

Shanghai Liangxin Electrical Co., Ltd.

NDM3L-400 Product Specification

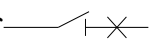
(IPD-ENG-DEV-T20 A1 2016-09-23)

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Revision History					
Version	Revision Reason/Content	Implementat ion Date	Prepared by	Reviewed by	Approv ed 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	21/12/2022	Yang rongrong	Chen Xinming	Ding Fei
3	Update the attachment package information	08/12/2023	Yang rongrong	Chen Xinming	Ding Fei
4	Increase the information about the incoming line	17/02/2025	Yang rongrong	Zhangjia n	Ding Fei

1. Applicable Scope and Purpose of Circuit Breaker

The NDM3L-400 circuit breaker with the residual current protection (hereinafter referred to as circuit breaker) applies to the AC50/60Hz, the working voltage of AC415V and the working current up to 400A for infrequent switching as well as infrequent motor starting. With the overload, short circuit and under-voltage protection functions, the circuit breaker can protect lines and power equipment from damage. Meanwhile, they can deal with the personal safety, fire hazards and other potential risks caused due to long-term ground faults that can't be detected with the overcurrent protection function.

The circuit breaker has an isolating function with the corresponding symbol of  ;

Comply with standards: IEC60947-2, GB/T 14048.2.

Products comply with CCC、CE、TUV and CB certification.

Downfeed products can only be used in downfeed scenarios; Forward feed can only be used in forward feed scenes.

2. Product Picture of Circuit Breaker (The picture is for reference only; the specific kind prevail)



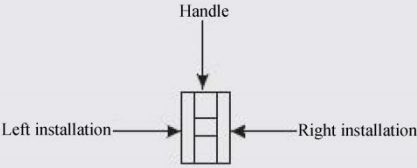
Picture of the Product

3. Specification and Model Description of Circuit Breaker

ND 1	M 2	3 3	L - 4	☐ 5	☐ 6	/ ☐ 7	☐ 8	☐ 9	/ ☐ 10	☐ 11	☐ 12	☐ 13	☐ 14	☐ 15	☐ 16	☐ 17	☐ 18
SN	SN name						NDM3L										
1	Enterprise code						ND: "Nader" low-voltage apparatus										
2	Product code						M: Molded case circuit breaker (MCCB)										
3	Design SN						3										
4	Derived code of the series						L: Residual current protection										
5	Shell frame level						400										
6	Operation mode						No code: Direct handle-operated mode										
							P: Motor-operated										
							Z: Rotary operation										
7	Derived code of the function						AC: Type AC current leakage protection type										
8	Delay type						X: Non-time delay										
							Y: Delay										
							XB: Non-time delay and alarm tripping										
							YB: Delay and alarm tripping										
							XI: Non-time delay and alarm non-tripping										
9	Type of residual current release						V: 300mA、500mA、1000mA										
10	Number of poles						3, 4										
11	Release code						0: Release (none)										
							2: Instantaneous tripper only										
							3: Complex tripper										
12	Accessory code						See Table 1										
13	Application code						No code: Power distribution type										
							2: Motor protection type										
14	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										
15	Rated current						See Table 2										
16	Cabling type						No code: Normal product										
							P: Connection busbar										
17	Other type						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
		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 AC380V/AC400V/AC415V
		DC24V: Shunt release operation voltage DC24V
		DC220V: Shunt release operation voltage DC220V
		MS2: MS2 lock
		J: Mechanical interlocking
		Z: Terminal housing
		S: Heating handle
18	Product wiring method	X: lower input (customized special item number is required)
		upper input (default description does not reflect)
Note1: When the operation mode is electric operation or manual operation, the residual action current gear, residual current action time gear, and leakage indication button can't be adjusted. 2:By default, leakage products can only be used with the incoming line. If you need the incoming line, you need to customize the special product number, and the N pole of the 4-pole product is an A-type product. Any operating condition is not allowed to use the incoming line.		

