NO:2021.04

CHINT ELECTRICS

NA1
Air Circuit Breaker

User Instruction

Standard: IEC 60947-2

⚠ Safety Warning

1. Only professional technicians are allowed for installation and maintenance.
2. It is strictly prohibited to install in the environment containing inflammable, explosive gas and moist condensation.
3. Power must be turned off when the product is installed or maintained.
4. Please do not touch the conductive part of the product during working.

CHINT ELECTRICS

Catalog

1 The Purpose of Use and Application Scope

NA1 series air circuit breaker is suitable for the circuit of AC 50Hz/60Hz with rated service voltage 400V, 690V and rated service current up to 6300A. It is mainly used to distribute electric energy and protect circuits and electric equipment against over-load, under-voltage, short-circuit and single-phase earthing fault. The circuit breaker is equipped with intelligent protection functions. With intelligentized and selective protection functions, the breaker can improve the reliability of power supply, and avoid unnecessary power failure.

2 Type Key and Definitions

NA1 - □□-□□/□-□-□-□ □

Voltage of secondary circuit
AC220/230V, AC380/400V , DC220V, DC110V

Wiring of main circuit:
H:Horizontal wiring of main circuit， V:Vertical wiring of main circuit

Mode of installation:
F:Fixed type,D:Draweout type

Mode of operation:
M:Manual,P: Power-driven

No. of poles:
3:3-pole,4:4-pole

Intelligent controller:
M: Standard type
3M: Multifunctional type
3H: Communication type

Rated current:

Frame size rated current	Rated current
1000A	200A
	400A
	630A
	800A
	1000A
2000A	630A
	800A
	1000A
	1250A
	1600A
	2000A
3200A	2000A
	2500A
	3200A
4000A	4000A
6300A	4000A
	5000A
	6300A

Breaking capacity:
X,XN,XH

Frame size rated current:
1000,2000,3200,4000,6300

Design sequence number

ACB

Company code

3 Conditions for Normal operation, Installation, Transportation and Storage

3.1 Conditions for normal operation:

3.1.1 Ambient temperature: -5ºC~+40ºC, with average temperatue within 24h not higher than +35ºC (unless otherwise stated).

Note: 1. The ambient temperature for specially ordered low temperature model is -40ºC~+40ºC;
2. If the ambient temperature exceeds +40ºC, please derate the product according to Table 3 in 4.3.1, the maximum permissible ambient temperature is +65 ºC.

3.1.2 The product should not be installed above 2000m altitude (if the product is installed above 2000m,it should be derated, refer to 4.3.2 for derated operation)

3.1.3 The relative humidity should not exceed 50% at maximum temperature of +40ºC; higher humidity is allowed under lower temperature; the average minimum relative humidity is 90% in wettest month, and the average minimum temperature in that month is +25ºC, and the impact of condensation due to temperature changes should be taken into consideration.

3.1.4 The pollution level is Class 3.

3.1.5 The application category is Class B.

3.1.6 The installation category of the circuit breaker is IV. When the rated operating voltage of the main circuit is not higher than AC400V, the installation category of auxiliary circuit is III, except that the installation category of the undervoltage release coil and the primary coil of power transformer in the electric release should be the same as the circuit breaker; when the rated operating voltage of the main circuit is between AC400V and AC690V, the auxiliary circuit should be isolated from the main circuit by using a isolation transformer with capacity≥2kVA, and the maximum operating voltage of control circuit is AC400V; the installation category of auxiliary circuit should be Ⅲ.

3.2 Installation conditions: the circuit breaker should be installed according to this instruction, with vertical inclination no higher than 5º.

3.3 Protection class: front IP20, other sides IP00.

3.4 Conditions for transportation and storage: -25℃~+55℃, up to +70℃ for a short time (24h).

4 Main Technical Parameters and Performance

4.1 please see Table 1 for the technical parameters of the main circuit of circuit breaker

Table 1 Technical Parameters of the Main Circuit

Type			NA1-1000X
			
Rated ultimate short circuit breaking capacity (Icu)		AC400V	42
		AC690V	25
Rated service short circuit breaking capacity (Ics)		AC400V	30
		AC690V	20
Rated short-time withstand current (Icw.1s)		AC400V	30
		AC690V	20
Rated current In (A)			200, 400, 630, 800, 1000
Number of poles			3, 4
Rated voltage Ue (V)			AC 400, AC 690
Rated insulation voltage Ui (V)			800
Rated current of N-pole In (A)			100%In
Intelligent controller	Standard type (M)		●
	Communication type (H)		●
Operation performance	Electric life		AC 400V:6500, AC 690V:3000
	Mechanical life		Non-maintenance 15,000
			Maintenance 30,000
Connection pattern			Horizontal, Vertical
Total breaking time (no additional delay time) (ms)			≤28
Closing time(ms)			≤50
Arcing distance(mm)			0

Continued table 1

Type			NA1-2000X	NA1-2000XN	NA1-2000XH
					
Rated ultimate short circuit breaking capacity (Icu)		AC400V	80	50	65
		AC415V	50	40	50
		AC690V	50	40	50
Rated service short circuit breaking capacity (Ics)		AC400V	65	50	65
		AC415V	40	40	40
		AC690V	40	40	40
Rated short-time withstand (Icw.1s)		AC400V	50	50	50
		AC415V	40	40	40
		AC690V	40	40	40
Rated short-time withstand (Icw.3s)		AC400V	42	42	42
		AC415V	42	42	42
Rated current In (A)			630, 800, 1000, 1250, 1600, 2000		
Number of poles			3, 4		
Rated voltage Ue (V)			AC400, AC415, AC690		
Rated insulation voltage Ui (V)			1000		
Rated current of N-pole In (A)			100%In		
Intelligent controller	Standard type (M)		●		
	Communication type (H)		●		
Operation performance	Electric life		AC400:6500 AC690V:3000		
	Mechanical life		Non-maintenance 15,000		
			Maintenance 30,000		
Connection pattern			Horizontal, Vertical		
Total breaking time (no additional delay time) (ms)			≤28		
Closing time(ms)			≤50		
Arcing distance(mm)			0		

Type			NA1-3200X	NA1-3200XN	NA1-4000X
					
Rated ultimate short circuit breaking capacity (Icu)		AC400V	80	65	80
		AC415V	65	50	—
		AC690V	65	50	65
Rated service short circuit breaking capacity (Ics)		AC400V	65	65	65
		AC415V	65	50	—
		AC690V	65	50	65
Rated short-time withstand (Icw.1s)		AC400V	65	65	65
		AC415V	50	50	—
		AC690V	50	50	50
Rated short-time withstand (Icw.3s)		AC400V	45	45	—
		AC415V	45	45	—
Rated current I_n (A)			2000, 2500, 3200, 4000		
Number of poles			3, 4		3
Rated voltage Ue (V)			AC400, AC415, AC690		
Rated insulation voltage Ui (V)			1000		
Rated current of N-pole I_n (A)			100%In		
Intelligent controller	Standard type (M)		●		
	Communication type (H)		●		
Operation performance	Electric life		AC400V:3000 AC690V:2000		AC400V:1500 AC690V:1000
	Mechanical life		Non-maintenance 10,000		
			Maintenance 20,000		
Connection pattern			Horizontal, Vertical		
Total breaking time (no additional delay time) (ms)			≤28		
Closing time(ms)			≤50		
Arcing distance(mm)			0		

Continued table 1

Type			NA1-6300X	NA1-6300XN
				
Rated ultimate short circuit breaking capacity (Icu)		AC400V	120	100
		AC415V	85	75
		AC690V	85	75
Rated service short circuit breaking capacity (Ics)		AC400V	100	100
		AC415V	75	75
		AC690V	75	75
Rated short-time withstand (Icw.1s)		AC400V	100	100
		AC415V	75	75
		AC690V	75	75
Rated short-time withstand (Icw.3s)		AC400V	50	50
		AC415V	50	50
rated current In (A)			4000, 5000, 6300	
Number of poles			3, 4	3
Rated voltage Ue (V)			AC400, AC415,AC690	
Rated insulation voltage Ui (V)			1000	
Rated current of N-pole In (A)			50%In	—
Intelligent controller	Standard type (M)		●	
	Communication type (H)		●	
Operation performance	Electric life		AC400V:1500 AC690V:1000	
	Mechanical life		Non-maintenance 5000	
			Maintenance 10,000	
Connection pattern			Horizontal, Vertical	
Total breaking time (no additional delay time) (ms)			≤28	
Closing time(ms)			≤50	
Arcing distance(mm)			0	

