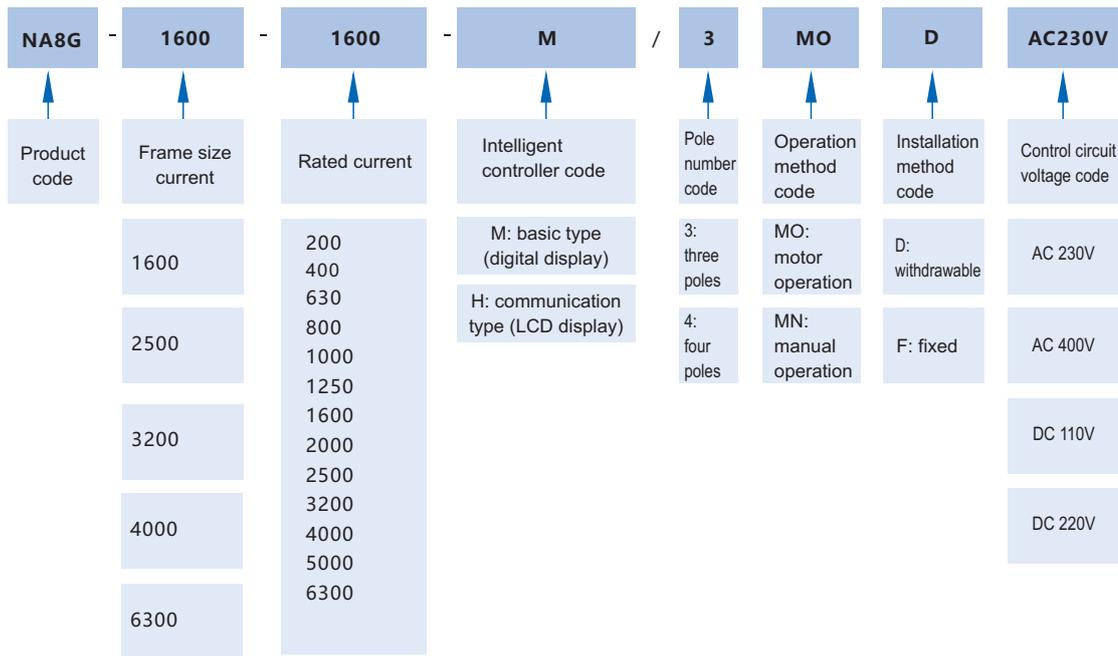


### 1. User Purpose and Range of Application

The NA8G series air circuit breaker ( "circuit breaker" in short), with rated current from 200A to 6300A and rated operating voltage of 415V, 690V AC, is suitable for operation under 50Hz/60Hz AC and is mainly used in distribution network for power distribution, and to protect power line and power equipment from various faults such as overload, short circuit, undervoltage and single-phase ground. The circuit breaker is a combination of aesthetic appearance, high breaking capacity, zero flashover and multiple intelligent protection features . It can provide selective protection with accurate operations, to avoid unnecessary black out and guarantee reliable power supply.

The circuit breaker is widely applied in power plants, factories, mines and modern high rises, especially in power distribution system of intelligent buildings. It is also widely used in green projects such as wind power generation or solar power generation.

### 2. Type Key and Definitions



Notes: 1. Manual operation: not containing any motor operation mechanism, closing electromagnet and shunt release. Motor operation: including all standard accessories for remote operation.

2. Code example: NA8G-1600-1600M/3 MO D AC230V: frame size 1600, rated current 1600A, M type intelligent controller, 3 poles, motor operation, withdrawable type, control voltage AC230V.

### 3. Conditions for Normal Use, Installation, Transportation and Storage

3.1 Ambient air temperature from -5°C~+40°C, with average temperature within 24h not exceeding +35°C.

Note: user shall consult with manufacturer for applications under temperature over +40°C or below -5°C.

3.2 The product shall not be installed at an altitude higher than 2000m.

3.3 Relative humidity shall not exceed 50% when ambient air temperature is at +40°C; higher relative humidity is allowed under lower temperature; if the average minimum relative humidity is 90% in wettest month, and the average minimum temperature in that month is +25°C, condensation due to temperature changes shall be taken into consideration.

3.4 The pollution grade is 3.

**3.5** The installation category of the main circuit of the circuit breaker is IV. When the rated operating voltage of the main circuit is less than or equal to AC400V, the auxiliary circuit installation category is the same as that of the circuit breaker except that the primary coil of the power transformer of the undervoltage release and the intelligent controller are the same as the circuit breaker. III; when the rated working voltage of the main circuit is greater than AC400V and less than or equal to AC690V, the control circuit and auxiliary circuit need to be isolated from the main circuit by an isolation transformer with a capacity of  $\geq 2kA$ , and the maximum working voltage of the control circuit and auxiliary circuit is AC400V The installation categories of auxiliary circuits are all III.

**3.6** Circuit breaker should be installed in set or separately indoor according to this instruction, with vertical inclination not bigger than 5°.

**3.7** Protection level: IP20 on the front and IP00 on the other.

## 4. Key Technical Parameters and Performance

**Table 1** Key technical parameters

Frame size	NA8G-1600	NA8G-2500	NA8G-3200	NA8G-4000	NA8G-6300	
Rated current $I_n$ (A)	200,400,630,800,1000,1250,1600	630,800,1000,1250,1600,2000,2500	1600,2000,2500,2900,3200	1600,2000,2500,2900,3200,4000	4000,5000	6300
Rated current of N-pole $I_n$ (A)	100% $I_n$	100% $I_n$	100% $I_n$	100% $I_n$	50% $I_n$	/
Number of poles	3P,4P	3P,4P	3P,4P	3P,4P	3P,4P	3P
Utilization category	B	B	B	B	B	
Rated insulation voltage $U_i$ (V)	690	1000	1000	1000	1000	
Rated impulse withstand voltage $U_{imp}$ (kV)	8	12	12	12	12	
Rated frequency (Hz)	50/60	50	50/60	50/60	50/60	
Rated operational voltage $U_e$ (V)	415 690	415 690	415 690	415 690	415	
Rated ultimate short-circuit breaking capacity $I_{cu}$ (kA rms) VAC	50 25	80 50	100 65	100 65	120	
Rated service short-circuit breaking capacity $I_{cs}$ (kA rms) VAC	40 20	55 40	80 65	100 65	100	
Rated short-time withstand current $I_{cw}$ 1s (kA rms) VAC	40 20	55 40	80 65	85 65	100	
Rated short-circuit making capacity $I_{cm}$ (kA peak) VAC	105 52.5	176 105	220 143	220 143	264	
Breaking time (ms)	20 ~ 30	20 ~ 30	20 ~ 35	20 ~ 35	20 ~ 35	
Closing time (ms)	30 ~ 40	30 ~ 40	30 ~ 40	30 ~ 40	30 ~ 45	
Frequency of operation (times/hour)	20	20	10	10	10	
Life C.O cycle	Mechanical life	15000	10000	10000	10000	5000
	Electrical (AC400V)	5000	5000	4000	5000	1000
	life (AC690V)	3000	3000	2000	3000	500
Flashover distance (mm)	0	0	0	0		
Wire incoming pattern	For upper or lower port	For upper or lower port	For upper or lower port	For upper or lower port	For upper or lower port	
Weight(3P/4P)	Fixed (kg)	22/26.5	46/55	52.5/66.5	52.5/66.5	-
	Withdrawerable(kg)	42.5/55	80/91.5	98/121	98/121	210/233
Dimension(3P/4P) H×W×D	Fixed	320×(254/324)×248	400×(370/465)×290	402×(430/545)×290	402×(430/545)×290	-
	Withdrawerable	351×(282/352)×297	431×(375/470)×391	431×(435/550)×391	431×(435/550)×391	431×(813/930)×391

Notes: It is only withdrawer type for NA8G-6300 and no fixed type ; it is only 3P type for NA8G-6300( $I_n=6300A$ ) and no 4P type.

## 5. Structural Features

### 5.1 NA8G-1600 withdrawable circuit breaker structure

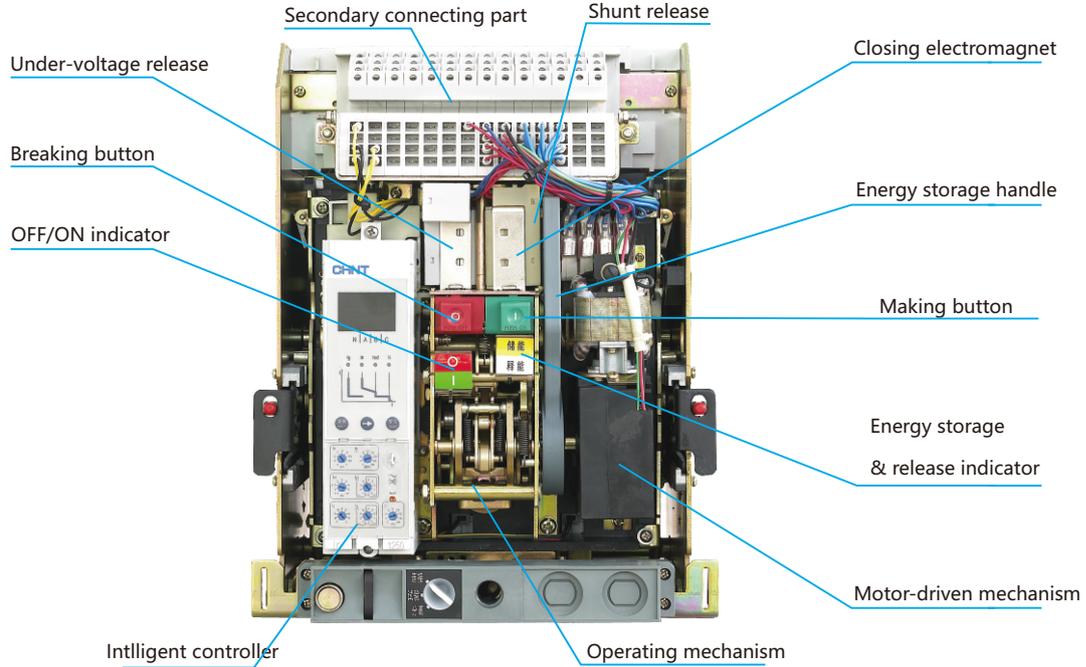


Figure 5.1-1 NA8G-1600 withdrawable circuit breaker structure

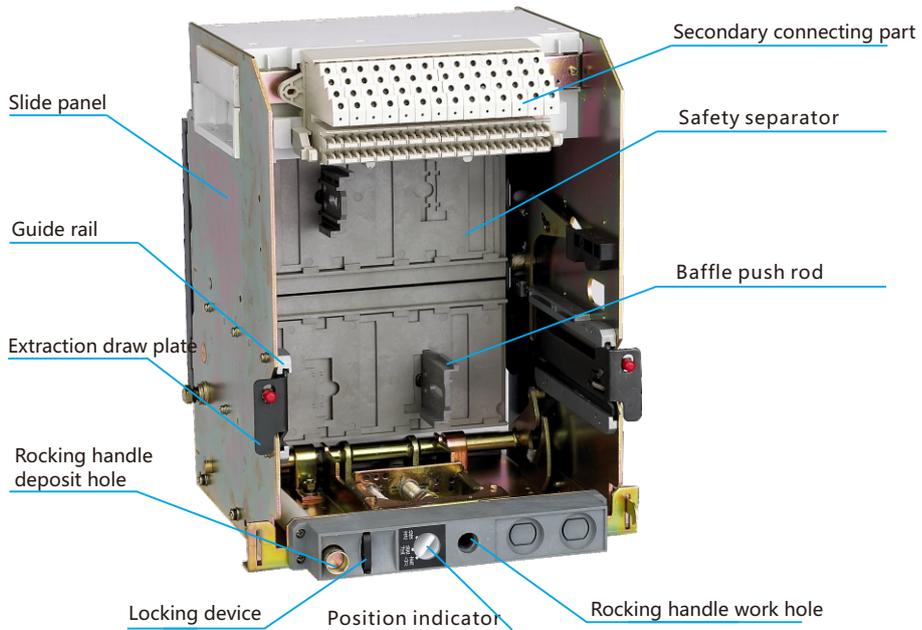


Figure 5.1-1 NA8G-1600 withdrawer structure

5.2 NA8G-3200 withdrawable circuit breaker structure

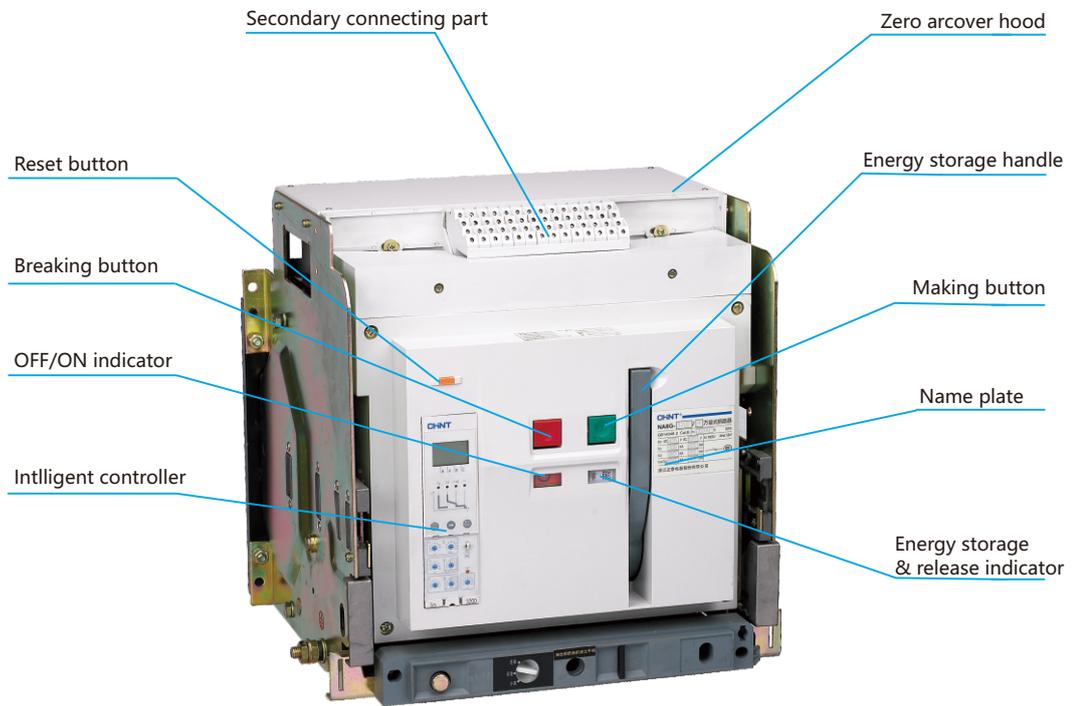


Figure 5.2-1 NA8G-3200 withdrawable circuit breaker structure

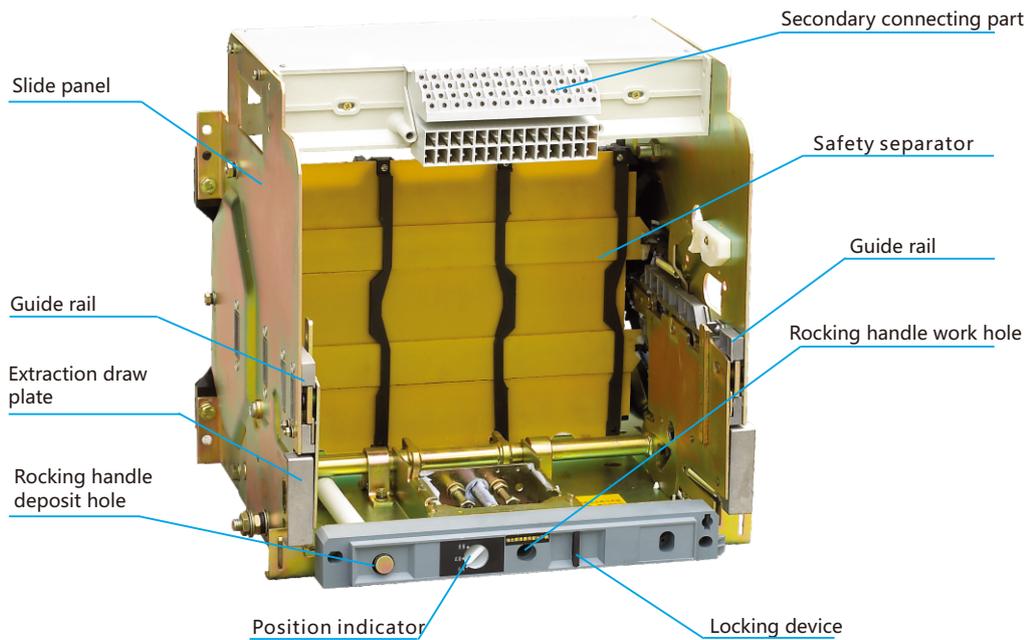


Figure 5.2-2 NA8G-3200 withdrawer structure

### 5.3 The states of air circuit breaker

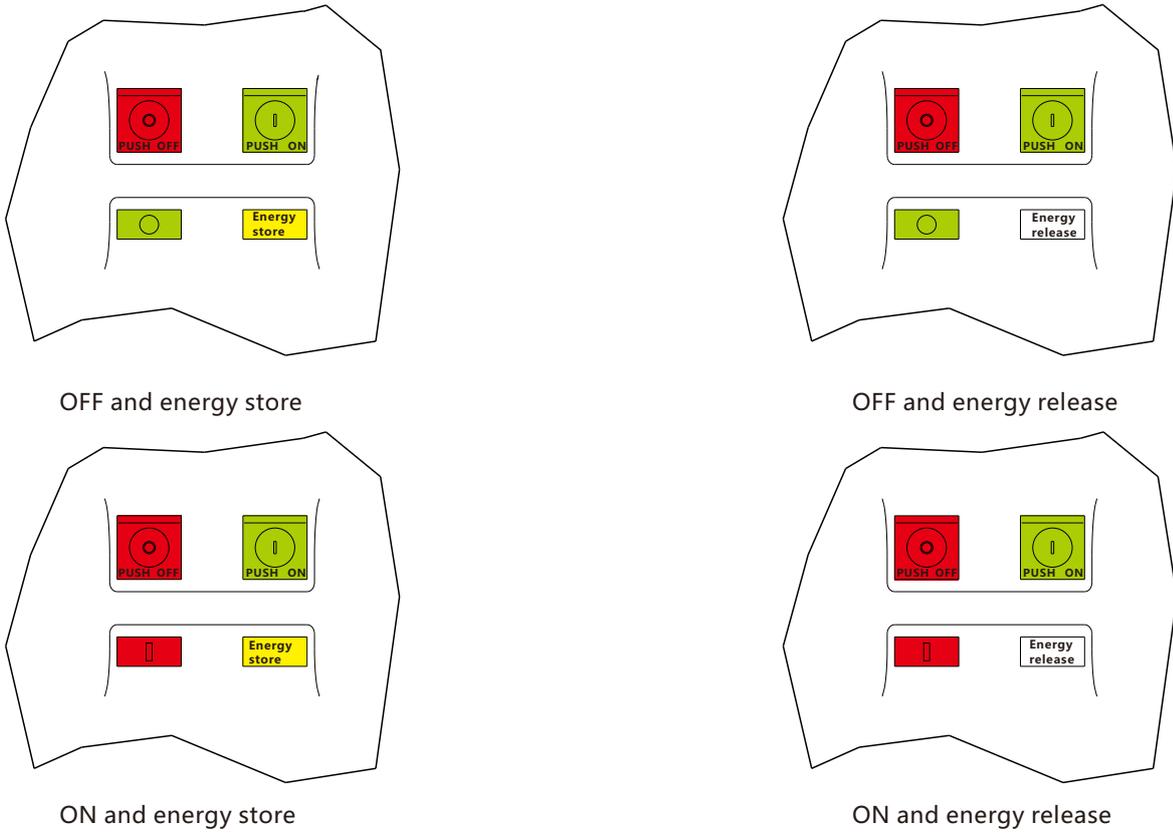
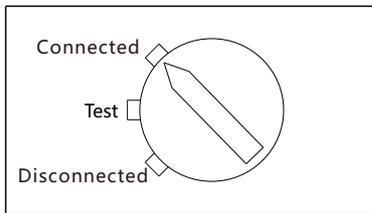
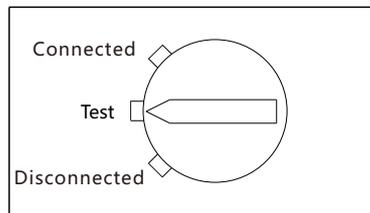


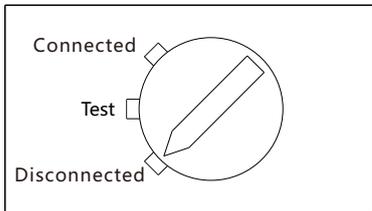
Figure 5.3-1 Four status of air circuit breaker



"Connected" position main circuit and secondary circuit are both connected



"Test" position, main circuit disconnected and isolated with safety barrier, only secondary circuit is connected



"Disconnected" position, main circuit and secondary circuit are both disconnected

Figure 5.3-2 Position of withdrawable circuitbreaker

## 6. Installation Requirements

### 6.1 Pre-installation check

6.1.1 Check with your order to see whether it is consistent with the parameters on the nameplate of the circuit breaker,

check for the following items:

- a. Circuit breaker type, rated current, rated operating voltage;
- b. Installation method, operating method;
- c. Intelligent controller voltage, shunt release voltage, closing electromagnet voltage, energy storage motor voltage, undervoltage release voltage and delay time;
- d. Other special ordering requirements;

6.1.2 Check the packing contents according to the configuration described in this manual;

6.1.3 Before installing, operating, maintaining and repairing the product, read this manual carefully to avoid artificial damage to the circuit breaker and cause unnecessary problems.

**6.2 Preparation before installation**

6.2.1 Unpack according to the order described on the bottom of the package, do not use brutal force;

6.2.2 Remove the circuit breaker from the base plate of the package. If the circuit breaker is of withdrawable type, you can find fixing bolts inside the drawer seat, rotate the body out and clean up the drawer seat;

6.2.3 Use 500V megameter to test the insulation resistance of the circuit breaker. It shall not be lower than 20 megohm under ambient temperature of 25°C±5°C and relative humidity of 50-70%. Position for testing insulation resistance: between phases and between phase and frame when the circuit breaker is closed; between inlet and outlet cable of each phase when the circuit breaker is open.

**6.3 Recommended busbar, power consumption and derated application of circuit breaker**

6.3.1 Recommendation busbar

Maximum allowable temperature of busbar: 100°C. Busbar is made of bare copper, with width and thickness in mm.

**Table 2 Recommended busbar for circuit breaker**

Frame size current	Rated current (A)	Ambient temperature (-5 ~40) °C				Ambient temperature 50°C				Ambient temperature 60 °C			
		Recommended busbar specifications				Recommended busbar specifications				Recommended busbar specifications			
		Width	Thickness	Pieces	Specification	Width	Thickness	Pieces	Specification	Width	Thickness	Pieces	Specification
1600A	200	30	5	1	30*5*1	30	5	1	30*5*1	40	5	1	40*5*1
	400	30	5	2	30*5*2	30	5	2	30*5*2	30	10	1	30*10*1
	630	40	5	2	40*5*2	40	5	2	40*5*2	50	5	2	50*5*2
	800	50	5	2	50*5*2	50	5	2	50*5*2	50	6	2	50*6*2
	1000	50	5	3	50*5*3	50	5	3	50*5*3	50	6	3	50*6*3
	1250	60	8	2	60*8*2	60	8	2	60*8*2	60	10	2	60*10*2
	1600	60	10	2	60*10*2	60	10	2	60*10*2	60	10	3	60*10*3
2500A	630	40	5	2	40*5*2	50	5	2	50*5*2	50	5	2	50*5*2
	800	50	5	2	50*5*2	50	5	2	50*5*2	60	5	2	60*5*2
	1000	50	5	3	50*5*3	50	5	3	50*5*3	60	5	3	60*5*3
	1250	60	8	2	60*8*2	60	8	2	60*8*2	60	8	3	60*8*3
	1600	60	10	2	60*10*2	60	10	2	60*10*2	60	10	3	60*10*3
	2000	100	5	3	100*5*3	100	5	3	100*5*3	100	5	4	100*5*4
	2500	100	10	2	100*10*2	100	10	2	100*10*2	80	10	3	80*10*3
3200A	1600	100	6	2	100*6*2	100	6	2	100*6*2	100	8	2	100*8*2
	2000	100	6	3	100*6*3	100	6	3	100*6*3	100	10	2	100*10*2
	2500	100	10	2	100*10*2	100	10	2	100*10*2	100	10	2	100*10*2
	2900	100	10	3	100*10*3	100	10	3	100*10*3	100	10	4	100*10*4
	3200	100	10	4	100*10*4	100	10	4	100*10*4	100	10	5	100*10*5
4000A	1600	80	8	2	80*8*2	80	8	2	80*8*2	80	10	3	80*10*3
	2000	80	8	3	80*8*3	80	8	3	80*8*3	80	10	3	80*10*3
	2500	80	6	4	80*6*4	80	6	4	80*6*4	80	8	4	80*8*4
	2900	80	6	4	80*6*4	80	6	4	80*6*4	80	8	4	80*8*4
	3200	100	10	4	100*10*4	100	10	4	100*10*4	100	10	4	100*10*4
	4000	100	10	5	100*10*5	100	10	5	100*10*5	120	10	5	120*10*5
6300A	4000	100	10	5	100*10*5	100	10	5	100*10*5	100	10	6	100*10*5
	5000	100	10	7	100*10*7	100	10	7	100*10*7	120	10	7	120*10*7
	6300	120	10	7	120*10*7	120	10	7	120*10*7	120	10	8	120*10*8

Notes: a. If the busbar selected by user does not match with the terminals of circuit breaker, an extended busbar is needed for adaption. The extended busbar should be provided by user itself, with cross section area not smaller than the requirement in the table above. The clearance of extended busbar should not be smaller than that of circuit breaker terminals.

b. After installing the busbar according to the table above, make sure the electric clearance between each phase is not less than 18mm.

c. If silicon controlled electrical elements (such as high frequency induction heating furnace (medium frequency furnace for steelmaking), solid state high frequency welder (such as submerged arc welder), vacuum heating melting equipment (such as single crystal silicon growth furnace)) are used for three-phase rectification and high-frequency inversion in loading equipment, impact from ambient temperature and altitude as well as higher harmonic generated by silicon controlled electrical elements should all be considered when selecting circuit breaker. In such cases, the circuit breaker must be derated, the recommend derating factor is 0.5-0.8.

d. After the busbar is installed, the electrical clearance between the upper and lower fixing bolts of the busbar should not be smaller than 20mm.

e. After the circuit breaker is installed, the safety clearance between live parts of different electrical potentials and the safety clearance between live parts and earth should not be smaller than 18mm.

6.3.2 Power consumption

Power consumption is measured under In, 50/60Hz for each pole.

Table 3 Power consumption of circuit breaker

Frame size	Rated current (A)	Power consumption of withdrawable type (W)	Power consumption of fixed type (W)
1600A	200	115	45
	400	140	80
	630	161	100
	800	215	110
	1000	230	120
	1250	250	130
2500A	1600	460	220
	630	58.6	26.4
	800	73.7	36.6
	1000	172	78
	1250	268	122
	1600	440	200
3200A	2000	530	262
	2500	600	312
	1600	390	170
	2000	470	250
	2500	550	280
4000A	2900	550	280
	3200	670	420
	1600	470	250
	2000	470	250
	2500	550	280
6300A	2900	550	280
	3200	670	420
	4000	1047	656
	4000	550	-
	5000	590	-
	6300	950	-

6.3.3 Circuit breaker derating

a) Circuit breaker derating under different temperature

**Table 4 Temperature derating table for NA8G-1600**

Ambient temperature	200A		400A		630A		800A		1000A		1250A		1600A	
Connection method	Horizontal	Vertical												
40°	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45°	-	-	-	-	-	-	-	-	-	-	-	-	1550	-
50°	-	-	-	-	-	-	-	-	-	-	-	-	1500	1550
55°	-	-	-	-	-	-	-	-	950	950	1150	1200	1450	1500
60°	-	-	-	-	550	580	700	700	900	900	1050	1100	1350	1450

**Table 5 Temperature derating table for NA8G-2500**

Ambient temperature	630A		800A		1000A		1250A		1600A		2000A		2500A	
Connection method	Horizontal	Vertical												
40°	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45°	-	-	-	-	-	-	-	-	-	-	1900	-	2400	2400
50°	-	-	-	-	-	-	-	-	1500	1550	1850	1900	2300	2300
55°	-	-	-	-	-	-	-	-	1400	1450	1800	1800	2200	2200
60°	-	-	-	-	-	-	-	-	1300	1350	1700	1700	2100	2100

**Table 6 Temperature derating table for NA8G-3200**

Ambient temperature	1600A		2000A		2500A		2900A		3200A	
Connection method	Horizontal	Vertical								
40°	-	-	-	-	-	-	-	-	-	-
45°	-	-	-	-	-	-	-	-	-	-
50°	-	-	-	-	-	-	-	-	3100	-
55°	-	-	-	-	2450	-	2800	-	3000	3050
60°	-	-	-	-	2350	2400	2700	2800	2900	2900

**Table 7 Temperature derating table for NA8G-4000**

Ambient temperature	1600A		2000A		2500A		2900A		3200A		4000A	
Connection method	Horizontal	Vertical										
40°	-	-	-	-	-	-	-	-	-	-	-	-
45°	-	-	-	-	-	-	-	-	-	-	3800	3850
50°	-	-	-	-	-	-	-	-	3100	-	3600	3650
55°	-	-	-	-	2450	-	2800	-	3000	3050	3400	3450
60°	-	-	1900	1950	2350	2400	2700	2800	2900	2950	3200	3250

**Table 8 Temperature derating table for NA8G-6300**

Ambient temperature	4000A		5000A		6300A	
Connection method	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
40°	-	/	-	/	-	/
45°	-	/	-	/	6100	/
50°	-	/	4700	/	6000	/
55°	3900	/	4600	/	5500	/
60°	3800	/	4400	/	5200	/

Note: "-" means no derating; "/" means no vertical connection.

b) Circuit breaker derating under different altitudes

**Table 9 Voltage correction table under different altitudes**

Altitude (m)		2000	3000	4000	5000
Rate impulse withstand voltage (kV)	Uimp	12	10	8.5	7.5
Insulation class (V)	Ui	1000	800	700	600
Power frequency withstand voltage (V)		2200	1955	1760	1600
Maximum operating voltage (V)	Ue	690	580	500	400

**Table 10 Current correction table under different altitudes**

Altitude (m)	Rated operating current (Ie)
2000	1.0Ie
2500	0.93Ie
3000	0.88Ie
3500	0.83Ie
4000	0.78Ie
4500	0.73Ie
5000	Must confirm with manufacturer

Note: If ambient temperature is lower than 40°C, Ie=In; if ambient temperature is higher than 40°C, Ie≠In, Ie and In should be referred to according to temperature derating table.

