NO:2023.09

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:
FX:fixed type, WD:draw-out type

Mode of operation:
MN:manual operation, MO:motor operation

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,XQ

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 maximum 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.The product should be installed in a power distribution cabinet which protection class does not exceed IP20.

3.3 Protection class of circuit breaker: 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)			1000
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	NA1-2000XQ
						
Rated ultimate short circuit breaking capacity (Icu)		AC400V	80	50	65	80
		AC415V	50	40	50	
		AC690V	50	40	50	
Rated service short circuit breaking capacity (Ics)		AC400V	65	50	65	65
		AC415V	40	40	40	
		AC690V	40	40	40	
Rated short-time withstand (Icw.1s)		AC400V	50	50	50	65
		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	100
		AC415V	65	50	—
		AC690V	65	50	65
Rated service short circuit breaking capacity (Ics)		AC400V	65	65	80
		AC415V	65	50	—
		AC690V	65	50	65
Rated short-time withstand (Icw.1s)		AC400V	65	65	80
		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		Horizontal
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	
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

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(In the IP20 cabinet, configure the copper bar according to Table 8 in this manual)

Table 3 Derating application of circuit breaker at different altitude

Altitude (m)	2000	2500	3000	3500	4000	4500	5000
Power frequency withstand voltage (V)	3500	3500	3500	3500	3000	2500	2200
Insulation voltage (V)	1000	1000	1000	1000	1000	1000	800
Rated operating voltage (V)	690	690	690	690	690	690	560
Rated operating current (Ie)	Ie	0.97Ie	0.94Ie	0.91Ie	0.88Ie	0.85Ie	0.82Ie

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

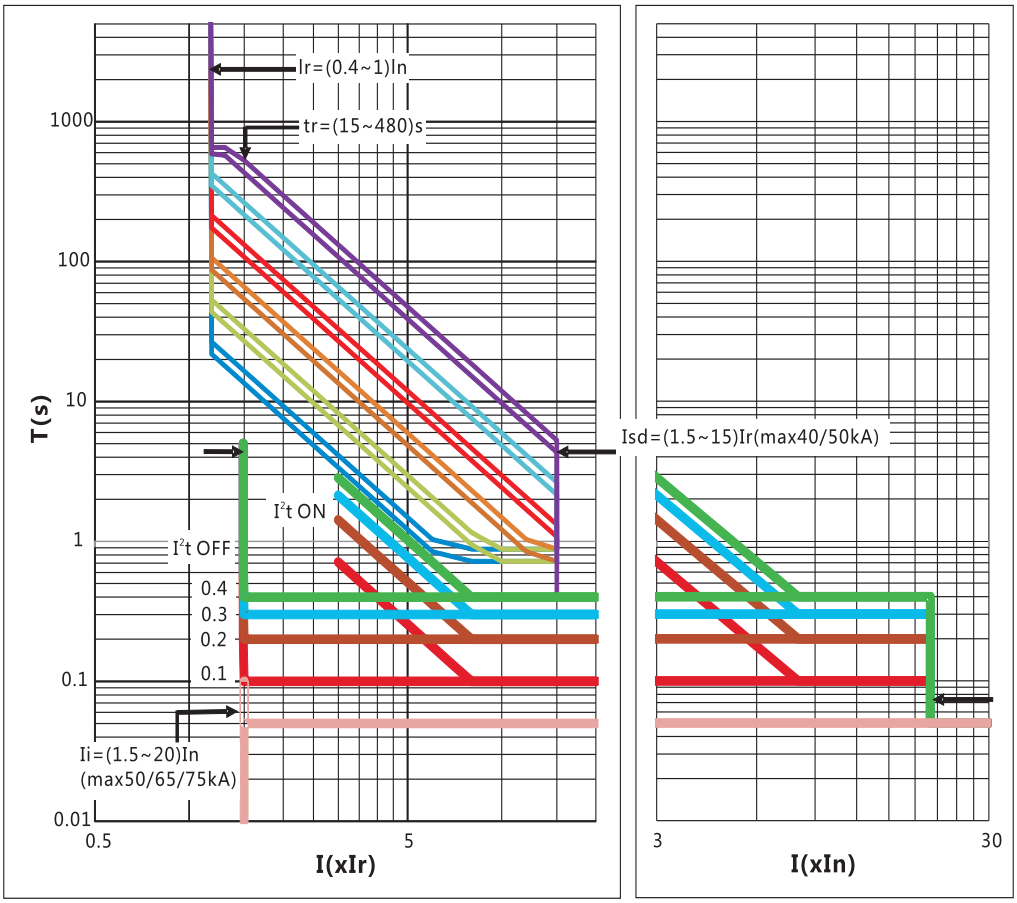


Figure 1.Over-current protection curve

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)		(0.4~1) In+OFF						Current error ±10%
Characteristic type		Inverse time lag, Tr=(1.5Ir/I)²*tr						
Action delay time setting tr (s)		15	30	60	120	240	480	
Action delay time Tr (s)	I≤1.05Ir	> 2h inaction						
	I≥1.3Ir	< 1h movement						±10%(Max 655s, Min 0.8s)
	I=1.5Ir	15	30	60	120	240	480	
	I=2Ir	8.4	16.9	33.7	67.5	135	270	

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

Table 5 Short circuit short time delay protection characteristics

Range of setting current (Isd)			(1.5~15)Ir+OFF				Current error ±10%
Definite time lag + Inverse time lag	Delay time setting symbol		0.10	0.20	0.30	0.40	
	Set time tsd(s)		0.1	0.2	0.3	0.4	
	Action delay time Tsd(s)	I≤0.9Isd	2tsd inaction				
		I > 8Ir且I > 1.1Isd	0.1	0.2	0.3	0.4	±15%(Inherent breaking time 40ms)
		I≤8Ir且I > 1.1Isd	Tsd = (8Ir/I)²*tsd				
Definite time lag	Delay time setting symbol		0.11	0.21	0.31	0.41	
	Set time tsd(s)		0.1	0.2	0.3	0.4	
	Action delay time Tsd(s)	I≤0.9Isd	2tsd inaction				
		I > 1.1Isd	0.1	0.2	0.3	0.4	±15%(Inherent breaking time 40ms)
Returnable time (s)			0.05	0.14	0.25	0.33	

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.

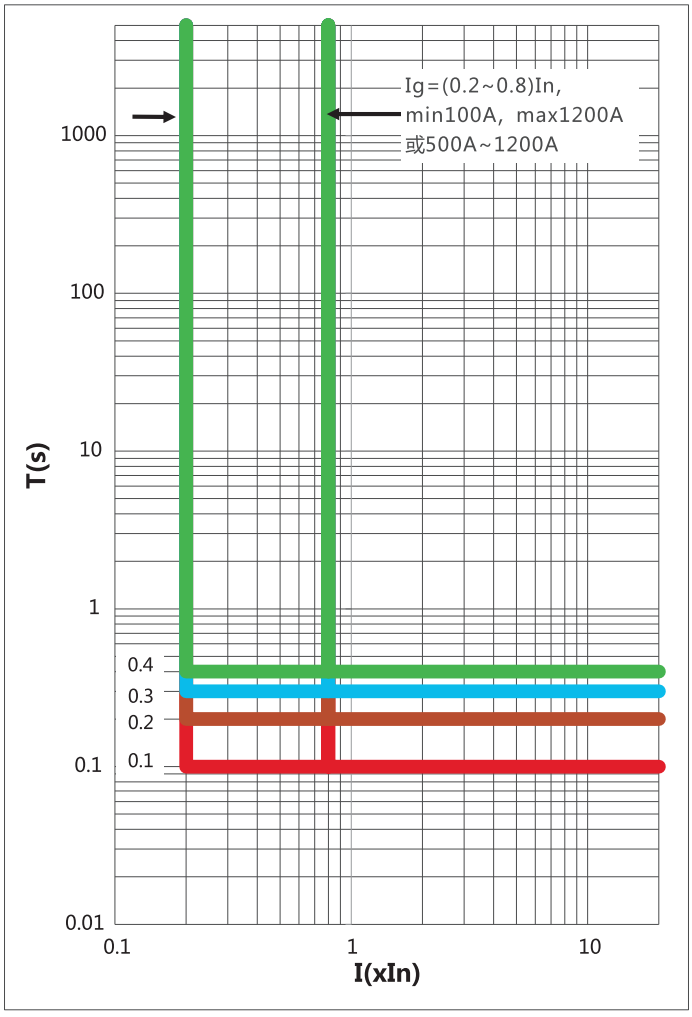


Figure 2.Earthing protection curve

Table 7 Technical data of single-phase earthing protection

Range of setting current (Ig)		(0.2 ~ 0.8) In(Inm=1000、2000) (500 ~ 1200) A(Inm=3200、4000、6300)				Current error ±10%
Characteristic type		Definite time lag				
Action delay time setting tg (s)		0.1	0.2	0.3	0.4	
Action delay time Tg (s)	I≤0.9Ig	No action in 2tg				
	I > 1.1Ig	0.1	0.2	0.3	0.4	±15%(Inherent breaking time 40ms)
Returnable time (s)		0.05	0.14	0.25	0.33	

Note: 1. When tg=0.1s, 0.2s, the time error is ±0.040s;

2. When Inm=1000A, the minimum Ig is 100A;

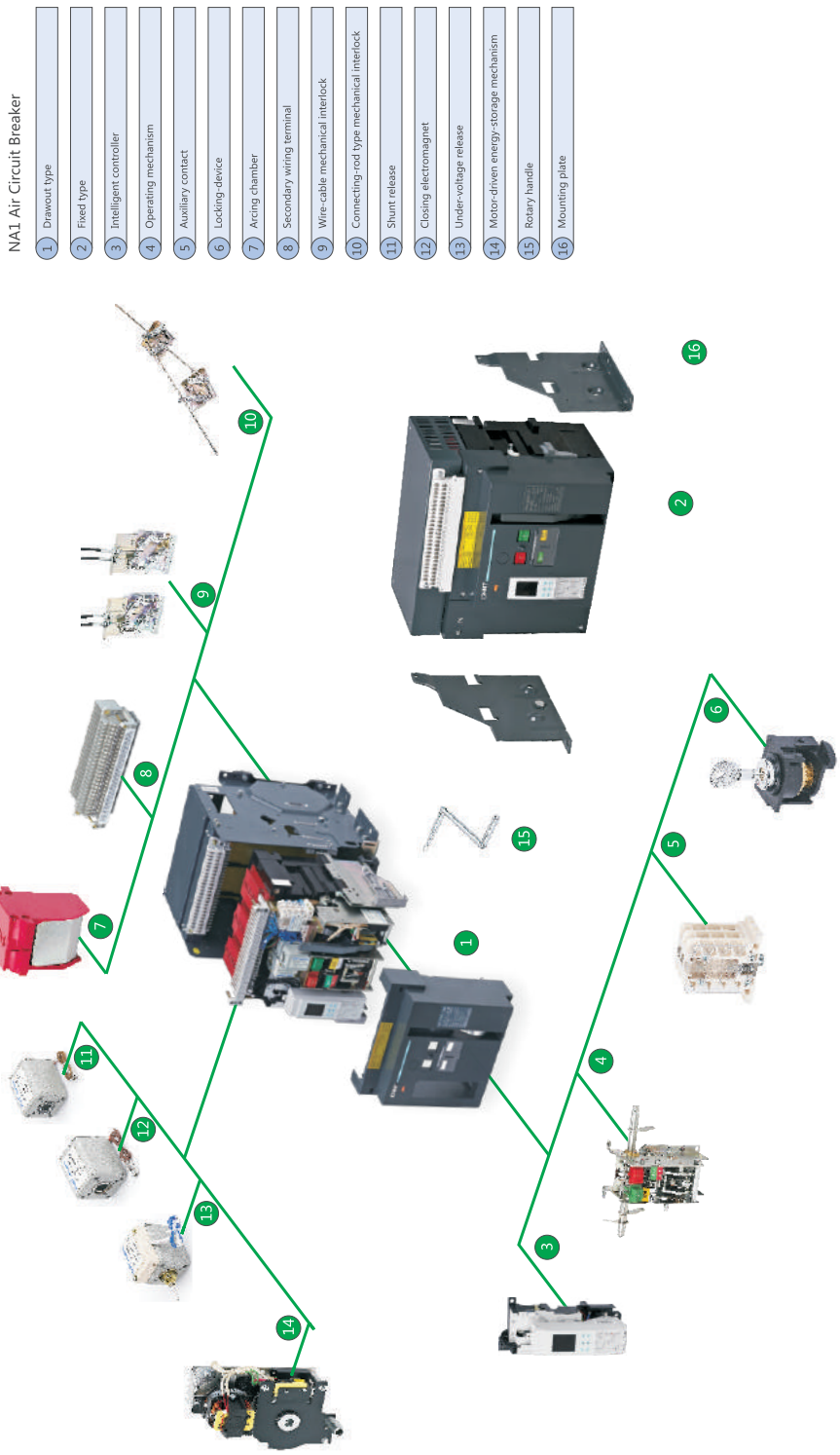
3. When Inm=2000A, the maximum Ig is 1200A;

4. When Inm=3200A, 4000A, 6300A, the minimum Ig is 500A and the maximum Ig is 1200A.

5.Regular factory setting: tg=OFF(M type), Ig=OFF(H type)

5 Structural Features

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



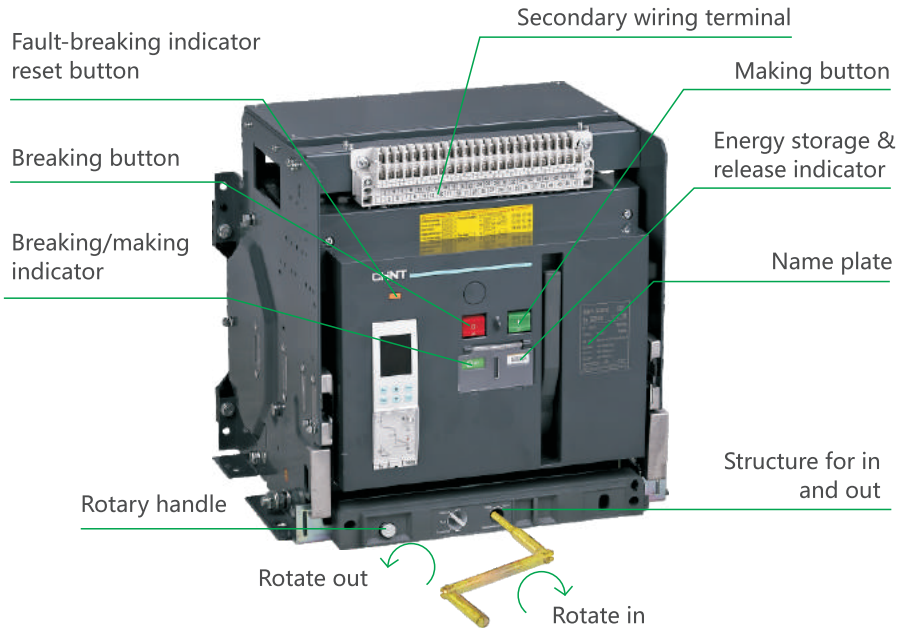


Figure 3.Product external structure

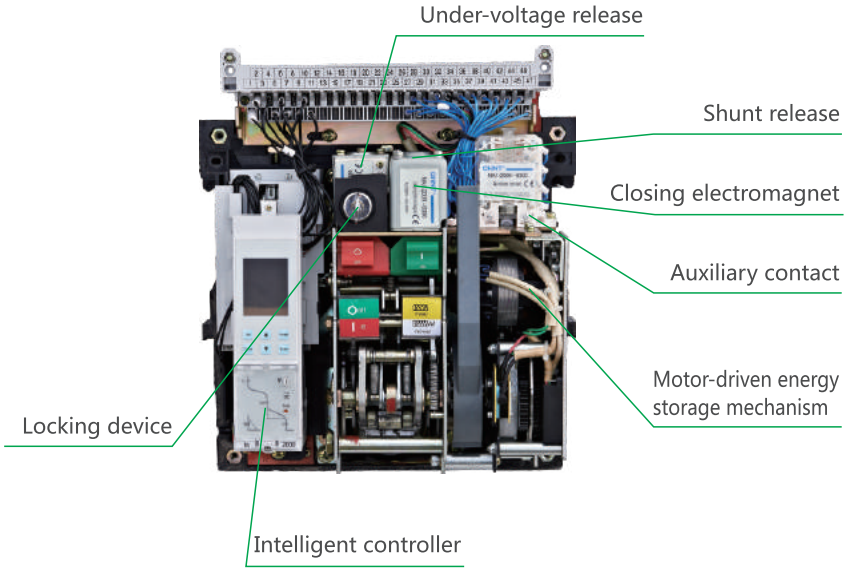
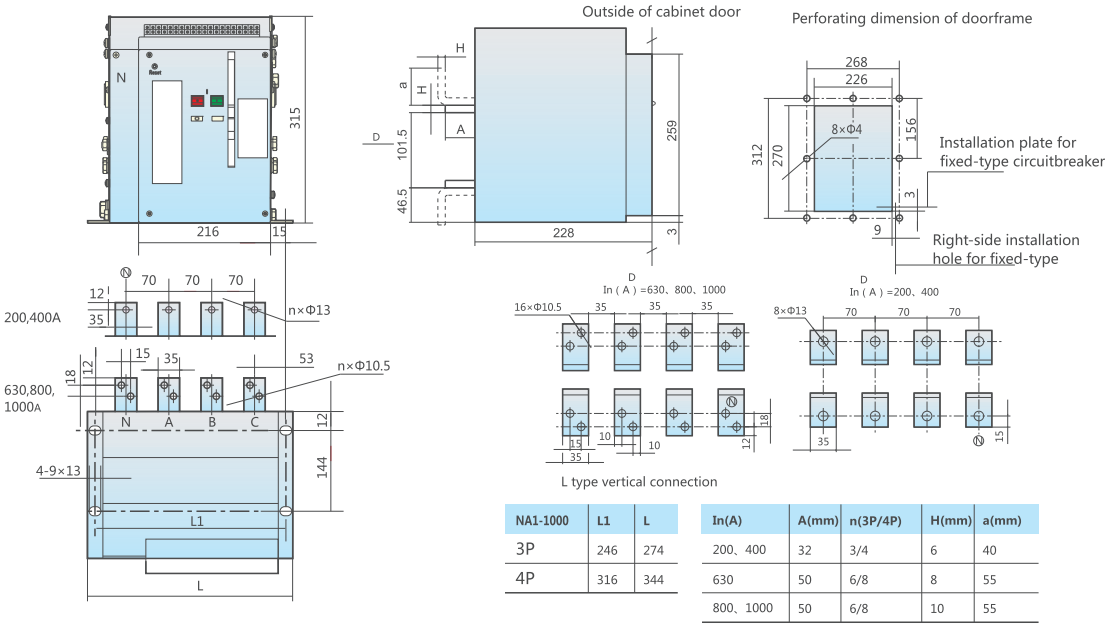


Figure 4.Product internal structure

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

Figure 5.Product installation type

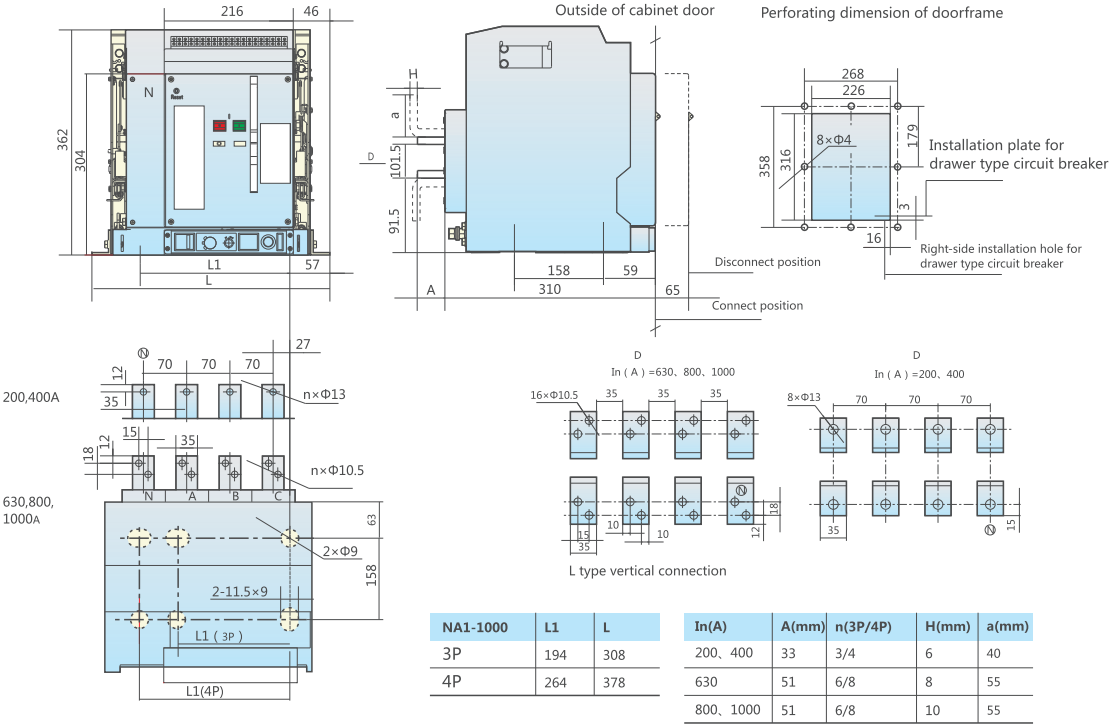
6 Structural Features



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

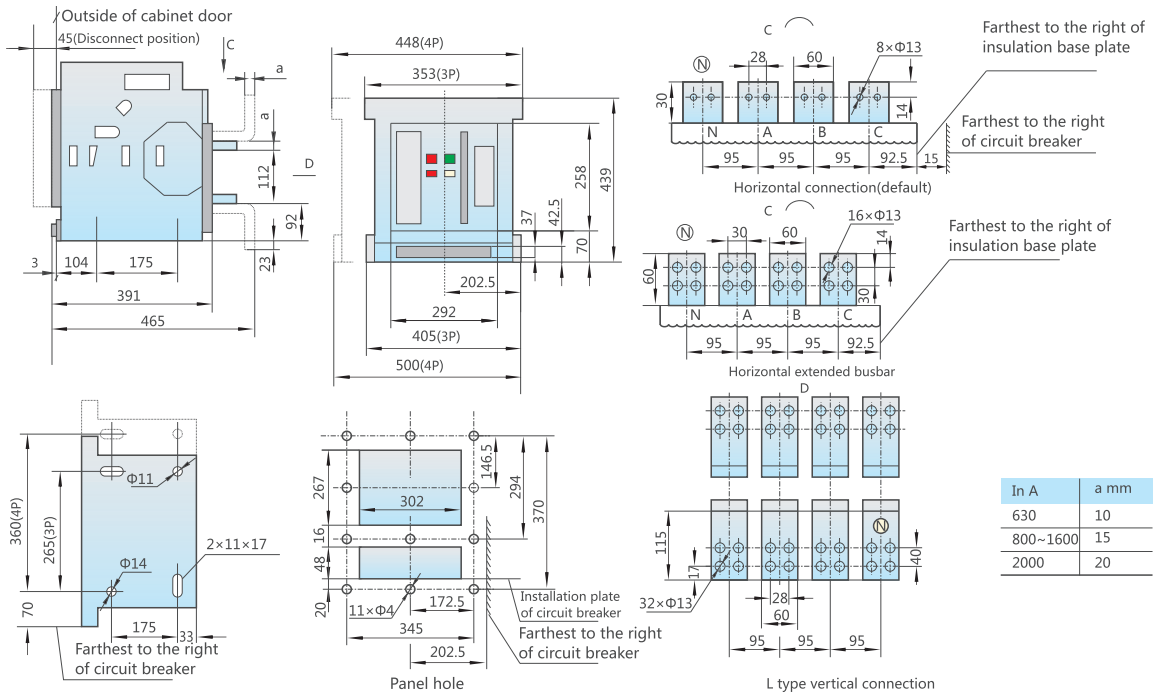
Figure 6.NA1-1000X fixed type



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

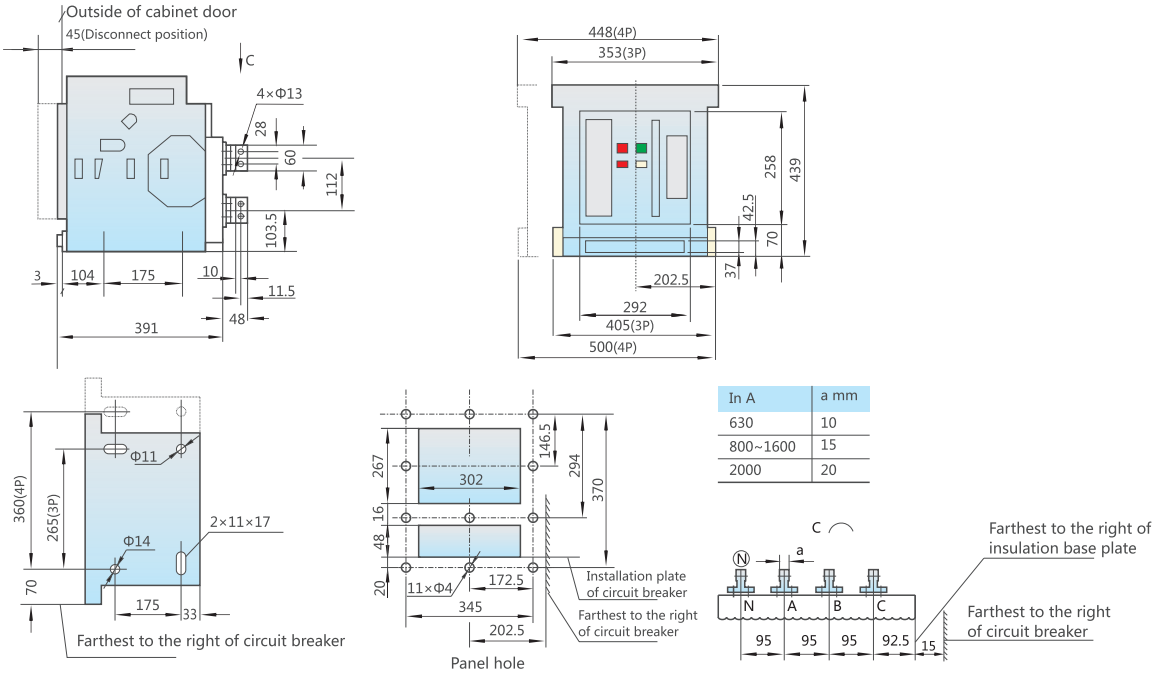
In(A)	A(mm)	n(3P/4P)	H(mm)	a(mm)
200、400	33	3/4	6	40
630	51	6/8	8	55
800、1000	51	6/8	10	55