4.1.1 Please see Table 2 for the power consumption of circuit breaker inlet and outlet wires

Table 2 Power loss of circuit breaker inlet and outlet wires (each pole)

Inm(A)		1000					2000						3200			4000/3	6300		
In(A)		200	400	630	800	1000	630	800	1000	1250	1600	2000	2000	2500	3200	4000/3	4000	5000	6300
Power loss (W)	Drawer type	40	101	123	110	171	70	110	172	268	440	530	384	600	737	921	575	898	1426
	Fixed type	33	85	107	94	146	34.4	50	78	122	200	262	200	312	307	450	-	-	-

4.1.2 Derating application of circuit breaker at different altitude

When the altitude is above 2000m, the insulation performance, cooling performance and pressure in the atmosphere will change. See Table 4 for performance correction.

Table 3 Derating application of circuit breaker at different altitude

Altitude (m)	2000	2500	3000	3500	4000	4500	5000
Power frequency withstand voltage (V)	2200	2077	1955	1857	1760	1680	1600
Insulation voltage (V)	1000	900	800	750	700	650	600
Rated operating voltage (V)	690	635	580	540	500	450	400
Rated operating current (Ie)	Ie	0.93Ie	0.88Ie	0.83Ie	0.78Ie	0.73Ie	Consult manufacturer

Note: 1. If the ambient temperature is lower than 40ºC, Ie= In;
2. If the ambient temperature is higher than 40ºC, the circuit breaker must be derated strictly according to the instructions, this time Ie≠ In. Please refer to the Ie according to current and temperature.

4.2 Current Protection Parameters of Circuit Breaker

4.2.1 Please see Figure 1 for Over-current protection characteristic curve

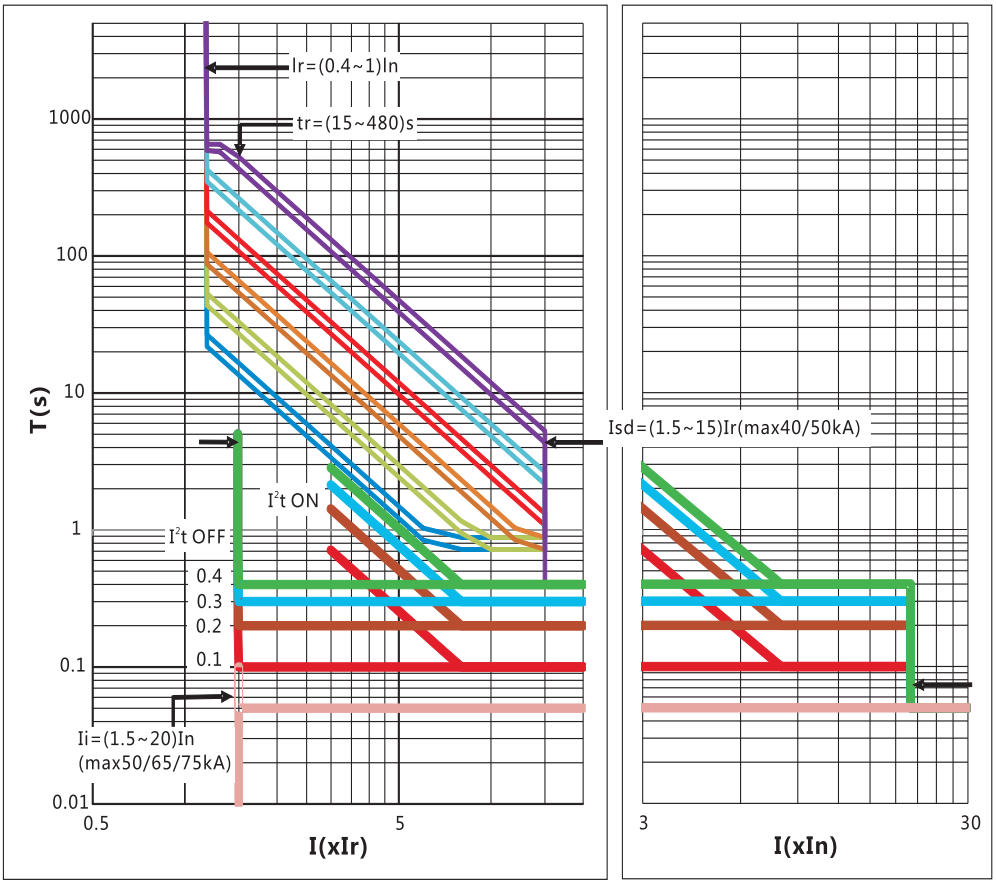


Figure 1.Over-current protection curve

4.2.2 Please see Table 5 for overload long time delay protection characteristics

Table 4 Overload long time delay protection characteristics

Range of setting current (Ir)	Error	Current	Operation time (s)						Time Error
(0.4~1)In +OFF	±10%	≤1.05Ir	> 2h Non-trip						–
		> 1.30Ir	< 1h trip						--
		1.5Ir	15	30	60	120	240	480	±10%
		2.0Ir	8.4	16.9	33.7	67.5	135	270	±10%

4.2.3 Please see Table 6 for short circuit short time delay protection characteristics.

There are two types of short time delay protections, one is definite time lag plus inverse time lag protection, which is activated when the current is low and the time conform to the formula $I^2Tsd=(8Ir)^2tsd$, where I is actual current, Tsd is actual operation time and tsd is setting delayed operation time. When the fault current exceeds the set value of inverse time lag but is smaller than 8Ir, the controller will provide setting delayed protection according to the curve that is the same as overload curve (calculate fault delay time according to overload curve functions); when the fault current exceeds the delay value of inverse time lag and is bigger than 8Ir, the controller will provide definite time lag protection. The other type of protection is definite time lag protection (time is set to 0.11s, 0.21s, 0.31s, 0.41s), when the actual current exceeds the set value and is smaller than the setting value of instantaneous current, the circuit breaker will conduct according to definite time lag protection.

Table 5 Short circuit short time delay protection characteristics

Range of set current (Isd)	Error	Current	Operation time (s)					Time Error
(1.5~15)Ir +OFF(exit position)	±10%	≤0.9Isd	no trip within 2tsd					
		> 1.1Isd	delayed trip within 2tsd					
			Setting time (tsd)	0.1	0.2	0.3	0.4	±15%
			Returnable time	0.06	0.14	0.25	0.33	±15%

Note: 1. When the controller Inm=3200A, 4000A, the maximum set value of short time delay protection Isd is 40kA;
2. When the controller Inm=6300A, the maximum short time delay protection Isd is 50kA;
3. When tsd=0.1s, 0.2s, time error is ±0.040s.

4.2.4 Table 7 for short circuit instantaneous protection characteristics

Tripping time for instantanous protection (including the inherent breaking time of circuit breaker) should be less than 60ms (effective value protection) or 30ms (peak value protection)。

Table 6 Short-circuit instantaneous protection characteristics

Range of setting current (Ii)	Error	Current	Operation characteristics
(1.5~20)In +OFF	±15%	≤0.85Ii	No trip within 0.2s
		> 1.15Ii	trip within 0.2s

Note: 1. When the controller Inm=2000A, the set value of instantanous protection is 1.5In~50kA+OFF;
2. When the controller Inm=3200A, 4000A, the set value of instantanous protection is 1.5In~65kA+OFF;
3. When the controller Inm=6300A, the set value of instantanous protection is 1.5In~75kA+OFF.

4.2.5 Earthing protection

Earthing protection is definite time lag protction (Figure 2). Refer to technical data table(Table 8) for fault delay time.