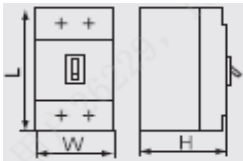
Table 1: Comparison Table of Accessory Code:

				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	Installation Position	Model	NDM3L-400	
				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				
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				
28	Dual-auxiliary contact, alarm contact				
58	Auxiliary alarm contact				
68	Dual-auxiliary contact, auxiliary alarm contact				

Note: The 3P product can only be available with the left-installed single accessory with the accessory code as 10, 20, 21, 30, 08, 58.

4. Main Technical Parameters of Circuit Breaker

Table 2 Main Technical Parameters of Circuit Breaker

Model			NDM3L-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			
Utilization category			A			
Number of poles			3	4		
Rated limit short-circuit breaking capacity Icu (kA)			70	70		
Rated operating short-circuit breaking capacity Ics (kA)			70	70		
Rated residual short-circuit making and breaking capacity IΔm(kA)			0.25Icu			
Rated residual action current IΔn(mA)	Non-time delay	Type AC	30/100/300/500/1000	30/100/300/500/1000		
	delay	Type AC	100/300/500/1000	100/300/500/1000		
Rated residual non-action current IΔno(mA)			0.5IΔn			
Residual current action time	Residual current		IΔn	2IΔn	5IΔn	10IΔn
	Non-time delay	Maximum breaking time (s)	0.2	0.1	0.04	0.04
	delay	Maximum breaking time (s)	0.5, 1.15 2.15	0.35, 1 2	0.25, 0.9 1.9	0.25, 0.9 1.9
		Limit non-driving time (s)	/	0.1, 0.5 1	/	/
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	
			H(mm)	107	107	
Flashover distance(mm)			100			

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

According to the standard, the maximum rated working voltage is $AC415V * 1.05 * 1.05 = 457.5V$.

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

Table 3 Selection of the NDM3L-400 Circuit Breaker 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)
NDM3L-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 Table of Product Temperature							
NDM3L-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	Power frequency withstand voltage correction coefficient(V)	Isolation voltage correction coefficient (V)
2000	1	3500	1000
2500	1	3500	1000
3000	0.98	3150	900
3500	0.97	3000	850
4000	0.95	2800	810
4500	0.94	2650	770
5000	0.93	2500	730

4.5 Power loss coefficient of circuit breaker

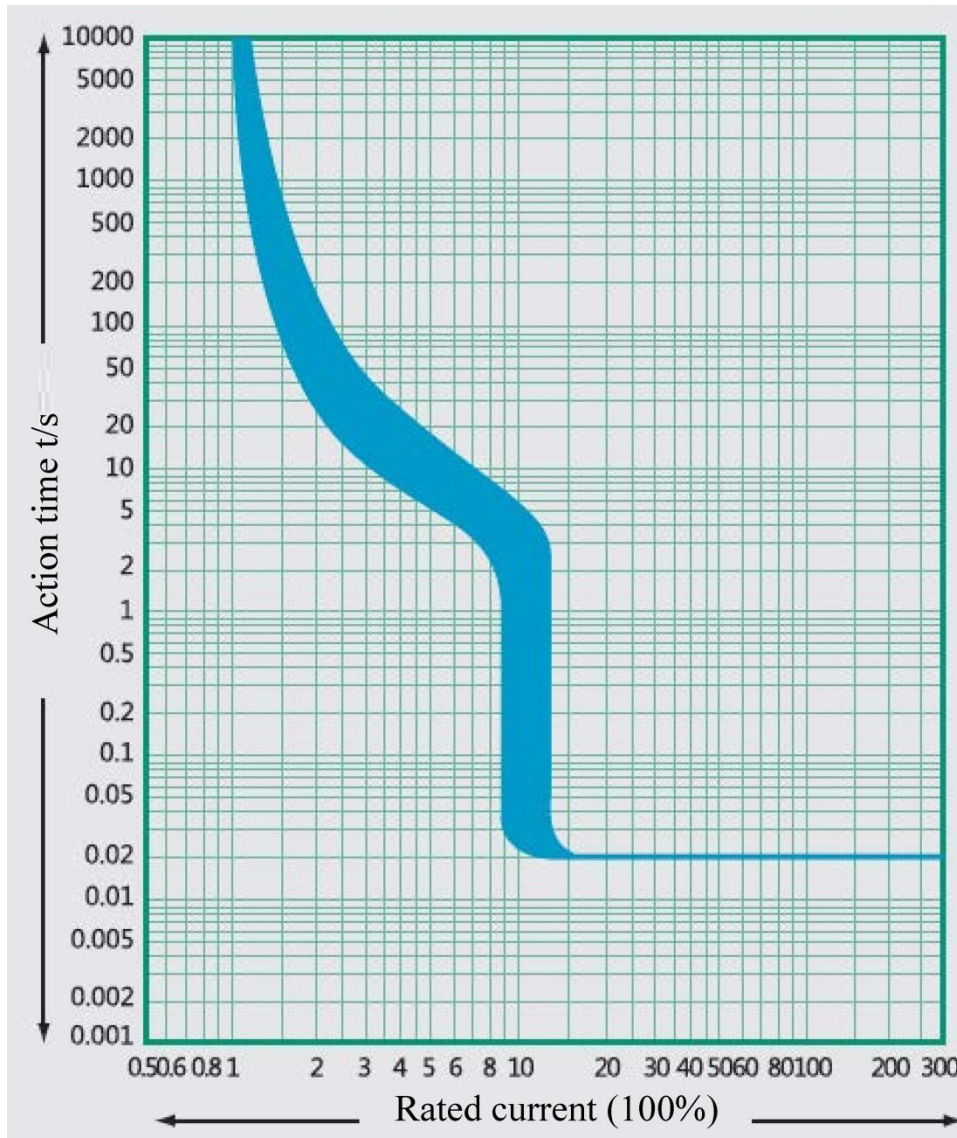
Table 7 Power loss coefficient table of circuit breaker

