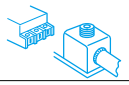
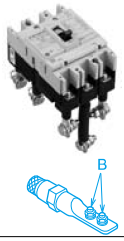
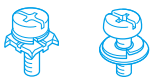
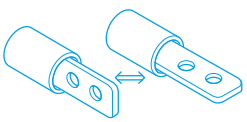
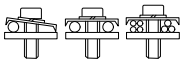
5

Installation and Connection

1. Connection Types

Table 5-1 Connection

Connection type (Code address)			Front connection (F)			Rear (B)		
			Screw terminal (AMP-N)	Busbar terminal (BAR)	Solderless (BOX) terminal (SL)	Bar stud (B-ST)	Round stud (B-ST)	
Image			 Please refer to page 98.					
MCCB	C•S•H•MB	NF30-CS	●	–	–	–	●	
		NF32-SV • NF63-CV • NF63-SV • NF63-HV	●	●	–	–	●	
		NF125-CV • NF125-SV • NF125-HV • NF125-SEV • NF125-SGV • NF125-LGV • NF125-HEV • NF125-HGV	●	●	●	●	–	
		NF160-SGV • NF160-LGV • NF160-HGV • NF250-CV • NF250-SV • NF250-HV • NF250-SEV • NF250-HEV • NF250-SGV • NF250-LGV • NF250-HGV	●	●	●	●	–	
		NF400-SW • NF400-SEW • NF400-HEW • NF400-REW • NF400-CW	–	●	–	●	–	
		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•U	NF125-UV	●	●	●	●	–	
		NF125-RGV • NF250-RGV • NF250-UV	●	●	●	●	–	
		NF400-UEW	–	●	–	●	–	
		NF800-UEW						
	UL	NF50-SVFU	●	●	–	–	–	
		NF100-CVFU	●	●	●	–	–	
		NF125-SVU NF125-HVU	●	●	●	–	–	
		NF250-SVU NF250-HVU	●	●	●	–	–	
		NF225-CWU	●	●	–	–	–	
		NF-SKW • NF-SLW	–	●	●	–	–	
BH		BH-P	●(Only load side)	–	–	–	–	
ELCB	C•S•H	NV32-SV • NV63-CV • NV63-SV • NV63-HV	●	●	–	–	●	
		NV125-CV • NV125-SV • NV125-HV • NV125-SEV • NV125-HEV	●	●	–	●	–	
		NV250-CV/SV/HV • NV250-SEV/HEV	●	●	–	●	–	
		NV400-SW • NV400-SEW • NV400-HEW • NV400-REW • NV400-CW	–	●	–	●	–	
		NV630-SW • NV630-SEW • NV630-HEW • NV630-CW			–			
		NV800-SEW • NV800-HEW				●		

Remarks	Kind of terminal screw (A) (Circuit breakers having frame size of 1000A and more are not provided with terminal screws (A).)							●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.
	Shape	 Pan-head screw with clamp		 Pan-head screw	 Bolt (Hex-socket)		 Bolt	
	Screw size	M5		M8	M8	2×M8	M10	
	Type	NF32-SV 63-CV 63-SV 63-HV 50-SVFU(*1)	BH-P	NV32-SV 63-CV 63-SV 63-HV	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-HEV 250-SGV 250-LGV 250-HGV 250-RGV 250-UV 225-CWU 250-SVU 250-HVU NV 125-SEV 125-HEV 250-CV 250-SV 250-HV 250-SEV 250-HEV	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 400-REW 630-CW 630-SW 630-SEW 630-HEW	
		In case of clamp connection (*1)  ①When the wire size is 5.5 mm² or more, divide the wires, and connect them. ②When connecting wires differing in size, for example, φ1.6 wires and 5.5-mm² 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 1.25-mm² wires, together.							

Note *1 It is impossible to directly connect the wires of 40- and 50-A, NF/NV 50-SVFU.