Figure 7.NA1-1000X Drawer type



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

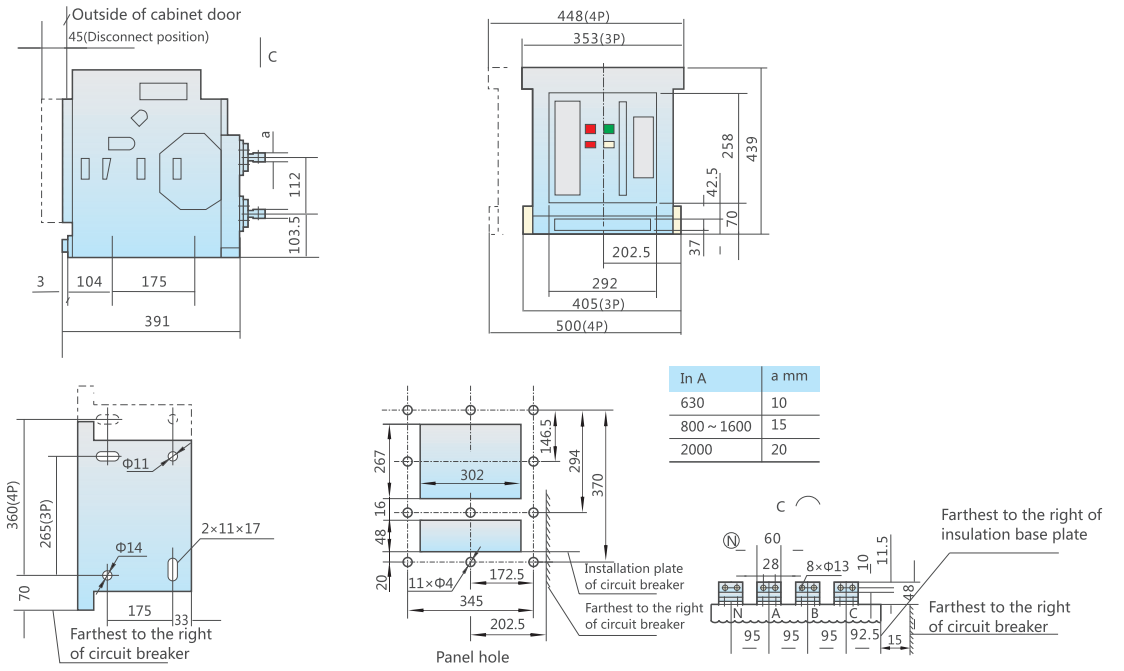
Figure 8.NA1-2000X drawer type



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)

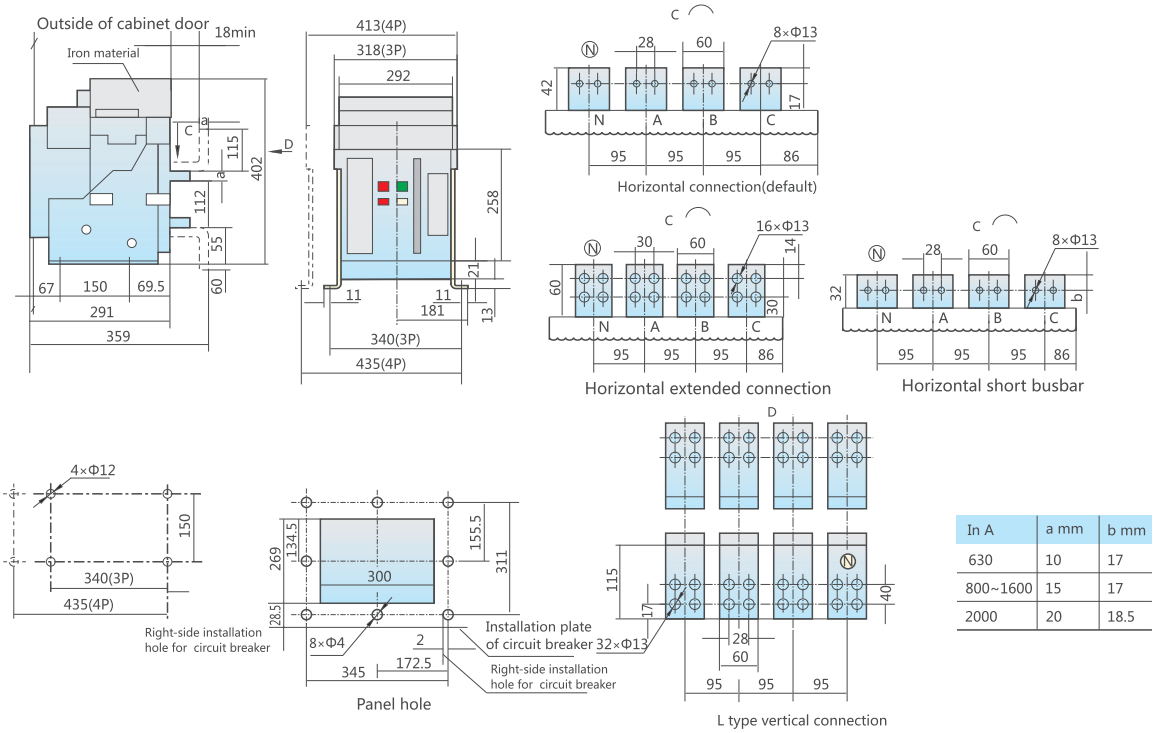


Figure 11.NA1-2000X fixed type

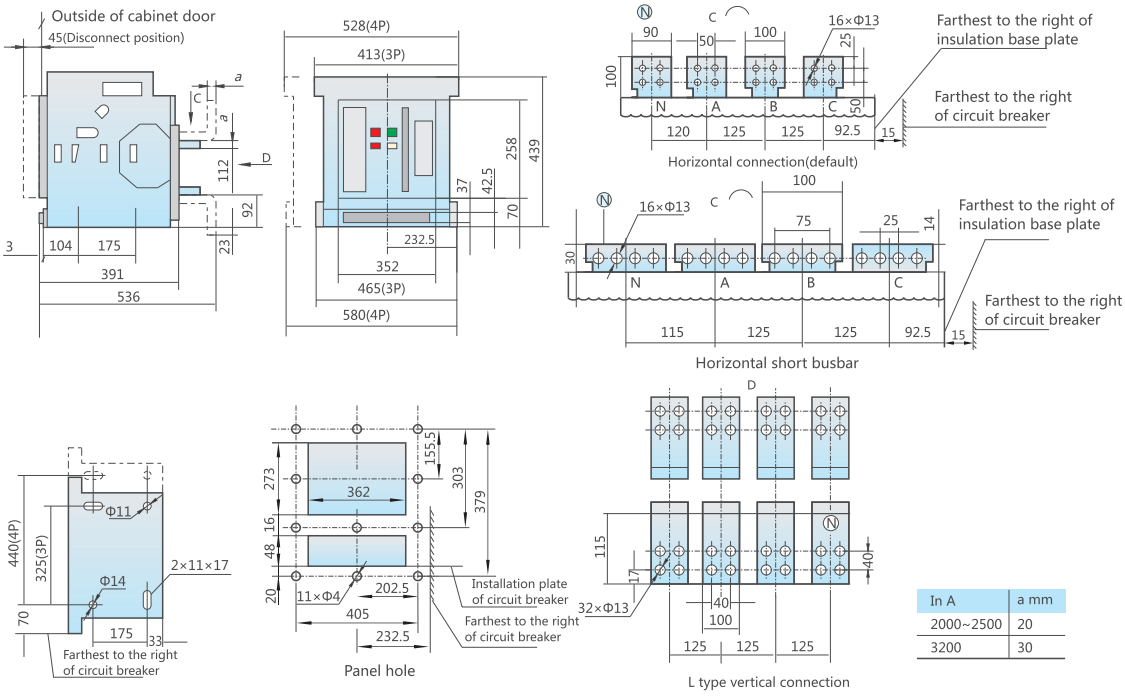
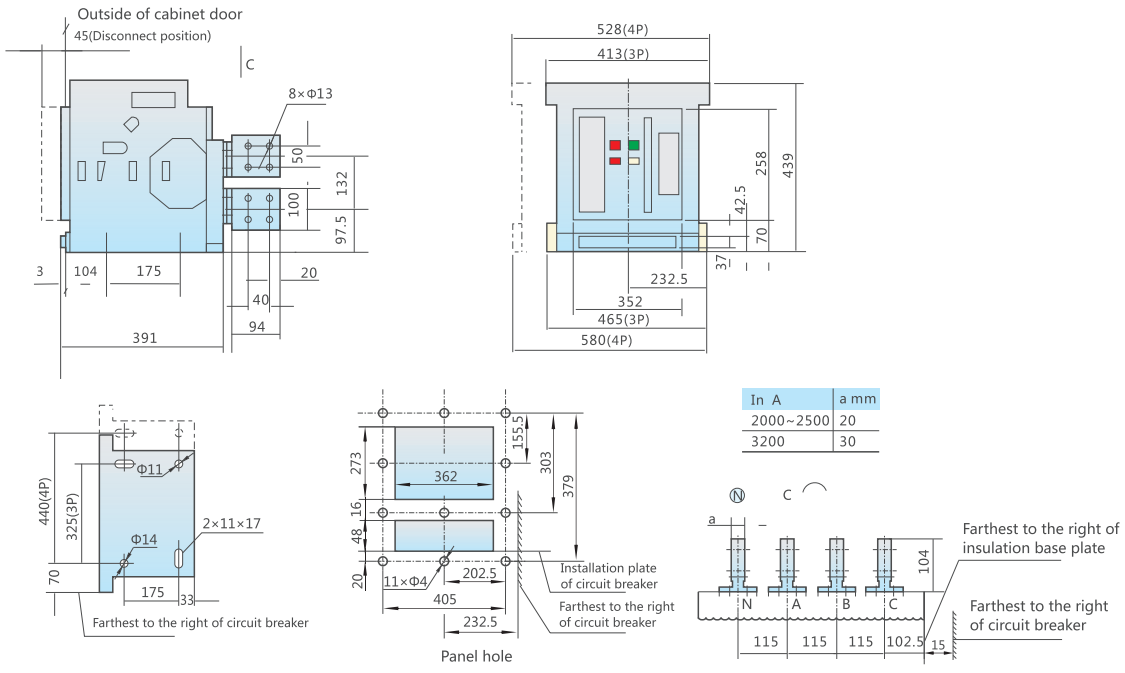
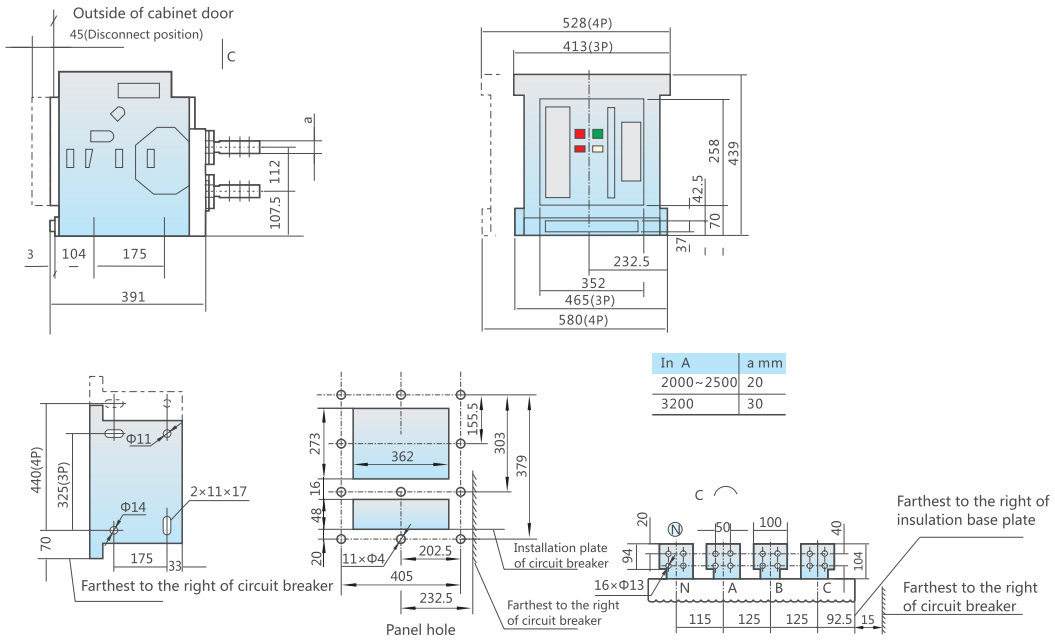


Figure 12.NA1-3200X withdrawable type



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)

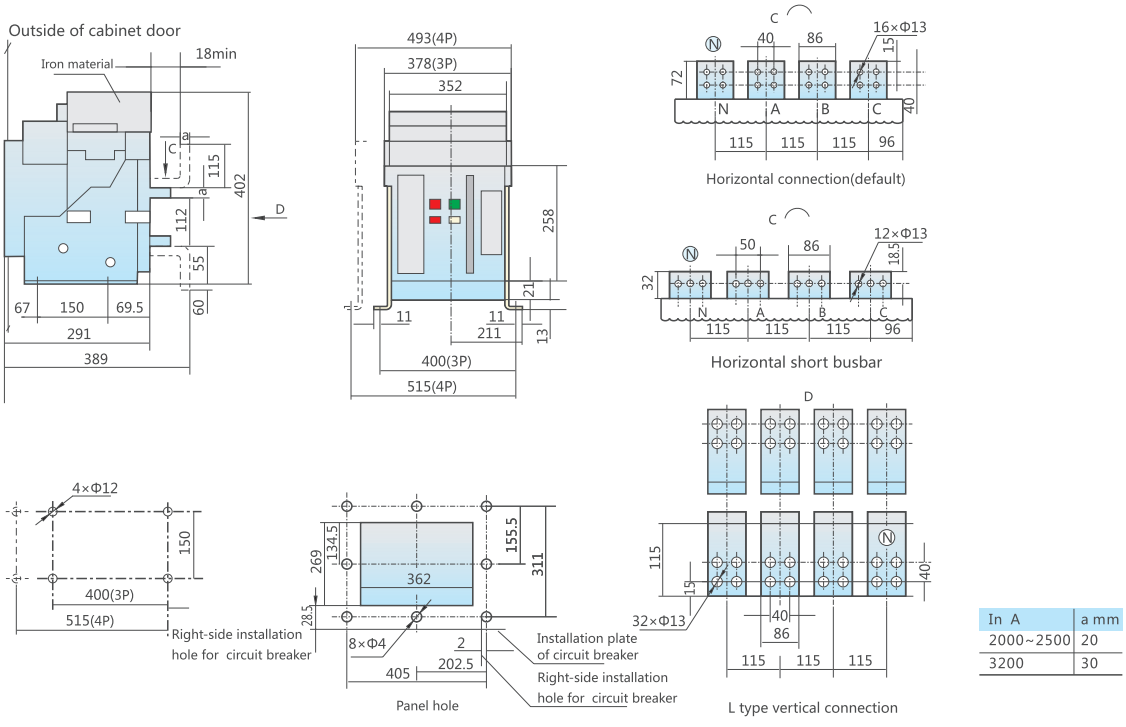


Figure 15.NA1-3200X fixed type

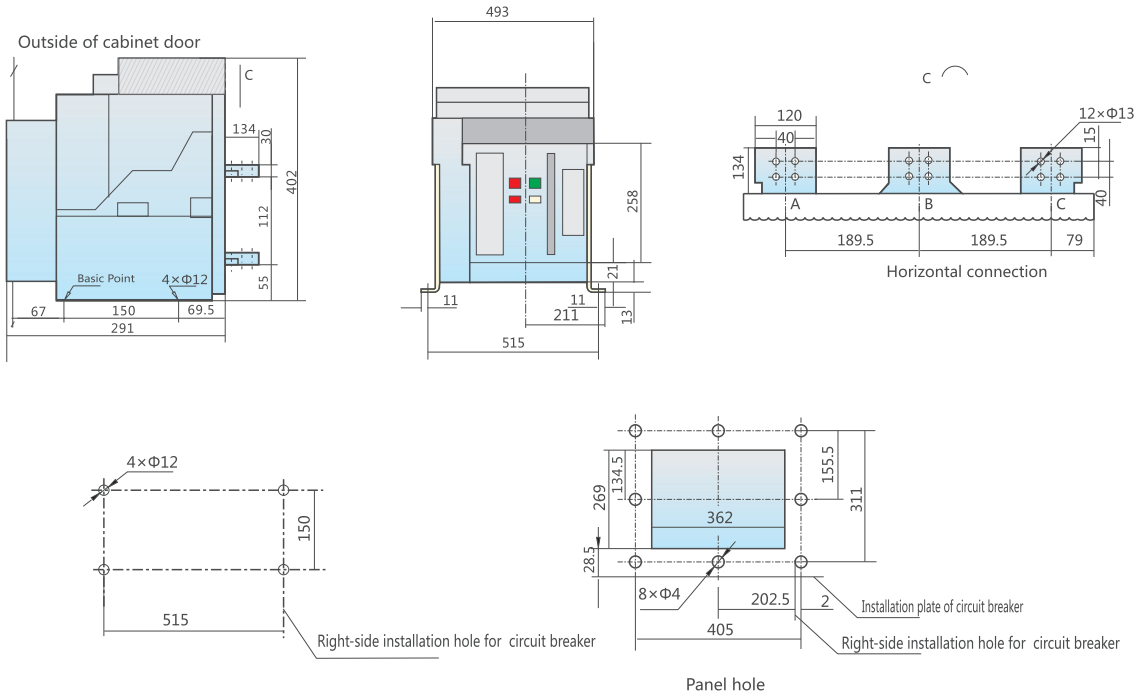


Figure 16.NA1-4000X/3 fixed type

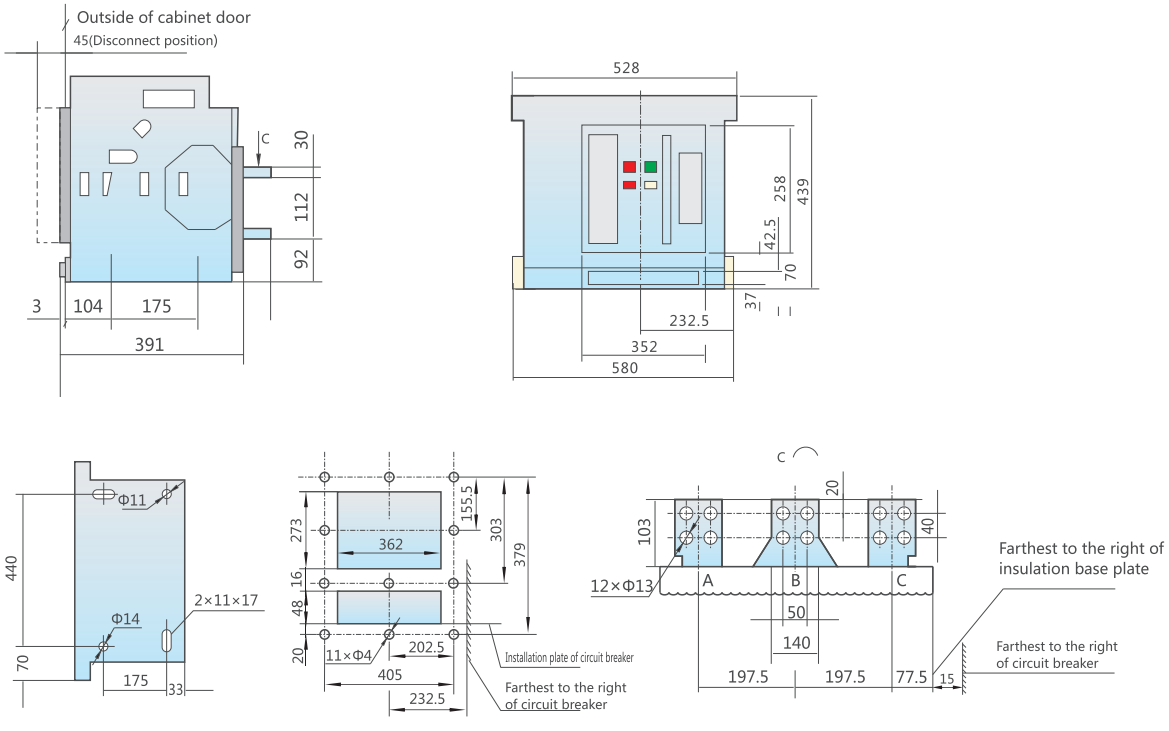


Figure 17.NA1-4000X/3 drawer type

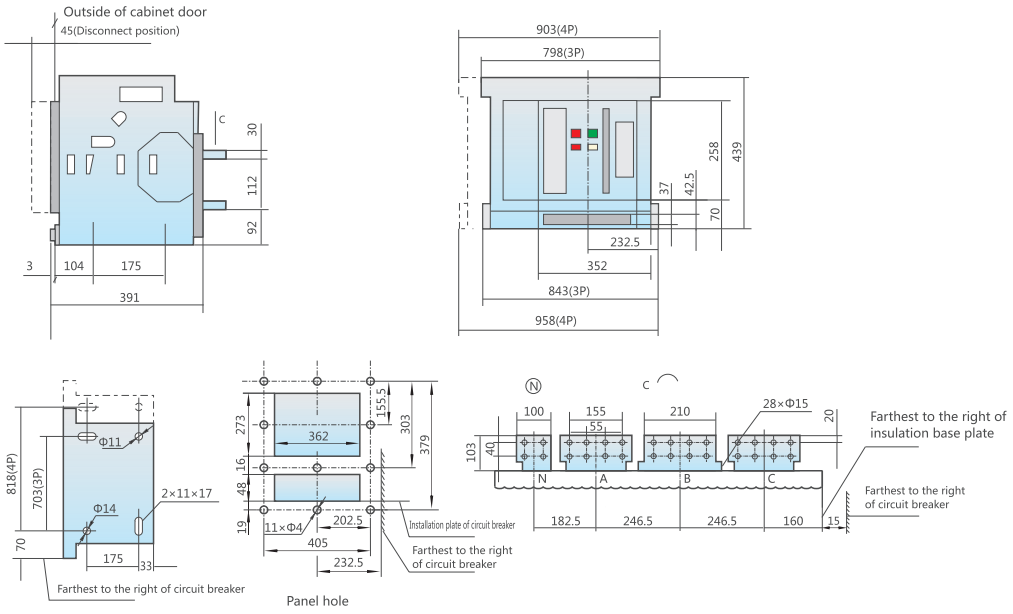


Figure 18.NA1-6300X(In=4000A, 5000A) drawer type

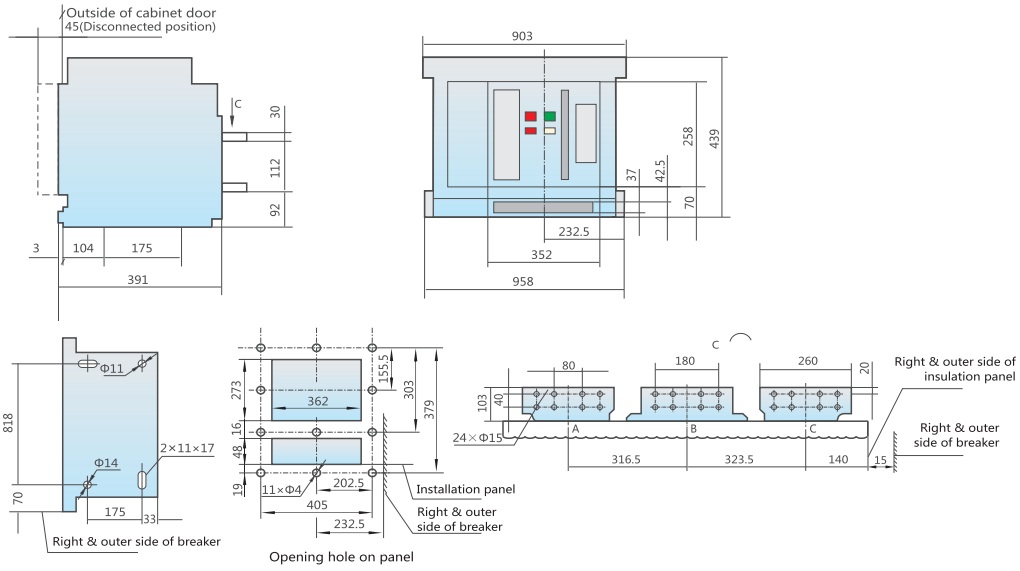


Figure 19.NA1-6300X(In=6300A) drawer type (3 poles)

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/-

7 Structural Features

7.1 Basic Inspections and Technical Requirements for Installation

7.1.1 Inspections before installation:

a. Check your order to see whether it is consistent with the parameters on the nameplate of the circuit breaker, check for the following items:
(1) Rated current, setting current; (2) Main circuit voltage; (3) Installation method, operation method; (4) intelligent controller voltage, shunt release voltage, undervoltage release voltage and delay time, making electromagnet voltage, energy storage motor voltage; (5) Other special order requirements;
b. Check the contents according to the configuration described in this instruction;
c. Before installing, operating, maintaining and repairing the product, read this instruction carefully to avoid manual damage to the circuit breaker and any unnecessary problems;

7.1.2 Preparation before installation:

a. Unpack according to the order described on the top of the package, do not use brutal force;
b. Remove the circuit breaker from the base plate of the package, if the circuit breaker is withdrawable type, remove the circuit breaker body out of the drawer seat according to 7.6.1.2 and clean up the drawer seat;

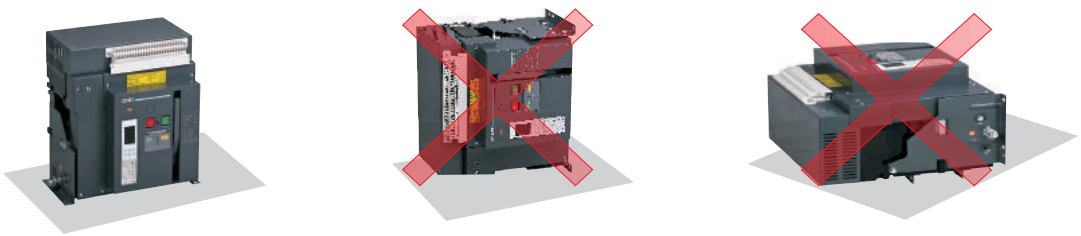


Figure 20.Placement of circuit breaker

c. Use 500V megameter to test the insulation resistance of the circuit breaker. The insulation resistance shall not be lower than 20 MΩ under ambient temperature of 25℃±5℃ and relative humidity of 50-70%, otherwise dry the circuit breaker.

7.1.3 Busbar recommendations

Table 9 Busbar recommendations

Inm(A)		NA1-1000X					NA1-2000X						NA1-3200X			NA1-4000X/3	NA1-6300X		
In(A)		200	400	630	800	1000	630	800	1000	1250	1600	2000	2000	2500	3200	4000/3P	4000	5000	6300
Busbar	Thickness (mm)	5	5	5	6	8	5	6	8	10	12	10	8	10	10	10	10	10	10
	Width (mm)	30	30	40	50	50	60	60	60	60	60	60	100	100	100	120	100	100	100
	Number	1	2	2	2	2	2	2	2	2	3	2	2	2	4	4	5	7	8

Note: a. The busbar specifications in the table above are applicable to open-type installed circuit breakers under ambient temperature of 40℃ and comply with the conventional thermal conditions specified in IEC/EN 60947-2.
b. If the busbar selected by user does not match with the terminals of circuit breaker, an extended busbar is needed for transfer. 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.
c. After installing the busbar according to the table above, make sure the electric clearance between the poles is not less than 18mm
d. 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, user should consider the impact of ambient temperature and altitude as well as higher harmonic generated by silicon controlled electrical elements when selecting circuit breaker. In such cases, the circuit breaker must be derated, the recommend derating factor is 0.5-0.8.
e. After the circuit breaker is installed, the safety clearance between live parts of different potentials and the safety clearance between live parts and ground should not be smaller than 18mm.