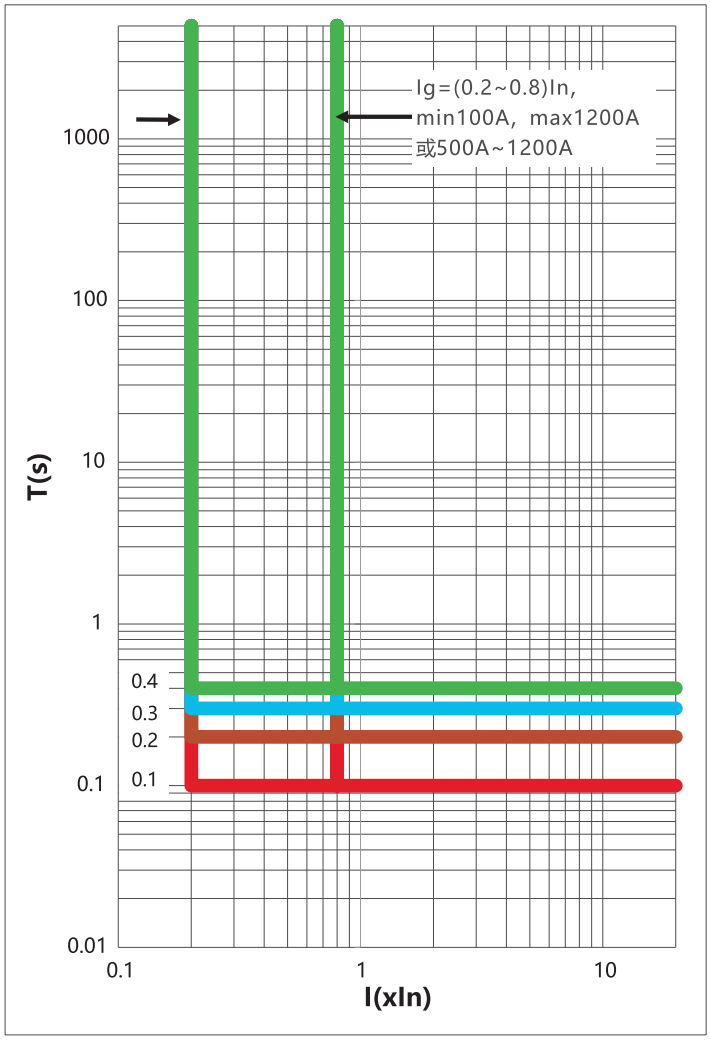


Figure 2.Earthing protection curve

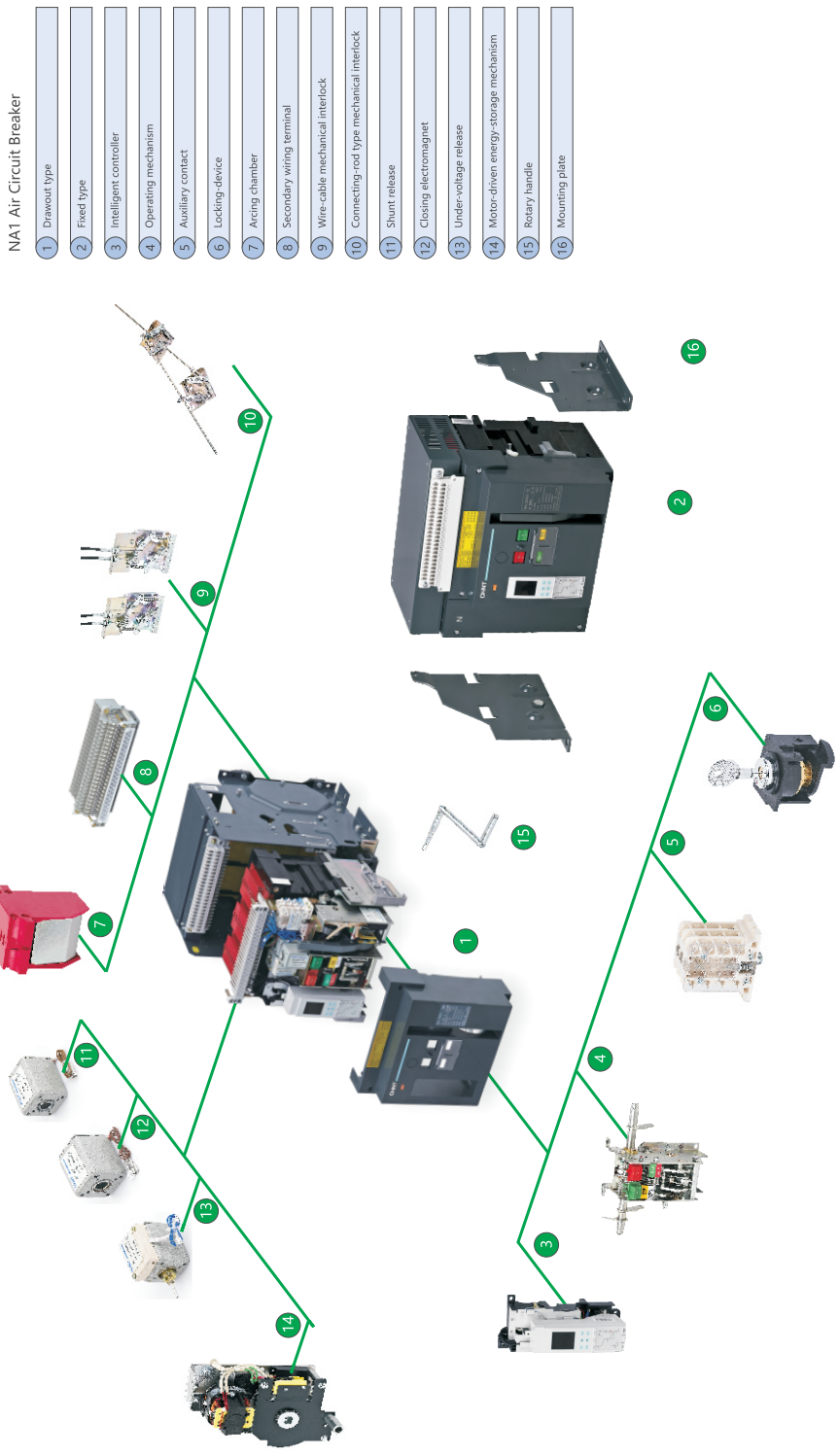
Table 7 Technical data of single-phase earthing protection

Range of set current (Ig)	Error	Current	Tripping time					Time error
(0.2~0.8)In+OFF(Inm=1000, 2000) 500A~1200A(Inm=3200, 4000, 6300)	±10%	≤0.9Ig	No trip					
		>1.1Ig	Delayed trip					
			Setting time (tg)	0.1	0.2	0.3	0.4	±15%
			Returnable time	0.06	0.14	0.25	0.33	±15%

Note: 1. When tg=0.1s, 0.2s, the time error is ±0.040s;
2. When Inm=1000A, the minimum Ig is 100A;
3. When Inm=2000A, the maximum Ig is 1200A;
4. When Inm=3200A, 4000A, 6300A, the minimum Ig is 500A and the maximum Ig is 1200A.

