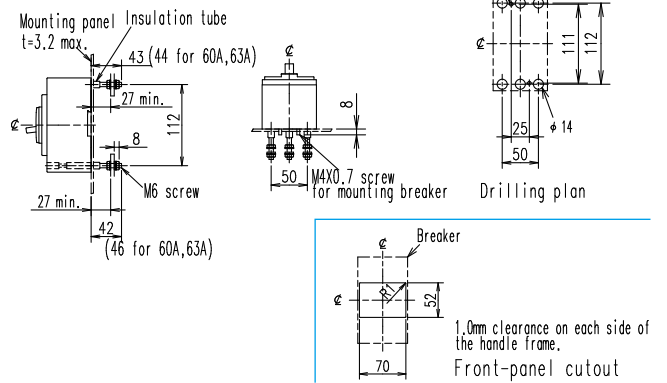


Plug-in



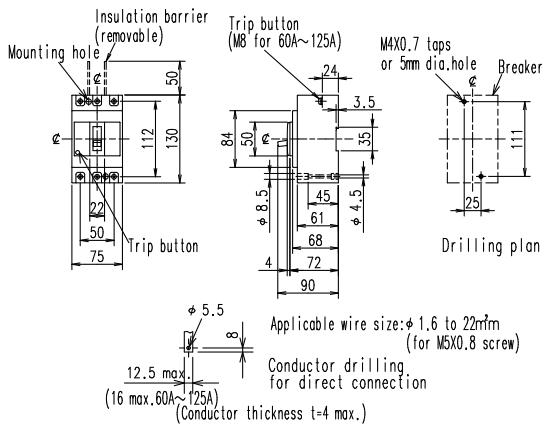
NF63-HDV

Rear connection



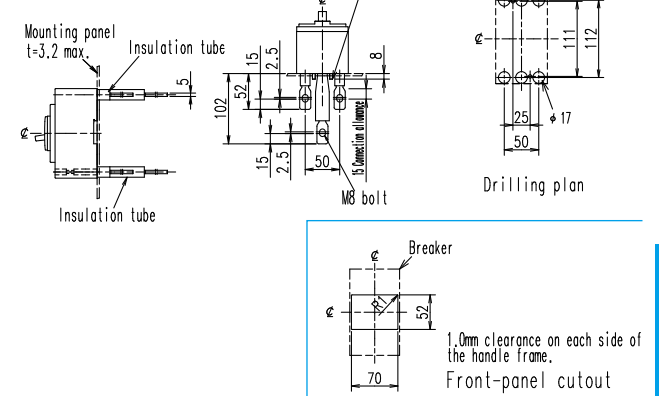
NF63-HDV 3P/NF125-HDV 3P

Front connection



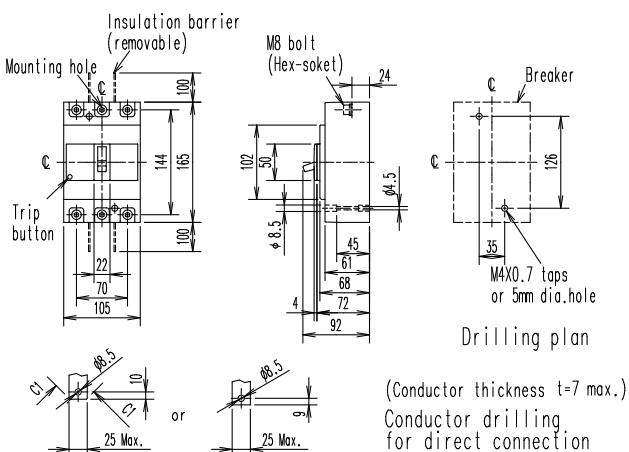
NF125-HDV

Rear connection



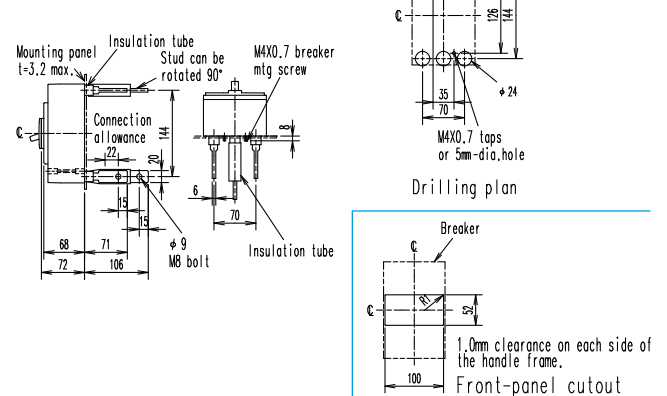
NF250-HDV 3P

Front connection



NF250-HDV

Rear connection



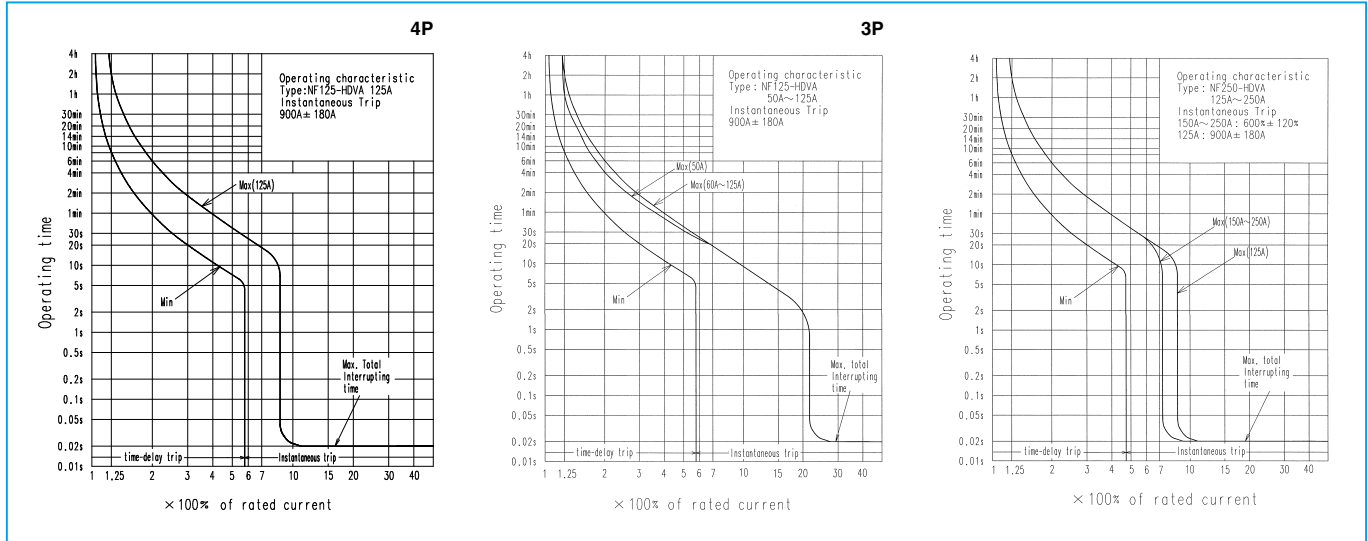
## NF125-HDVA NF250-HDVA



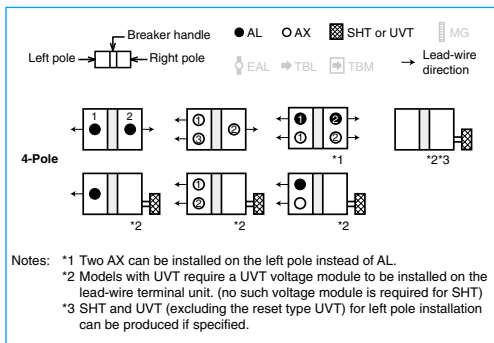
NF250-HDVA

Model	NF125-HDV	NF250-HDVA	NF125-HDVA	NF250-HDVA			
Rated current In(A)	50 60 75 100	125	125 150 175 200 225	250	125	125 150 175 200 225	250
Number of poles	3		3		4		
Rated insulation voltage Ui(V)	800		800		1000		
Rated short-circuit breaking capacity(kA)	IEC 60947-2 (Icu/Ics)	DC	1000V		10/5		
Standard attached parts (front connection)	Mounting screw: M4x0.7x55(2pcs) Insulation barrier: (2P: 1pcs, 3P: 4pcs)			Mounting screw: M4x0.7x55(4pcs) Insulation barrier: (4P: 6pcs)			

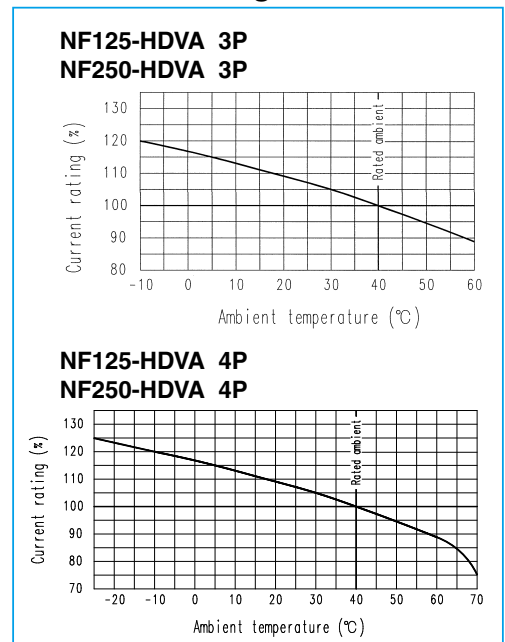
### Operating Characteristics



### Internal Accessories



### Current Reducing Curve



### External Accessories

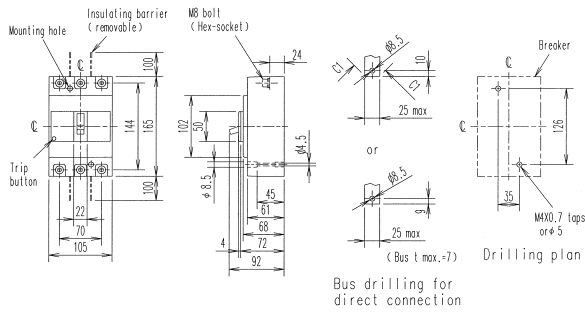
#### NF125-HDVA/NF250-HDVA

Accessories		Type name	Reference page	Accessories		Type name	Reference page
Operating handle	F	F-2SV	123	Terminal cover	Small	TC-S	128
	V	V-2SV	125		3P	TCS-2SV3	
Lock cover	LC	LC-05SV	135		3P	TCL-2SV3L	
	HL(*1)	HLF-05SV	134		4P	TCL-2SV4L	
Handle lock device	HL-S	HLS-2SV		Note *1 HLF types are used for OFF lock and HLN types for ON lock.			

Outline Drawing

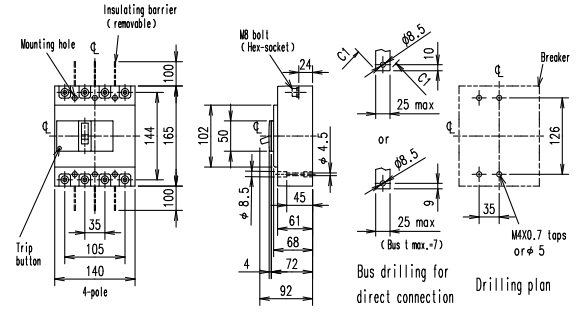
NF125-HDVA/NF250-HDVA 3P

Front connection

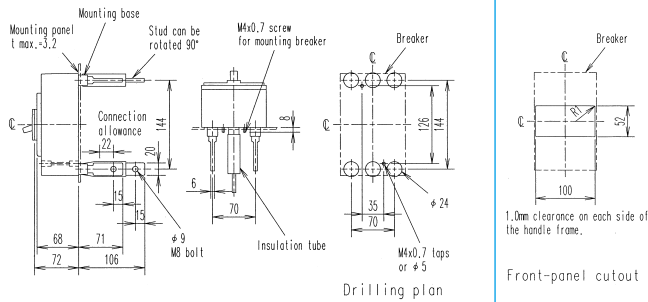


NF125-HDVA/NF250-HDVA 4P

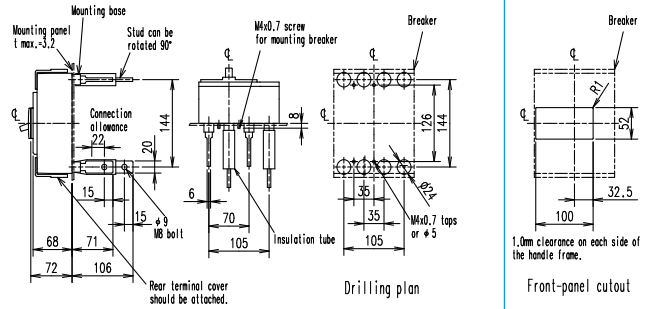
Front connection



Rear connection



Rear connection



1.0mm clearance on each side of the handle frame.  
 Front-panel cutout

1.0mm clearance on each side of the handle frame.  
 Front-panel cutout

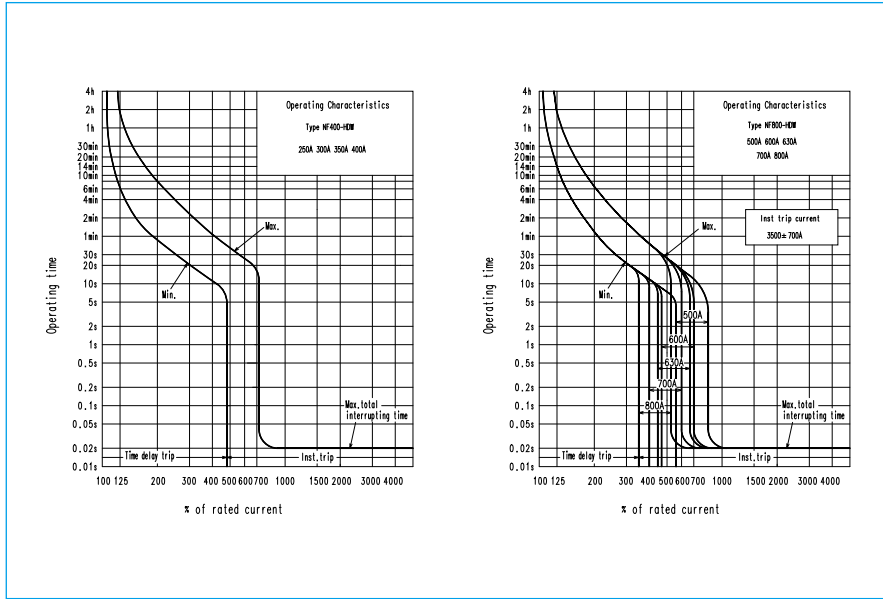
## NF400-HDW NF800-HDW



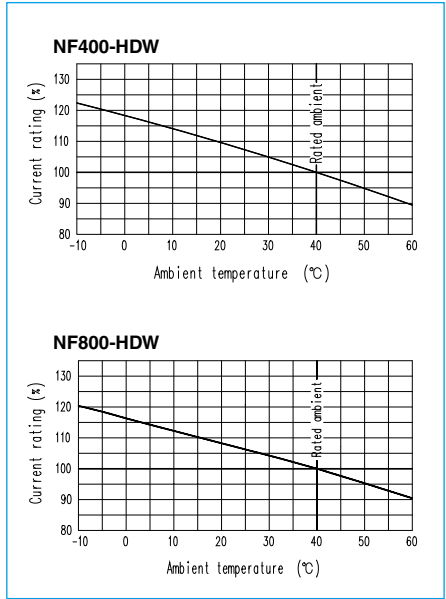
NF800-HDW

Model		NF400-HDW		NF800-HDW	
Rated current In(A)		250	300 350 400	500 600 630 700 800	
Number of poles		3	4	3	4
Rated insulation voltage Ui(V)		800	1000	800	1000
Rated short-circuit breaking capacity(kA)	IEC 60947-2 (Icu/Ics)	750V	10/5	10/5	10/5
	DC	1000V	10/10	10/10	10/10
Standard attached parts	Front connection	Mounting screw: M6x72(4pcs) Insulation barrier: (3P: 4pcs, 4P: 6pcs)		Mounting screw: M6x40(4pcs) Insulation barrier: (3P: 2pcs, 4P: 3pcs)	
	Rear connection	Mounting screw: M6x72(4pcs)		Mounting screw: M6x40(4pcs)	

### Operating Characteristics



### Current Reducing Curve



### Internal Accessories

**NF400-HDW**

**NF800-HDW**

Notes

- \*1 When UVT is provided, the UVT voltage module will come in the vertical lead wire terminal block type. (SHT does not have a voltage module.)
- \*2 SHT and UVT are installed on the right pole as standard. Please specify if SHT and UVT are required to be installed on the left pole.
- \*3 In the case where three or more accessories are installed on the left pole side and AL, AX or AL and AX are installed on the pole on which SLT, SHT or UVT is installed, SLT will be manufactured to order.
- \*4 When AL, AX or AL and AX are installed on the pole on which UVT is installed, the UVT voltage module must be installed separately.

Remarks

- The encircled numbers indicate the order of installation.
- AL-AX for minute load are also available.

### External Accessories

#### NF400-HDW

Accessories		Type name	Reference page
Operating handle	F	F-4S	123
	V	V-4S	125
Terminal cover	Large	3P	TCL-4SW3
		4P	TCL-4SW4
	Skeleton	3P	TTC-4SW3
		4P	TTC-4SW4
Rear	3P	BTC-4HDW3	
	4P	BTC-4HDW4	
Handle lock device	HL	HL-4SW	134
Auziliary handle	HT	HT-4SW	135

#### NF800-HDW

Accessories		Type name	Reference page
Operating handle	F	F-8S	123
	V	V-8S	125
Terminal cover	Large	3P	TCL-8SW3
		4P	TCL-8SW4
	Skeleton	3P	TTC-8SW3
		4P	TTC-8SW4
Rear	3P	BTC-8HDW3	
	4P	BTC-8HDW4	
Handle lock device	HL	HL-4SW	134
Auziliary handle	HT	HT-4SW	135



## BH-D6 BH-D10

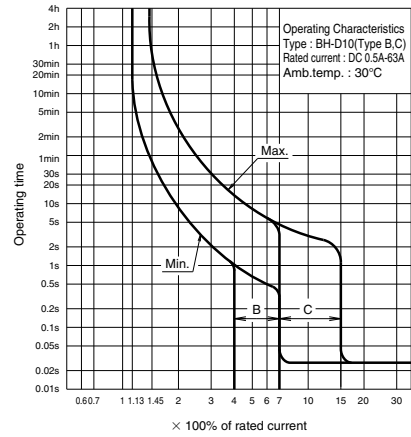
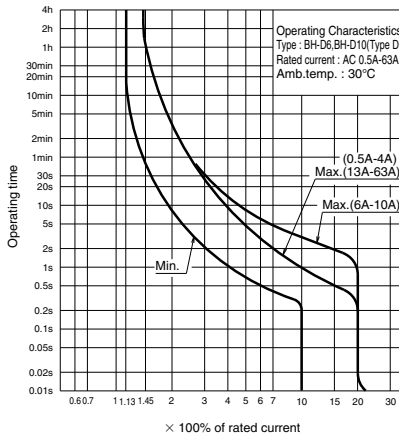
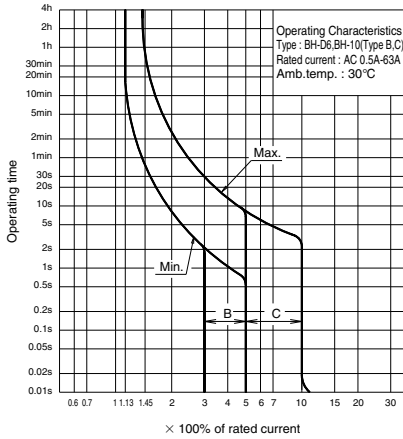


BH-D6

Model		BH-D6					BH-D10				BH-D10 (For DC)			
Number of poles (P)		1	2	3	4(3+N) (*1)	2(1+N) (*1)	1	2	3	4(3+N) (*1)	1	2		
Instantaneous tripping		Type B, C, D					Type B, C		Type B, C, D			Type B, C		
Rated insulation voltage $U_i$ (V)		440					440					250		
Rated current $I_n$ (A) at ambient temperature 30°C		0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63					0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40		0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63				0.5, 1, 1.6, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50, 63	
Rated short-circuit capacity (kA)	IEC60898-1 GB/T10963.1 (Icn)	AC	230V	6	-		6	10	-		6	-		
		230/400V	6	-		-	10	-		6	-			
	400V	-	6		-	-	10		-	-	6			
	IEC60898-2 GB/T10963.2 (Icn)	DC	125V	-		-		-		-		10	-	
250V		-		-		-		-		-	10			

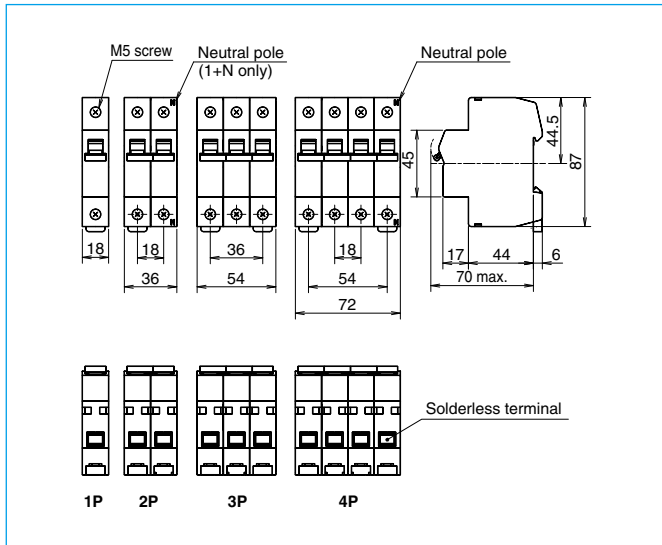
Note \*1 N pole is a switched neutral pole (without overcurrent release device).