7.2 Installation of withdrawable circuit breaker

7.2.1 Install the drawer seat of NA1-1000X on the mounting plate in the cabinet. Use four M8 bolts (with gasket) to secure the drawer seat, with installation torque of (10.3~14.4)N · m; install the drawer seat of NA1-2000X~6300X on the mounting plate in the cabinet; use four M10 bolts (with gasket) to secure the drawer seat, with installation torque of (20~28)N · m, see Figure 21 (You can use special bracket to install the withdrawable circuit breaker vertically).

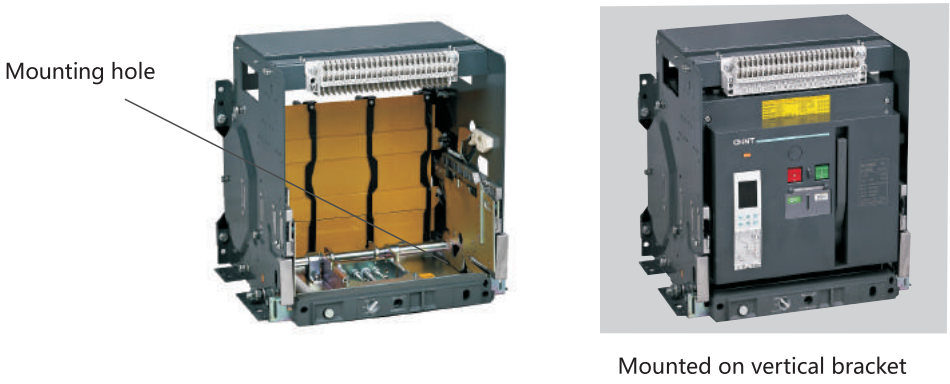


Figure 21.Installation of drawer type circuit breaker

7.2.2 For NA1-1000X type circuit breaker, put the body directly on the rail of drawer seat and push the body into the drawer seat until it meets resistance; for NA1-2000X~6300X type, pull out the rail and put the body on the rail as shown in the figure. Remember to put the two bracket holder into the slots of the rail, then push the body into the drawer seat until it meets resistance.

7.2.3 Draw out the handle and insert the hexagon head fully into the handle hole of the drawer seat. Rotate the handle clockwise until the position indicator switches to "Connect" position. For NA1-1000X type, the secondary circuit is fully engaged without any clearance; for NA1-2000X~6300X type, stop rotating the handle when you hear a click, then pull out the handle and put it back.

Note: 1. Before putting the body into the drawer seat, check if the rated current of the body is consistent with that of the drawer seat, otherwise the product might be damaged.
2. When rotating from "Test" position to "Connect" position, you must break the circuit breaker first to avoid any possible accident.

7.3 Installation of fixed type circuit breaker

Put the circuit breaker (fixed type) on the mounting bracket, secure the circuit breaker and connect the main circuit busbar directly with the busbar of the fixed type circuit breaker.

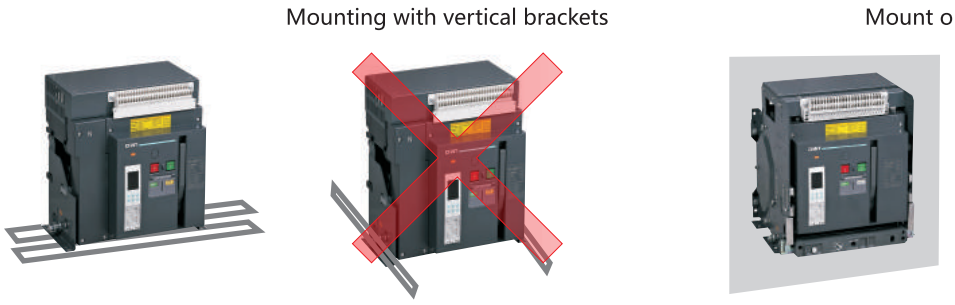


Figure 22. Installation of fixed type circuit breaker

Note: It is very important to distribute the weight of the circuit breaker evenly on the rigid mounting surface (for example, mounting on rail or baseplate). The mount surface should be level (tolerance: 2mm) to avoid deformation that may impact the normal operation of the circuit breaker.

7.4 Connection of main circuit

7.4.1 Incoming power line

Figure 23. Incoming line options from top and bottom

7.4.2 Partitions

Leave sufficient space for good ventilation. The partitions for top and bottom connectors of circuit breaker must be made of non-magnetic material.

For circuit breakers with current of 2500A and above, avoid magnet loop when there is conductor passing through the metal partition.

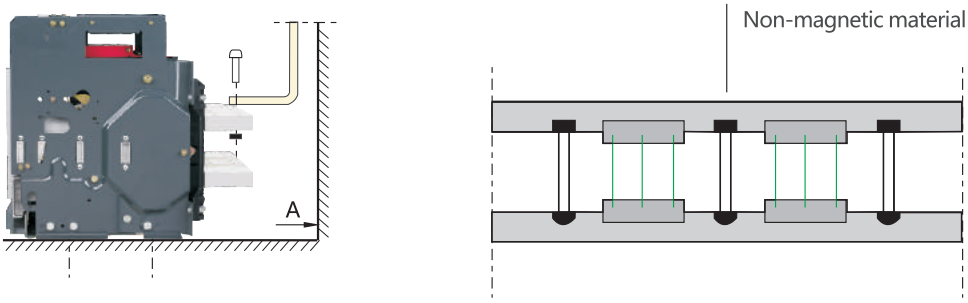


Figure 24. Metal support or partition is made of non-magnetic material

7.4.3 Busbar connection

Before inserting bolt B into the busbar, adjust and locate the support busbar properly.The support busbar should be fixed to the frame of the cabinet so that the circuit breaker terminal is free from weight C (the support bar should be installed near the terminal)

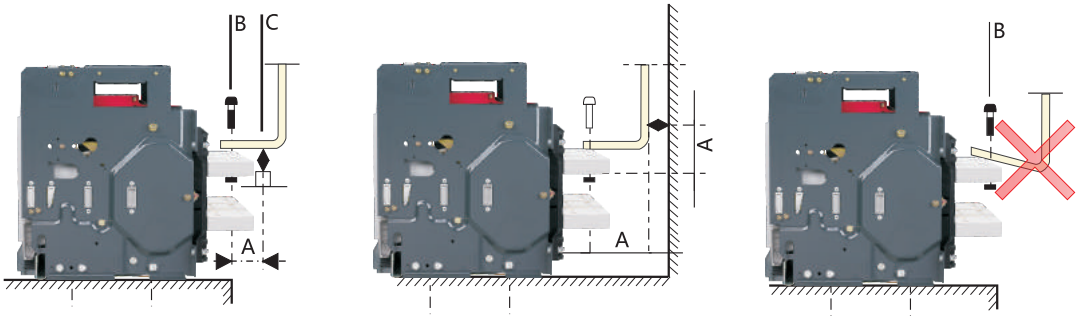


Figure 25. Circuit breaker busbar connection

Dynamically stable: The distance between the first support bar and the circuit breaker connecting point should not exceed the specified maximum distance (see Table 11). To avoid interphase short circuit, such distance should always meet the requirement of being dynamically stable.

Table 10 Maximum distance between support bar and circuit breaker connecting point

Ics(kA)	≤30	40	50	75	80	100
Distance A(mm)	350	320	300	200	150	150

7.4.4 Cable connection

When using cable connection, user should make sure that the circuit breaker terminal does not bear too much mechanical force. User can extend the connecting terminal of the circuit breaker by using power connection busbar. Single core cable and multi-core cable are both available. Follow the steps below when connecting with busbar:

(1) Locate the terminal lug before inserting the bolt

(2) Fix the cable on the cabinet frame securely

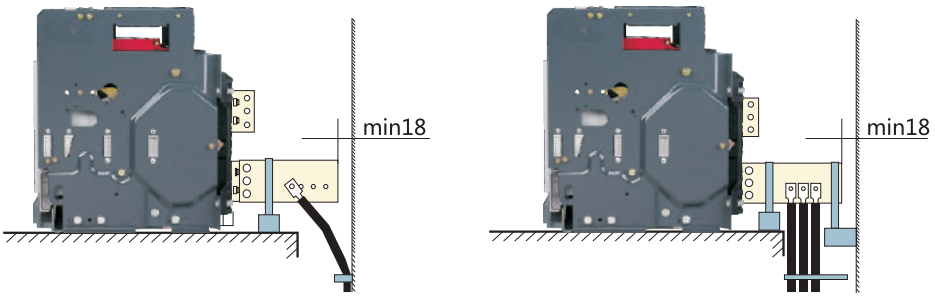


Figure 26. Circuit breaker cable connection

7.4.5 Clamping

The busbar must be fixed with proper torque by using bolts and nuts. Neither too big nor too small torque is allowed. Too big torque may cause bolts to slip which makes it difficult to tighten the bolts; too small torque may lead to poor fastening and may cause excessive temperature rise. Please refer to the Table 12 for tightening torque of circuit breaker connections: These data are applicable to copper busbar and steel bolts and nuts, with grade≥8.8. The same torque can be applied to aluminum busbar.

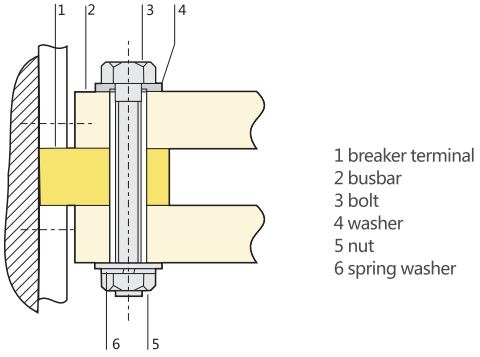


Figure 27.Busbar clamping diagram

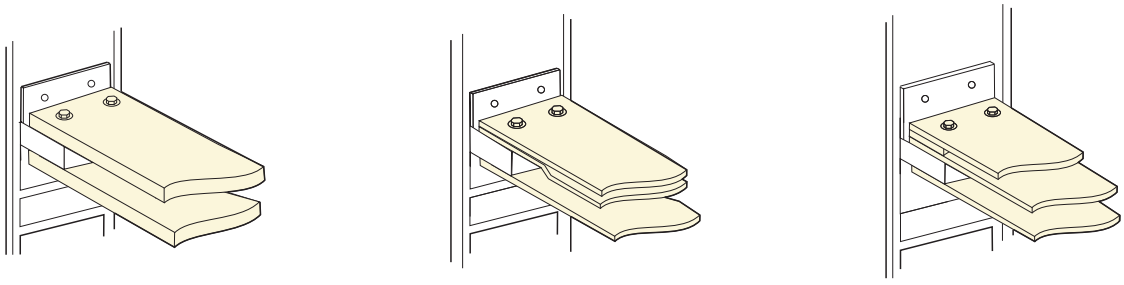


Figure 28.Recommended installation method

Table 11 Tightening torque

Bolt type	Application	Torque (N•m)
M3	Secure secondary connection termianl	0.4~0.5
M10	Secure busbar	36~52
M12	Secure busbar	61~94

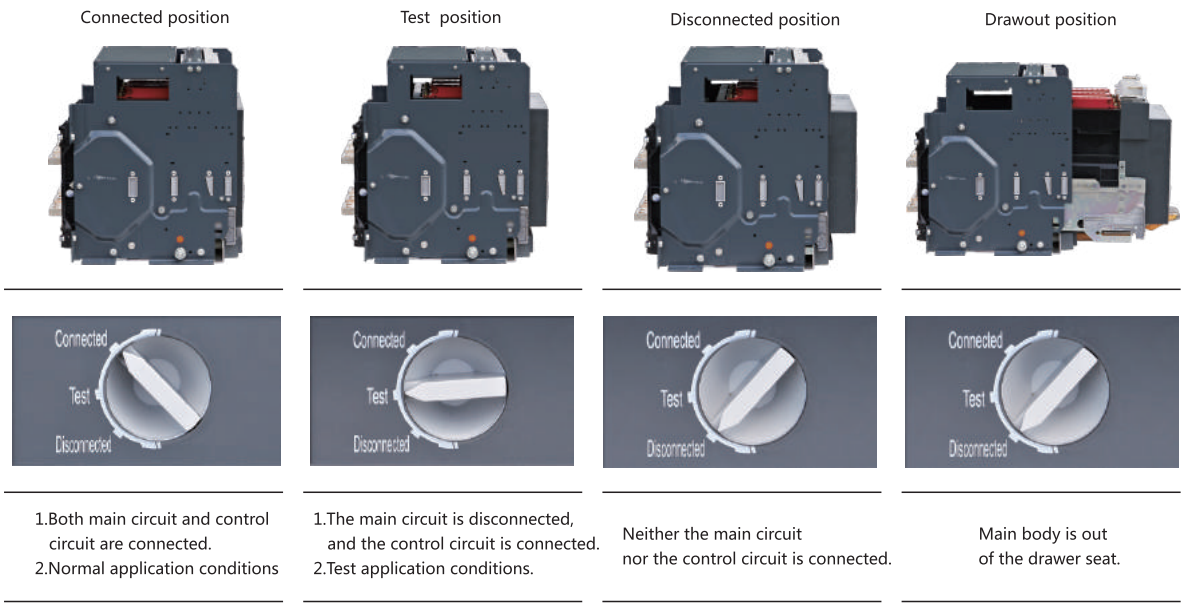


Figure 29.Three position for drawer type

7.4.6 Wiring the secondary circuit according to electric principle diagram.

Note: Bolts, nuts, gaskets shouldn't be left inside the drawer seat to avoid being blocked.

7.4.7 Operation

Check the rated voltage of the following components whether conforms to the power voltage .Such as under voltage release, shunt release, closing electromagnet, motor-driven mechanism and intelligent controller.

7.4. 8 Maintenance

Check the technical parameters in time or add some lubricating oil, etc. This breaker structure is arranged vertically and modularized composition with each functioncell separated, which make the maintenance easy.

It has compact structure, reliable operation and strong free maintenance capability. Please check the technical parameters on the nameplate in accordance with the requirements of order before installation. See figure 30.

7.4. 9 Manual energy-storage

Making the secondary circuit power, the motor-driven mechanism can store energy automatically until hearing the click and energy stored indicating on the panel. Otherwise press the storage handle for 6~7 times until hearing the click and the indicator display energy stored and the closing operation can be realized either by closing electromagnet or manual button. See figure 31.

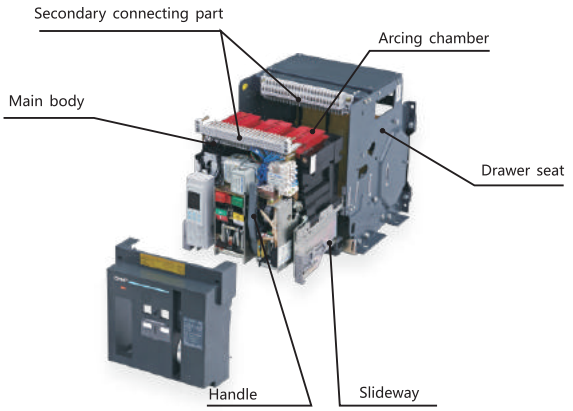


Figure 30.breaker structureFigure

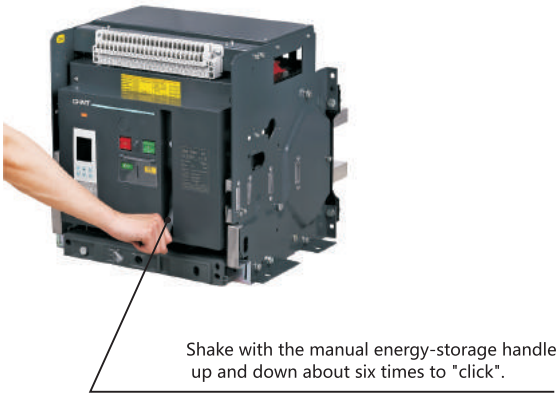
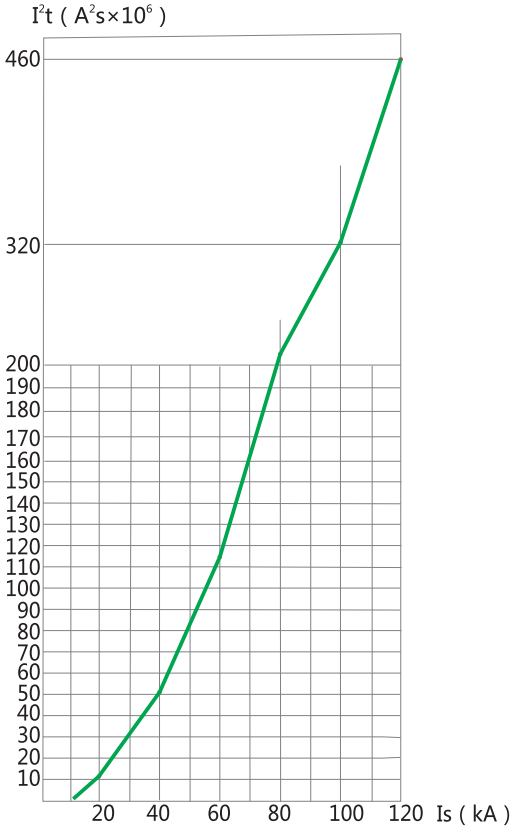


Figure 31.Manual energy-storage

7.4.10 A^2 S curve



Is: prospective symmetrical current(of an a.c. circuit)

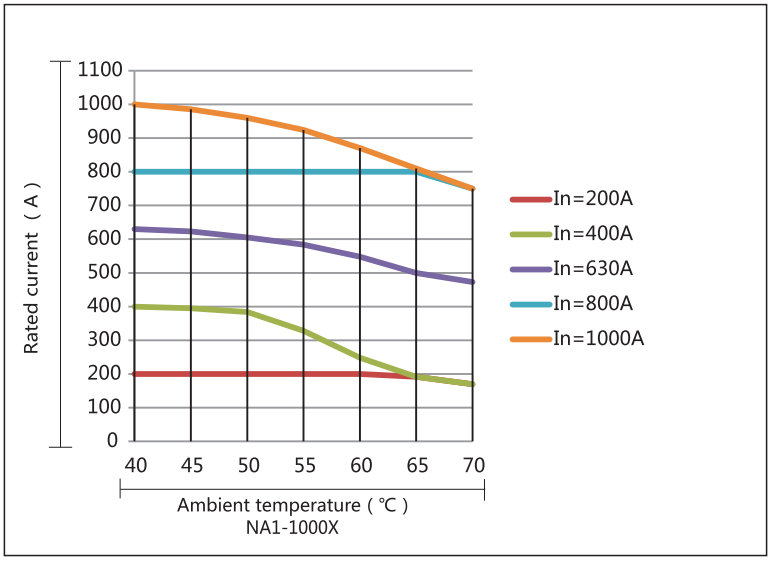
Figure 32.A^2S curve

7.4.11 Temperature derating

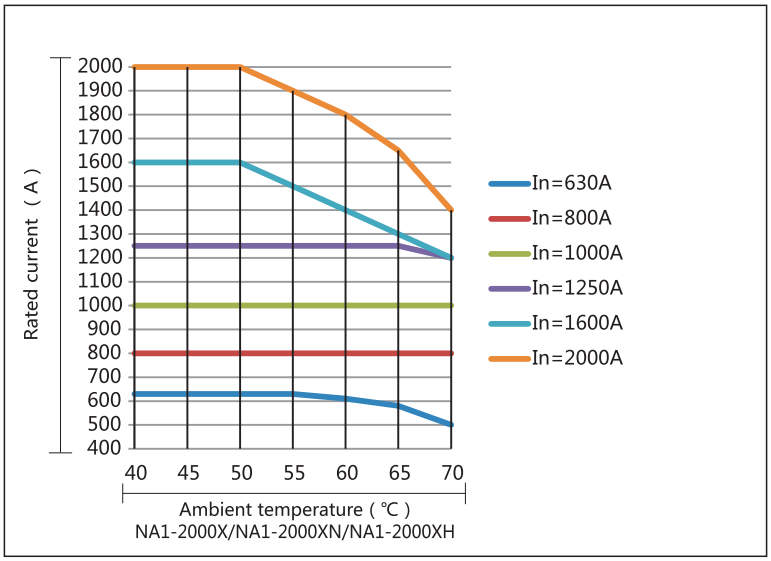
Table 12 Temperature derating

Standard	Ambient temperature	NA1-1000X					NA1-2000X/NA1-2000XN/NA1-2000XH						NA1-3200X/NA1-3200XN NA1-4000X				NA1-6300X/ NA1-6300XN		
IEC/EN60947-2	40℃	200	400	630	800	1000	630	800	1000	1250	1600	2000	2000	2500	3200	4000	4000	5000	6300
	45℃	200	395	623	800	985	630	800	1000	1250	1600	2000	2000	2500	3200	3800	4000	5000	6000
	50℃	200	384	605	800	960	630	800	1000	1250	1600	2000	2000	2500	3200	3600	4000	5000	5600
	55℃	200	328	584	800	924	630	800	1000	1250	1500	1900	2000	2300	3000	3400	4000	4800	5400
	60℃	200	248	548	800	870	610	800	1000	1250	1300	1800	2000	2200	2800	3200	4000	4800	5200
	65℃	192	192	500	800	810	610	800	1000	1250	1300	1650	2000	2200	2600	3000	4000	4600	5100
	70℃	170	170	473	750	750	473	800	1000	1200	1200	1400	2000	2000	2200	2520	4000	4000	4200

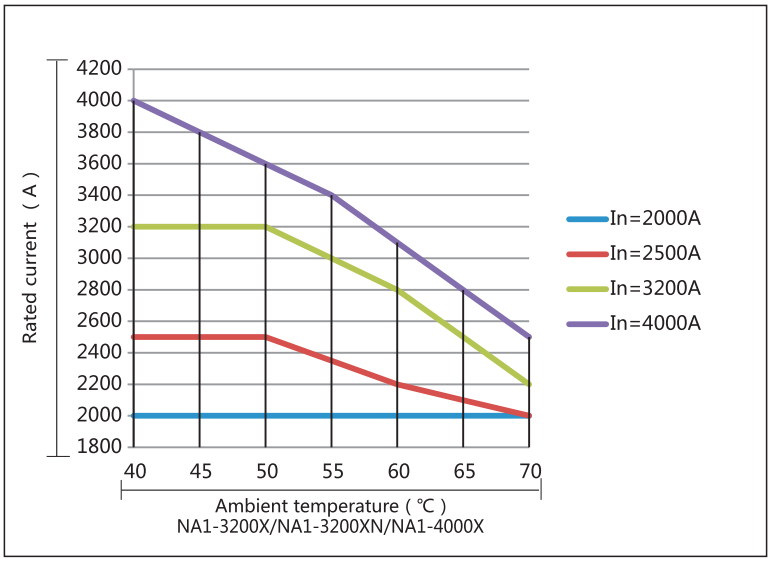
Note: The ACB is to calibrated at 40℃, special application please refer to the table above and the curve below.