5 Structural Features

Product structural diagram (take NA1-2000X as example for withdrawable type, take NA1-2000X/4 as example for fixed type)



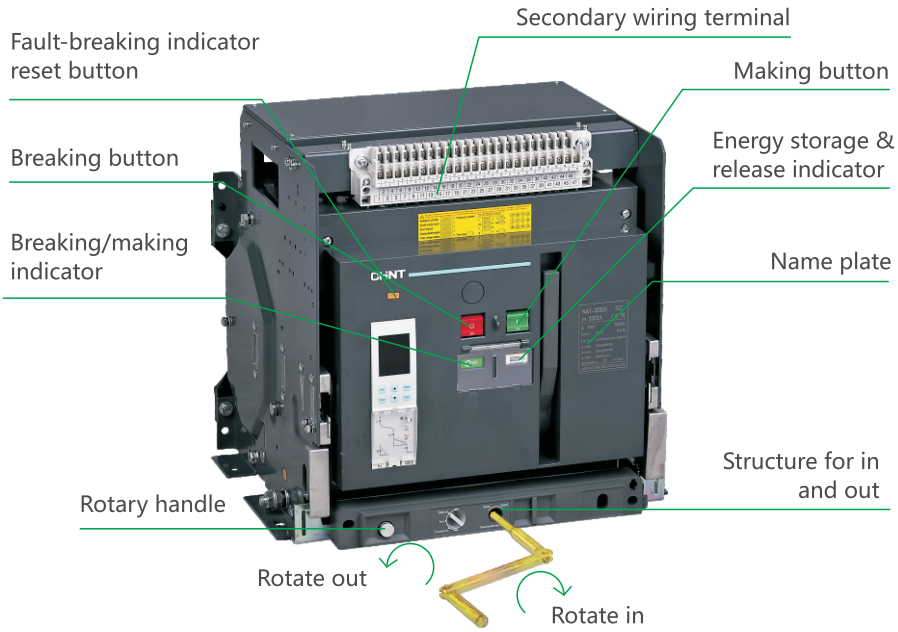


Figure 3.Product external structure

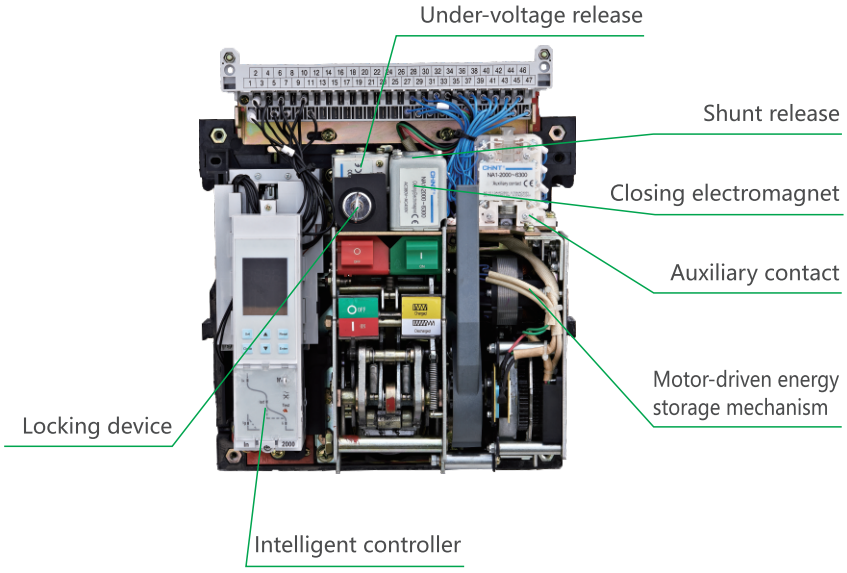
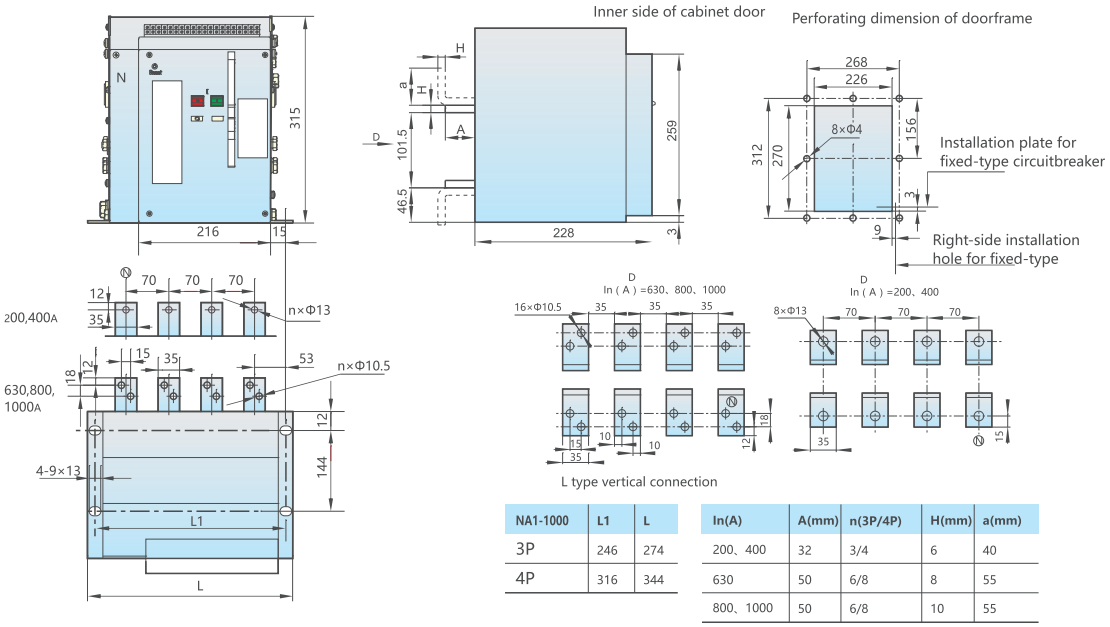


Figure 4.Product internal structure

5-a NA1-1000X~6300X drawer-type circuit breaker 5-b NA1-2000X~4000X/3 fixed-type circuit breaker

Figure 5.Product installation type

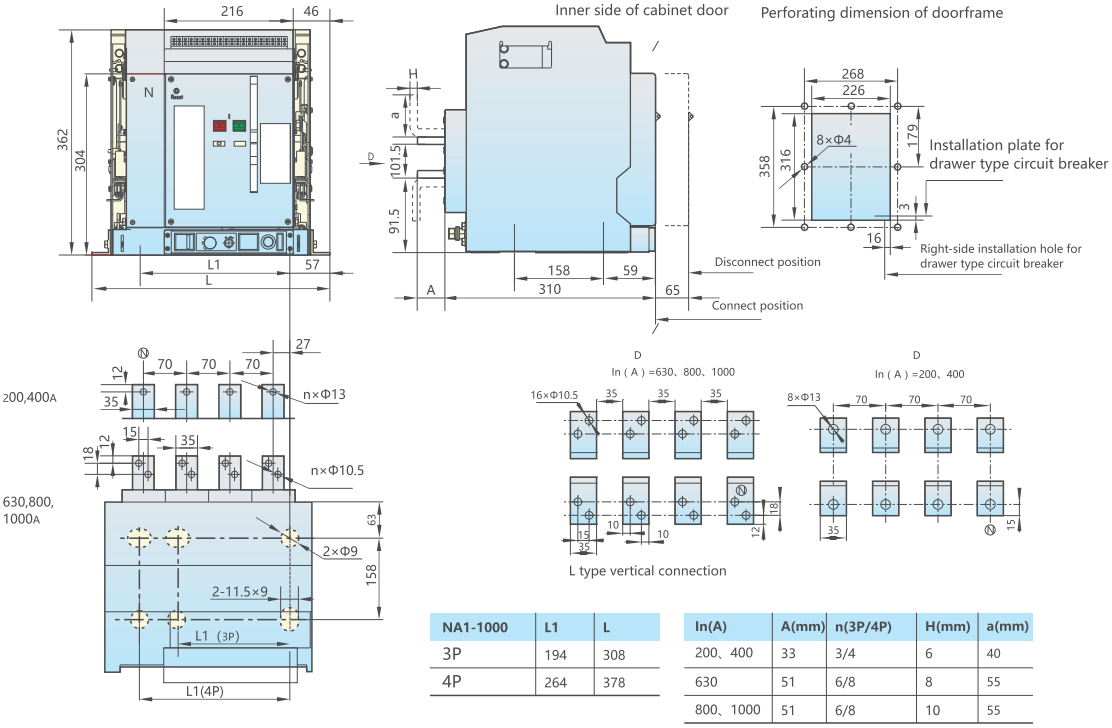
6 Structural Features



NA1-1000	L1	L
3P	246	274
4P	316	344

In(A)	A(mm)	n(3P/4P)	H(mm)	a(mm)
200、400	32	3/4	6	40
630	50	6/8	8	55
800、1000	50	6/8	10	55