## Operating Characteristics

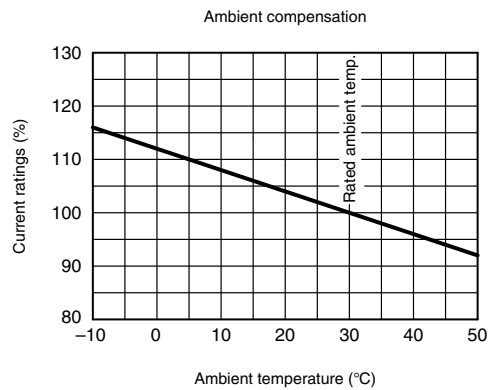


\* When using BH-D10 (for DC) in AC circuit, characteristic curve of BH-D10 (Type B, C) for AC is applied.

## Outline Drawing



## Temperature Compensation Curve



\* In case of installing breakers side by side, reduce the passing current to under 80% of the rated current.



# BH-DN

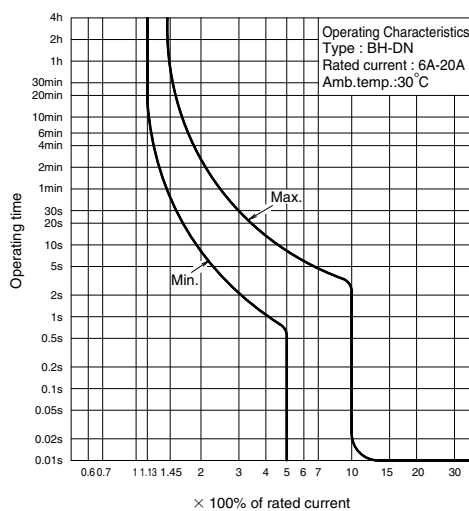


BH-DN

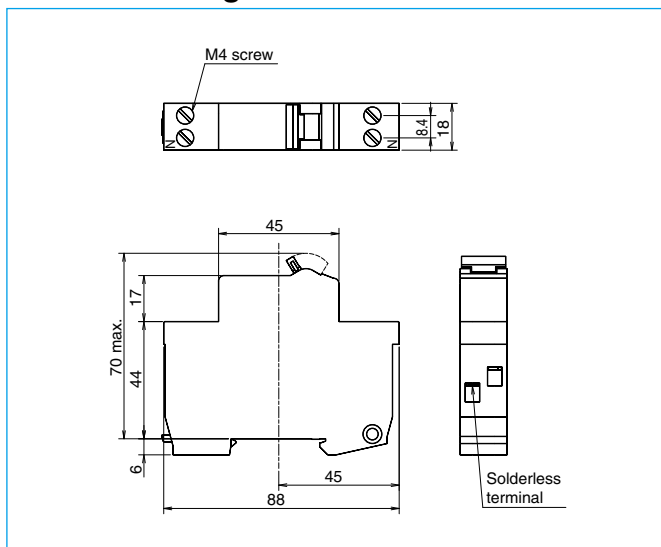
Model				BH-DN
Number of poles (P)				2 (1+N) (*1)
Instantaneous tripping				Type C
Rated insulation voltage $U_i$ (V)				230
Rated current $I_n$ (A) at ambient temperature 30°C				6, 10, 16, 20
Rated short-circuit capacity (kA)	IEC60898-1 GB/T10963.1 (Icn)	AC	230V	4.5

Note \*1 N pole is a switched neutral pole (without overcurrent release device).

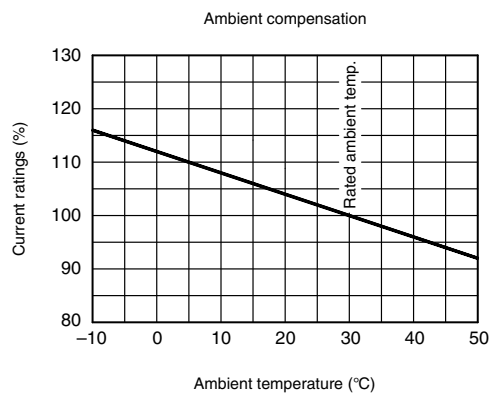
## Operating Characteristics



## Outline Drawing



## Temperature Compensation Curve



\* In case of installing breakers side by side, reduce the passing current to under 80% of the rated current.

## BV-D

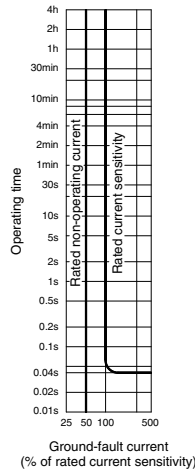


BV-D

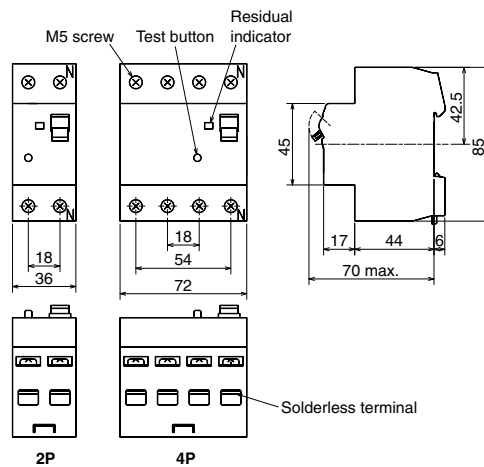
Model	BV-D	
Number of poles (P)	2 (1+N) (*1)	4 (3+N) (*1) (*2)
Rated operational voltage $U_e$ (VAC)	230	230/400
Rated current $I_n$ (A) at ambient temperature 30°C	25, 40, 63	
Rated current sensitivity $I_{\Delta n}$ (mA)	30, 300	
Max. operating time at $5I_{\Delta n}$ (s)	0.04	
Pulsating current sensitivity	Type AC	
Residual operation	Dependent on line voltage	
Rated making and breaking capacity $I_m$ (A)	500 (In 25, 40A) 630 (In 63A)	
Rated conditional short-circuit current $I_{nc}$ (kA)	6	
Rated residual making and breaking capacity $I_{\Delta m}$ (A)	500 (In 25, 40A) 630 (In 63A)	
Rated conditional residual short-circuit current $I_{\Delta c}$ (kA)	6	

Notes \*1 N pole is a switched neutral pole (without overcurrent release device).  
\*2 For use to three phase 4-wire type. When wiring to three phase 4-wire, connect the neutral line to the neutral pole. Not available for use to three phase 3-wire type.

## Operating Characteristics



## Outline Drawing



## BV-DN

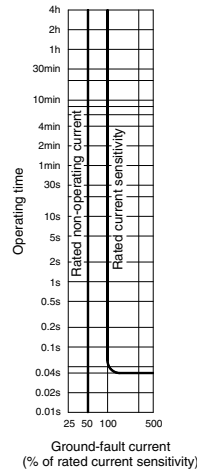
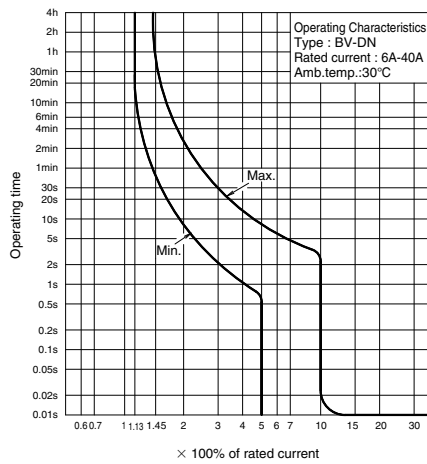


BV-DN

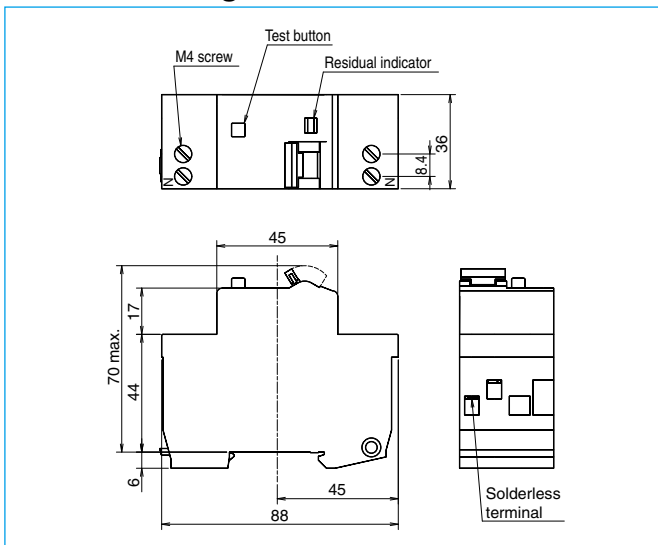
Model				BV-DN
Number of poles (P)				2 (1+N) (*1)
Rated operational voltage U <sub>e</sub> (VAC)				230
Rated current I <sub>n</sub> (A) at ambient temperature 30°C				6, 10, 16, 20, 25, 32, 40
Instantaneous tripping				Type C
Rated current sensitivity ΔI <sub>n</sub> (mA)				30, 100, 300
Max. operating time at 5I <sub>n</sub> (s)				0.04
Pulsating current sensitivity				Type AC
Residual operation				Dependent on line voltage
Rated short-circuit capacity (kA)	IEC61009-1 GB/T16917.1 (I <sub>cn</sub> )	AC	230V	4.5
Rated residual making and breaking capacity I <sub>Δm</sub> (A)				500

Note \*1 N pole is a switched neutral pole (without overcurrent release device).

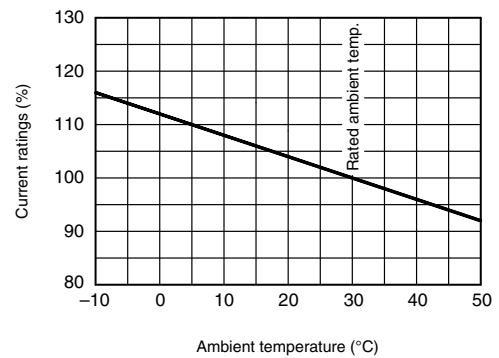
### Operating Characteristics



### Outline Drawing



### Temperature Compensation Curve



\* In case of installing breakers side by side, reduce the passing current to under 80% of the rated current.

### KB-D

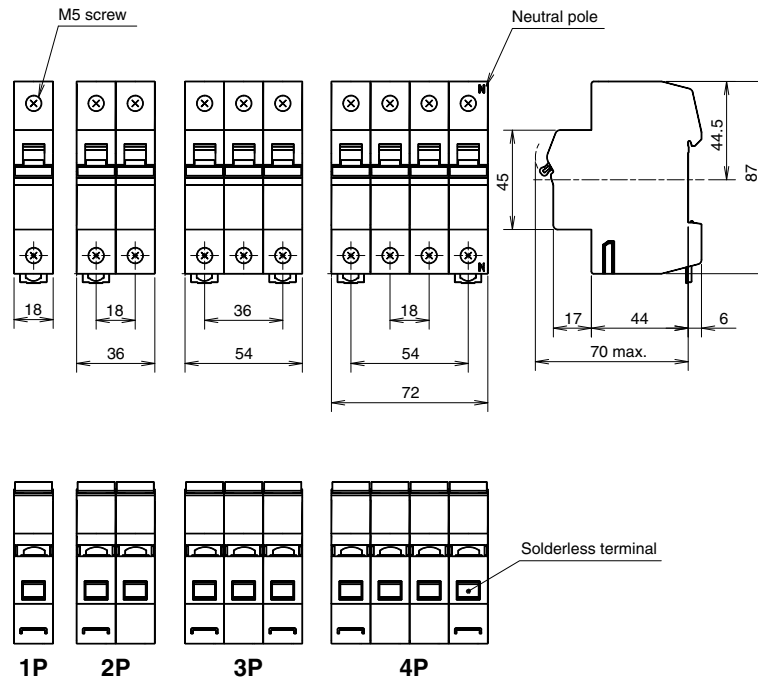


KB-D

Model	KB-D			
Number of poles (P)	1	2	3	4 (3+N) (*1)
Utilization category	AC-22A class			
Rated insulation voltage $U_i$ (V)	250	440		
Rated voltage $U_e$ (VAC)	230	400		
Rated current $I_n$ (A) at ambient temperature 30°C	32, 63, 80			
Short-time withstand current (A)	20× $I_n$ , 1sec			
Short-time making current (A)	20× $I_n$			

Note \*1 N pole is a switched neutral pole (without overcurrent release device).

### Outline Drawing





## (1) Dimensions of electrical operated circuit breakers

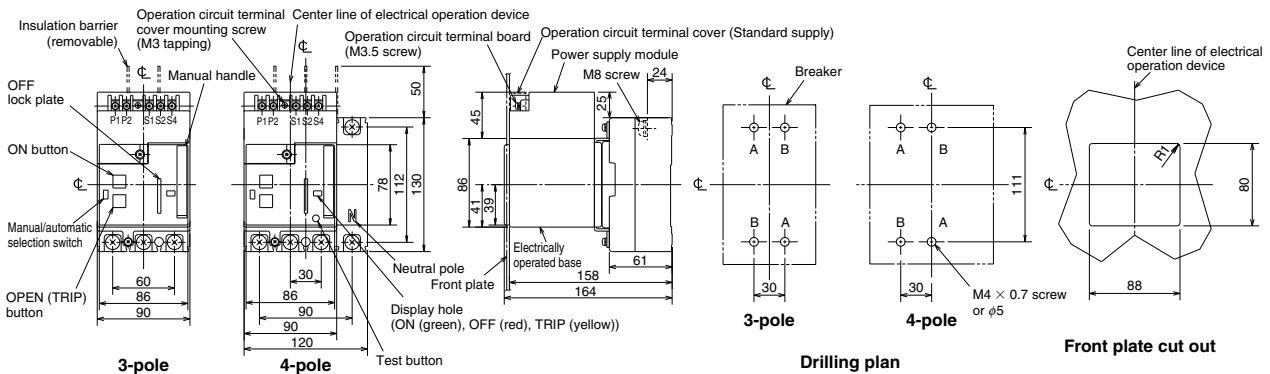
The following concept is applied for the dimensions of the electrical operated circuit breaker. Please understand this before using this type of breaker.

Connection method	Outline dimensions listing method			
Front connection (Rear connection)	Model	Listed page	Model	Listed page
	NF125-CV/SV/HV NV125-CV/SV/HV NF125-UV	229 (*1)	NF400-CW/SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW NF400-UEW (3P)	230
	NF125-SEV/HEV/RV/ZEV NF250-CV/SV/HV/SEV/HEV NF250-RV NF125-SGV/LGV/HGV/RGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV/RGV NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV	230	NV400-CW/SW/SEW/HEW NF400-UEW (4P) NV630-CW/SW/SEW/HEW NF800-CEW/SEW/HEW/REW/SDW NF800-UEW NV800-SEW/HEW	
	NF250-UV	(*1)	NF1000-SEW, NF1250-SEW/SDW NF1600-SEW/SDW	232
Rear connection Plug-in	The drilling dimensions and connection related dimensions are the same as the dimensions for the breaker body. Refer to the dimension drawings of each model. Note that for the rear connection type, four mounting holes are required even for the 2-pole or 3-pole types.			

## (2) Front connection (Rear connection)

NF125-CV, NF125-SV, NF125-HV  
NV125-CV, NV125-SV, NV125-HV

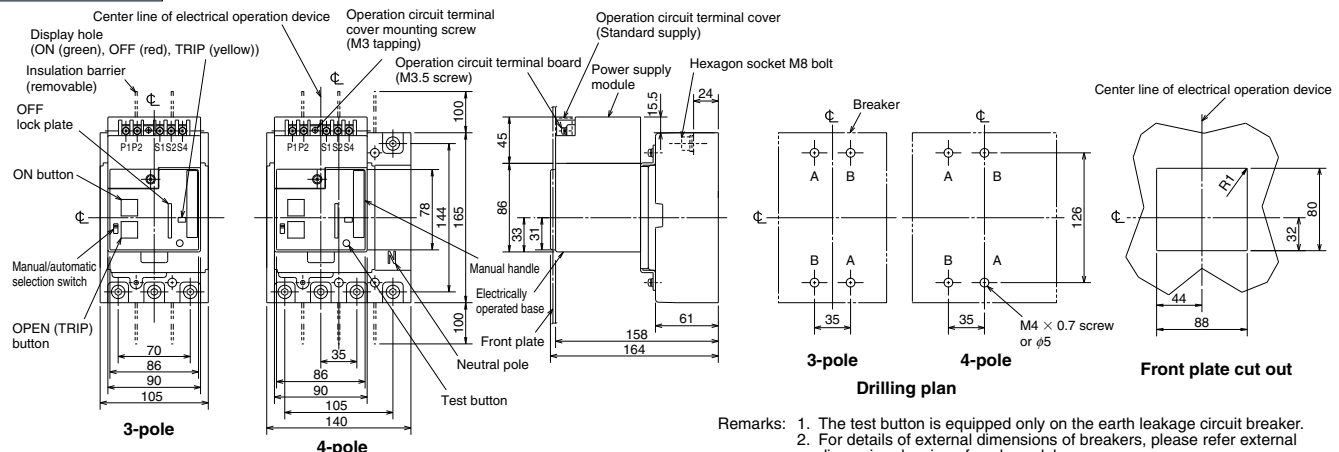
### Front connection



Remarks: 1. This cannot be mounted on the 2-pole breaker.  
2. The test button is equipped only on the earth leakage circuit breaker.

NF125-SEV, NF125-HEV, NF125-RV  
NF250-CV, NF250-SV, NF250-HV, NF250-SEV, NF250-HEV, NF250-RV  
NV125-SEV, NV125-HEV  
NV250-CV, NV250-SV, NV250-HV, NV250-SEV, NV250-HEV  
NF125-SGV/LGV/HGV/RGV  
NF160-SGV/LGV/HGV  
NF250-SGV/LGV/HGV/RGV

### Front connection

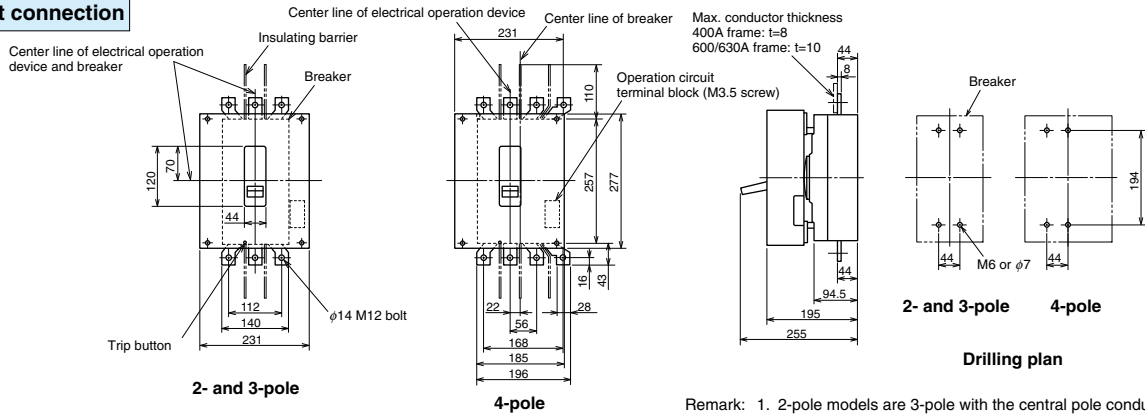


Remarks: 1. The test button is equipped only on the earth leakage circuit breaker.  
2. For details of external dimensions of breakers, please refer external dimension drawing of each model.