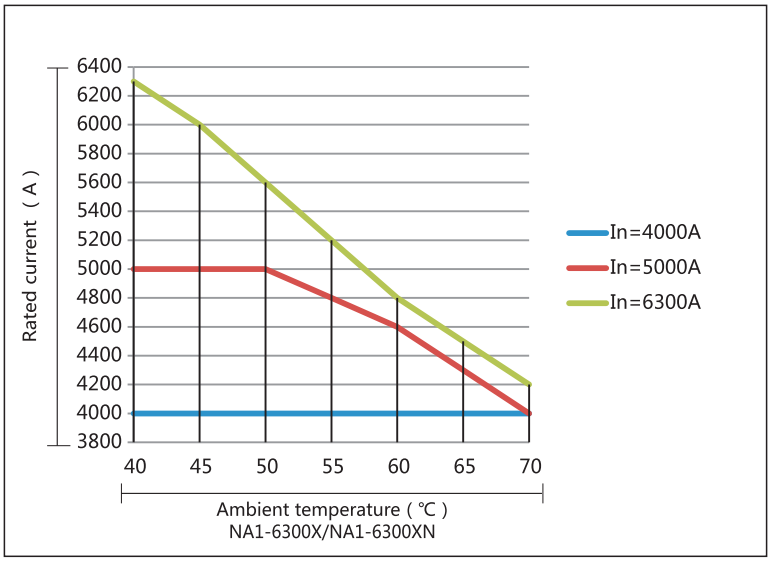
33-a



33-b



33-c



33-d

Figure 33.Temperature compensation correction

7.4.12 Coordination recommendations

Table 13 Coordination recommendations

Capacity of transformer (kVA) & parallelly connected number	Rated current of transformer In(A)	Short circuit current of main circuit (kA)	Breaking capacity of air circuit breaker for main circuit (kA)
1×250	360	9	9
2×250	360	9	9
3×250	360	9	18.5
1×315	455	11.4	11.4
2×315	455	11.4	11.4
3×315	455	11.4	22.7
1×400	578	14.4	14.4
2×400	578	14.4	14.4
3×400	578	14.4	28.8
1×500	722	18	18
2×500	722	18	18
3×500	722	18	36.1
1×630	910	22.7	22.7
2×630	910	22.7	22.7
3×630	910	22.7	44.5
1×800	1154	19.3	19.3
2×800	1154	19.3	19.3
3×800	1154	19.3	38.5
1×1000	1444	24	24
2×1000	1444	24	24
3×1000	1444	24	48.1
1×1250	1805	30	30
2×1250	1805	30	30
3×1250	1805	30	60.1
1×1600	2310	36.5	36.5
2×1600	2310	36.5	36.5
3×1600	2310	36.5	73
1×2000	2887	48.2	48.2
2×2000	2887	48.2	48.2
3×2000	2887	48.2	96.3
1×2500	3608	60	60
2×2500	3608	60	60
1×3150	4550	75.8	75.8
2×3150	4550	75.8	75.8

Continued table 13

Type of air circuit breaker for main circuit	Number and area of the busbar for main circuit (n×W×T)	Breaking capacity of air circuit breaker for branch circuit (kA)	Air circuit breaker for branch circuit
NA1-1000X-400		9	
NA1-1000X-400	2×(5×30)	18.5	NA1, NM8
NA1-1000X-400		27.5	
NA1-1000X-630		11.4	
NA1-1000X-630	2×(5×40)	22.7	NA1, NM8
NA1-1000X-630		34.1	
NA1-1000X-630		14.4	
NA1-1000X-630	2×(5×40)	28.8	NA1, NM8
NA1-1000X-630		43.2	
NA1-1000X-800		18	
NA1-1000X-800	2×(6×50)	36.1	NA1, NM8
NA1-1000X-800		54.1	
NA1-1000X-1000		22.7	
NA1-1000X-1000	2×(8×50)	44.5	NA1, NM8
NA1-2000X-1000		67.2	
NA1-2000X-1250		19.3	
NA1-2000X-1250	2×(10×60)	38.5	NA1, NM8
NA1-2000X-1250		57.8	
NA1-2000X-1600		24	
NA1-2000X-1600	2×(12×60)	48.1	NA1, NM8
NA1-2000X-1600		72.1	
NA1-2000X-2000		30	
NA1-2000X-2000	3×(10×60)	60.1	NA1, NM8
NA1-2000X-2000		90.1	
NA1-3200X-2500		36.5	
NA1-3200X-2500	2×(10×100)	73	NA1, NM8
NA1-3200X-2500		109.5	
NA1-3200X-3200		48.2	
NA1-3200X-3200	4×(10×100)	96.3	NA1, NM8
NA1-3200X-3200		144.5	
NA1-6300X-4000	4×(10×120)	60	NA1, NM8
NA1-6300X-4000		120	
NA1-6300X-5000	7×(10×100)	75.8	NA1, NM8
NA1-6300X-5000		151.6	

7.4.13 Selectivity protection

7.4.13 .1 Selective protection between NM8 and NAl

			Circuit breaker	**NA1-2000X/NA1-2000XN/NA1-2000XH**			
Downstream			Upstream	Rated current (A)	630	800	1000	1250
				Default setting ratings of short time-delay 8In (kA)	5.04	6.4	8	10
				Setting range (kA)	0.63～9.45	0.8~12	1~15	1.25~18.75
				Delayed tripping time (s)	0.1, 0.2, 0.3, 0.4			
				Returnable time	0.06, 0.14, 0.23, 0.35			
Frame size rated current	**Rated current (A)**	**Instantaneous setting ratings (kA)**						
NM8-125 NM8S-125	16	0.16 0.19(motor)			0.63~9.45 0.63~9.45	0.8~12 0.8~12	1~15 1~15	1.25~18.75 1.25~18.75
	20	0.2 0.24(motor)			0.63~9.45 0.63~9.45	0.8~12 0.8~12	1~15 1~15	1.25~18.75 1.25~18.75
	25	0.25 0.30(motor)			0.63~9.45 0.63~9.45	0.8~12 0.8~12	1~15 1~15	1.25~18.75 1.25~18.75
	32	0.32 0.38(motor)			0.63~9.45 0.63~9.45	0.8~12 0.8~12	1~15 1~15	1.25~18.75 1.25~18.75
	40	0.40 0.48(motor)			0.63~9.45 0.6624~9.45	0.8~12 0.8~12	1~15 1~15	1.25~18.75 1.25~18.75
	50	0.50 0.60(motor)			0.69~9.45 0.828~9.45	0.8~12 0.828~12	1~15 1~15	1.25~18.75 1.25~18.75
	63	0.63 0.75(motor)			0.8694~9.45 1.035~9.45	0.8694~12 1.035~12	1~15 1.035~15	1.25~18.75 1.25~18.75
	80	0.80 0.96(motor)			1.104~9.45 1.325~9.45	1.104~12 1.325~12	1.104~15 1.325~15	1.25~18.75 1.325~18.75
	100	1.0 1.20(motor)			1.38~9.45 1.656~9.45	1.38~12 1.656~12	1.38~15 1.656~15	1.38~18.75 1.656~18.75
	125	1.25 1.5(motor)			1.725~9.45 2.07~9.45	1.725~12 2.07~12	1.725~15 2.07~15	1.725~18.75 2.07~18.75
NM8-250 NM8S-250	100	1.0 1.2(motor)			1.38~9.45 1.656~9.45	1.38~12 1.656~12	1.38~15 1.656~15	1.38~18.75 1.656~18.75
	160	1.6 1.92(motor)			2.208~9.45 2.65~9.45	2.208~12 2.65~12	2.208~15 2.65~15	2.208~18.75 2.65~18.75
	200	2.0 2.4(motor)			2.76~9.45 3.312~9.45	2.76~12 3.312~12	2.76~15 3.312~15	2.76~18.75 3.312~18.75
	250	2.5 3.0(motor)			3.45~9.45 4.14~9.45	3.45~12 4.14~12	3.45~15 4.14~15	3.45~18.75 4.14~18.75

		NA1-3200X/NA1-3200XN			**NA1-4000X**	**NA1-6300X/NA1-6300XN**		
1600	2000	2000	2500	3200	4000	4000	5000	6300
12.8	16	16	20	25.6	32	32	40	50.4
1.6~24	2~30	2~30	2.5~37.7	3.2~48	4~60	4~60	5~75	6.3~94.5
0.1, 0.2, 0.3, 0.4								
0.06, 0.14, 0.23, 0.35								
1.6~24 1.6~24	2~30 2~30	2~30 2~30	2.5~37.7 2.5~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
1.6~24 1.6~24	2~30 2~30	2~30 2~30	2.5~37.7 2.5~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
1.6~24 1.6~24	2~30 2~30	2~30 2~30	2.5~37.7 2.5~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
1.6~24 1.6~24	2~30 2~30	2~30 2~30	2.5~37.7 2.5~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
1.6~24 1.6~24	2~30 2~30	2~30 2~30	2.5~37.7 2.5~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
1.6~24 1.6~24	2~30 2~30	2~30 2~30	2.5~37.7 2.5~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
1.6~24 1.6~24	2~30 2~30	2~30 2~30	2.5~37.7 2.5~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
1.6~24 1.6~24	2~30 2~30	2~30 2~30	2.5~37.7 2.5~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
1.6~24 1.656~24	2~30 2~30	2~30 2~30	2.5~37.7 2.5~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
1.725~24 2.07~24	1.725~30 2.07~30	1.725~30 2.07~30	1.725~37.7 2.07~37.7	1.725~48 2.07~48	1.725~60 2.07~60	1.725~60 2.07~60	1.725~75 2.07~75	1.725~94.5 2.07~94.5
1.6~24 1.656~24	2~30 2~30	2~30 2~30	2.5~37.7 2.5~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
2.208~24 2.65~24	2.208~30 2.65~30	2.208~30 2.65~30	2.5~37.7 2.65~37.7	3.2~48 3.2~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
2.76~24 3.312~24	2.76~30 3.312~30	2.76~30 3.312~30	2.76~37.7 3.312~37.7	3.2~48 3.312~48	4~60 4~60	4~60 4~60	5~75 5~75	6.3~94.5 6.3~94.5
3.45~24 4.14~24	3.45~30 4.14~30	3.45~30 4.14~30	3.45~37.7 4.14~37.7	3.45~48 4.14~48	4~60 4.14~60	4~60 4.14~60	5~75 5~75	6.3~94.5 6.3~94.5

				Circuit breaker	NA1-2000X/NA1-2000XN/NA1-2000XH			
Downstream			Upstream	Rated current (A)	630	800	1000	1250
				Default setting ratings of short time-delay 8In (kA)	5.04	6.4	8	10
				Setting range (kA)	0.63～9.45	0.8~12	1~15	1.25~18.75
				Delayed tripping time (s)	0.1, 0.2, 0.3, 0.4			
				Returnable time	0.06, 0.14, 0.23, 0.35			
Frame size rated current	**Rated current (A)**	**Instantaneous setting ratings (kA)**						
NM8-630 NM8S-630	250	2.5 3.0(motor)			3.45~9.45 4.14~9.45	3.45~12 4.14~12	3.45~15 4.14~15	3.45~18.75 4.14~18.75
	315	3.15 3.78(motor)			4.347~9.45 5.216~9.45	4.347~12 5.216~12	4.347~15 5.216~15	4.347~18.75 5.216~18.75
	350	3.5 4.2(motor)			4.83~9.45 5.796~9.45	4.83~12 5.796~12	4.83~15 5.796~15	4.83~18.75 5.796~18.75
	400	4.0 4.8(motor)			5.52~9.45 6.624~9.45	5.52~12 6.624~12	5.52~15 6.624~15	5.52~18.75 6.624~18.75
	500	5.0 6.0(motor)			6.9~9.45 8.28~9.45	6.9~12 8.28~12	6.9~15 8.28~15	6.9~18.75 8.28~18.75
	630	6.3 7.56(motor)			8.694~9.45	8.694~12 10.44~12	8.694~15 10.44~15	8.694~18.75 10.44~18.75
NM8S-630	630	6.3 7.56(motor)			8.694~9.45	8.694~12 10.44~12	8.694~15 10.44~15	8.694~18.75 10.44~18.75
	700	7.0 8.4(motor)				9.66~12 11.59~12	9.66~15 11.59~15	9.66~18.75 11.59~18.75
	800	8.0 9.6(motor)				11.04~12	11.04~15 13.25~15	11.04~18.75 13.25~18.75
NM8-1250 NM8S-1250	1000	10 12(motor)					13.8~15	13.8~18.75 16.56~18.75
	1250	12.5 15.0(motor)						17.25~18.75

			NA1-3200X/NA1-3200XN			NA1-4000X	NA1-6300X/NA1-6300XN		
	1600	2000	2000	2500	3200	4000	4000	5000	6300
	12.8	16	16	20	25.6	32	32	40	50.4
	1.6~24	2~30	2~30	2.5~37.7	3.2~48	4~60	4~60	5~75	6.3~94.5
	0.1, 0.2, 0.3, 0.4								
	0.06, 0.14, 0.23, 0.35								
	3.45~24 4.14~24	3.45~30 4.14~30	3.45~30 4.14~30	3.45~37.7 4.14~37.7	3.45~48 4.14~48	4~60 4.14~60	4~60 4.14~60	5~75 5~75	6.3~94.5 6.3~94.5
	4.347~24 5.216~24	4.347~30 5.216~30	4.347~30 5.216~30	4.347~37.7 5.216~37.7	4.347~48 5.216~48	4.347~60 5.216~60	4.347~60 5.216~60	5~75 5.216~75	6.3~94.5 6.3~94.5
	4.83~24 5.796~24	4.83~30 5.796~30	4.83~30 5.796~30	4.83~37.7 5.796~37.7	4.83~48 5.796~48	4.83~60 5.796~60	4.83~60 5.796~60	5~75 5.796~75	6.3~94.5 6.3~94.5
	5.52~24 6.624~24	5.52~30 6.624~30	5.52~30 6.624~30	5.52~37.7 6.624~37.7	5.52~48 6.624~48	5.52~60 6.624~60	5.52~60 6.624~60	5.52~75 6.624~75	6.3~94.5 6.624~94.5
	6.9~24 8.28~24	6.9~30 8.28~30	6.9~30 8.28~30	6.9~37.7 8.28~37.7	6.9~48 8.28~48	6.9~60 8.28~60	6.9~60 8.28~60	6.9~75 8.28~75	6.9~94.5 8.28~94.5
	8.694~24 10.44~24	8.694~30 10.44~30	8.694~30 10.44~30	8.694~37.7 10.44~37.7	8.694~48 10.44~48	8.694~60 10.44~60	8.694~60 10.44~60	8.694~75 10.44~75	8.694~94.5 10.44~94.5
	8.694~24 10.44~24	8.694~30 10.44~30	8.694~30 10.44~30	8.694~37.7 10.44~37.7	8.694~48 10.44~48	8.694~60 10.44~60	8.694~60 10.44~60	8.694~75 10.44~75	8.694~94.5 10.44~94.5
	9.66~24 11.59~24	9.66~30 11.59~30	9.66~30 11.59~30	9.66~37.7 11.59~37.7	9.66~48 11.59~48	9.66~60 11.59~60	9.66~60 11.59~60	9.66~75 11.59~75	9.66~94.5 11.59~94.5
	11.04~24 13.25~24	11.04~30 13.25~30	11.04~30 13.25~30	11.04~37.7 13.25~37.7	11.04~48 13.25~48	11.04~60 13.25~60	11.04~60 13.25~60	11.04~75 13.25~75	11.04~94.5 13.25~94.5
	13.8~24 16.56~24	13.8~30 16.56~30	13.8~30 16.56~30	13.8~37.7 16.56~37.7	13.8~48 16.56~48	13.8~60 16.56~60	13.8~60 16.56~60	13.8~75 16.56~75	13.8~94.5 16.56~94.5
	17.25~24 20.7~24	17.25~30 20.7~30	17.25~30 20.7~30	17.25~37.7 20.7~37.7	17.25~48 20.7~48	17.25~60 20.7~60	17.25~60 20.7~60	17.25~75 20.7~75	17.25~94.5 20.7~94.5

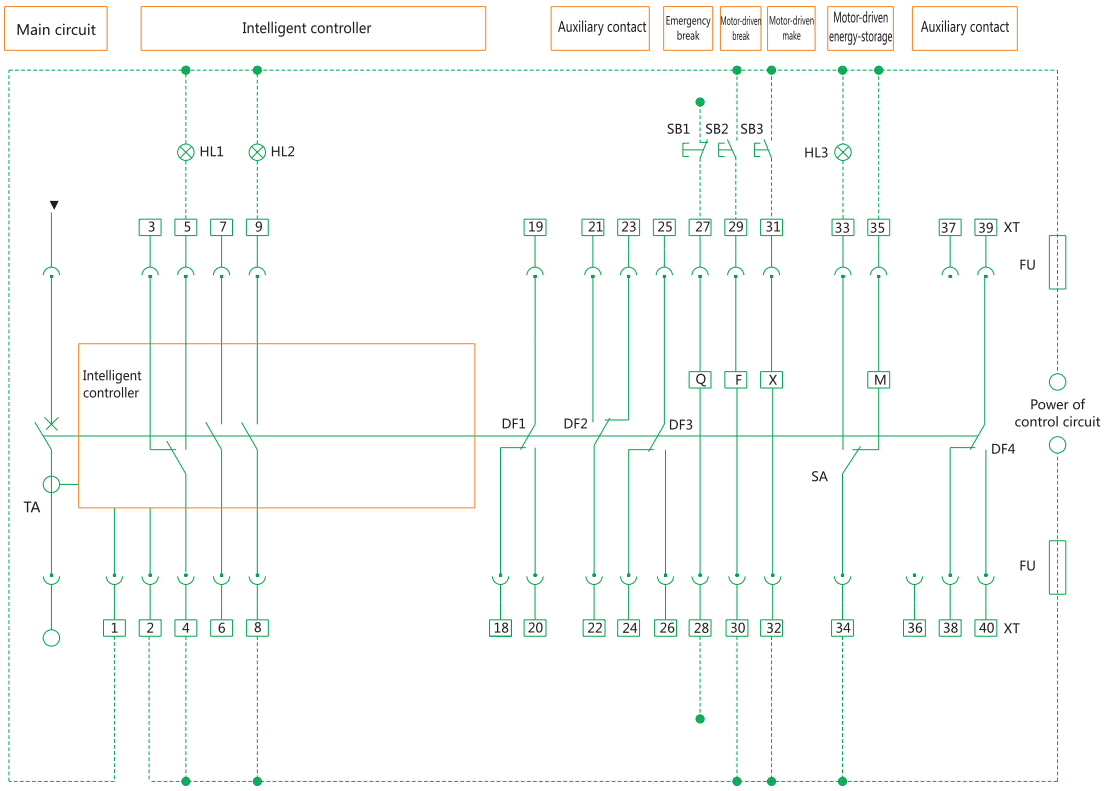
7.4.13 .2 Selective protection in NAI

				Circuit breaker	NA1-2000X/NA1-2000XN/NA1-2000XH			
Downstream			Upstream	Rated current (A)	630	800	1000	1250
				Default setting ratings of short time-delay 8In (kA)	5.04	6.4	8	10
				Setting range (kA)	0.63～9.45	0.8~12	1~15	1.25~18.75
				Delayed tripping time (s)	0.1, 0.2, 0.3, 0.4			
				Returnable time	0.06, 0.14, 0.23, 0.35			
Frame size rated current	**Rated current (A)**	**Default instantaneous setting ratings 12In (kA)**						
NA1-2000X	400	4.8			6.348~9.45	6.348~12	6.348~15	6.348~18.75
	630	7.56				9.998~12	9.998~15	9.998~18.75
	800	9.6					12.696~15	12.696~18.75
	1000	12						15.87~18.75
	1250	15						
	1600	19.2						
	2000	24						
NA1-3200X	2000	24						
	2500	30						
	3200	38.4						
NA1-4000X	3200	38.4						
	4000	48						
	4000	48						
NA1-6300X	5000	60						
	6300	75						

Note: It can satisfy the selective protection if only the short time-delay setting value of the superior breaker 1.32 times more than the subordinate breaker, when the instantaneous setting value is adjustive.

		NA1-3200X/NA1-3200XN			NA1-4000X	NA1-6300X/NA1-6300XN		
1600	2000	2000	2500	3200	4000	4000	5000	6300
12.8	16	16	20	25.6	32	32	40	50.4
1.6~24	2~30	2~30	2.5~37.7	3.2~48	4~60	4~60	5~75	6.3~94.5
0.1, 0.2, 0.3, 0.4								
0.06, 0.14, 0.23, 0.35								
6.348~24	6.348~30	6.348~30	6.348~37.7	6.348~48	6.348~60	6.348~60	6.348~75	6.348~94.5
9.998~24	9.998~30	9.998~30	9.998~37.7	9.998~48	9.998~60	9.998~60	9.998~75	9.998~94.5
12.696~24	12.696~30	12.696~30	12.696~37.7	12.696~48	12.696~60	12.696~60	12.696~75	12.696~94.5
15.87~24	15.87~30	15.87~30	15.87~37.7	15.87~48	15.87~60	15.87~60	15.87~75	15.87~94.5
19.837~24	19.837~30	19.837~30	19.837~37.7	19.837~48	19.837~60	19.837~60	19.837~75	19.837~94.5
	25.392~30	25.392~30	25.392~37.7	25.392~48	25.392~60	25.392~60	25.392~75	25.392~94.5
			31.74~37.7	31.74~48	31.74~60	31.74~60	31.74~75	31.74~94.5
			31.74~37.7	31.74~48	31.74~60	31.74~60	31.74~75	31.74~94.5
				39.675~48	39.675~60	39.675~60	39.675~75	39.675~94.5
					50.784~60	50.784~60	50.784~75	50.784~94.5
					50.784~60	50.784~60	50.784~75	50.784~94.5
							63.48~75	63.48~94.5
							63.48~75	63.48~94.5
								79.35~94.5

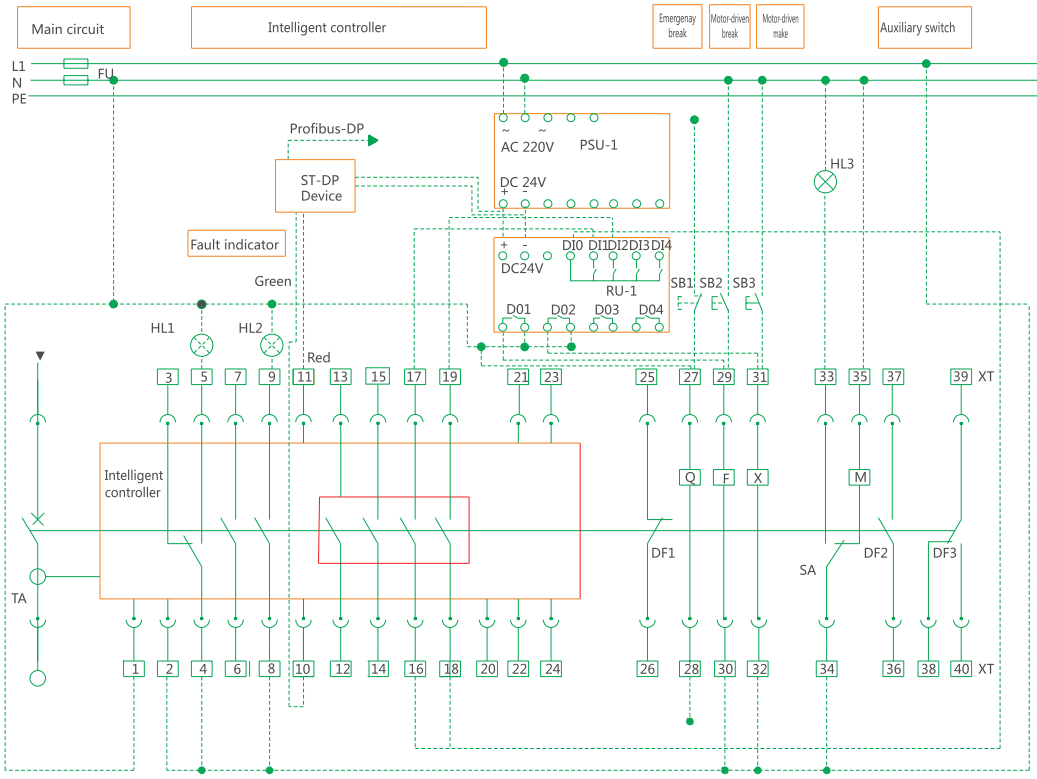
7.5 Secondary Circuit Wiring Diagram



HL1: Failure indicator
HL2: Close indicator
HL3: Energy storage indicator
SB1: Under-voltage button
SB2: Shunt button
SB3: Close button
Q: Under-voltage release
F: Shunt release
X: Close electromagnet
M: Energy storage motor
DF1-DF4: Auxiliary switch
1#, 2#: Auxiliary power input
3#,4#,5#: Fault trip contact output(4# common terminal, contact capacity AC230V,5A
8#,9#: Making indicator (capacity AC400V,1A)
27#,28#: Under-voltage release (Connected to the main circuit with the same rated voltage. With external control module, according to the module wiring diagram) During the voltage withstand test, Under-voltage release should be disconnected first.
29#,30#: Shunt release
31#,32#: Closing electromagnet
33#,34#,35#: Energy storage motor
18#~26#, 38#~40#: Auxiliary contact
(auxiliary contact capacity: AC230V,5A)
6#, 7#: external transformer input (a group of auxiliary NO contacts if no external transformer, contact capacity AC 230V, 2A)

Note: 1. The lines in red should be connected by user. Add fuse to protect control circuit (6A fuse is recommended).
2. Terminal 35# can be directly connected to power (to automatically store energy in advance). If 33# is needed, connect it with indicator in series, otherwise the micro-switch inside the motor might be damaged.
3. If 3M type controller with voltage measurement function is used, 21#-24# are used for voltage signal input of phase N, A, B, C, with maximum voltage of AC400V. In this case, 25#-26# is a group of NC contacts.
4. Wiring diagram shows: the circuit loop no power, ACB is opening and in connection location, the operating mechanism has no power.

Figure 34.NA1-1000X standard type, type(M/3M)

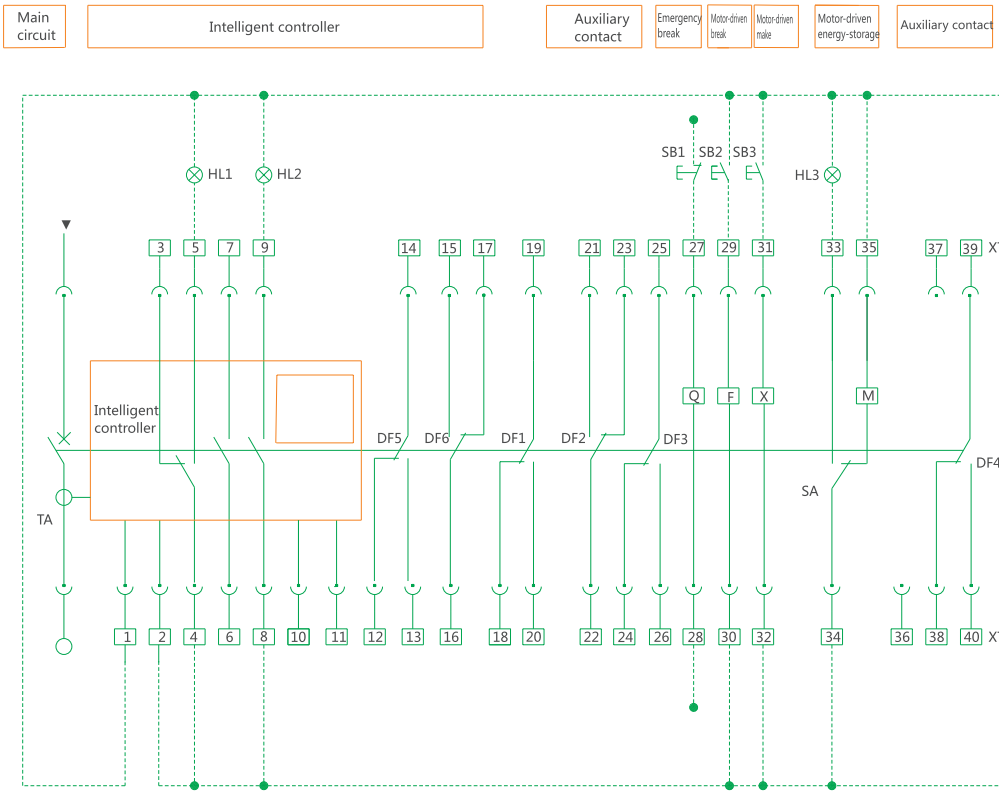


HL1: Failure indicator
HL2: Close indicator
HL3: Energy storage indicator
SB1: Under-voltage button
SB2: Shunt button
SB3: Close button
Q: Under-voltage release
F: Shunt release
X: Close electromagnet
M: Energy storage motor
DF1-DF3: Auxiliary switch
1#, 2#: Auxiliary power input(DC24)
3#,4#,5#: Fault trip contact output(4# common terminal, contact capacity AC230V,5A
6#, 7#: external transformer input (a group of auxiliary NO contacts if no external transformer, contact capacity AC 230V, 2A)

Note: 1. The lines in red should be connected by user. Add fuse to protect control circuit.
2. Terminal 35# can be directly connected to power (automatically store energy in advance). If 33# is needed, connect it with indicator in series, otherwise the microswitch inside the motor might be damaged.
3. Wiring diagram shows: the circuit loop no power, ACB is opening and in connection location, the operating mechanism has no power.

