

Shanghai Liangxin Electrical Co., Ltd.

NDM3-400 Product Specification

(IPD-ENG-DEV-T20 A1 2016-09-23)

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Revision History					
Version	Revision Reason/Content	Implementation Date	Prepared by	Reviewed by	Approved by
0	Newly added	5/8/2020	Wang Hu	Peng Haorang	Hu Qi
1	Update the product appearance picture and product dimension outline drawing	30/9/2021	Sun Lanping	Chen Xinming	Ding Fei
2	Add attachment information	9/03/2023	Yang rongrong	Chen Xinming	Ding Fei
3	Logo change	2025.02.24	Yang rongrong	Xu Fuping	Ding fei

3. Specification and Model Description of Circuit Breaker

ND 1	M 2	3 - 400 3 4	☐ 5	☐ / ☐ 6 7	☐ 8	☐ 9	☐ 10	☐ 11	☐ 12	☐ 13	☐ 14	☐ 15	☐ 16
SN	SN name		NDM3										
1	Enterprise code		ND: "Nader" low-voltage apparatus										
2	Product code		M: Molded case circuit breaker (MCCB)										
3	Design SN		3										
4	Shell frame level		400										
5	Breaking capacity level		C: Basic type										
			L: Standard type										
			M: Relatively high breaking type										
			H: High breaking type										
6	Operation mode		No code: Direct handle-operated mode										
			P: Motor-operated										
			Z: Rotary operation										
7	Number of poles		3, 4										
8	Release code		0: Release (none)										
			2: Instantaneous tripper only										
			3: Complex tripper										
9	Accessory code		See Table 1										
10	Application code		No code: Power distribution type										
			2: Motor protection type										
11	N-pole (neutral pole) type of the 4P product		A: The N-pole isn't installed with an overcurrent release, but always connected										
			B: The N-pole isn't installed with an overcurrent release, but on-off with the other three poles										
			C: The N-pole is installed with an overcurrent tripper, and on-off with the other three poles										
12	Special use		Q: Voltage-check self-reset										
13	Special function code		I: Non-tripping at the time of alarming										
14	Rated current		See Table 2										
15	Cabling type		No code: Normal product										
			P: Connection busbar										
			Z1: Rear-plate connection										
			Z3H: Integrated plug-in rear-plate connection										
			Z3Q: Integrated plug-in front-plate connection										
16	Other code		CS1-A/150: Circular center hole rotary handle + shaft length 150mm										
			CS1-A/200: Circular center hole rotary handle + shaft length 200mm										
			CS1-A/300: Circular center hole rotary handle + shaft length 300mm										
			CS1-A/350: Circular center hole rotary handle + shaft length 350mm										

	CS1-A/650: Circular center hole rotary handle + shaft length 650mm
	CS1-F/150: Square center hole rotary handle + shaft length 150mm
	CS1-F/200: Square center hole rotary handle + shaft length 200mm
	CS1-F/300: Square center hole rotary handle + shaft length 300mm
	CS1-F/350: Square center hole rotary handle + shaft length 350mm
	CS1-F/650: Square center hole rotary handle + shaft length 650mm
	CS2-A/150: Circular eccentric hole rotary handle + shaft length 150mm
	CS2-A/200: Circular eccentric hole rotary handle + shaft length 200mm
	CS2-A/300: Circular eccentric hole rotary handle + shaft length 300mm
	CS2-A/350: Circular eccentric hole rotary handle + shaft length 350mm
	CS2-A/650: Circular eccentric hole rotary handle + shaft length 650mm
	CS2-F/150: Square eccentric hole rotary handle + shaft length 150mm
	CS2-F/200: Square eccentric hole rotary handle + shaft length 200mm
	CS2-F/300: Square eccentric hole rotary handle + shaft length 300mm
	CS2-F/350: Square eccentric hole rotary handle + shaft length 350mm
	CS2-F/650: Square eccentric hole rotary handle + shaft length 650mm
	CS1-IP65/150: IP65 Circular eccentric hole rotary handle + shaft length 150mm
	CS1-IP65/200: IP65 Circular eccentric hole rotary handle + shaft length 200mm
	CS1-IP65/300: IP65 Circular eccentric hole rotary handle + shaft length 300mm
	CS1-IP65/350: IP65 Circular eccentric hole rotary handle + shaft length 350mm
	CS1-IP65/650: IP65 Circular eccentric hole rotary handle + shaft length 650mm
	CS2-IP65/150: IP65 Square eccentric hole rotary handle + shaft length 150mm
	CS2-IP65/200: IP65 Square eccentric hole rotary handle + shaft length 200mm
	CS2-IP65/300: IP65 Square eccentric hole rotary handle + shaft length 300mm
	CS2-IP65/350: IP65 Square eccentric hole rotary handle + shaft length 350mm
	CS2-IP65/650: IP65 Square eccentric hole rotary handle + shaft length 650mm
	DC1 24V: Electric operation voltage DC24V
	DC1 110V: Electric operation voltage AC/DC110V
	DC1 220V: Electric operation voltage AC230V/DC220V
	DC1 380V: Electric operation voltage AC380/400/415V
	AC230V: Shunt release/ Under-voltage release operation voltage AC220/230V
	AC380V: Shunt release/ Under-voltage release operation voltage AC380/400V
	DC24V: Shunt release operation voltage DC24V
	DC220V: Shunt release operation voltage DC220V
	MS2: MS2 lock
	J: Mechanical interlocking
	Z: Terminal housing
	S: Heating handle

Table 1: Comparison Table of Accessory Code:

Legend

- Single auxiliary contact
- Dual-auxiliary contact
- Alarm contact
- Shunt release
- Under-voltage release
- Auxiliary alarm contact (a single accessory features the auxiliary and alarm functions)

Accessory code	Accessory name	Model	
		3	4
00	N/A	—	—
10	Shunt release		
20	Dual-auxiliary contact		
21	Single auxiliary contact		
30	Under-voltage release		
40	Shunt release, dual-auxiliary contact		
41	Shunt release, single auxiliary contact		
50	Shunt release, under-voltage release		
60	Two sets of dual-auxiliary contacts		
61	Two sets of single auxiliary contacts		
62	Dual-auxiliary contact, single auxiliary contact		
70	Under-voltage release, dual-auxiliary contact		
71	Under-voltage release, single auxiliary contact		
08	Alarm contact		
18	Shunt release, alarm contact		
28	Dual-auxiliary contact, alarm contact		
38	Under-voltage release, alarm contact		
48	Shunt release, auxiliary alarm contact		
58	Auxiliary alarm contact		
68	Dual-auxiliary contact, auxiliary alarm contact		
78	Under-voltage release, auxiliary alarm contact		