Outline Drawing

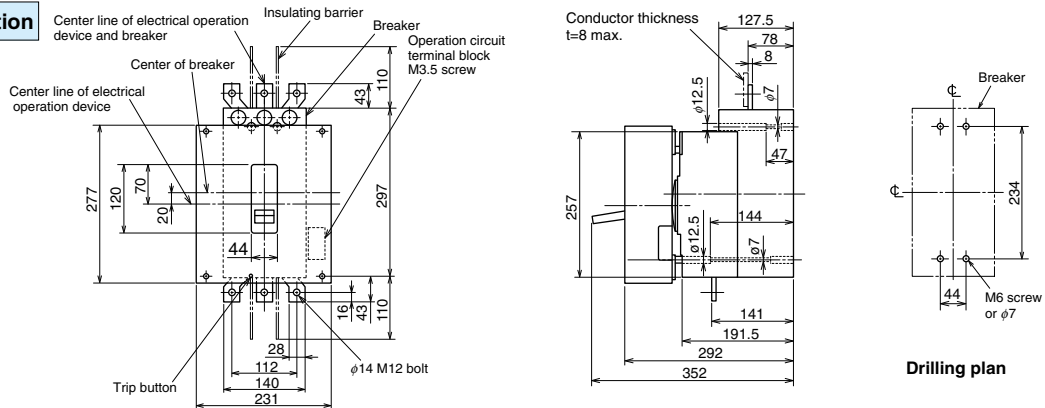
NF400-CW, NF400-SW, NF400-SEW, NF400-HEW, NF400-REW, NF630-CW, NF630-SW, NF630-SEW, NF630-HEW, NF630-REW Motor drive type

Front connection



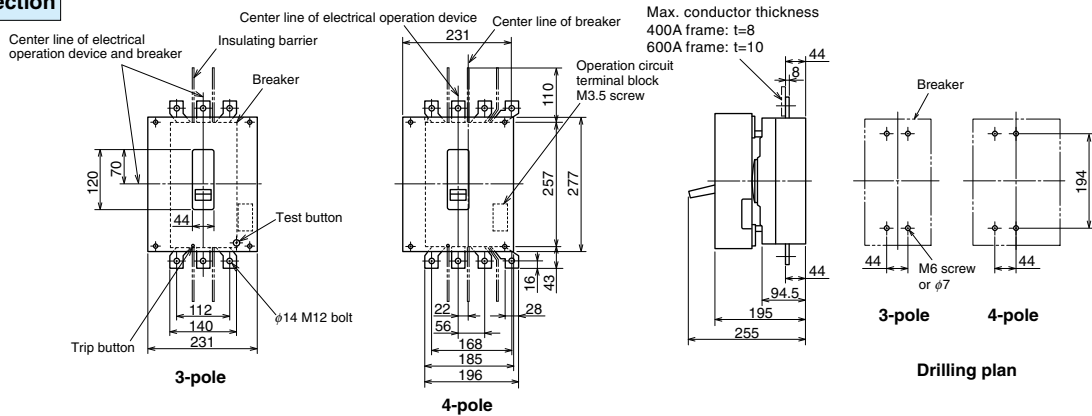
NF400-U EW (3-pole) Motor drive type

Front connection



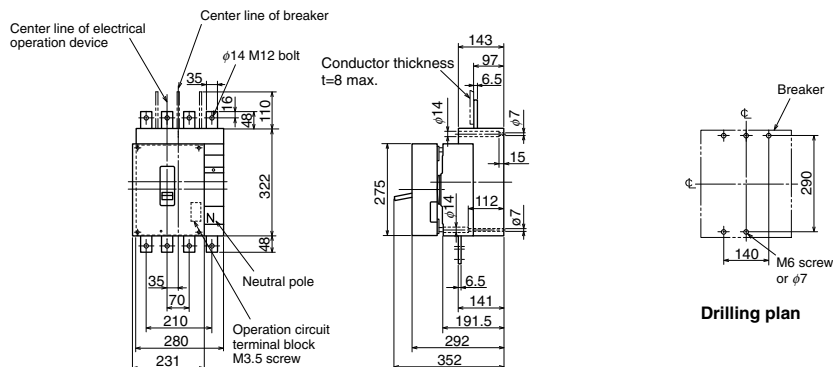
NV400-CW, NV400-SW, NV400-SEW, NV400-HEW, NV630-CW, NV630-SW, NV630-SEW, NV630-HEW Motor drive type

Front connection



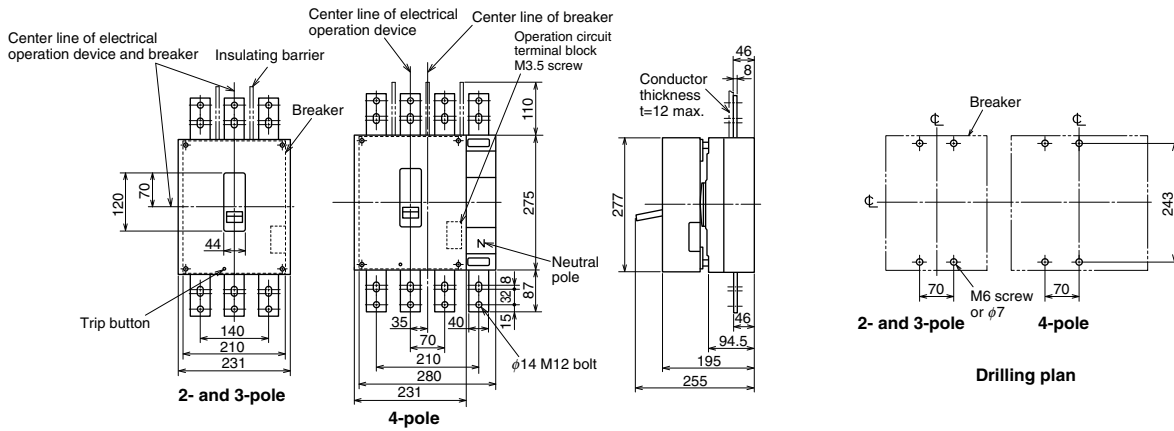
NF400-U EW (4-pole) Motor drive type

Front connection



NF800-CEW, NF800-SDW, NF800-SEW, NF800-HEW, NF800-REW Motor drive type

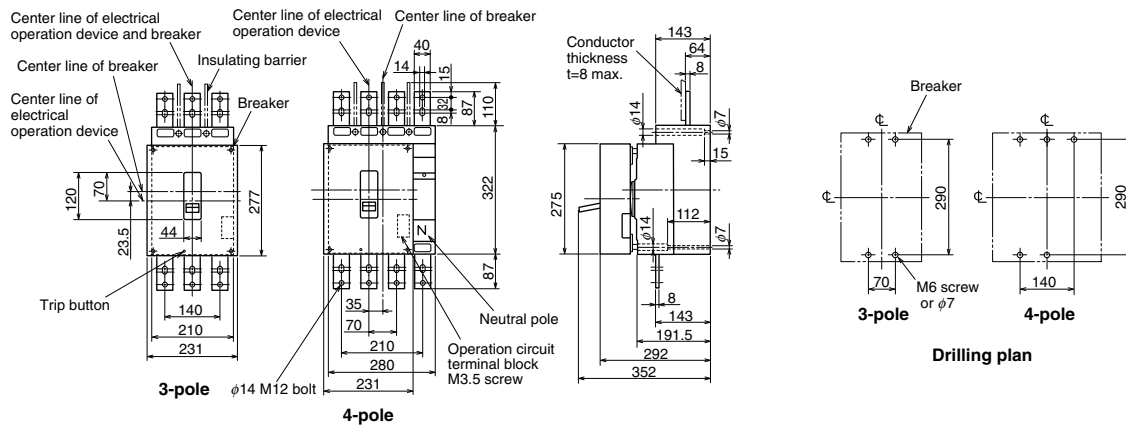
**Front connection**



Remark: 1. 2-pole models are 3-pole with the central pole conductor removed.

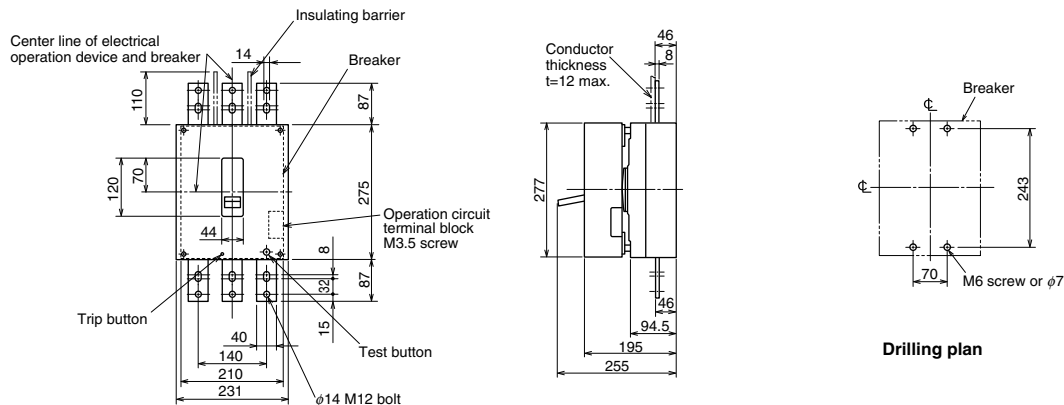
NF800-U EW Motor drive type

**Front connection**



NV800-SEW, NV800-HEW Motor drive type

**Front connection**

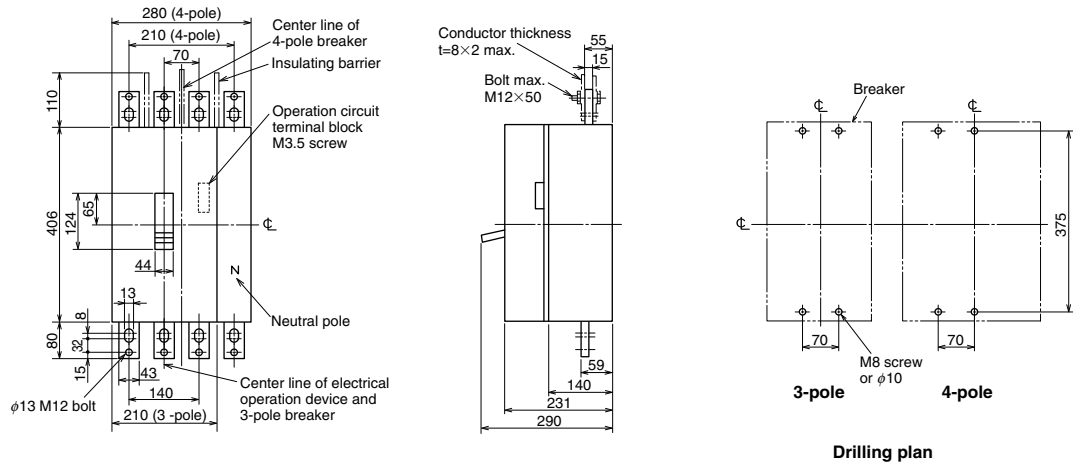




Outline Drawing

NF1000-SEW, NF1250-SEW, NF1250-SDW Motor drive type

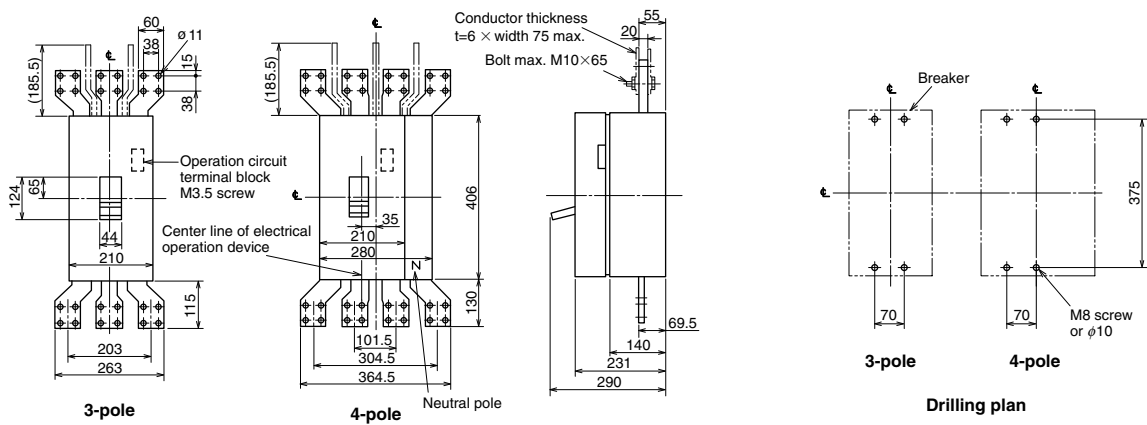
Front connection



Remark: 1. 2-pole models are 3-pole with the central pole conductor removed.

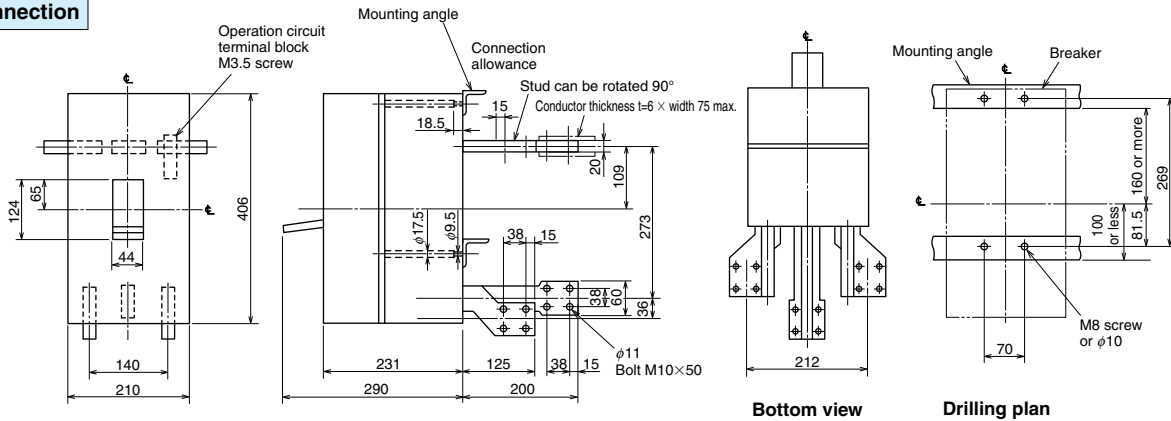
NF1600-SEW, NF1600-SDW Motor drive type

Front connection



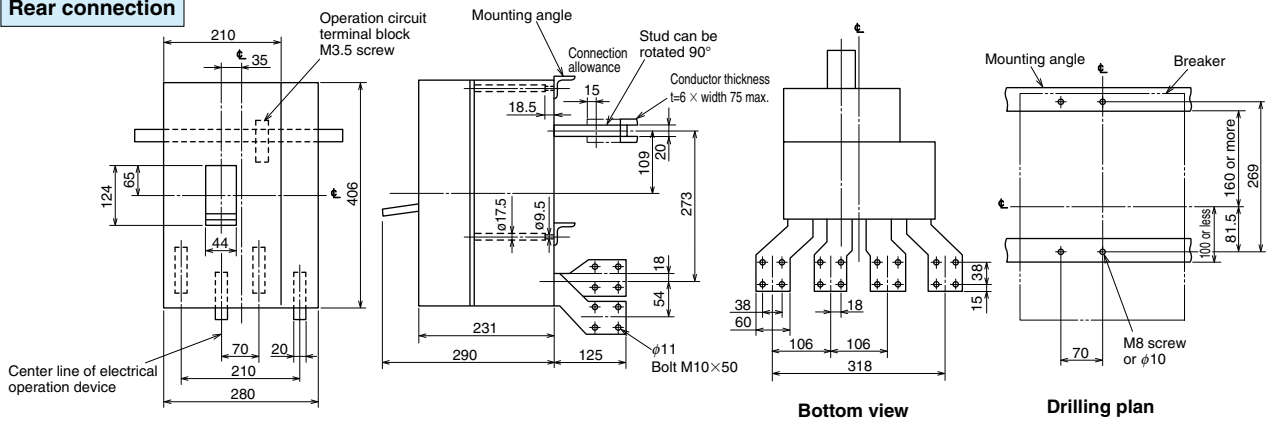
## NF1600-SEW (3-pole) Motor drive type

### Rear connection



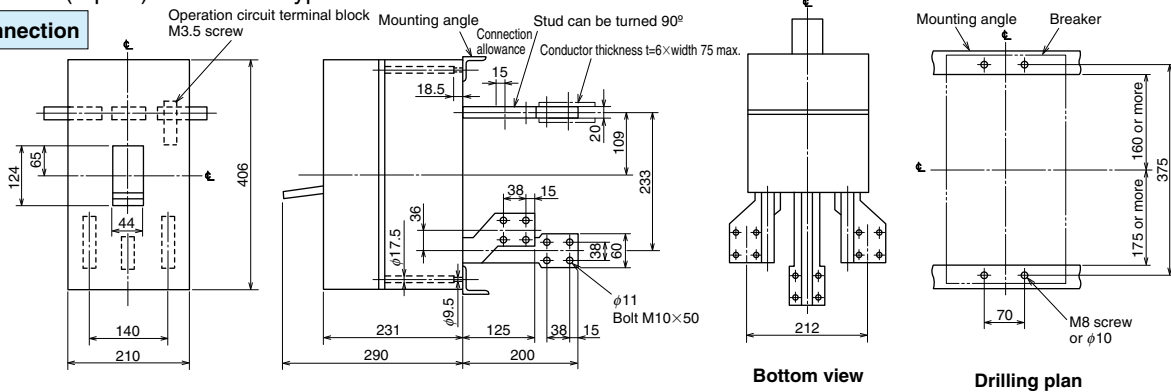
## NF1600-SEW (4-pole) Motor drive type

### Rear connection



## NF1600-SDW (3-pole) Motor-drive type

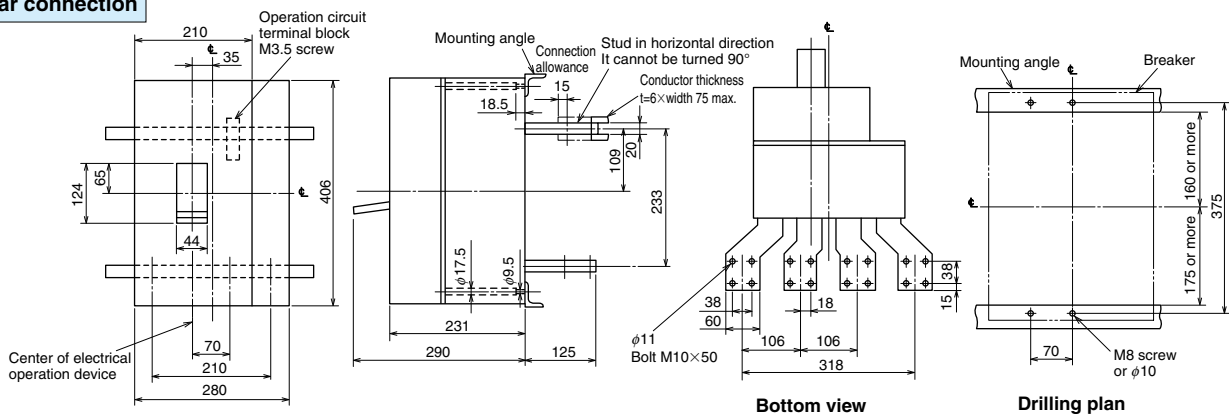
### Rear connection



Remark: 2-pole models are 3-pole models with the central pole removed.

## NF1600-SDW (4-pole) Motor-drive type

### Rear connection



# 8

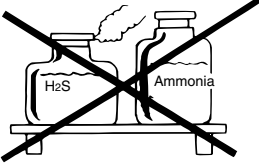
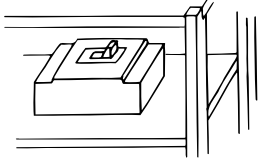
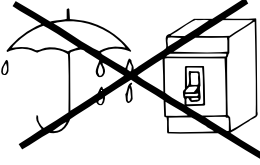
## Handling and Maintenance

1) Storage and Transportation .....	250
2) Standard Working Conditions .....	250
3) Mounting and Connections .....	250
4) Maintenance and Inspections .....	252
5) Troubleshooting .....	254

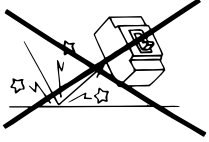
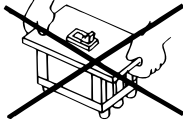

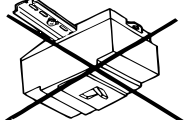
# 8 Handling and Maintenance

## 1. Storage and Transportation

### (1) Precautions for storage

<p><b>Avoid corrosive gases</b></p>  <p>Do not store the product in an atmosphere containing acidic gas or ammonia gas.  <math>H_2S</math> 0.01ppm or less   <math>SO_2</math> 0.05ppm or less  <math>NH_3</math> 0.25ppm or less</p>	<p><b>Store in the OFF or tripped state</b></p>  <p>Store the breaker in the OFF state or tripped state.</p>	<p><b>Avoid moisture</b></p>  <p>Do not leave the breaker in a humid place for long periods of time.</p>
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### (2) Precautions for transportation


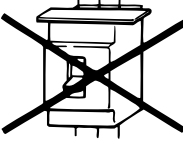
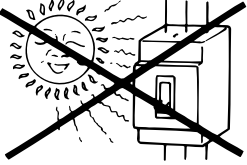
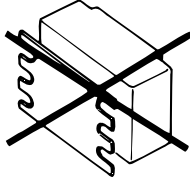
<p><b>Carefully pack and transport</b></p>  <p>Do not drop the package during transportation. When shipping the breaker, make sure to package it carefully.</p>	<p><b>Do not carry by holding the front and back of the flush plate</b></p>  <p>Do not carry the embedded type breaker by holding the front and back of the flush plate. The breaker could drop during transportation.</p>	<p><b>Do not carry by the lead wires</b></p>  <p>Do not carry the accessories by the lead wires. Excessive force will be applied on the accessories.</p>	<p><b>Do not transport upside down (when mounted on IEC 35mm rail)</b></p>  <p>Do not transport a panel containing parts mounted on an IEC 35mm rail in an upside down state.</p>
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## 2. Standard Working Conditions

- Working ambient temperature ...  $-10^{\circ}C$  to  $40^{\circ}C$   
 (Note that the 24-hour average value must not exceed  $35^{\circ}C$ )  
 working current reduction rate in ambient temperature exceeding  $40^{\circ}C$ .  
 $50^{\circ}C$ ... 0.9 fold  
 $60^{\circ}C$ ... 0.7 fold
- Relative humidity ... 85% or less with no dew condensation.
- Altitude ... 2000m or less
- Atmosphere ... Free of excessive moisture, oil vapors, smoke, dust, salt, corrosive substances, vibration or impact, etc.