8#,9#: Making indicator(capacity AC400V,1A)
10#, 11#: communication output
12#, 13#: Signal alarm of load 1 output
14#, 15#: Signal alarm of load 2 output
16#, 17#: Making signal output
18#, 19#: Closing signal output
20#: Communication shield ground line
21#~24#: Voltage signal input of phase N,A,B,C (With voltage measurement);
21#~23# is a set of auxiliary switches (Without voltage measurement)
22# common terminal,contact capacity AC230V,5A
25#,26#: Auxiliary contact (capacity:AC230V,5A)
27#,28#: Under-voltage release (Connected to the main circuit with the same rated voltage. With external control module, according to the module wiring diagram) During the voltage withstand test, Under-voltage release should be disconnected first.
29#,30#: Shunt release
31#,32#: Closing electromagnet
33#,34#,35#: Energy storage motor
36#~40#: Auxiliary contact (capacity:AC230V,5A)

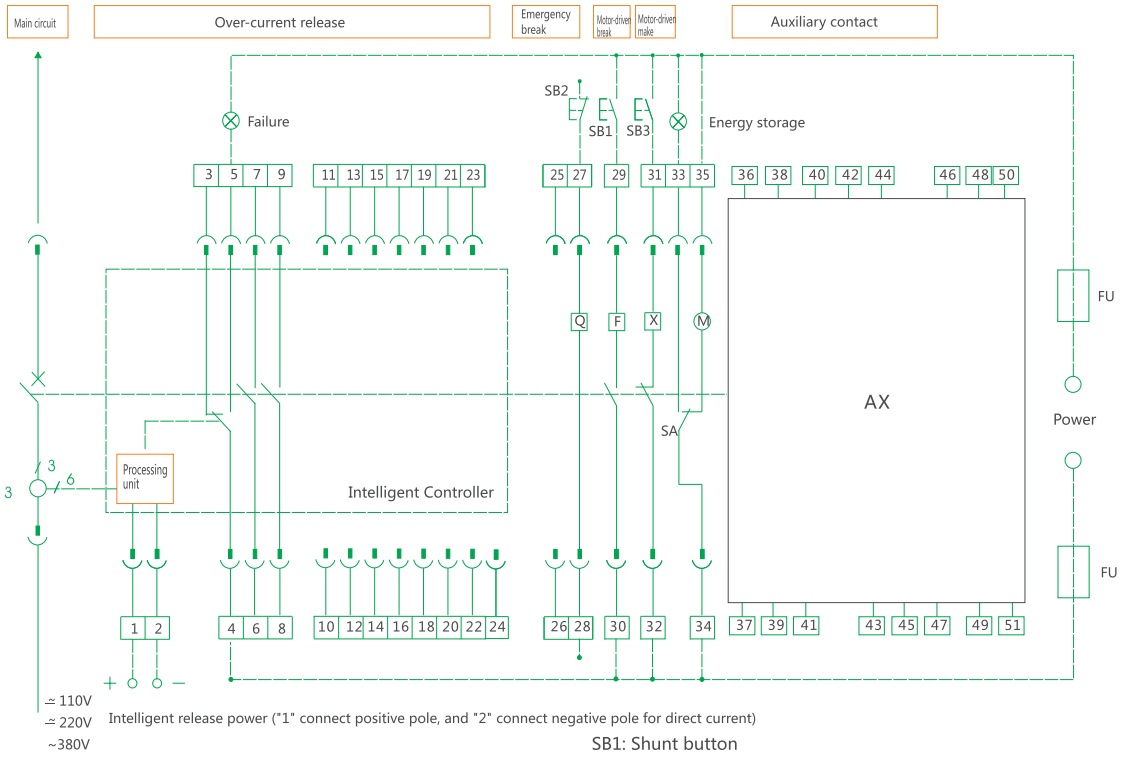
Figure 35.NA1-1000X Communication type ,type(H/3H)



HL1: Failure indicator
HL2: Close indicator
HL3: Energy storage indicator
SB1: Under-voltage button
SB2: Shunt button
SB3: Close button
Q: Under-voltage release
F: Shunt release
X: Close release
M: Energy storage motor
DF1-DF6: Auxiliary switch
1#, 2#: Auxiliary power input
3#,4#,5#: Fault trip contact output(4# common terminal,contact capacity AC230V,5A
6#, 7#: external transformer input (a group of auxiliary NO contacts if no external transformer, contact capacity AC 230V, 2A)
8#,9#: Making indicator (capacity AC400V,1A)
12#~26#: Auxiliary contact(auxiliary contact capacity: AC230V,1A)
27#,28#: Under-voltage release (Connected to the main circuit with the same rated voltage. With external control module, according to the module wiring diagram) During the voltage withstand test, Under-voltage release should be disconnected first.
29#,30#: Shunt release
31#,32#: Closing release
33#,34#:Energy storage indicator
34#,35#: Energy storage motor
38#~40#: Auxiliary contact(auxiliary contact capacity: AC230V,1A)

Note: 1. The lines in red should be connected by user. Add fuse to protect control circuit (6A fuse is recommended).
2. Terminal 35# can be directly connected to power (automatically store energy in advance). If 33# is needed, connect it with indicator in series, otherwise the microswitch inside the motor might be damaged.
3. If 3M type controller with voltage measurement function is used, 21#-24# are used for voltage signal input of phase N, A, B , C, with maximum voltage of AC400V. In this case, 25#-26# is a group of NC contacts.
4. Wiring diagram shows: the circuit loop no power, ACB is opening and in connection location, the operating mechanism has no power.

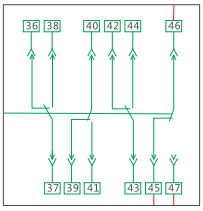
Figure 36.NA1-1000X six pairs change-over contacts standard type, type(M/3M)



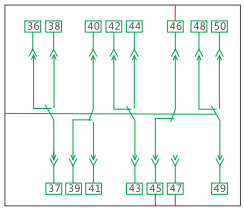
SB1: Shunt button
SB2: Under-voltage button
SB3: Making button
Q: Under-voltage release
F: Shunt release
X: Closing electromagnet
M: Energy storage motor
XT: Connection terminal
SA: Position switch
Note: If control voltage of Q, F, X is different from each other, they can be connected to different power.
1#,2#: Auxiliary power input
3#,4#,5#: Fault trip contact output(4# common terminal)
6#,7#,8#,9#: Auxiliary contact, normal open,
10#~24#: empty
25#,26#: The input signal terminal of external transformer, only provided for special orders requiring external transformer (N-phase/ ground current/leakage transformer)
27#,28#: Under-voltage release (Connected to the main circuit with the same rated voltage. With external control module, according to the module wiring diagram) During the voltage withstand test, Under-voltage release should be disconnected first.
29#,30#: Shunt release
31#,32#: Closing release
33#,34#: Energy storage indicator
34#,35#: Energy storage motor
36#,51#: Auxiliary contact

The auxiliary contact modes for customer use

I Four pairs change-over contacts

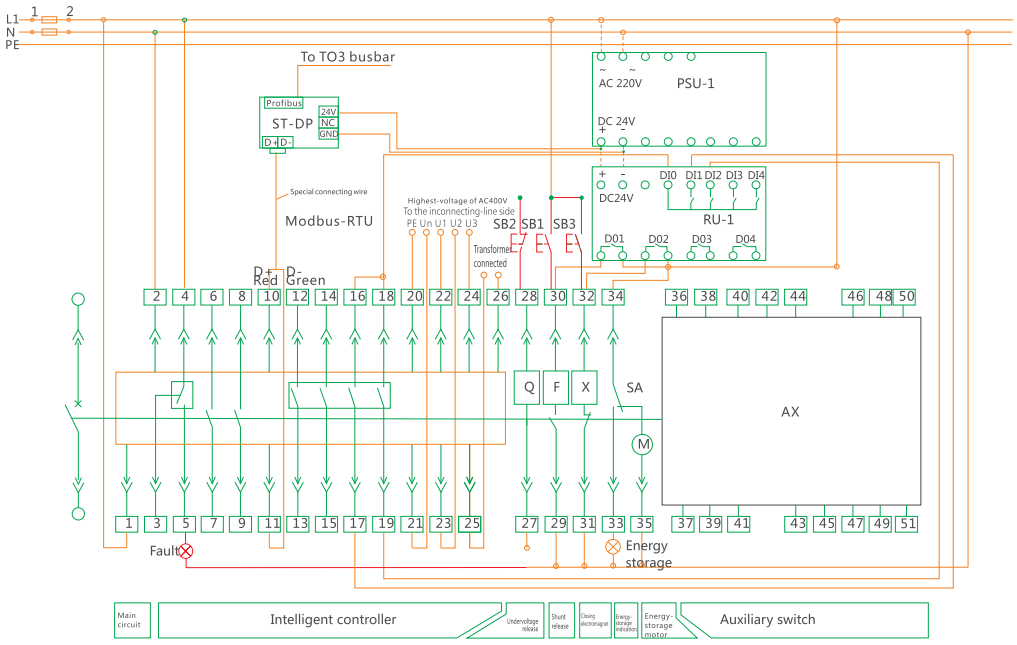


II Five pairs change-over contacts



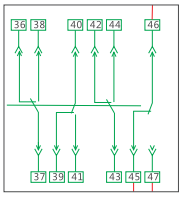
Note: 1. The lines in red should be connected by user. Add fuser to protect control circuit.
2. 6#-7# can be used as output NC contacts upon request.
3. Terminal 35# can be directly connected to power (automatically store energy in advance); or connected to NO button in series before being connected to power. If 33# is needed, connect it with indicator in series, otherwise the micro-switch inside the motor might be damaged.
4. The 21#~24# is only for wiring with function meter display. (Excluding the special wiring).
5. Wiring diagram shows: the circuit loop no power, ACB is opening and in connection location, the operating mechanism has no power.

Figure 37.The secondary circuit wiring for NA1-2000X~6300X with standard type (M/3M) intelligent controller, and instantaneous under-voltage release or self-priming time-delay under-voltage release.

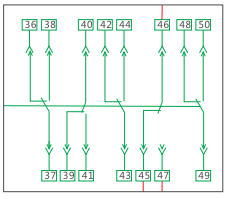


The auxiliary contact modes for customer use

I Four pairs change-over contacts



II Five pairs change-over contacts



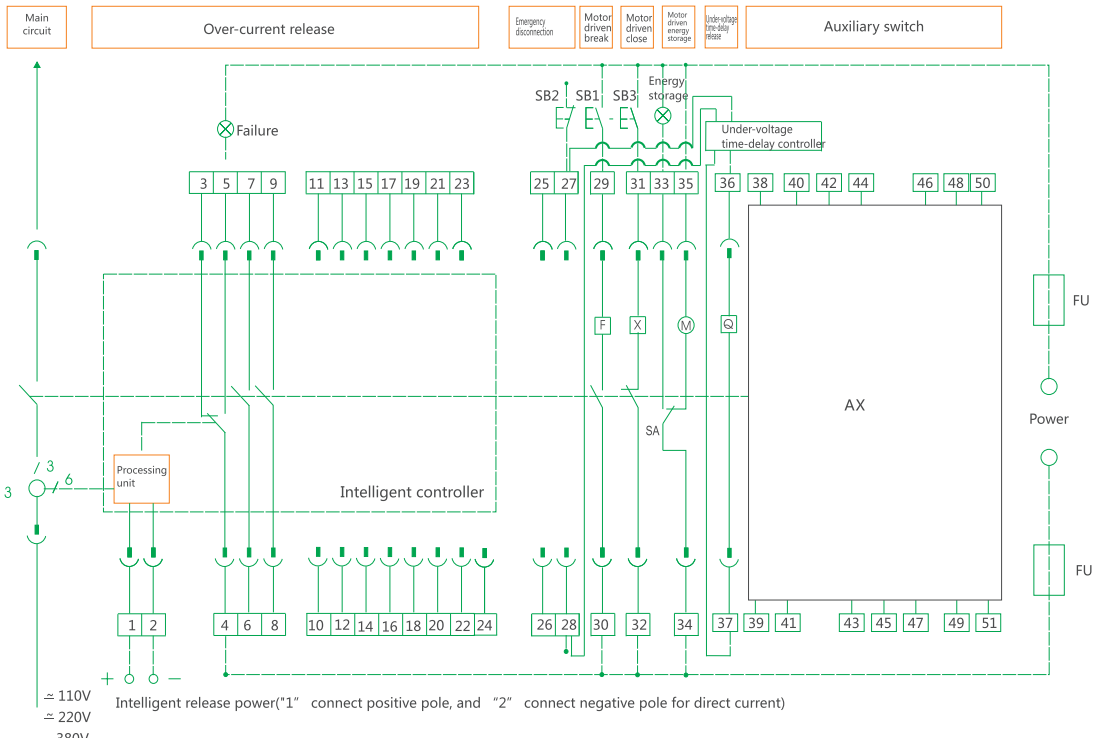
SB1: Shunt button; SB2: Under-voltage button
SB3: Making button; Q: Under-voltage release
F: Shunt release; X: Closing release
M: Energy storage motor; XT: connection terminal
SA: Position switch
1#, 2#: Intelligent controller power input
Note: When the power supply of the intelligent controller is AC power, the 1#~2# connects to the AC power directly. When the power supply is DC power, forbid connecting the 1#~2# to the DC power directly. Add a DC power supply module, then the DC power connect to the input terminal of the DC power supply module, and the 1#~2# connect to the output terminal of the DC power supply module, or else the intelligent controller will be damaged.

3#,4#,5#: Fault trip contact output(4# common terminal)
6#,7#,8#,9#: Auxiliary contact (normal open)
10#~11#: communication output
12#,13#: Signal alarm of load 1 output; 14#,15#: Signal alarm of load2 output
16#,17#:Breaking signal output; 18#,19#:Making signal output
20#: PE line; 21#: N phase input terminal
22#,23#,24#: A, B, C three phase power input terminal (note the sequence)(highest-voltage of AC 400V)

25#,26#: The input signal terminal of external transformer, only provided for special orders requiring external transformer (N-phase/ground current/leakage transformer)
27#,28#: Under-voltage release (Connected to the main circuit with the same rated voltage. With external control module, according to the module wiring diagram) During the voltage withstand test, Under-voltage release should be disconnected first.
31#,32#: Closing release; 33#,34#: Energy storage indicator
34#,35#: Energy storage motor; 36#~51#: Auxiliary contact

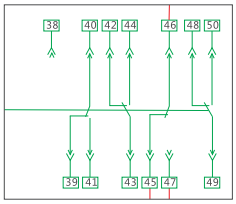
Note:1. The lines in red should be connected by user. Add fuser to protect control circuit.
2. Refer to the figure above for releases with optional functions
3. UN and U2 are short circuited in three-phase three-wire system (please specify in order if voltage exceeds 400V)
4. Terminal 35# can be directly connected to power (manually store energy in advance); or connected to NO button in series before being connected to power. If 33# is needed, connect it with indicator in series, otherwise the microswitch inside the motor might be damaged.
5. Wiring diagram shows: the circuit loop no power, ACB is opening and in connection location, the operating mechanism has no power.

Figure 38.The secondary circuit wiring for NA1-2000X~6300X with standard type (3H) intelligent controller, and instantaneous under-voltage release or self-priming time-delay under-voltage release.



The auxiliary contact modes for customer use

I Four pairs change-over contacts

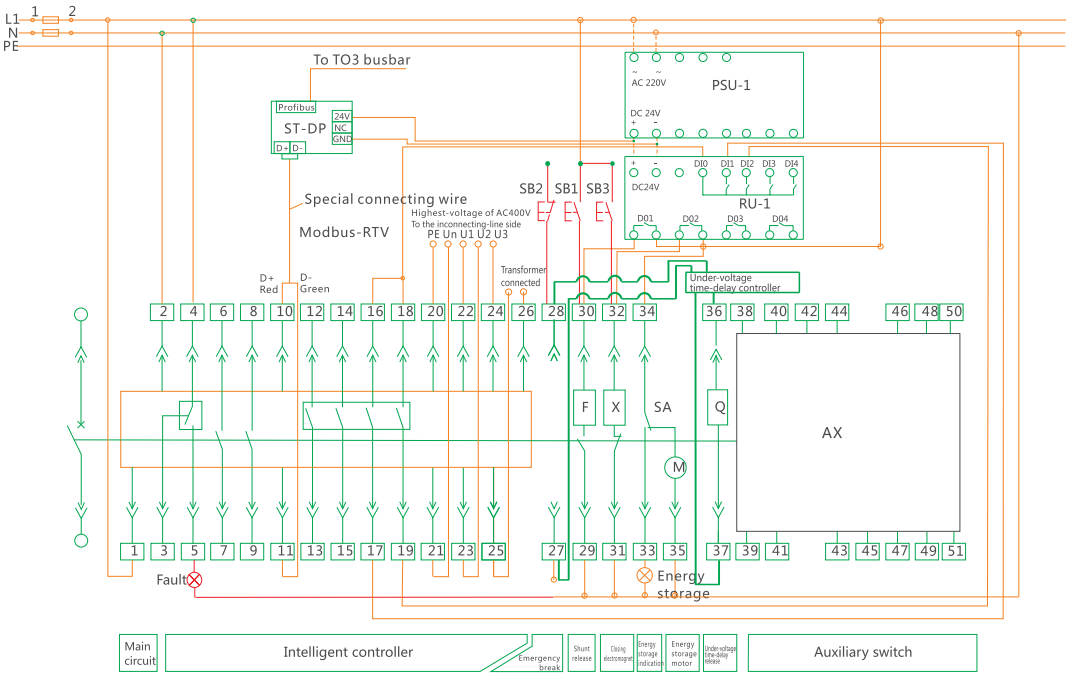


SB1: Shunt button SB2: Under-voltage button SB3: Making button
Q: Under-voltage time-delay release F: Shunt release
X: Closing electromagnet M: Energy storage motor
XT: Connection terminal SA: Position switch
Note: If control voltage of Q, F, X is different from each other, they can be connected to different power.

1#,2#: Auxiliary power input
3#,4#,5#: Fault trip contact output(4# common terminal)
6#,7#,8#,9#: Auxiliary contact (normal open)
10#~24#: empty
25#,26#: The input signal terminal of external transformer, only provided for special orders requiring external transformer (N-phase/ground current/leakage transformer)
27#,28#: Under-voltage release (Connected to the main circuit with the same rated voltage. With external control module, according to the module wiring diagram) During the voltage withstand test, Under-voltage release should be disconnected first.
29#,30#: Shunt release
31#,32#: Closing release
33#,34#: Energy storage indicator
34#,35#: Energy storage motor
36#,37#: Under-voltage time delay release
38#~51#: Auxiliary contact

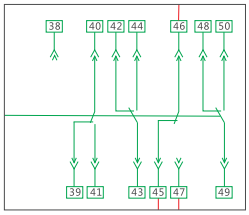
Note: 1. The lines in red should be connected by user. Add fuser to protect control circuit.
2. 6#-7# can be used as output NC contacts upon request.
3. Terminal 35# can be directly connected to power (automatically store energy in advance); or connected to NO button in series before being connected to power (manually store energy in advance). If 33# is needed, connect it with indicator in series, otherwise the micro-switch inside the motor might be damaged.
4. When using emergency breaking button to break the circuit breaker, the circuit breaker will breaker after the setup under-voltage delay period if it is equipped with delay function.
5. One under-voltage delay controller can only be connected to one under-voltage delay release
6. The 21#~24# is only for wiring with function meter display. (Excluding the special wiring).
7. Wiring diagram shows: the circuit loop no power, ACB is opening and in connection location, the operating mechanism has no power.

Figure 39.The secondary circuit wiring for NA1-2000X~4000X/3 with standard type (M/3M) intelligent controller, with helped-type time-delay under-voltage release.



The auxiliary contact modes for customer use

I Four pairs change-over contacts



SB1: Shunt button; SB2: Under-voltage button
SB3: Making button; Q: Under-voltage release
F: Shunt release; X: Closing release
M: Energy storage motor; XT: Connection terminal
SA: Position switch
1#, 2#: Intelligent controller power input
Note: When the power supply of the intelligent controller is AC power, the 1#~2# connects to the AC power directly. When the power supply is DC power, forbid connecting the 1#~2# to the DC power directly. Add a DC power supply module, then the DC power connect to the input terminal of the DC power supply module, and the 1#~2# connect to the output terminal of the DC power supply module, or else the intelligent controller will be damaged.

3#,4#,5#: Fault trip contact output(4# common terminal)
6#,7#,8#,9#: Auxiliary contact (normal open)
10#~11#: Communication output; 12#,13#: Signal alarm of load 1 output
14#,15# : Signal alarm of load 2 output; 16#,17#: Breaking signal output; 18#,19#: Closing signal output
20#: PE line; 21#: N phase input terminal
22#,23#,24#: A, B, C three phase power input terminal (note the sequence)(highest-voltage of AC400V)
25#,26#: The input signal terminal of external transformer, only provided for special orders requiring external transformer (N-phase/ground current/leakage transformer)
27#,28#: Under-voltage release (Connected to the main circuit with the same rated voltage. With external control module, according to the module wiring diagram) During the voltage withstand test, Under-voltage release should be disconnected first.
31#,32#: Closing release; 33#,34#: Energy storage indicator
34#,35#: Energy storage motor; 36#,37#: Under-voltage time delay release
38#~51#: Auxiliary contact

Note:1. The lines in red should be connected by user; b. Refer to the figure above for releases with optional functions; c. UN and U2 are short circuited in three-phase three-wire system (please specify in order if voltage exceeds 400V).
2. When using emergency breaking button to break the circuit breaker, the circuit breaker will breaker after the setup under-voltage delay period if it is equipped with delay function.
3. One under-voltage delay controller can only be connected to one under-voltage delay release.
4. Terminal 35# can be directly connected to power (automatically store energy in advance); or connected to NO button in series before being connected to power (manually store energy in advance). If 33# is needed, connect it with indicator in series, otherwise the micro-switch inside the motor might be damaged.
5. 21#, 22#, 23# and 24# voltage sampling wires are not available for H type.
6. Wiring diagram shows: the circuit loop no power, ACB is opening and in connection location, the operating mechanism has no power.

Figure 40.The secondary circuit wiring for NA1-2000X~4000X/3 with standard type (H) intelligent controller, with helped-type time-delay under-voltage release.

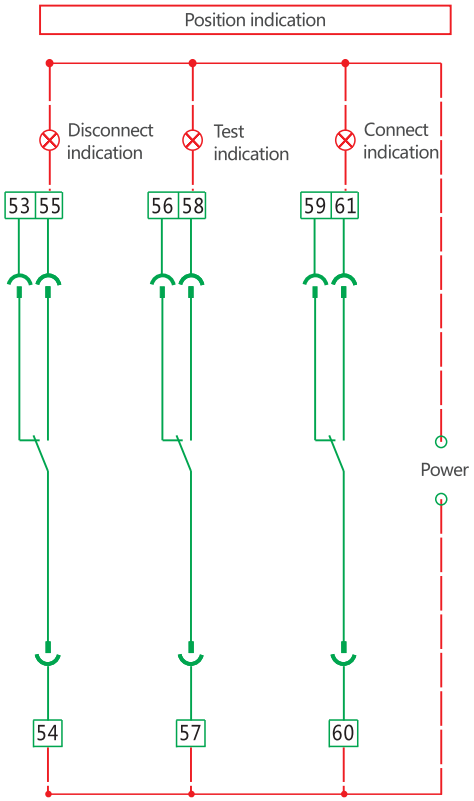


Figure 41.Wiring diagram of position signal device

Operational requirements:

1. There are three available drawer seat positions: "Disconnected", "Test" and "Connected". All or part of these positions can be used depending on specific order.

2.When changing the position of drawer-type circuit breaker body from "Drawout" to "Disconnected", the 53# and 54# terminals should be switched from connect to disconnect, while the 54# and 55# terminals should be switched from disconnected to connected.

3. When changing the position of drawer-type circuit breaker body from "Disconnected" to "Test", the 56# and 57# terminals should be switched from connected to disconnected, while the 57# and 58# terminals should be switched from disconnected to connected. There should be a sufficient safety distance between the Busbar of circuit breaker body and the drawer seat bridge contact, and make sure the circuit breaker can break and make reliably.

4. When changing the position of drawer-type circuit breaker body from "Test" to "Connected", make sure there is no clearance in secondary circuit for 1000 type.As for 2000~6300 type, keep rotating the handle after you clear a click sound but no more than 1.5 circle. The 59# and 60# terminals should be switched from disconnect to connect, while the 60# and 61# terminals should be switched from disconnected to connected. Make sure the Busbar of circuit breaker body is securely inserted into the drawer seat bridge contact and can carry main circuit current reliably.

5. When changing the position of withdrawable circuit breaker body from "Connected" to "Test", the 56# and 57# terminals should be switched from connect to disconnect, while the 57# and 58# terminals should be switched from disconnect to connect. There should be a sufficient safety distance between the Busbar of circuit breaker body and the drawer seat bridge contact, and make sure the circuit breaker can break and make reliably.

6. When changing the position of drawer-type circuit breaker body from "Test" to "Disconnected", the 53# and 54# terminals should be switched from connect to disconnect, while the 54# and 55# terminals should be switched from disconnect to connect. You cannot draw out the body at this moment. You need to keep rotating the body to "Disconnect" position until the handle could not move ahead., then you can pull out the body. After you pull out the body, the 53# and 54# terminals should be switched from disconnect to connect , while the 54# and 55# terminals should be switched from connect to disconnect.

7. When chaning the position of drawer seat, you must not stop until the indicator points at "Disconnect", "Test" or "Connect" position, otherwise the indicator will not be able to indicate the exact position of the circuit breaker body in drawer seat.

Attachment:

Table 14 Position signal contact capacity

Rated voltage (V)	Rated thermal current Ith(A)	Rated operating current Ie(A)	Rated control capacity
AC230	5	1.3	300VA
AC400	5	0.75	300VA
DC220	5	0.25	60W
DC110	5	0.55	60W

7.6 Electric break and make operations

a. Make: When the circuit breaker is under energy storage and disconnected status (make sure the undervoltage release is closed), apply rated voltage on the make electromagnet to make the circuit breaker.

b. Break: When the circuit breaker is under connected status, apply rated voltage on the shunt release to break the circuit breaker.

8 Maintenance, Handling

8.1 Safety Precautions

The following operations must be performed in sequence before the maintenance and overhaul of the circuit breaker:

a. Open the circuit breaker to ensure that the circuit breaker is in the open state;

b. Disconnect the upper level knife switch to ensure that the main circuit and the secondary circuit are not energized;

c. Energy release and breaking of the circuit breaker to ensure that the circuit breaker is in the energy release and breaking state;

d. All components that may be touched by the staff must be unpowered.

8.2 Maintenance and Overhaul Cycle Shown in Table 15

Table 15 Maintenance and overhaul cycle

Conditions	Environment	Maintenance cycle	Overhaul cycle	Remarks
General environment	The air is kept clean and dry without corrosive gases, the temperature is between -5ºC to +40ºC, and the humidity meets 3.1.3 operating conditions in the manual.	Once every six months	Once a year (once every six months if installed for more than three years)	In line with IEC/EN 60947-2 General environmental conditions requirements
Harsh environment	-5ºC to -40ºC or 40ºC～65ºC, or humidity≥90%	Once every three months	Once every six months (once every three months if installed for more than three years)	
	A place with much dust and corrosive gases	Once a month	Once every three months	
Note: The circuit breaker must be checked after breaking of the short-circuit current.				

8.3 Maintenance of Circuit Breaker

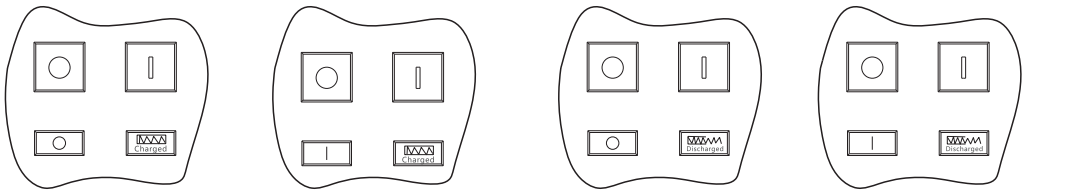
8.3.1 Regularly remove foreign objects (such as tools, wire ends or debris, metal foreign objects, etc.) from the power distribution cabinet.

8.3.2 Regularly remove dust from the circuit breaker to keep the circuit breaker well insulated.

8.3.3 Check whether the spring washer of the connecting bolt and grounding bolt of the main circuit is flattened and the connection is firm.