4. Main Technical Parameters of Circuit Breaker

Table 2 Main Technical Parameters of Circuit Breaker

Model			NDM3-400					
Rated current of frame Inm (A)			400					
Rated current In (A)			225, 250, 315, 350, 400					
Rated insulation voltage Ui (AC V)			1000					
Rated impulse withstand voltage Uimp (V)			8000					
Rated working voltage Ue (AC V)			380/400/415, 500, 660/690					
Power frequency withstand voltage U (1min) (V)			3500					
Utilization category			A					
Number of poles			3				4	
Breaking capacity level			C	L	M	H	/	
Rated limit short-circuit breaking capacity Icu (kA)		AC380/400/415V	36	50	70	100	70	
		AC500V	/	/	50	/	50	
		AC660/690V	/	/	20	/	20	
Rated operating short-circuit breaking capacity Ics (kA)		AC380/400/415V	36	50	70	75	70	
		AC500V	/	/	50	/	50	
		AC660/690V	/	/	15	/	15	
Operating performance (times)	Electrical life		7500					
	Mechanical life	Maintainable free life	10000					
		Maintainable life	20000					
Boundary dimension			L(mm)	257				257
			W(mm)	150				198
			L(mm)	107				107
Flashover distance(mm)			100					

Note :The overall dimension does not include the dimension of terminal cover。

4.1 Selection of the circuit breaker connecting bus or cable cross-section area:

Table 3 Selection of the NDM3-400 Connecting Bus or Cable Cross-section Area

Rated current (A)	225	250	315, 350	400
Wire cross-section area (mm ²)	95	120	185	240

4.2 Tightening Torque of the Circuit Breaker Terminal and Mounting Screw

Table 4 Tightening Torque of the Circuit Breaker Terminal and Mounting Screw

Model	Thread specification	Torque (N·m)
NDM3-400	M10	20
	M6	6

4.3 Derating factor of temperature change for the circuit breaker

Table 5 Derating Factor Table of Temperature Change for the Circuit Breaker

Model	Derating factor of product temperature change							
NDM3-400	Temperature (°C)	40	45	50	55	60	65	70
	Derating factor	1	0.981	0.962	0.942	0.922	0.901	0.879

Note: 1) When the operating ambient temperature is below +40°C, the product can be used normally without derating capacity.

2) The above derating factors are measured at the frame current.

4.4 High-altitude derating factor of the circuit breaker

Table 6 High-altitude Derating Factor Table of Circuit Breaker

Elevation (m)	Working current correction coefficient	Maximum working current correction coefficient	Power frequency withstand voltage correction coefficient	Isolation voltage correction coefficient
2000	1	690	3500	1000
2500	1	690	3500	1000
3000	0.98	620	3150	900
3500	0.97	580	3000	850
4000	0.95	550	2800	810
4500	0.94	520	2650	770
5000	0.93	500	2500	730

4.5 Power loss coefficient of circuit breaker

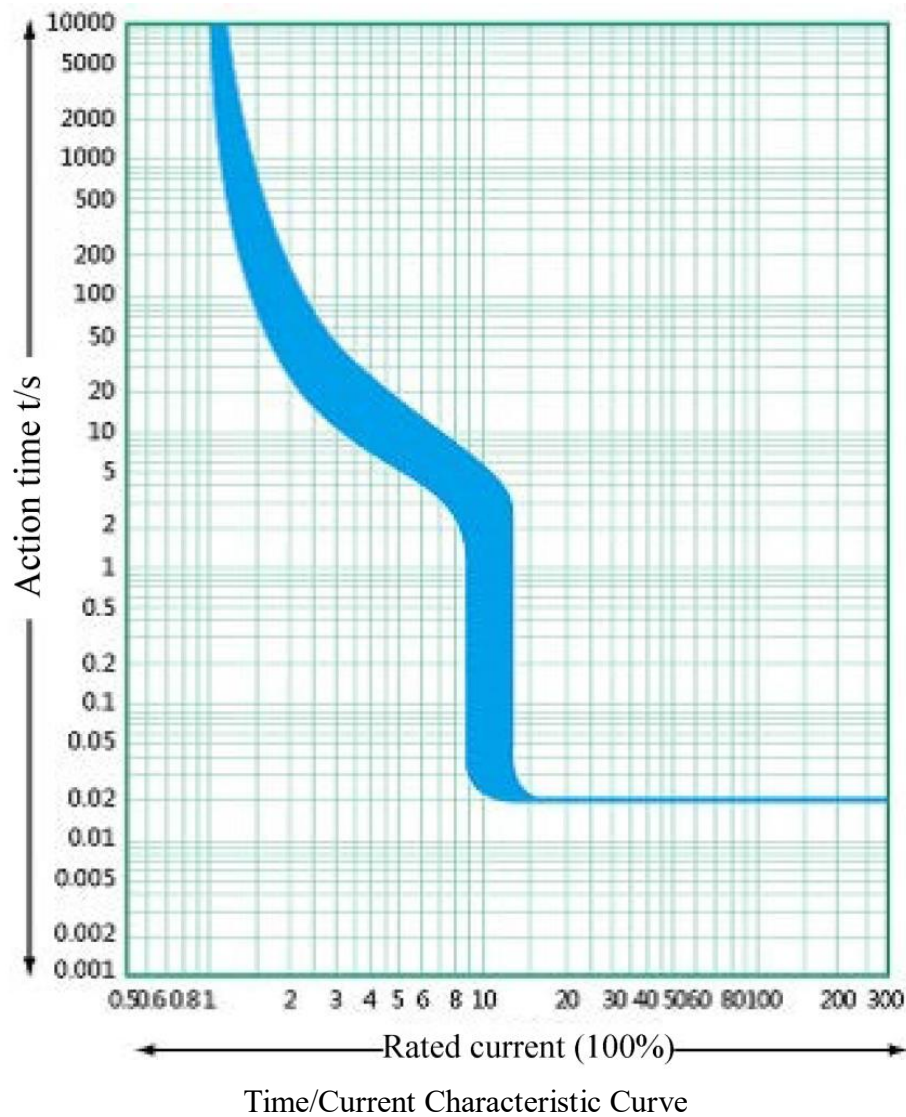
Table 7 Power loss coefficient table of circuit breaker

Model	Energizing current(A)	Total power loss(W)		
		Wiring before and after board	Plug in board front Wiring	Plug in bear board Wiring
NDM3-400(C/L/M/H) Mesothermal type (225-400A)	400	115	120	125