## 3. Mounting and Connections

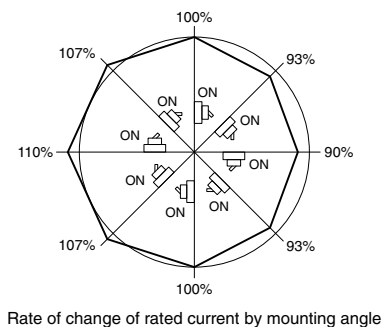
### (1) Precautions for mounting

<p><b>Attention to dust and cutting chips!</b></p>  <p>Make sure that the breaker does not come in contact with rain water, oil, dust or cutting chips. Special attention must be taken to conductive materials such as scraps from drilling steel plates.</p>	<p><b>Do not block ventilation ports</b></p>  <p>Do not block the ventilation ports. The breaker performance could drop. Ensure the insulation distance for breaker mounting indicated on page 101.</p>	<p><b>Avoid direct sunlight</b></p>  <p>Make sure that the breaker is not subject to direct sunlight during use. An increase in temperature could cause malfunctions. Sunlight could also discolor the nameplate and molded case, etc.</p>	<p><b>Do not remove the rear cover</b></p>  <p>Do not remove the rear cover from the back of the base.</p>
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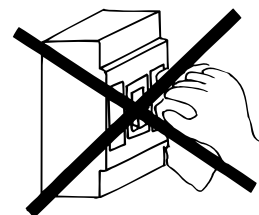
#### Mounting style

Pay attention to the mounting angle of the following models as the overcurrent tripping characteristics may vary according to the mounting style. Use in a vertical direction is recommended.

- NF30-CS
- CP30-BA

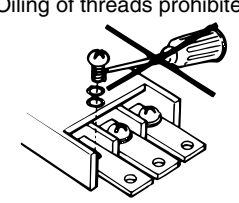
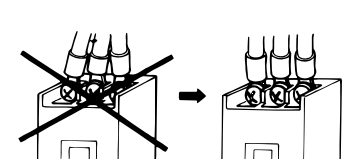
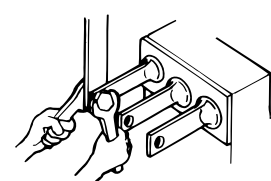


Do not wipe with thinner, detergent or chemical cloth

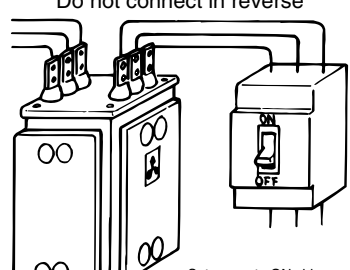


Do not use thinner, etc., to clean the surface of the breaker. Use compressed air or a dry cloth to clean.

**(2) Precautions for Connections**

<p><b>Oiling of threads prohibited</b></p>  <ul style="list-style-type: none"> <li>Do not apply lubricant to the threads. Oil will decrease the friction at threads and cause the screws to loosen easily, and the unit to overheat. Excessive stress will be applied on the threads even with the standard tightening torque and can cause the screws to break.</li> </ul>	<p><b>Connect conductors parallel to each pole</b></p>  <ul style="list-style-type: none"> <li>Connect each connection conductor so it is parallel to each pole.</li> </ul>	<p><b>Do not deform studs</b></p>  <ul style="list-style-type: none"> <li>When connecting the conductors on the rear connection type, take care not to deform the studs when tightening.</li> </ul>
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**Do not connect in reverse**

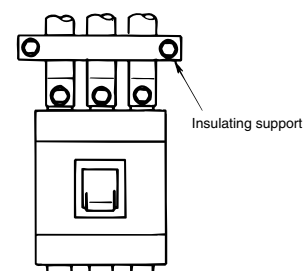


Set power to ON side ...

- As a rule, do not connect the power and load in reverse. If necessary, refer to the specifications and select a model which can be connected in reverse.
- An insulating barrier should be provided on both the power and load sides of the breakers when using a high voltage circuit where dew condenses easily or in a circuit which has a reverse connection in the circuit.

**Securely fix conductors**

- A large electromagnetic force is applied on the connected conductor according to the accident current. Use the conditions on the right as guide and securely fix (tighten) the conductors.

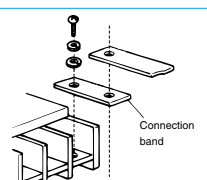


**Electromagnetic force applied per 1m conductor (During 3-phase short-circuit)**

Current target value kA(Pf)	Distance between conductors cm		10	20
	10	(0.4)		
10	(0.4)	490	245	
18	(0.3)	1860	930	
25	(0.2)	4410	2205	
35	(0.2)	8720	4360	
42	(0.2)	12545	6270	
50	(0.2)	17835	8920	
65	(0.2)	30185	15090	
85	(0.2)	51550	25775	
100	(0.2)	71540	35770	
125	(0.2)	111720	55860	

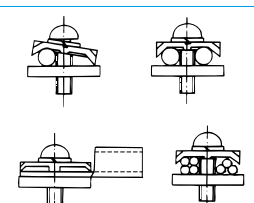
**Bar Connection**

- When directly connecting the conductor, refer to the outline drawings and drill the conductor.
- When connecting the conductors to a bar terminal, pay attention to the insulating distance with the ground. A ground fault prevention barrier is available as an option.



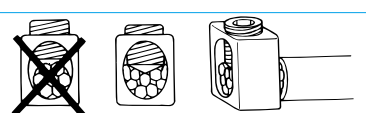
**Wire retention type connection**

- When directly connecting to the terminal, insert the single strand or stranded wires in straight and then tighten. A commercially-available crimp terminal or bar can be connected directly.
- When using stranded wires, split them and then tighten.



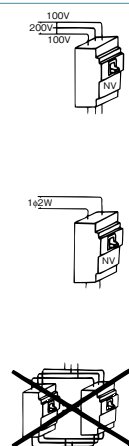
**Solderless terminal connection**

- Untwist the connection wires, align the core wires and then tighten. The wires will loosen up during use, and must be tightened during periodic maintenance.
- Do not solder or bind the end of the strands.
- Make sure not to catch the insulating sheath of the wire when tightening.



**ELCB (NV) connection**

- When using a single-phase 3-wire method, connect the neutral pole to the NC's center pole.
- When using a 3-pole ELCB with a single-phase 2-wire, connect to the left and right poles (poles at both sides) of ELCB.
- Never connect the ELCB units in parallel as it will create a loop circuit, and could burn the magnetic device.
- Never connect the MCCB and ELCB in parallel.



# 8 Handling and Maintenance

## 4. Maintenance and Inspections

### (1) Initial inspections

After installing the MCCB and ELCB, inspect the following matters before powering the units.

Model	Inspection items	Criterion	Remarks
Common	1. Are there any excessive screws, drilling scraps, wire scraps or any other conductive materials around the terminals?	All conductive material must be removed.	
	2. Are there any cracks or damage on the cover or base?	No cracks or breaks allowed.	
	3. Is there any dew condensation on the cover, base or terminals?	No dew condensation allowed.	
	4. Measure the insulation resistance with a 500V insulation resistance tester.	5MΩ or more	Refer to Precautions ② for the ELCB.
	5. Are the connector connections tightened securely?	Must be specified tightening torque.	
ELCB	6. Are the ELCB rated voltage and circuit voltage the same?	Voltages must be the same.	
	7. Apply voltage, press the test button and check the operation.	Must trip with an earth leak.	

#### Precautions

##### ① Withstand voltage test

A guide for the test is given on the following. Do not perform a withstand voltage test exceeding these levels. (Note) Test the operating circuit between the live section and ground.

(Application time: one minute)

(Unit: V)

Main circuit		Auxiliary circuit or control circuit	
Rated insulation voltage	Test voltage (effective value for alternating current)	Rated insulation voltage of operating circuit	Test voltage (effective value for alternating current)
$U_i \leq 300$	2000	$U_{is} \leq 60$	1000
$300 < U_i \leq 690$	2500	$60 < U_{is} \leq 690$	$2U_{is} + 1000$ (min. 1500)

##### ② Insulation resistance measurement and withstand voltage test

The restrictions a and b apply to the following models.

Applicable models: Earth leakage circuit breaker, Measuring display unit breaker.

Measurement position		Test		Insulation resistance measurement		Withstand voltage test	
		ON	OFF	ON	OFF		
State of handle		○	○	○	○	○	○
Between live section of main circuit and ground		○	○	○	○	○	○
Between different poles	Line side	Between left - middle, middle - right, left - right poles		△	○	×	○
	Load side	Between left - neutral pole, middle - neutral poles, right - neutral poles		○ <sup>(*)</sup> (△)	○	○ <sup>(*)</sup> (x)	○
		Between left - middle, middle - right, left - right poles		△	△	×	×
	Between left - neutral poles, middle - neutral poles, right - neutral poles		○ <sup>(*)</sup> (△)	○ <sup>(*)</sup> (△)	○ <sup>(*)</sup> (x)	○ <sup>(*)</sup> (x)	○
Between power - load side terminals		-	○	-	○	○	○
Between main circuit live sections - operating circuit live sections		○	○	○	○	○	○
Between operating circuit live section - ground		○	○	○	○	○	○

Note \*1 Values in parentheses apply for measuring display unit breaker.

### (2) Periodic inspections

To prevent trouble and ensure the breaker operates safely for a long time, inspect the breaker one month after starting use and periodically thereafter according to the environmental conditions.

#### Inspection Interval Guide

1	Clean and dry environment	Once every 2 to 3 years
2	Environment with low levels of dust, corrosive gas, vapors, salt, etc.	Once a year
3	Places other than 1 or 2	Once every six months

Model	Inspection items	Criterion	Remarks
Common	1. Are any of the conductors loose?	No conductor must be loose.	If any conductor is loose, tighten again with the appropriate torque given in Tables 5-5 and 5-6 on pages 97 to 98.
	2. Is any cover or base cracked? Is any handle damaged?	There must be no cracks, damage or breaks.	
	3. Has the breaker been submerged and infiltrated with water? Is the breaker heavily dirtied by mud or dust?	There must be no infiltration of water, heavy mud or dust.	If water has infiltrated the breaker, it must be replaced with a new part or overhauled by the Mitsubishi Service Center.
	4. Has the temperature risen abnormally?	(1) Visually inspect that none of the studs on the backs of the terminals, or the breaker's tightened or molded sections are discolored from burning. (2) There must be no especially high temperature rise when the current at each phase is balanced. (Tolerable maximum value for terminal temperature rise: 60K) (3) There should be no difference on the left and right side of the base sides if the load current is balanced.	There may be a light temperature difference between the following terminals. ● Between the power side terminal and load side terminal ● Between the center pole terminal and left and right pole terminals.
	5. Can the handle be turned ON and OFF smoothly?	Should operate smoothly.	Open and close a normally closed breaker periodically.
	6. Does pressing the TRIP button result in a trip?	Must be resettable after tripping.	This will clean the contact and prevent abnormal heating.
NV	7. Test by pressing the TEST button.	Must operate properly and close again.	Test the operation once a month.

### (3) Inspection after Tripping

Whether the circuit breaker can be reused or must be replaced after switching off a fault current depends on the intensity of the current which was switched off.

Intensity of trip current, degree of MCCB and ELCB damage, and countermeasures

Intensity of trip current	Degree of MCCB and ELCB damage	Countermeasures
When it is clear that the circuit breaker operated within the time-delay trip range (Overcurrent up to 10 times of rated current)	No abnormality such as contamination around vent observed	Reusable [(The circuit breaker can function 50 times (100A or less) at overload current which is 6 times higher than rated current)]
Relatively low short-circuit current which causes instantaneous tripping ↕ Large short-circuit current close to rated breaking capacity	Soot and dust found near vent ↕ Soot and dust found near handle, remarkable contamination found near vent Molten metal found in circuit breaker Box of box type circuit breaker is severely deformed	Reusable ↕ Replace with a new part

If the intensity of the fault current cannot be estimated, remove the MCCB and ELCB, and measure the insulation resistance. If the specified value (5MΩ) has not been reached, perform a withstand voltage test. If the withstand voltage is within the specified value, the circuit breaker can be used temporarily but it should be replaced with a new part as soon as possible. If both the insulation resistance and withstand voltage are sufficient, the circuit breaker may be judged as reusable. However, it should be checked for abnormalities, such as an abnormal rise in temperature for a set period.

- Measure the insulation resistance and perform the withstand voltage test with the procedures given in section 1 and 2 on page 254.
- Check that the ELCB operates when the test button is pressed.

### (4) Guide to service life

Maintenance and inspection must be conducted according to the environment in which the circuit breaker is installed.

The service life of the circuit breaker cannot be determined just by the number of service years.

A reference to the service life is given below, but the circuit breaker must be diagnosed by a specialist for an accurate reading.

Guide to service life

Degree	Environment	Example	Guide for replacement (years)
Standard usage state	1 Place where air is always clean and dry	Dust-proof and air-conditioned electrical room	Approx. 10 to 20
	2 Indoors, where there is little dust and no corrosive gas	Circuit-breakers housed in distribution panels or boxes within an individual electric room having no dust-proofing or air-conditioning	Approx. 7 to 15
Poor environment	1 Place with gases such as sulfuric acid, hydrogen sulfide, salt and high levels of moisture, but low levels of dust	Geothermal power house, sewage treatment plants, iron and steel works, paper and pulp plants, etc.	Approx. 3 to 7
	2 Place with high levels of gas and dust which humans cannot endure for long periods of time	Chemical plants, quarries, mines, etc.	Approx. 1 to 3

Standard	Size of circuit breaker frame (A)	Number of operating cycles (times)			Number of tripping times by shunt tripping device or undervoltage tripping device, or by trip button
		Energization	No energization	Total	
JIS C 8201-2-1 Ann.2	100 or less	1500	8500	10000	10% of total operating cycles
JIS C 8201-2-2 Ann.2	More than 100, 315 or less	1000	7000	8000	
JIS C 8201-2-1 Ann.1	More than 315, 630 or less	1000	4000	5000	
JIS C 8201-2-2 Ann.1	More than 630, 2500 or less	500	2500	3000	
IEC 60947-2 (*1)	More than 2500	500	1500	2000	

Note \*1 The number of trips by the ELCB test button is one-third the number of energizations.

The operating life shortens as the circuit breaker frame size increases. (Refer to above tables.)

These values may seem low, but since this circuit breaker is a protective device, it basically differs from a switch intended for frequent opening and closing.

For tripping by a shunt tripping device, the life is especially short and special consideration should be taken.

**⚠ WARNING** Continuing user of a circuit breaker which has reached its service life can result in the following problems. Always update the circuit breakers accordingly.

- ① Insulation fault: Risk of burning, internal short-circuit, and electric shock.
- ② Energizing fault: Burning or unnecessary operations caused by overheating of the internal parts, etc.
- ③ Operation fault: ON and OFF operation of the circuit may be disabled.
- ④ Tripping fault: Protection of the load device or wiring, etc., may be disabled.

**⚠ CAUTION** When the operating endurance exceeds the specified value, the above faults could occur or the internal conductor could break, overheat or burn.

## 5. Troubleshooting

### (1) Troubleshooting for breaker unit (MCCB, ELCB)

Fault state		Cause		Countermeasures and Actions	
Operation errors	Can't close	Foreign matter in switching mechanism		Remove the foreign matter	
		Breaker hasn't been reset		Reset again	
		Breaker can't be reset	See below(*)	See below	
	(*) Can't reset Can't trip Can't turn OFF	Wear due to tripping endurance	Excessive use of shunt trip operation	Replace with new part. Change shunt trip to electric operation	
			End of service life	Replace with new part	
		Reset mechanism is faulty	Improper adjustment	Return for repairs	
		Undervoltage coil is not excited	Careless operation	Excite the coil	
		Resetting time has not elapsed		Wait for bimetal to cool down	
		Switching spring is broken or fatigued	Breakage caused by initial trouble	Return for repairs	
			End of service life	Replace with new part	
			Contact has fused because of excessive interruptive current	Replace with large capacity breaker	
		Insufficient lubricant (grease)	Return for repairs		
Broken handle	Excessive power during operation		Replace handle		
	Positional relation of external operation handle and breaker is poor		Replace handle		
			Correct positional relation		
Poor energizing	Foreign matter caught between contacts		Remove foreign matter (if cover is removable) Return for repairs (if cover is not removable)		
	Fusion at conductive section	Excessive interrupting current	Replace with new part having large interruptive capacity		
	Excessive wear of contacts	Short-circuit current cut off End of service life	Replace with new part		
Broken rated changeover screw		Excessive tightening torque (Tighten with 0.3 to 0.45N·m)		Return for repairs	
Annoying operation	Operates under normal load	Ambient temperature is high	Incorrect selection (temperature compensation)	Change the selection	
			Panel is sealed	Ventilate	
		Excessive temperature rise	Loosening at terminal connections	Tighten	
		Load current contains high levels of high-frequency distortion		Insert a reactor and decrease distortion factor	
		Measuring instrument is reading small measurement values because of distorted current		Correctly specify the rated values by using real meters with effective value	
	Electronic type	Overcurrent indicator LED is ON	Rated current setting value is too low		Correct the rated current setting
			Rated current changeover screw was not tightened		Correctly tighten the rated current changeover screw Tightening torque 0.3 to 0.45N·m
	Failure of rated current changeover section		Return for repairs		
	Malfunctions when starting	Heating caused by repeated starting current		Replace with breaker having higher rating	
		Long starting time	Incorrect selection	Replace with breaker having higher rating	
	Momentarily functions when starting	Starting current is too high		Change the instantaneous setting or replace with breaker having higher rating	
		Starting rush current is too high		Change the instantaneous setting or replace with breaker having higher rating	
		Excessive current during delta-star starting changeover		Change the instantaneous setting or replace with breaker having higher rating	
		Excessive current due to reversible operation		Change the instantaneous setting or replace with breaker having higher rating	
		Rush current during instantaneous restart		Change the instantaneous setting or replace with breaker having higher rating	
		Rare short-circuit of motor		Repair the motor	
		Bimetal reset incomplete after instantaneous tripping		Allow to properly reset	
	Operates during use	Abnormal current passed simultaneously with closing (short-circuit closing)		Inspect the circuit and remove the cause	
Antenna for transceiver (5W or higher) was seated against electronic type MCCB body during transmission		Use the transformer at least 1m away from the electronic type MCCB			
Short-circuit on power side		Dust is accumulated		Remove the cause or replace with new part	
		Conductive matter has dropped into power side		Remove the cause or replace with new part	
Temperature rise	Terminal temperature is high	Improper tightening	Improper maintenance	Tighten	
	Mold side temperature is high	Complete electromagnetic type being used at a high frequency (400Hz, etc.)		Replace with breaker having suitable frequency	
		Load current contains high levels of high-frequency distortion		Insert a reactor and decrease distortion factor	
	Heating at stud tightening section	Incorrect measurement resulting from touch		Measure with a measuring instrument	
		Studs are loose		Tighten	
Contact fault between stud conductor and body terminal		Reassemble the stud			
No operation	No tripping at overcurrent	Selected rated current is too high		Replace with a breaker having a lower current	
		Applied frequency is incorrect		Replace with breaker having suitable frequency	
		Backup breaker has tripped	Backup breaker's instantaneous tripping current is too low	Lower the instantaneous electromagnetic setting Raise the electromagnetic setting for the backup breaker, or change the rating	
Does not operate with tester	electronic type MCCB	Overcurrent indication LED does not turn ON, or turns ON and then OFF before specified time		Breaker tester's battery is spent	
		Overcurrent indication LED turns ON and then OFF after specified time, but does not trip		Tripping mechanism is faulty	



**(2) Troubleshooting for leakage operation section**

Fault state		Cause	Countermeasures and Actions
Annoying operation errors	Operates simultaneously with closing (The leakage mechanism operates, such as the leakage indication button pops out)	The wiring is long creating a large ground electrostatic capacity, and causes a leakage current flow	Change the rated sensitivity current or install the ELCB near the load
		ELCB units are being used in parallel, or is incorrectly connected with a neutral wire, etc.	Use the correct wiring
	Operates during use	An excessive surge, such as inducted lightning, has infiltrated the unit	Install a surge absorber, etc., near the circuit
		Induction noise from a nearby large current bus, etc., has infiltrated the unit	Avoid sources of noise
Operation errors	Leakage operation occurs when the test button is pressed, etc., but there is not indication	LED is faulty or is at end of service life	Replace with new part
		The indicator button is improperly adjusted and does not protrude	Return for repairs
No operation	No operation takes place when the test button is pressed	Electronic circuit section is faulty	Replace with new part
		Voltage is not applied	Apply the specified voltage
		Contact continuity is faulty	Remove the foreign matter from the contact

Remarks: 1. When using a transceiver, use at least 1m away from the electronic MCCB and ELCB.