8.3.4 Check whether the making and breaking indications are correct and reliable. See Figure 44.

Figure 43.Remove foreign objects and dust



44-a Breaking+energy storage 44-b Making+energy storage 44-c Breaking+energy release 44-d Making+ energy release

Figure 44.Making and breaking indications

8.4 Overhaul of Circuit Breaker

8.4.1 Connection and Installation Inspection

It is recommended to refer to the requirements in Table 17 for the torque force of the main circuit and secondary circuit.

Table 16 Recommended reference table for the torque force of fasteners

Fastener specifications	Torque requirements (N · m)
M3	0.4-0.5
M4	1.2-1.7
M8	16-26
M10	36-52
M12	61-94

8.4.2 Insulation Performance Testing

The insulation resistance between phases or between a phase and the ground is required to be 20MΩ or greater.

The insulation resistance test must be performed before power is applied again after overhaul and a long period of power off (≥ 7 days).

8.4.3 Operational Characteristic Inspection

Connect the accessories to the corresponding rated voltage according to the nameplate on the shield and perform the following operations:

Electric energy storage, making and breaking operations, cycled 5 times;

Manual energy storage, making and breaking operations, cycled 5 times;

The circuit breaker is required to store, close and open normally.

Note: The main circuit must be unpowered; if there is an undervoltage release, it must be applied with a rated voltage first.

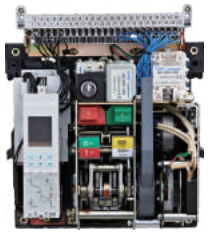
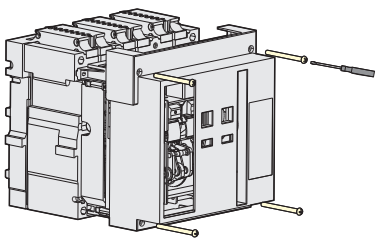


Figure 45.Parameter requirements and operation diagram

8.4.4 Circuit Breaker Component Inspection

8.4.4.1 Shield Removal



• Remove the four bolts of the circuit breaker that fix the panel and take off the shield

Figure 46.Shield Removal

8.4.4.2 Operating Mechanism Inspection

Check the parts of the mechanism for breakage and whether the fasteners are tight.

Remove dust, and evenly apply oil (7012 low-temperature grease or similar solid grease) to each rotating part.

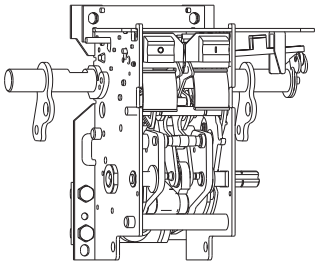


Figure 47.Operating mechanism

8.4.4.3 Inspection of Intelligent Controller

- 1. Press the "Set" button to enter the parameter setting interface "P-0".
- 2. Press the "Enter" button to enter the protective parameter setting and query interface.
- 3. Press the "▲" or "▼" button to in turn select the display of protective parameter setting details.
- 4. Press the "Reset" button to return to the upper-level menu or exit from the interface.

Simulated test tripping function

Note: For detailed operation instructions, see 12.1.5

Figure 48.Parameter settings meet site requirements

• Press the "Test" button to simulate the tripping test.

49-a Simulation test

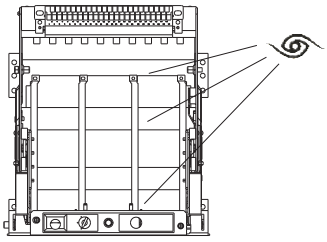
• Press the orange "Reset" button on the face shield to return to normal state.

49-b Reset operation

Figure 49.Simulation test of tripping function

8.4.4.4 Inspection of Drawer Seat (tested after removing the body, taking NA1-2000X as an example)

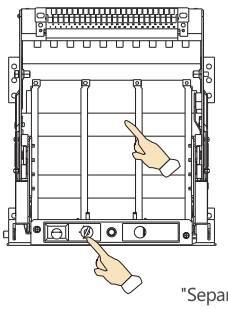
a. Check for foreign objects inside



• Check whether there are foreign objects in the inside of the drawer seat, such as screws, thread ends, iron filings, etc. If yes, remove them.

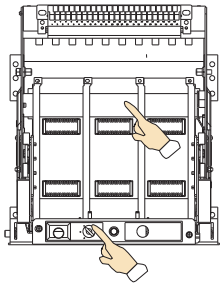
Figure 50.Inspection of foreign objects inside the drawer seat

b. Check whether the arc-proof plate opens and closes normally and whether the insulation contact has deformation or oxidation



"Separation"

• Shake to the separation position. The arc shield is as shown on the left.

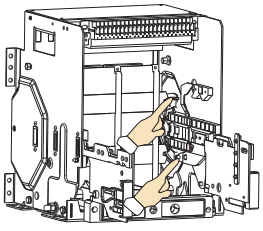


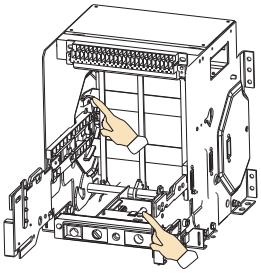
"Connection"

• Shake to the connection position for NA1-2000X-6300X series. Press the partition to open the connecting rod for NA1-1000X series. The arc shield is as shown on the left. Check whether there are deformation, misalignment and oxidation on the bridge contacts of each phase. If yes, replace it.

Figure 51.Inspection of arc-proof plate and contact of drawer seat

c. Turn the friction parts and evenly apply oil there





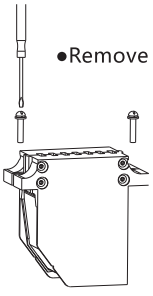
• Evenly apply 7012 low temperature grease or similar solid oil on the positions indicated on the left for lubrication.

Figure 52.Inspection of rotating parts of drawer seat

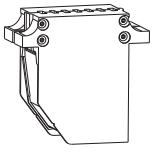
8.4.4.5 Inspection of Arcing chamber (taking NA1-2000X-6300X as an example)

Check grid pieces and arc striking pieces for defects, and check the arc chute for breakage. If any, timely replace and remove dust, corrosion layer and arcing point in the room. If corrosion and rust are serious, replace in time.

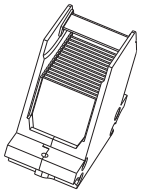
Note: The circuit breaker must be checked after breaking of the short-circuit current.



●Remove the fixing bolts



●Take out the arc chamber.



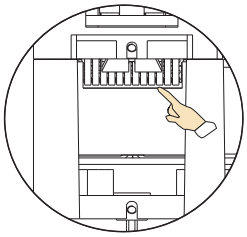
●Check chamber comditions

Figure 53.Inspection of Arcing chamber

8.4.4.6 Inspection of Main Contact (taking NA1-2000X-6300X as an example)

a. The overtravel is required to be greater than equal to 2 mm

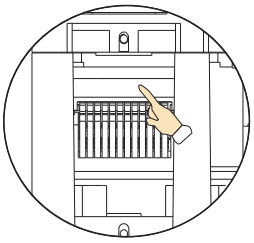
b. Remove dust, corrosive layer and particular burnt materials



- Manually make the product and observe the overtravel of the main contact

Note: Please replace the contact if reached the position shown in the figure .

Figure 54.Inspection of overtravel of the main contact



- Break the product and the main contact is in the position indicated on the left. Check whether there is dust, granular burnt material and oxidized corrosion layer on the contact. If yes, use a steel brush or sandpaper to wipe the contact surface to remove foreign matter and oxide layer, and then wipe the contact surface with a clean towel dipped in absolute alcohol.

Figure 55.Inspection of contact surface

Note: The circuit breaker must be checked after breaking of the short-circuit current.

8.4.4.7 Inspection of Secondary Circuit

Check the casing for damage.

Use the universal meter to check the contact between the secondary circuit of the drawer body and the secondary circuit of the drawer seat, and whether the contacts are in good contact at the "Test" and "Connection" positions and whether the wiring screws are tight and the wire insulation is intact.

Figure 56.Inspection of secondary circuit

8.5 Replacement of Undervoltage Release, Shunt Release and Closed Electromagnet Accessories

The following operations must be performed before replacing the accessories:

Cut off all power and ensure that the power supply to the main circuit and secondary circuit is Unpowered on.

The circuit breaker is in the energy release breaking state

8.5.1 Replacement of Fixed type accessories

Remove the panel fixing bolts and remove the panel

Untie the cable tie and remove the wiring wires

Remove the fixed accessory mounting screws

Remove and replace the accessory

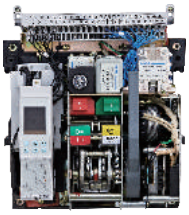


Figure 57.Fixed type accessories

8.5.2 Replacement of Drawer Accessories

Shake out the body to the separation position and remove the body

Remove the panel fixing bolts and remove the panel

Untie the cable tie and remove the wiring wires

Remove the fixed accessory mounting screws

Remove and replace the accessory

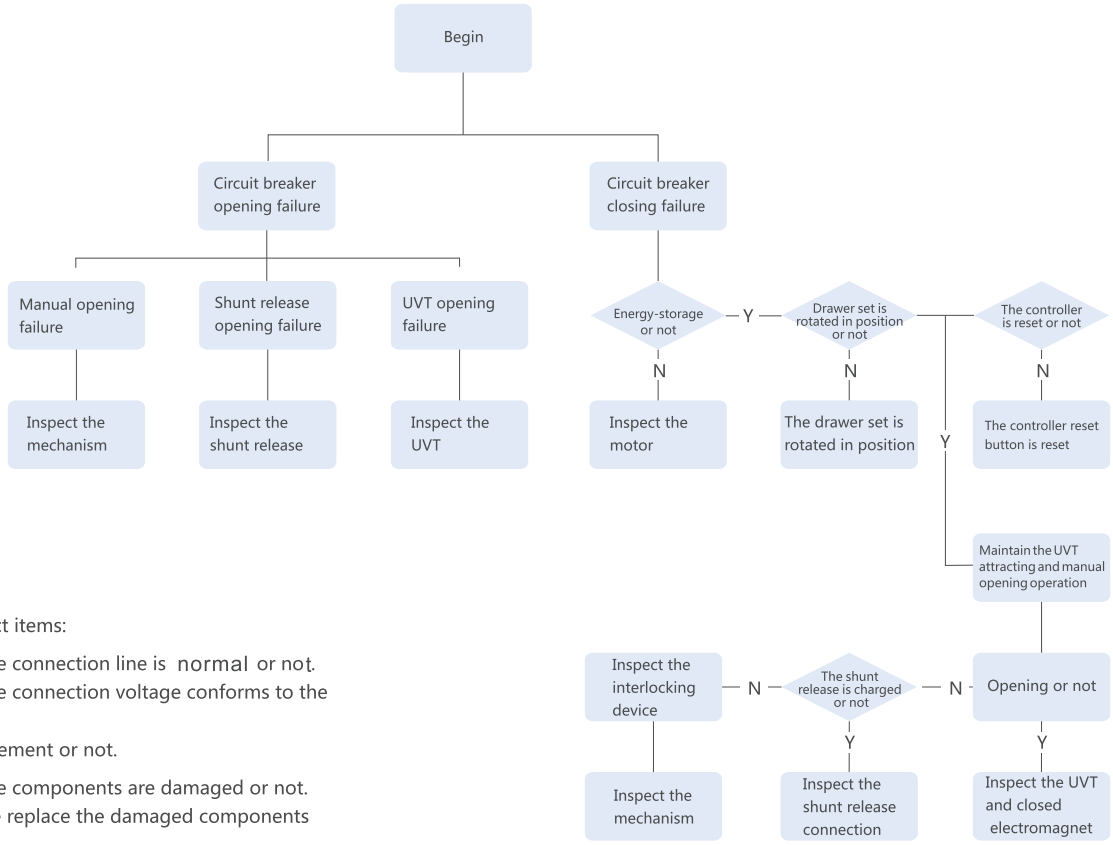
Figure 58.Drawer Accessories

8.6 The recommended storage period is not more than 24 months, and keep surrounding environment cool and dry

If the product has been placed in a high temperature and humidity environment for more than 7days after the packaging is removal, the insulation performance must be tested according to 8.4.2 and the contact surface must be checked according to 8.4.4.6 before putting into use.

9 Analysis and Elimination of Faults

9.1 Troubleshooting procedure



Inspect items:

1、The connection line is normal or not.
2、The connection voltage conforms to the requirement or not.
3、The components are damaged or not. please replace the damaged components

9.2 Fault Trip Analysis

Identification of fault causes

Fault identification through intelligent controller indication

· Presss the "Reset" button till it returns to the default display interface.

· Press the "Check" button to enter the query menu interface; Press the "Enter" button to enter the failure query menu interface; press the "▾" and select the failure record frequency to be viewed, and press the "Enter" button again to query the failure details.

· Presss the "Reset" button to exit from or return to the upper-level menu.

Note: The live making operation is prohibited before the fault is eliminated.

Figure 59.Identification of fault causes

9.3 Common Fault Causes and Solutions Shown in table 17 .

Table 17 Fault analysis and repair

Problem	Cause	Solution
Circuit breaker trip	Overload fault trip (I_R indicator on)	1. Check the breaking current value and operation time on the intelligent controller; 2. Analyze the conditions of the load and grid; 3. If there is overload, eliminate the overload fault; 4. If the actual running current does not match the long delay operation current setting value, modify the long delay operation current setting value according to the actual running current to achieve appropriate matching protection; 5. Press the Reset button and reclose the circuit breaker.
	Short circuit fault trip (Isd or Ii indicator on)	1. Check the breaking current value and operation time on the intelligent controller; 2. If there is short circuit, find and eliminate short circuit fault; 3. Check the setting value of the intelligent controller; 4. Check the integrity of the circuit breaker; 5. Press the Reset button and reclose the circuit breaker.
	Ground fault trip (Ig indicator on)	1. Check the breaking current value and operation time on the intelligent controller; 2. If there is ground fault, find and eliminate the ground fault; 3. Modify the ground fault current setting value of the intelligent controller; 4. If there is no ground fault, check whether the fault current setting value matches the actual protection; 5. Press the Reset button. Reclose the circuit breaker.
	Mechanical interlocking operation	Check the working status of the two circuit breakers with mechanical interlocks.
	Undervoltage release is faulty: a. The rated working voltage is less than 70% Ue; b. The undervoltage release control unit is faulty.	1. Check whether the undervoltage release is powered on; 2. The power supply voltage of the undervoltage release must be 85% Ue or higher; 3. Change the control unit of the undervoltage release.

Continued table 17

Problem	Cause	Solution
The circuit breaker cannot be closed	The intelligent controller is not reset	Press the Reset button (on the raised panel) and remake the circuit breaker.
	Poor contact in the secondary circuit of the drawer circuit breaker	Shake the drawer circuit breaker to the "On" position (clattering is heard).
	The circuit breaker has not stored energy	Check whether the secondary circuit is connected: 1. The motor control power supply voltage must be 85%Us or higher; 2. Check the motor energy storage mechanism. If there is any fault, contact the manufacturer to replace the motor operating mechanism.
	Mechanical interlocking operation; the circuit breaker has been locked	Check the working status of the two circuit breakers with mechanical interlocks.
	Closed electromagnet: a. The rated control voltage is less than 85% Us; b. The closed electromagnet is faulty and damaged.	1. The power supply voltage of the closed electromagnet must be 85% Us or higher; 2. Replace the closed electromagnet.
Tripping after the circuit breaker is closed (fault indicator is on)	1. Trip immediately: The short circuit current is closed; 2. Delayed trip: The overload current is closed.	1. Check the breaking current value and operation time on the intelligent controller; 2. If there is short circuit, find and eliminate short circuit fault; 3. If there is overload, find and eliminate the overload fault; 4. Check the integrity of the circuit breaker; 5. Modify the current setting value of the intelligent controller; 6. Press the Reset button and remake the circuit breaker.
The circuit breaker cannot be disconnected	1. The circuit breaker cannot be manually disconnected locally: The mechanical operating mechanism is faulty; 2. The circuit breaker cannot be electrically disconnected remotely: a. The mechanical operating mechanism is faulty; b. The shunt release power voltage is less than 70% Us; c. The shunt release is damaged.	1. Check the mechanical operating mechanism. If there is any fault such as a stuck, contact the manufacturer. 2.a. Check the mechanical operating mechanism. If there is any fault such as a stuck, contact the manufacturer; b. Check whether the shunt release power voltage is less than 70% Us; c. Replace the shunt release.
The circuit breaker cannot store energy	1. Cannot store energy manually; 2. Cannot store energy electrically: a. The control power voltage of the rated control electric energy storage device is less than 80% Us; b. The energy storage device has a mechanical failure.	1. The energy storage device has a mechanical failure. Contact the manufacturer. 2.a. Check whether the control power supply of the electric energy storage device is 85% Us or higher; b. Check the energy storage device machinery and contact the manufacturer.
The handle cannot be inserted into the drawer seat to Shake in and out the body (Drawer breaker)	1. There is a padlock in the off position. 2. The plugging rail or the circuit breaker body is not fully inserted	1. Remove the padlock 2. Push the rail or circuit breaker to the end.

Continued table 17

Problem	Cause	Solution
The drawer circuit breaker cannot be pulled out in the "Off" position	1. The handle is not pulled out. 2. The circuit breaker does not fully reach the "Off" position.	1. Pull out the handle. 2. Fully shake the circuit breaker to the "Off" position.
The drawer circuit breaker cannot be shaken to the "on" position	There is a problem such as some foreign objects fall into the drawer seat and stick the shake mechanism or the shake mechanism jump over teeth.	Check and remove foreign objects. If the circuit breaker still cannot be shaken in, contact the manufacturer.
	The frame rated current of the circuit breaker body does not match that of the drawer seat.	Select the circuit breaker body and drawer seat with the same frame rated current.
The intelligent controller screen has no display	1. The intelligent controller is not connected to the power supply. 2. The intelligent controller is faulty. 3. The rated control power supply voltage is less than 85% Us.	1. Check whether the intelligent controller has been connected to the power supply. If not, connect to the power supply immediately. 2. Turn off the control power of the intelligent controller and then send power. If the fault persists, contact the manufacturer. 3. The power supply voltage of the intelligent controller must be 85% Us or higher.
The fault indicator of the intelligent controller is on and is still on after pressing the "Back" button.	The intelligent controller is faulty	Turn off the control power of the intelligent controller and then send power. If the fault persists contact the manufacturer.

10 Environmental Protection

In order to protect the environment, when this product or its components are scrapped, please dispose of them as industrial waste, or hand them over to the recycling station for classified disassembly, recycling and reuse according to the relevant local regulations.

11 Ordering specification

Customer: Tel: Date:

Quantity:

Model		☐NA1-1000X	☐NA1-2000X ☐NA1-2000XN ☐NA1-2000XH	☐NA1-3200X ☐NA1-3200XN	NA1-4000X	☐NA1-6300X ☐NA1-6300XN
Rated current In (A)		☐200 ☐400 ☐630 ☐800 ☐1000	☐630 ☐800 ☐1000 ☐1250 ☐1600 ☐2000	☐2000 ☐2500 ☐3200	☐4000	☐4000 ☐5000 ☐6300(no four poles)
Installation mode		☐ Drawout type ☐Fixed type (Note: no fixed type when In> 4000A)				
Number of poles		☐ Three poles ☐Four poles				
Intelligent Controller		Protection function			Auxiliary functions	Optional function
	☐ M type Standard (Default configuration)	1. ☐ Ir overload long delay, Isd short-circuit short delay inverse time + definite time, Ii transient short-circuit, Ig single-phase grounding 4-section protection 2. ☐ Ir overload long delay, Isd definite time short-circuit short delay,Ii transient short-circuit, Ig single-phase grounding 4-section protection			1. Ammeter function 2. Self-diagnostic function 3. Tuning function 4. Test function 5 Display function	/
	☐ 3M type Multifunctional (Optional configuration)	1. ☐ Ir overload long delay, Isd short-circuit short delay inverse time + definite time, Ii transient short-circuit, Ig single-phase grounding 4-section protection 2. ☐ Ir overload long delay, Isd definite time short-circuit short delay,Ii transient short-circuit, Ig single-phase grounding 4-section protection				☐ Voltage display ☐ Frequency display ☐ Power Factor show ☐ Active power display ☐ Load monitoring function Note: For the specific optional function, refer to List of controller functions in the sample (The cost of optional functions will be calculated additionally).
	☐ 3H-type Communication type (Optional configuration)	1. ☐ Ir overload long delay Isd short-circuit short delay inverse time +definite time Ii transient short-circuit, Ig single-phase grounding 4-section protection 2. ☐ Ir overload long delay, Isd definite time short-circuit short delay, Ii transient short-circuit, Ig single-phase grounding 4-section protection 3. ☐ with PROFIBUS-DP communication protocol ☐ with MODBUS communication protocol				
	Notes: Protection function Settable range and conventional factory tuning	Ir long delay current setting range: (0.4 to 1) In Overload 1.5Ir action time setting range: 15,30,60 ..... 480s	! Conventional factory tuning: overload long delay 1.0In ! Conventional factory tuning: overload 1.5Ir; action 15s			
		Isd short delay current setting range: (1.5 to 15) Ir; short delay action time (0.1 ~ 0.4) s	! Conventional factory setting: short delay current 8Ir ; ! Conventional factory tuning: Short delay action time 0.4s [Note: 3M, 3H for (1.5 to 15) Ir]			
		Ii instantaneous current setting range: 1.5In ~ 50kA/65kA/75kA ! Conventional factory tuning: 12In [Note: 3M, 3H for (1.5In~50kA/65kA/75kA)				
		Ig earthing protection current setting range: (0.2 to 0.8) In; the earthing protection time setting range: (0.1to0.4)s ! Conventional factory setting: 0.5 In; OFF				
	Controller power	☐AC380V,☐AC400V,☐AC220V,☐AC230V,☐AC127V,☐DC220V,☐DC110V				(Optional)
Electrical accessories	Under voltage release	☐AC110V,☐AC220/230V,☐AC380/400V,☐Order____V ,☐Non-undervoltage ☐ Helped＆instantaneous ☐ Helped＆delay__s (Inm=2000A~4000A, 1 s, 3 s, 5 s, non-adjustable); ☐ self-priming＆instantaneous ☐ self-priming＆delay __s (Inm≥2000A, 0.3 s~7.5 s,adjustable); Note: Inm=1000A no Helped priming type, delay time 1 s, 3 s, 5 s, 7 s,non-adjustable.				(No AC110V for NA1-1000X)
	Shunt release	☐ intermittent (only for Inm≥2000A and default)	☐AC110V,☐AC220/230V,☐AC380/400V,☐DC110V,☐DC220V			
	Closing electromagnet	☐ pulse (must select in automatic control system)	☐AC110V,☐AC220/230V,☐AC380/400V,☐DC110V,☐DC220V			
	Electric motor	☐AC110V,☐AC220/230V,☐AC380/400V,☐DC110V,☐DC220V				
Special requirements	Interlock device (surcharge)	Mechanical linkage: ☐ Link interlock ☐ Cable interlock Door interlock: ☐ Switch body position door interlock(drawer-type) ☐ Switch on/off state door interlock				(Optional)
	Accessories (surcharge)	Button lock: ☐Panel products on/off button lock Key lock: ☐1 lock 1 key ☐2 locks 1 key ☐3 locks 1 key ☐ 3 locks 2 keys ☐5 locks 3 keys ☐Special custom__lock__ key External transformer: ☐External N phase transformer [(3P+N)T type ☐External leakage zero sequence current transformer (E mode) ☐External ground current transformer (W) Module: ☐ PSU-1 Power module ☐RU-1 relay module ☐ST-DP protocol converting module ☐Position signaling devices (☐Connected ☐Test ☐Unconnected) ☐Mechanical counting device				(Optional)
	The main circuit connection	☐Horizontal connection (default) ☐Vertical connection (with L vertical bus-bar) ☐Rotation busbar horizontal connection (Drawer In ≤ 3200) ☐Rotation busbar vertical connection (drawer-type In ≤ 3200)				(Optional)

Note: The casing current, rated current and auxiliary control voltage must be specified when ordering!
Note: 1) Please mark "√" or fill figure in the relative " ☐" if no mark, we will provide according to conventional.
Note: 2) The operational fuction of the intellgent controller and special requirements require additional costs.

Tel.:0577-62877777-6213 Fax :0577-62877777-6288


NA1-6300X


NA1-4000X


NA1-3200X


NA1-2000X


NA1-1000X

Configuration instructions

1. NA1-2000X~6300X fundamental configurations
   a. Motor-driven:
   Under-voltage instantaneous release;
   Shunt release;
   Closing electromagnet;
   4 suits of transform contact;
   Motor driven operating mechanism;
   M-type Intelligent Controller;
   Horizontal wiring of main circuit;
   Doorcase;
   Element of main circuit;
   Operating instructions of M-type Intelligent Controller
   Operating instructions of Air Circuit Breaker;
   Packing box;
   Drawer seat (Drawout type)

   b. Manual:
   Under-voltage instantaneous release;
   4 suits of transform contact;
   M-type Intelligent Controller;
   Horizontal wiring of main circuit;
   Doorcase;
   Element of main circuit;
   Operating instructions of M-type Intelligent Controller
   Operating instructions of Air Circuit Breaker;
   Packing box;
   Drawer seat(Drawout type)

3. NA1-2000X~6300X operational configuration (additional costs)
   Nonadjustable under voltage delayed release (1s, 3s, 5s);
   Connecting-rod type mechanical interlock (for drawout type);
   Wire-cable mechanical interlock; Button lock; Key lock;
   Door interlock'Locking device;
   External current transformer earthing protection;
   Vertical busbar;
   Rotating busbar (IN≤3200);
   3NO (normal open) and 3NC (normal close) contacts;
   4NO and 4NC contacts; 5 groups changeover contacts;
   3 groups changeover contacts; H type intelligent controller;
   Position signal; Counter; Protecting cover (NA1-2000);
   Double power controller.