**6.4 Circuit breaker installation**

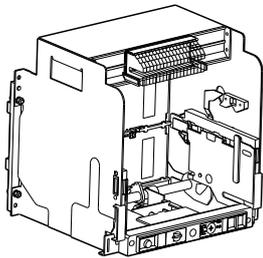
a. Fixed type circuit breaker installation Place the circuit breaker in the cabinet, use 4 M6 (Inm=1600A) or M10 (Inm=2500A and above) bolts and washers to fix the circuit breaker.

The circuit breaker should be secured properly, without additional mechanical force, to avoid damage of circuit breaker or poor contact of main bus.

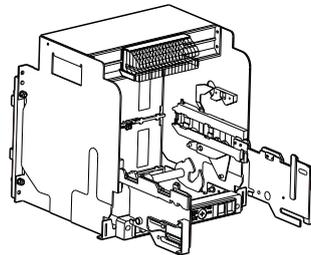
b. Withdrawable type circuit breaker installation

Draw the circuit breaker body out of the drawer seat, install the drawer seat in the cabinet, use 4 M6 (Inm=1600A) or M10 (Inm=2500A and above) bolts and washers to fix the circuit breaker.

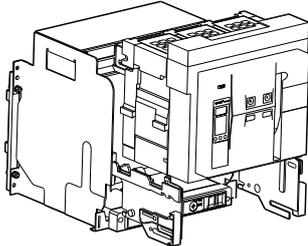
The circuit breaker should be secured properly, without additional mechanical force, to avoid damage of circuit breaker or poor contact of main bus and secondary circuit. Then, install the body back into the drawer seat.



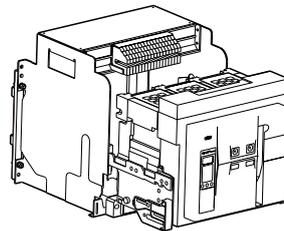
(1) Withdrawer socket placed horizontally



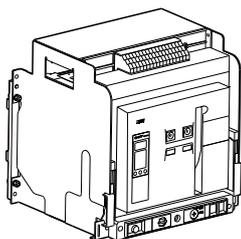
(2) Pull out the guide rail



(3) Place the breaker body on the guide rail



(4) Move the breaker body onto the guide rail with a snap



(5) Push the breaker body in, and turn it into the connected position

**Figure 6.4-1 Diagram of operation for the withdrawable circuit breaker**

**6.5 Interval**

Leave sufficient space for ventilation in the cabinet, the spacer for upper and lower connectors of circuit breaker must be made of non-magnetic material.

**6.6 Busbar fixation**

The busbar must be fixed with proper torque by using bolts and nuts, too big or too small torque is not allowed. Too big torque may cause bolts to slip which makes it difficult to tighten the bolts; too small torque may cause misalignment of bolts and nuts which leads to poor fastening and may cause excessive temperature rise. For circuit breaker connections, the data of torque tightening is applicable to copper busbar and steel bolts and nuts, with grade $\geq$ 8.8, it is also applicable aluminum busbar.

- 1. Circuit breaker terminal
- 2. Busbar
- 3. Bolt
- 4. Washer
- 5. Nut
- 6. Elastic washer

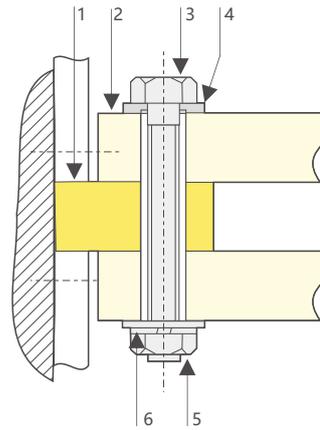


Figure 6.6-1 Diagram of busbar fixing

Recommended installation method

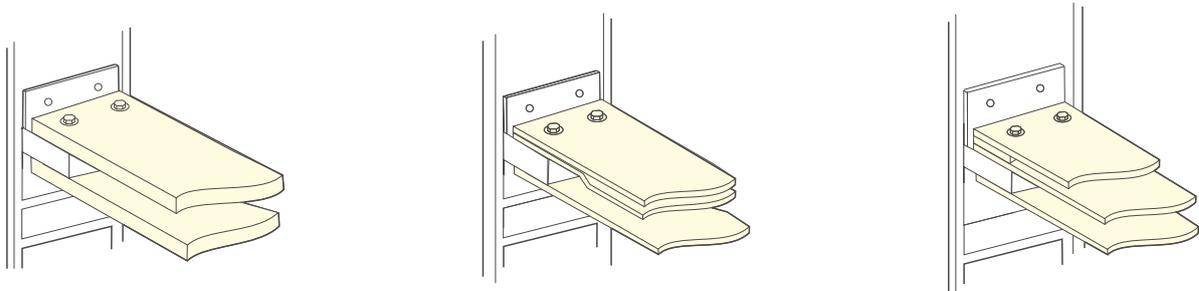


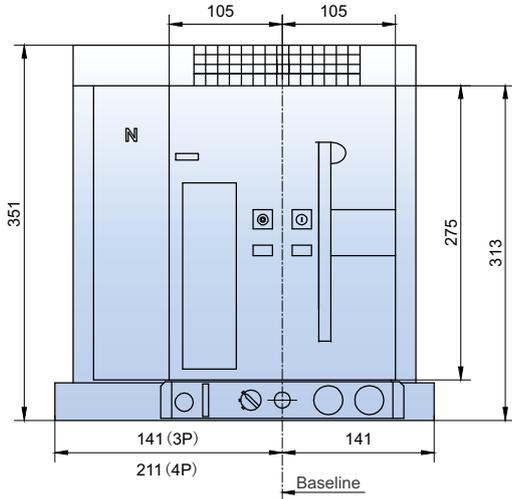
Figure 6.6-2 Recommended installation diagram of busbar

Table 11 Tightening torque for circuit breaker

Bolt type	Application	Preferred tightening torque
M3	Secure secondary connection cable	(0.5~0.7) N·m
M8 (only with flat washer)	Secure the product to cabinet (1600A frame size)	(18~25) N·m
M10 (only with flat washer)	Secure the product to cabinet (2500A frame size and above)	(25~40) N·m
M10	Secure busbar	(36~52) N·m
M12	Secure busbar	(61~94) N·m

### 7. Outline and Installation Dimensions

Front view



Side view

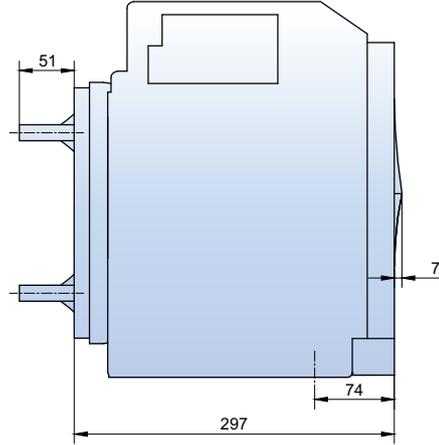
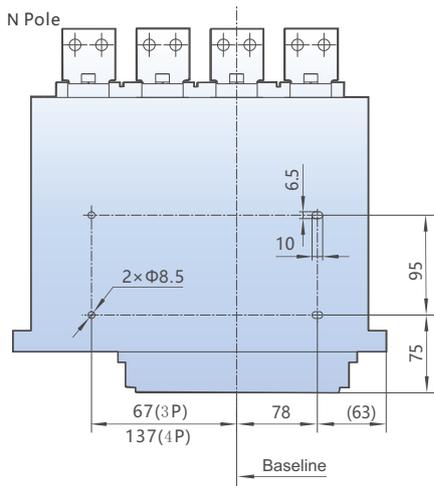


Figure 7.1 Overall dimension of NA8G-1600 withdrawable type

Hole size of the base



Hole size of the panel

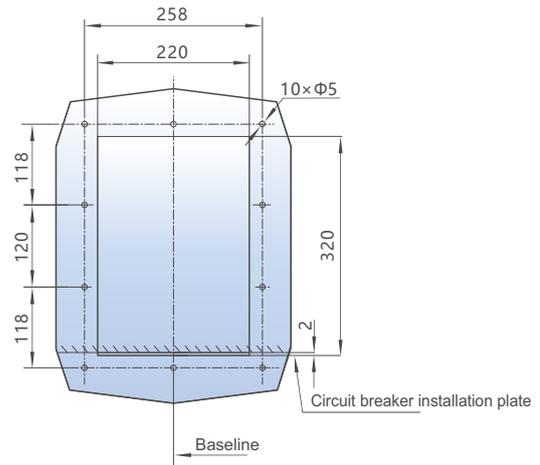
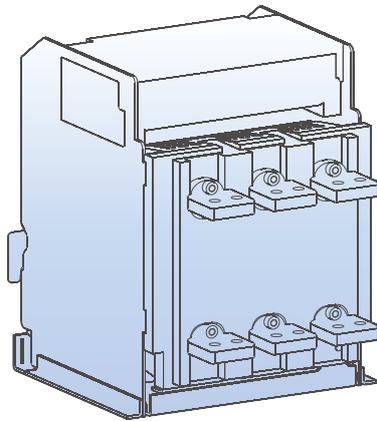


Figure 7.1-1 Perforating size of NA8G-1600 withdrawable type

Side view



In(A)	D(mm)
200~800	10
1000~1600	16

Note: If the user wants to change the horizontal connection to the vertical connection on site, just rotate the busbar 90°.

Busbar installation dimensions

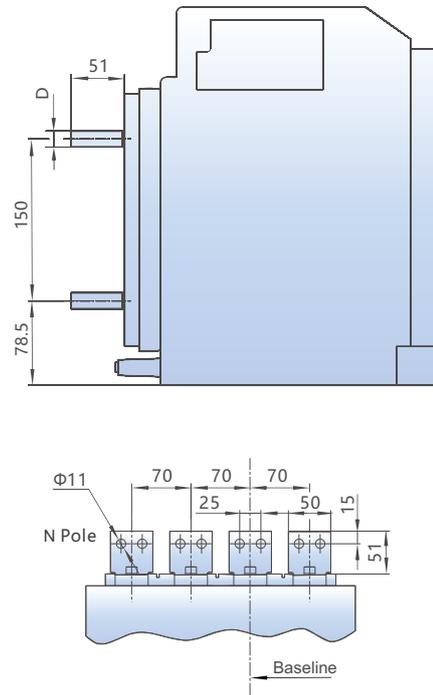
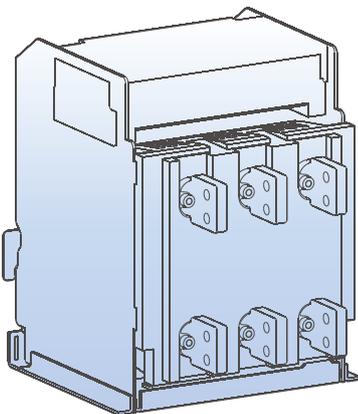


Figure 7.1-2 Horizontal busbar connection of NA8G-1600 withdrawable type

Side view



In(A)	D(mm)
200~800	10
1000~1600	16

Note: If the user wants to change the horizontal connection to the vertical connection on site, just rotate the busbar 90°.

Busbar installation dimensions

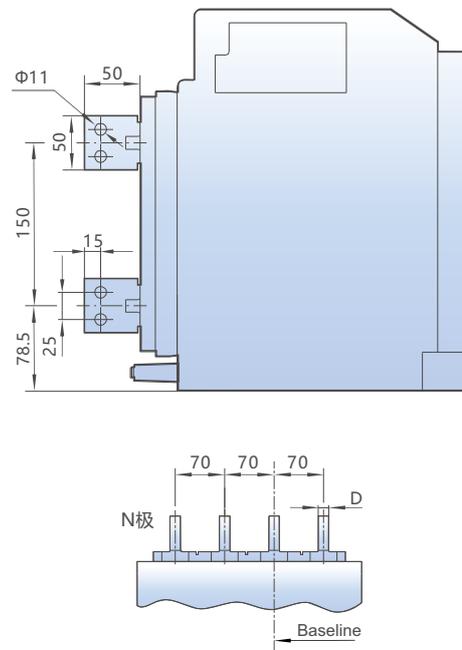
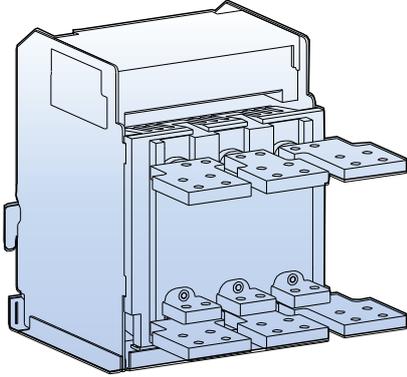
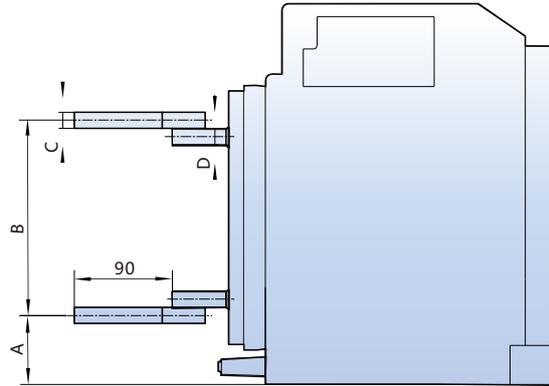


Figure 7.1-3 Vertical busbar connection of NA8G-1600 withdrawable type

Side view



Busbar installation dimensions



Unit:mm

In(A)	A	B	C	D
200~800	68.5	169	10	10
1000~1600	63	179	15	16

Note: The extended busbar is an optional accessory, which will be charged separately.

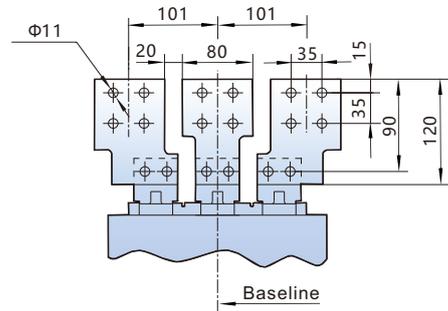
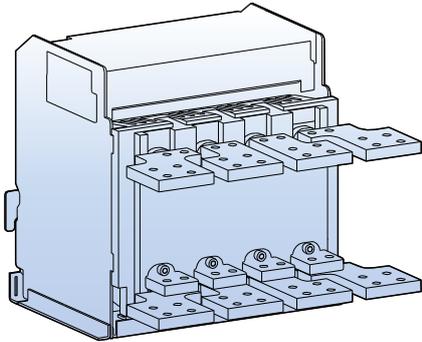
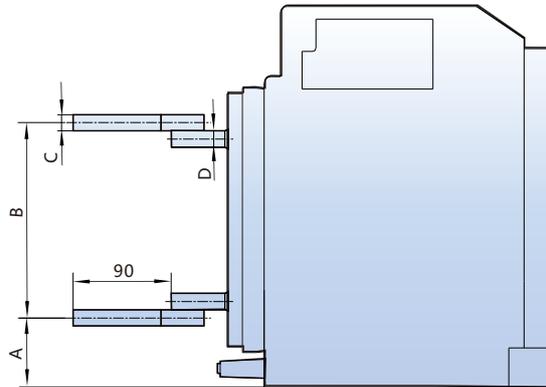


Figure 7.1-4 Extended busbar horizontal connection of NA8G-1600-3P withdrawable type

Side view



Busbar installation dimensions



Unit:mm

In(A)	A	B	C	D
200~800	68.5	169	10	10
1000~1600	63	179	15	16

Note: The extended busbar is an optional accessory, which will be charged separately.

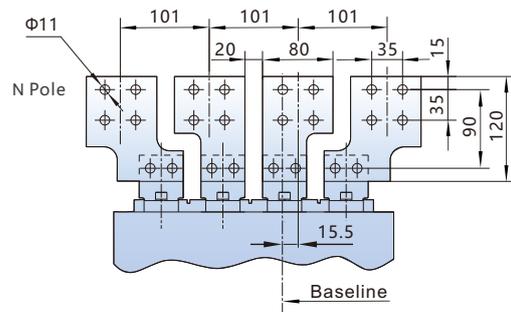
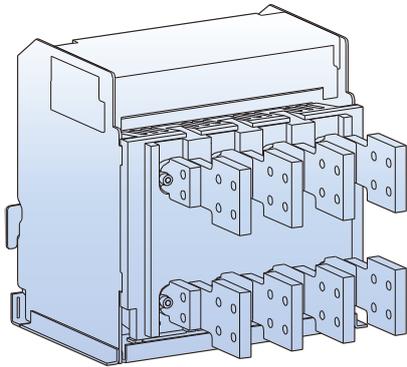
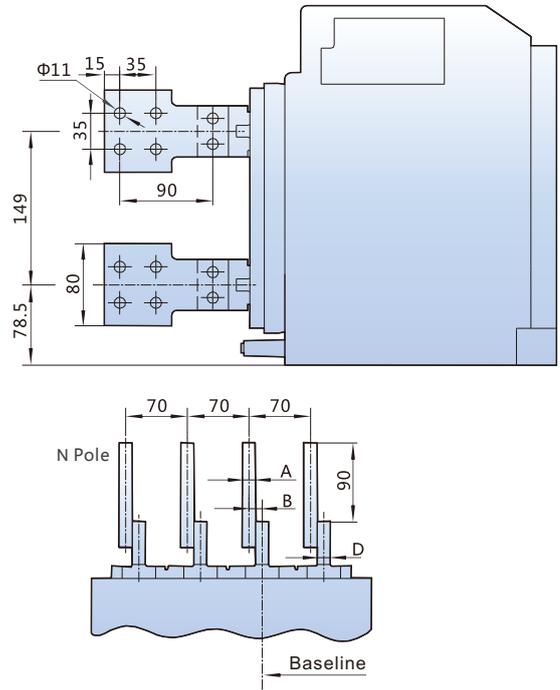


Figure 7.1-5 Extended busbar horizontal connection of NA8G-1600-4P withdrawable type

Side view



Busbar installation dimensions



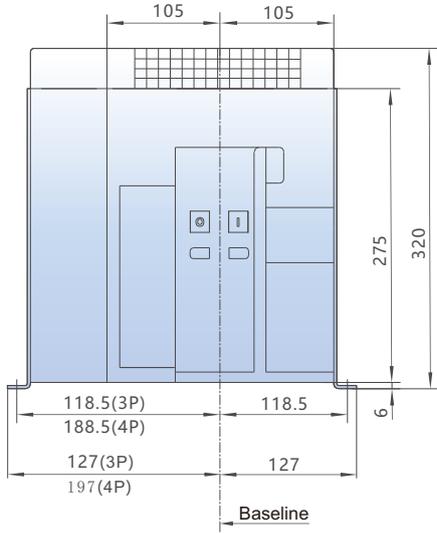
Unit:mm

In(A)	A	B	D
200~800	10	10	10
1000~1600	15	15.5	16

Note: The extended busbar is an optional accessory, which will be charged separately.

Figure 7.1 -6 Extended busbar vertical connection of NA8G-1600 withdrawable type

Front view



Side view

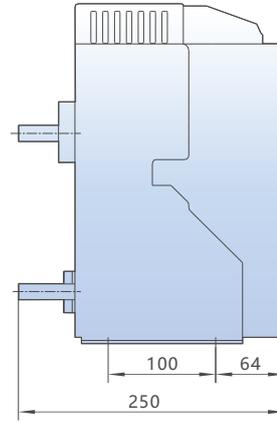
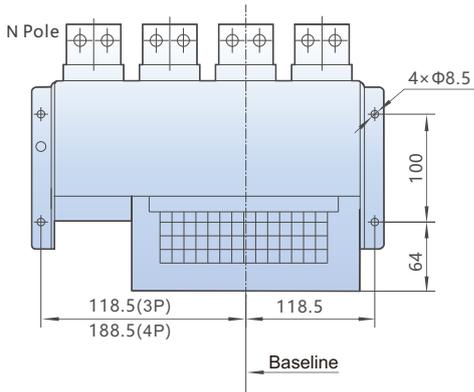


Figure 7.2 Overall dimension of NA8G-1600 fixed type

Hole size of the base



Hole size of the panel

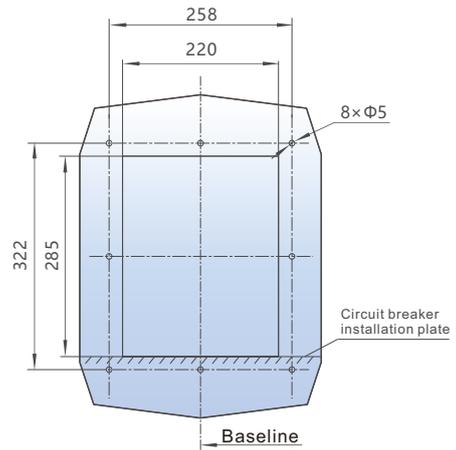
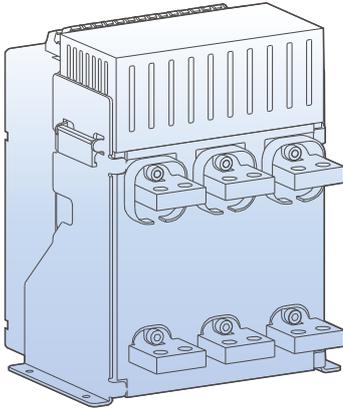


Figure 7.2-1 Perforating size of NAG8-1600 fixed type

Side view



In(A)	D(mm)
200~800	10
1000~1600	16

Note: If the user wants to change the horizontal connection to the vertical connection on site, just rotate the busbar 90°.

Busbar installation dimensions

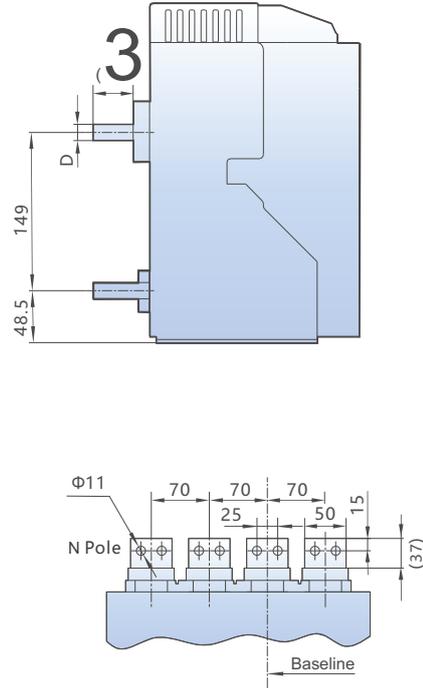
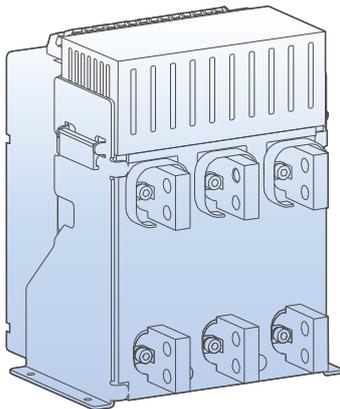


Figure 7.2-2 Horizontal busbar connection of NA8G-1600 fixed type

Side view



In(A)	D(mm)
200~800	10
1000~1600	16

Note: If the user wants to change the horizontal connection to the vertical connection on site, just rotate the busbar 90°.

Busbar installation dimensions

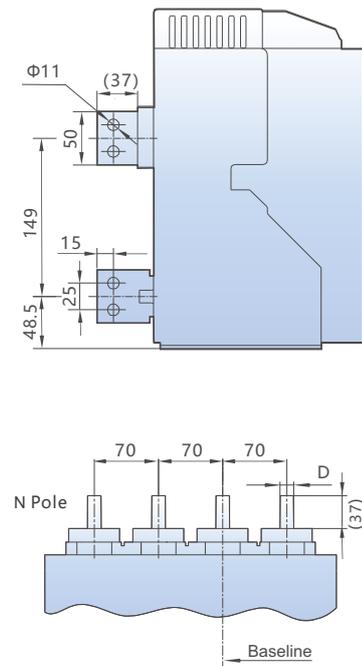
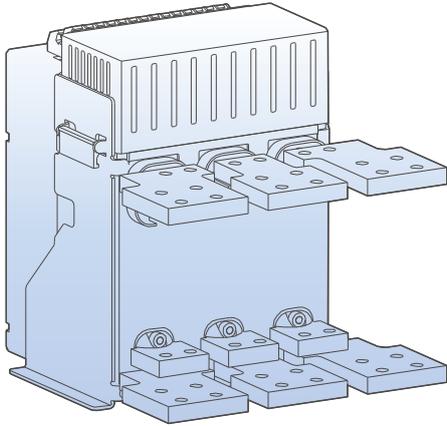


Figure 7.2-3 Vertical busbar connection of NA8G-1600 fixed type

Side view



Unit:mm

In(A)	A	B	C	D
200~800	38.5	169	10	10
1000~1600	33	179	15	16

Note: The extended busbar is an optional accessory, which will be charged separately.

Busbar installation dimensions

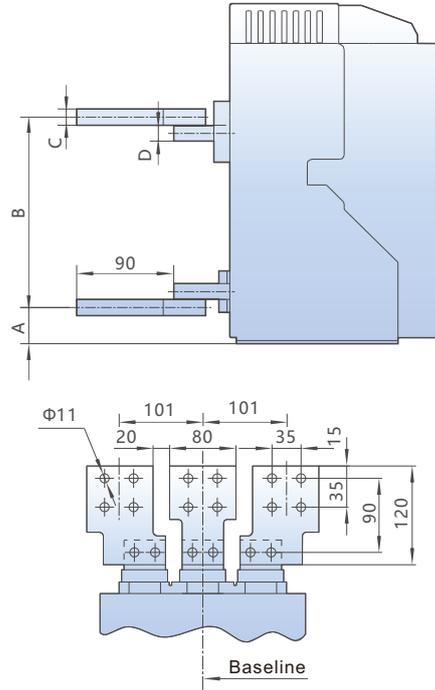
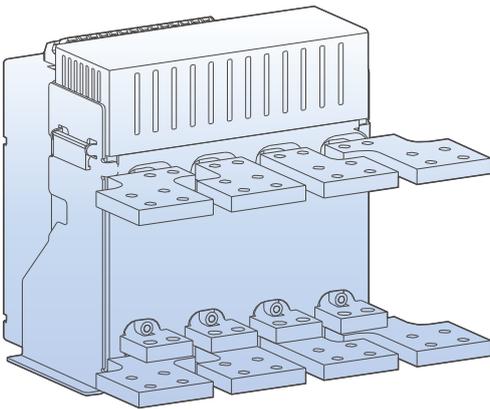


Figure 7.2-4 Extended busbar horizontal connection of NA8G-1600-3P fixed type

Side view



Unit:mm

In(A)	A	B	C	D
200~800	38.5	169	10	10
1000~1600	33	179	15	16

Note: The extended busbar is an optional accessory, which will be charged separately.

Busbar installation dimensions

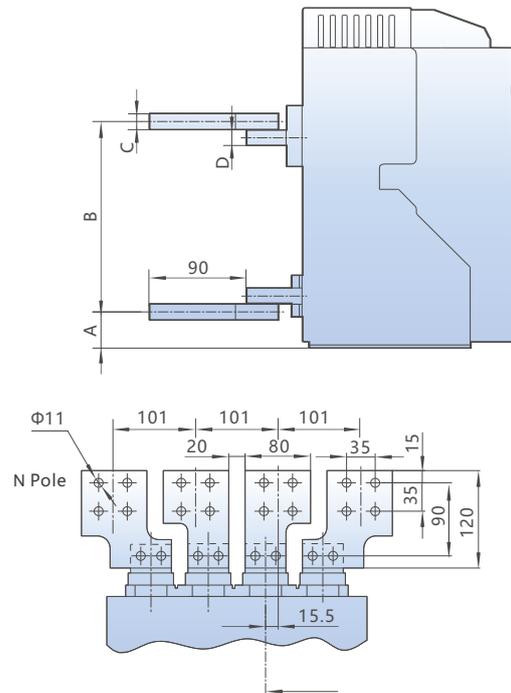
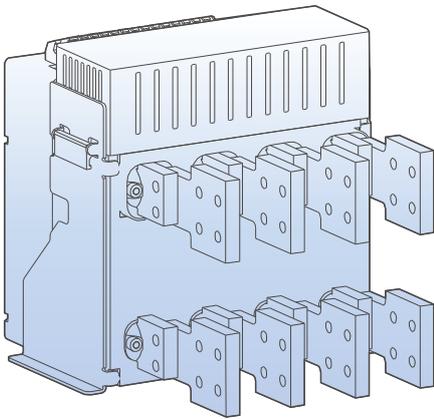


Figure 7.2-5 Extended busbar horizontal connection of NA8G-1600-4P fixed type

Side view



Unit:mm

In(A)	A	B	D
200~800	10	10	10
1000~1600	15	15	16

Note: The extended busbar is an optional accessory, which will be charged separately.