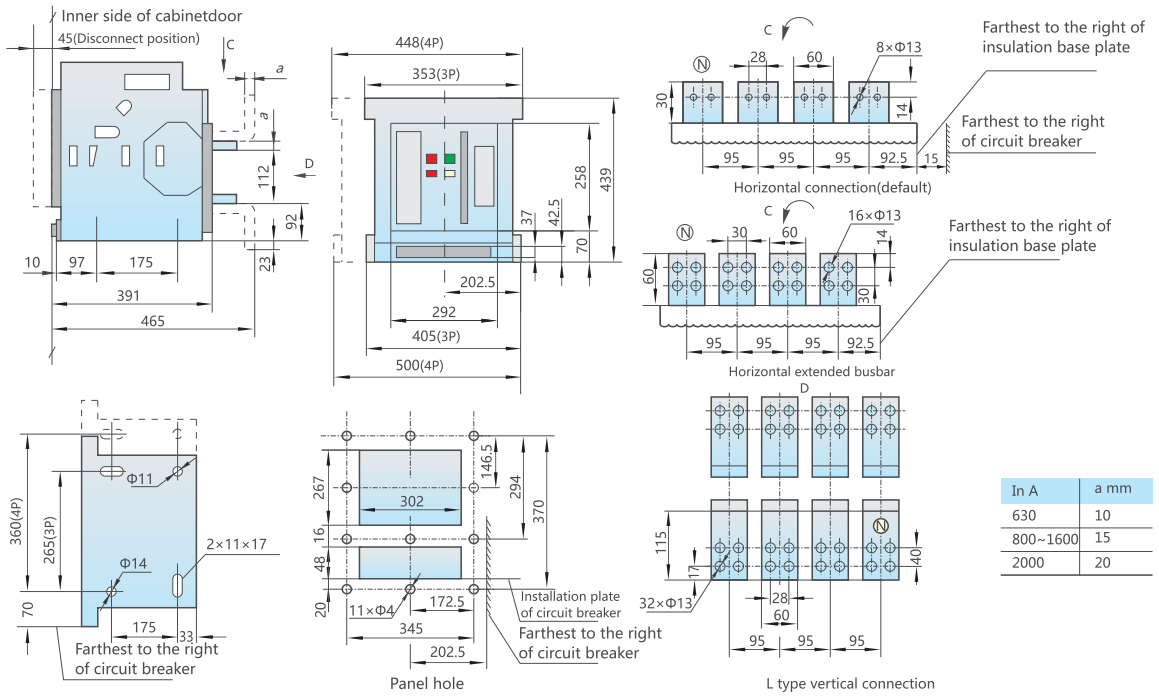
Figure 6.NA1-1000X fixed type



NA1-1000	L1	L
3P	194	308
4P	264	378

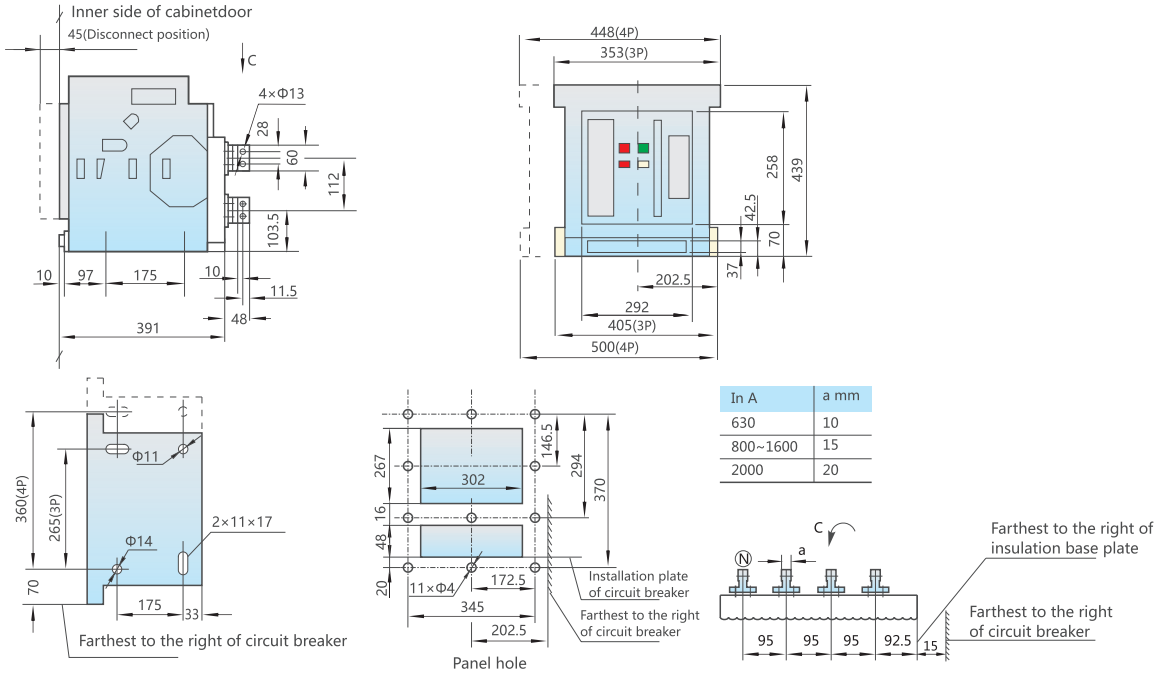
In(A)	A(mm)	n(3P/4P)	H(mm)	a(mm)
200、400	33	3/4	6	40
630	51	6/8	8	55
800、1000	51	6/8	10	55

Figure 7.NA1-1000X Drawer type



In A	a mm
630	10
800~1600	15
2000	20

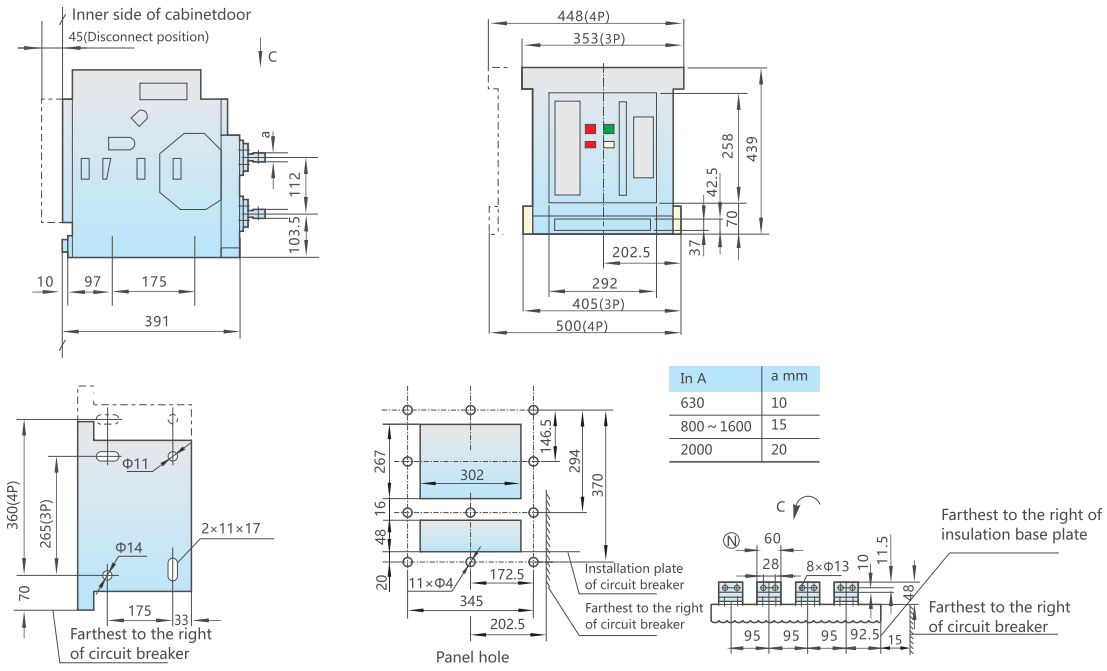
Figure 8.NA1-2000X drawer type



In A	a mm
630	10
800~1600	15
2000	20

User only needs to rotate the busbar for 90°to change from vertical connection to horizontal connection onsite.