	Plug-in (PM)		Plug-in type for distribution board
	Bar stud (PM)	Screw terminal (PM)	For distribution board for electric lamps (BPA)
			
	–	–	–
	–	●	–
	–	●	–
	●	–	–
	●	–	–
	● (Except for NF1600-SEW)	–	–
	–	●(Except for 4P)	–
	●(Except for 4P)	–	–
	● (Except for NF800-UEW)	–	–
	–	–	–
	–	–	–
	–	–	–
	–	–	–
	–	–	–
	–	–	–
	–	●	–
	–	●	–
	●	–	–
	●	–	–
	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.		Mounting base for distribution board for electric lamps. For the external dimensions, refer to page 139.

Table 5-2 List of terminal screws (B)

Model		Connection type	Front	Rear	Plug-in
MCCB	C • S • H	NF400-CW • NF400-SW • NF400-SEW • NF400-HEW • NF400-REW • NF630-CW • NF630-SW • NF630-SEW NF630-HEW • NF630-REW • NF800-CEW • NF800-SEW • NF800-HEW • NF800-REW • NF800-SDW • NF-SKW • NF-SLW	M12 bolt		
		NF1000-SEW • NF1250-SEW	M12 bolt		
		NF1600-SEW	M10 bolt		—
	U	NF400-UEW	M12 bolt		
		NF800-UEW	M12 bolt		—
ELCB	1P2C	NV400-SW • NV400-SEW • NV400-HEW • NV400-REW • NV400-CW • NV630-SW • NV630-SEW • NV630-HEW • NV630-CW • NV-SKW	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 MCCB	Applicable models ELCB	Set of order	Stud shape and major included parts	Remarks
ST-05SV2	2	NF32-SV, NF63-CV, NF63-SV NF63-HV	NV32-SV, NV63-CV NV63-SV, NV63-HV	sets	★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					
ST-05SV4	4	NF63-SV, NF63-HV	—			
ST-1SV2	2	NF125-CV, NF125-SV NF125-HV(3, 4P)	—	sets	★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 NV125-HV			
ST-1SV4	4					
ST-1HV2	2	NF125-HV(2P)	—			
ST-2SV2	2	NF125-SEV, NF125-HEV, NF125-RGV	—	sets	★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	NF125-SGV, NF125-LGV, NF125-HGV NF160-SGV, NF160-LGV, NF160-HGV	NV125-SEV, NV125HEV NV250-CV, NV250-SV NV250-HV, NV250-SEV NV250-HEV			
ST-2SV4	4	NF250-SGV, NF250-LGV, NF250-HGV NF250-CV, NF250-SV NF250-LGV/HGV, NF250-HV NF250-SEV, NF250-RGV NF250-HEV, NF125-SGV/HGV NF125-LGV, NF160-SGV NF160-LGV/HGV				
ST-4SW2	2	NF400-CW, NF400-SW NF400-SEW, NF400-HEW NF400-REW	—	sets	★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 NV400-HEW NV400-REW			
ST-4SW4	4					
ST-6SW2	2	NF630-CW, NF630-SW	—			
ST-6SW3	3	NF630-SEW, NF630-HEW	NV630-CW, NV630-SW			
ST-6SW4	4	NF630-REW	NV630-SEW, NV630-HEW			
ST-8SW2	2	NF800-SDW, NF800-CEW NF800-SEW, NF800-HEW NF800-REW	—	sets	★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-8SW3	3		NV800-SEW, NV800-HEW			
ST-8SW4	4					