Busbar installation dimensions

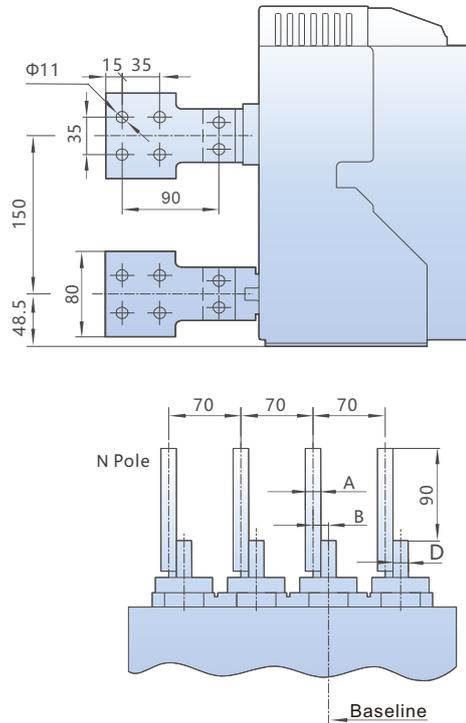
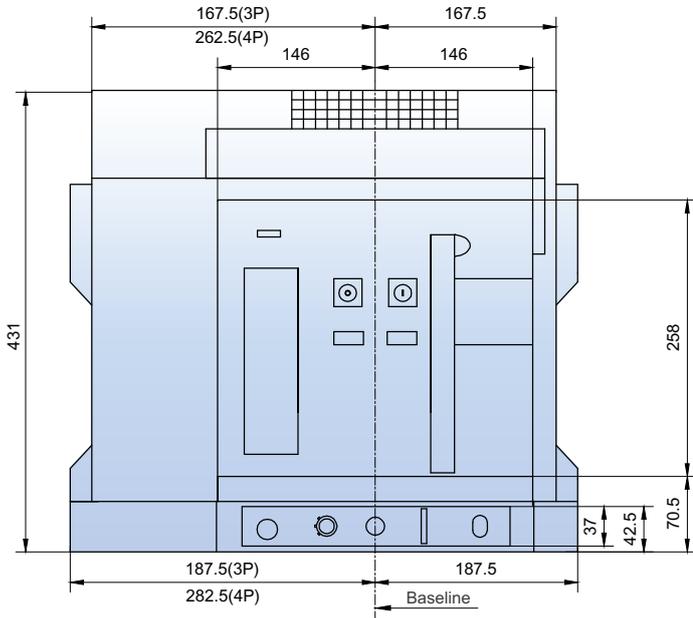


Figure 7.2 -6 Extended busbar vertical connection of NA8G-1600 fixed type

Front view



Side view

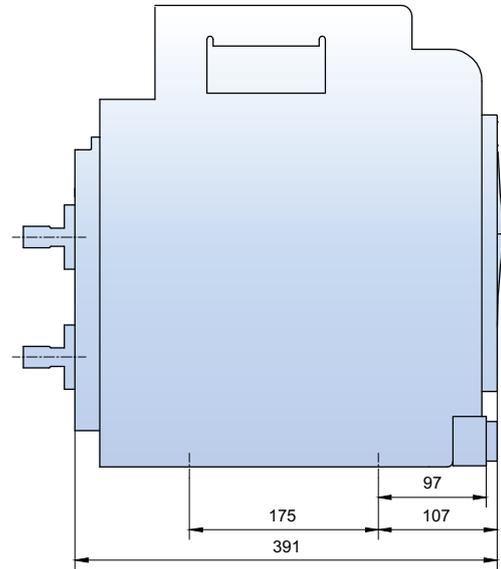
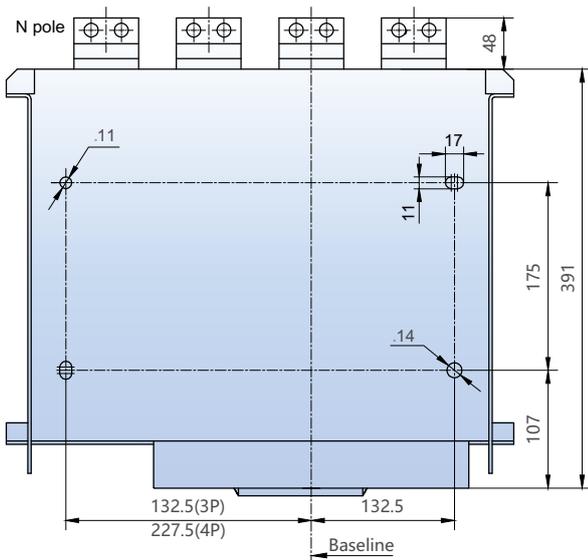


Figure 7.3 Overall dimension of NA8G-2500 withdrawable type

Hole size of the base



Hole size of the panel

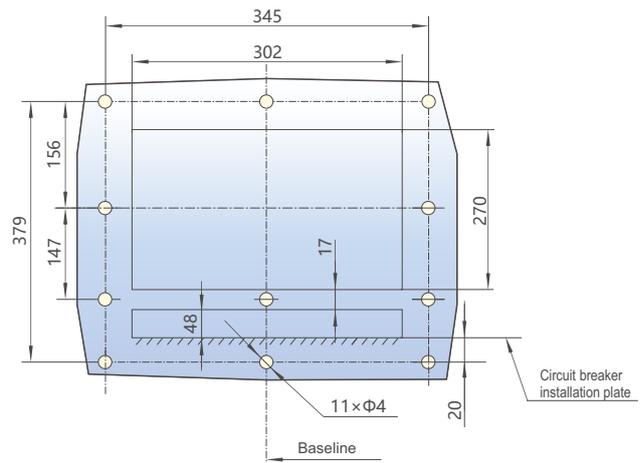
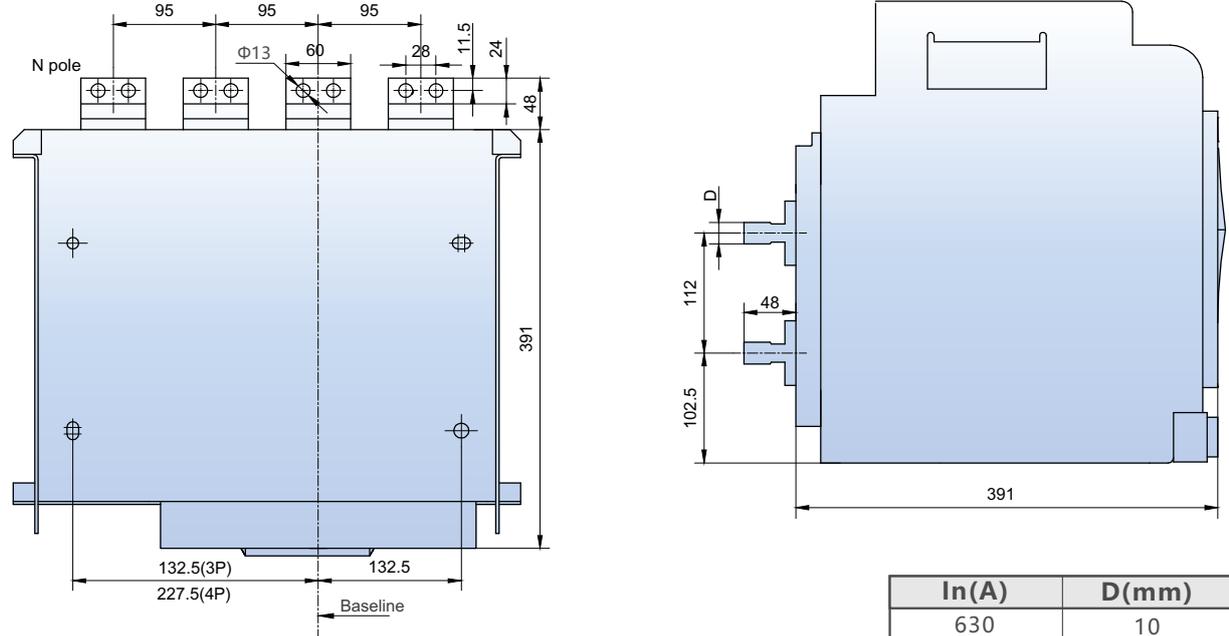


Figure 7.3-1 Perforating size of NA8G-2500 withdrawable type

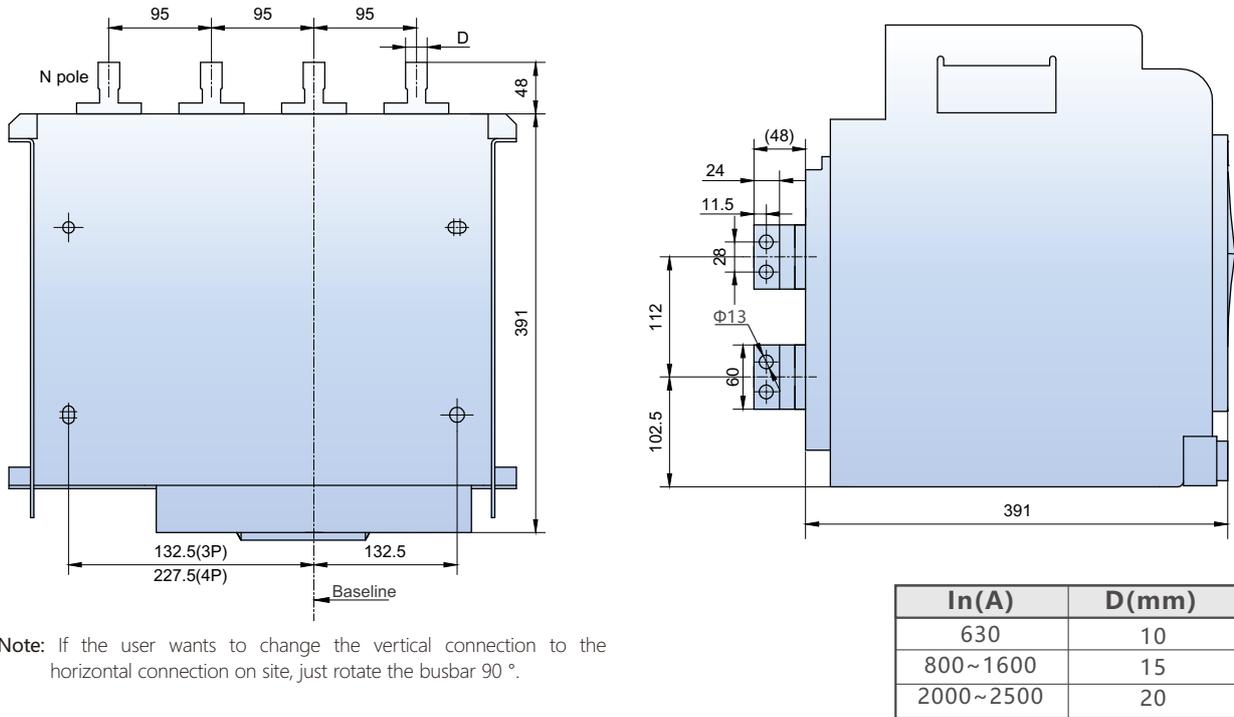
Busbar installation dimensions (factory default configuration)



Note: If the user wants to change the horizontal connection to the vertical connection on site, just rotate the busbar 90°.

Figure7.3-2 Horizontal busbar connection of NA8G-2500 withdrawable type

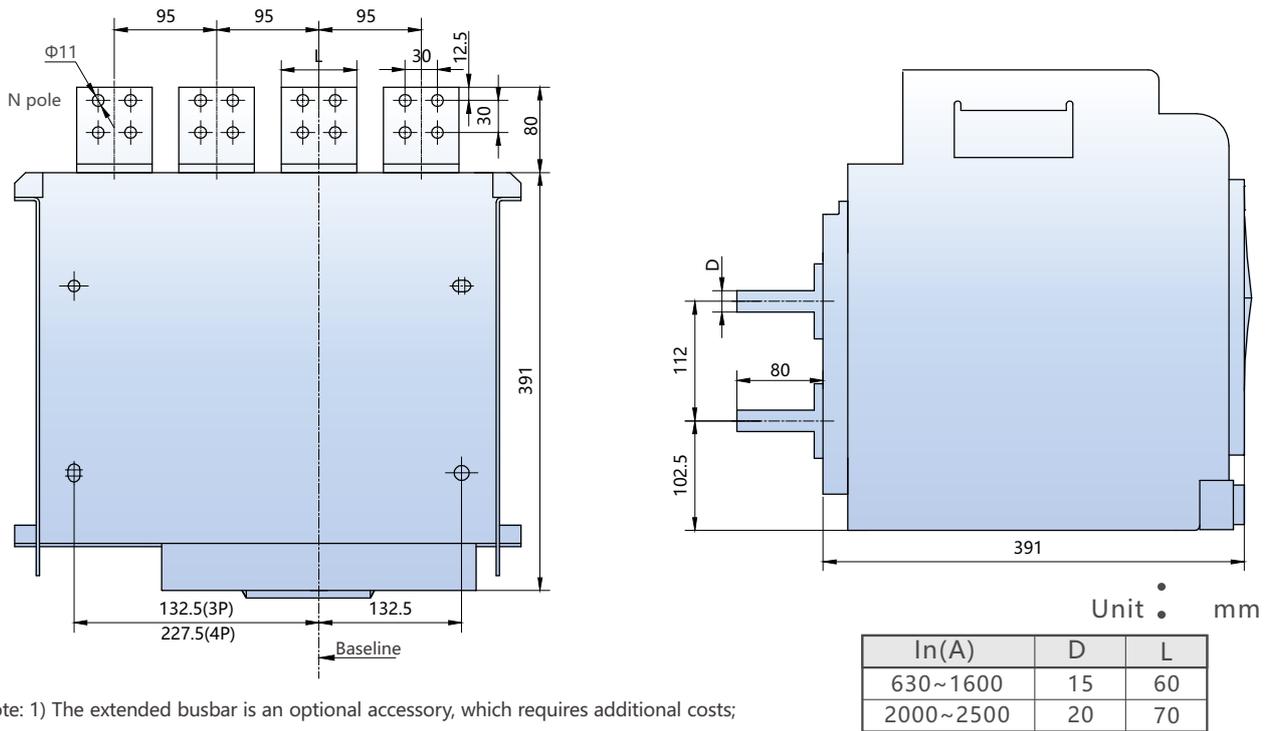
Busbar installation dimensions



Note: If the user wants to change the vertical connection to the horizontal connection on site, just rotate the busbar 90°.

Figure7.3-3 Vertical busbar connection of NA8G-2500 withdrawable type

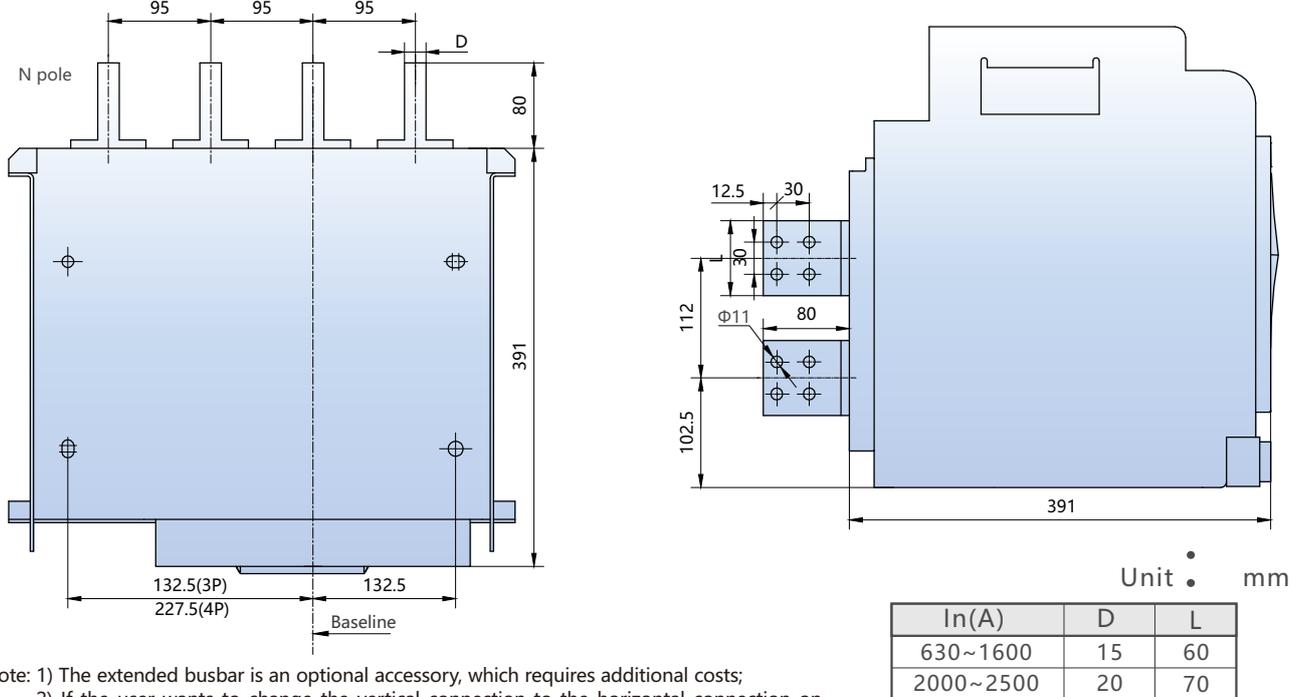
Busbar installation dimensions



- Note: 1) The extended busbar is an optional accessory, which requires additional costs;  
 2) If the user wants to change the horizontal connection to the vertical connection on site, just rotate the busbar 90°.

Figure7.3-4 Horizontal extended busbar connection of NA8G-2500 withdrawable type

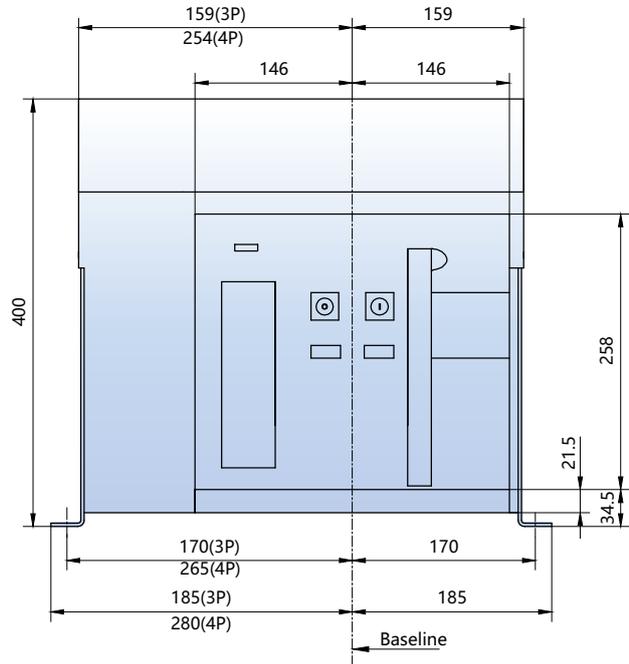
Busbar installation dimensions



- Note: 1) The extended busbar is an optional accessory, which requires additional costs;  
 2) If the user wants to change the vertical connection to the horizontal connection on site, just rotate the busbar 90°.

Figure7.3-5 Vertical extended busbar connection of NA8G-2500 withdrawable type

Front view



Side view

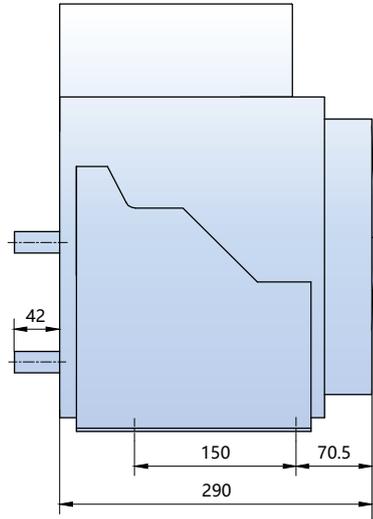
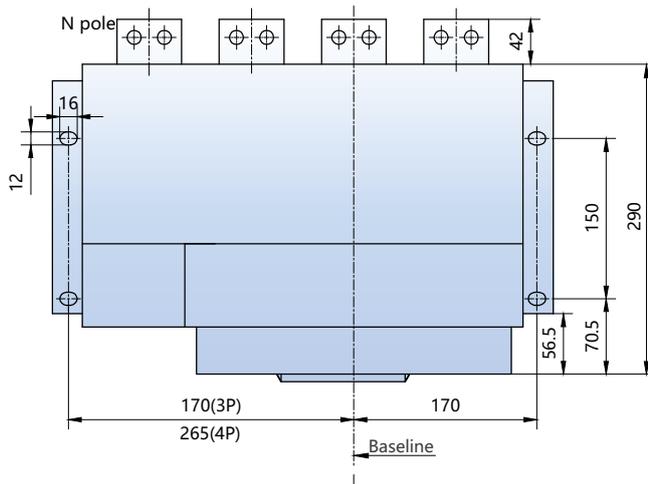


Figure 7.4 Overall dimension of NA8G-2500 fixed type

Hole size of the base



Hole size of the panel

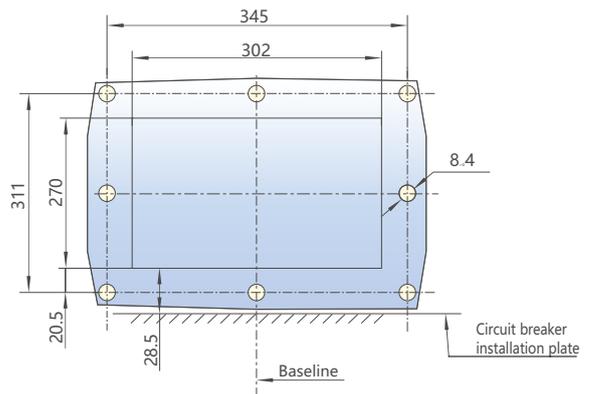
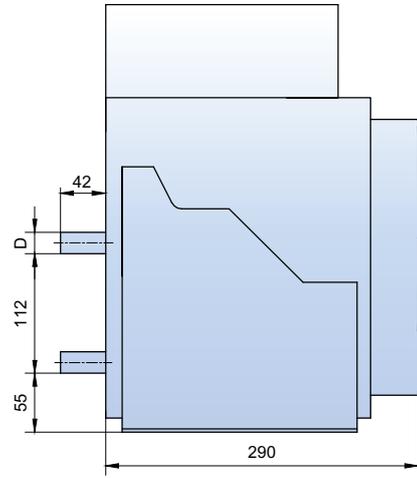
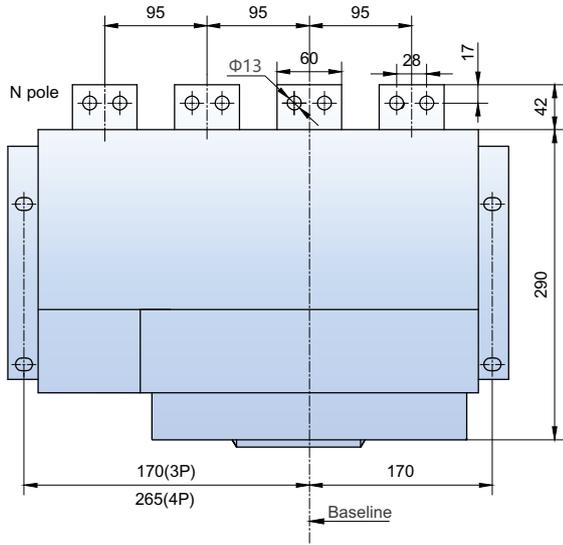


Figure 7.4-1 Perforating size of NA8G-2500 fixed type

Busbar installation dimensions (factory default configuration)

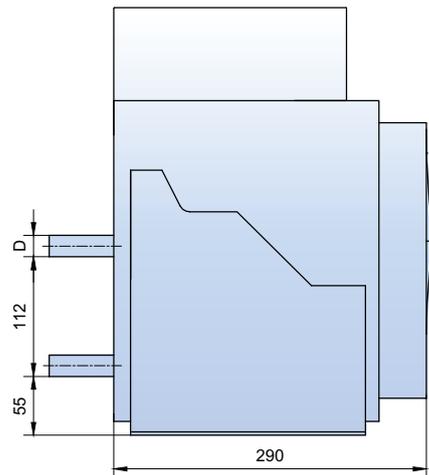
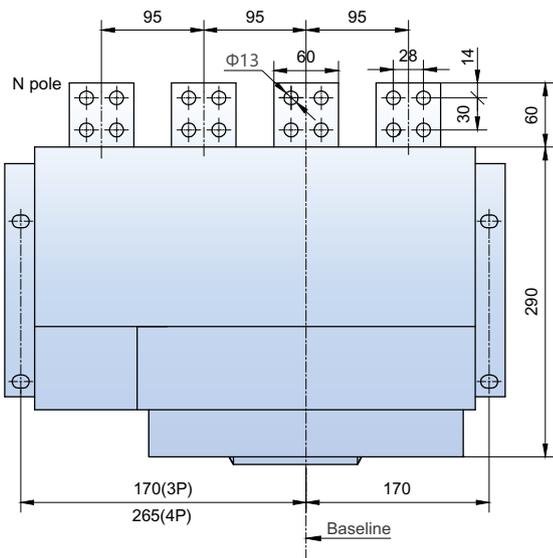


Unit : mm

In(A)	D
630	10
800~1600	15
2000~2500	20

Figure7.4-2 Horizontal busbar connection of NA8G-2500 fixed type

Busbar installation dimensions



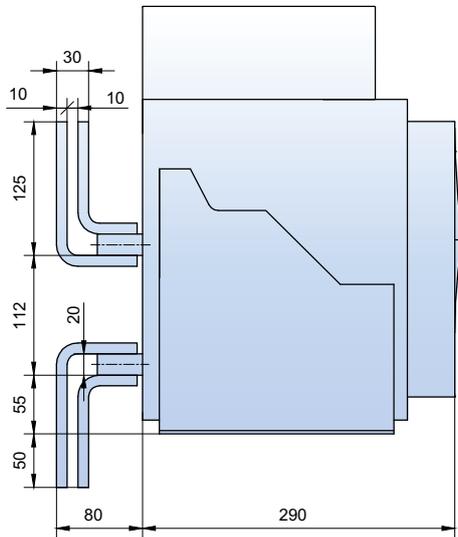
Unit : mm

In(A)	D
630	10
800~1600	15
2000~2500	20

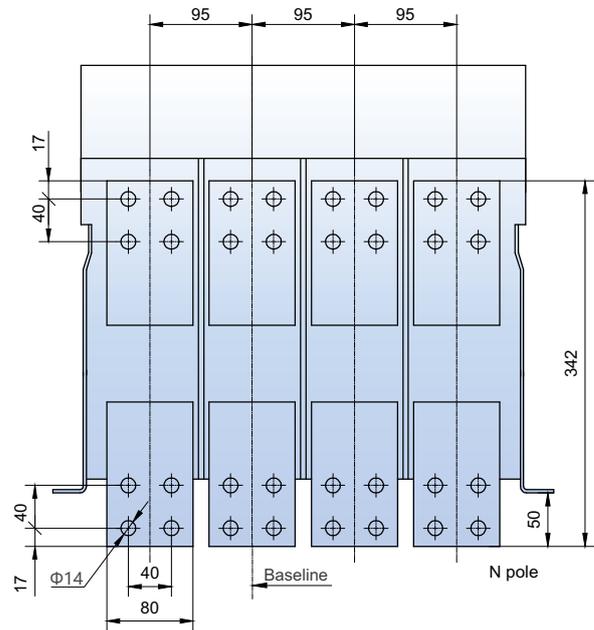
Note: The extended busbar is an optional accessory, which requires additional costs.

Figure7.4-3 Horizontal extended busbar connection of NA8G-2500 fixed type

Busbar installation dimensions (side view)



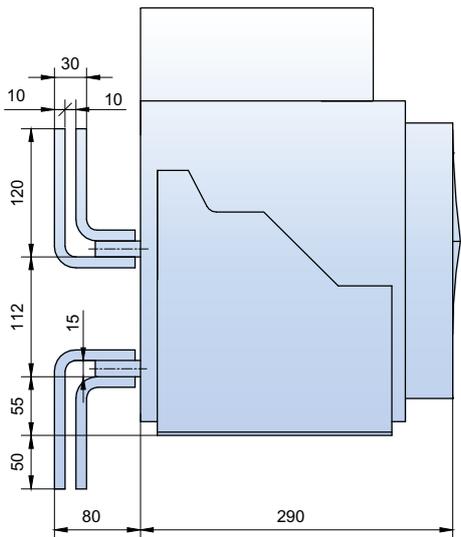
Rear view



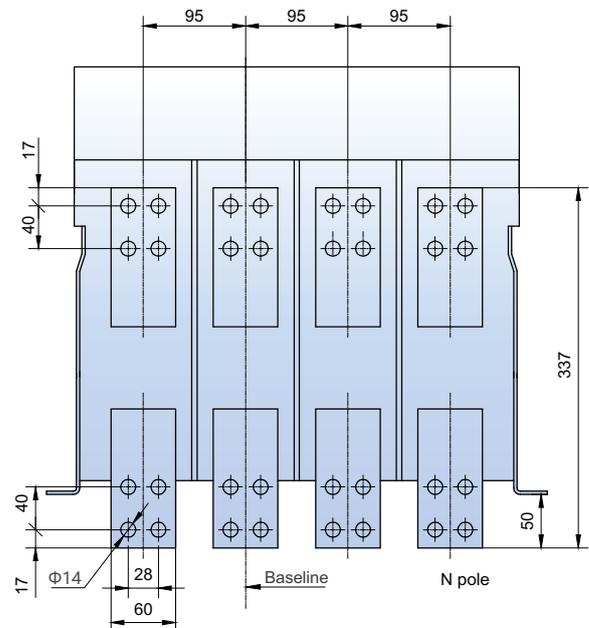
Note: The vertical connection busbar is an optional accessory, which requires an additional cost; the vertical connection requires an additional phase spacer.