5. Normal Working Environment of Circuit Breaker

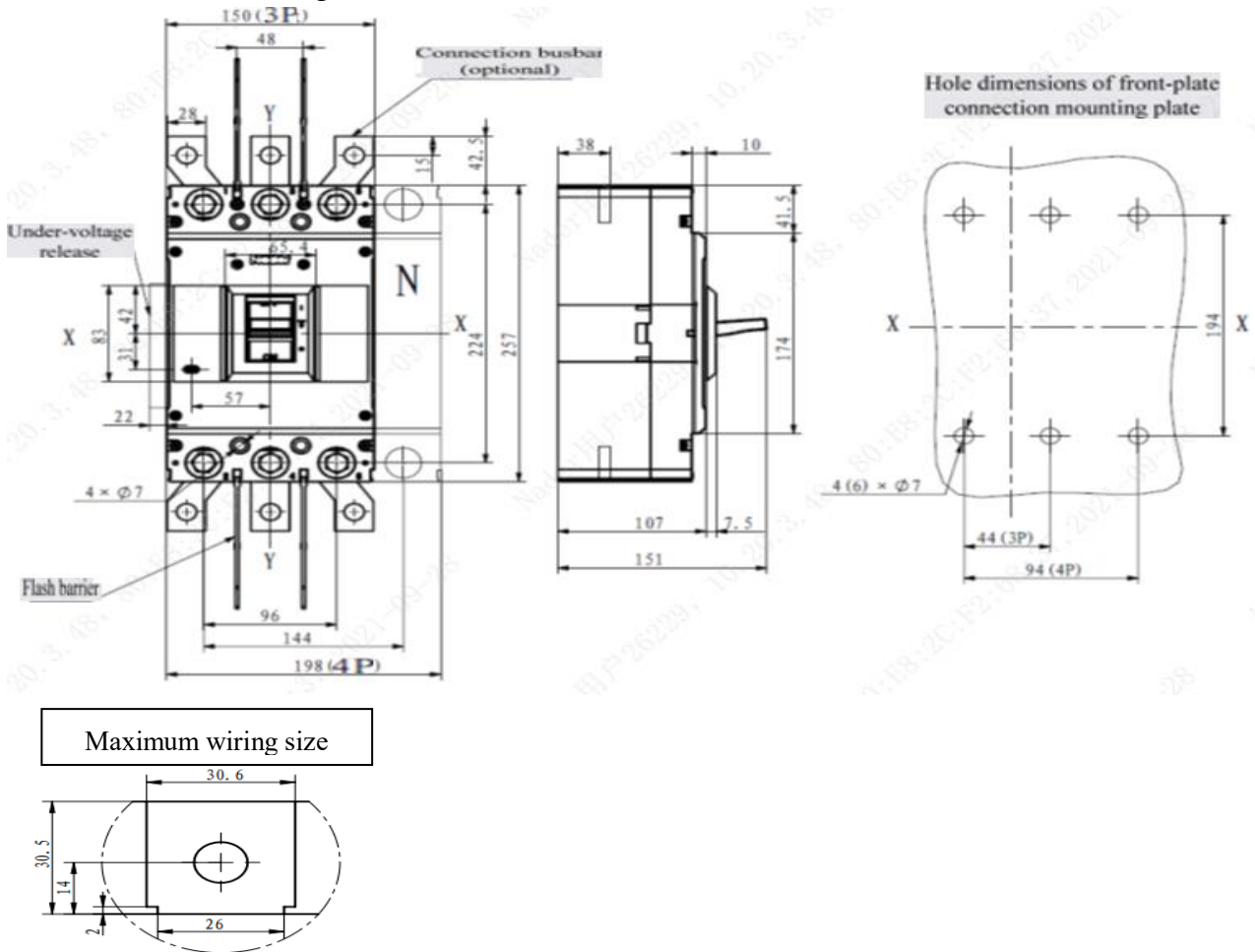
- 1) The altitude of the installation site doesn't exceed 2,500m. See the "High-altitude Derating Factor Table of Circuit Breaker" for the derating factor at the altitude;
- 2) The ambient temperature is $-35^{\circ}\text{C} \sim +70^{\circ}\text{C}$; the average within 24 h shall not be more than $+35^{\circ}\text{C}$. If the ambient temperature is higher than $+40^{\circ}\text{C}$, the user needs to reduce the capacity. See the "Derating Factor Table of Temperature Change for the Circuit Breaker" for the derating factor;
- 3) Its relative humidity at an ambient temperature of $+40^{\circ}\text{C}$ should not exceed 50%. A higher relative humidity is allowed at a lower temperature. For example, the relative humidity at 20°C can reach 90%; for frost due to temperature change, the corresponding measures should be taken;
- 4) The product can withstand the effects of wet air, salt mist, oil mist and mould;
- 5) The installation category of the circuit breaker connected to the main loop is: Category III (power distribution and control level), The installation category of the circuit breaker not connected to the main loop is: Category II (load level);
- 6) The pollution level is Level 3;
- 7) The product should be installed in places that are free from explosive media, media corrosive to metal, insulation damaging gas, and conductive dust, which should be also avoided from snow and rain;
- 8) In case of stricter user conditions than the above description, negotiate with the manufacturer.

6. Short-circuit Overload Protection Characteristic Curve of Circuit Breaker



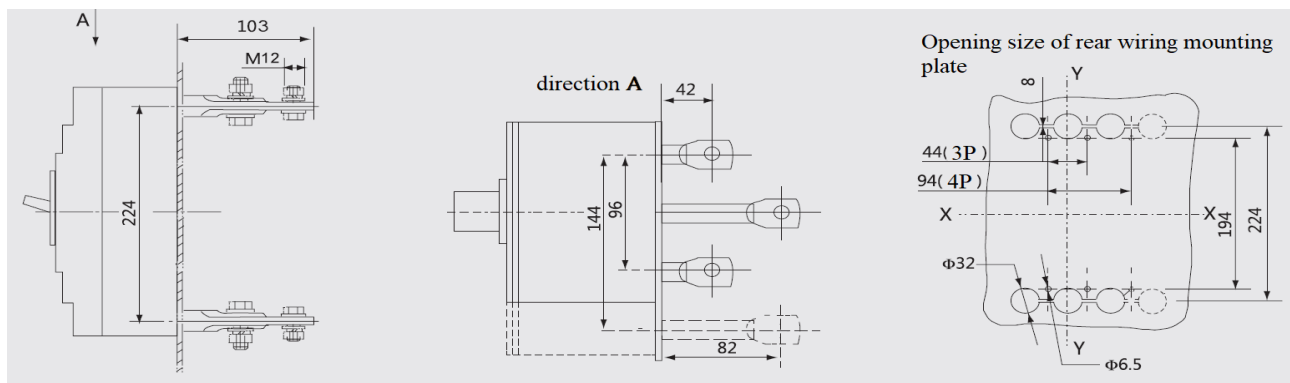
7. Outline and Mounting Hole Dimensions of Circuit Breaker

7.1 Outline and mounting hole dimensions of circuit breaker



Note: The limit deviation not indicated with the tolerance dimensions is as per GB/T 1804-c.