Model	Energizing current(A)	Total power loss(W)
		Wiring before and after board
NDM3L-400	400	115

5. Normal Working Environment of Circuit Breaker

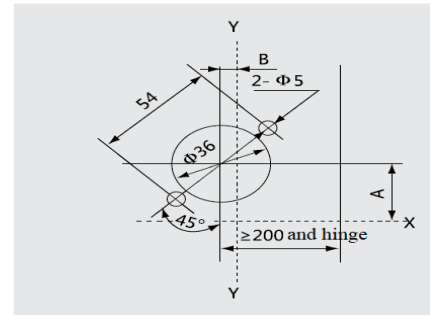
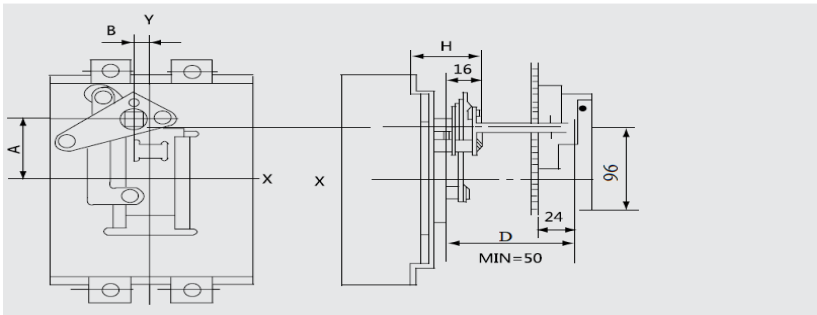
- 1) The altitude of the installation site doesn't exceed 2,500m. See the "High-altitude Derating Factor Table of Circuit Breaker" for the derating factor at the altitude;
- 2) The ambient temperature is $-35^{\circ}\text{C} \sim +70^{\circ}\text{C}$; the average within 24 h shall not be more than $+35^{\circ}\text{C}$. 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

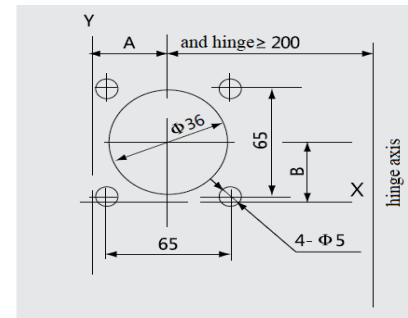
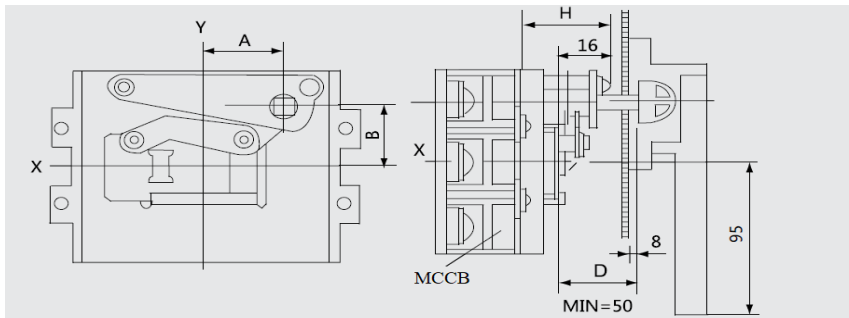