Figure7.4-4 Horizontal busbar connection of NA8G-2500 (In=2000A~2500A) fixed type

Busbar installation dimensions (side view)



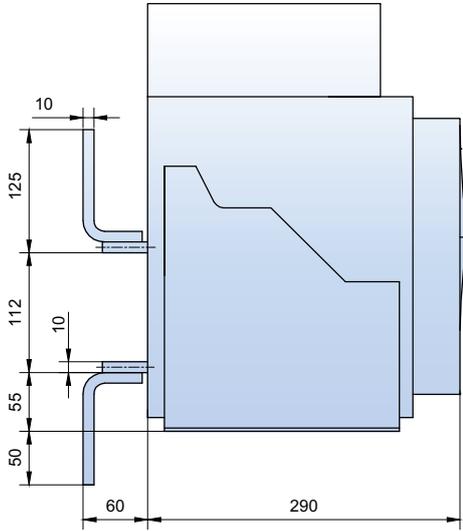
Rear view



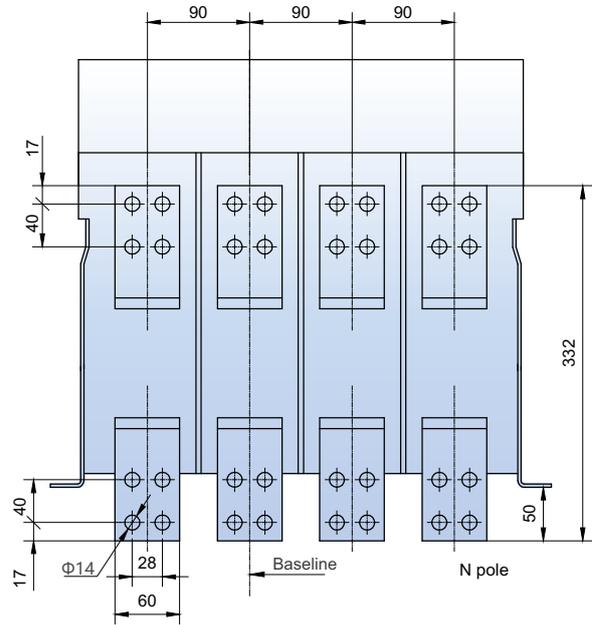
Note: The vertical connection busbar is an optional accessory, which requires an additional cost.

Figure7.4-5 Vertical busbar connection of NA8G-2500 (In=800A~1600A) fixed type

Busbar installation dimensions (side view)



Rear view



**Note:** The vertical connection busbar is an optional accessory, which requires an additional cost.

Figure7.4-6 Vertical busbar connection of NA8G-2500 (In=630A) fixed type

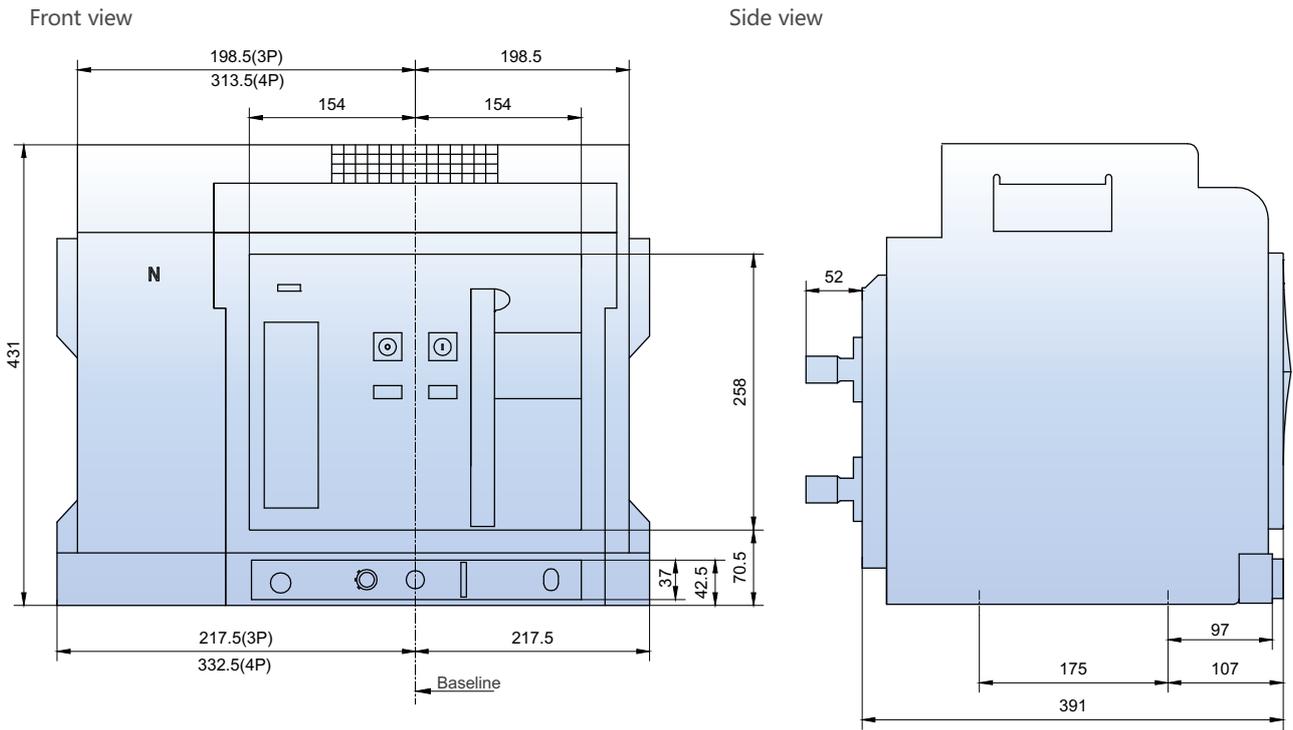


Figure 7.5 Overall dimension of NA8G-3200 withdrawable type

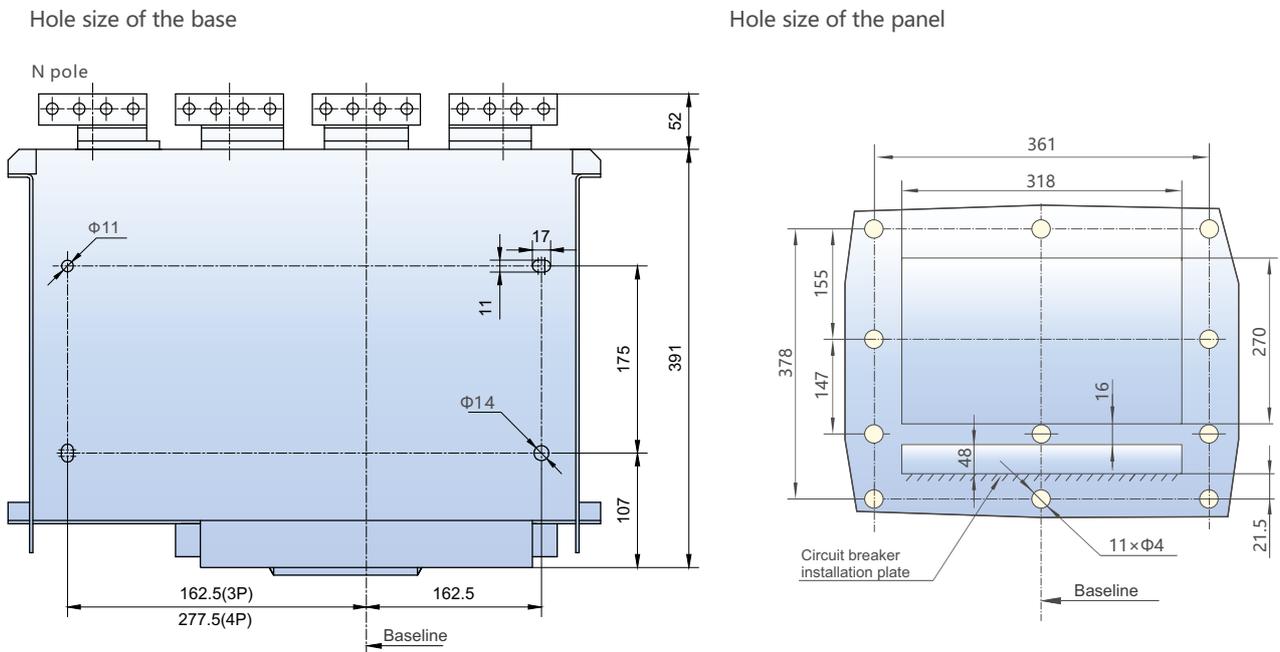
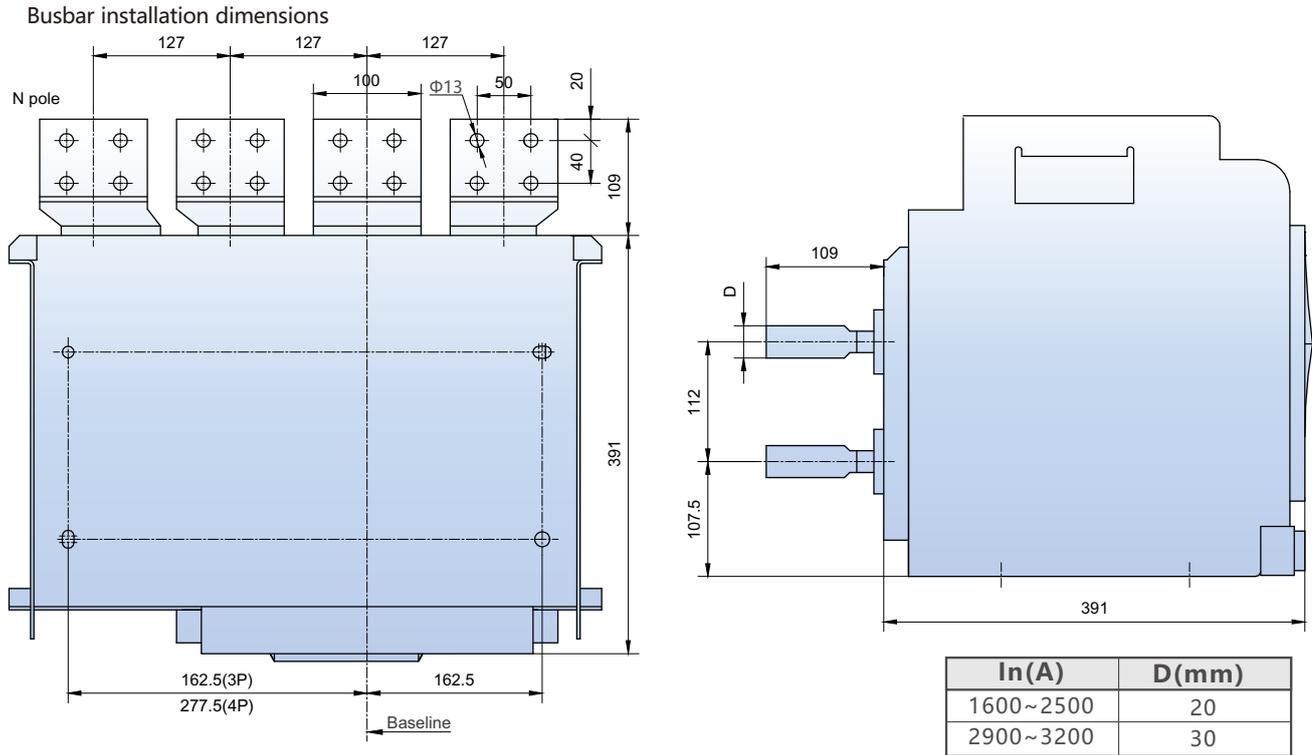


Figure 7.5-1 Perforating size of NAG8-3200 withdrawable type

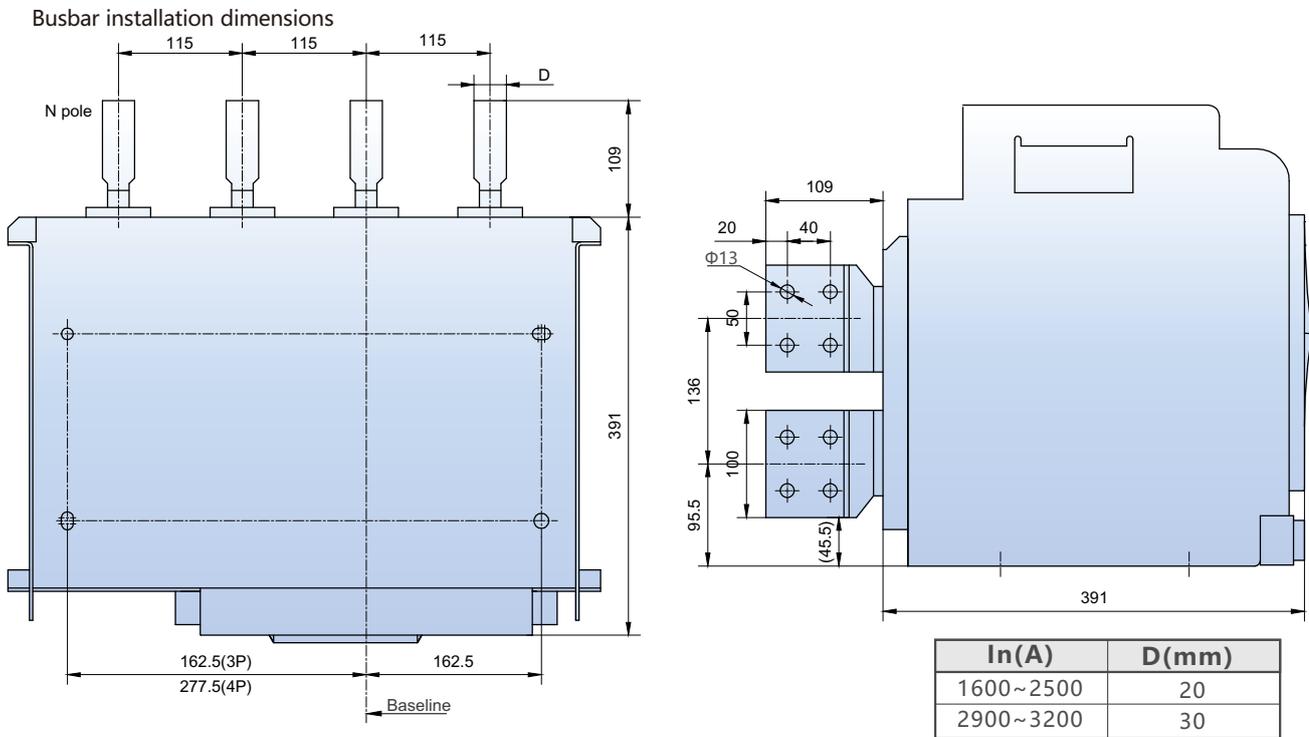






Note: The extended busbar is an optional accessory, which requires additional costs.

figure7.5 -6 Horizontal extened busbar connection of NA8G-3200 withdrawable type



Note: The extended busbar is an optional accessory, which requires additional costs.

figure7.5 -6 Vertical extened busbar connection of NA8G-3200 withdrawable type

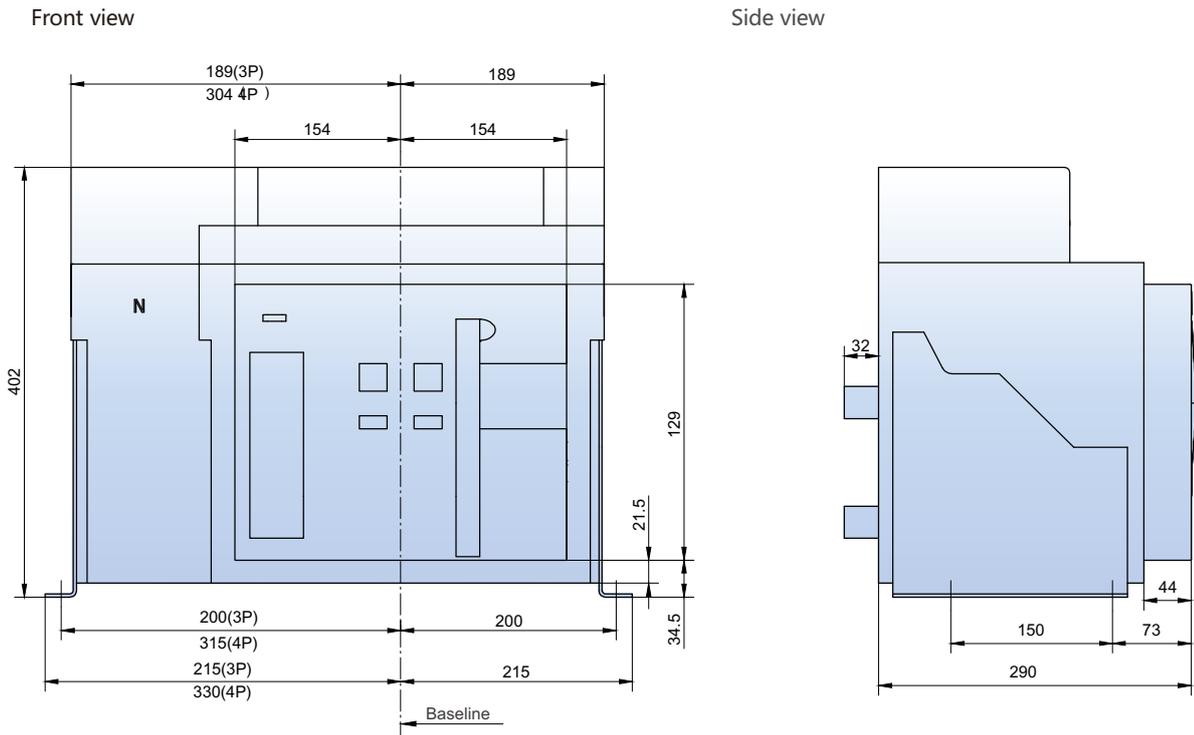


Figure 7.6 Overall dimension of NA8G-3200 fixed type

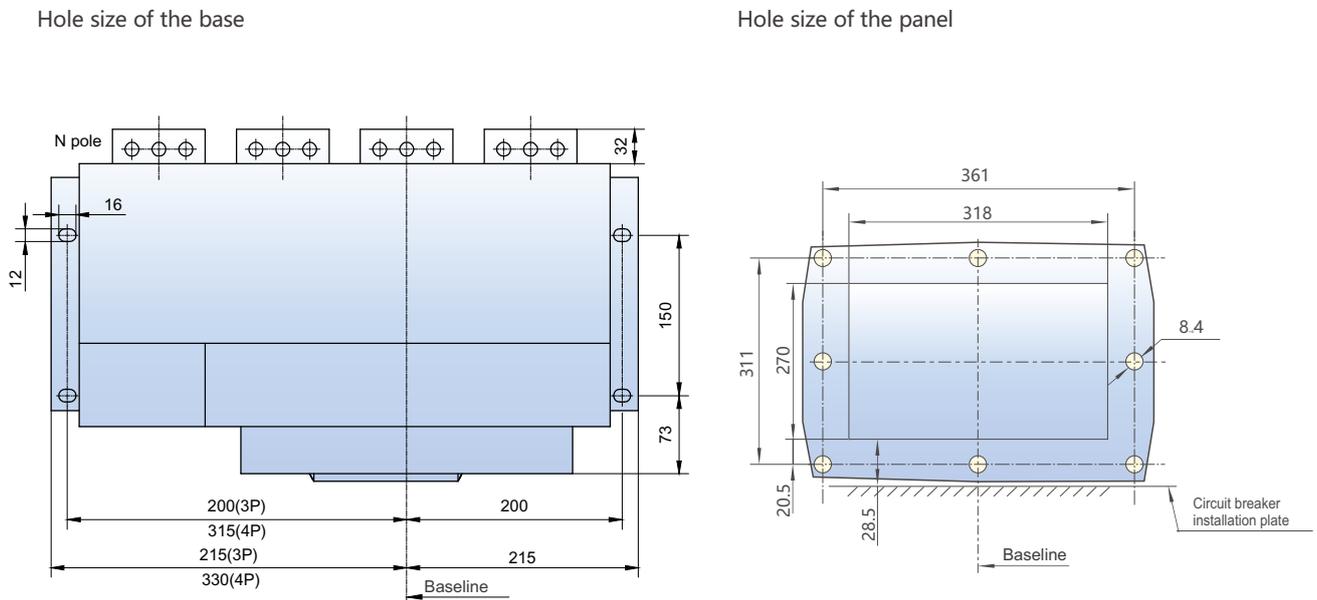


Figure 7.6-1 Perforating size of NA8G-3200 fixed type

Front view

Side view

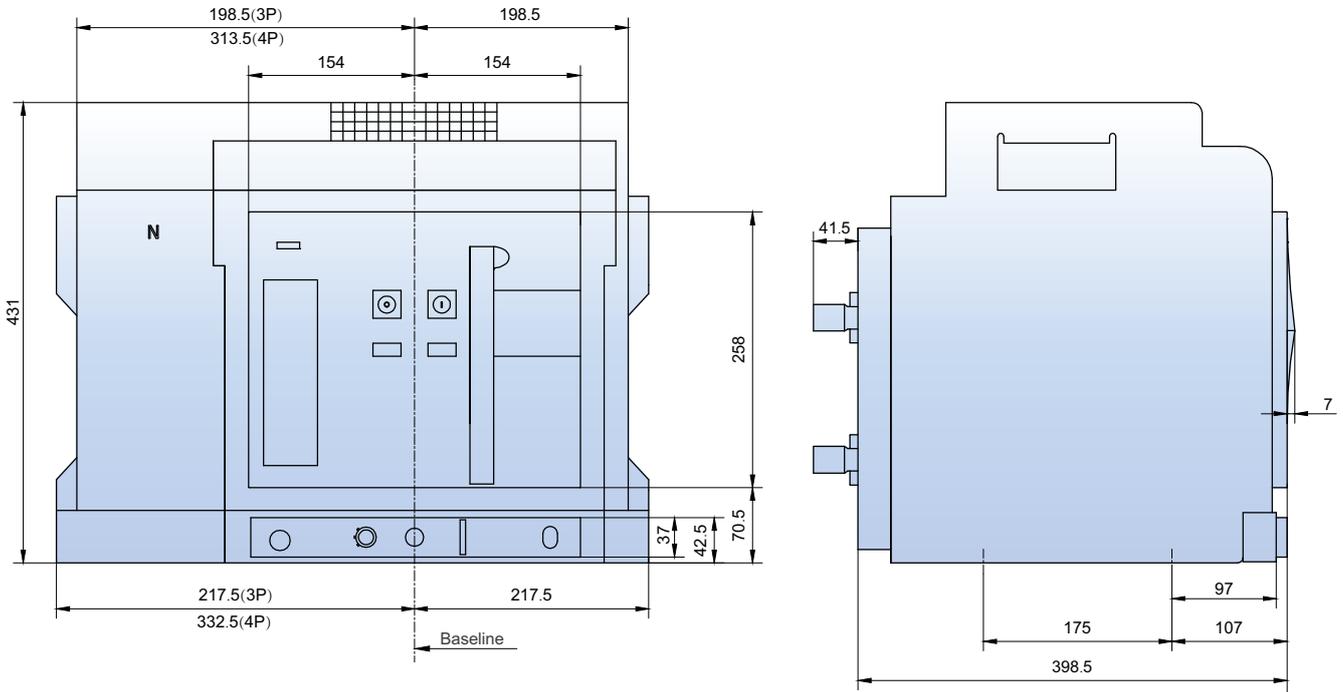


Figure 7.7 Overall dimension of NA8G-4000 withdrawable type

Hole size of the base

Hole size of the panel

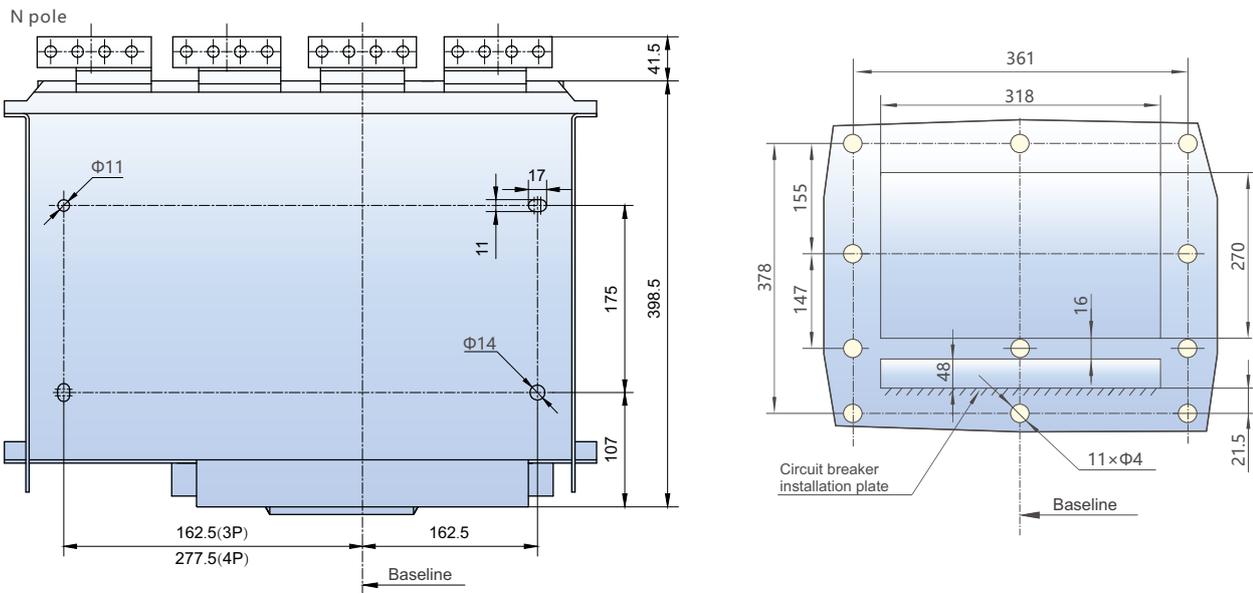
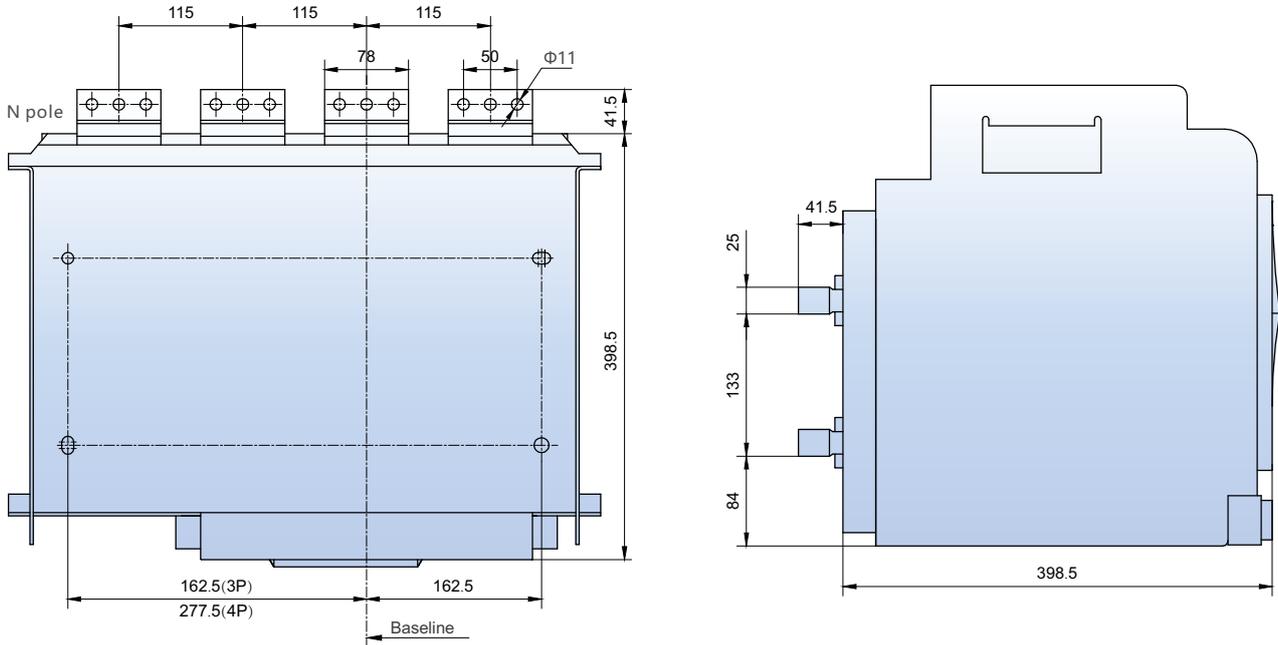


Figure 7.7-1 Perforating size of NAG8-4000 withdrawable type

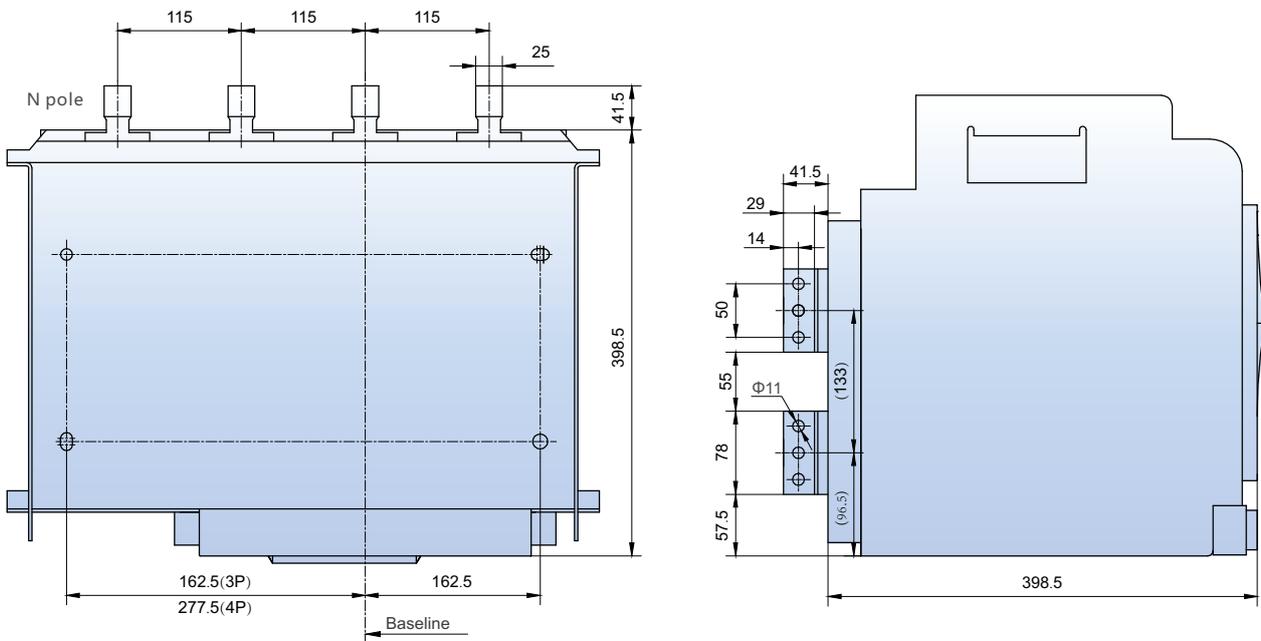
Busbar installation dimensions (factory default configuration)



Note: If the user wants to change the horizontal connection to the vertical connection on site, just rotate the bus bar 90 °.