Figure 9.Rotatable busbar vertical connection diagram of NA1-2000X drawer type (vertical connection is factory default)



User only needs to rotate the busbar for 90°to change from horizontal connection to vertical connection onsite.

Figure 10.Rotatable busbar horizontal connection diagram of NA1-2000X drawer type (change to horizontal connection by user)

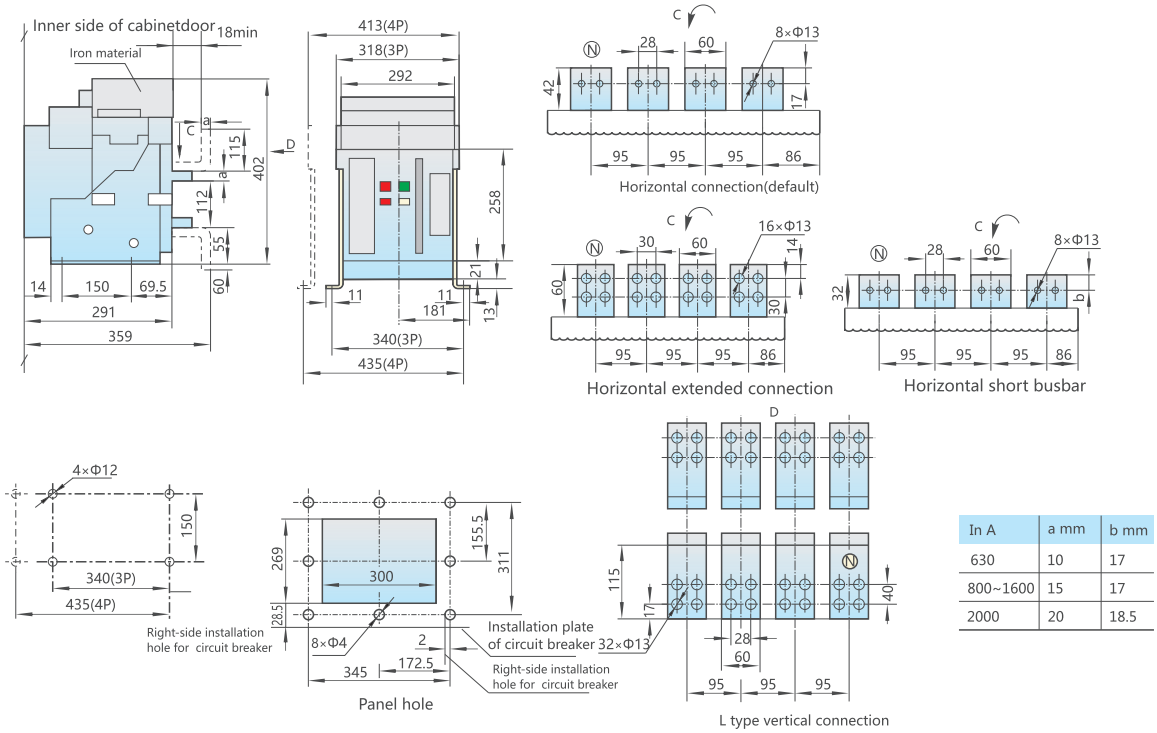


Figure 11.NA1-2000X fixed type

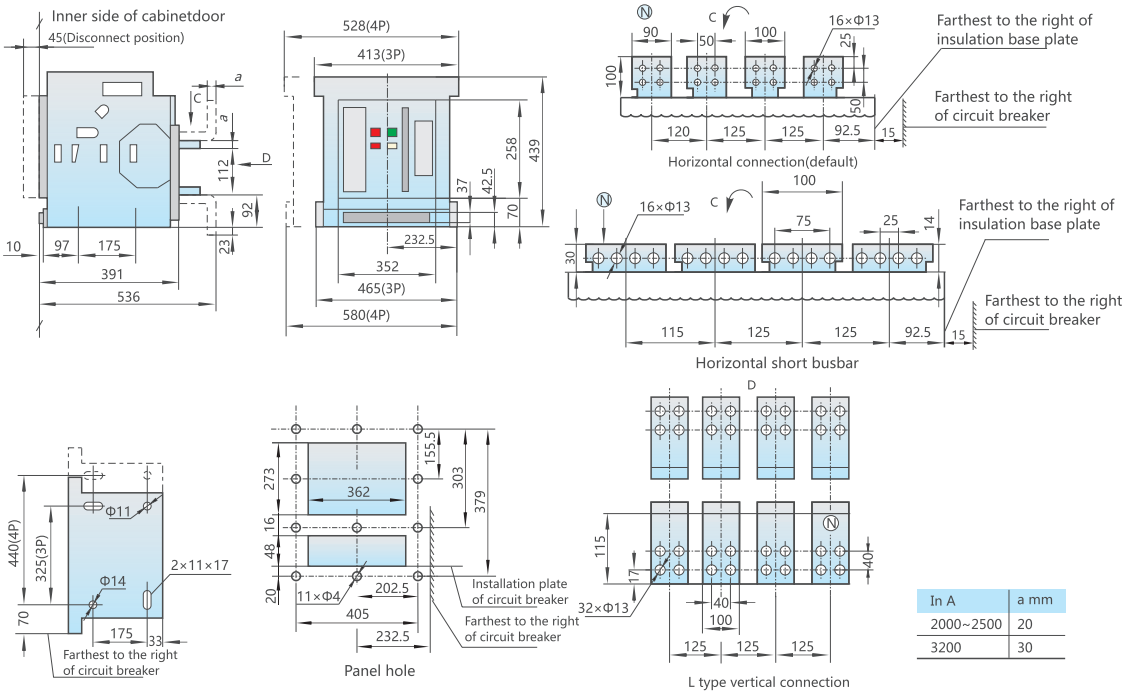
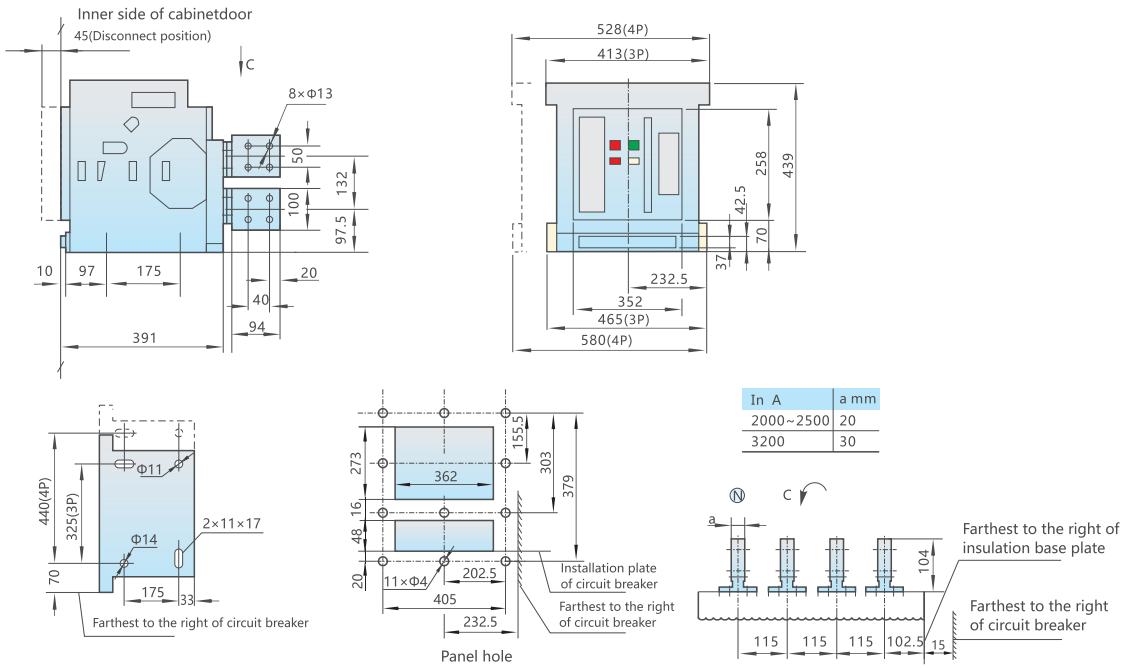
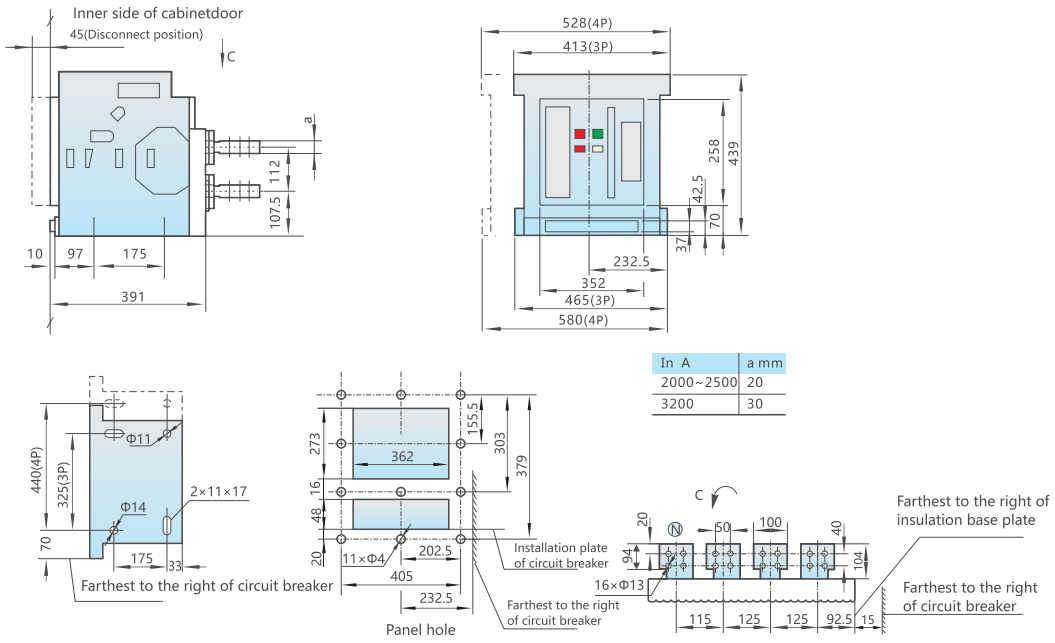