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

Type name	Number of poles	Applicable models	Set of order	Major included parts
PMDN-05SV2L	2P	NF32-SV NF63-CV/SV/HV (3A-50A)	sets	Plug-in type terminal block (1 pc) Crip terminals (2-pole: 4pcs, 3-pole: 6 pcs, 4-pole: 8 pcs)
PMDN-05SV3L	3P	NF32-SV NF63-CV/SV/HV (3A-50A) NV32-SV NV63-CV/SV/HV (5A-50A)		
PMDN-05SV4L	4P			
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	sets	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	sets	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 NV125-SEV/HEV NV250-CV/SV/HV/SEV/HEV	sets	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			
PMDN-2SV4	4P			
PMDN-2SV2	2P	NF125-RGV, NF250-RGV		
PMDN-2SV3	3P			
PMDN-2UV2	2P	NF250-UV	sets	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-2UV3	3P			
—	4P			
PMDN-4SW2	2P	NF400-CW/SW	sets	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/REW		
PMDN-4SW4	4P	NF400-SW/SEW NV400-SEW		
	4P	NF400-HEW		
PMDN-8SW2	2P	NF800-SDW	sets	Plug-in type terminal block (2 pcs) Tulip terminals (3-pole: 6 pcs)
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

Rear
<Round stud>

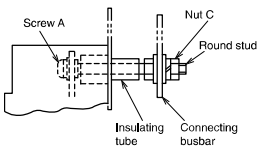


Fig. 1

<Bar stud>

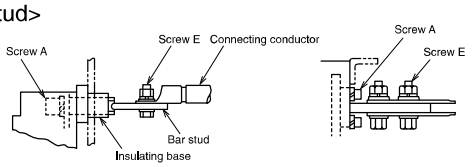


Fig. 2 Fig. 3

Plug-in
<Screw terminal>

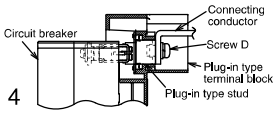


Fig. 4

<Bar stud>

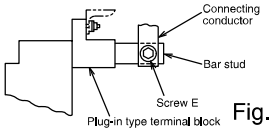


Fig. 5

Table 5-5 Standard tightening torque (*1)

Tightening torque N·m

Model / Connection type		Rear								Plug-in			
		Round stud				Bar stud				Screw terminal		Bar stud	
		Fig.1				Fig. 2, Fig.3				Fig.4		Fig.5	
		Screw A		Nut C		Screw A		Screw E		Screw D		Screw E	
MCCB	ELCB	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque	Size	Tightening torque
NF30-CS	–	M4×0.7	1	M6	2	–	–	–	–	–	–	–	–
NF32-SV, NF63-CV NF63-SV, NF63-HV	NV32-SV, NV63-CV NV63-SV, NV63-HV	M4×0.7	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 NV400-REW	–	–	–	–	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	NV800-SEW NV800-HEW	–	–	–	–	M10	30	2-M12	45	–	–	2-M12	45
NF800-UEW (*2)													
NF1000-SEW NF1250-SEW	–	–	–	–	–	4-M8	12	2-M12	45	–	–	2-M12	45
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

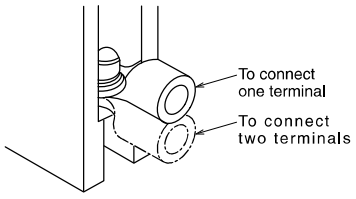
As the terminals in [ ], commercially available crimp terminals can be used. Please purchase the terminals at an electric material store.
For others, the crimp terminals for MCCB must be used. Place an order with us.
For the connection types shown in Fig. a and Fig. b, only crimp terminals will be delivered.