Figure 7.7-2 Horizontal busbar connection of NA8G-4000(In=1600A~2500A) withdrawable type

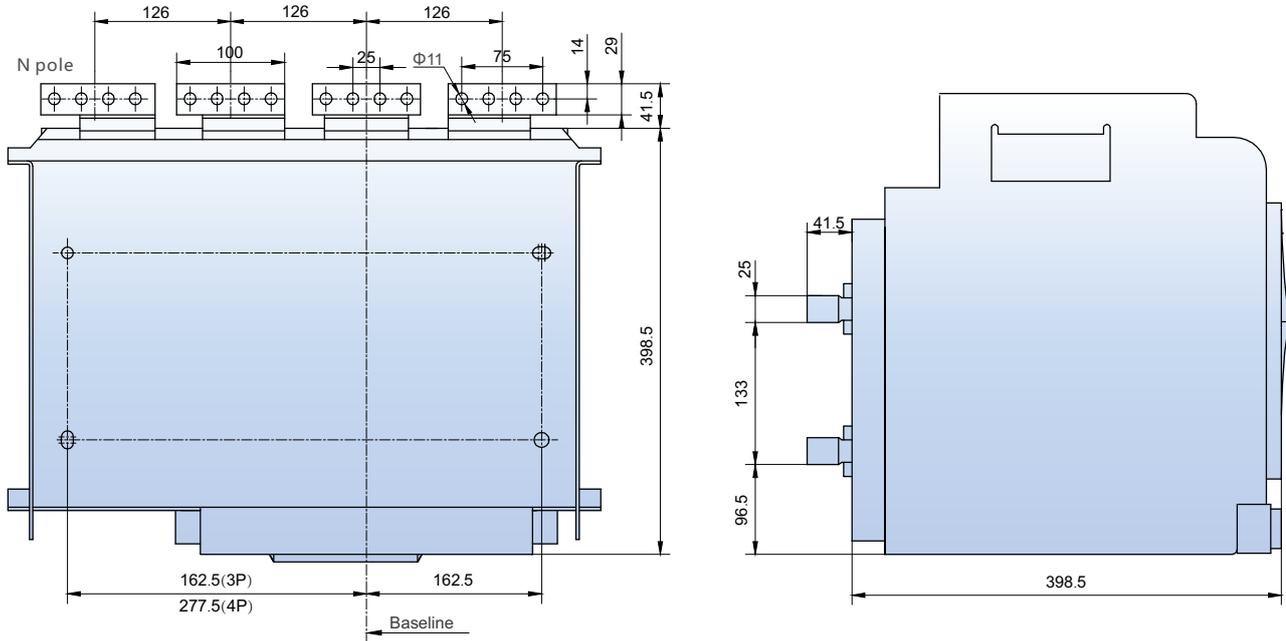
Busbar installation dimensions



Note: If the user wants to change the vertical connection to the horizontal connection on site, just rotate the bus bar 90 °.

Figure 7.1-3 Vertical busbar connection of NA8G-4000(In=1600A~2500A) withdrawable type

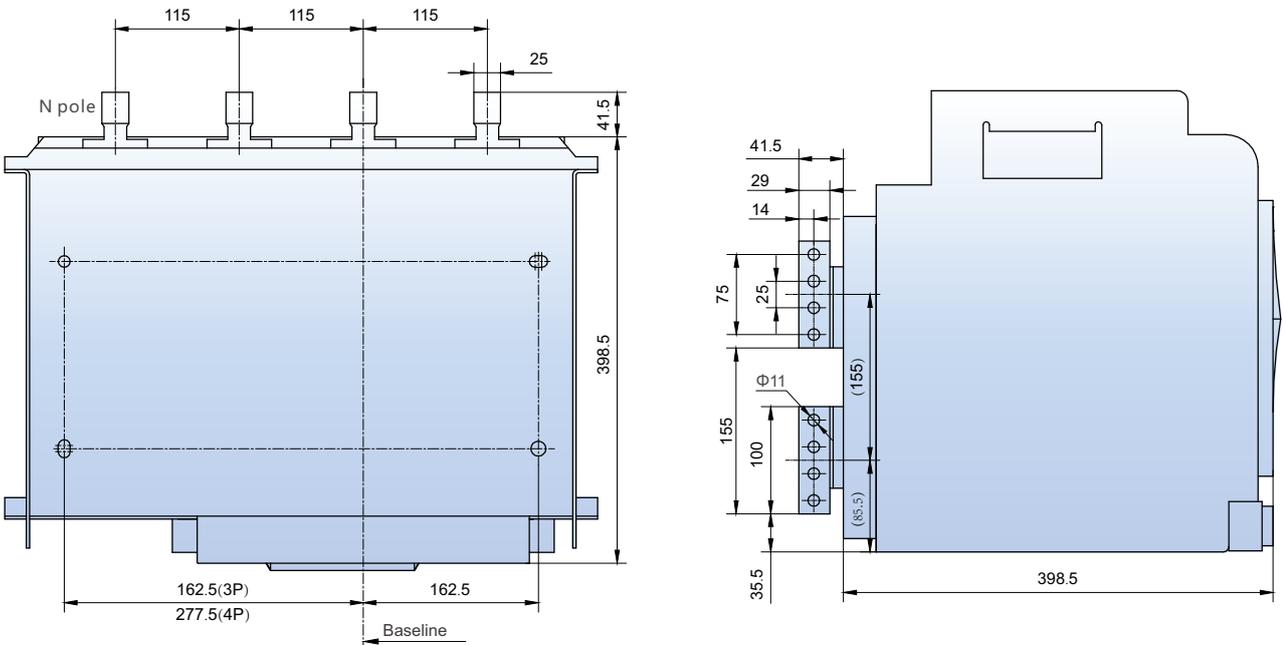
Busbar installation dimensions (factory default configuration)



Note: If the user changes the horizontal to vertical connection on the scene, the upper and lower buses of the N and B phases on both sides need to be replaced with the same as the A and C buses of the middle.

Figure 7.7-4 Horizontal busbar connection of NA8G-4000(In=2900A~4000A) withdrawable type

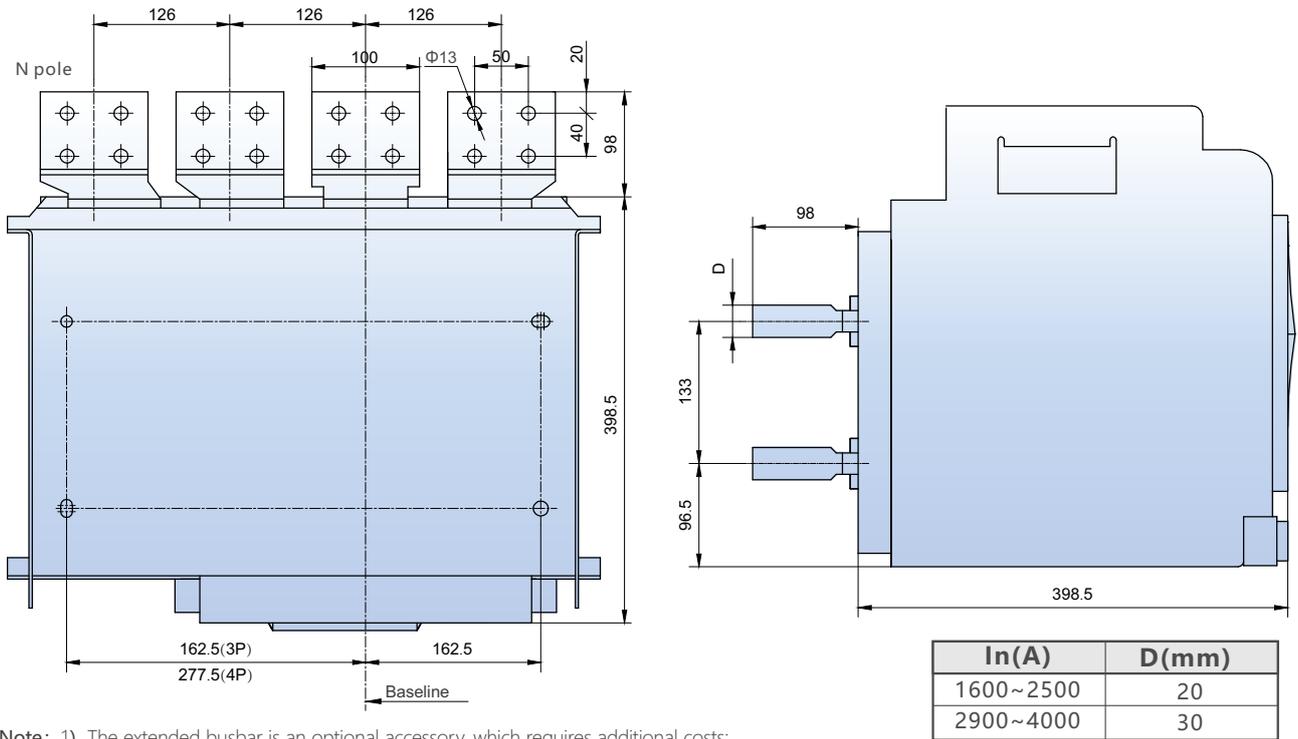
Busbar installation dimensions



Note: If the user changes the vertical to horizontal connection on the scene, the upper and lower buses of the N and C phases on both sides need to be replaced with the horizontally connected bus specifications.

Figure 7.1-3 Vertical busbar connection of NA8G-4000(In=2900A~4000A) withdrawable type

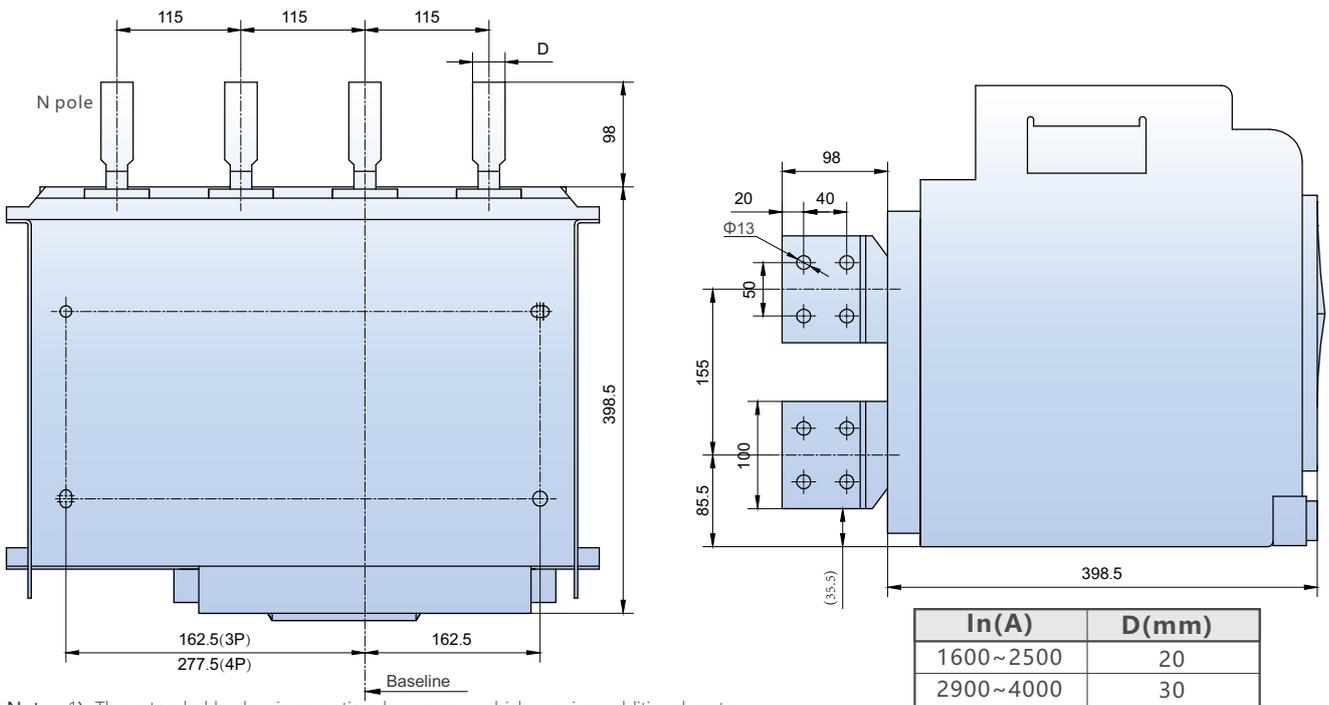
Busbar installation dimensions



- Note: 1) The extended busbar is an optional accessory, which requires additional costs;  
 2) If the user changes the horizontal to vertical connection at the scene, the upper and lower buses of the N and B phases on both sides need to be replaced with the same as the A and C buses of the middle.

Figure7.7-6 Horizontal extended busbar connection of NA8G-4000 withdrawable type

Busbar installation dimensions



- Note: 1) The extended busbar is an optional accessory, which requires additional costs;  
 2) If the user changes the vertical to horizontal connection at the scene, the upper and lower buses of the N and B phases on both sides need to be replaced with the horizontally connected bus specifications.

Figure7.7-7 Vertical extended busbar connection of NA8G-4000 withdrawable type

Front view

Side view

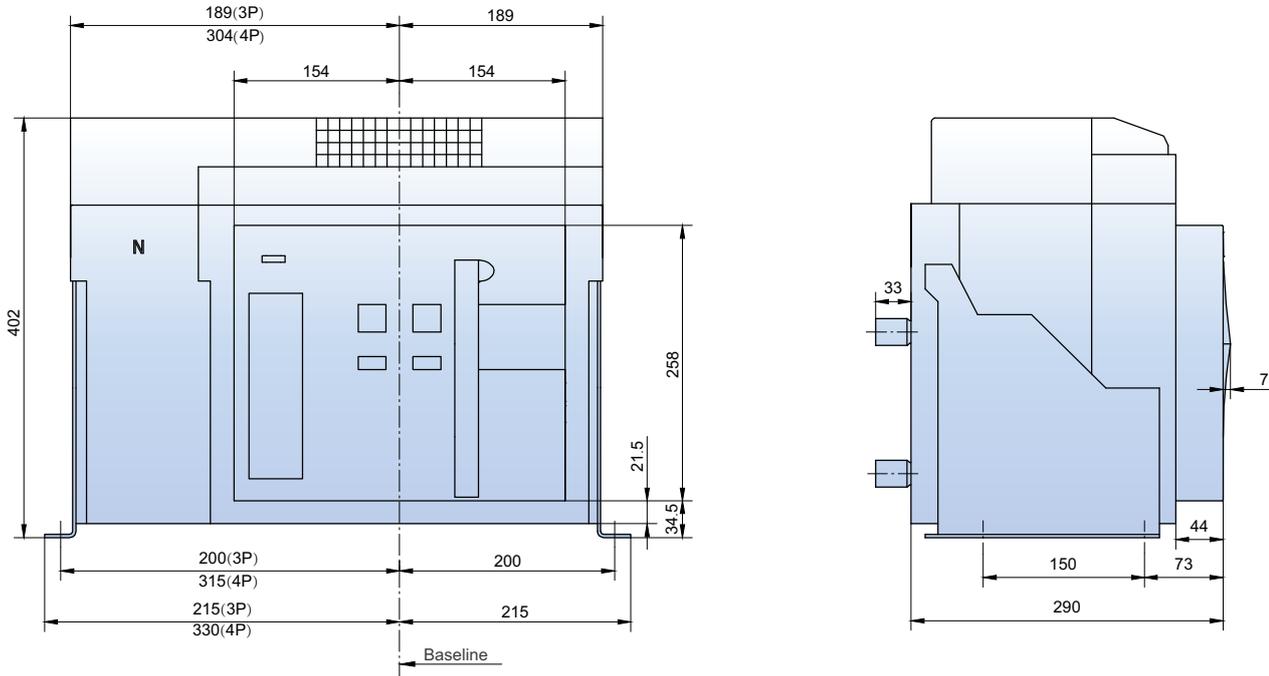


Figure 7.8 Overall dimension of NA8G-4000 fixed type

Hole size of the base

Hole size of the base

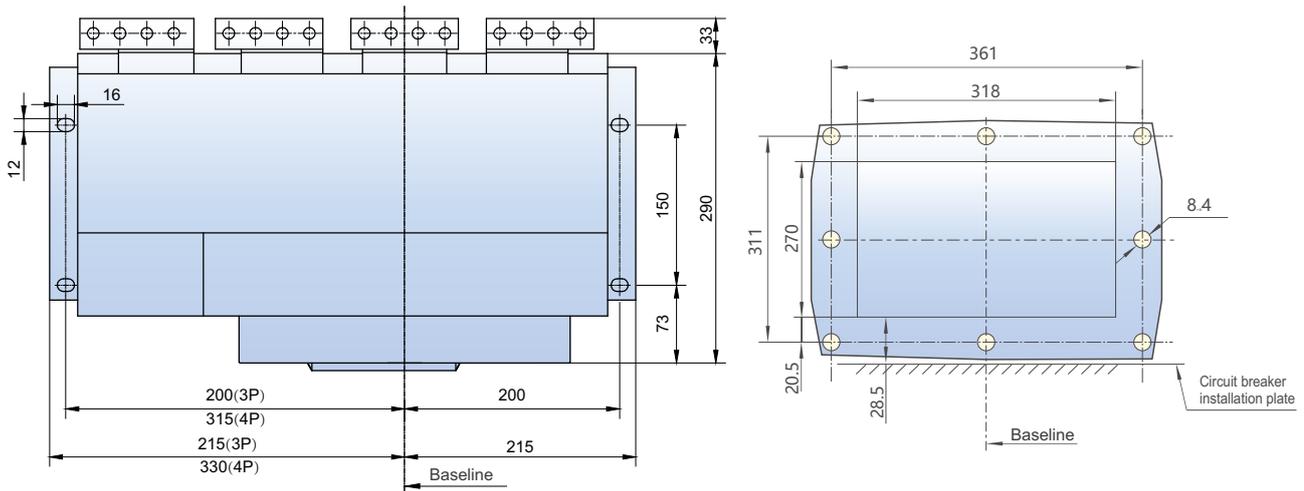
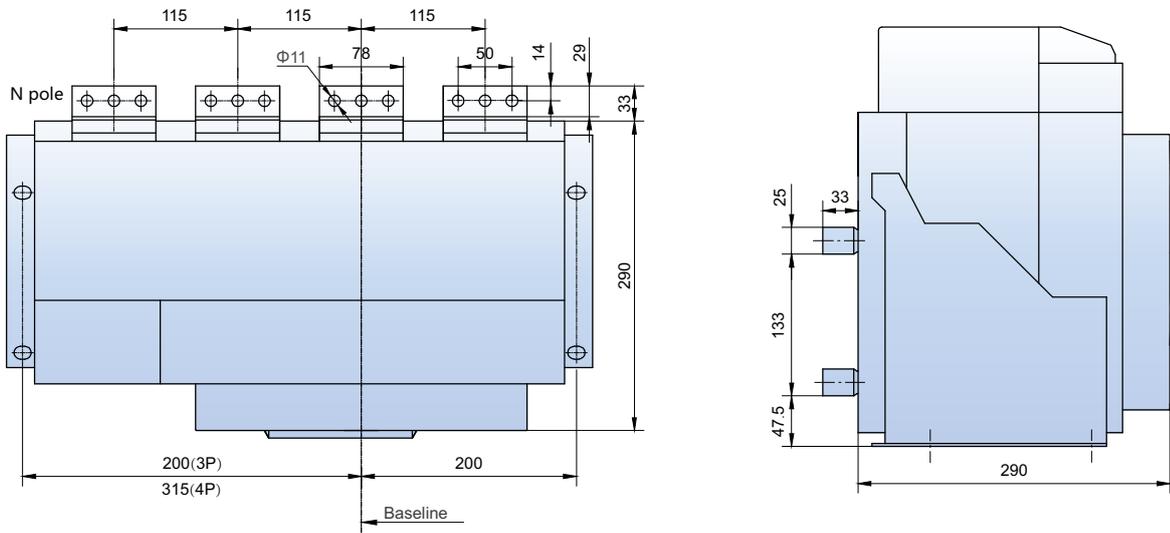


Figure 7.8-1 Perforating size of NA8G-4000 fixed type

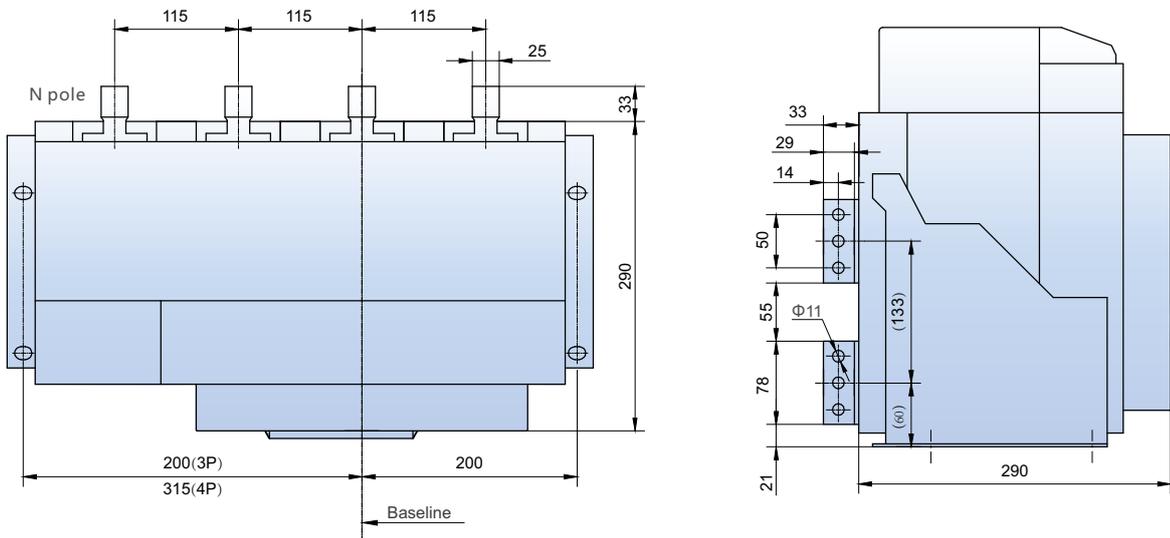
Busbar installation dimensions (factory default configuration)



**Note:** If the user wants to change the horizontal connection to the vertical connection on site, just rotate the busbar 90 °.

**Figure7.8-2 Horizontal busbar connection of NA8G-4000(In=1600A-2500A) fixed type**

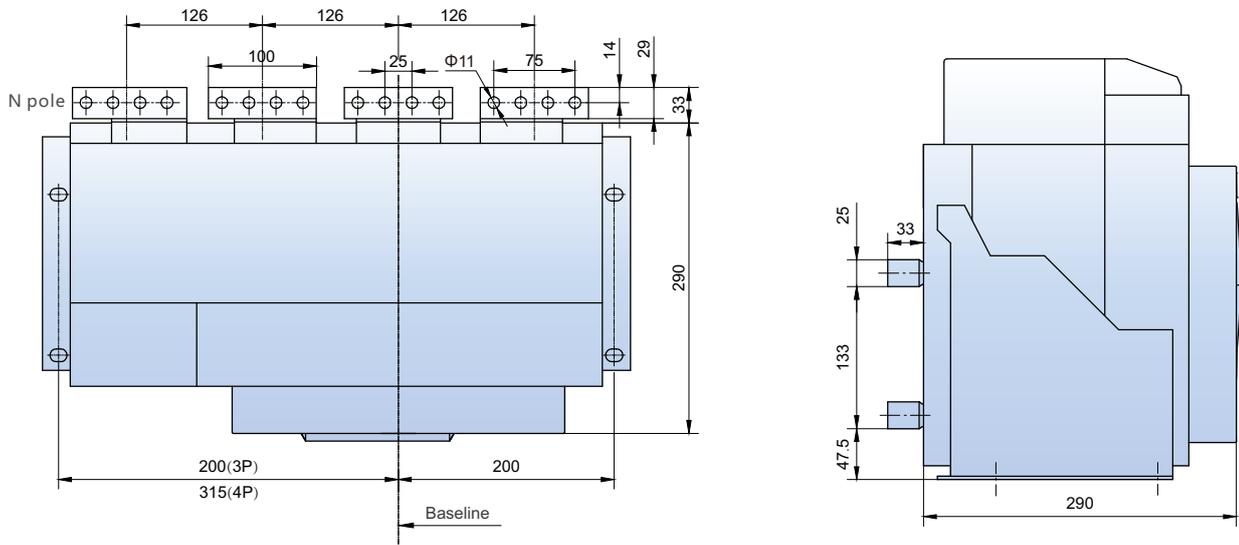
Busbar installation dimensions



**Note:** If the user wants to change the vertical connection to the horizontal connection on site, just rotate the busbar 90 °.

**Figure7.8-3 Vertical busbar connection of NA8G-4000(In=1600A-2500A) fixed type**

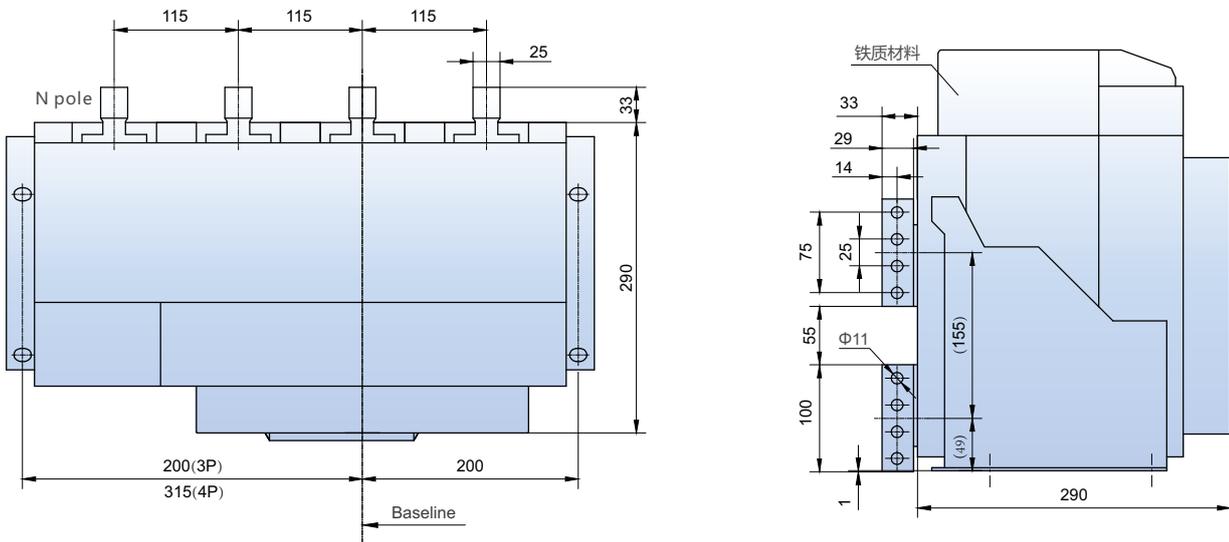
Busbar installation dimension (factory default configuration)



**Note:** If the user changes the horizontal to vertical connection on the scene, the upper and lower buses of the N and C phases on both sides need to be replaced with the same as the A and B buses of the middle.