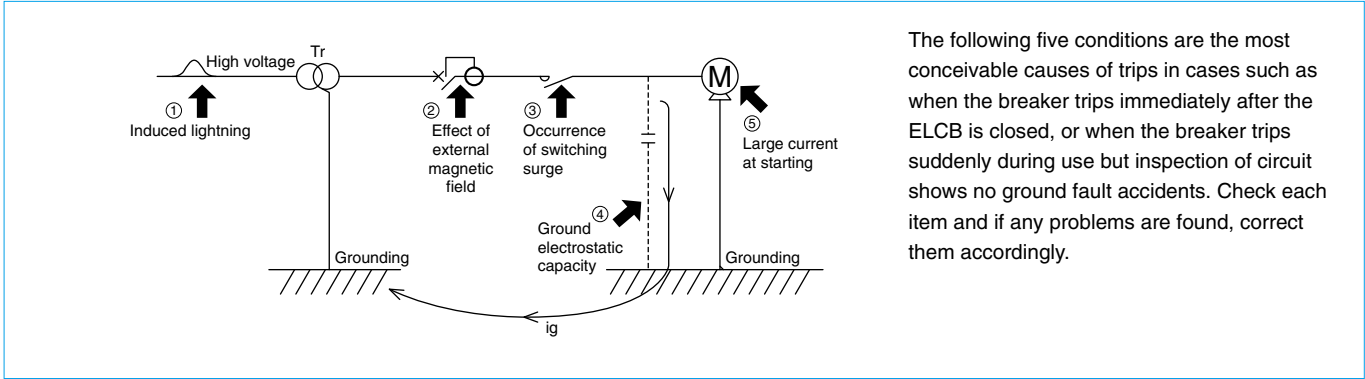
**(3) Troubleshooting for accessories**

Fault state		Cause		Countermeasures and Actions
NFM NVM (Electric operation device)	Operation disabled	Operation power voltage has dropped	Operation circuit wire capacity is insufficient	Use a larger operation circuit wire
			Operation power capacity is insufficient	Improve the operation power
		Resistor or motor is burned	Excessive continuous operation	Return for repairs (motor replacement)
		Connection is incorrect		Use the correct wiring
	Continuous idling	Applied voltage is incorrect		Apply the correct operation voltage
		ON and OFF circuits are operating simultaneously, operation is mistaken		Provide an interlock at the pushbutton
		For the self-holding type, the auxiliary switch contact is used for automatic reset		Use the alarm switch contact for the automatic reset contact
	One idle run when closing	Voltage ripping in the OFF state, or tripping caused by undervoltage		Turn OFF once to reset, and then turn ON again
Breaker itself has automatically cut-off and tripped				
UVT (Undervoltage tripping device)	Closing disabled	Applied frequency or voltage is incorrect		Improve the power
		Doesn't attract	voltage drop is large	Improve the voltage
	Doesn't trip even when voltage is absent	Breaker's tripping mechanism is faulty		Return for repairs
SHT (Shunt tripping device)	Doesn't trip	Insufficient voltage	Operation voltage has dropped	Improve the power
			Applied voltage is incorrect	Improve the power
		Coil is burnt	Coil is continuously excited	Return for repairs (coil replacement, installation of burn prevention auxiliary coil)
			Operation voltage has dropped causing continuous excitation	Return for repairs (coil replacement), improve power
			Burn preventing auxiliary contact is faulty	Return for repairs (coil replacement, contact repair)
			Abnormal voltage is applied	Return for repairs (coil replacement)
AL (Alarm switch) AX (Auxiliary switch) EAL (Earth leakage alarm contact) TBM (Test button module) PAL (Pre-alarm)	Malfunction	Contact fault caused by overcurrent		Return for repairs
		Incorrect connection	Connection mistaken during installation	Refer to nameplate and correct the wiring
		Microload	Incorrect selection	Return for repairs (replacement with type for microloads)
		Loose mounting screws	Insufficient tightening Vibration during transportation	Return for repairs (readjustment)

# 8 Handling and Maintenance

## (4) Cases of unnecessary ELCB operation

Even if the ELCB is not faulty, there may be a problem in the circuit which causes frequent operation or instantaneous operation at closing. Refer to the following section and incorporate it as part of the circuit inspection and troubleshooting.



The following five conditions are the most conceivable causes of trips in cases such as when the breaker trips immediately after the ELCB is closed, or when the breaker trips suddenly during use but inspection of circuit shows no ground fault accidents. Check each item and if any problems are found, correct them accordingly.

Cause	Countermeasures
1 Induction lightning	All models incorporate a non-operating shock structure and should sufficiently withstand 7kV (JIS Standards), so unnecessary operation should not occur.
2 External magnetic field	The ZCT is equipped with a magnetic shield, and is not affected easily. However, the breaker could operate if there are large current buses reaching several thousand amperes near the ELCB, or if there is a short-circuit fault in nearby circuit. Separate the ELCB from the large current bus wires by at least 10cm.
3 Switching surge	All models incorporate a non-operating shock structure and should not operate unnecessarily. However if there is a time lag in the closing time of each pole in the magnetic switch, unnecessary operation could occur due to the relation of the ground electrostatic capacity.
4 Effect of ground electrostatic capacity	If the wires are stored in a metal conduit or metal duct wiring, the ground electrostatic capacity will increase compared to other wiring methods. This may cause the leakage current to constantly increase. If the magnetic switch chatters, etc., the leakage current may become temporarily unbalanced thus reaching a leakage current equivalent to the sensitivity current and causing unnecessary operation. Review the following matters in this case. <ol style="list-style-type: none"> <li>1) Shorten the load circuit line, or install the ELCB near the load (device) being used. (Install in a branch circuit.)</li> <li>2) Lead the control circuit for the control device, etc., from the power on the ELCB side.</li> <li>3) If the above measures are difficult or if they cause further unnecessary operation, reconsider the selected ELCB rated sensitivity current.</li> </ol>
5 Equilibrium properties caused by large current at starting	The ZCT is made of high-grade permalloy, a material with Ni as its main element and which has outstanding residual magnetic characteristics. The periphery of the ZCT is covered with material having outstanding magnetic characteristics, creating a complete magnetic shield. This suppresses the effect of residual currents to the minimum, and prevents the breaker from unnecessarily operating even near a current of several thousand amperes. In the relay, the characteristics change if the primary conductor is bent immediately after it is passed through the ZCT. Thus, when passing a primary conductor with current of 300A or more through the ZCT, keep the conductor straight for at least 30cm on either side.

# 9

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## 1. Handle Operation Angle Dimensions

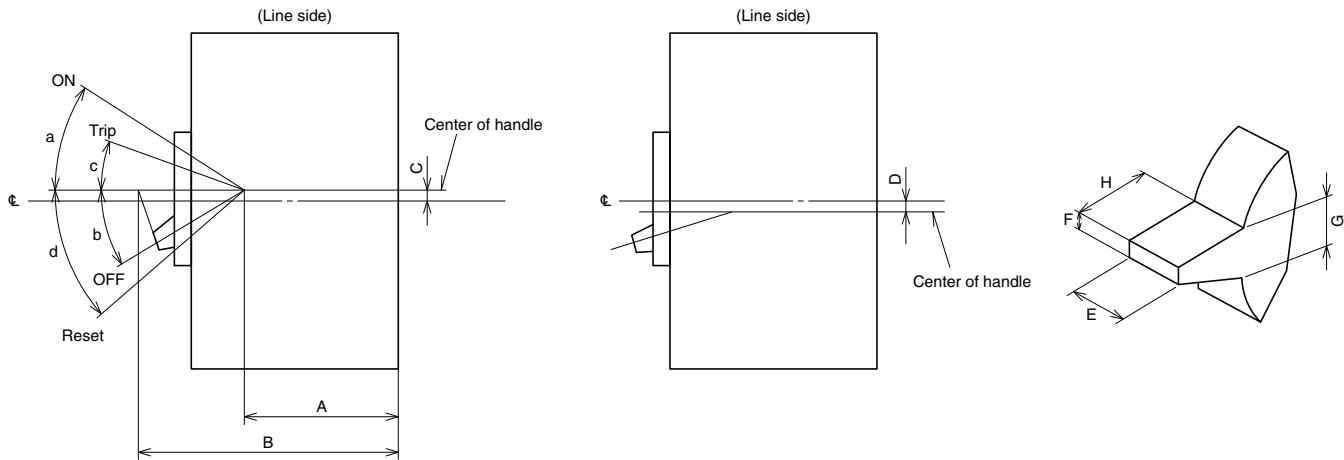


Table of dimension variations

Class	Model		Operation angle (°)				Dimensions (mm)								
			ON	OFF	Trip	Reset	A	B	C	D	E	F	G	H	
	MCCB, MCB	ELCB, RCCB, RCBO	a	b	c	d	A	B	C	D	E	F	G	H	
C S H	NF50-SVFU	NV50-SVFU	12	20	4	27	55	90	13	-	8	5	5	14	
	NF32-SV, NF63-HDV, NF125-HDV NF63-CV, NF63-SV, NF63-HV NF125-CV, NF125-SV, NF125-HV NF100-CVFU, NF125-SVU, NF125-HVU	NV32-SV NV63-CV, NV63-SV, NV63-HV NV125-CV, NV125-SV, NV125-HV NV100-CVFU, NV125-SVU, NV125-HVU	15	19	5	21	40	90	2	-	12	7	7	17	
	NF125-SEV, NF125-HEV NF250-CV, NF250-SV, NF250-HV NF250-SEV, NF250-HEV NF250-SEV/HEV with MDU NF125-HDVA, NF250-HDV/HDVA NF250-SGV, NF250-LGV, NF250-HGV NF125-SGV, NF125-LGV, NF125-HGV NF160-SGV, NF160-LGV, NF160-HGV NF250-CVU, NF250-SVU, NF250-HVU	NV125-SEV, NV125-HEV NV250-CV, NV250-SV, NV250-HV NV250-CVU, NV250-SVU, NV250-HVU	15	19	5	21	40	92	2	-	12	7	7	19	
	NF30-CS	-	21	29	1	31	47	67	10	-	8.5	4.5	6	13	
	NF100-SRU	NV100-SRU	20	35.5	5	44.5	71	96	13	-	10	5	8.5	16.5	
	NF100-HRU	NV100-HRU	20	35.5	5	44.5	71	102	13	-	10	5	8.5	16.5	
	NF400-CW	NV400-CW	16.5	10	6.5	14.5	49	134	6.5	-	32.5	14.5	15.5	25	
	NF400-SW/SEW/HEW/REW NF630-CW/SW/SEW/HEW/REW NF400-SWU/HWU	NV400-SW/SEW/HEW NV630-CW/SW/SEW/HEW	16.5	10	6.5	14.5	49	155	6.5	-	32.5	13.5	15.5	46	
	NF400-HDW	-	16.5	10	6.5	14.5	55	161	6.5	-	32.5	13.5	15.5	46	
	NF800-CEW/SDW/SEW/HEW/REW NF800-SEW/HEW with MDU NF630-SWU/HWU	NV800-SEW/HEW	16.5	10	6.5	14.5	49	155	6.5	-	32.5	13.5	15.5	46	
	NF800-HDW	-	16.5	10	6.5	14.5	55	161	6.5	-	32.5	13.5	15.5	46	
	NF1000-SEW, NF1250-SEW NF1600-SEW	-	18	12	6	17	84	190	-	4	41.5	13.5	15	36.5	
	R U	NF125-RGV, NF250-RGV	-	15	19	5	21	40	92	2	-	12	7	7	19
		NF125-UV	-	15	19	5	21	40	92	-	29	12	7	7	17
		NF250-UV	-	15	19	5	21	40	92	-	35	12	7	7	19
		NF400-UEW	-	16.5	10	6.5	14.5	146	252	-	13.5	32.5	13.5	15.5	46
		NF400-UEW(4P), NF800-UEW	-	16.5	10	6.5	14.5	146	252	-	17	32.5	13.5	15.5	46
	FA	NF30-FA/FAU, NF50-FA/FAU	NV30-FA/FAU, NV50-FA/FAU	30	21	1	31	53.5	73.5	5	-	8	5	6	13
		NF50-FHU	NV50-FHU	21	29	1	31	57	76	15.5	-	8.5	4.5	6	13
		NF100-FHU	NV100-FHU	21	29	1	31	57	76	12.5	-	8.5	4.5	6	13
BH	BH-D6, BH-D10*1	-	41	36	-	-	63	76	9	-	-	-	-		
	BH-DN*1	-	42	48	-	-	63	76	10	-	17	4	9.5	12	
	KB-D	-	41	48	-	-	63	76	9	-	-	-	-		
	-	BV-D*1	42	40	-	-	61	76	10	-	14	4	-	-	
-	BV-DN*1	42	48	-	-	63	76	10	-	17	4	-	-		

Note \*1 Trip is the same as the OFF position. Resetting is not required.

## 2. MCCB Trip Button, Instantaneous Adjustment Dial Drilling and Terminal Cover Mounting Hole Dimensions

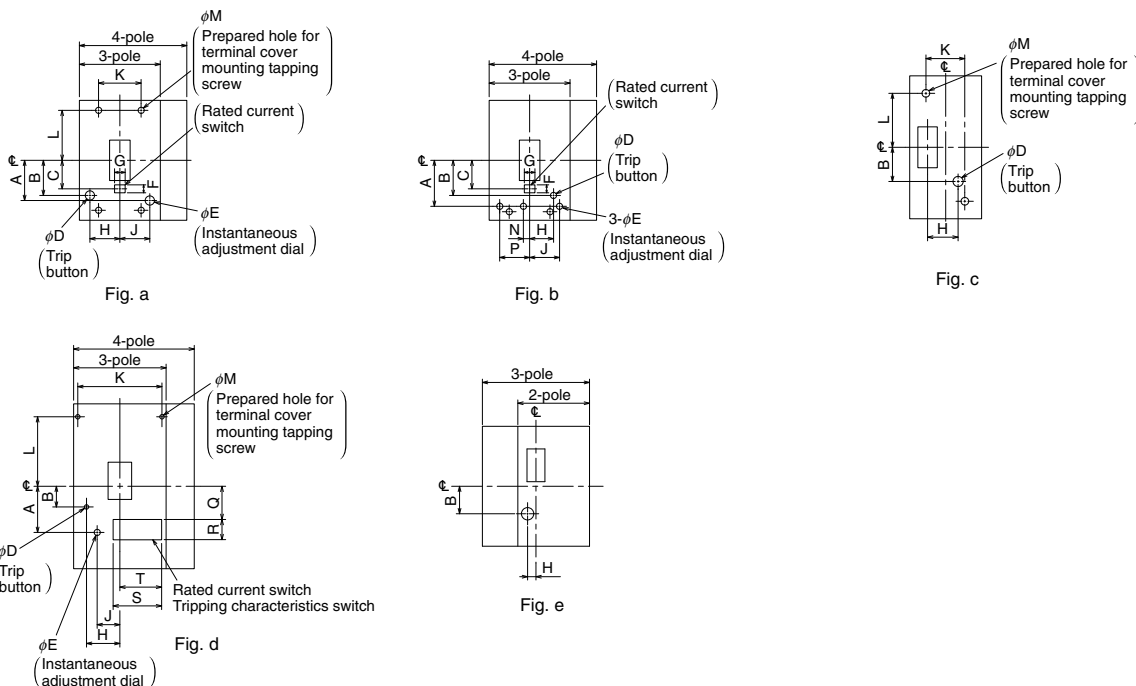


Table of dimension variations

Model	Number of poles	Fig.	A	B	C	φD	φE	F	G	H	J	K	L	φM	N	P	Q	R	S	T
NF50-SVFU	2, 3	e	-	14	-	6.5	-	-	-	4	-	-	-	-	-	-	-	-	-	-
NF32-SV, NF63-CV	2	c	-	20	-	6.5	-	-	-	21	-	-	-	-	-	-	-	-	-	-
NF63-SV, NF63-HV	3, 4	a	-	20	-	6.5	-	-	-	29	-	-	-	-	-	-	-	-	-	-
NF63-HDV, NF125-HDV	3, 4	a	-	20	-	6.5	-	-	-	37	-	-	-	-	-	-	-	-	-	-
NF125-CV, NF125-SV, NF125-HV	2	c	-	20	-	6.5	-	-	-	21	-	-	-	-	-	-	-	-	-	-
NF100-CV, NF125-SVU, NF125-HVU	3, 4	a	-	20	-	6.5	-	-	-	37	-	-	-	-	-	-	-	-	-	-
NF125-UV	2, 3, 4	a	-	20	-	6.5	-	-	-	37	-	-	-	-	-	-	-	-	-	-
NF125-SEV, NF125-HEV, NF250-SV, NF250-HV	2, 3, 4	a	-	20	-	6.5	-	-	-	44	-	-	-	-	-	-	-	-	-	-
NF125-SGV, NF125-LGV, NF125-HGV	2, 3, 4	a	-	20	-	6.5	-	-	-	44	-	-	-	-	-	-	-	-	-	-
NF160-SGV, NF160-LGV, NF160-HGV	2, 3, 4	a	-	20	-	6.5	-	-	-	44	-	-	-	-	-	-	-	-	-	-
NF250-SGV, NF250-LGV, NF250-HGV	2, 3, 4	a	-	20	-	6.5	-	-	-	44	-	-	-	-	-	-	-	-	-	-
NF250-CVU, NF250-SVU, NF250-HVU, NF250-UV, NF250-HDV	2, 3, 4	a	-	20	-	6.5	-	-	-	44	-	-	-	-	-	-	-	-	-	-
NF250-SEV, NF250-HEV	3, 4	a	-	20	-	6.5	-	-	-	44	-	-	-	-	-	-	-	-	-	-
NF125-RGV	2, 3	a	-	20	-	6.5	-	-	-	44	-	-	-	-	-	-	-	-	-	-
NF250-RGV	2, 3	a	-	20	-	6.5	-	-	-	44	-	-	-	-	-	-	-	-	-	-
NF30-CS	2	b	-	14.5	-	4	-	-	-	16	-	-	-	-	-	-	-	-	-	-
	3	b	-	14.5	-	4	-	-	-	27.5	-	-	-	-	-	-	-	-	-	-
NF50-FHU	2	a	-	9.5	-	4	-	-	-	15	-	-	-	-	-	-	-	-	-	-
	3	a	-	9.5	-	4	-	-	-	27.5	-	-	-	-	-	-	-	-	-	-
NF30-FA, NF50-FA, NF30-FAU, NF50-FAU	2	a	-	11	-	4	-	-	-	0	-	-	-	-	-	-	-	-	-	-
	3	a	-	11	-	4	-	-	-	10	-	-	-	-	-	-	-	-	-	-
NF100-SRU, NF100-HRU	2	a	-	2.5	-	4	-	-	-	18.5	-	-	-	-	-	-	-	-	-	-
	3	a	-	2.5	-	4	-	-	-	31	-	-	-	-	-	-	-	-	-	-
NF100-FHU	3	a	-	12.5	-	4	-	-	-	27.5	-	-	-	-	-	-	-	-	-	-
NF400-CW	2, 3	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	-	-	-	-
	2, 3	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	-	-	-	-
NF400-SW, NF400-SWU, NF400-HWU	4	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	-	-	-	-
	3	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	53	30	74	63.5
	4	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	53	30	74	63.5
NF400-UEW	3	d	-	50.5	-	6.5	-	-	-	51.5	-	125	130.5	3.5	-	-	53	30	74	63.5
	4	d	-	54	-	6.5	-	-	-	78.5	-	156	152	3.5	-	-	76.5	30	74	98.5
NF400-HDW	3	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	-	-	-	-
	4	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	-	-	-	-
NF630-CW	2, 3	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	-	-	-	-
	2, 3	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	-	-	-	-
NF630-SW	4	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	-	-	-	-
	3	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	53	30	74	98.5
	4	d	-	30.5	-	6.5	-	-	-	51.5	-	125	110.5	3.5	-	-	53	30	74	98.5
NF800-CEW, NF800-SEW, NF800-HEW, NF800-REW	3	d	-	30.5	-	6.5	-	-	-	78.5	-	86	128.5	3.4	-	-	53	30	74	98.5
	4	d	-	30.5	-	6.5	-	-	-	78.5	-	156	128.5	3.4	-	-	53	30	74	98.5
NF800-SDW, NF630-SWU, NF630-HWU	2, 3	d	74	30.5	-	6.5	10	-	-	78.5	57	86	128.5	3.4	-	-	-	-	-	-
	4	d	74	30.5	-	6.5	10	-	-	78.5	57	156	128.5	3.4	-	-	-	-	-	-
NF800-UEW	3	d	-	54	-	6.5	-	-	-	78.5	-	86	152	3.4	-	-	76.5	30	74	98.5
	4	d	-	54	-	6.5	-	-	-	78.5	-	156	152	3.4	-	-	76.5	30	74	98.5
NF800-HDW	3	d	-	30.5	-	6.5	-	-	-	78.5	-	86	128.5	3.4	-	-	-	-	-	-
	4	d	-	30.5	-	6.5	-	-	-	78.5	-	156	128.5	3.4	-	-	-	-	-	-
NF1000-SEW, NF1250-SEW	3	d	-	70	-	6	-	-	-	56.5	-	199	178.5	3.4	-	-	130	30	74	89
NF1600-SEW	4	d	-	70	-	6	-	-	-	56.5	-	269	178.5	3.4	-	-	130	30	74	89

Remarks: 1. The 4-pole part is available for the S and H Series 50A frame to 1600A frame (excluding NF400-REW, NF630-REW and NF800-REW).  
 2. The 2-pole part for NF250-CV and larger is the same as the 3-pole part. (Including NF125-HV.)  
 3. The terminal cover mounting hole shows the case for the screwed type. The breaker mounting hole is used to mount the one-touch terminal cover. Refer to the respective dimension drawings.  
 4. The K dimensions are divided down the breaker center.