Time/Current Characteristic Curve

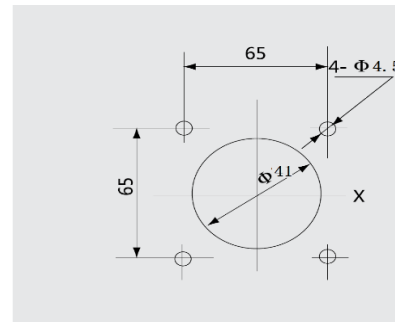
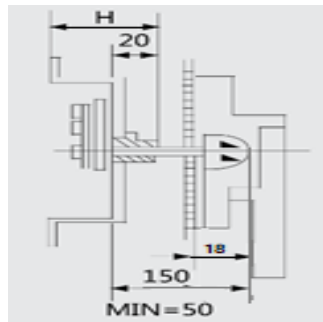
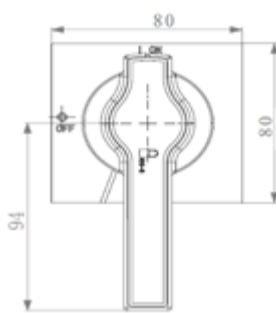
7.2.3 Manual operating mechanism and CS2-A handle



7.2.4 Manual operating mechanism and CS2-F handle



7.2.5 Manual operating mechanism and CS1-IP65 handle



7.2.6 Manual operating mechanism and CS2-IP65 handle

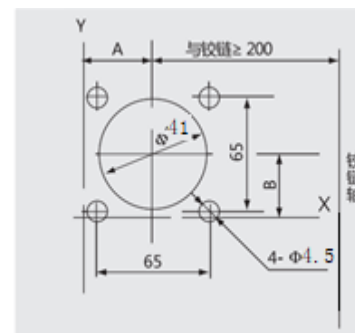
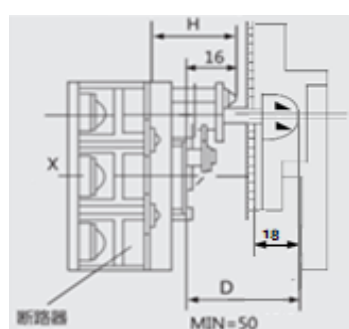
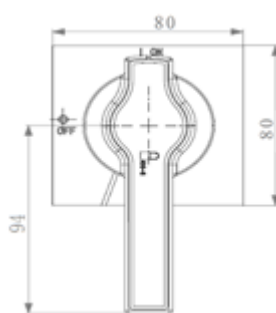


Table 8 Installation mode of electric operating mechanism

Manual operation type	Model	Installation dimension of manual operating mechanism				Installation mode
		H	A	B		
				3P	4P	
CS1	NDM3L-400	82	194	137	185	Vertical installation
CS2	NDM3L-400	61	68	15	15	