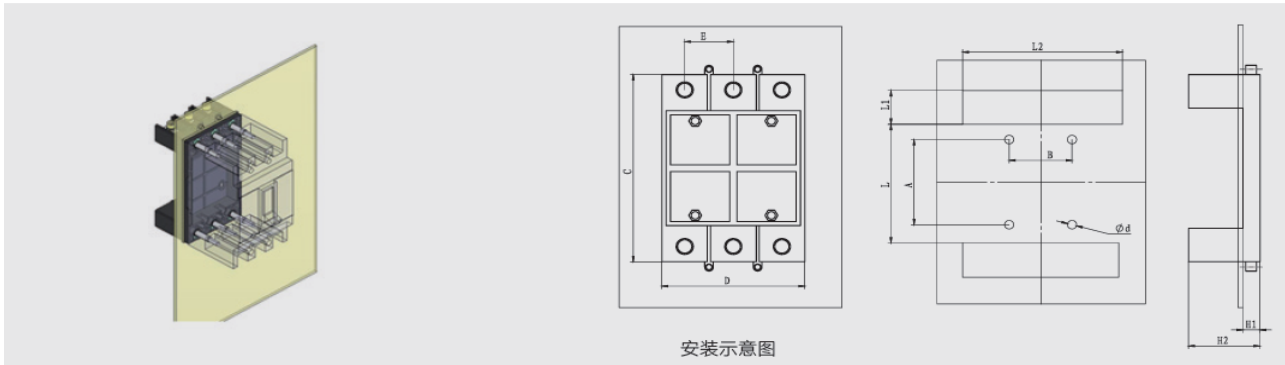
7.2 Z1: opening size of rear wiring mounting plate



Note: The limit deviation not indicated with the tolerance dimensions is as per GB/T 1804-c.

7.3 Z3H: 3P、4P Plug-in front-plate connection

7.3.1 Integrated plug-in rear-plate connection



Note: The limit deviation not indicated with the tolerance dimensions is as per GB/T 1804-c.

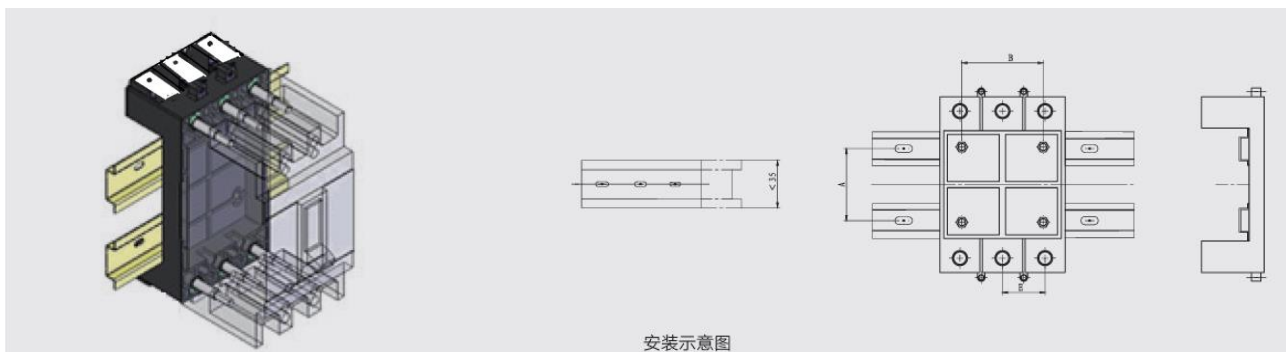
Model	A	B	L	L1	L2	d	C	D	E	H1	H2
NDM3-400	140	96	182	70	150	7	274	148	48	37	85

Note 1: When the product is 4-pole, the distance E increases for dimension D

Note 2: When the product is 4-pole, dimension B remains unchanged, Increase the distance E in the L2 direction by increasing the N phase direction;

Note3: The limit deviation not indicated with the tolerance dimensions is as per GB/T 1804-c.

7.3.2 Installation of rack type boards after installation

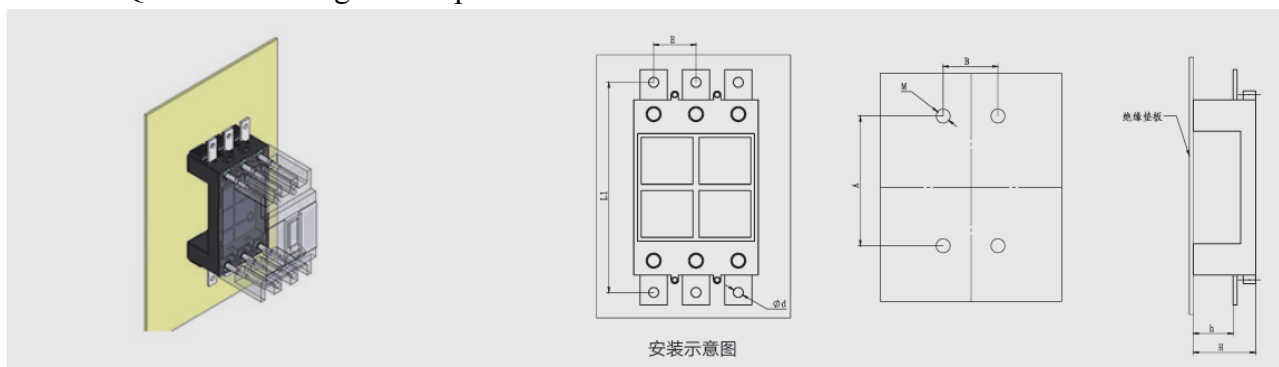


Model	A	B	E
NDM3-400	140	96	48

Note1: When the product is 4-pole, dimension B increases the distance E

Note2: The limit deviation not indicated with the tolerance dimensions is as per GB/T 1804-c.