**Figure7.8-4 Horizontal busbar connection of NA8G-4000(In=2900A-4000A) fixed type**

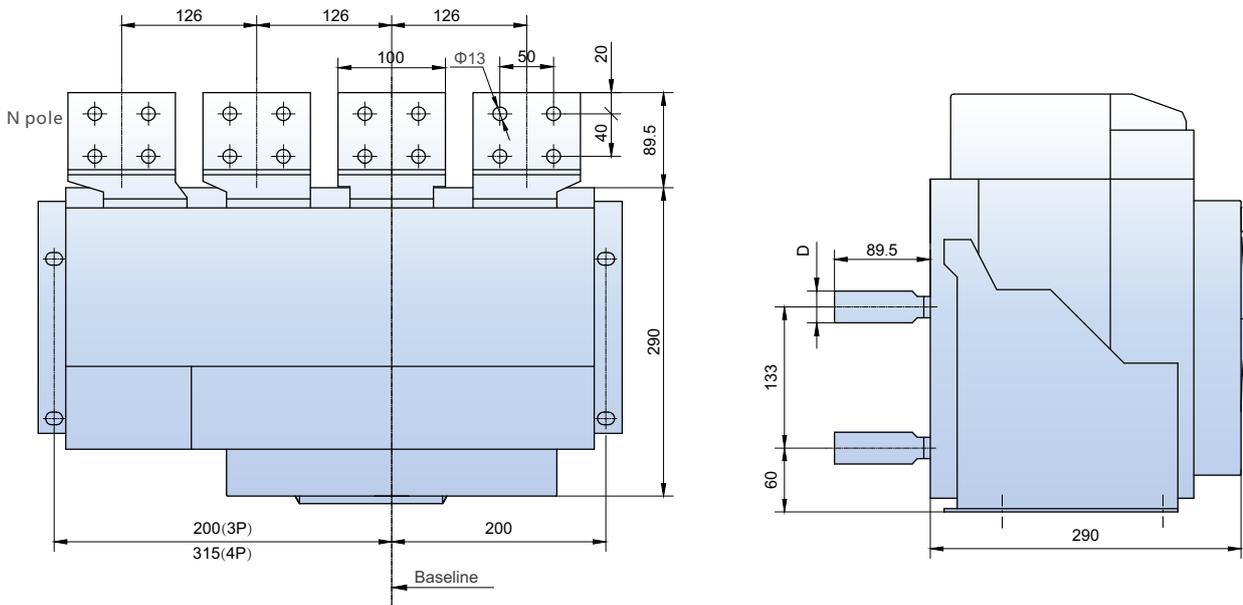
Busbar installation dimension



**Note:** If the user changes the vertical to horizontal connection on the scene, the upper and lower buses of the N and B phases on both sides need to be replaced with the horizontally connected bus specifications.

**Figure7.8-5 Vertical busbar connection of NA8G-4000(In=2900A-4000A) fixed type**

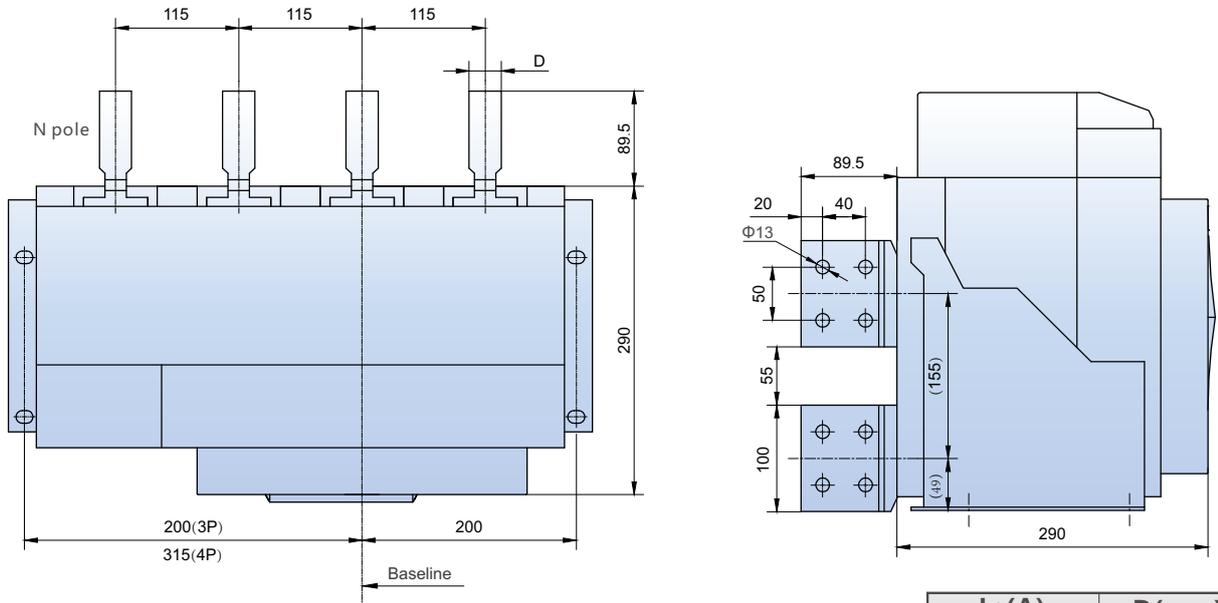
Busbar installation dimension



Note: 1) The extended busbar is an optional accessory, which requires additional costs;  
 2) If the user changes the horizontal to vertical connection on the scene, the upper and lower buses of the N and B phases on both sides need to be replaced with the same as the A and C buses of the middle.

Figure7.8-6 Horizontal extended busbar connection of NA8G-4000 fixed type

Busbar installation dimension



Note: 1) The extended busbar is an optional accessory, which requires additional costs;  
 2) If the user changes the vertical to horizontal connection on the scene, the upper and lower buses of the N and B phases on both sides need to be replaced with the horizontally connected bus specifications.

Figure7.8-6 Vertical extended busbar connection of NA8G-4000 fixed type

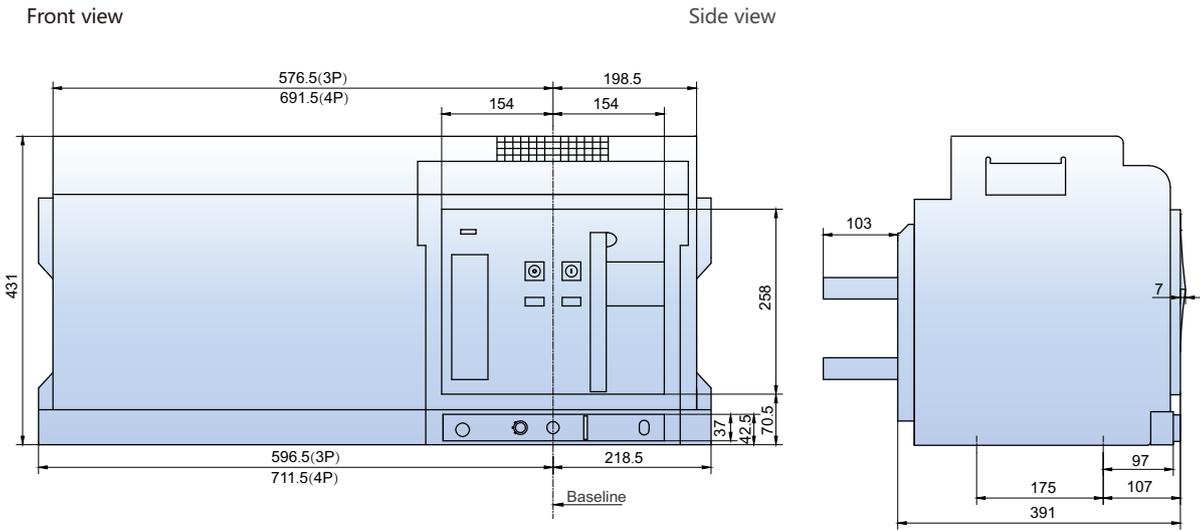


Figure 7.9 Overall dimension of NA8G-6300(In=4000A~5000A) withdrawable type

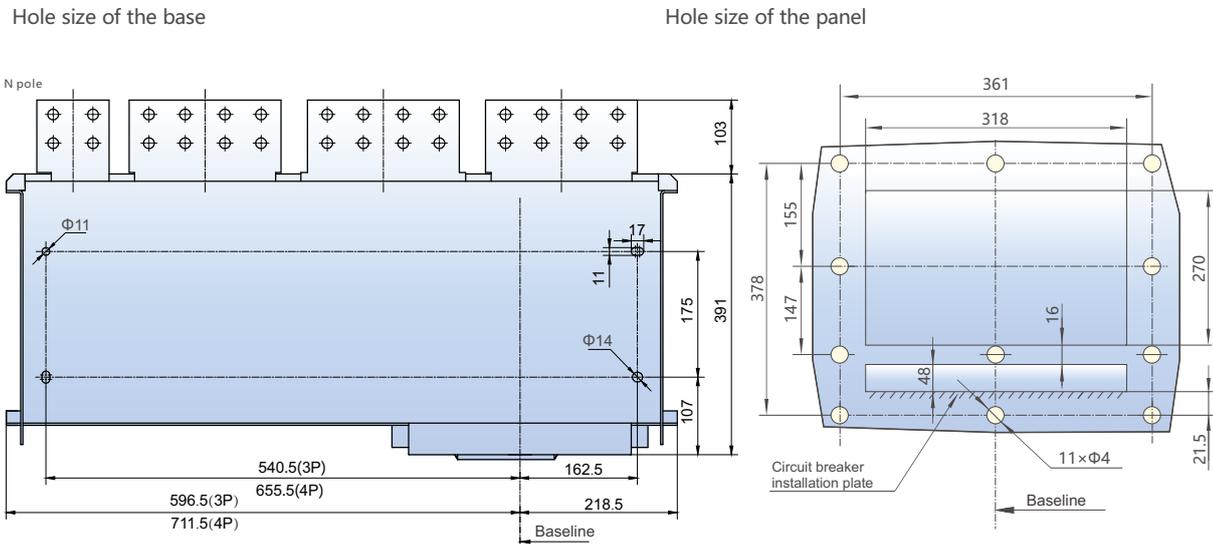


Figure 7.9-1 Perforating size of NAG8-6300(In=4000A~5000A) withdrawable type

Busbar installation dimension (factory default configuration)

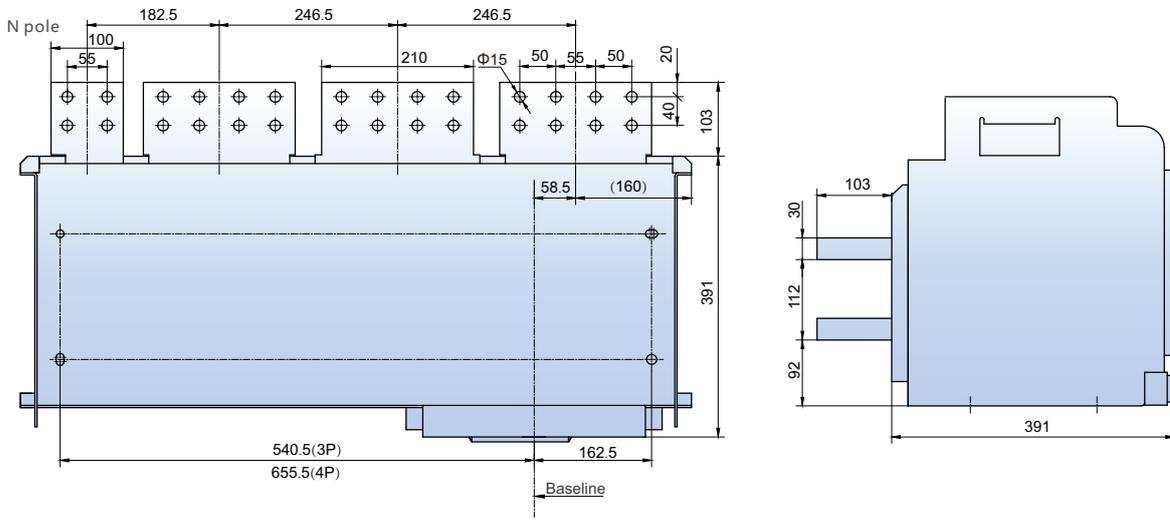


Figure 7.9-2 Horizontal busbar connection of NA8G-6300(In=4000A~5000A) withdrawable type

Front view

Side view

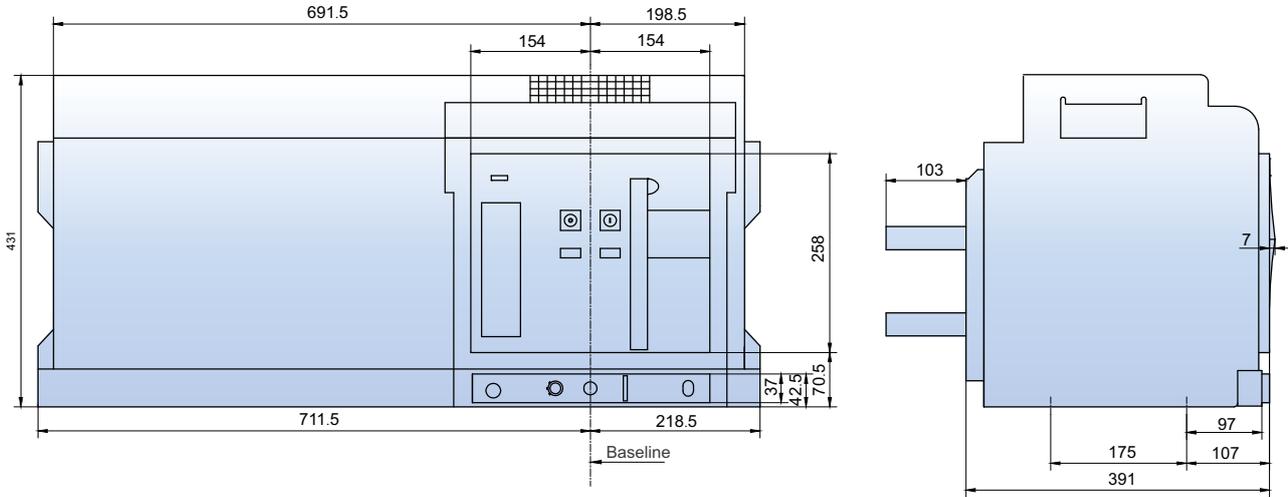


Figure 7.10 Overall dimension of NA8G-4000(In=6300A) withdrawable type

Hole size of the base

Hole size of the panel

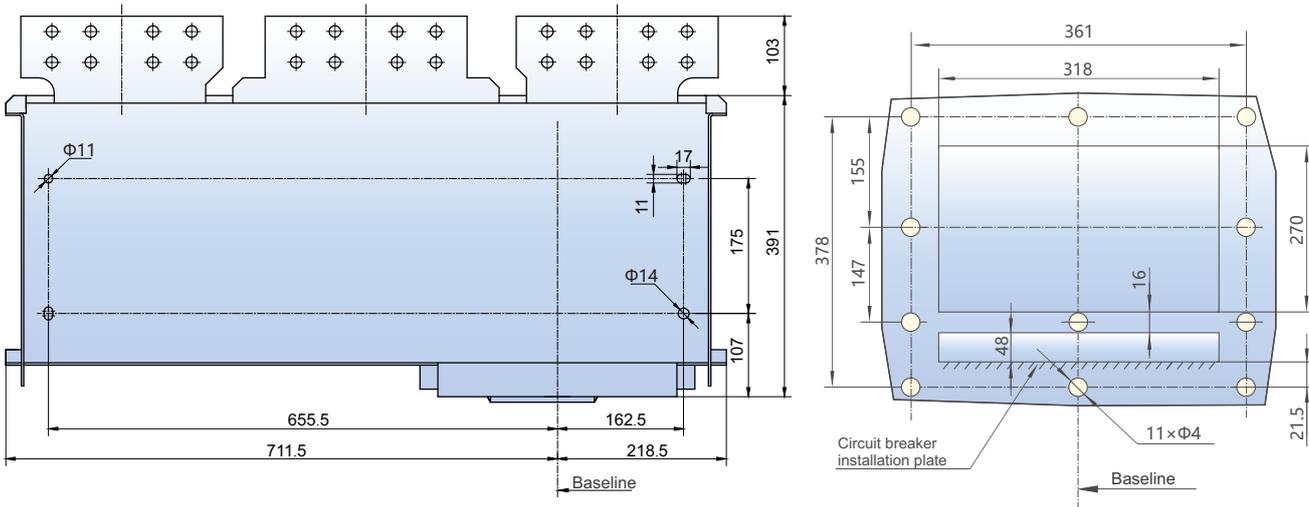


Figure 7.10-1 Perforating size of NAG8-6300(In=6300A) withdrawable type

Busbar installation dimension (factory default configuration)

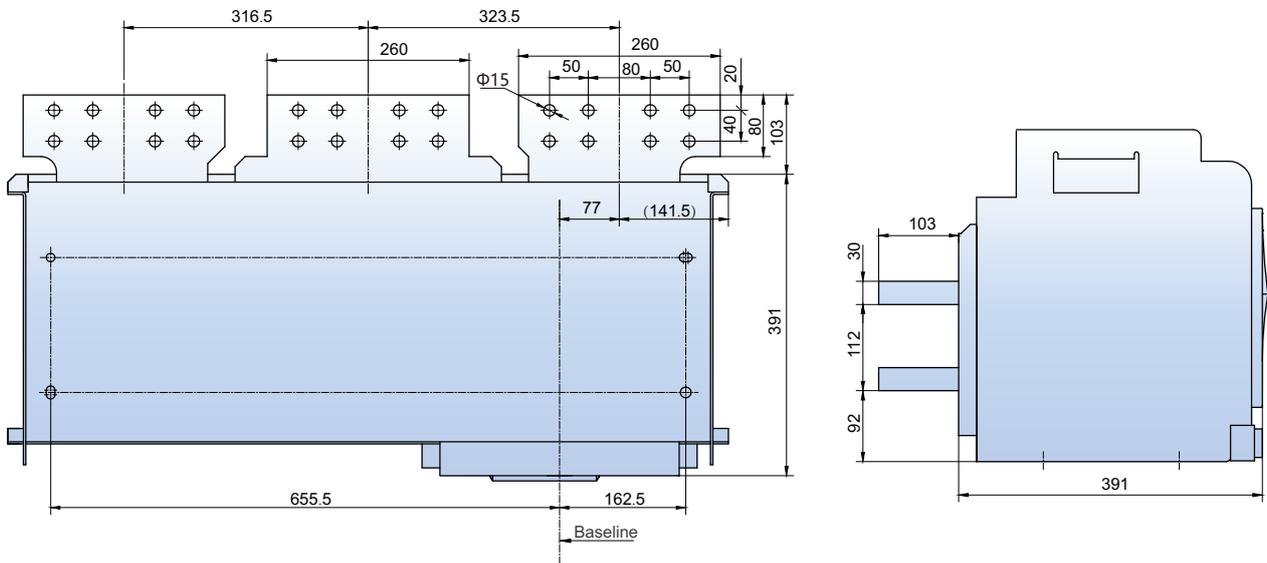
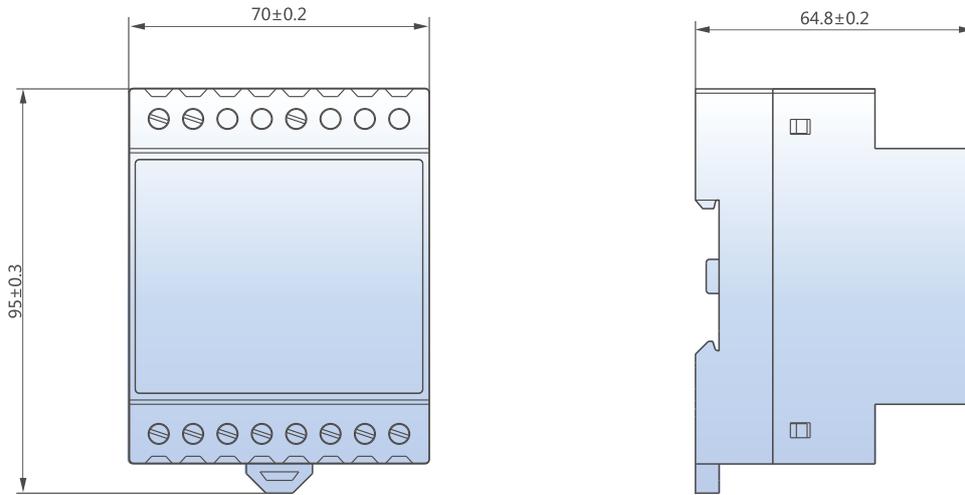
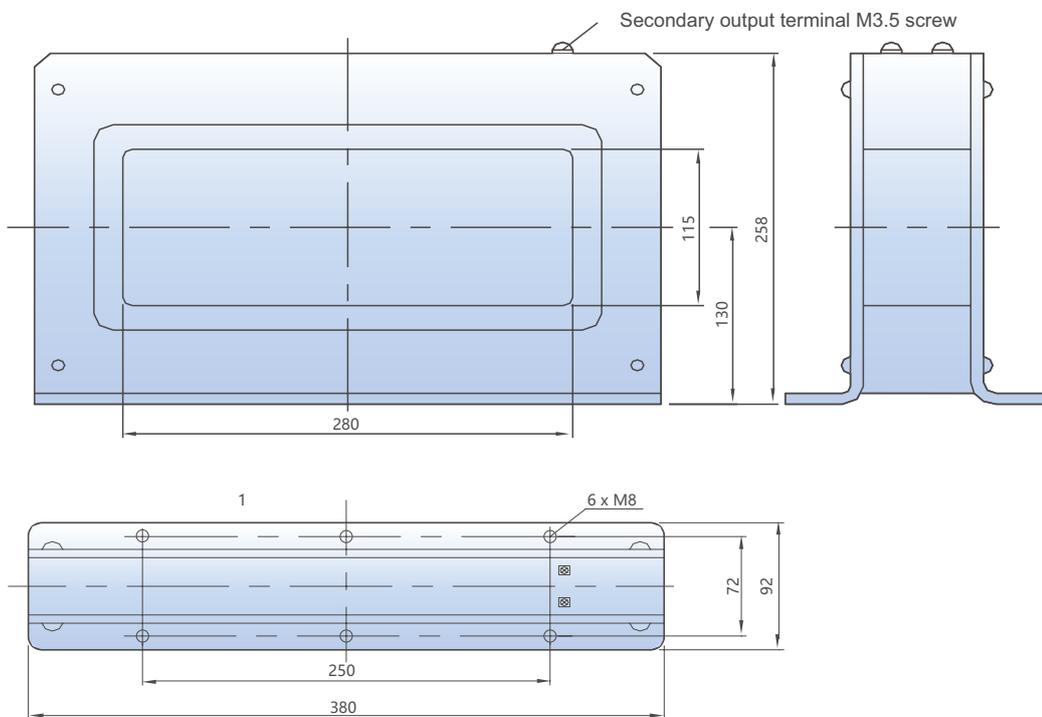


Figure 7.10-2 Horizontal busbar connection of NA8G-6300(In=6300A) withdrawable type



**Note:** Power module and RU-1 relay signal module are of same overall dimension, 35mm standard guide rail installation can also be used for installation.

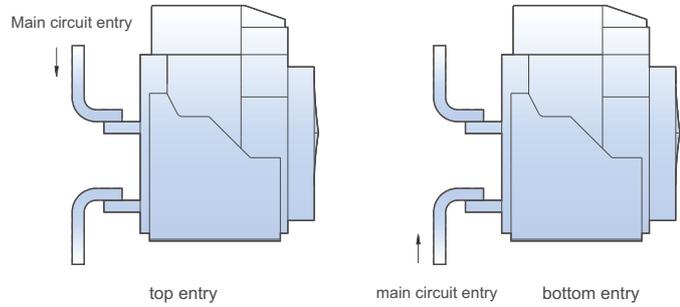
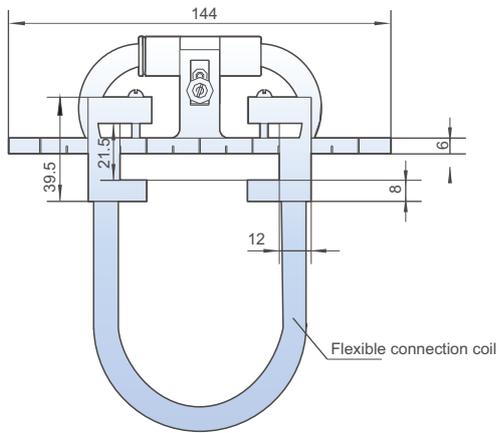
**Figure 7.11 PSU-1 power module, RU-1 relay signal module**



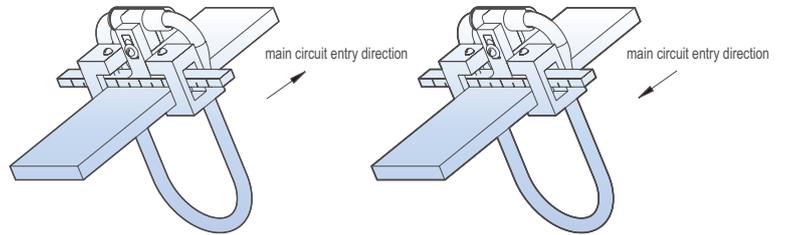
**Note:** Circuit breaker with leakage transformer must use vertical bus connection.

**Figure 7.12 Overall dimensions of leakage protection transformer**

Front view



**Note:** 1. Neutral transformer should be installed at the entry end of circuit breaker, with its flexible cable side facing towards the entry direction of main circuit.  
 2. When the rated current is 200A-630A, the transformer needs to be wrapped around the busbar twice to be used normally.



**Figure 7.12 Overall dimensions of neutral pole current transformer**

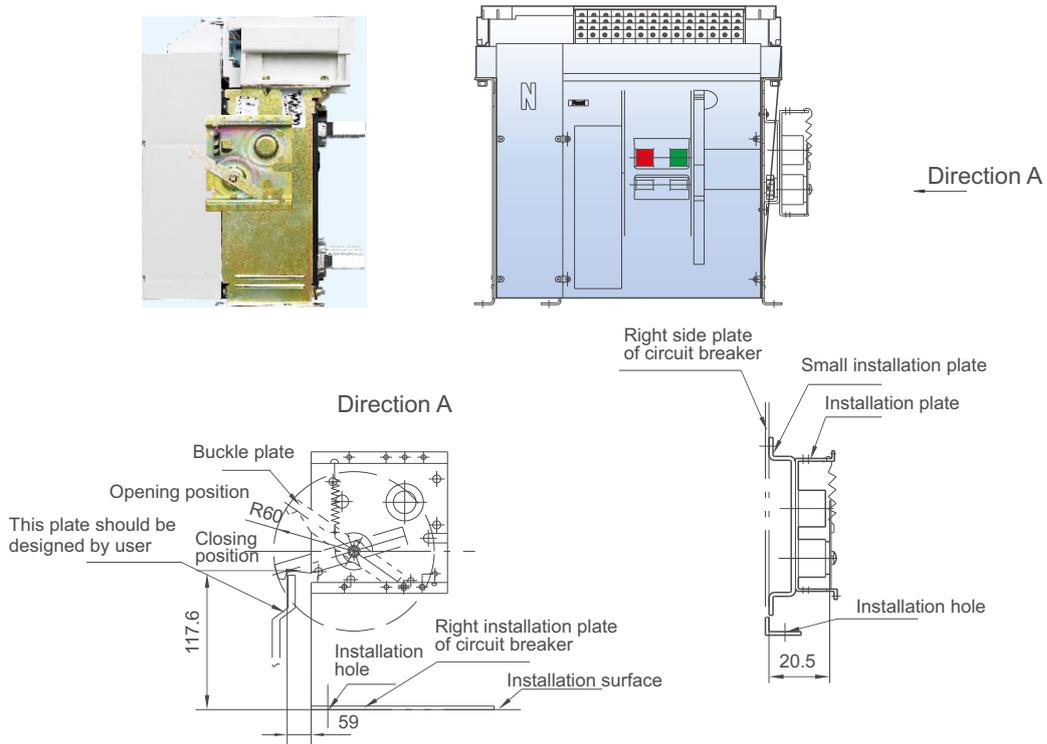


Figure 7.13 NA8G-1600 fixed type circuit breaker status door interlock installation dimensions

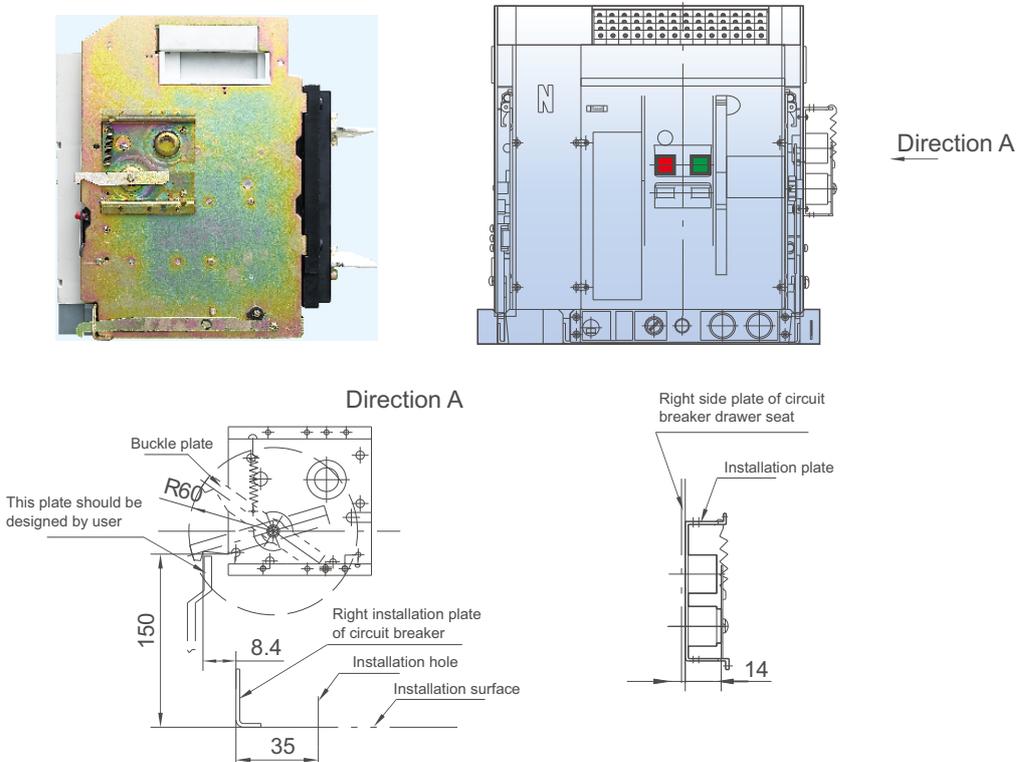


Figure 7.14 NA8G-1600 withdrawable type circuit breaker status door interlock installation dimensions