Figure 12.NA1-3200X withdrawable type



Note: In order to change vertical connection to horizontal connection onsite, user needs to change the upper and lower busbars of phase B so they are different from those of phase A and phase C.

Figure 13.Rotatable busbar vertical connection diagram of NA1-3200X drawer type (vertical connection is factory default)



Note: In order to change horizontal connection to vertical connection onsite, user needs to change the upper and lower busbars of phase B so they are different from those of phase A and phase C.

Figure 14.Rotatable busbar horizontal connection diagram of NA1-3200X drawer type (change to horizontal connection by user)

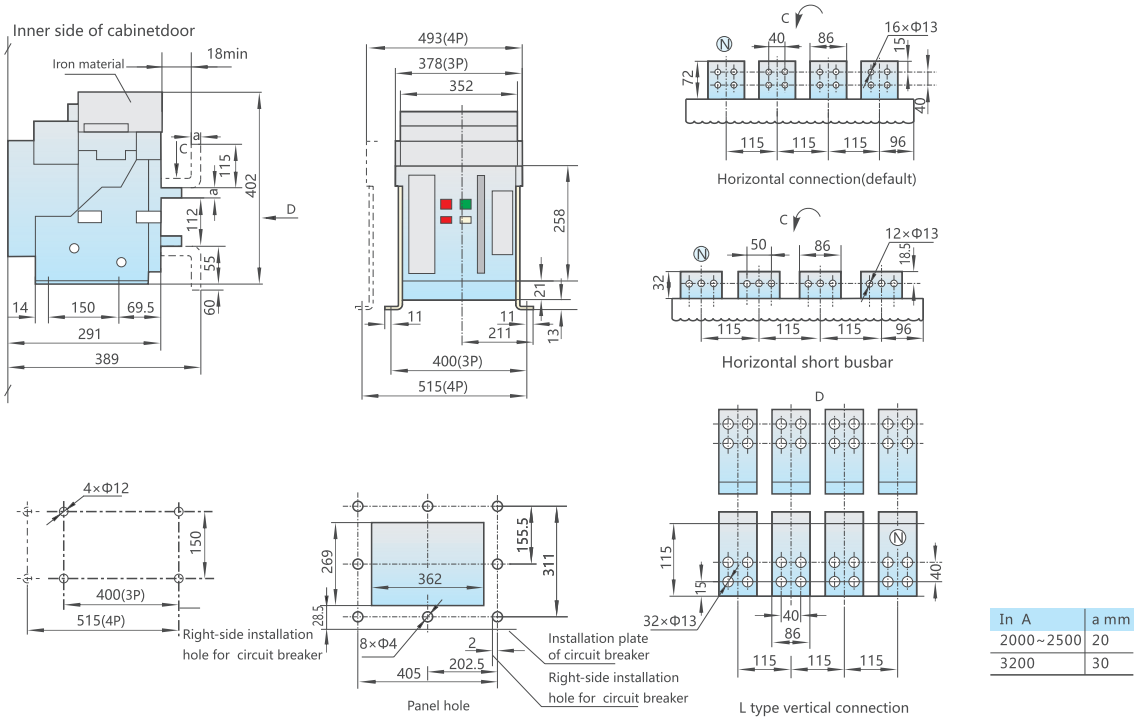