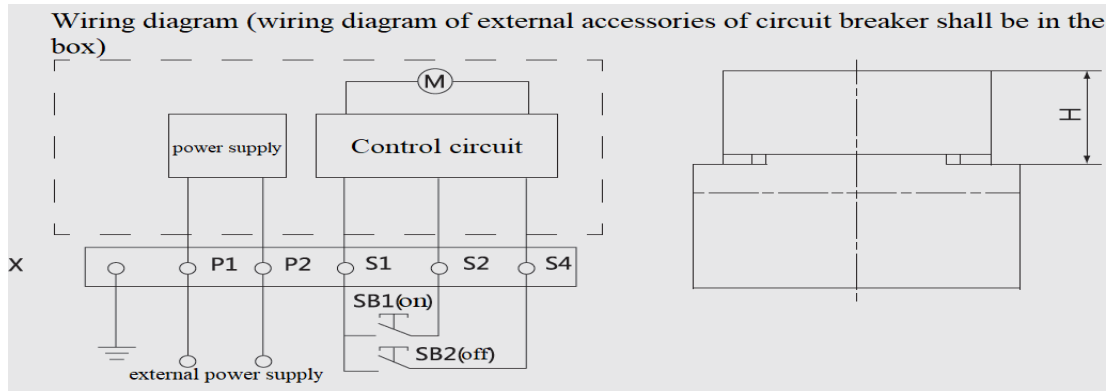
Note :1)Type A is round handle, type F is square handle;

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

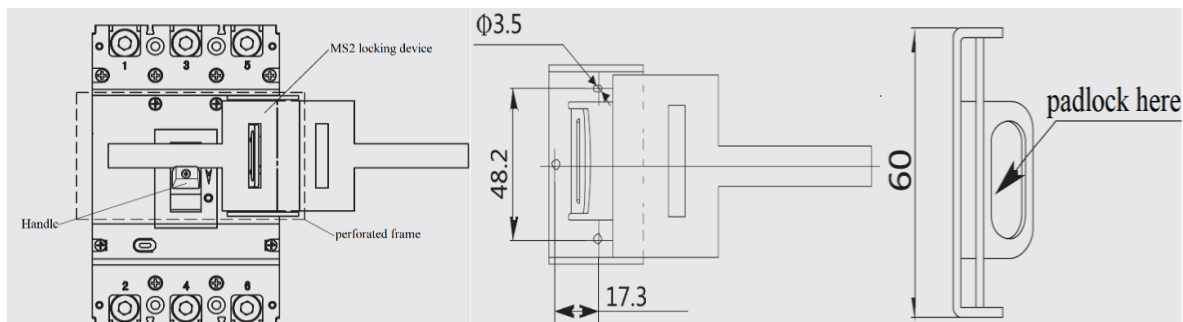
Voltage specification: AC110V、AC220V、AC400V、DC24V、DC110V、DC220V

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		
NDM3L-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 NDM3L 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

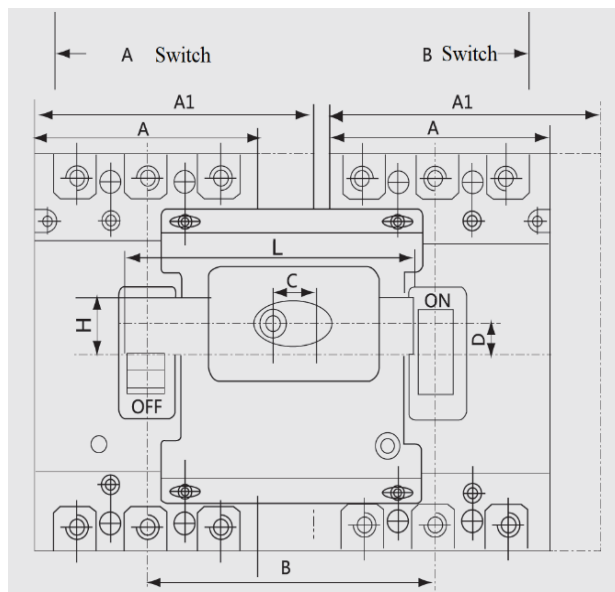


Table 10 Installation dimension of mechanical interlocking (Unit: mm)

Model	A	A1	B	C	D	L	H
NDM3L-400	150	/	180	57	10	190	30
NDM3L-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.

7.6 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		
NDM3L-400	25	120	35	35

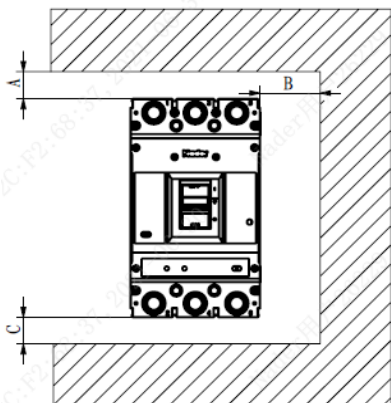


Table 12 Minimum Center Distance between Rowed Circuit Breakers (Unit: mm)

Model	Width of circuit breaker		I Center distance	
	3 poles	4 poles	3 poles	4 poles
NDM3L-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.