Table 5-6 List of applicable crimp terminals

Frame (A)	Model: MCCB	Model: ELCB	Nominal sectional area mm²	2	5.5	8	14	22
			Allowable current (600 V, IV wire at 30°C, not in conduit) (*4)	27A	49A	61A	88A	115A
			Size of mm²	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 50 100	BH-P	–		R-2-5	R-5.5-5	R-8-5	R-14-5	BH-22 (L330T459-23)
	BH-P100	–				R-8-8	R-14-8	R-22-8
30 32 50 60 63	NF30-CS, NF32-SV, NF63-CV*, NF63-SV* NF63-HV* *50A or below	NV32-SV, NV63-CV*, NV63-SV* NV63-HV* *50A or below		R-2-5 *(R-2-6)	R-5.5-5 *(R-5.5-6)	R-8-5	R-14-5	JST22-S5 BH-22 (L330T459-23)
	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
125	–	–		R-2-5 (R-2-6)	R-5.5-5 (R-5.5-6)	R-8-5	R-14-5	JST22-S5 (L330T459-23)
	NF125-CV, NF125-SV, NF125-HV, NF125-UV 60A or more	NV125-CV, NV125-SV, NV125-HV 60A or more		R-2-8	R-5.5-8	R-8-8	R-14-8	R-22-8
125 225 250	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
400 600 630	NF400-CW, NF400-SW, NF400-SEW NF400-HEW, NF400-REW, NF400-UEW NF630-CW, NF630-SW, NF630-SEW NF630-HEW, NF630-REW	NV400-CW, NV400-SW NV400-SEW, NV400-HEW NV400-REW, NV630-CW NV630-SW, NV630-SEW NV630-HEW						
800 1000 1200 1250	NF800-CEW, NF800-SEW, NF800-HEW NF800-REW, NF800-UEW, NF800-SDW NF1000-SEW, NF1250-SEW	NV800-SEW, NV800-HEW						

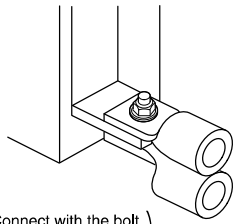
● **Reference drawings of connection types**

Method of connecting directly to terminal(s) of body



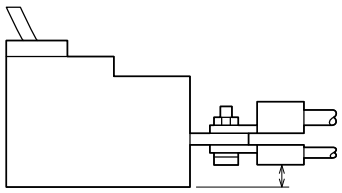
(Fig. a)

Method of connecting to front bar terminal



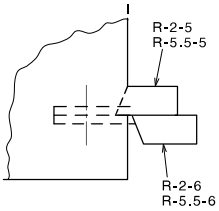
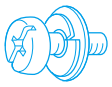
(Connect with the bolt head downward.)

(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.

38	60	100	150	200	325	Crimp terminal tightening screw			Remarks	Reference drawing of connection type
162A	217A	298A	395A	469A	650A	Screw size	Tightening torque N • m	Shape		
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					
						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)
AMP #322870 JST 38-S8 NTK R38-8S	1AF-60 (L330T459-12) CB60-S8					M8	5 to 7			
						M5	2 to 3	 M8		
AMP #322870 JST 38-S8 NTK R38-8S	1AF-60 (L330T459-12) CB60-S8					M8	5 to 7			
						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		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					

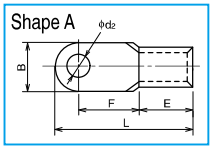
Notes *1 When using 2CR-150 or CB150-S8, insulate it from TC-S with insulating tube or tape. When using CB150-S8 for a 2- or 3-pole circuit breaker, TCL-2SV3L is applicable.
*2 On the power supply side, pan-head screws M5 are used.
*3 When tightening a terminal screw without connecting a wire, crimp 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.

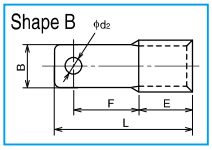
● Dimensions of crimp terminals <extracted from catalog of JST>