Figure 15.NA1-3200X fixed type

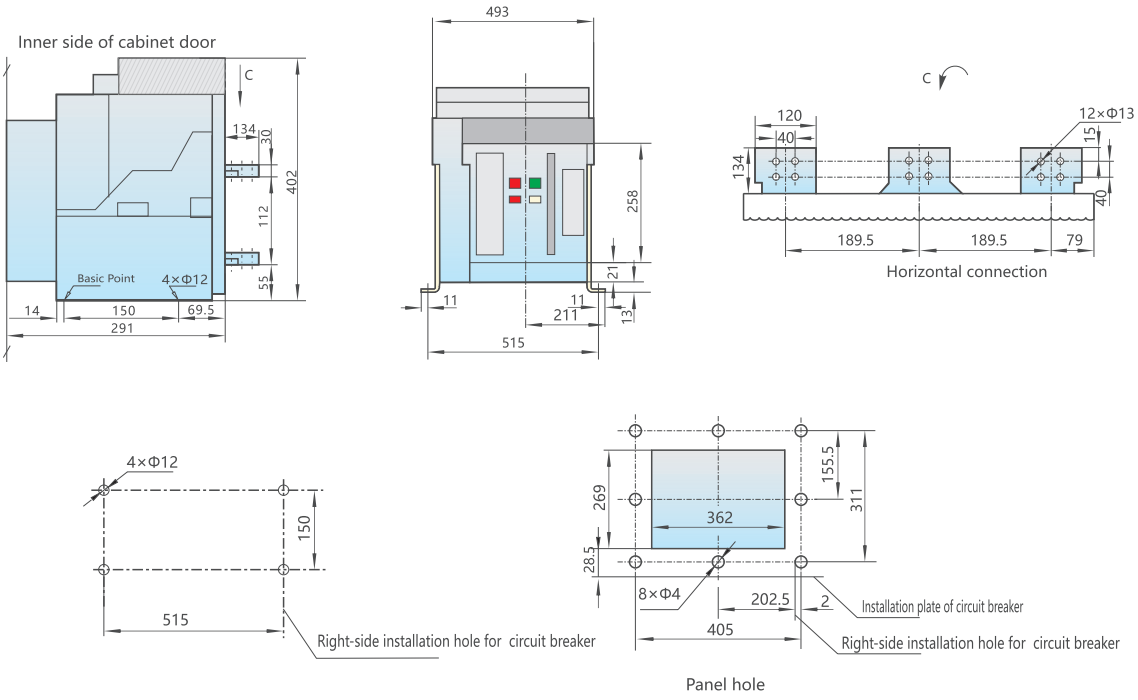


Figure 16.NA1-4000X/3 fixed type

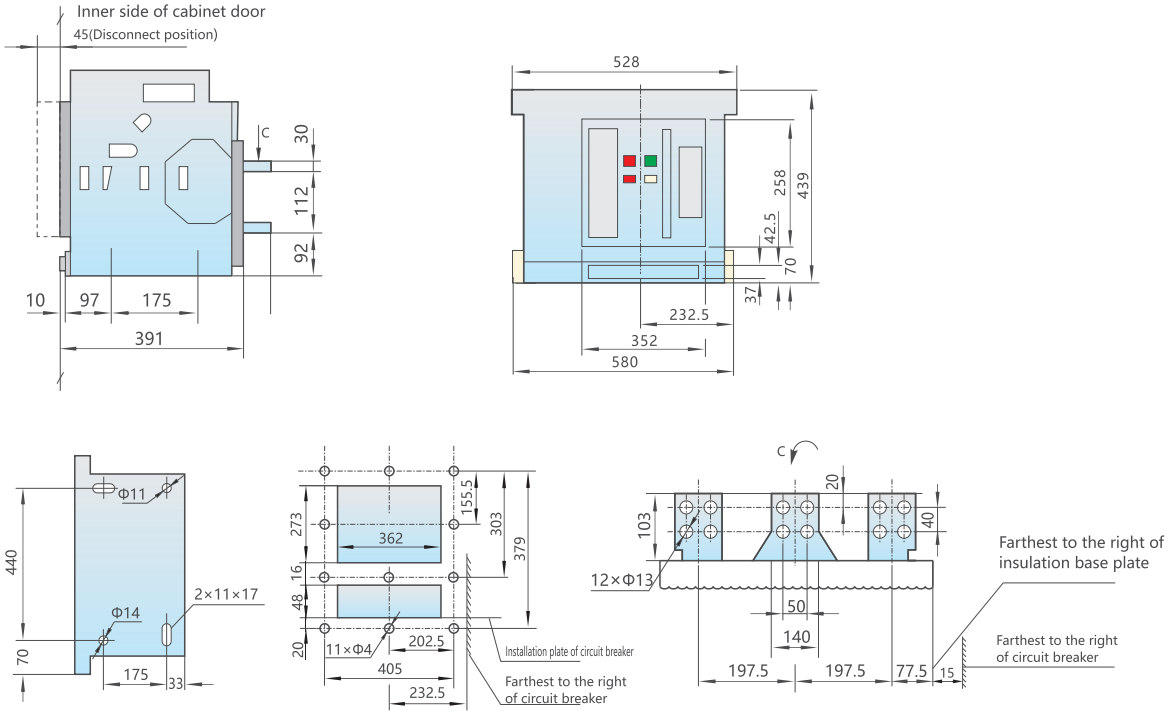


Figure 17.NA1-4000X/3 drawer type

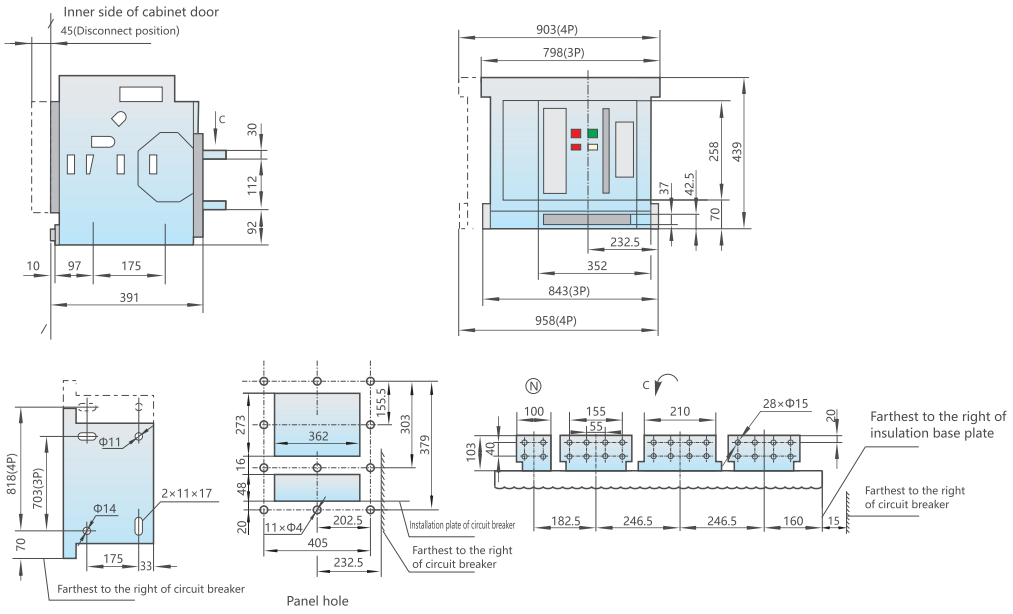


Figure 18.NA1-6300X(In=4000A, 5000A) drawer type

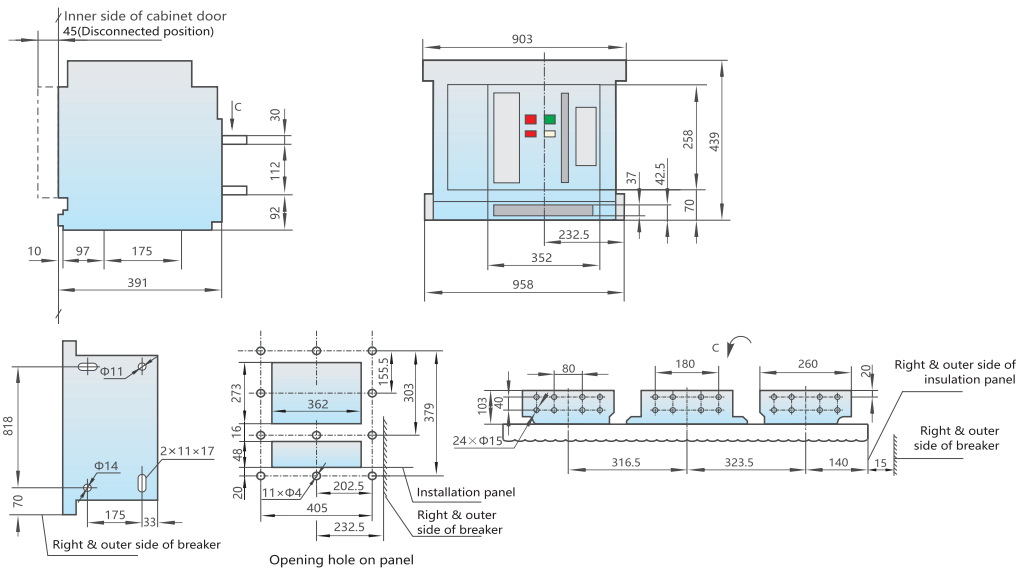


Figure 19.NA1-6300X(In=6300A) drawer type (3 poles)

Table 8 Weight of single product (net weight)

Weight (kg) / Model / Spec. / Installation method	NA1-1000X (3P/4P)	NA1-2000X(3/4)			NA1-3200X(3/4)		NA1-4000X /3	NA1-6300X(3/4)	
		630	800~1600	2000	2000~2500	3200		4000~5000	6300
Fixed type	21/25	44/53	45/54	46/55	57/69	59/72	91/-	-/-	-/-
Drawer type	38/45	67/82	73/85	75/90	96/118	106/130	135/172	201/233	235/-