2. NA1-1000X fundamental configurations
   a. Motor-driven:
   Under-voltage instantaneous release;
   Shunt release;
   Closing electromagnet;
   Motor driven operating mechanism;
   4 normal open and 4 normal close auxiliary contacts;
   M-type Intelligent Controller;
   Closing and breaking push button lock;
   Horizontal wiring of main circuit;
   Doorcase;
   Element of main circuit;
   Operating instructions of Air Circuit Breaker;
   Packing box;
   Drawer seat(Drawout type)

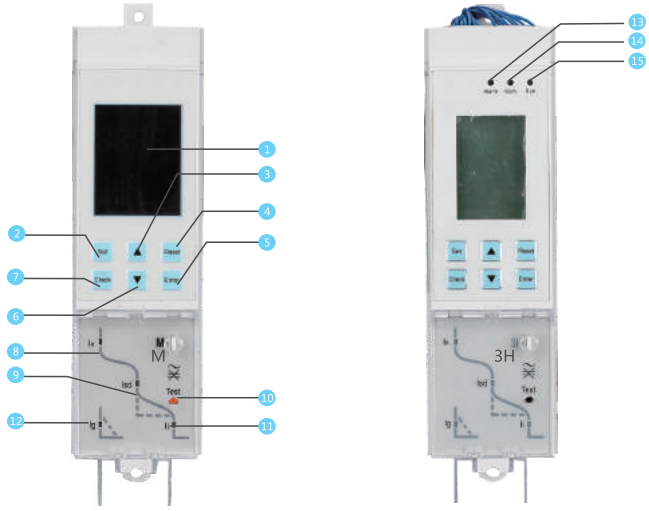
   b. Manual:
   Under-voltage instantaneous release;
   4 normal open and 4 normal close auxiliary contacts;
   M-type Intelligent Controller;
   Horizontal wiring of main circuit;
   Closing and breaking push button lock;
   Doorcase;
   Element of main circuit;
   Operating instructions of Air Circuit Breaker;
   Packing box;
   Drawer seat(Drawout type)

4. NA1-1000X operational configuration (additional costs)
   Under voltage delayed release; wire-cable mechanical interlock;
   key lock; External current transformer earthing protection;
   Vertical busbar; 6 groups changeover contacts;
   H type intelligent controller; Phases barrier, position signal

12 Appendix

12.1. Intelligent controller and Protection Features

12.1.1 The user interface of M / H and 3M / 3H intelligent controller is shown in Figure 60



60-a M/H control　　60-b 3M/3H control

1. Display window
Display current value, setting value, tripping time and so on
2. "Set"
Switch to setting menu
3. "Up"
Change the marquee or the selected parameter
4. "Return"
Escape from this grade and return to upper menu or cancel the current selected parameter
5. "Enter"
Enter into the next menu directed by the current item, or select current parameter and store modifications
6. "Down"
Change the marquee or the selected parameter
7. "Check"
Switch to query menu
8. "Ir" light
Overload long delay fault indication
9. "Isd" light
Short-circuit Short delay indication
10. "Test"
Trip test button
11. "Ii" light
Short-circuit instantaneous fault indication
12. "Ig" light
Asymmetric earthing or neutral line fault indication
13. Alarm light
14. Communication light
15. Run light

Note: Method of 3M/3H controller application please refer to 3M/3H controller instruction.

Figure 60.User interface of M / H and 3M / 3H intelligent controller

12.1.2 The rated current range of frames and the minimum display current value of the controller are shown in Table 18 .

Table 18 Minimum display current of the controller

Frame	Rated current range	Minimum display current of the controller
1000	200-400	40
1000	630-1000	80
2000	630-2000	80
≥3200	≥2000	160

12.1.3 Controller functions are shown in Table 19 .

Table 19 List of controller functions

Model	M	3M	3H
Functions	1. Four-stage overcurrent protection (overload, short delay, instantaneous, and ground); grounding protection act as vector sum (T model);	1. Include the protection functions of all M control units; 2. Human-machine	1. Include the protection functions of all 3M control units; 2. Voltage measurement and

Continued table 19

	2. Neutral phase protection 3. Current measurement function 4. Two test functions: (1) Panel direct simulation of the instantaneous release test (2) Software simulation of three-stage test of overload, grounding and operation time; 5. Fault record function: record 10 faults; 6. Alarm record function: record 8 alarms; 7. MCR switching on and off function; 8. Record of the number of operations; 9. Thermal memory function; 10. Overload pre-alarm function	interface: 128X64 liquid crystal display 3. Alarm record function: record 10 alarms;	protection; 3. Frequency measurement and protection; 4. Power measurement and protection; 5. Electrical energy, power factor and harmonic measurement; 6. Communication function: MODBUS protocol; 7. DI/DO function (optional)

12.1.4 M controller symbols and description as shown in Table 20.

Table 20 M controller symbols and description

No.	Symbol	Description
1	Ir= tr=	Represent the long delay current set value and the long delay time set value respectively
2	Isd= tsd=	Represent the short delay current set value and the short delay time set value respectively
3	Ig= tg=	Represent the ground current set value and the ground time set value respectively
4	Ii=	Represents the instantaneous current set value
5	N=	Represents the neutral pole protection parameter set value
6	TM	Represents the software simulation release status
7	TRIP	Represents the trip status
8	RUN	Represents normal operation
9	SET	Thermal represents the settable status, and flash indicates that the data can be modified
10	LIN	Represents the data storage status
11	P┣0	Represents the four-stage current protection setting interface
12	ΓES	Represents the software simulation test release setting interface
13	RLR	Represents the alarm setting or query interface
14	SYS	Represents the system setting interface (can calibrate the current and set the system frequency)
15	DBS	Represents the communication setting interface (H model)
16	DOS	Represents the DO output setting interface (H model + DO function)
17	FRU	Represents the fault record query interface
18	COU	Represents the query interface of the number of operation and the life
19	HDΓ	Represents the heat capacity query interface
20	DOC	Represents the DO status query interface
21	H	Represents therma capacity data
22	F--	Represents the fault record number
23	R--	Represents the alarm record number
24	Lg L1 L2 L3 LN	Represents the ground, A, B, C, N phases respectively
25	L ↘	The four-stage current graph. The full display indicates normal. The corresponding section flashes after the fault release, and also flashes in the fault record area.
26	ALM	Alarm indication status

12.1.5 Intelligent controller Operation and Display Description

The status of the intelligent controller can be divided into default status, setting status, query status, and Intelligent status.

(1) Default status: The default status is the measurement status where all the fault indicators are off and the controller is in non-button operation state and shows the maximum current.

In the default status, if you press "▲" or "▼" button, the L1, L2, L3, (LN) and Lg current values are displayed cyclically. Figure 61is an example.

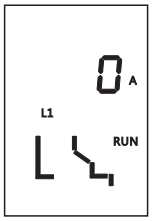


Figure 61.L1 phase current display interface

(2) Setting status: The setting status may be entered by pressing the "Set" button in the default interface. In the setting status, the current protection parameters may be queried and modified, the software simulation test release may be performed, and the overload pre-alarm, grounding alarm threshold and delay time be queried and set. In the setting status, the "SET" indicator lights up or flashes. When it flashes, data may be added or subtracted by pressing the "▲" or "▼" button. Press "ENTER" to store data. For examples, see Figure 62, Figure 63 and Figure 64.

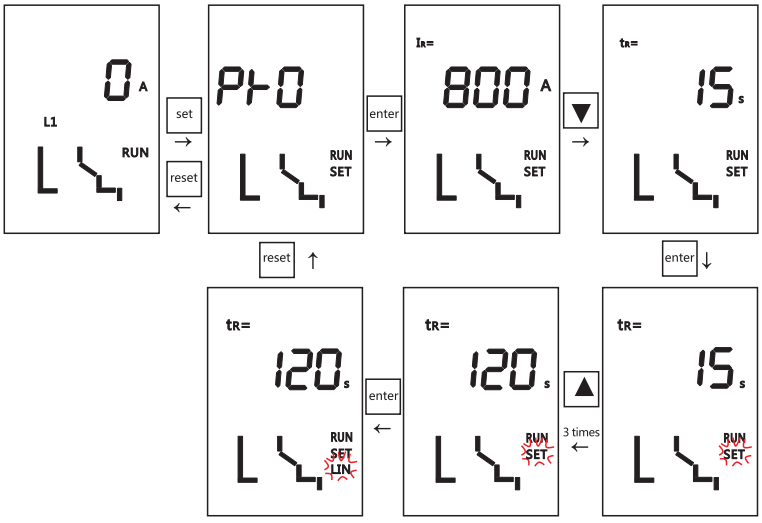


Figure 62.Modifying the long delay time value

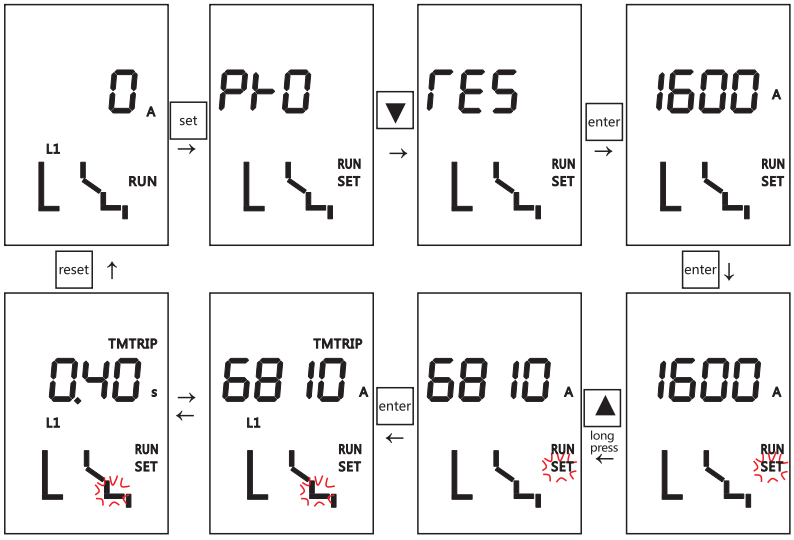


Figure 63.Software simulation short delay release test

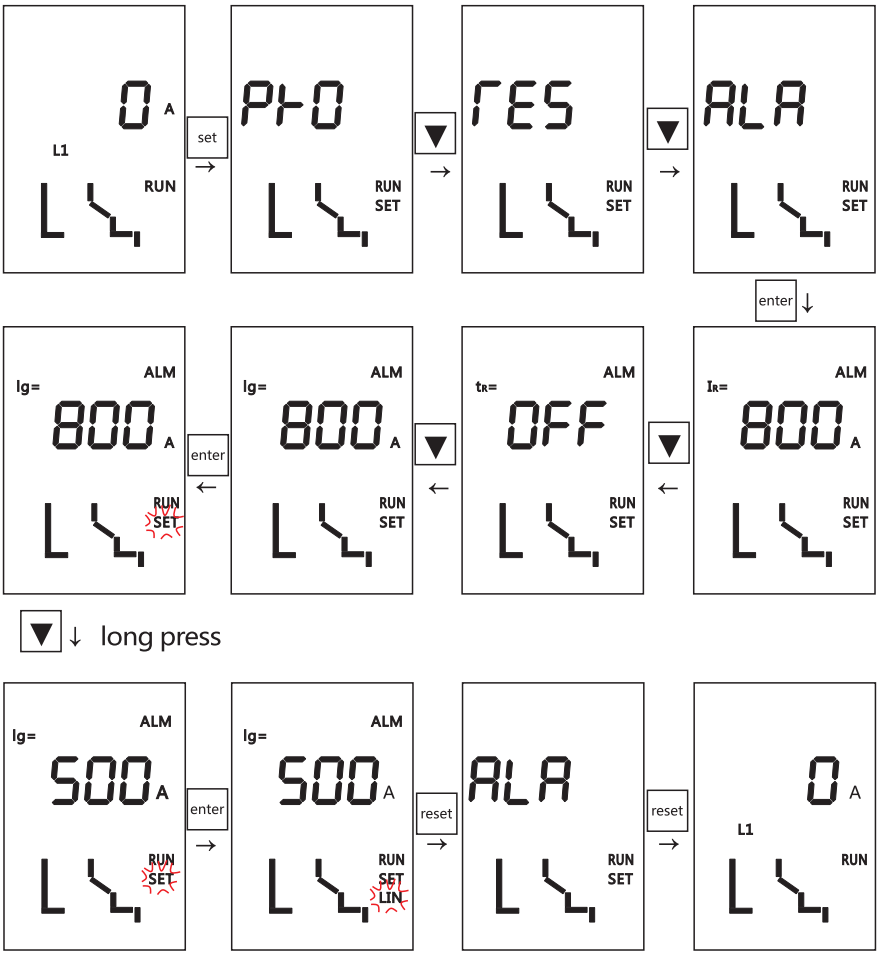


Figure 64.Setting the ground alarm current value threshold

(3) Query status: The query status may be entered by pressing the "Query" button in the default interface. In the query status, the recent 10 fault records, recent 8 alarm records, the number of circuit breaker operations, life records and heat capacity information may be queried. For examples, see Figure 65, Figure 66, Figure 67 and Figure 68.

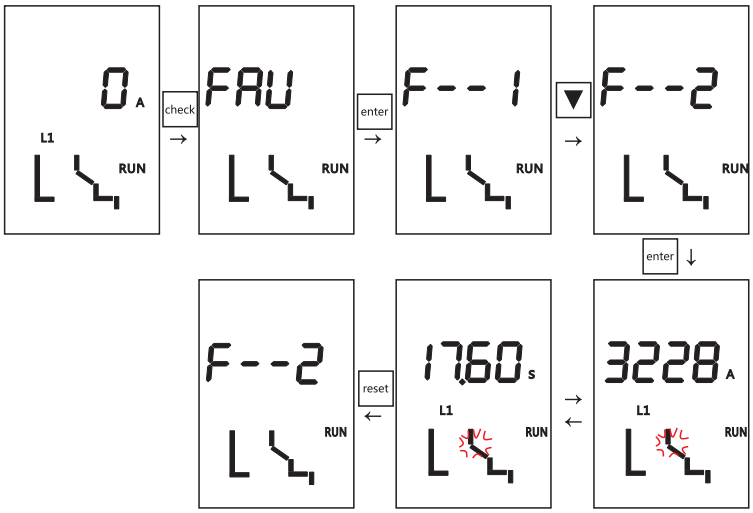


Figure 65.Querying the second fault record

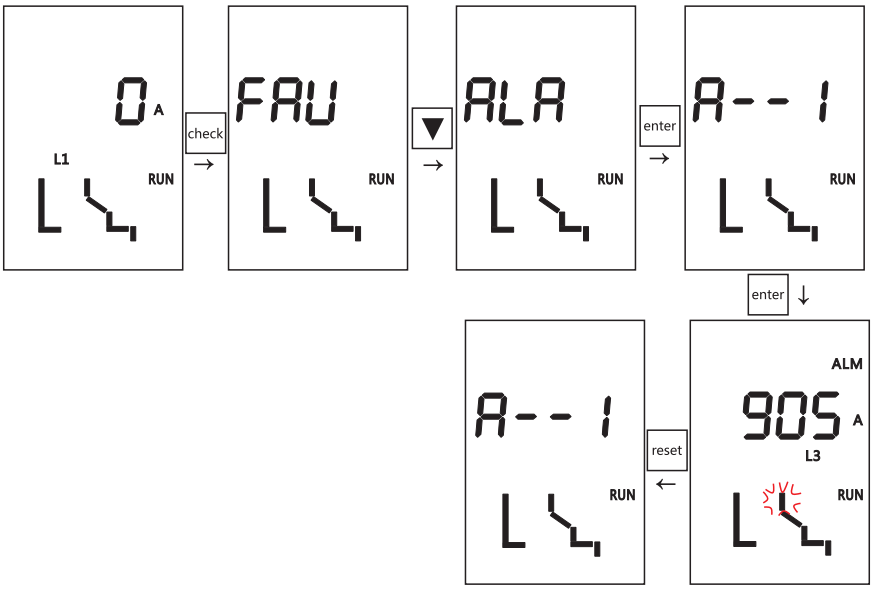


Figure 66.Querying the first alarm record

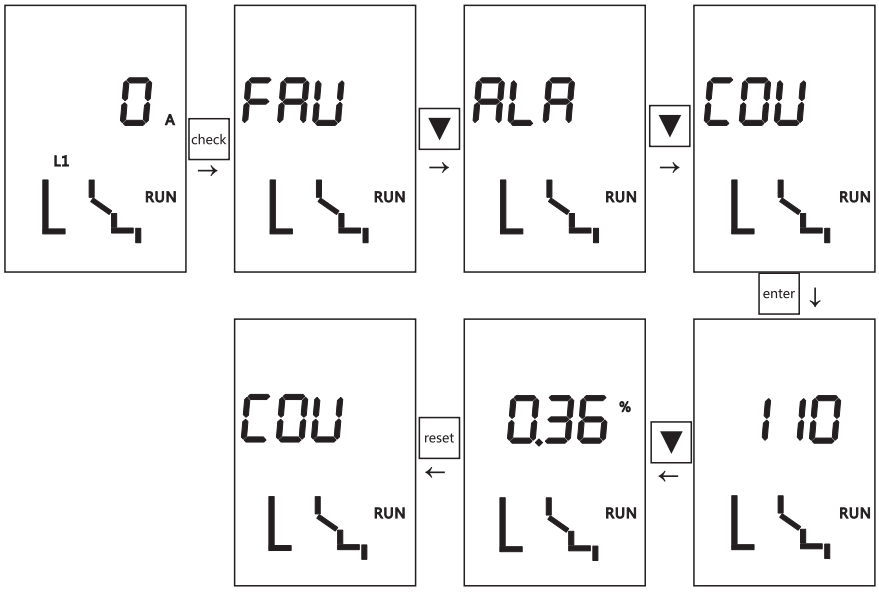


Figure 67.Querying the number of operations and the life of the circuit breaker

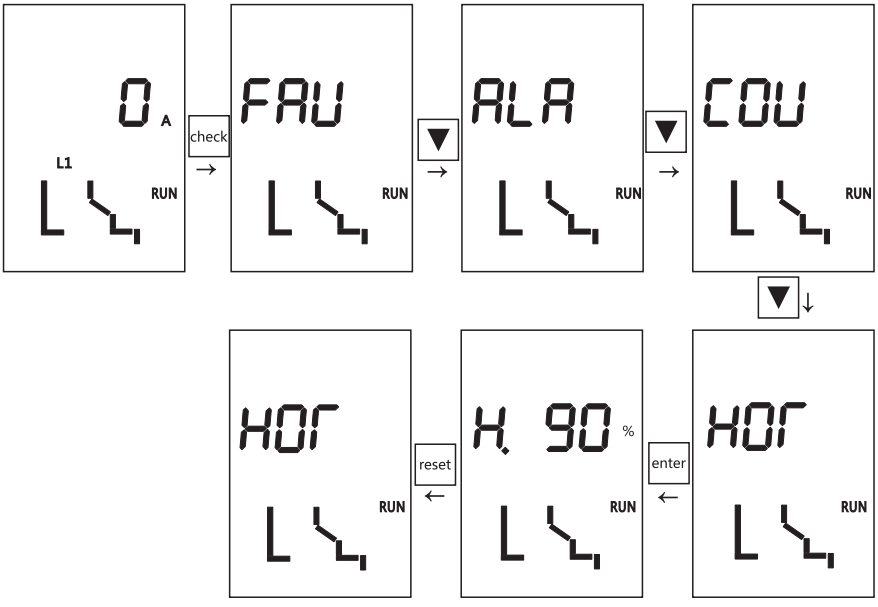


Figure 68.Querying the thermal capacity when the circuit breaker is released due to faults

(4) Release status: In addition to the statuses above that may be set and queried, the fault release status of the circuit breaker is illustrated in Figure 69 and Figure 70.

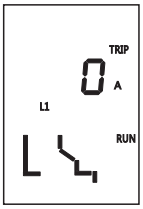
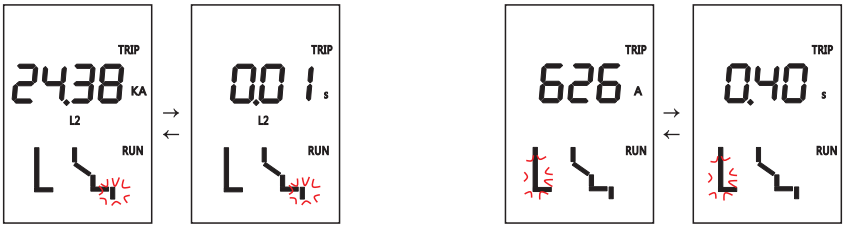


Figure 69.Pressing "Test" to simulate the instantaneous release status



70-a Instantaneous fault release status　　70-b Grounding fault release status

Figure 70.Pressing " Test " to eliminate the fault in case of a release fault

12.1.6 Default Interface and Menu Structure of 3M/3H Controller

The 3M/3H controller provides four theme menus and one default interface. The theme menus are the measurement menu, the parameter setting menu, the protection parameter setting menu, and the history record and maintenance menu.

Note: For detailed operation of the 3M/3H controller, see the NA1 multi-function intelligent controller manual.

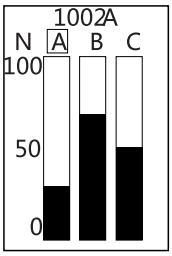


Figure 71.Default Interface of 3M/3H Controller

12.2 Shunt release

The power-on time cannot be greater than 2 seconds / time, and the power-on frequency cannot be greater than 5 times / minute.

a. The shunt release should be used except for special products where the circuit breaker must be directly disconnected manually;

b. The shunt release could operated within 10 meters to break the circuit breaker.

Table 21 Characteristics of shunt release

Rated control power supply voltage Us(V)			AC220/230	AC380/400	DC220	pulse	AC110 (not available for NA1-1000X)
Operating voltage (V)			(0.7-1.1)Us				
Break time (ms)			≤28				
Power consumption (VA/W)	Inm=1000A	pulse	500	620	400	500	-
	Inm=2000A~6300A	Intermittent(default)	460	400	140	70	300
		Pulse(option)	880	1800	880	850	850

Notes: 1. It must select pulse type in the automatic control system.
2. power-on time of the intermittent type cannot be greater than 2 s, pulse frequency of the pulse type cannot be more than 5 times/min, or the components are easily burnt;
3. If the circuit breaker is not break by a single power-on of 15 s, must disconnect the power on the shunt release immediately.

Figure 72.shunt release

12.3 Closed Electromagnet

After the energy storage of the motor is completed, the closed electromagnet can be operated and controlled within a range of 10 meters to instantaneously release the energy storage spring force of the operating mechanism to close the circuit breaker.

Table 22 Characteristics of closed electromagnet

Rated control power supply voltage Us(V)			AC220/230	AC380/400	DC220	DC110	AC110 (not available for NA1-1000X)
Operating voltage (V)			(0.85-1.1)Us				
Close time (ms)			≤50				
Power consumption (VA/W)	Inm=1000A	pulse	500	620	400	500	-
	Inm=2000A~6300A	Intermittent(default)	460	400	140	70	300
		Pulse(option)	880	1800	880	850	850

Notes: 1. It must select pulse type in the automatic control system.
2. power-on time of the intermittent type cannot be greater than 2 s, pulse frequency of the pulse type cannot be more than 5 times/min, or the components are easily burnt;
3. Ensure that the product is in the energy storage state so that the closed electromagnet may be energized;
4. If the product is not closed after a single power-on for 15s, must disconnect the power on the closed electromagnet Immediately.

Figure 73.closed electromagnet

12.4 Undervoltage release (UVT) (Default, The power must be turned on before the circuit breaker is closed)

12.4.1 The undervoltage release has instantaneous operation and delayed operation:

Table 23 Operation types of each frame under voltage release

	Self-priming	Helped priming
Undervoltage instantaneous release	Inm=1000A, 6300A	Inm=2000A, 3200A, 4000A/3
Undervoltage delay release	Inm=1000A, 6300A	Inm=2000A, 3200A, 4000A/3

Notes: 1. Inm=1000A undervoltage delay does not require an external delay controller. The power-off operation is an instantaneous operation. There is no zero voltage delay function;
2. Inm=6300A undervoltage delay does not require an external undervoltage delay controller. There is a delay function for low voltage and power off;
3. Inm=2000A~4000A/3 undervoltage delay requires an external delay controller. There is a delay operation when the power is off. There is a zero voltage delay function.

Table 24 Delay time of under voltage release

Product shell	Delay time(optional)	Accuracy
Inm=1600A	1s,3s,5s,7s(not adjustable)	±15%
Inm=2000A ~ 4000A	1s(not adjustable)	(0~1)s
	3s(not adjustable)	(0~1.2)s
	5s(not adjustable)	(0~1.5)s
Inm=6300A	0.3s ~ 7.5s(adjustable)	±15%
The under-voltage will not operate when the voltage returns to 85% Ue and higher,within 1/2 delay time.		

Note: A self-priming undervoltage delay release may be provided for special orders of NA1-2000X~6300X. There is no external undervoltage delay controller, and the delay time is 0.3s~7.5s, selectable and adjustable with an accuracy of ±15%.

12.4.2 When the undervoltage release is not powered, the circuit breaker cannot be closed either electrically or manually.

Table 25 Characteristics of under voltage release

Rated control power supply voltage Ue(V)	AC110, AC220/230, AC380/400
Operating voltage (V)	(0.35~0.7)Ue
Reliable closing voltage (V)	(0.85~1.1)Ue
Reliable not-closing voltage (V)	≤0.35Ue
Power consumption (Inm=1600A/Inm=2000A~6300A)	20VA/48VA (W)

Figure 74. under voltage release

12.5 The electric energy storage mechanism (the power-on time cannot be greater than 5 seconds / time, and the power-on frequency cannot be greater than 3 times/min) has an automatic re-energy storage function to facilitate dual power switching.

Table 26 Characteristics of electric energy storage mechanism

Rated control power supply voltage Us(V)	AC380/400,AC220/230	DC220, DC110
Operating voltage (V)	(0.85-1.1)Us	(0.85-1.1)Us
Power consumption (Inm=1000A)	90W	90W
Power consumption (Inm=2000A)	85W	85W
Power consumption (Inm=3200A, 4000A/3)	110W	110W
Power consumption (Inm=6300A)	150W	150W
Energy storage time	≤5s	≤5s

Figure 75.Motor

12.6 Auxiliary Contacts

12.6.1 NA1-1000X model

Standard type: 4 sets of conversion contacts(M/3M type);1 normally open and 1 normally closed contacts and 1 sets of conversion contacts(H/3H type)

Special type: 6 sets of conversion contacts(M/3M type) (for AC only)

12.6.2 NA1-2000X~NA1-6300X model

Standard type: 4 sets of conversion contacts(Undervoltage transient or self-priming under-voltage release); 4 sets of conversion contacts(Suction type under-voltage release)

Special type(Undervoltage transient or self-priming under-voltage release): 3 normally open and 3 normally closed contacts, 4 normally open and 4 normally closed contacts, 5 normally open and 5 normally closed contacts, 6 normally open and 6 normally closed contacts(M/3M type),5 sets of conversion contacts

Special type(Suction type under-voltage release): 3 normally open and 3 normally closed contacts, 4 normally open and 4 normally closed contacts, 5 normally open and 5 normally closed contacts(M/3M type), 4 sets of conversion contacts

Table 27 Auxiliary contact capacity

Type	NA1-1000X			NA1-2000X/NA1-2000XN/NA1-2000XH/NA1-3200X/NA1-3200XN/NA1-4000X/NA1-6300X/NA1-6300XN		
Rated voltage (V)	AC230	AC400	DC220	AC230	AC400	DC220
conventional free-air thermal current Ith (A)	10	6	0.5	6	6	6
Rated control capacity	300VA	100VA	60W	300VA	300VA	60W

NA1-1000X			NA1-2000X/NA1-2000XN/NA1-2000XH/NA1-3200X/NA1-3200XN/NA1-4000X/NA1-6300X/NA1-6300XN		
Category	Voltage	Current	Category	Voltage	Current
AC-15	AC230V	1.3A	AC-15	AC230V	1.3A
	AC400V	0.25A		AC400V	0.75A
DC-13	DC110V	0.55A	DC-13	DC110V	0.55A
	DC220V	0.27A		DC220V	0.27A

Figure 76.Auxiliary contact

12.7 Door frame and pad (fixed and drawer type)

The door frame and pad are installed on the door of the power distribution cabinet for sealing, and the protection level reaches IP20.