## 3. ELCB Button and Switch Dimensions

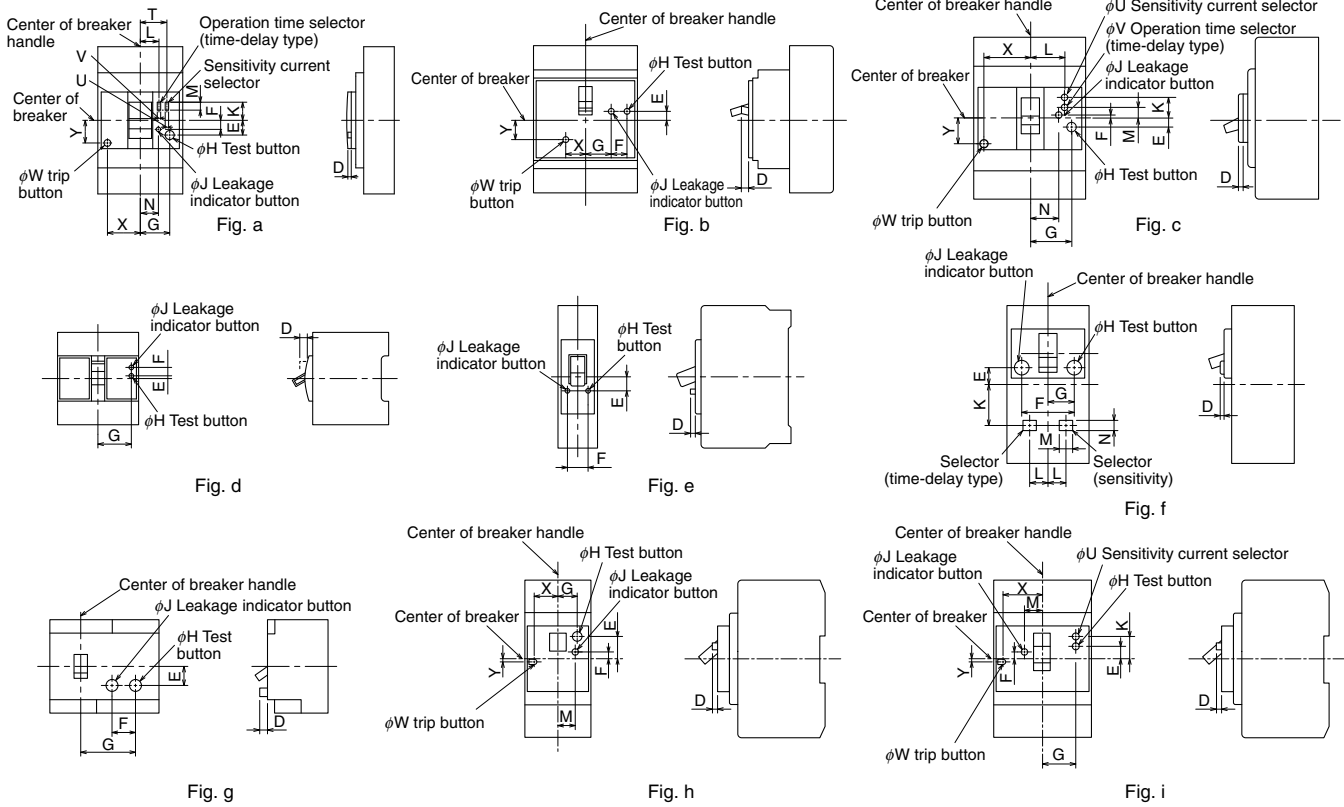


Table of dimension variations

Model	Reference drawing	Variable dimensions (mm)																	
		D		E	F	G	H	J	K	L	M	N	T	U	V	W	X	Y	
		Test button	Indicator button																
NV32-SV	Fixed type	a			13	8	26.5	9.5	4	-	-	-	16	-	-	-	6	29	20
NV63-CV, NV63-SV, NV63-HV	Selector type									16	-	7		23.5	3	-			
NV125-CV, NV125-SV, NV125-HV	Fixed type	a	3	4	13	8	26.5	9.5	4	-	-	-	16	-	-	-	6	37	20
	Selector type									16	-	7		24	3	-			
NV250-CV, NV250-SV, NV250-HV	Fixed type	a			13	8	34	9.5	4	-	-	-	23.5	-	-	-	6	44	20
	Selector type									16	-	7		31	3	-			
NV250-CVU, NV250-SVU, NV250-HVU	Time-delay type									16	24	7		31	3	3			
NV50-FHU	2P	b	4	4	6.5	9	9.5	4	4	-	-	-	-	-	-	-	-	-	-
	3P						22			-	-	-	-	-					
NV100-FHU			4	4	3.5	9	22	4	4	-	-	-	-	-	-	-	-	-	-
NV30-FA, NV50-FA	2P	d	0	2.5	3	6	15	3	3	-	-	-	-	-	-	-	-	-	-
NV30-FAU, NV50-FAU	3P						25			-	-	-	-	-					
NV100-SRU	2P	h	3.5	3	17	5	15	7.5	4.5	-	-	13.5	-	-	-	-	4	18	2.5
NV100-SRU/HRU	3P	i	3.5	3	9.5	5	25.5	7.5	4.5	17.5	-	13.5	-	-	5.5	-	4	30.5	2.5
NV400-CW (note 2)	Fixed type	c	3	3	(2.3)	14.6	43.5	9.5	5	-	-	-	43.5	-	-	-	6.5	51.5	30.5
NV400-SW	Selector type									30.6	43.5	-		5.5	-				
NV630-CW, NV630-SW	Time-delay type									30.6	-	22.6		5.5	5.5				
NV400-SEW, NV400-HEW	Fixed type	c	3	3	(2.3)	14.6	43.5	9.5	5	-	-	-	43.5	-	-	-	6.5	51.5	30.5
NV630-SEW, NV630-HEW	Selector type									30.6	43.5	-		5.5	-				
	Time-delay type									30.6	-	22.6		5.5	5.5				
NV800-SEW, NV800-HEW	Fixed type	c	3	3	(2.3)	14.6	54.1	9.5	5	30.6	54.1	-	54.1	-	-	-	6.5	78.5	30.5
	Time-delay type									30.6	-	22.6		5.5	5.5				

Note \*1 Dimensions shown in parentheses apply to minus direction.

# 4. List of Product Weights

## MCCB

Model	Item	Breaker body										Accessories (weight of only accessories)								
		Front connection type				Rear connection type				Plug-in type (including plug-in frame)		Electric operated type	Boxed type			Operation handle			Mechanical interlock (M)	
		1P	2P	3P	4P	1P	2P	3P	4P	2P	3P		4P	S	I	W	F type	V type		S type
M.B	NF32-SV	-	0.45	0.65	-	-	0.55	0.8	-	0.8	1.2	-	-	1.5	5.0	10.2	0.4	0.45	0.6	0.17
	NF63-CV (rated current 50A or less)	-	0.45	0.65	-	-	0.55	0.8	-	0.8	1.2	-	-	1.5	5.0	10.2	0.4	0.45	0.6	0.17
	NF63-CV (rated current 60A, 63A)	-	0.5	0.7	-	-	0.6	0.85	-	0.85	1.25	-	-	1.5	5.0	10.2	0.4	0.45	0.6	0.17
	NF63-SV, NF63-HV (rated current 50A or less)	-	0.5	0.7	0.9	-	0.6	0.85	1.1	0.85	1.25	1.5	-	1.5	5.0	10.2	0.4	0.45	0.6	0.17
	NF63-SV, NF63-HV (rated current 60A, 63A)	-	0.55	0.75	1.0	-	0.65	0.9	1.2	0.9	1.3	1.6	-	1.5	5.0	10.2	0.4	0.45	0.6	0.17
	NF125-CV	-	0.6	1.0	-	-	1.0	1.5	-	1.2	1.9	-	1.3	1.8	5.1	10.2	0.4	0.45	0.6	0.17
	NF125-SV	-	0.7	0.95	1.3	-	1.1	1.5	2.0	1.3	1.9	2.4	1.3	1.8	5.1	10.2	0.4	0.45	0.6	0.17
	NF125-HV	-	0.6	1.0	1.2	-	1.0	1.5	1.9	1.2	1.9	2.3	1.3	1.8	5.1	10.5	0.4	0.45	0.6	0.17
	NF125-SEV	-	-	1.7	2.2	-	-	2.2	2.9	-	2.6	3.3	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NF125-HEV	-	-	1.7	2.2	-	-	2.2	2.9	-	2.6	3.3	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NF250-CV	-	1.3	1.5	-	-	1.7	2.2	-	3.1	3.4	-	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NF250-SV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NF250-HV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	-	8.7	13.5	0.5	0.55	0.6	0.17
	NF250-SEV	-	-	1.7	2.2	-	-	2.2	2.9	-	2.6	3.3	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NF250-HEV	-	-	1.7	2.2	-	-	2.2	2.9	-	2.6	3.3	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NF125-SGV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NF125-LGV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	-	8.7	13.5	0.5	0.55	0.6	0.17
	NF125-HGV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	-	8.7	13.5	0.5	0.55	0.6	0.17
	NF160-SGV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NF160-LGV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	-	8.7	13.5	0.5	0.55	0.6	0.17
	NF160-HGV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	-	8.7	13.5	0.5	0.55	0.6	0.17
	NF250-SGV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NF250-LGV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	-	8.7	13.5	0.5	0.55	0.6	0.17
	NF250-HGV	-	1.4	1.6	2.0	-	1.8	2.3	3.0	3.2	3.5	4.5	1.3	-	8.7	13.5	0.5	0.55	0.6	0.17
	NF30-CS	-	0.35	0.25	-	-	0.35	0.5	-	-	-	-	-	-	1.1	-	-	-	-	-
	NF400-CW	-	4.4	5.0	-	-	5.7	7.0	-	7.0	8.3	-	-	-	-	-	-	-	-	-
	NF400-SW	-	4.6	5.2	6.8	-	5.9	7.3	9.7	7.2	8.5	11.3	-	-	19	30	-	-	-	-
	NF400-SEW/HEW	-	-	6.0	7.6	-	-	8.1	10.5	-	9.3	12.0	-	-	-	-	-	-	-	-
	NF400-REW	-	-	6.0	-	-	-	8.5	-	-	-	-	-	-	-	-	2.0	-	-	-
	NF630-CW	-	5.2	6.0	-	-	6.5	7.9	-	7.6	9.1	-	-	-	-	-	-	-	-	-
NF630-SW	-	5.4	6.2	8.0	-	6.7	8.1	10.6	7.8	9.3	12.0	-	-	33	30	-	-	-	-	
NF630-SEW/HEW	-	-	6.5	8.3	-	-	8.4	10.9	-	9.6	12.3	-	-	-	-	-	-	-	-	
NF630-REW	-	-	6.5	-	-	-	8.4	-	-	9.6	-	-	-	-	-	-	-	-	-	
NF800-CEW	-	-	10.9	-	-	-	12.1	-	-	16.3	-	-	-	-	-	-	-	-	-	
NF800-SDW	-	9	-	-	-	10	-	-	-	-	-	-	48	70	-	2.4	-	-	-	
NF800-SEW/HEW	-	-	10.9	14.2	-	-	12.1	15.8	-	16.3	21.4	-	-	-	-	-	-	-	-	
NF800-REW	-	-	10.9	-	-	-	12.1	-	-	16.3	-	-	-	-	-	-	-	-	-	
NF1000-SEW, NF1250-SEW	-	-	23.5	30.7	-	-	23	30.8	-	26.6	35.5	10	-	48	70	3.4	-	2.0	-	
NF1600-SEW	-	-	34.5	41.2	-	-	30	40.7	-	-	-	-	-	-	-	-	-	-	0.55	
U.F	NF125-RGV	-	1.5	1.8	-	-	-	-	2.35	2.7	-	1.3	-	-	-	0.5	0.55	0.6	0.17	
	NF250-RGV	-	1.5	1.8	-	-	-	-	3.2	3.6	-	1.3	-	-	-	0.5	0.55	0.6	0.17	
	NF125-LUV	-	1.35	1.5	1.9	-	-	-	2.2	2.4	-	1.3	-	-	-	0.5	0.55	0.6	0.17	
	NF250-LUV	-	2.5	2.7	3.7	-	-	-	4.2	4.5	-	1.3	-	-	-	0.5	0.55	0.6	0.17	
	NF400-UEW	-	-	16.2	25.4	-	-	18.6	30.7	-	19.8	-	-	9.0	-	-	2.2	-	1.9	0.45
HDV	NF63-HDV (rated current 50A or less)	-	0.45	0.65	-	-	0.55	0.8	-	-	-	-	-	-	-	0.4	0.45	-	-	
	NF63-HDV (rated current 60A, 63A)	-	-	0.7	-	-	0.85	-	-	-	-	-	-	-	-	0.4	0.45	-	-	
	NF125-HDV (rated current 100A or less)	-	-	0.8	-	-	1.3	-	-	-	-	-	-	-	-	0.4	0.45	-	-	
	NF125-HDV (rated current 125A)	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	0.4	0.45	-	-	
	NF250-HDV	-	-	1.5	-	-	2.2	-	-	-	-	-	-	-	-	0.5	0.55	-	-	
HDVA	NF125-HDVA	-	-	1.5	-	-	2.2	-	-	-	-	-	-	-	-	0.5	0.55	-	-	
	NF250-HDVA	-	-	1.5	-	-	2.2	-	-	-	-	-	-	-	-	0.5	0.55	-	-	
HDW	NF400-HDW	-	-	5.6	7.3	-	7.3	9.7	-	-	-	-	-	-	-	2.0	-	-	-	
	NF800-HDW	-	-	9.9	13.0	-	11.0	14.4	-	-	-	-	-	-	-	2.4	-	-	-	
FA	NF30-FA, NF30-FAU	-	0.14	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	NF50-FA, NF50-FAU	-	0.16	0.22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
FH	NF50-FHU	-	0.25	0.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	NF100-FHU	-	-	0.51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH	BH-D6, BH-D10	0.15	0.3	0.45	0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	BH-DN	-	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
UL	KB-D	0.09	0.18	0.27	0.36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	NF50-SVFU	-	0.3	0.45	-	-	-	-	-	-	-	-	-	-	-	0.3	0.35	-	-	
	NF100-CVUFU	-	0.6	0.85	-	-	-	-	-	-	-	-	-	-	-	0.4	0.45	-	-	
	NF125-SVU	-	0.7	0.95	-	-	-	-	-	-	-	-	-	-	-	0.4	0.5	-	0.17	
	NF125-HVU	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-	0.4	0.5	-	0.17	
	NF250-CVU/SVU/HVU	-	-	1.7	-	-	-	-	-	-	-	-	-	-	-	0.5	0.55	-	0.17	
	NF100-SRU	-	0.5	0.75	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-	
	NF100-HRU	-	0.55	0.8	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-	
	NF400-SWU/HWU	-	-	5.7	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	1.9	0.45
	NF630-SWU/HWU	-	-	9.6	-	-	-	-	-	-	-	-	-	-	-	2.4	-	-	1.9	0.45

## ELCB

Model	Item	Breaker body									Accessories (weight of only accessories)									
		Front connection type			Rear connection type			Plug-in type (including plug-in frame)			Electric operated type	Boxed type			Operation handle			Mechanical interlock (M)		
		2P	3P	4P	2P	3P	4P	2P	3P	4P		S	I	W	F type	V type	S type			
U.L.C	NV32-SV	-	0.75	-	-	-	0.95	-	-	1.35	-	-	-	1.5	5.0	10.2	0.4	0.45	0.6	0.17
	NV63-CV, NV63-SV (rated current 50A or less)	0.7	0.75	-	-	0.8	0.95	-	-	1.1	1.35	-	-	1.5	5.0	10.2	0.4	0.45	0.6	0.17
	NV63-CV, NV63-SV (rated current 60A, 63A)	0.75	0.8	-	-	0.85	1.0	-	-	1.15	1.4	-	-	1.5	5.0	10.2	0.4	0.45	0.6	0.17
	NV63-HV (rated current 50A or less)	-	0.75	-	-	-	0.95	-	-	-	1.35	-	-	1.5	5.0	10.2	0.4	0.45	0.6	0.17
	NV63-HV (rated current 60A, 63A)	-	0.8	-	-	-	1.0	-	-	-	1.4	-	-	1.5	5.0	10.2	0.4	0.45	0.6	0.17
	NV125-CV	-	1.0	-	-	-	1.5	-	-	-	1.9	-	1.3	1.8	5.1	10.2	0.4	0.45	0.6	0.17
	NV125-SV	-	1.1	1.4	-	-	1.6	2.1	-	-	2.0	2.5	1.3	1.8	5.1	10.2	0.4	0.45	0.6	0.17
	NV125-HV	-	1.1	1.4	-	-	1.6	2.1	-	-	2.0	2.5	1.3	1.8	5.1	10.5	0.4	0.45	0.6	0.17
	NV125-SEV	-	1.9	2.5	-	-	2.4	3.2	-	-	2.8	3.6	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NV125-HEV	-	1.9	2.5	-	-	2.4	3.2	-	-	2.8	3.6	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NV250-CV	-	1.7	-	-	-	2.4	-	-	-	3.6	-	1.3	6.8	8.7	13.5	0.5	0.55	0.6	0.17
	NV250-SV	-	1.9	2.5	-	-	2.6	3.5	-	-	3.8	5.0	1.3	6.8	8.7	13.5				

## 5. Switching the Adjustable Items

### (1) Adjustable rated current and tripping characteristics items

Adjustable item		Rated current	LTD tripping characteristics	STD tripping characteristics	Instantaneous tripping characteristics	PAL	Rated sensitivity	Rated Operating time (for time-delay type)	Rated voltage
Applicable model									
MCCB	NF125-SEV/HEV	○	○ (*2)	○ (*2)	○	○ (*1)			
	NF250-SEV/HEV	○	○ (*2)	○ (*2)	○	○ (*1)			
	NF400-SEW/HEW/REW/UEW								
	NF630-SEW/HEW/REW	○	○	○	○	○			
	NF800-CEW/SEW/HEW/REW/UEW								
	NF1000-SEW, NF1250-SEW, NF1600-SEW								
	NF800-SDW, NF630-SWU/HWU				○				
	NF125-SGV/LGV/HGV NF160-SGV/LGV/HGV NF250-SGV/LGV/HGV	○							
ELCB	NV125-SEV/HEV	○	○ (*2)	○ (*2)	○	○ (*1)	○	○	
	NV250-SEV/HEV	○	○ (*2)	○ (*2)	○	○ (*1)	○	○	
	NV400-SEW/HEW								
	NV630-SEW/HEW	○	○	○	○	○	○	○	
	NV800-SEW/HEW								
	NV32-SV, NV63-CV/SV/HV						○		
	NV100-SRU, NV100-HRU								
	NV125-CV/SV/HV/SVU/HVU NV250-CV/SV/HV/SVU/HVU NV400-CW/SW, NV630-CW						○	○	

Notes \*1 Available only for models with pre-alarm module.

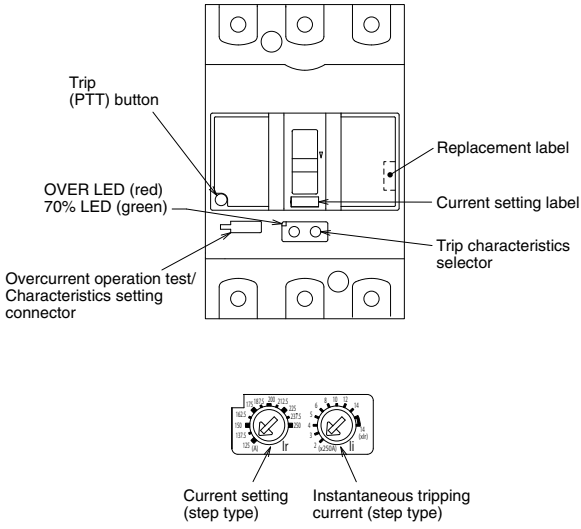
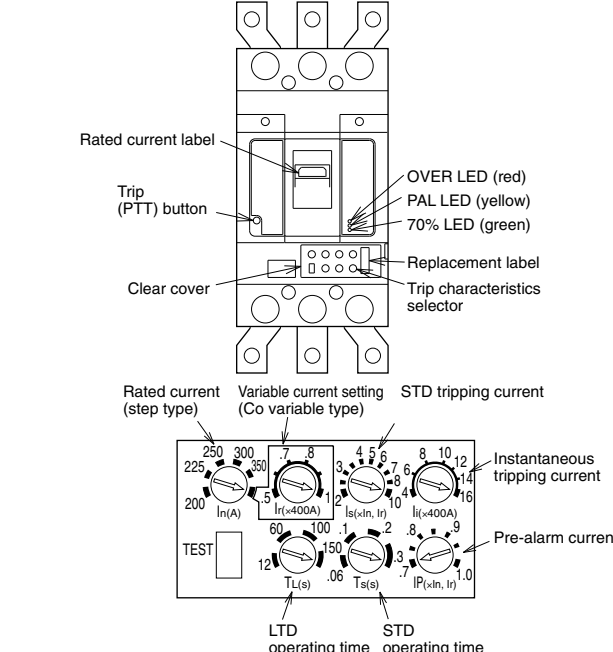

\*2 Use the OPERATION CHECK & SETUP UNIT Y-351. Consult Mitsubishi for details.

Remarks: Unless otherwise specified, the electronic breaker is adjusted to the following settings as a default.