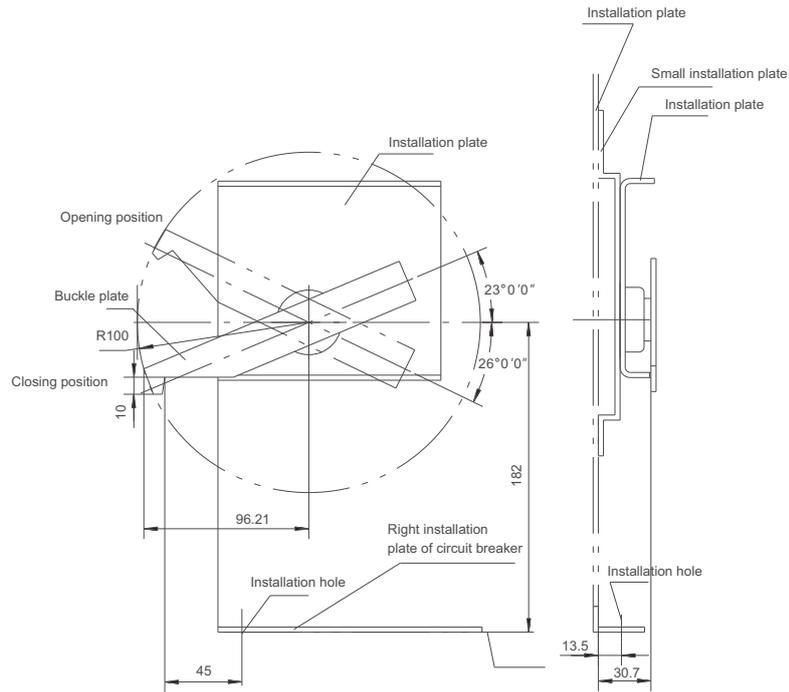


Figure 7.15 NA8G-2500~4000 fixed type circuit breaker status door interlock installation dimensions

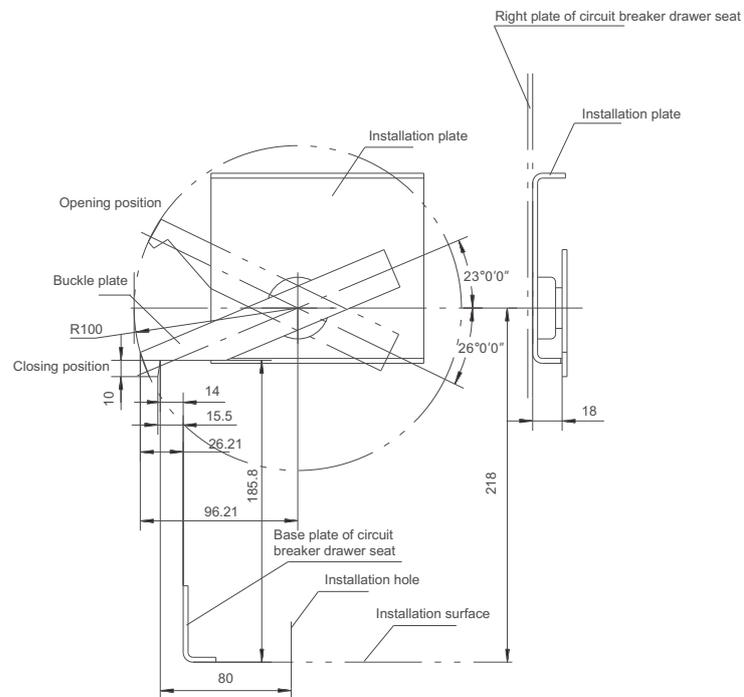


Figure 7.16 NA8G-2500~6300 withdrawable type circuit breaker status door interlock installation dimensions

### 8. Control Circuit Electrical Wiring Diagram

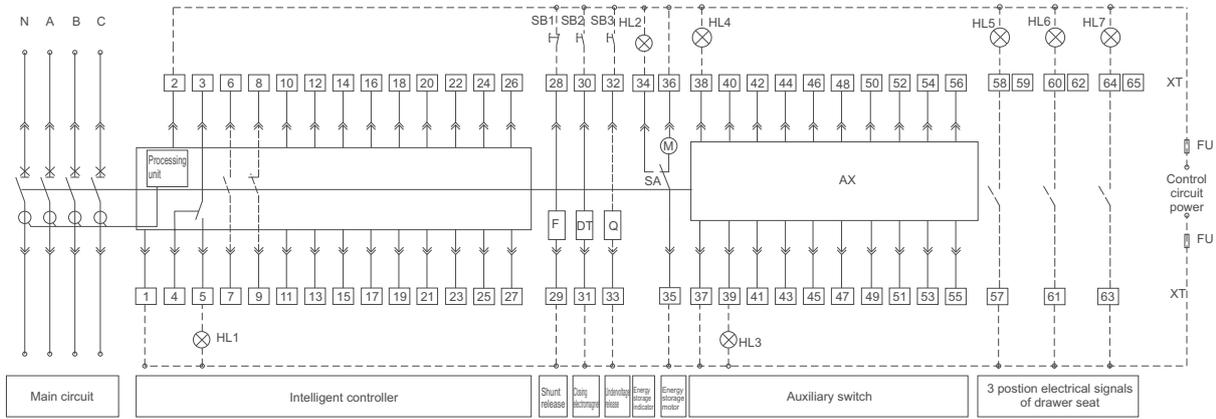
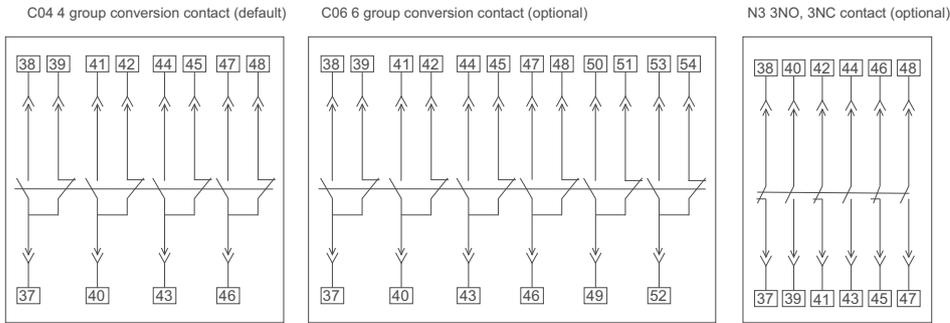


Figure 8.1 Control circuit wiring diagram of NA8G-1600 M controller



F—shunt release DT—closing electromagnet Q—undervoltage release M—motor operating mechanism  
 SA—position switch XT—terminal AX—auxiliary terminal SB1—Breaking button  
 SB2—Making button SB3—emergency stop button HL1—fault indicator HL2—energy storage indicator  
 HL3—Breaking indicator HL4—Making indicator HL5-7—position indicator  
 FU—fuse (6A)  
 1#, 2#: intelligent controller power: voltage AC220/380V, can be directly connected to 1#, 2#; If voltage is DC220/110V, a 24V output from power module is required before being connected to 1#, 2#  
 3#- 5#: trip alarm contact (3 is the common contact)  
 6#- 9#: auxiliary contact (1 NO and 1 NC contact), optional  
 10#, 11#: empty  
 12#- 19#: empty

20#: empty  
 21#- 24#: empty  
 24#, 25#: signal input contact for external N phase transformer, normally empty, used as signal input contact for external transformer if specially ordered by user.  
 27#: protectively earthed, connected to exterior panel of circuit breaker.  
 28#, 29#: shunt release; 30#, 31#: closing electromagnet; 32#, 33#: undervoltage release  
 34#-36#: motor operating mechanism  
 37#- 56#: auxiliary contact. Normally 4 groups of changeover auxiliary contacts, 6 groups of changeover auxiliary contacts or 3NO/3NC contacts are available if specially ordered by user.  
 6-group conversion auxiliary contacts are only applicable to AC current.  
 57#-65#: 3 position signal indicator for withdrawable circuit breaker, no connection for regular delivery, only for withdrawable circuit breakers with the functions.  
 Note: Solid lines are factory connected, dotted lines need to be connected by user.

Figure 8.1-1 AX auxiliary contact wiring diagram of NA8G-1600 M controller

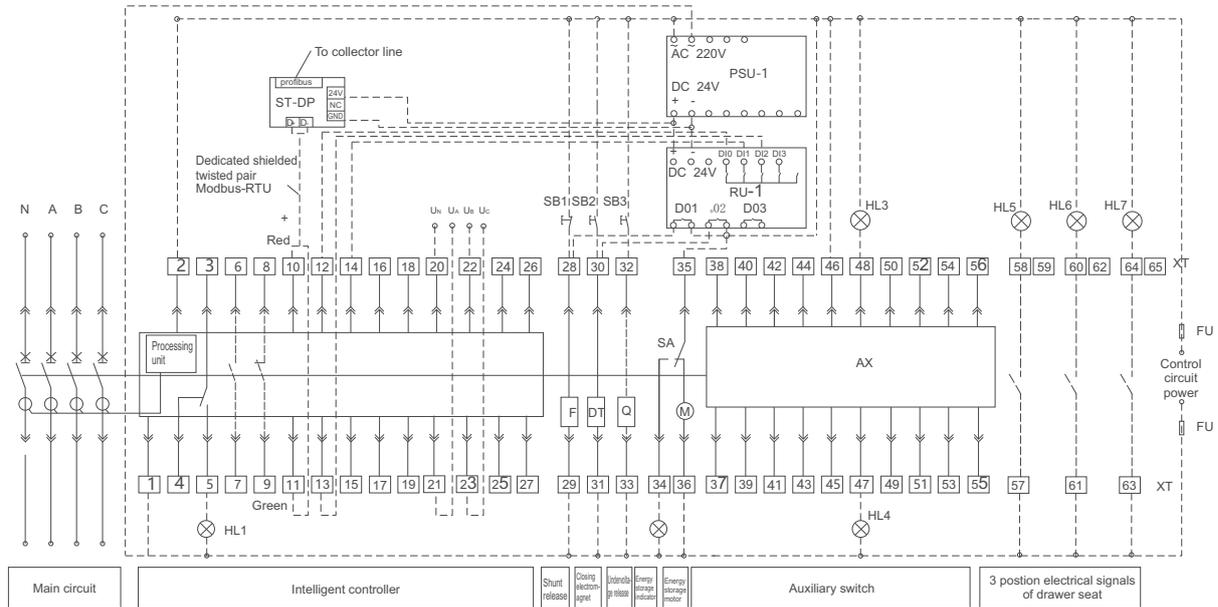
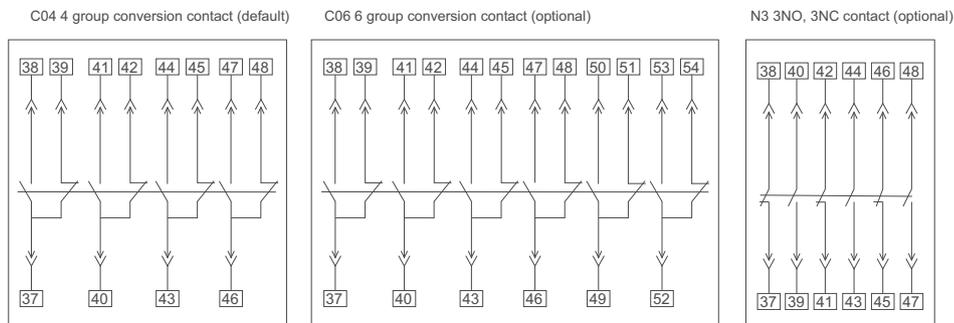


Figure 8.2 Control circuit wiring diagram of NA8G-1600 H controller



F—shunt release DT—closing electromagnet Q—under voltage release M—motor operating mechanism SA—position switch XT—terminal AX—auxiliary terminal SB1—Breaking button SB2—Making button SB3—emergency stop button HL1—fault indicator HL2—energy storage indicator HL3—Breaking indicator HL4—Making indicator HL5~7—position indicator FU—fuse (6A)

1#, 2#: intelligent controller power: voltage AC220/380V, can be directly connected to 1#, 2#. If voltage is DC220/110V, a 24V output from power module is required before being connected to 1#, 2#

3#~ 5#: trip alarm contact (3 is the common contact)

6#~ 9#: auxiliary contact (1 NO and 1 NC contact), optional

10#, 11#: H type intelligent controller default communication output terminal

12#~ 15#: 3 groups of programmable output signals, must be connected with external RU-1 relay module. Default outputs of H type intelligent controller with programmable output signals: 12#, 13#: closing signal output, 12#, 14#: opening signal output, 12#, 15#: fault trip. No connection for normal product.

19#: H intelligent controller communication shield grounding.

20#~ 23#: voltage display input signal terminal, 20#: Phase N voltage signal, 21#: phase A voltage signal, 22#: phase B voltage signal, 23#: phase C voltage signal. No connection for normal product.

24#, 25#: signal input contact for external N phase transformer or external earth current transformer, normally empty, used as signal input contact for external transformer if specially ordered by user.

27#: protectively earthed, connected to exterior panel of circuit breaker.

28#, 29#: shunt release; 30#, 31#: closing electromagnet; 32#, 33#: undervoltage release

34#~36#: motor operating mechanism

37#~ 56#: auxiliary contact. 6-group conversion auxiliary contacts are only applicable to AC current.

Normally 4 groups of changeover auxiliary contacts, 6 groups of changeover auxiliary contacts or 3NO/3NC contacts are available if specially ordered by user.

57#~65#: 3 position signal indicator for withdrawable circuit breaker, no connection for regular delivery, only for withdrawable circuit breakers with the functions.

ST-DP: DP protocol module, no need for ST-DP protocol module if upstream communication protocol is Modbus-RTU; use ST-DP protocol module to transfer Modbus-RTU protocol into Profibus-DP protocol if upstream communication protocol is Profibus-DP, which will be charged separately.

RU-1: relay module. Upstream machine opens and closes circuit breaker through remote control, used for opening and closing signal energy amplification, which will be charged separately.

Note: Solid lines are factory connected, dotted lines need to be connected by user.

Figure 8.2-1 AX auxiliary contact wiring diagram of NA8G-1600 H controller

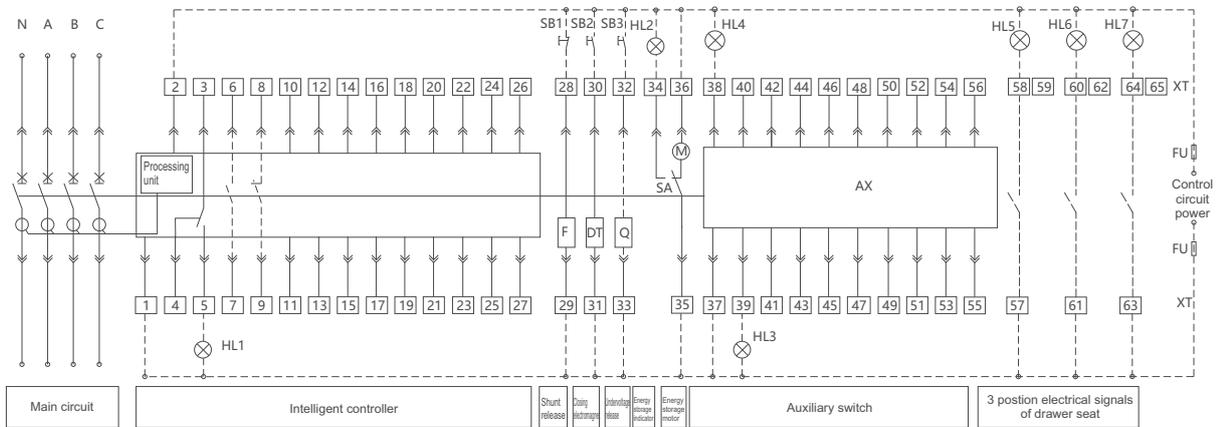
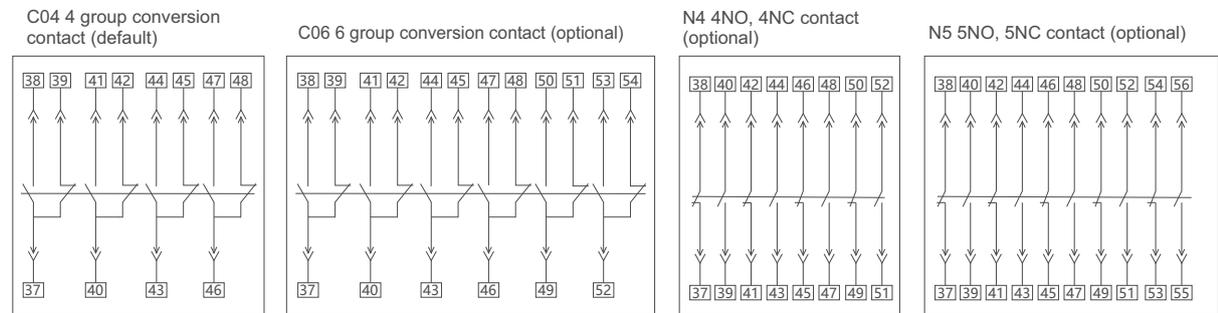


Figure 8.3 Control circuit wiring diagram of NA8G-2500~6300 M controller



F—shunt release DT—closing electromagnet Q—under voltage release M—motor operating mechanism  
 SA—position switch XT—terminal AX—auxiliary terminal SB1—Breaking button  
 SB2—Making button SB3—emergency stop button HL1—fault indicator HL2—energy storage indicator HL3—Breaking indicator HL4—Making indicator HL5~7—position indicator FU—fuse (6A)  
 1#, 2#: intelligent controller power: voltage AC220/380V, can be directly connected to 1#, 2#; If voltage is DC220/110V, a 24V output from power module will be required before being connected to 1#, 2#  
 3#~ 5#: trip alarm contact (3 is common contact)  
 6#~ 9#: auxiliary contact (1 NO and 1 NC contact), optional  
 10#, 11#: empty  
 12#~ 19#: empty  
 20#: empty  
 21#~ 24#: empty

24#, 25#: signal input contact for external N phase transformer, normally empty, used as signal input contact for external transformer if specially ordered by user.  
 27#: protectively earthed, connected to exterior panel of circuit breaker.  
 28#, 29#: shunt release; 30#, 31#: closing electromagnet; 32#, 33#: undervoltage release  
 34#~36#: motor operating mechanism  
 37#~ 56#: auxiliary contact. 6-group conversion auxiliary contacts are only applicable to AC current.  
 Normally 4 groups of changeover auxiliary contacts, 6 groups of changeover auxiliary contacts or 4NO/4NC contacts and 5NO/5NC contacts are available if specially ordered by user.  
 57#~65#: 3 position signal indicator for withdrawable circuit breaker, no connection for regular delivery, only for withdrawable circuit breakers with the functions.  
 Note: Solid lines are factory connected, dotted lines need to be connected by user.

Figure 8.3-1 AX auxiliary contact wiring diagram of NA8G-2500~6300 M controller

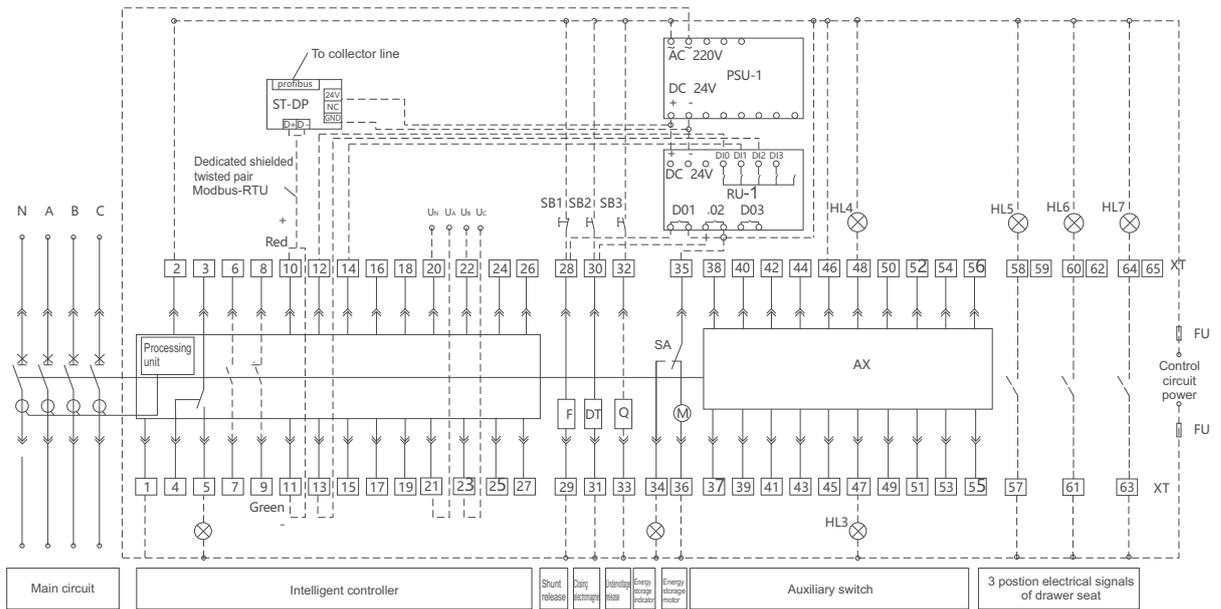
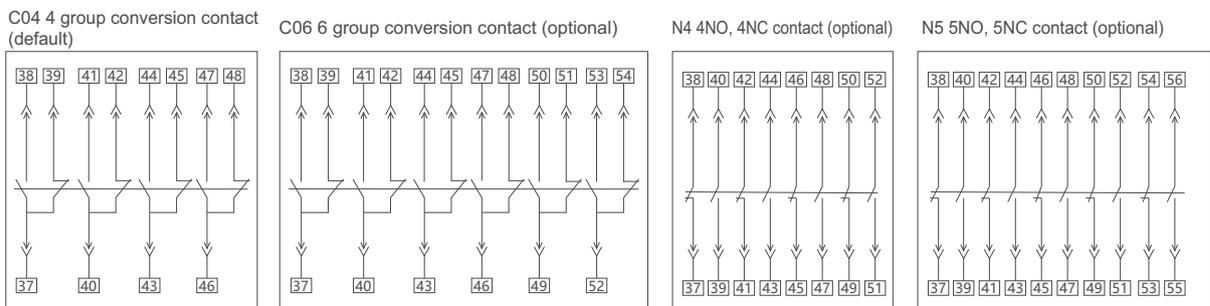


Figure 8.4 Control circuit wiring diagram of NA8G-2500~6300 H controller



F—shunt release DT—closing electromagnet Q—undervoltage release M—motor operating mechanism SA—position switch XT—terminal AX—auxiliary terminal SB1—Breaking button SB2—Making button SB3—emergency stop button HL1—fault indicator HL2—energy storage indicator HL3—Breaking indicator HL4—Making indicator HL5~7—position indicator FU—fuse (6A)

1#, 2#: intelligent controller power: voltage AC220/380V, can be directly connected to 1#, 2#; If voltage is DC220/110V, a 24V output from power module is required before being connected to 1#, 2#

3#~ 5#: trip alarm contact (3 is common contact)

6#~ 9#: auxiliary contact (1 NO and 1 NC contact), optional

10#, 11#: H type intelligent controller default communication output terminal

12#~ 15#: 3 groups of programmable output signals, must be connected with external RU-1 relay module. Default outputs of H type intelligent controller with programmable output signals: 12#, 13#: closing signal output, 12#, 14#: opening signal output, 12#, 15#: fault trip. No connection for normal product.

19#: H intelligent controller communication shield grounding.

20#~ 23#: voltage display input signal terminal, 20#: N phase voltage signal, 21#: phase A voltage signal, 22#: phase B voltage signal, 23#: phase C voltage signal. No connection for normal product.

24#, 25#: signal input contact for external N phase transformer or external earth current transformer, normally empty, used as signal input contact for external transformer if specially ordered by user.

27#: protectively earthed, connected to exterior panel of circuit breaker.

28#, 29#: shunt release; 30#, 31#: closing electromagnet; 32#, 33#: undervoltage release

34#~36#: motor operating mechanism

37#~ 56#: auxiliary contact. 6-group conversion auxiliary contacts are only applicable to AC current.

Normally 4 groups of changeover auxiliary contacts, 6 groups of changeover auxiliary contacts or 4NO/4NC contacts and 5NO/5NC contacts are available if specially ordered by user.

57#~65#: 3 position signal indicator for withdrawable circuit breaker, no connection for regular delivery, only for withdrawable circuit breakers with the functions.

ST-DP: DP protocol module, no need for ST-DP protocol module if upstream communication protocol is Modbus-RTU; use ST-DP protocol module to transfer Modbus-RTU protocol into Profibus-DP protocol if upstream communication protocol is Profibus-DP, which will be charged separately.

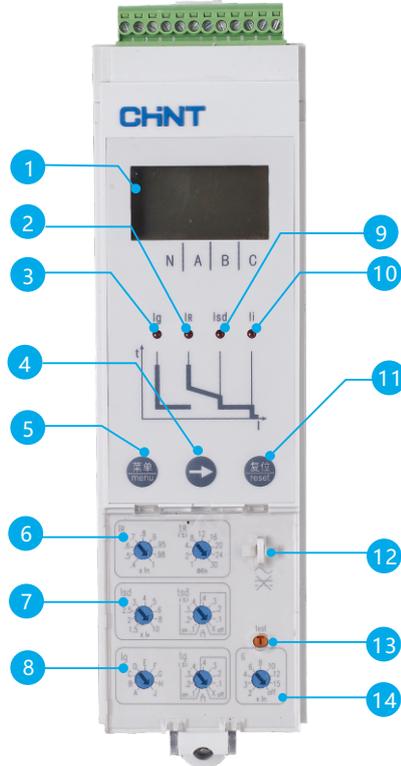
RU-1: relay module. Upstream machine opens and closes circuit breaker through remote control, used for opening and closing signal energy amplification, which will be charged separately.

Note: Solid lines are factory connected, dotted lines need to be connected by user.

Figure 8.4-1 AX auxiliary contact wiring diagram of NA8G-2500~6300 H controller

## 9. Intelligent controller usage

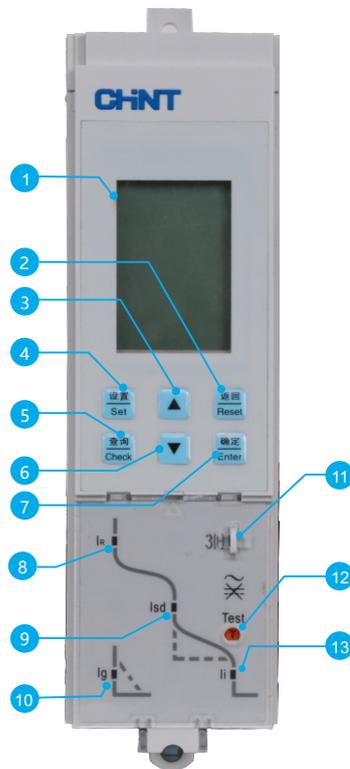
### 9.1 Operation interface of M type (basic type) intelligent controller



- 1 Display window: shows current value, setting parameters, fault current, release time, etc.
- 2 Ir indicator: overload long-time-delay fault indication.
- 3 Ig indicator: earth, neutral fault indication.
- 4 “→” button: used to query the current value of each phase; after entering the submenu, select the contents in the submenus of each level in a cycle.
- 5 Menu button: Press the menu button to enter the sub-menus of each level in turn.
- 6 Overload and long-time-delay protection settings: the left knob is for setting the multiple of the long delay protection current; the right knob is for setting the delay time.
- 7 Short-circuit short-time-delay protection setting: The left-hand knob is for setting the multiple of the short-time-delay protection current.
- 8 Earth fault protection setting: the left knob is for setting the earth fault protection current multiple; the right knob is for setting the delay time.
- 9 Isd indicator: short-circuit short-time-delay fault indication.
- 10 Li indicator: short-circuit instantaneous fault indication.
- 11 Reset button: return to the previous menu; the controller software is reset, the reset button must be pressed after the knob setting switch is adjusted; control. There is a fault memory after the device trips, it must be cleared by pressing the reset key.
- 12 Cover lock hole.
- 13 Button for tripping test.
- 14 Short-circuit instantaneous current protection setting: Knob setting instantaneous protection multiple of current.