7.4 Z3Q: 3P、4P Plug-in rear-plate connection

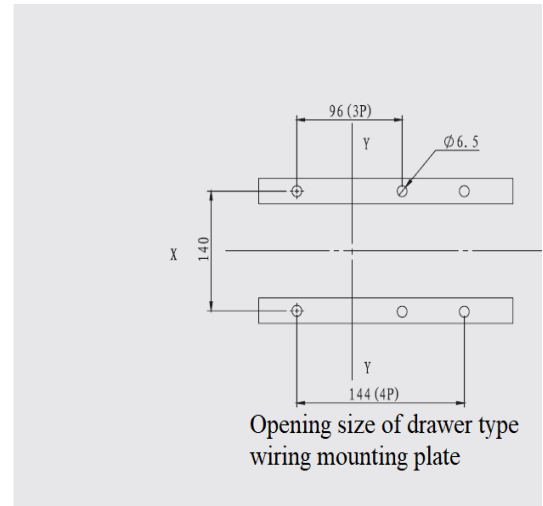
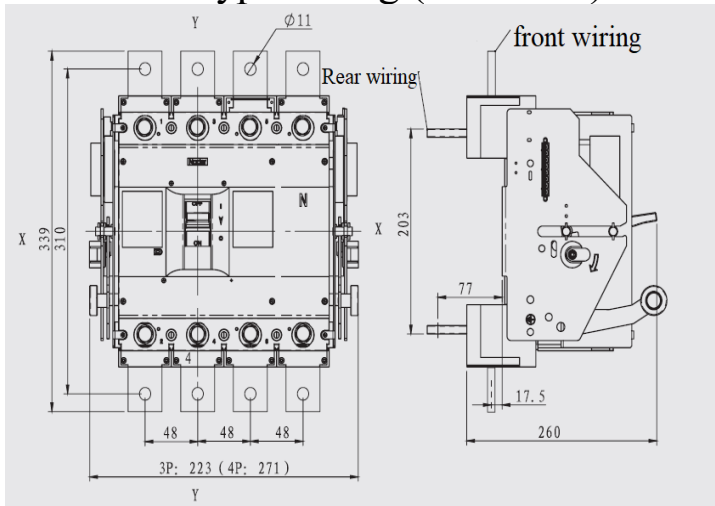


Model	A	B	L1	E	d	M	H	h
NDM3-400	244	48	326	48	10.5	M5	85	36

Warning: Insulation pads must be used for installation in front of the board;

Note: The limit deviation not indicated with the tolerance dimensions is as per GB/T 1804-c.

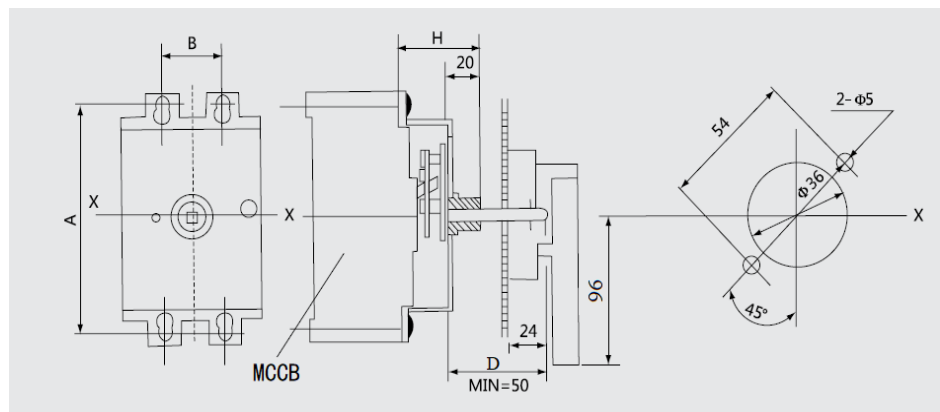
7.5 Drawer type wiring (Unit: mm)



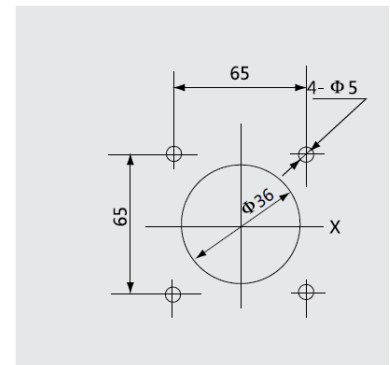
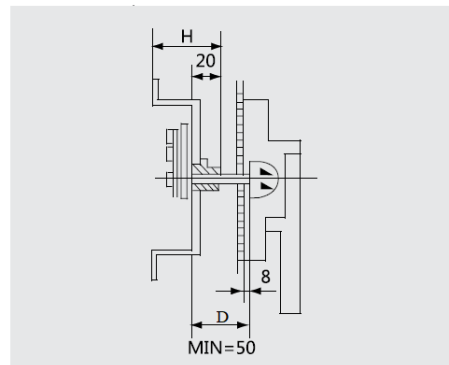
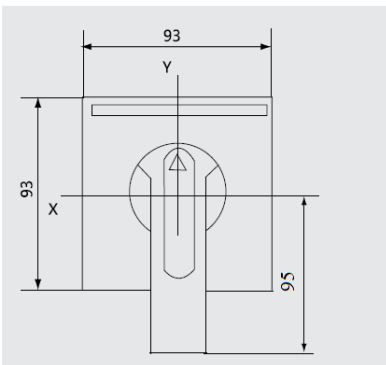
Note: The limit deviation not indicated with the tolerance dimensions is as per GB/T 1804-c.

7.6 Manual operating mechanism

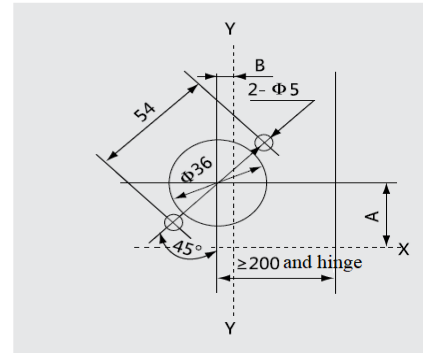
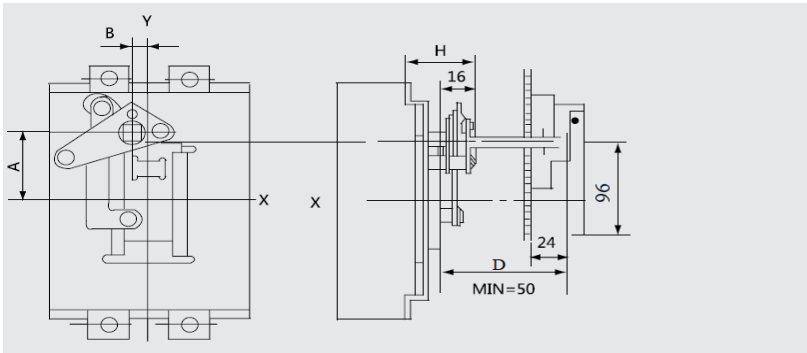
7.6.1 Electric operating mechanism and CS1-A handle