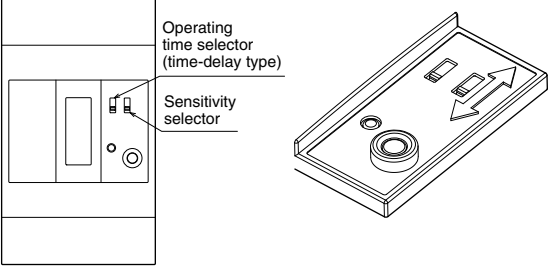
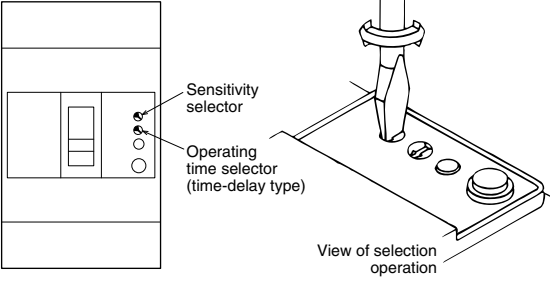
- (1) Rated current: maximum value
- (2) LTD tripping characteristics: maximum value
- (3) STD tripping characteristics (current, operating time): maximum value
- (4) Instantaneous tripping characteristics: maximum value
- (5) PAL: minimum value
- (6) Rated sensitivity current: maximum value
- (7) Leakage operation time (for time-delay type): maximum value



(2) Adjusting the rated current and tripping characteristics

Item	Electronic type	
Application	125 to 250A frame	400 to 1600A frame
Example of selector layout		
Example of making a selection	<p>Turn the handle to OFF before starting the settings.</p> <ol style="list-style-type: none"> <li>Set the arrow of each characteristic's setting dial to the required scale position. Always set the dial arrow within the bold lines of the setting value. If stopped at the middle, the adjacent setting value may be applied. Use a 0.5mm thick flat-tip screwdriver with a 3mm or less tip width. Turn the screwdriver at 0.05N·m or less.</li> <li>From the replacement labels, select the rated current label with the same value as the setting value.</li> <li>Replace the rated current label.</li> <li>Close the cover and tighten the screw.</li> </ol>	<p>Turn the handle to OFF before starting the settings.</p> <ol style="list-style-type: none"> <li>Open the clear cover.</li> <li>Set the arrow of each characteristic's setting dial to the required scale position. For values other than instantaneous tripping current and adjustable current settings, which can be adjusted at any time, always set the dial arrow within the bold lines of the setting value. If stopped at the middle, the adjacent setting value may be applied. Use a 0.6mm thick flat-tip screwdriver with a 4.5mm or less tip width. Turn the screwdriver at 0.05N·m or less.</li> <li>From the replacement labels, select the rated current label with the same value as the setting value.</li> <li>Replace the rated current label.</li> <li>Close the clear cover.</li> </ol>
Setter and tester	<p><b>In case of 125 to 250A frame</b>  <b>(Application: Electronic (effective value detection) breaker)</b>          The following items can be set and tested using the breaker test and setter Y-351.</p> <ul style="list-style-type: none"> <li>• LTD and STD characteristics settings</li> <li>• Long-term operation test (variable signal)</li> <li>• Short-term operation test (fixed signal) *1</li> <li>• Instantaneous operation test (fixed signal)</li> <li>• Pre-alarm operation test (variable signal) *2</li> </ul> <p>*1. Fixed signal which is 1.5 times the STD trip current.          *2. Only for models with pre-alarm module.</p>	<p><b>In case of 400 to 1600A frame</b>  <b>(Application: Electronic (effective value detection) breaker)</b>          The following items can be tested using the tester Y-250.</p> <ul style="list-style-type: none"> <li>• Long-term operation test (variable signal)</li> <li>• Short-term operation test (fixed signal)</li> <li>• Instantaneous operation test (fixed signal)</li> <li>• Pre-alarm operation test (variable signal)</li> </ul>  <p>Y-250</p>

## (3) Selecting the rated voltage, rated sensitivity and operating time

Model	Selector layout	Voltage selection	Sensitivity and operation time selection
ELCB 3-step sensitivity selector type		Use for the circuit voltage within the rated voltage.	Turn the handle to OFF before changing the selection.
		Use for the circuit voltage within the rated voltage.	Turn the handle to OFF before changing the selection.

## 6. Breaker Mounting Screw Dimensions

### ■ MCCB • MCB

Class	Model	Hole depth A	Wood screw (round wood screw) for front connection	Front connection type	Rear connection type	Plug-in type	Required quantity per unit			
							1P	2P	3P	4P
C • S • H	NF50-SVFU	56	–	M4x0.7x65 (note)	–	–	–	2	2	–
	NF32-SV, NF63-CV, NF63-SV, NF63-HV NF125-CV, NF125-SV, NF125-HV NF100-CVFU, NF125-SVU NF125-HVU	45	4.1x58	M4x0.7x55	M4x0.7x55	M4x0.7x55	–	2	2	4
	NF125-SEV, NF125-HEV NF250-CV, NF250-SV, NF250-HV NF250-SEV, NF250-HEV NF250-CVU, NF250-SVU, NF250-HVU NF125-SGV, NF125-LGV, NF125-HGV NF160-SGV, NF160-LGV, NF160-HGV NF250-SGV, NF250-LGV, NF250-HGV	45	4.1x58	M4x0.7x55	M4x0.7x55	M4x0.7x55 M4x0.7x73	–	2 (For plug-in type 4)	2	4
	NF30-CS	10	4.1x25	M4x0.7x20	M4x0.7x20	–	–	2	2	–
	NF400-CW, NF400-SW NF400-SWU, NF400-HWU	47	–	M6x60	M6x72	M6x72	–	4	4	4
	NF400-SEW, NF400-HEW, NF400-REW NF630-CW, NF630-SW, NF630-SEW NF630-HEW, NF630-REW	59	–	M6x72	M6x85	M6x85	–	4	4	4
	NF800-CEW, NF800-SEW NF800-HEW, NF800-REW NF630-SWU, NF630-HWU	15	–	M6x35	M6x40	M6x35	–	4	4	4
	NF1000-SEW, NF1250-SEW	18.5	–	M8x40	M8x40	M8x40	–	4	4	4
	NF1600-SEW	18.5	–	M8x40	M8x40	–	–	4	4	4
	NF125-RGV NF250-RGV	45	–	M4x0.7x55	M4x0.7x55	M4x0.7x55	–	2	2	–
	NF125-UV, NF250-UV NF125-UV (4P), NF250-UV (4P)	45/61 45	–	M4x0.7x55/73 M4x0.7x55	M4x0.7x55/73 M4x0.7x55	M4x0.7x55/73 M4x0.7x55	–	4 2	4 2	– 4
	NF400-UEW (3P) NF400-UEW (4P), NF800-UEW	47/156 15/112	–	M6x65/174 M6x35/132	M6x72/181 M6x40/137	M6x72/181 M6x35/132	–	–	4	– 6
BH	BH-D6	–	–	–	–	–	–	–	–	
	BH-DN	–	–	–	–	–	–	–	–	
	KB-D	–	–	–	–	–	–	–	–	
	BH-D10	–	–	–	–	–	–	–	–	

Remarks: 1. The mounting shown in the  sections are enclosed with the MCCB. The mounting screws for the plug-in connection are enclosed with the plug-in terminal block.

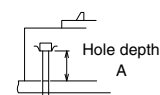
All other mounting screws must be prepared by the user.

2. All mounting screws other than the hexagon socket bolts and hexagon bolts are P-type panhead screws.

3. For models with two types of mounting screws, the screw length differs on the supply side and load side.

4. The plug-in type is not available for NF800-UEW.

Note For the P-type panhead screw, use a type with a spring washer and flat washer (small round) combination, or a P-type panhead screw with spring washer and flat washer.



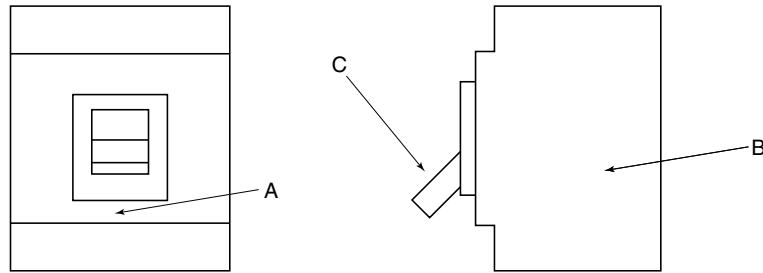
### ■ ELCB • RCCB • RCBO

Class	Model	Hole depth A	Wood screw (round wood screw) for front connection	Screw for steel plates (P-type panhead screw)			Required quantity per unit		
				Front connection type	Rear connection type	Plug-in type	2, 3P	4P	
NV	NV50-SVFU	56	–	M4x0.7x65 (note)	–	–	2	–	
	NV32-SV, NV63-CV, NV63-SV, NV63-HV NV125-CV, NV125-SV, NV125-HV NV100-CVFU, NV125-SVU, NV125-HVU	45	4.1x58	M4x0.7x55	M4x0.7x55	M4x0.7x55	2	4	
	NV125-SEV, NV125-HEV NV250-CV, NV250-SV, NV250-HV NV250-SEV, NV250-HEV, NV250-CVU, NV250-SVU, NV250-HVU	45	4.1x58	M4x0.7x55	M4x0.7x55	M4x0.7x55 M4x0.7x73	2 (For plug-in type 4)	4	
	NV400-CW, NV400-SW	47	–	M6x60	M6x72	M6x72	4	4	
	NV400-SEW, NV400-HEW NV630-CW, NV630-SW, NV630-SEW NV630-HEW	59	–	M6x72	M6x85	M6x85	4	4	
	NV800-SEW, NV800-HEW	15	–	M6x35	M6x40	M6x35	4	4	
	BV	BV-D	–	–	–	–	–	–	–
		BV-DN	–	–	–	–	–	–	–

Remarks: 1. The mounting shown in the  sections are enclosed with the ELCB.

Note For the P-type panhead screw, use a type with a spring washer and flat washer (small round) combination, or a P-type panhead screw with spring washer and flat washer.

## 7. List of Mold Surface Temperature-rise Values



### MCCB

(K)

Model	Conducting current	Measurement point				
		Cover surface (A)	Base side (B)	Handle (C)	Line terminal	Load terminal
NF32-SV	32A	14	38	12	36	37
NF63-CV	63A	15	42	14	39	44
NF63-SV	63A	15	39	12	41	44
NF63-HV	63A	15	42	12	41	49
NF125-CV	125A	13	29	9	43	42
NF125-SV	125A	14	32	10	44	40
NF125-HV	125A	16	33	11	49	42
NF250-CV	250A	19	35	13	46	45
NF250-SV	250A	20	36	13	47	45
NF250-HV	250A	20	36	13	49	46
NF30-CS	30A	18	15	5	23	33
NF125-SGV	125A	20	35	13	42	49
NF250-SGV	250A	20	36	13	49	50
NF160-SGV	160A	20	35	13	40	44

(K)

Model	Conducting current	Measurement point				
		Cover surface (A)	Base side (B)	Handle (C)	Line terminal	Load terminal
NF400-CW	400A	16	25	16	47	37
NF400-SW	400A	20	27	10	46	37
NF400-SEW	400A	14	22	9	35	31
NF400-HEW	400A	14	23	8	34	32
NF400-REW	400A	15	23	9	35	32
NF400-UW	400A	19	28	13	42	33
NF630-CW	630A	23	32	15	52	52
NF630-SW	630A	23	33	16	54	52
NF630-SEW	630A	22	31	14	51	45
NF630-HEW	630A	20	31	13	50	44
NF630-REW	630A	21	31	13	51	44
NF800-CEW	800A	21	30	13	45	40
NF800-SDW	800A	18	28	12	46	44
NF800-SEW	800A	21	30	12	45	41
NF800-HEW	800A	22	31	12	47	42
NF800-REW	800A	21	30	13	46	42
NF800-UW	800A	25	35	16	51	46

### ELCB

(K)

Model	Conducting current	Measurement point				
		Cover surface (A)	Base side (B)	Handle (C)	Line terminal	Load terminal
NV32-SV	32A	15	35	11	36	41
NV63-CV	63A	17	32	13	43	41
NV63-SV	63A	17	37	13	45	47
NV63-HV	63A	17	35	13	43	43
NV125-CV	125A	13	30	13	47	43
NV125-SV	125A	14	30	15	45	43
NV125-HV	125A	14	32	14	42	43
NV250-CV	250A	21	37	14	43	44
NV250-SV	250A	21	39	18	47	43
NV250-HV	250A	23	38	17	48	43

(K)

Model	Conducting current	Measurement point				
		Cover surface (A)	Base side (B)	Handle (C)	Line terminal	Load terminal
NV400-CW	400A	22	32	11	46	41
NV400-SW	400A	23	32	12	47	42
NV400-SEW	400A	16	23	10	36	34
NV400-HEW	400A	15	22	11	35	35
NV630-CW	630A	24	34	17	54	52
NV630-SW	630A	23	33	16	53	53
NV630-SEW	630A	23	34	17	54	53
NV630-HEW	630A	22	33	17	54	52
NV800-SEW	800A	29	40	13	53	46

Notes \*1 The connected wire size follows JIS C 8201 Ann.2 Standards. The temperature rise value will vary according to the size of the connected wire.

\*2 This table shows the temperature-rise values. The ambient temperature must be added for the actual measurement value.

\*3 These are examples of the measurement values, and are not guaranteed values. Use these as reference data.

# 8. Ordering Information

## ● Molded Case Circuit Breakers

Model	NF		C	Economy class
<b>NF250-SV</b>			S	Standard class
			H	High-performance class
			U	Ultra current-limiting class
	DSN		DSN-type switches	

Number of poles	2P, 3P, 4P
<b>3P</b>	

Rated current	Please specify the rated current even for rated current adjustable types
<b>200A</b>	

Motor protection	Please specify MB for Motor Protection Breakers
<b>MB</b>	

Rated voltage	Please specify DC voltage for use in DC circuit

Standard	Please specify applicable marine standard

Connection method	F Front connection
	SL Solderless (box) terminal
<b>B</b>	B Rear connection
	PM Plug-in

Built-in accessories	PAL Pre-alarm (contact output)
<b>PAL</b>	

Internal accessories	AL Alarm switch
	AX Auxiliary switch
<b>AL, SHT (110VAC)</b>	SHT Shunt trip (specify rated coil voltage)
	UVT Undervoltage trip (specify rated coil voltage)
	SLT Lead-wire terminal block

External accessories	MD Electrical operation device
	F/S/V Operating handle
	S//W Enclosure box
	MI Mechanical interlock
	TC Terminal cover (TC-L, TC-S, TTC, BTC)
	LC/HL HL-S Handle lock device
	CH Card holder

Special-purpose breakers	Mag Only Mag Only (specify AC or DC and rated current)
	400VDC DC use (specify 400, 440, 500, 550 or 600VDC)
	400Hz 400Hz use
	Low-inst Low-inst (specify AC or DC and Inst. %)

Quantity	<b>10</b>
----------	-----------

## ● Earth Leakage Circuit Breakers

Model	NV		C	Economy class
<b>NV250-SV</b>			S	Standard class
			H	High-performance class
			U	Ultra current-limiting class

Number of poles	2P	NV	1ø2W
<b>3P</b>	3P	NV	1ø2W 1ø3W 3ø3W
	4P	NV	3ø4W

Rated current	Please specify the rated current even for rated current adjustable types
<b>200A</b>	

Rated voltage	AC
	100-440V
	200-440V

Rated sensitivity current	30mA
<b>100/200/500mA</b>	100/200/500mA

Connection method	F Front connection
	SL Solderless (box) terminal
<b>B</b>	B Rear connection
	PM Plug-in

Type of residual current protection	Blank High-speed type
	Specify Time-delay type

Built-in accessories	MG Insulation switch
	EAL Earth-leakage circuit alarm switch
<b>MG</b>	TBM Test button module
	PAL Pre-alarm module

Internal accessories	AL Alarm switch
	AX Auxiliary switch
<b>AX, SLT, TBM</b>	UVT Undervoltage trip (specify rated coil voltage)
	SLT Lead-wire terminal block

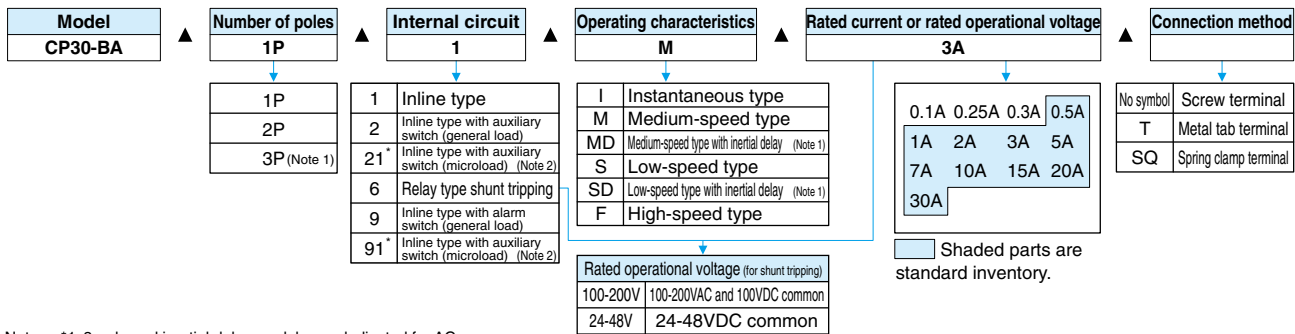
  

External accessories	MD Electrical operation device
	F/S/V Operating handle
	MI Mechanical interlock
	TC Terminal cover (TC-L, TC-S, TTC, BTC)
	LC/HL HL-S Handle lock device
	CH Card holder

Quantity	<b>10</b>
----------	-----------

## ● Circuit Protector (CP30-BA)



Notes \*1 3-pole and inertial delay models are dedicated for AC.

\*2 If an auxiliary switch (AX) or alarm switch (AL) used for a 125VAC 0.5A or less circuit is required, select the microload type indicated with an asterisk\*.

\*3 The relay type shunt trip is subject to CCC. This is a UL (cURus) and CE Marking compliant product.

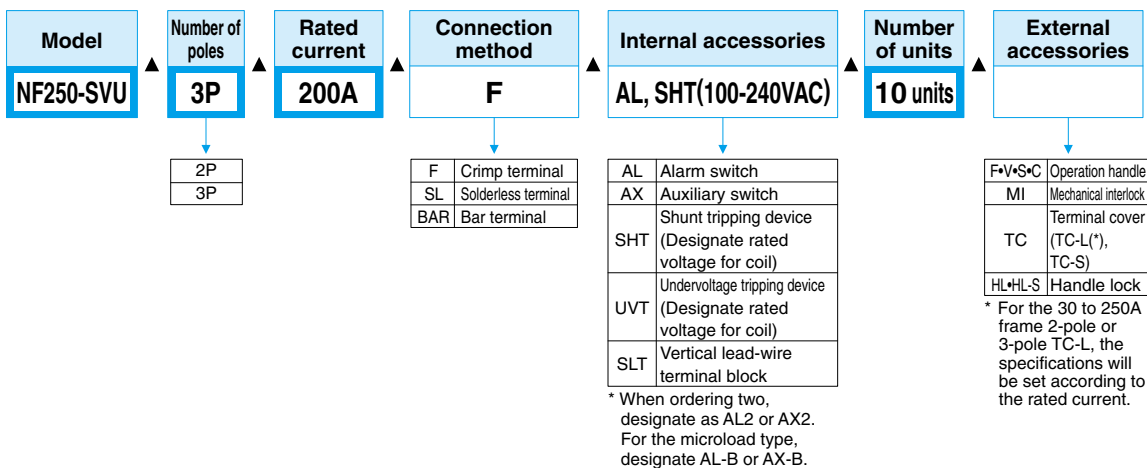
Example 1. CP30-BA 1P 1-M 3A (example of inline type, medium-speed, 1-pole part, 3A, screw terminal specifications)

**As a standard, this product is a UL (cURus), CCC, CE Marking compliant product.**

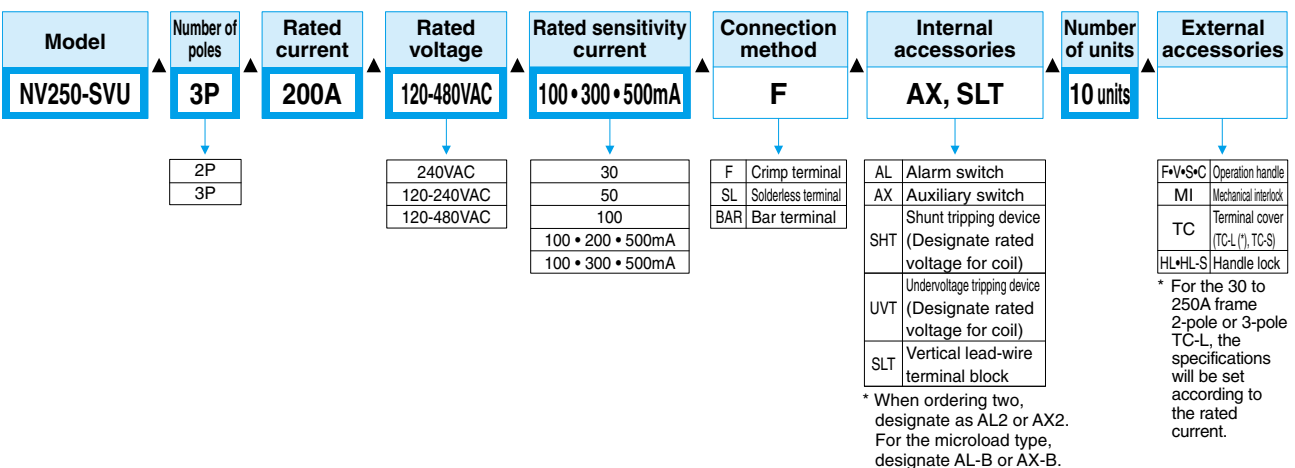
Mandatory items are indicated with a bold box. Always specify these items.

Unless specified, all other items will be manufactured with standard Mitsubishi specifications.