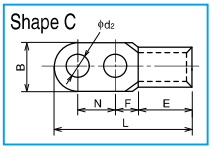
Part number	Shape	Applicable screw size	External dimensions						Applicable wire mm²
			ϕd2	B	L	F	E	Thickness	
R2-5	A	M5	5.3	9.5	16.8	7.3	4.8	0.8	1.04 to 2.63
R2-6		M6	6.4	12.0	21.8	11.0			
R2-8		M8	8.4						
R5.5-5	A	M5	5.3	9.5	19.8	8.3	6.8	1.0	2.63 to 6.64
R5.5-6		M6	6.4	12.0	25.8	13.0			
R5.5-8		M8	8.4	15.0	28.0	13.7			
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				
R8-6		M6	6.4	12.0	23.8				
R8-8		M8	8.4	15.0	29.8	13.8			
8-5SC-9		M5	5.3	9	23.8	9.3	8.5	1.2	6.64 to 10.52
R14-5	A	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				
R14-6		M6	6.4	12.0	29.8				
R14-8		M8	8.4	16.0	32.8	14.5			
L330T459-23	A	M5	5.3	12.0	30.0	12.0	12.0	1.8	16.78 to 26.66
22-5NS		M5	5.3	9.5	28.7				
22-S6		M6	6.4	12.0	30.0				
R22-8		M8	8.4	16.5	33.7	13.5			
R22-12		M12	13.0	22.0	42.5	19.5			
38-S8	A	M8	8.4	15.5	38.0	16.0	14.0	1.8	26.66 to 42.42
R38-8		M8	8.4	22.0	42.7	17.7			
R38-12		M12	13.0						
L330T459-12	A	M8	8.4	16.0	46.7	20.7	18.0	2.0	42.42 to 60.57
R60-8		M8	8.4	22.0	49.7	20.7			
R60-12		M12	13.0						
LN300T920-20	B	M8	8.4	22.5	51.0	20.0	21.0	2.6	96.3 to 117.2
R100-12	A	M12	13.0	28.5	55.6	20.4			

Part number	Shape	Applicable screw size	External dimensions						Applicable wire mm²
			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			
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	A	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	42.42 to 60.57
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 mm²
			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			14.0	50.5	123.8	23.0	35.5		4.5	242.27 to 325
SD150-12	C	M12	14.0	36.0	107.0	29.0	28.0	32	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

Shape A 

Shape B 

Shape C 

5. Busbar

The size of the conductor 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.

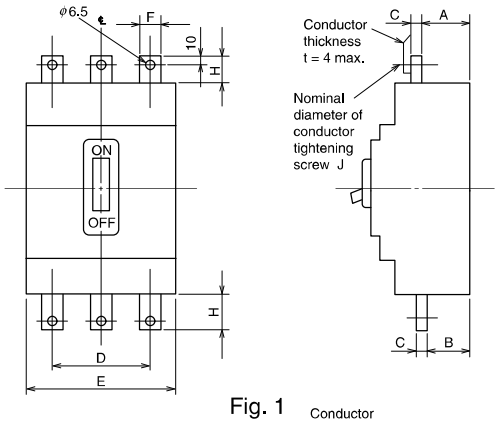


Fig. 1

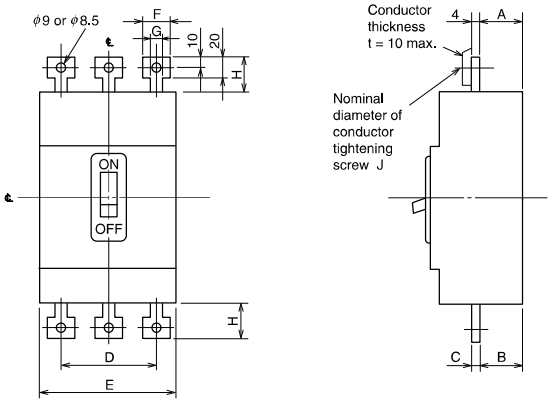


Fig. 2

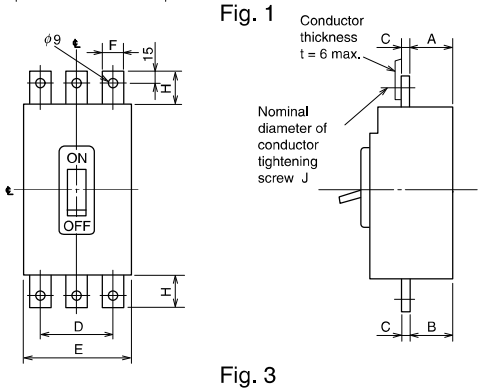
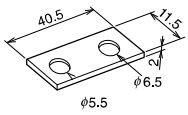
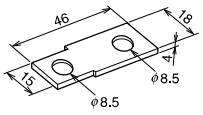
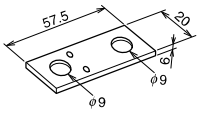


Fig. 3

Table 5-7 Table of variable dimensions

Type name	Applicable models		Outline and dimentions	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 bear, 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 10 mm.
◇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 50 mm in between.
◇A circuit breaker of 400-ampere frame or larger with an SHT or a UVT could operate falsely if a current of 50 kA or higher flows through the adjacent circuit breaker.
Be sure to secure a distance of at least 50 mm in between.