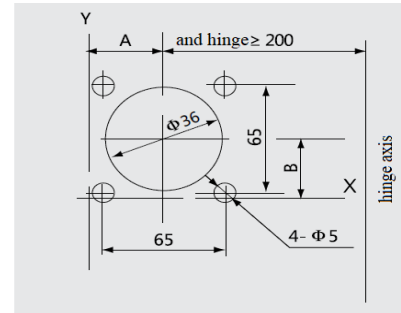
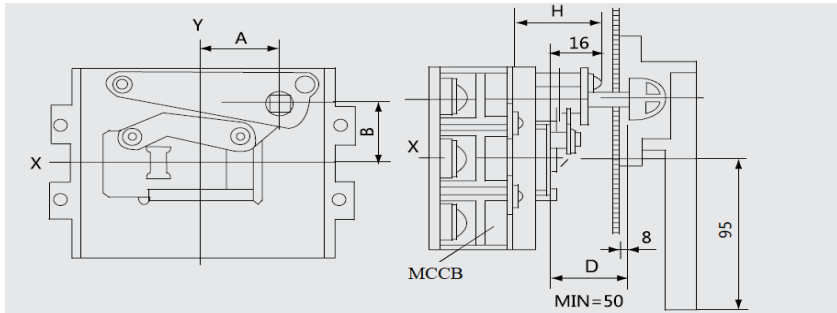
7.6.2 Electric operating mechanism and CS1-F handle



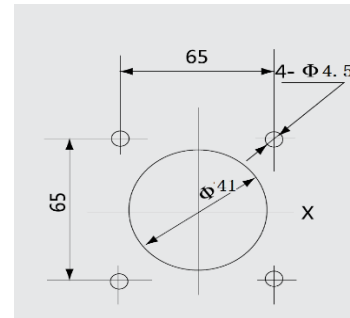
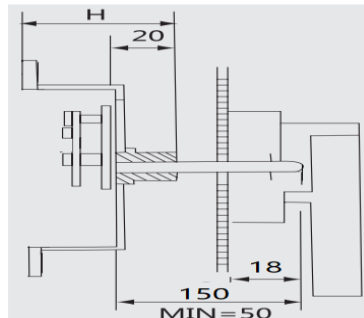
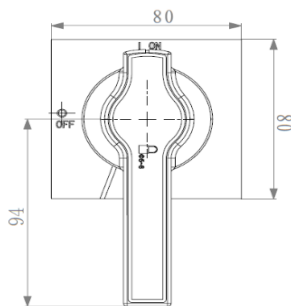
7.6.3 Electric operating mechanism and CS2-A handle



7.6.4 Electric operating mechanism and CS2-F handle



7.6.5 Electric operating mechanism and CS1-IP65 handle



7.6.6 Electric operating mechanism and CS2-IP65 handle

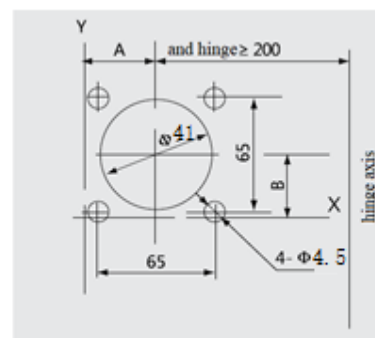
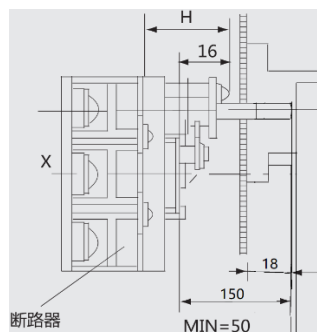
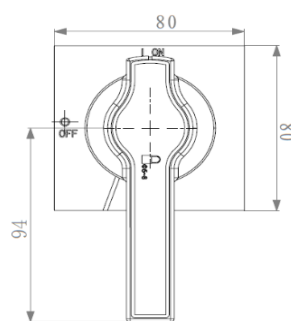
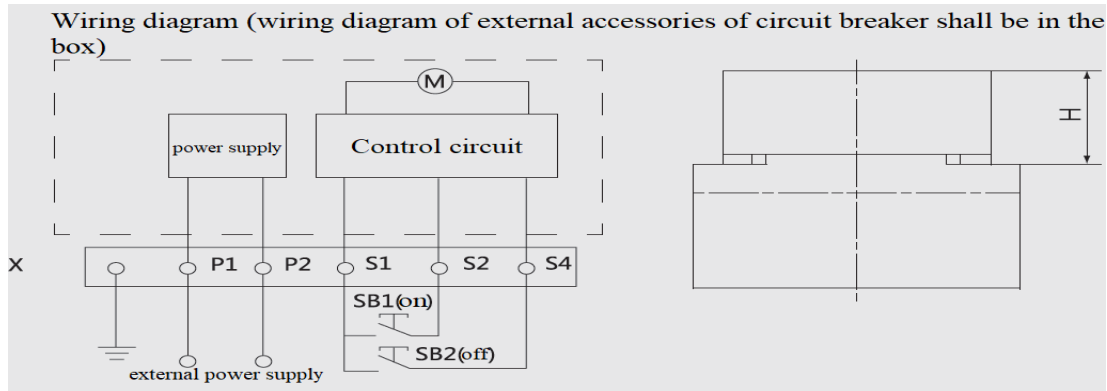


Table 8 Installation mode of electric operating mechanism

Manual operation type	Model	Installation dimension of manual operating mechanism				Installation mode
		H	A	B		
				3P	4P	
CS1	NDM3-400	85	194	137	185	Vertical installation
CS2	NDM3-400	61	68	15	15	

- Note :1)Type A is round handle, type F is square handle;
 2) The length of A-type handle is 96mm and that of F-type handle is 95mm;
 3) The D dimension in the drawing is 150mm by default, and the customizable length is 200 / 300 / 350 / 650mm;
 4) The limit deviation not indicated with the tolerance dimensions is as per GB/T 1804-c.