Figure 9.1 M-type (basic type) intelligent controller

## 9.2 Operation interface of H type (communication type) intelligent controller



- 1 Display window: shows current, set parameters, fault current, release time, etc.
- 2 Return key: exit current menu to previous one, or cancel current parameter setting value
- 3 Up key: move select box upwards under current menu, or used to input "+" setting value under parameter setting
- 4 Setup key: switch to default setup menu
- 5 Inquiry key: switch to default inquiry menu
- 6 Down key: move select box downwards under current menu, or used to input "-" setting value under parameter setting
- 7 Confirm key: enter the next menu of the selected box, or save current parameter setting
- 8 Ir indicator for overload long-time-delay tripping
- 9 Isd indicator for short circuit short-time-delay tripping
- 10 Ig indicator for earth fault tripping
- 11 Cover lock hole
- 12 Button for tripping test
- 13 Ii indicator for short-circuit instantaneous tripping

Figure 9.2 H type (communication type) intelligent controller

### 9.3 Intelligent controller feature introduction

#### 9.3.1 Overcurrent protection curve

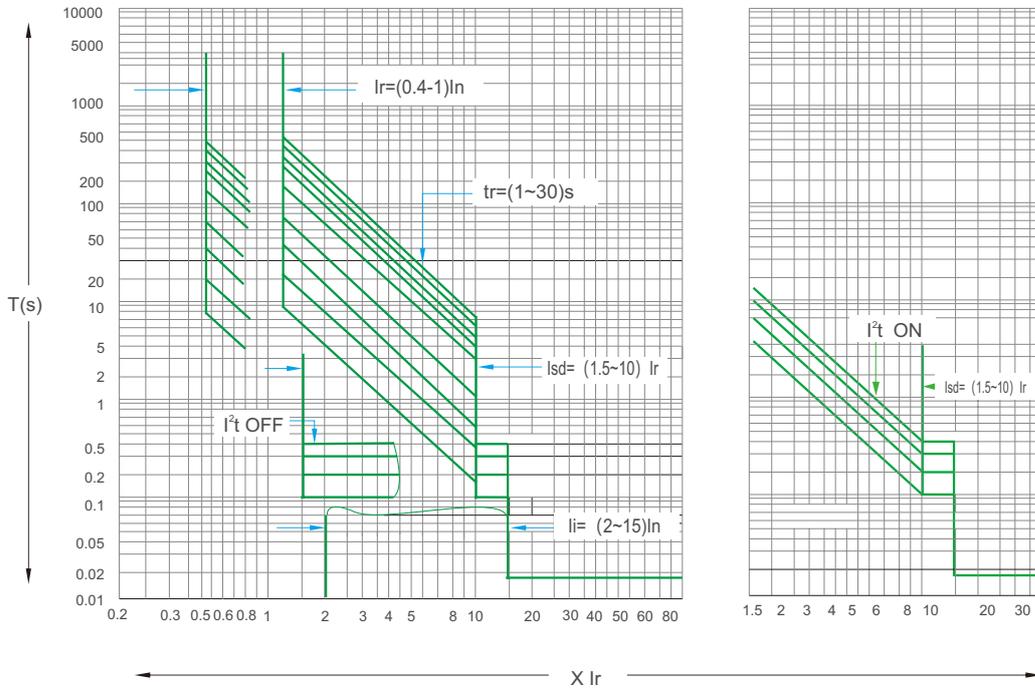


Figure 9.3-1 Overcurrent protection curve

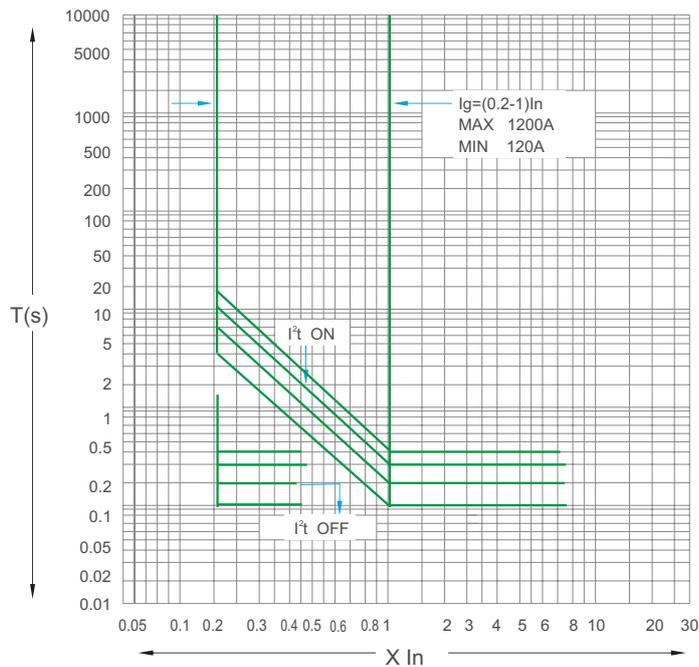


Figure 9.3-2 Neutral line (earthing) fault protection curve

9.4 Intelligent controller protection features

a. Overload long time delay protection

The overload long delay protection function is generally used to protect the cable overload, and the protection is based on the true RMS value of the current.

Table 17 Parameter setting and action characteristics of overload long delay

Setting parameters	Setting range	Current action error								
Long-time-delay current setting value $I_r$	M type: (0.4 ~ 1.0) $I_n$ H type: (0.4 ~ 1.0) $I_n + OFF$	±15%								
Long-time-delay current setting step	H type: 1A (1600 ~ 2500 frame) ; 2A (3200 ~ 6300 frame)									
Long-time-delay time setting value $t_r$	(1-2-4-8-12-16-20-24-30) s	±10%								
Inverse time characteristic	$t = \left(\frac{6}{N}\right)^2 \times t_r$									
Multiple of fault current	Action time									
$I < 0.85I_r$	No action									
$I > 1.15I_r$	Action									
1.5 $I_r$	16	32	64	128	192	256	320	384	480	
2.0 $I_r$	9	18	36	72	108	144	180	216	270	
6.0 $I_r$	1	2	4	8	12	16	20	24	30	

Note: For the inverse time characteristic curve, its code meaning is

N --- fault current divided by multiple of set current  $I / I_r$

t --- Delay time for fault action

$t_r$  --- long delay time set value

Allowable error of operating time ± 15%

Conventional factory setting: overload long delay current 1.0 $I_n$ ;

Normal factory setting: Action time 2s (under 6 $I_r$ )

Example: Known overload long delay current 1.0 $I_n$ , delay time 2s (under 6 $I_r$ ), now line current  $I = 1.8I_n$ , the actual fault action delay time can be calculated:

$$N = 1.8I_n / 1.0I_n = 1.8$$

$$t = (6 / 1.8)^2 \times 2 = 22.2s$$

b. Short-circuit short-delay protection

The short-time delay protection is based on the current effective value (RMS) protection, which is divided into two sections: the anti-time section and the definite-time section; it further strengthens the cooperation with the lower-level protection devices.

Table 18 Short circuit short delay parameter settings and operating characteristics

Setting parameters	Setting range	Current action error
Short delay current setting value $I_{sd}$	M type: 1.5 10 $I_n$ H type: (1.5 ~ 10) $I_n + OFF$	±10%
Short delay current setting step	H type: 1A (1600 ~ 2500 frame) ; 2A (3200 ~ 6300 frame)	
Short delay time setting value $t_{sd}$	M type--Definite-time limit 0.1 0.2 0.3 0.4 anti-time limit 0.1 0.2 0.3 0.4 H type--Definite-time limit: 0.11, 0.21, 0.31, 0.41; anti-time limit: 0.1, 0.2, 0.3, 0.4	± 15% or inherent ± 40ms (take the maximum value)
Current	Action time	
$I < 0.9I_{sd}$	No action	
$I > 1.15I_{sd}$	Delay action	
$I_{sd} < I \leq 10I_r$	Anti-time limit	Operating characteristics $I^2t = (10I_r)^2 t_{sd}$
		Setting time (s): 0.1, 0.2, 0.3, 0.4
$I \geq 1.1I_{sd}$	Definite-time limit	Setting time (s): 0.11 0.21 0.31 0.41
		Minimum (s): 0.06, 0.16, 0.255, 0.34
		Maximum(s): 0.14, 0.24, 0.345, 0.46
Return time		0.05, 0.14, 0.25, 0.33

Note: For the anti-time characteristic curve, its code meaning is

I<sub>sd</sub> --- short-time-delay current set value

I ----- fault current value

I<sub>r</sub> ---- long-time-delay current set value

t ----- fault action delay time

t<sub>sd</sub> --- short-time delay to achieve the set value

Allowable error of action time ± 15%

Conventional factory setting: short delay current 8.0I<sub>r</sub>; Conventional factory setting: short delay time limit 0.41s.

**c. Short-circuit transient protection characteristics**

The short-circuit instantaneous protection function prevents solid-state short-circuits in the power distribution system. Such faults are generally phase-to-phase faults. The short-circuit current is large and needs to be quickly disconnected. Instantaneous protection is based on the true RMS value of the current.

**Table 18 Short-circuit transient protection characteristics**

Setting parameters	Setting range
Instantaneous current setting value I <sub>i</sub>	(2 ~ 15) I <sub>n</sub> +OFF
Instantaneous current setting step	1A (1600 ~ 2500 frame) 2A (3200 ~ 6300 frame)
Action characteristics	I < 0.85I <sub>i</sub> no action
	I > 1.15I <sub>i</sub> action
	Action time                        ≤100ms

**d. Single-phase ground protection**

For single-phase metal grounding protection, there are two protection methods: vector sum (difference) type (T) and ground current type (W). The vector sum type detects the zero-sequence current, that is, takes the vector sum of the four-phase (three-phase four-wire system) or three-phase (three-phase three-wire system) current for protection. The ground current type uses a special external transformer to directly detect the current on the ground cable. It can simultaneously protect the upper and lower ground faults of the circuit breaker. The maximum distance between the transformer and the circuit breaker does not exceed 5 meters.

**Table19 Earthing fault protection setting range**

Product model	Setting range	Setting step	Current error
1600 frame	(0.2 ~ 1.0) I <sub>n</sub> +OFF, Max 1200A	1A	±15%
2500 frame	(0.2 ~ 1.0) I <sub>n</sub> +OFF, Max 1200A	1A	
3200~6300 frame	500A ~ 1200A+OFF	2A	

**Table20 Definite-time earth fault protection features**

fault current	Delay action time (s)				
	> I <sub>g</sub>	Setting time	0.11	0.21	0.31
Minimum delay		0.06	0.16	0.255	0.34
Maximum delay		0.14	0.24	0.345	0.46
Returnable time		0.05	0.14	0.25	0.33

**Table 21 Anti-time earth fault protection features**

fault current	Delay action time (s)				
	Setting time	0.1	0.2	0.3	0.4
> I <sub>g</sub> and (I ≥ 0.8I <sub>n</sub> or 1200A)	Setting time	0.1	0.2	0.3	0.4
	Minimum delay	0.06	0.16	0.255	0.34
	Maximum delay	0.14	0.24	0.345	0.46
> I <sub>g</sub> and (I < 0.8I <sub>n</sub> or 1200A)	Inverse time delay	$t = \frac{(I_g)^2}{I^2} \times t_g$			
	Returnable time	0.05	0.14	0.25	0.33

Note: I<sub>g</sub>-Set value for Earthing protection;

I-Fault current value

T-Fault operation delay time

t<sub>g</sub>-Set value for earthing inverse time lag

Allowable error of inverse time lag operation time ±15%

Normal factory setting:OFF

## 9.5 Auxiliary Function Description

### 9.5.1 Test function description

When the controller cooperates with the circuit breaker in the field debugging, periodic inspection or maintenance, it needs to use the controller's test function to break several times to check the cooperation between the controller and the circuit breaker. After the circuit breaker is closed, press the "test" button, and the intelligent controller will trip instantaneously to open the circuit breaker.

Notes: a.This function can only be used during on-site debugging or maintenance of the circuit breaker. Do not use it during normal operation.

b. Before closing the controller, the reset button above the controller panel must be pressed before the circuit breaker can be closed and put into operation again.

### 9.5.2 Fault memory description

After the controller is reset or powered off, it still has fault memory function, which keeps the most recent historical event for easy analysis after the event. Only when a new fault occurs again, the original information is cleared and the latest fault data is saved. For the query method, refer to the description of the fault display above.

## 9.6 Display Function Description

When the rated current is 400A or more, the single-phase current is not less than 0.4I<sub>n</sub>, and the controller works normally when the three-phase is not less than 0.2I<sub>n</sub>. When the rated current is less than 400A, the single-phase is not less than 0.8I<sub>n</sub>, and the three-phase is not less than 0.4I<sub>n</sub>, the controller works normally.

Notes: When power is applied to the ST 220V AC power module, the controller will no longer display when the voltage drops to AC120V.

When power is applied to the ST 380V AC power module, the controller will no longer display when the voltage drops to AC200V.

a. Current display

Current display error range: ± 5%

b. Voltage display

Voltage display error range: ± 1.5%

10. Circuit Breaker Accessories



1600 frame size CC



2500-6300 frame size CC



1600 frame size ST



2500-6300 frame size ST



1600 frame size UVT



2500-6300 frame size UVT

10.1 Closing electromagnet (CC)

After the operation mechanism finishes energy storage, CC is energized and ready for remote closing.

Table 23 Operation feature of Closing electromagnet

Feature		CC
Power Supply	VAC 50/60HZ	220/230/240 380/400/415
	VDC	220,110
Operation voltage		0.85-1.1Us
Frame size: power consumption (VA or W)	AC	400VA
	DC	1600: 380W; 2500~6300: 130W
Circuit breaker response time		30ms-45ms

10.2 Shunt release (ST)

After being energized, ST will instantaneously disconnect the circuit breaker, to realize remote opening.

Table 24 Operation feature of Shunt release

Feature		ST
Power Supply	VAC 50/60HZ	220/230/240 380/400/415
	VDC	220,110
Operation voltage		0.85-1.1Us
Frame size: power consumption (VA or W)	AC	400VA
	DC	1600: 380W; 2500~6300: 130W
Circuit breaker response time		25ms-35ms

10.3 Undervoltage release (UVT)

If the supply voltage drops to any point between 35%-70% of rated voltage, the release coil will disconnect the circuit breaker instantaneously. If the UVT release coil is not energized, the circuit breaker cannot be closed manually (closing button) or electrically (closing electromagnet). The circuit breaker can only be closed when the supply voltage of UVT release coil reaches 85% of rated voltage.

Delayed undervoltage release (UVTD)

To prevent unintended release due to voltage drop in short time, we add an operation delay to UVT by adding a delay unit.

Table 25 Operation feature of undervoltage release

Feature		
Power Supply	VAC 50/60HZ	
	220/230/240 380/400/415	
Operation threshold	VDC	
	-	
Operation threshold	Open	0.35-0.7Ue
	Close	0.85Ue
Frame size: power consumption (VA or W)	UVT	1600: 220W/15W; 2500~6300: 220W/13W
	UVTD	1600: 20VA 2500~6300: 48VA
Adjustable time	1s-5s, delay time adjustable	

Notes: a.closing/maintain.

b.only NA8G-1600 uses external undervoltage delay module, delay unit is integrated into the undervoltage delay release for 2500-7500 products.



1600 frame size MO



2500-7500 frame size MO

#### 10.4 Motor operation mechanism (MO)

Storage energy by motor and automatically after circuit breaker closing, to ensure the circuit breaker can close immediately after opening. Energy storage handle used as standby measure if there is no auxiliary power supply.

**Table 26 Feature of motor operation mechanism**

Feature		
Power Supply	VAC 50/60HZ	220/230/240, 380/400/415
	VDC	110, 220
Operation threshold		0.85-1.1Us
Frame size: power consumption (VA or W)		1600:75W; 2500:85W; 3200:110W; 4000:150W; 6300:150W
Motor overcurrent time		≤1min
Energy storage time		≤7s
Operation frequency		≤2times/min

After the motor operation mechanism (MO) finishes energy storing, the internal indication contact will switch to output, user may connect the energy storage indicator, see the table below for feature of indication contact.



1600 frame size OF



2500-6300 frame size OF

#### 10.5 Auxiliary contacts (OF)

Standard configuration: 4 groups of changeover contacts (4CO) Optional configuration:

6 groups of changeover contacts (6CO) Optional for NA8 full series

3NO, 3NC (N3) Optional for NA8-1600

4NO, 4NC (N4) Optional for NA8-2500-7500

5NO, 5NC (N5) Optional for NA8-2500-7500

**Table 29 Auxiliary contact technical parameters (1)**

Features			
Auxiliary model		4CO/N4/N5	6CO(1600)
Breaking capacity		Current (A)	Current (A)
Application type	230/240VAC(AC-15)	1.3	1.3
	400/415VAC(AC-15)	0.75	0.75
	110VDC(DC-13)	0.55	-
	220VDC(DC-13)	0.27	-

**Table 27 Indication contact technical parameters**

Spring energy storage indication contact		
Standard supply	1NO	
Breaking capacity	Current (A)/Voltage (V)	
Application type	VAC (AC-15)	1.3/240, 0.75/415
	VDC (DC-13)	0.55/220, 0.27/110

**Table 30 Auxiliary contact technical parameters (2)**

Features		
Auxiliary model		6CO (2500 and above)
Breaking capacity		Current (A)
Application type	230/240VAC(AC-15)	1.3
	400/415VAC(AC-15)	0.75
	110VDC(DC-13)	0.55
	220VDC(DC-13)	0.27

Note: 6 groups of changeover contacts of NA8G-1600 is not applicable to DC operation voltage.

### 10.6 Key lock (KL)

Key lock is used to lockout the opening button of circuit breaker. After pulling out the key, you will not be able to close the circuit breaker manually or electrically, and the circuit breaker will maintain opening status; user may choose this option, and we will provide lock and key; there are 3 types of key locks:



1 lock and 1 key (1S1S): 1 circuit breaker with an independent lock and a key

2 locks and 1 key (2S1S): 2 circuit breakers with two identical locks and a key

3 locks and 2 keys (3S2S): 3 circuit breaker with 3 identical locks and 2 keys

Notes: 1. Before you pull out the key, you must press the opening button first, then rotate the key counterclockwise;

2. If user purchase key lock separately, then you must use hole opener to open a hole on the panel before installation, there are two diameters available:  $\Phi 21\text{mm}$  (NA8-1600) and  $\Phi 24\text{mm}$  (NA8G-2500-6300), hole opener should be provided by user itself.

### 10.7 Button lock (PL)

A padlock is used to lock the mechanical breaking and closing buttons on the panel. After lockout, user will not be able to open or close the circuit breaker manually (padlock should be provided by user itself).



### 10.8 Padlock for drawer seat disconnect position

Use the padlock to lock the drawer seat and body at disconnect position, at this position, user cannot insert the drawer seat rotation handle into the hole to rotate and change the position of withdrawable circuit breaker body.

Padlock should be provided by user itself.



### 10.9 Padlock for drawer seat baffle

If a padlock is used, user ensure the body contact will not be connected with external live circuit when the circuit breaker body is at disconnect or test position.

Padlock should be provided by user itself.

### 10.10 Circuit breaker status door interlock

This interlock can prevent the cabinet from being opened when the circuit breaker is under closing status; the cabinet can only be opened when the circuit breaker is under opening status.



**10.11 Circuit breaker position door interlock**



This interlock can prevent the cabinet from being opened when the circuit breaker is at connect or test position; the cabinet can only be opened when the circuit breaker is at disconnect position. This device is only applicable to withdrawable products.

**10.12 Three-position electrical signal device CE-CT-CD**

Use the rotary handle to shake the circuit breaker body to any position of separation, test, and connection. The device will output a group of normally closed signals for users to detect position signals. The internal indicator contact characteristics are shown in the table below.

**Table 29 Indicating contact technical parameters**

Spring energy storage indicator contact		
Provided as standard	1NO	
Break-off	Current (A) /Voltage (V)	
Use category	VAC (AC-15)	1.3/240, 0.75/415
	VDC (DC-13)	0.55/220, 0.27/110



**10.13 Barrier**

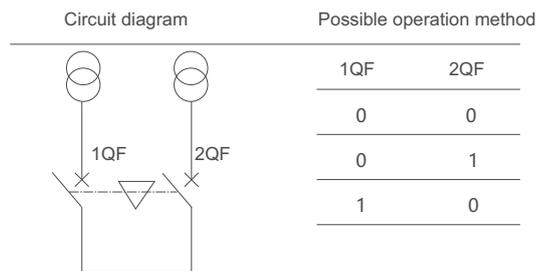
Installed between the phases of connector bar, to enhance the phase to phase insulation of circuit breaker.

**10.14 Door frame and gasket**

Installed on the cabinet door for sealing, with protection class of IP40.

**10.15 Mechanical interlock ILK2 (steel cable double interlock)**

For interlock of two horizontally or vertically installed 3 pole or 4 pole circuit breakers.

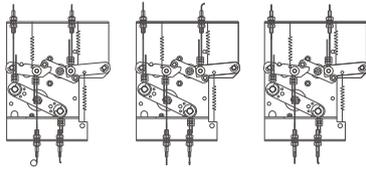


**Notes:** a. If user needs to bend the steel cable, the transition arc at the bend must be larger than R120mm, to ensure the flexible movement of the cable.

b. Check the cable and make sure there is sufficient lubricant to guarantee the flexible movement of the cable.

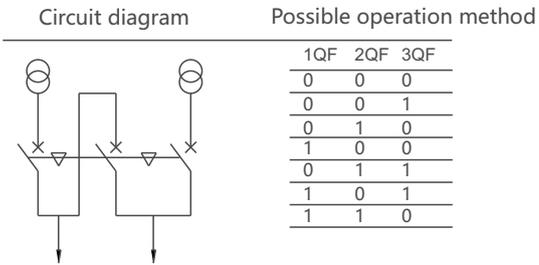
### 10.16 Mechanical interlock ILK3/4

For interlock of three horizontally or vertically installed 3 pole or 4 pole circuit breakers.

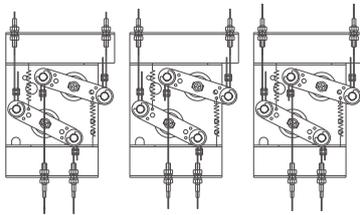


ILK-3 triple interlock diagram

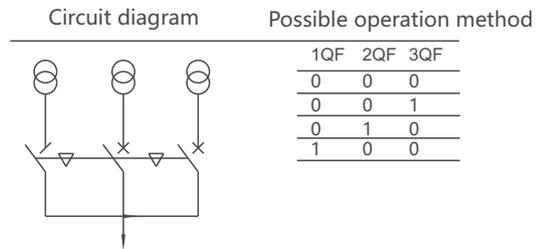
ILK-3 triple interlock circuit diagram



ILK-4 triple interlock circuit diagram



ILK-4 interlock diagram



**Notes:** a. If user needs to bend the steel cable, the transition arc at the bend must be larger than R120mm, to ensure the flexible movement of the cable.

b. Check the cable and make sure there is sufficient lubricant to guarantee the flexible movement of the cable.

## 11. Ordering Information

### 11.1 Circuit breaker configuration

**Table 34 Circuit breaker standard configuration**

Standard accessories	NA8G-1600		NA8G-2500		NA8G-3200		NA8G-4000		NA8G-6300
	Fixed	Withdrawable	Fixed	Withdrawable	Fixed	Withdrawable	Fixed	Withdrawable	Withdrawable
Circuit breaker body	■	■	■	■	■	■	■	■	■
Drawer seat		■		■		■		■	■
Intelligent controller	■	■	■	■	■	■	■	■	■
Horizontal connection	■	■	■	■	■	■	■	■	■
Auxiliary contacts 4CO	■	■	■	■	■	■	■	■	■
Fault release indication contact	■	■	■	■	■	■	■	■	■
Motor operation mechanism	■	■	■	■	■	■	■	■	■
Closing electromagnet	■	■	■	■	■	■	■	■	■
Shunt release	■	■	■	■	■	■	■	■	■
Door frame	■	■	■	■	■	■	■	■	■

**Notes:** The standard configuration above is for motor type products, in comparison with which the standard configuration of manual type does not include motor operation mechanism, closing electromagnet and shunt release.

**Table 35 Circuit breaker optional accessories**

Standard accessories	NA8G-1600		NA8G-2500		NA8G-3200		NA8G-4000		NA8G-6300
	Fixed	Withdrawable	Fixed	Withdrawable	Fixed	Withdrawable	Fixed	Withdrawable	Withdrawable
Undervoltage instantaneous release	■	■	■	■	■	■	■	■	■
Relayed undervoltage release	■	■	■	■	■	■	■	■	■
Opening and closing button	■	■	■	■	■	■	■	■	■
Drawer position padlock		■		■		■		■	■
Drawer safety baffle padlock		■		■		■		■	■
Body key lock	■	■	■	■	■	■	■	■	■
Position door interlock		■		■		■		■	■
Status door interlock		■		■		■		■	■
Auxiliary contacts 6CO	■	■	■	■	■	■	■	■	■
Auxiliary contacts N3	■	■							
Auxiliary contacts N4			■	■	■	■	■	■	■
Auxiliary contacts N5			■	■	■	■	■	■	■
Drawer position indication contact		■		■		■		■	■
External neutral line transformer	■	■	■	■	■	■	■	■	■
Earth current transformer and accessories	■	■	■	■	■	■	■	■	■
Interphase barrier	■	■	■	■	■	■	■	■	■
Mechanical interlock (2 sets)	■	■	■	■	■	■	■	■	■
Mechanical interlock (3 sets)			■	■	■	■	■	■	■

11.2 Circuit breaker selection table

Table 36 Circuit breaker selection table

Frame size current	NA8G-1600	NA8G-2500	NA8G-3200	NA8G-4000	NA8G-6300
Rate current	200A <input type="checkbox"/>	630A <input type="checkbox"/>	1600A <input type="checkbox"/>	1600A <input type="checkbox"/>	4000A <input type="checkbox"/>
	400A <input type="checkbox"/>	800A <input type="checkbox"/>	2000A <input type="checkbox"/>	2000A <input type="checkbox"/>	5000A <input type="checkbox"/>
	630A <input type="checkbox"/>	1000A <input type="checkbox"/>	2500A <input type="checkbox"/>	2500A <input type="checkbox"/>	6300A <input type="checkbox"/>
	800A <input type="checkbox"/>	1250A <input type="checkbox"/>	2900A <input type="checkbox"/>	2900A <input type="checkbox"/>	
	1000A <input type="checkbox"/>	1600A <input type="checkbox"/>	3200A <input type="checkbox"/>	3200A <input type="checkbox"/>	
	1250A <input type="checkbox"/>	2000A <input type="checkbox"/>		4000A <input type="checkbox"/>	
	1600A <input type="checkbox"/>	2500A <input type="checkbox"/>			
Number of poles	3P <input type="checkbox"/>	4P <input type="checkbox"/>			
Installation method	Withdrawable <input type="checkbox"/>	Fixed <input type="checkbox"/> (not available for NA8G-6300)			
Bus connection	Horizontal <input type="checkbox"/>	Vertical <input type="checkbox"/>	Mixed <input type="checkbox"/> (specify)		
Intelligent controller	M type <input type="checkbox"/> (basic) H type <input type="checkbox"/> (communication)				
Shunt, close, motor	Closing electromagnet <input type="checkbox"/>		Shunt release <input type="checkbox"/>	Energy storage motor <input type="checkbox"/>	
	AC220/230V <input type="checkbox"/>	AC380/400 V <input type="checkbox"/>	DC220V <input type="checkbox"/>	DC110V <input type="checkbox"/>	
Undervoltage release	UVT <input type="checkbox"/>	UVTD <input type="checkbox"/>			
	AC220/230V <input type="checkbox"/>	AC380/400V <input type="checkbox"/>			
Auxiliary contact	NA8G-1600	C04 (standard)	C 06 <input type="checkbox"/> (only for AC)	N3 <input type="checkbox"/> (only for AC)	
	NA8G-2500~6300	C04 (standard)	C 06 <input type="checkbox"/>	N4 <input type="checkbox"/>	N5 <input type="checkbox"/>
Auxiliary contact indicator(optional)	3 position signal device for drawer seat <input type="checkbox"/>				
Connection accessories (optional)	Interphase barrier <input type="checkbox"/>				
Controller functions and accessories (optional)	External transformer: N phase external transformer <input type="checkbox"/> External LEC leakage transformer <input type="checkbox"/> Earth current protection transformer <input type="checkbox"/>				
	Controller function: 3P+N protection <input type="checkbox"/> Leakage protection <input type="checkbox"/> Earth current protection <input type="checkbox"/> Voltage measurement and protection <input type="checkbox"/> Energy measurement and protection <input type="checkbox"/> Signal contact output <input type="checkbox"/> ZSI zone selective interlock protection <input type="checkbox"/> Load monitoring <input type="checkbox"/> Notes: 1) 3P+N protection requires N phase external transformer; 2) Leakage protection requires external LEC leakage transformer; 3) Earth current protection requires earth current protection transformer.				
Locking mechanism (Optional)	Breaking and making button lock <input type="checkbox"/> 1 lock 1 key <input type="checkbox"/> 2 locks 1 key <input type="checkbox"/> 3 locks 2 keys <input type="checkbox"/>				
Mechanical interlock (Optional)	Steel cable interlock (dual interlock) <input type="checkbox"/> Steel cable interlock (MIT-3) <input type="checkbox"/> Steel cable interlock (MIT-4) <input type="checkbox"/>				
Module (Optional)	PSU-1 <input type="checkbox"/>	RU-1 <input type="checkbox"/>	ST-DP protocol conversion module <input type="checkbox"/>		

Notes:1) specify frame size current, rated current and auxiliary control voltage when ordering.

2) Please mark “” or “” in the “-” to select the option you need; if not marked, we will delivery with factory settings.

3) Extra charges are required for additional functions and special requirements. Telephone:

Fax: 0577-6287777-706288

Configuration

1. NA8G-1600-6300 regular configuration

Shunt release, closing electromagnet, 4 groups of auxiliary changeover contacts, motor, M type intelligent controller, main circuit horizontal connection, door frame, main circuit installation bolts, circuit breaker manual, package box, drawer seat (withdrawable circuit breaker).

2. Optional configuration (extra charges)

NA8G-1600 optional configuration: undervoltage instantaneous release, undervoltage delayed release, steel cable interlock, keylock, external transformer ground protection, 6 groups of auxiliary changeover contacts, 3 NO 3 NC contacts, H type intelligent controller, optional H type functions, interphase barrier, position signal.

NA8G-2500-6300 optional configuration: undervoltage delayed release (1s-5s adjustable), steel cable interlock, button lock, keylock, door interlock, external transformer ground protection, vertical connection, 6 groups of auxiliary changeover contacts, 4 NO 4 NC contacts, 5 NO 5 NC contacts, H type intelligent controller, optional H type functions, position signal.