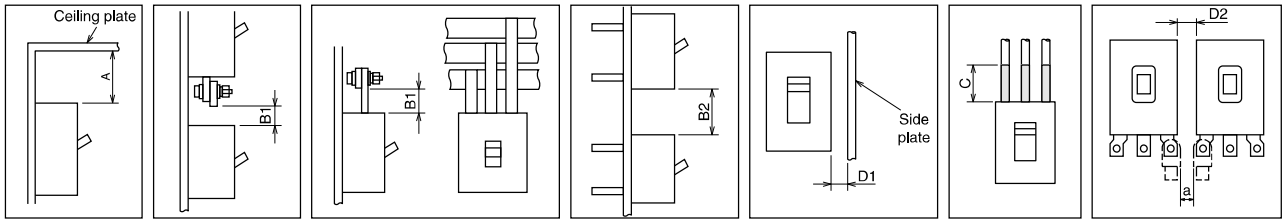


Table 5-8 Insulation distance (mm) (440VAC or below) *Figures in parentheses are for 230VAC or below.

Class • Series	Model		Ceiling plate			Vertical spacing		C	Horizontal spacing
			A			B1, B2			
	MCCB	ELCB	Uncovered metal Plate		Insulated plate, coated plate	Without terminal cover	With terminal cover		D1
			Without terminal cover	With terminal cover					
C • S • H • R • MB	NF30-CS	–	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 NF125-SGV, NF160-SGV, NF250-SGV	NV125-SEV, NV250-SV, NV250-SEV	70(40)	40	40	70(50)	50	70(50)	50
	NF125-HEV, NF250-HV, NF250-HEV NF125-LGV, NF160-LGV, NF250-LGV NF125-HGV, NF160-HGV, NF250-HGV	NV125-HEV, NV250-HV, NV250-HEV	80	60	60	80	80	80	60
	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, NV400-REW	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 NF1600-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
BH	BH-K, BH-K100	–	(*1)		(*1)	(*1)		(*1)	20
UL	NF225-CWU	–	(40)	–	(40)	(50)	–	(50)	(50)
	NF50-SVFU	–	10 (*6)	10 (*6)	10 (*6)	20 (*7)	20 (*7)	30	10
	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

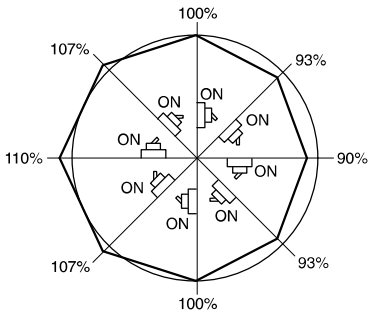
Remark: 1. The table shows the dimensions in the case of the use of a large terminal cover (TC-L).
Notes *1 It is not necessary to provide an insulation distance (an arc space) on the power supply side. However, if a grounding metal piece or the like comes in close contact with the terminal, be sure to completely insulate the terminals or the bare-live parts of the cable conductors.
*2 At more than 440 V AC, the distance shall be 10 mm.
*3 For 480Y/277V AC.
*4 For 480V AC.
*5 For 600Y/347V AC.
*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-RGB 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.)

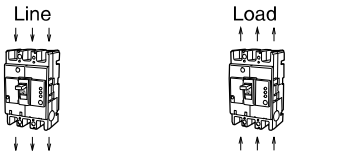
MCCB	
Class	Model
C	NF30-CS



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) Reserve connection

Connection methods

NF-C, NF-S, NF-H, NF-R and NF-U class BH-P, 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.