7.3 Electric operating mechanism



Symbol description: SB1、SB2: Operation button (provided by the customer)

X: Terminal block P1、P2: External power supply

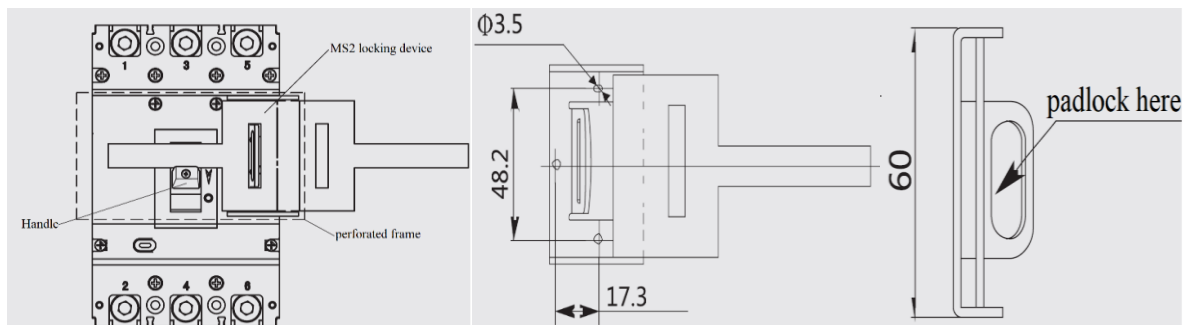
Voltage specification: AC110V、AC220V、AC400V、DC24V、DC110V、DC220V

Table 9 Main technical parameters of electric operating mechanism

Equipped with circuit breaker	Electric power (W)				Service life / time	Operating mechanism height H(mm)
	AC/DC220V	AC/DC110V	AC380V	DC24V		
NDM3-400	350	250	600	160	10000	149

7.4 MS2 locking device

MS2 is a split locking device (i.e. the device is installed on the left or right side of the Circuit breaker cover, and the default is installed on the right side if there are no special requirements). It is used for NDM3 series products to prevent manual closing and opening (the dotted line part is the Circuit breaker part).



Installation diagram of MS2 lock mechanism (Unit: mm)

Note 1:After MS2 accessories are selected, other internal and external accessories cannot be installed on the same side;

Note 2: The limit deviation not indicated with the tolerance dimensions is as per GB/T 1804-c.

7.5 Mechanical interlocking

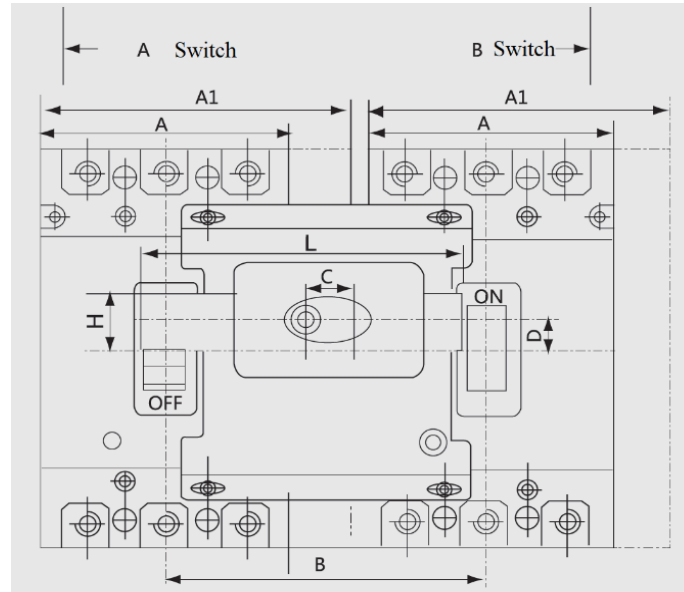


Table 10 Installation dimension of mechanical interlocking (Unit: mm)

Model	A	A1	B	C	D	L	H
NDM3-400	150	/	180	57	10	190	30
NDM3-400 (4P)	/	198	230	57	10	235	30

Note: The limit deviation not indicated with the tolerance dimensions is as per GB/T 1804-c.

7.10 Safe mounting distance of circuit breaker

Table 11 Insulation Distance Mounted in the Metal Cabinet (Unit: mm)

Mounting distance	A (inlet wire end to the cabinet face)		B (distance from side to the cabinet face)	C (outlet wire end to the cabinet face)
Model	With a terminal cover	Without a terminal cover		
NDM3-400	25	120	35	35

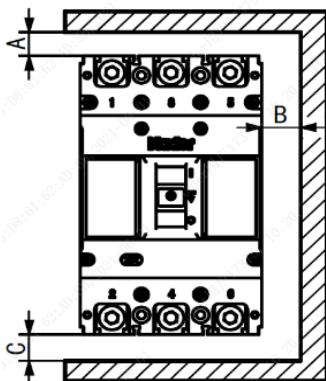


Table 12 Minimum Center Distance between Rowed Circuit Breakers (Unit: mm)

Model	Width of circuit breaker		I Center distance	
	3 poles	4 poles	3 poles	4 poles
NDM3-400	150	198	190	238

Note: Check the connected busbar or cable during rowing or stacking of the circuit breaker to ensure that the air insulation distance won't be reduced.

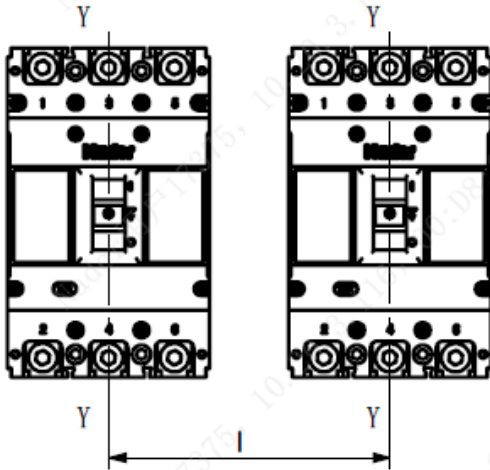


Table 13 Minimum Distance between Stacked Circuit Breakers (Unit: mm)

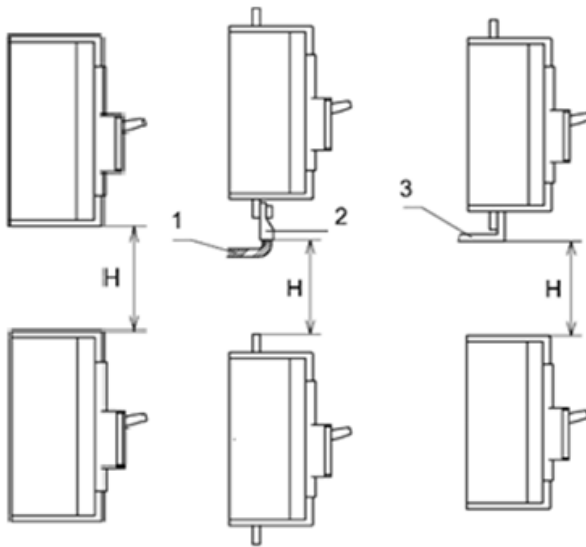
Model	H (distance of circuit breaker from bottom)	
	With a terminal cover	Without a terminal cover
NDM3-400	155	155

Note: 1) Insulated cable

2) Cable terminal

3) Connection without insulation

Requirements: Check whether the terminal cover or phase partition is assembled properly before products are energized.