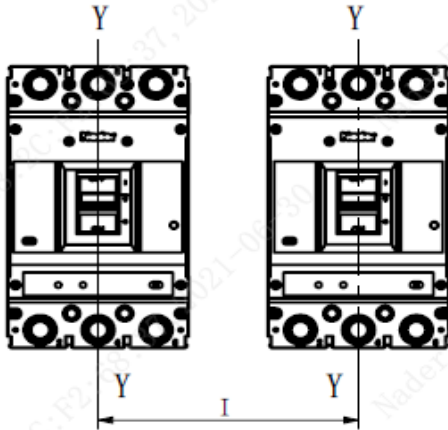


Table 13 Minimum Distance between Stacked Circuit Breakers (Unit: mm)

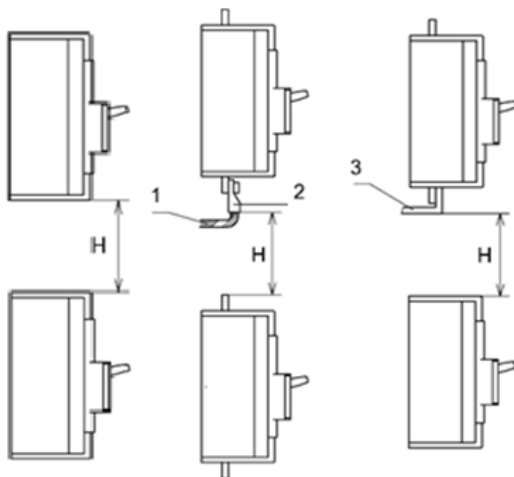
Model	H (distance of circuit breaker from bottom)	
	With a terminal cover	Without a terminal cover
NDM3L-400	155	155

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
NDM3L-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.

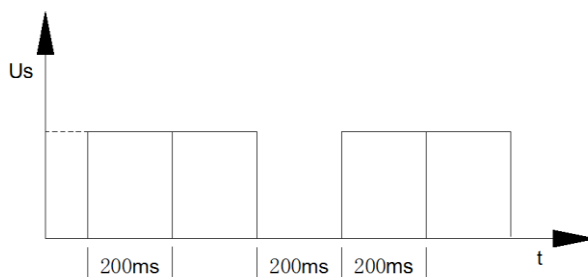
8.2 Shunt release

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
NDM3L-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		
	Single auxiliary contact		
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)	Ith(A) Conventional thermal current Ith (A)	Rated working current Ie(A)	
			AC400V(AC-15)	DC220V(DC-13)
Auxiliary contact	400	3	1.5	0.15
Minimum load: 5V/1mA				

8.3.2 Electrical life of auxiliary contact

Table 17 Electrical life 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	0.3	1	1	0.3	6050	360	≥0.05s
DC-13	1	1	6Pe	1	1	6Pe			≥T0.95ms

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	≥0.05s
DC-13	1.1	1.1	6Pe	1.1	1.1	6Pe			≥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

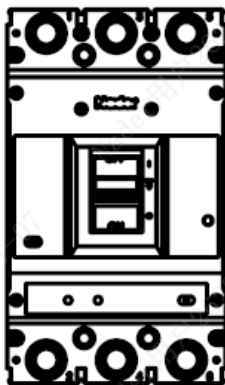
Category	Frame current (A)	Conventional thermal current Ith(A)	Rated working current Ie(A)	
			AC400V	DC220V
Alarm contact	400	3	0.4	0.15

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

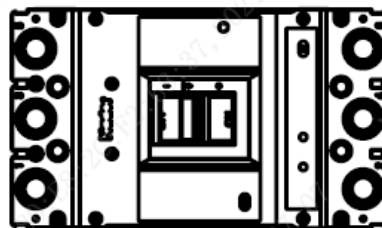
9. Installation Direction of Circuit Breaker

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. Circuit breaker factory accessories list

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.