Figure 77.Door frame and pad

12.8 Inter phased partition

Inter phased partition are installed between the terminal blocks to increase the phase insulation of the circuit breaker.

Note: 1. inter phased partition used in the fixed and drawer type products are different.;

2. Three-pole products use two inter phased partitions, and four-pole products use three inter phased partitions.

3.Inter phased partition in NA1-2000X-6300X, is different from that in NA1-1000X.

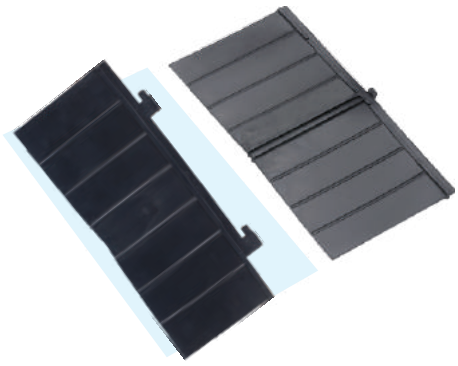


Figure 78.Inter phased partition

12.9 Off Position Locking Device

When the drawer type circuit breaker is in the "Disconnected" position, the lock lever can be pulled out and locked with the padlock. The circuit breaker cannot be shaken to the "Test" or "Connected" position (User purchase padlock).

Figure 79.Off Position Locking Device

12.10 Key Lock

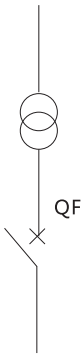
12.10.1 The separation button of the circuit breaker can be locked in the pressed position. At this time, the circuit breaker cannot perform the making operation.

12.10.2 After the user has selected the product, the factory provides the lock and key.

12.10.3 The user purchases the key lock separately. When installing, it is recommended that the panel be opened with a hole opener. The hole opener has a diameter ofΦ28mm for NA1-2000X-6300X andΦ21mm for NA1-1000X. The hole opener is provided by the user.

Note: After the circuit breaker is locked with the key lock, the circuit breaker cannot be closed either manually or electrically. To remove the key, press the breaking button, turn the key counterclockwise, and then pull out the key.

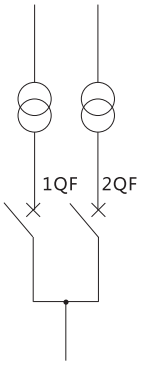
Circuit diagram Possible mode of operation



QF
0
1

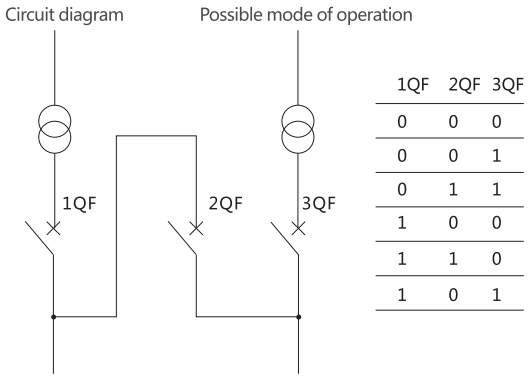
80-a One lock and one key: One circuit breaker is equipped with one separate lock and one key

Circuit diagram Possible mode of operation



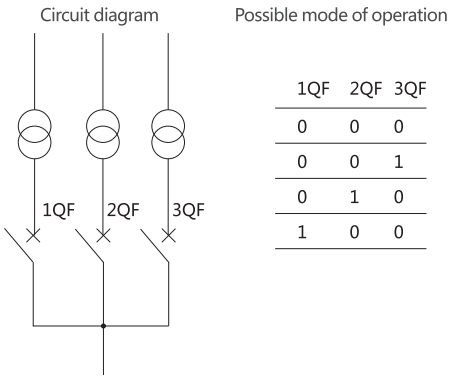
1QF	2QF
0	0
0	1
1	0

80-b Two locks and one key: Two circuit breakers are equipped with two identical locks and one key



1QF	2QF	3QF
0	0	0
0	0	1
0	1	1
1	0	0
1	1	0
1	0	1

80-c Three locks and two keys: Three circuit breakers are equipped with three identical locks and two identical keys



1QF	2QF	3QF
0	0	0
0	0	1
0	1	0
1	0	0

80-d Three locks and one key: Three circuit breakers are equipped with three identical locks and one key

Figure 80.Operation mode of circuit breaker equipped with locks and keys

Figure 81.Key Lock

★ NA1Install the locking system

1. Components of the locking system:

2. Installation sequence:

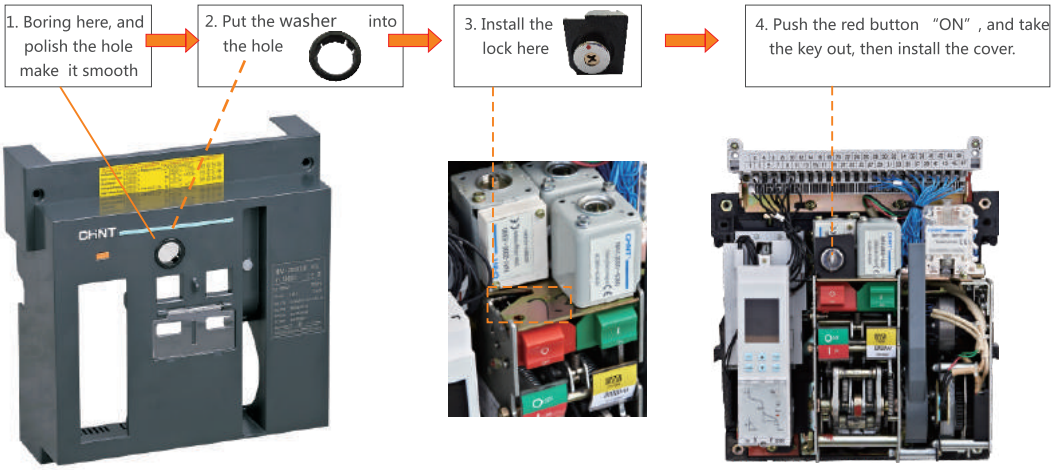


Figure 82.NA1 instal the locking system

12.11 Transparent protective cover

(only available for NA1-2000X drawer type)

The transparent protective cover is installed on the door frame of the cabinet door to achieve IP54 protection.

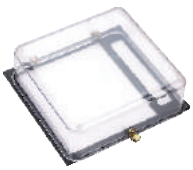


Figure 83.Transparent protective cover

12.12 Counter (only available for NA1-2000X-4000X/3 model)

The counter accumulates the number of mechanical operations of the circuit breaker, which is clear to the user and is convenient for maintenance and overhaul.

12.13 Drawer circuit breaker position signal:

installed on the drawer seat to indicate the position of the drawer circuit breaker body in the drawer seat. The positions that can be indicated are " disconnection ", "Test" and "Connection".

12.14 Door Interlock(only available for NA1-2000X-6300X model)

a. Circuit breaker status door interlock: The cabinet door is forbidden to open when the circuit breaker is closed and is allowed to open when the circuit breaker is disconnected.

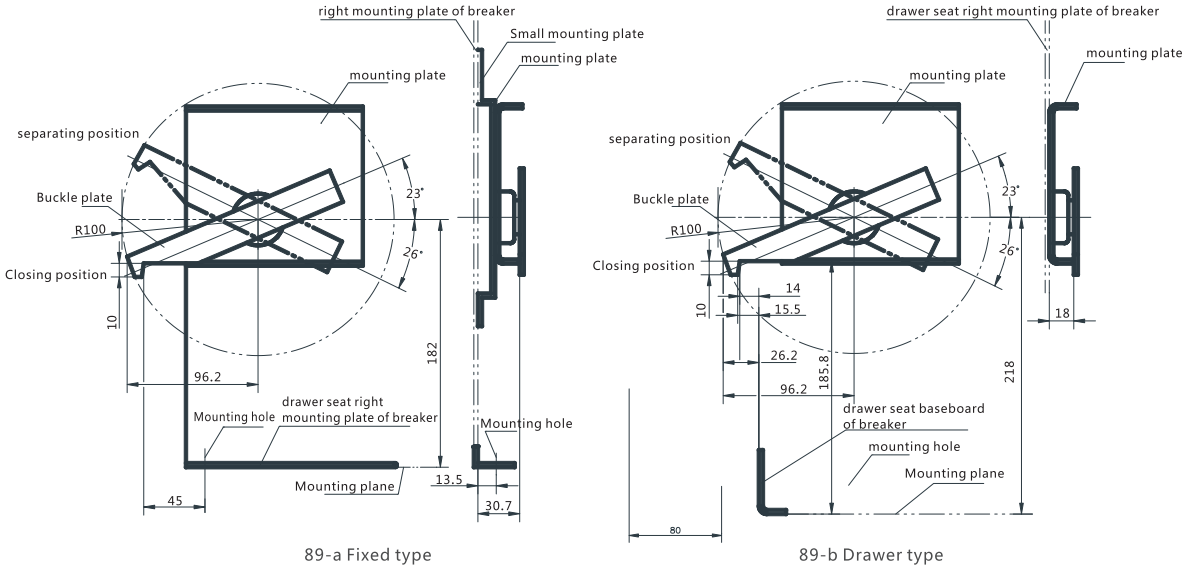


Figure 84.Installation dimension drawing of NA1-2000X-6300X air circuit breaker status door interlock

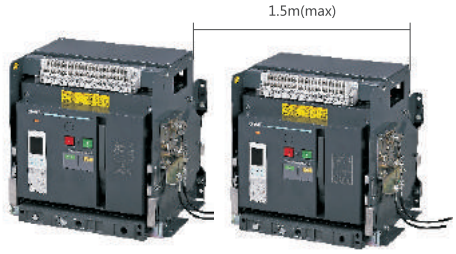
b. Circuit breaker position door interlock: The cabinet door is forbidden to open when the circuit breaker is in the connection and test positions and is allowed to open when the circuit breaker is in the separation position.

12.15 Steel Cable Interlock (see Appendix 12.19 for installation method)

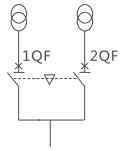
12.15.1 Double Interlock (can realize interlocking of two three-pole or four-pole circuit breakers which installed in horizontal or vertical)

It can realize the interlock of two or three horizontal or vertical-installed, three poles or four poles drawout type or fixed type circuit breaker.

a. If need bend the cable, make sure the radian is more than 120°.
b. Check and make sure enough lubricating oil of the cable.
c. The maximum distance between two interlock circuit breakers is 1.5m.



Circuit diagram



Available running manner

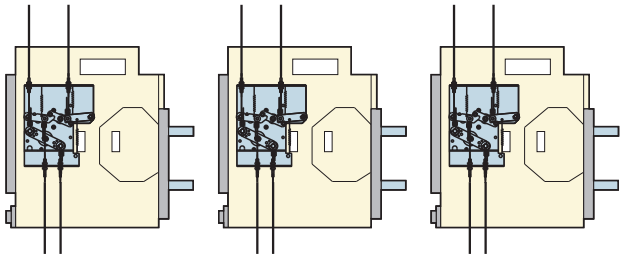
1QF	2QF
0	0
0	1
1	0

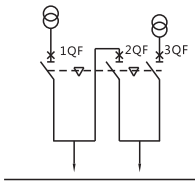
Notes: a. when the steel cable needs to be bent, enough transition arc should be reserved to guarantee flexible movement of steel cable;
b. check the steel cable and make sure there is enough lubricant in the steel cable to guarantee flexible movement of steel cable.

Figure 85.Steel cable interlock

12.15.2 Triple Interlock (can realize interlocking of three horizontal three-pole or four-pole circuit breakers)

The distance of right mounting plates between two adjacent breakers ≤1m.





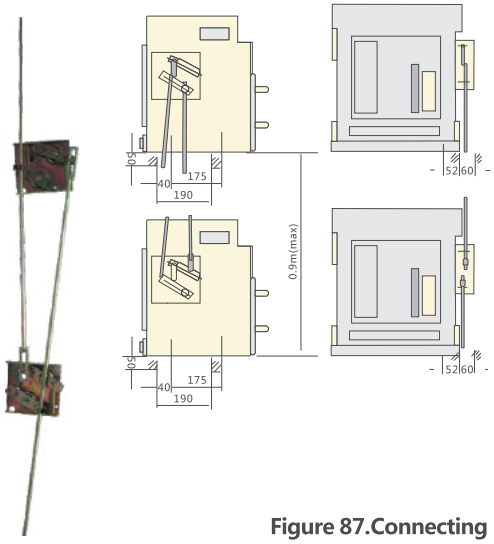
1QF	2QF	3QF
0	0	0
0	0	1
0	1	0
1	0	0
0	1	1
1	0	1
1	1	0

Circuit diagram Possible mode of operation

Figure 86.Steel cable triple interlock

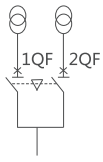
12.16 Connecting Rod Interlock (available for NA1-2000X-6300X products, not for NA1-1000X products)

For two vertically mounted three-pole or four-pole circuit breakers, the interlock can be realized where one makes and the other breaks.



Circuit diagram Available running manner

Manner 1: three power supplies are provided for one circuit breaker only



1QF	2QF
0	0
0	1
1	0

Figure 87.Connecting rod interlock

12.17 External Leakage Transformer (E Mode)

The external leakage transformer is suitable for leakage faults caused by equipment insulation damage or by human body exposure to exposed conductive parts. The leakage release value I△n is directly expressed in amperes, irrelevant to the rated current of the circuit breaker. The signal is taken in a zero-sequence sampling mode, and a rectangular transformer is required. This sampling has high precision and high sensitivity and is suitable for protection of a small current.

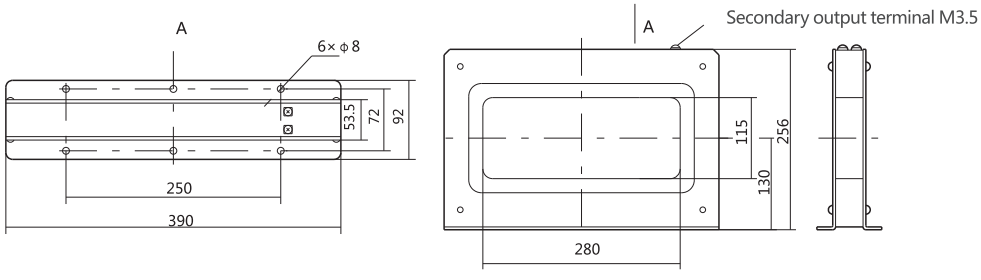


Figure 88.ZCT1: rectangular leakage transformer

Note: ZCT1 provides the busbar pass-through method for NA1-1000X(3P/4P) and NA1-2000X(3P) products, not for NA1-2000X(4P) and NA1-3200X-6300X products.

12.17.1 Leakage Protection Related Setting Parameters

Table 28 Earthing protection parameter setting

Parameter name In(A)	Setting range	Setting step
Operating current setting value I△n	(0.5-30.0)A	Step size 0.1 A
Delay time T△n(S)	Instantaneous, 0.06, 0.08, 0.17, 0.25, 0.33, 0.42, 0.5, 0.58, 0.67, 0.75, 0.83	
Execution mode	trip / close	

12.17.2 Leakage Protection Action Characteristics

Table 29 Leakage protection action characteristics

Characteristics	Current multiple (I/I△n)	Appointed trip time	Delay tolerance
Non-action characteristics	< 0.8	Non-action	
Action characteristics	> 1.0	Action	
Action characteristics	≥1.0	See Table 30	±10% (inherent absolute error ±40ms)

Table 30 Leakage protection action delay

Maximum disconnection time(s) / setting time(s) / Fault current	0.06	0.08	0.17	0.25	0.33	0.42	0.5	0.58	0.67	0.75	0.83	Instantaneous
I△n	0.36	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	0.04
2I△n	0.18	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	0.04
5I△n	0.072	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	0.04
10I△n												

12.17.3 Leakage protection detection principle shown in Figure 87.

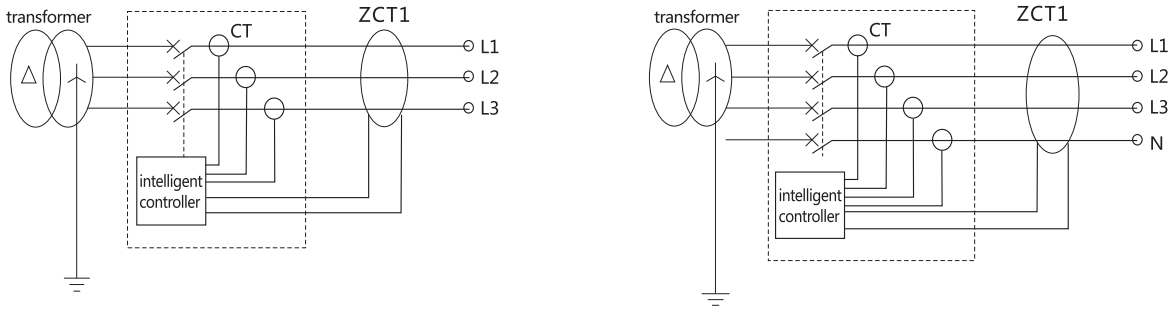


Figure 87.Leakage protection detection principle

12.18 External Ground Current Transformer (W Mode)

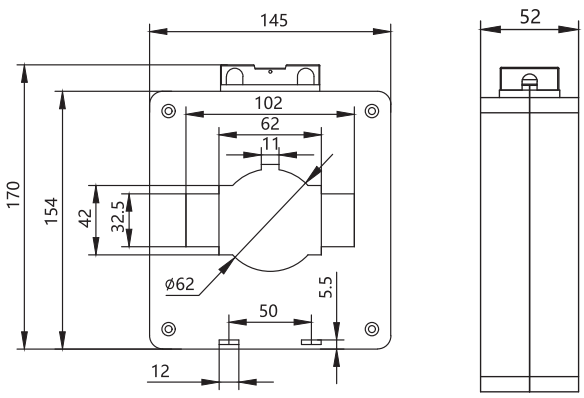
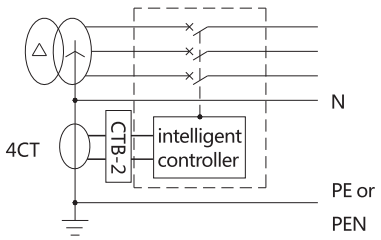


Figure 90.External ground current transformer sizeFigure



4CT: Additional special transformer,
CTB-2: ground current transformer module

Figure 91.Ground current protection principle

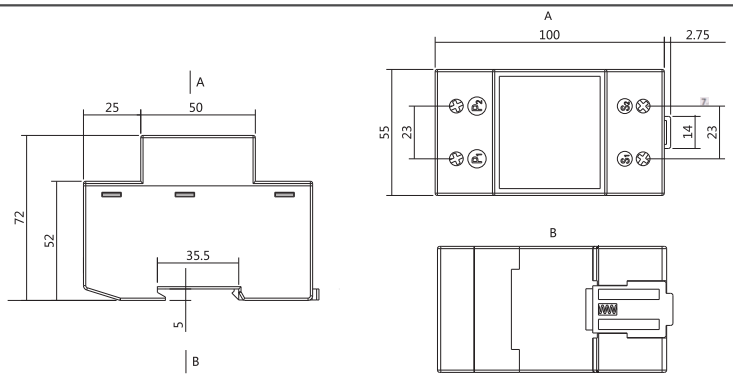


Figure 92.CTB-2 Earthing current transformer module

12.19 Differential Earthing Protection Principle

Metal earthing protection with single-phase earthing protection fault current of several hundred amperes is generally used for neutral point direct ground system. The controller has two different protection modes: one is the vector sum mode without external transformers, and the other is the vector sum mode with external transformers. As shown in Figure 91:

a) In the three-phase three-wire system, the three-pole circuit breaker is selected without a transformer, the ground fault signal only takes the vector sum of the three-phase current, and the protection characteristic is the time-limited protection. (See Figure 91-a 3PT mode)

b) In the three-phase four-wire system, the four-pole circuit breaker is selected without a transformer, the ground fault signal only takes the vector sum of the three-phase current and the N pole current, and the protection characteristic is the time-limited protection. (See Figure 91-b 4PT mode)

c) In the three-phase four-wire system, the three-pole circuit breaker is selected with an external neutral pole N current transformer for grounding protection (the 1000 model is connected to 6# and 7# terminal blocks and 2000-6300 models connected to 25# and 26# terminal blocks), the ground fault signal takes the vector sum of the three-phase current and the N pole current, and the protection characteristic is the time-limited protection. (See Figure 91-c (3P+N)T mode)

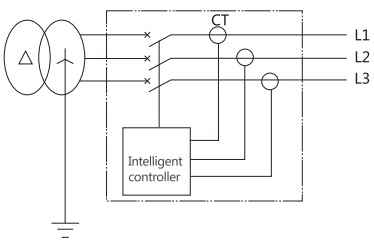


Figure 93-a 3PT mode

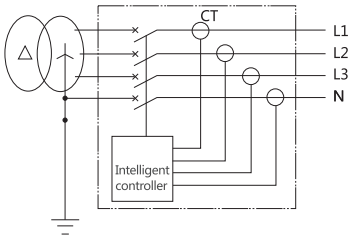


Figure 93-b 4PT mode

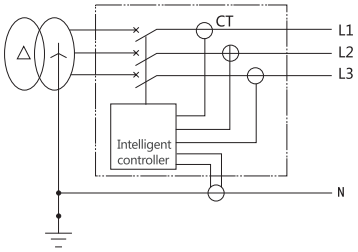


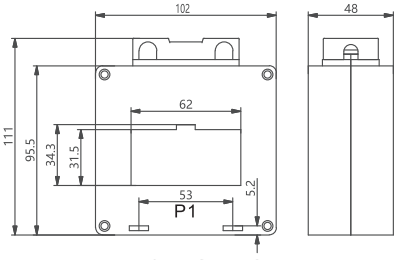
Figure 93-c (3P+N)T mode

Figure 93.earthing protection modes

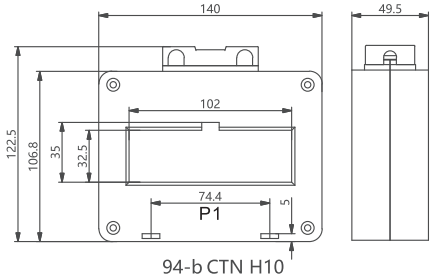
Note: (1) The external N-phase current transformer is a specially configured transformer of the company.
(2) In the 3PT mode,when the unbalanced current of the system exceeds Ig, the ground fault protection of the circuit breaker will trip incorrectly. To prevent false switching, disable the ground fault protection function;
(3) In the (3P+N)T mode, the maximum distance between the transformer and the circuit breaker should not exceed 5 m.

12.20 External N-phase transformer (3P+N mode) structure dimensions

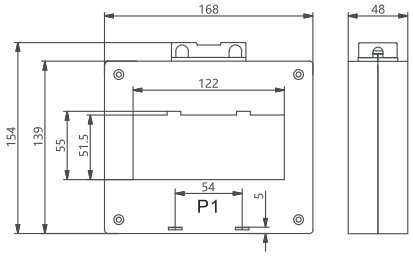
When the controller is 3P+N, the external additional neutral pole transformer's installation dimensions are shown in Figure 94.



94-a CTN H6



94-b CTN H10



94-c CTN H12

TIPs: 1. When the incoming line of the Circuit Breaker is at the upper end, the P1 side should face the incoming line; When the incoming line of the Circuit Breaker is at the lower end, the P1 side should face the load;

2. The Transformer should be connected to the Circuit Breaker using twisted pair wires, with a cross-sectional area of not less than 0.75mm^2 and a length of less than 2m. S1 should be connected to the secondary circuit terminal 25 of Circuit Breaker;S2 should be connected to the secondary circuit terminal 26 of Circuit Breaker.

3. CTN prohibits grounding.

Table 31 Recommended Models for External N-pole Transformer

Case Frame	Rated Current (A)	Transformer Ratio Code	Transformer Perforation Size		
			H6:60*30	H10:100*30	H12:120*50
1000	200~400	T0	●		
	630~1000	TA	●		
2000	630~2000	T3	●	○	○
3200	2000~3200	T4		●	○
4000/3	4000	T4			●
4000/4	4000	T3		●	○
6300	4000~6300	T4			●
TIP: ●Default Configuration, ○Optional Configuration					

Figure 94.External Ground Current Transformer

12.21 Installation Dimensions of Undervoltage Delay Controller

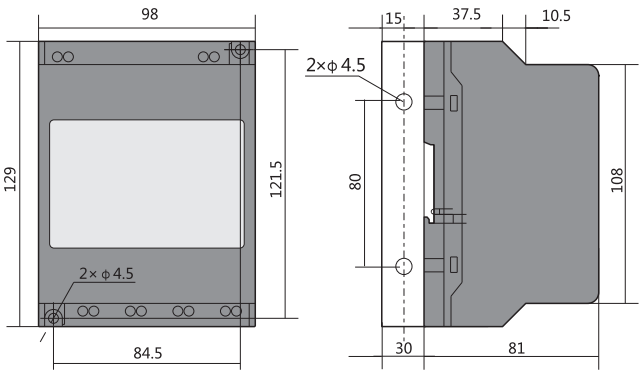


Figure 95.Undervoltage Delay Controller

12.22 PSU-1 Power Module

The PSU-1 power module can provide DC 24 V power with a power of 9.6 W. It can output two sets of terminals and input AC (AC220V, AC400V) or DC (DC110V, AC220V) power. It can be used as the power supply for the RU-1 relay module. The product adopts the 35 mm standard rail mounting method. The shape and installation dimensions are shown in Figure 104.

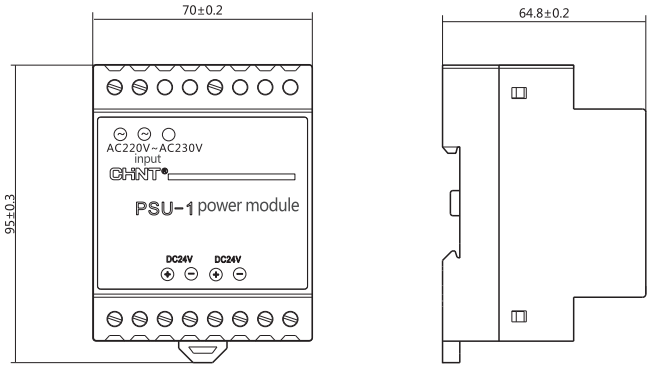


Figure 96.PSU-1 power module installation structure

12.23 RU-1 Power Module

The signal unit output by the controller is generally used for fault alarm or indication. When it is used to control the breaking and making of the circuit breaker or the load capacity is large, it needs to be controlled after converted by the RU-1 relay module. The capacity of the RU-1 contact is AC250V, 10A; DC28V, 10A. Its shape and installation dimensions are the same as the PSU-1 power module.

CHINT ELECTRICS

NA1 Series
Air Circuit Breaker
User Instruction

Zhejiang Chint Electrics Co., Ltd.

Add: No.1, CHINT Road, CHINT Industrial Zone,North Baixiang,
Yueqing, Zhejiang 325603,P.R.China

E-mail: global-sales@chint.com

Website: http://en.chint.com