8、 Attachment function description

8.1 Under-voltage release

When the power voltage drops to the range (35%~70%) of the under-voltage release, the release can break the circuit breaker reliably; when the power voltage is 35% lower than the rated working voltage of the under-voltage release, the release can prevent closing of the circuit breaker; when the power voltage is 85% higher than the rated working voltage of the under-voltage release, the release can guarantee reliable closing of the circuit breaker.

Table 14 Voltage Specifications and Power Consumption of Under-voltage Release

Model	Instantaneous current value(A)		Power waste (W)			
			Pull in power consumption		maintain power consumption	
	AC230V	AC380V	AC230V	AC380V	AC230V	AC380V
NDM3-400	0.8	0.5	190	223	0.8	0.9

Note: The under-voltage release must be energized before the circuit breaker can be switched on and closed again, otherwise the circuit breaker will be damaged.

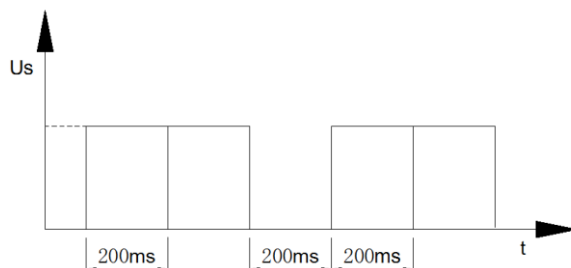
8.2 Shunt release

When impressed voltage of shunt tripper is between 70% and 110% of rated control power voltage, the breaker can be reliably broken.

Table 15 Voltage Specifications and Power Consumption of shunt release

Model	Shunt release	DC24V	AC230V	DC220V	AC380V
NDM3-400	Instantaneous current value(A)	6.8	0.76	0.48	0.28
	Power waste (W)	164.5	176.3	105	112

Note: The working principle of shunt release device: there is a coil inside the shunt release device, which can only work for a short time, and the shunt action is a single pulse action (it is recommended that the power supply time is greater than 200ms). Shunt trip power (received signal) to the product trip time is $\leq 200\text{ms}$, it is recommended to use 500ms-1s pulse power supply.



Working principle diagram of shunt trip device

8.3 Auxiliary contact

The circuit breaker is in the "open" and "free tripping" positions	Dual-auxiliary contact	F14 F12	F11	F24 F22	F21
	Single auxiliary contact	F14 F12	F11		
the circuit breaker is in the "close" position	"close" to "open"、" open " to " close "				

8.3.1 Current parameters of auxiliary contact

Table 16 Current parameters of auxiliary contact

Category	Frame current (A)	I _{th} (A) Conventional thermal current I _{th} (A)	Rated working current I _e (A)	
			AC400V(AC-15)	DC220V(DC-13)
Auxiliary contact	400	3	0.4	0.15
Note :minimum applicable load: 5V, 1mA.				

8.3.2 Electrical life of auxiliary contact

Table 17 Electrical life of auxiliary contact

U _{es} category	On			Off			Times	Frequency	Power on time
	I/I _e	U/U _e	cosφ	I/I _e	U/U _e	cosφ			
AC-15	10	1	0.3	1	1	0.3	6050	360	≥0.05s

DC-13	1	1	6Pe	1	1	6Pe			$\geq T0.95ms$
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8.3.3 Making and breaking capacity of auxiliary contact

Table 18 Making and breaking capacity of auxiliary contact

Ues category	On			Off			Times	Frequency	Power on time
	I/Ie	U/Ue	cosφ	I/Ie	U/Ue	cosφ			
AC-15	10	1.1	0.3	10	1.1	0.3	10	360	$\geq 0.05s$
DC-13	1.1	1.1	6Pe	1.1	1.1	6Pe			$\geq T0.95ms$

8.4 Alarm contact

The circuit breaker is in the position of "opening" and "closing"	
The circuit breaker is in the position of "free tripping"	

Table 19 Current parameters of alarm contact

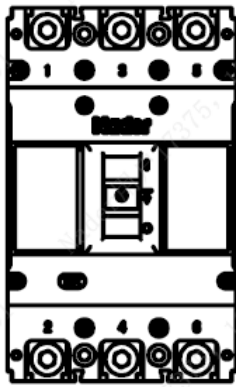
Category	Frame current (A)	Conventional thermal current Ith(A)	Rated working current Ie(A)	
			AC400V	DC220V
Alarm contact	400	3	0.4	0.15

Note: Shunt release, auxiliary contact and alarm contact wiring standard wire length is 0.7m, 1m 、 2m 、 4m can be customized according to demand.

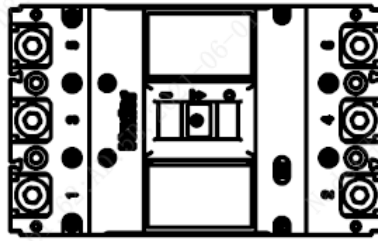
9. Installation Direction of Circuit Breaker

For vertical installation of the product, the gradient between the installation surface and the vertical plane is no more than $\pm 22.5^\circ$.

Horizontal installation of the product.



Vertical Installation



Horizontal Installation

10. Packaging and Storage of Circuit Breaker

Minimum packaging quantity: 1 piece/box. The packaged products should be stored in a warehouse with the air ventilation and the relative humidity no more than 80% when the ambient temperature is $-40^{\circ}\text{C}\sim+75^{\circ}\text{C}$. No acidic alkaline or other corrosive gas exists in the ambient air in the warehouse. Under the conditions above, the storage period shall be no more than three years since the manufacturing date.

11. Installation Direction of Circuit Breaker

SN	Name	Specification	3P Quantity/Set	4P Quantity/Set
1	Cross small pan-head screw	M6×70	4	4
2	Hexagon nut	M6	4	4
3	Plain washer	6	4	4
4	Phase partition	——	4	6
5	Hexagon head combination bolt	M10×35	6	8

12. Circuit Breaker Notes

- 1) Various characteristics and accessories of the circuit breaker are set in the factory. The circuit breaker, tripping unit or other accessories can only be adjusted, installed and maintained by the trained or qualified professionals according to the parameter requirements of the line design;
- 2) Ensure that the power supply is off before installing or removing any device;
- 3) The circuit breaker handle can be located in three positions, indicating three states: on, off

and free tripping. When the handle is in the free tripping position, pull the handle in the off direction when the circuit breaker is connected and on.