## ● UL 489 Listed Molded Case Circuit Breakers



## ● UL 489 Listed Earth Leakage Circuit Breakers



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## 10. Revision history

Changes in 20A (published in February 2021).

### 1. Outline of circuit breakers

- Added NF/NV250-CVU, NF-HDV/HDVA/HDW and NF/NV-SRU/HRU/FAU/FHU/SMU
- Added product history
- Changed photos of ME96, EMU and MDU breaker
- Deleted BH, BH-P, NF225-CWU, MDU breaker 630AF

### 2. Detailed specification

- Added NF/NV-SRU/HRU/FAU/FHU/SMU and CP30-HU
- Added earth leakage protection characteristic
- Added high-voltage MCCB
- Changed "GL" to "DNV·GL"
- Changed "GB" to "GB/T"
- Changed weight and dimension of AE series
- Changed NF-SEP/HEP with MDU to NF-SEW/HEW with MDU
- Adjusted wording of units
- Deleted BH and BH-P

### 3. Special-purpose breakers

- Added ELCB for special voltage
- Added MCCB and ELCB for special environment

### 4. Selection

- Added NF/NV-SRU/HRU/FAU/FHU/SMU
- Changed "GB" to "GB/T"
- Changed "GL" to "DNV·GL"
- Adjusted wording of units
- Deleted BH, BH-P and AE-SH

### 5. Installation and connection

- Added NF/NV-SRU/HRU/FAU/FHU/SMU
- Adjusted wording of units
- Deleted NF225-CWU, NF-SKW/SLW, BH, BH-P, BH-K and BPA

### 6. Accessories

- Added NF/NV-SRU/HRU/FAU/FHU/SMU
- Adjusted wording of units
- Deleted BH, BH-P, BH-S, BH-PS and NF225-CWU

### 7. Characteristics and dimensions

- Added 4P accessory
- Added DC High-voltage MCCB
- Added NF/NV-SRU/HRU/FAU/FHU/SMU
- Changed "GB" to "GB/T"
- Changed NF-SEP/HEP with MDU to NF-SEW/HEW with MDU
- Adjusted wording of units

### 9. Appendix

- Added DC High-voltage MCCB
- Added NF/NV-SRU/HRU/FAU/FHU/SMU
- Changed Melshort2 to MELSELECT
- Changed Haisei-web to FA Global
- Adjusted wording of units



# 11. MELSELECT™

## Short-circuit current calculation and model selection software

MELSELECT is the software that calculates short circuit current and autoselects suitable products from Mitsubishi Electric ranges for circuit protection.

The image displays the MELSELECT software interface. It includes a 'Project setting' dialog box with fields for project name, country (Australia), and frequency (50 Hz). A central window shows a graph of Time (s) on the y-axis (log scale from 0.01 to 10000) versus Current (A) on the x-axis (log scale from 1 to 100000). Below the graph is a table of settings for various parameters like CT ratio, rated current, and pickup current. To the right, a 'Calculation and Selection report' is shown, featuring the Mitsubishi Electric logo and a 'CAUTION' section. A blue speech bubble contains a thought bubble with mathematical symbols and a circuit breaker icon.

***MELSELECT simplifies the circuit design and improves the work rate!***

### Registered Products

Low-voltage Power Distribution Products: ACBs, MCCBs, ELCBs, MCBs, Contactors, Thermal relays

### Features

- Calculating short circuit current and auto-selecting the suitable combination of installation components from Mitsubishi Electric ranges.
- Outputting a report of calculation and selection results.
- Checking coordination by comparing the characteristics of the selected products.
- Multi-languages available. (Japanese, English, Chinese)
- Widely-used in the world. (57 countries and regions)
- Compatibility with Windows 10.
- IEC based SLD (Single Line Diagram) indication.
- Free software open to public on Mitsubishi Electric FA Global Website and off-line operating.

### System Requirements

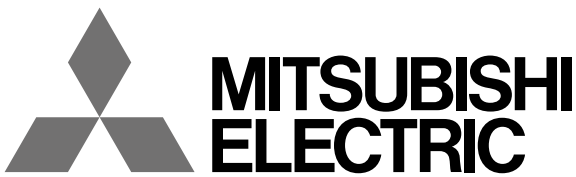
- Operating system (OS): Microsoft Windows 10 (32/64 bit) Pro.
  - Microsoft .NET Framework: Microsoft .NET Framework 4.6.
- \* Microsoft, Windows, .NET Framework and Word are registered trademarks of Microsoft Corporation in the United States and other countries.

### Download Link

<http://www.mitsubishielectric.com/fa/products/lvd/lvcb/smerit/melselect/index.html>

## 12. Low Voltage Products Website

*Changes for the Better*



<https://www.mitsubishielectric.com/fa/>

— Easier to Navigate, More Information Available —

Whether you are looking for information on high-performance power distribution/protection systems and energy-saving support equipment or simply interested in one of our many low-voltage power control products, we've made things easier for you to find. The website is now organized to provide enhanced usability for customers, and the latest information on our low-voltage products and systems. Please be sure to visit, check out our new look, and bookmark the site for future reference.



### Four Key Features

#### 1 Product Information

Based on past customer requests, we've increased the content to include a full product line-up, product specifications and relevant CAD data. The Products pages are divided into two categories:

##### Low-voltage Circuit Breakers

WS-V Series Next-generation MCCB and ELCB, AE-SW Series ACB, DIN Series MCB

##### Energy Measuring Devices

New SS series Multi-measuring instruments, EcoMoniorPlus Energy Measuring Unit

#### 2 Downloads

The latest catalogs, information on certifications acquired, handling and maintenance information, and technical notes can all be downloaded free of charge. We've organized the information for maximum customer convenience, and will be updating the contents periodically.

#### 3 News

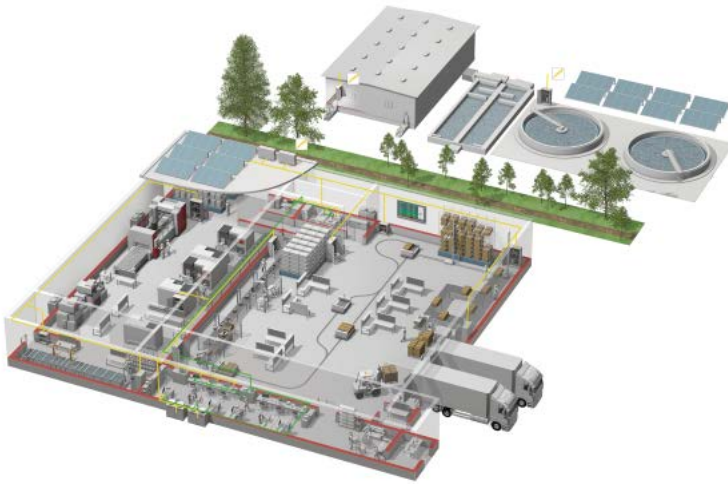
Check here for the latest, up-to-date news on Mitsubishi Electric products such as new product releases and changes in specifications.

#### 4 Support

Our interest is to serve you! Please contact us whenever you have a question or are in need of support. We'll reply at the earliest possible time. Committed to supporting our customers' businesses, we also provide information through Mitsubishi Electric's global network.

**Empowering Industries**

# YOUR SOLUTION PARTNER



Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

## A NAME TO TRUST

Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation is active in space development, transportation, semi-conductors, energy systems, communications and information processing, audio visual equipment and home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

This is why you can rely on Mitsubishi Electric automation solution - because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

As one of the world's leading companies with a global turnover of over 4 trillion Yen (over \$40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.



Low voltage: MCCB, MCB, ACB



Medium voltage: VCB, VCC



Power monitoring, energy management



Compact and Modular Controllers



Inverters, Servos and Motors



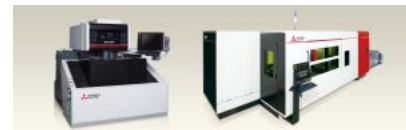
Visualisation: HMIs



Numerical Control (NC)



Industrial / Collaborative Robots



Processing machines: EDM, Lasers, IDS



Transformers, Air conditioning, Photovoltaic systems

\* Not all products are available in all countries.

# Low Voltage Circuit Breakers

## Service Network for Fukuyama Products

Country/Region	Corporation Name	Address	Telephone
Australia	Mitsubishi Electric Australia Pty. Ltd.	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	+61-2-9684-7777
Algeria	Mec Casa	Rue I N 125 Hay-Es-Salem, 02000, W-Chief, Algeria	+213-27798069
Bangladesh	PROGRESSIVE TRADING CORPORATION	HAQUE TOWER,2ND FLOOR,610/11,JUBILEE ROAD, CHITTAGONG, BANGLADESH	+880-31-624307
	ELECTRO MECH AUTOMATIONS ENGINEERING LTD.	SHATABDI CENTER, 12TH FLOOR, SUITES-12-B, 292, INNER CIRCULAR ROAD, FAKIRA POOL, MOTIJIHEEL, DHAKA-1000, BANGLADESH	+88-02-7192826
Belarus	Tehnikon	Oktyabrskaya 19, Off. 705, BY-220030 Minsk, Belarus	+375 (0)17 7 210 46 26
Belgium	Koning & Hartman B.V.	Woluwelaan 31, BE-1800 Vilvoorde, Belgium	+32 (0)2 2570240
Brazil	Mitsubishi Electric do Brasil Comércio e Serviços Ltda.	Avenida Adelino Cardana, 293 21 andar Bethaville, Barueri SP Brasil	+55-11-4689-3000
Cambodia	DHINIMEX CO.,LTD	#245, St. Tep Phan, Phnom Penh, Cambodia	+855-23-997-725
Central America	Automation International LLC	7050 W. Palmetto Park Road Suite #15 PMB #555, Boca Raton, FL 33433	+1-561-232-3200
Chile	Rhona S.A. (Main office)	Vte. Agua Santa 4211 Casilla 30-D (P.O. Box) Vina del Mar, Chile	+56-32-2-320-600
	Mitsubishi Electric Automation (China) Ltd.	Mitsubishi Electric Automation Building, No.1386 Hongqiao Road, Shanghai, China 200336	+86-21-2322-3030
	Mitsubishi Electric Automation (China) Ltd. Beijing	5/F,ONE INDIGO,20 JiuXianQiao Road Chaoyang District,Beijing, China 100016	+86-10-6518-8830
	Mitsubishi Electric Automation (China) Ltd. ShenZhen	Level 8, Galaxy World Tower B, 1 Yabao Road, Longgang District, Shenzhen, China 518129	+86-755-2399-8272
	Mitsubishi Electric Automation (China) Ltd. GuangZhou	Rm.1006, A1 Times E-Park, No.276-282, Hanxi Road East, Zhongcun Street, Panyu Distric, Guangzhou, China 510030	+86-20-8923-6730
	Mitsubishi Electric Automation (China) Ltd. ChengDu	1501-1503,15F, Guang-hua Centre Building-C, No.98 North Guang Hua 3th Rd Chengdu, China 610000	+86-28-8446-8030
	Mitsubishi Electric Automation (Hong Kong) Ltd.	20/F, Cityplaza One, 1111 King's Road, Talook shing, Hong Kong	+852-2510-0555
Colombia	Proelectrico Representaciones S.A.	Carrera 42 N° 75 - 367 Bodega 109, Itagipi, Medellín, Antioquia, Colombia	+57-4-4441284
Czech Republic	AUTOCONT CONTROL SYSTEMS S.R.O	Technologická 374/6, CZ-708 00 Ostrava - Pustkovec	+420 595 691 150
Denmark	BEJER ELECTRONICS A/S	LYKKEGARDSVEJ 17, DK-4000 ROSKILDE, Denmark	+45 (0)46 75 76 66
Egypt	Cairo Electrical Group	9, Rostoun St. Garden City P.O. Box 165-11516 Maglis El-Shaab,Cairo - Egypt	+20-2-27961337
France	Mitsubishi Electric Europe B.V. French Branch	FR-92741 Nanterre Cedex	+33 (0)1 55 68 57 01
Germany	Mitsubishi Electric Europe B.V.	Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	+49 (0) 2102 4860
	KALAMARAKIS - SAPOUNAS S.A.	IONIAS & NEROMILOU STR., CHAMOMILOS ACHARNES, ATHENS, 13678 Greece	+30-2102 406000
Greece	UTECO	5, MAVROGENOUS STR., 18542 PIRAEUS, Greece	+30-211-1206-900
Hungary	Meltrade Ltd.	Fertő utca 14, HU-1107 Budapest, Hungary	+36 (0)1-431-9726
	Mitsubishi Electric India Private Limited	3rd Floor, Tower A, Global Gateway, MG Road, Gurugram - 122002, Haryana, India	+91(124)673 9300
	Mitsubishi Electric India Private Limited Pune Sales Office	ICC-Devi Gaurav Technology Park, Unit no. 402, Fourth Floor, Survey no. 191-192 (P), Opp. Vallabh Nagar Bus Depot, Pune - 411018, Maharashtra, India	+91-20-68192100
	Mitsubishi Electric India Private Limited FA Center	204-209, 2nd Floor, 31FIVE, Corporate Road, Prahladnagar, Ahmedabad 380015,Gujarat, India	+91-79677-77888
	PT.Mitsubishi Electric Indonesia	Gedung Jaya 8th floor, JL.MH. Thamrin No.12 Jakarta Pusat 10340, Indonesia	+62-21-3192-6461
Indonesia	P.T. Sahabat Indonesia	P.O.Box 5045 Kawasan Industri Pergudangan, Jakarta, Indonesia	+62-(0)21-6610651-9
Ireland	Mitsubishi Electric Europe B.V.	Westgate Business Park, Ballymount, IRL-Dublin 24, Ireland	+353 (0)1-4198800
Israel	Gino Industries Ltd.	26, Ophir Street IL-32235 Haifa, Israel	+972 (0)4-867-0656
Italy	Mitsubishi Electric Europe B.V.	Viale Colleoni 7, I-20041 Agrate Brianza (MI), Italy	+39 039-60531
Kazakhstan	Kazpromavtomatika	Ul. Zhambyla 28, KAZ - 100017 Karaganda	+7-712-501000
Korea	Mitsubishi Electric Automation Korea Co., Ltd	9F Gangeo Hangang xi-tower A, 401 Yangcheon-ro, Gangeo-gu, Seoul 07528 Korea	+82-2-3660-9573
Laos	AROUNKIT CORPORATION IMPORT- EXPORT SOLE CO.,LTD	SAPHANMO VILLAGE. SAYSETHA DISTRICT, VIENTIANE CAPITAL, LAOS	+856-20-415899
Lebanon	Comptoir d'Electricite Generale-Liban	Cebaco Center - Block A Autostrade Dora, P.O. Box 11-2597 Beirut - Lebanon	+961-1-240445
Lithuania	Rifas UAB	Tinklu 29A, LT-5300 Panevezys, Lithuania	+370 (0)45-582-728
Malaysia	Mitric Sdn Bhd	No. 5 Jalan Pemberita U1/49, Temasya Industrial Park, Glenmarie 40150 Shah Alam,Selangor, Malaysia	+603-5569-3748
	Flexible Automation System Sdn Bhd	60, Jalan USJ 10/1B,UEP Subang Jaya,47620 Selangor Darul Ehsan,Malaysia	+603-5633-1280
Malta	ALFATRADE LTD	99 PAOLA HILL, PAOLA PLA 1702, Malta	+356 (0)21-697-816
Marocco	SCHIELE MAROC	KM 7,2 NOUVELLE ROUTE DE RABAT AIN SEBAA, 20600 Casablanca, Marocco	+212 661 45 15 96
Myanmar	Peace Myanmar Electric Co.,Ltd.	NO137/139 Botahtaung Pagoda Road, Botahtaung Town Ship 11161, Yangon, Myanmar	+95-(0)1-202589
Nepal	Watt&Volt House	KHA 2-65, Volt House Dillibazar Post Box-2108, Kathmandu, Nepal	+977-1-4411330
Netherlands	Imtech Marine & Offshore B.V.	Sluisjesdijk 155, NL-3087 AG Rotterdam, Netherlands	+31 (0)10-487-19 11
North America	Mitsubishi Electric Automation, Inc.	500 Corporate Woods Parkway, Vernon Hills, IL 60061 USA	+847-478-2100
Norway	Scanelec AS	Leirvikasen 43B, NO-5179 Godvik, Norway	+47 (0)55-506000
Mexico	Mitsubishi Electric Automation, Inc. Mexico Branch	Bldv. Miguel de Cervantes Saavedra 301, Torre Norte Piso 5, Col. Ampliación Granada, Miguel Hidalgo, Ciudad de México, CP 11520, México	+52-55-3067-7511
Middle East Arab Countries & Cyprus	Comptoir d'Electricite Generale-International-S.A.L.	Cebaco Center - Block A Autostrade Dora P.O. Box 11-1314 Beirut - Lebanon	+961-1-240430
Pakistan	Prince Electric Co.	2-P GULBERG II, LAHORE, 54600, PAKISTAN	+92-42-575232, 5753373
Peru	Rhona S.A. (Branch office)	Avenida Argentina 2201, Cercado de Lima	+51-1-464-4459
Philippines	MELCO Factory Automation Philippines Inc.	128, Lopez Rizal St., Brgy. Highway Hills, Mandaluyong City, Metro Manila, Philippines	+63-(0)2-256-8042
	Edison Electric Integrated, Inc.	24th Fl. Galleria Corporate Center, Edsa Cr. Ortigas Ave., Quezon City Metro Manila, Philippines	+63-(0)2-634-8691
Poland	Mitsubishi Electric Europe B.V. Polish Branch	Krakowska 48, 32-083 Balice, Poland	+48 12 347 65 00
Republic of Moldova	Intehsis SRL	bld. Traian 23/1, MD-2060 Kishinev, Moldova	+373 (0)22-66-4242
Romania	Sirius Trading & Services SRL	RO-060841 Bucuresti, Sector 6 Aleea Lacu Morii Nr. 3	+40-(0)21-430-40-06
Russia	Mitsubishi Electric (Russia) LLC	2 bld.1, Letnikovskaya street, Moscow, 115114, Russia	+7 495 721-2070
Saudi Arabia	Center of Electrical Goods	Al-Shuwayer St. Side way of Salahuiddin Al-Ayoubi St. P.O. Box 15955 Riyadh 11454 - Saudi Arabia	+966-1-4770149
Singapore	Mitsubishi Electric Asia Pte. Ltd.	307 Alexandra Road, Mitsubishi Electric Building, Singapore 159943	+65-6473-2308
Slovakia	PROCONT, Presov	Kupelna 1/ SK - 08001 Presov, Slovakia	+421 (0)51 - 7580 611
	SIMAP	Jana Derku 1671, SK - 91101 Trenčin, Slovakia	+421 (0)32 743 04 72
Slovenia	Inea RBT d.o.o.	Stegne 11, SI-1000 Ljubljana, Slovenia	+386 (0)1-513-8116
South Africa	CBI-electric: low voltage	Private Bag 2016, ZA-1600 Isando Gauteng, South Africa	+27-(0)11-9282000
Spain	Mitsubishi Electric Europe B.V. Spanish Branch	Carretera de Rubi 76-80, E-08190 Sant Cugat del Vallés (Barcelona), Spain	+34 (0)93-565-3131
Sweden	Mitsubishi Electric Europe B.V. (Scandinavia)	Hedvig Möllers gata 6, 223 55 Lund, Sweden	+46 (0)8-625-10-00
	Euro Energy Components AB	Järnvägsgatan 36, S-434 24 Kungälv, Sweden	+46 (0)300-690040
Switzerland	TriElec AG	Muehentalstrasse 136, CH-8201 Schaffhausen, Switzerland	+41-(0)52-6258425
Taiwan	Setsuyo Enterprise Co., Ltd	5th Fl., No.105, Wu Kung 3rd, Wu-Ku Hsiang, Taipei, Taiwan, R.O.C.	+886-(0)2-2298-8889
	United Trading & Import Co., Ltd.	77/12 Bamrungruang Road,Klong Mahanak Pomprab Bangkok Thailand	+66-223-4220-3
Thailand	MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO.,LTD	101, True Digital Park Office, 5th Floor, Sukhumvit Road, Bangchak, Phara Khanong, Bangkok, 10260 Thailand	+662-092-8600
Tunisia	MOTRA Electric	3, Résidence Imen, Avenue des Martyrs Mourouj III, 2074 - El Mourouj III Ben Arous, Tunisia	+216-71 474 599
Turkey	Mitsubishi Electric Turkey A.Ş.	Şerifali Mahallesi Kale Sokak No: 41, 34775 Ümraniye, İstanbul, Turkey	+90-216-969-2666
United Kingdom	Mitsubishi Electric Europe B.V.	Travellers Lane, UK-Hatfield, Herts. AL10 8XB, United Kingdom	+44 (0)1707-276100
Uruguay	Fierro Vignoli S.A.	Avda. Uruguay 1274 Montevideo Uruguay	+598-2-902-0808
	Mitsubishi Electric Vietnam Co.,Ltd. Head Office	11th & 12th Floor, Viettel Tower B, 285 Cach Mang Thang 8 Street, Ward 12, District 10, Ho Chi Minh City, Vietnam	+84-28-3910-5945
	Mitsubishi Electric Vietnam Co.,Ltd. Hanoi Branch	24th Floor, Handico Tower, Pham Hung Road, khu do thi moi Me Tri Ha, Nam Tu Liem District, Hanoi City, Vietnam	+84-24-3937-8075

**For Safety :** Please read the instruction manual carefully before using the products in this catalog.  
Wiring and connection must be done by the person have a specialized knowledge of electric construction and wiring.

## MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN