

Shanghai Liangxin Electrical Co., Ltd.

NDM3-1600 Product Specification

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

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1. Applicable Scope and Purpose of Circuit Breaker

The NDM3-1600 molded case circuit breaker (hereinafter referred to as circuit breaker) applies to infrequent switching of circuits with the AC 50/60Hz, the working voltage of AC690V and working current of 1250A as well as infrequent motor starting. With the overload, short circuit and undervoltage protection functions, the circuit breaker can protect lines and power equipment from damage.

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	M	3	-	1600	□	□ / □	□	□	□	□	□	□	□
1	2	3	4	5	6	7	8	9	10	11	12	13	14
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		1600										
5	Breaking capacity level		M: Relatively 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	Rated current		See Table 2										
13	Cabling type		No code: Normal product										
			P: Connection busbar										
			HZ1: Rear-plate horizontal connection										
			CZ1: Rear-plate vertical connection										
14	Other codes		Codes of internal and external accessories: Such as manual operation: CS2-A, electric operation: DC1 220V, shunt: 230V, undervoltage: 230V										



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
NDM3-1600			
00	None	—	
08	One set of alarm contacts		
98	Two sets of alarm contacts		
10	Shunt release		
K01	Two sets of shunt releases		
30	Under-voltage release		
A01	Two sets of under-voltage releases		
21	Single auxiliary contact		
61	Two sets of single auxiliary contacts		
23	Three sets of single auxiliary contacts		
24	Four sets of single auxiliary contacts		
18	Shunt release, alarm contact		
38	Under-voltage release, alarm contact		
22	Single auxiliary contact, alarm contact		
88	Two sets of single auxiliary contacts, alarm contact		
26	Three sets of single auxiliary contacts, alarm contact		
25	Four sets of single auxiliary contacts, alarm contact		
42	Shunt release, single auxiliary contact, alarm contact		
44	Shunt release, two sets of single auxiliary contacts, alarm contact		
46	Shunt release, three sets of single auxiliary contacts, alarm contact		
14	Shunt release, four sets of single auxiliary contacts, alarm contact		
75	Under-voltage release, single auxiliary contact, alarm contact		
77	Under-voltage release, two sets of single auxiliary contacts, alarm contact		
45	Shunt release, two sets of single auxiliary contacts, two sets of single alarm contacts		
47	Shunt release, three sets of single auxiliary contacts, two sets of single alarm contacts		
15	Shunt release, four sets of single auxiliary contacts, two sets of single alarm contacts		
75	Under-voltage release, single auxiliary contact, two sets of single alarm contacts		
77	Under-voltage release, two sets of single auxiliary contacts, two sets of single alarm contacts		
81	Under-voltage release, three sets of single auxiliary contacts, two sets of single alarm contacts		
82	Under-voltage release, four sets of single auxiliary contacts, two sets of single alarm contacts		
32	Under-voltage release, shunt release, single auxiliary contact, alarm contact		
33	Under-voltage release, shunt release, two sets of single auxiliary contacts, alarm contact		
34	Under-voltage release, shunt release, three sets of single auxiliary contacts, alarm contact		
35	Under-voltage release, shunt release, four sets of single auxiliary contacts, alarm contact		
39	Under-voltage release, shunt release, single auxiliary contact, two sets of single alarm contacts		
55	Under-voltage release, shunt release, two sets of single auxiliary contacts, two sets of single alarm contacts		
56	Under-voltage release, shunt release, three sets of single auxiliary contacts, two sets of single alarm contacts		
36	Under-voltage release, shunt release, four sets of single auxiliary contacts, two sets of single alarm contacts		
A02	Two sets of undervoltage releases, single auxiliary contact		
A07	Two sets of undervoltage releases, two sets of single auxiliary contacts		
A08	Two sets of undervoltage releases, three sets of single auxiliary contacts		
A09	Two sets of undervoltage releases, four sets of single auxiliary contacts		
A10	Two sets of undervoltage releases, single auxiliary contact, alarm contact		
A12	Two sets of undervoltage releases, two sets of single auxiliary contacts, alarm contact		
A14	Undervoltage release		
A16	Undervoltage release		
NDM3-1600			
B1	Under-voltage release, three sets of single auxiliary contacts, alarm contact		
B2	Under-voltage release, four sets of single auxiliary contacts, alarm contact		
41	Shunt release, single auxiliary contact		
11	Shunt release, two sets of single auxiliary contacts		
12	Shunt release, three sets of single auxiliary contacts		
13	Shunt release, four sets of single auxiliary contacts		
71	Under-voltage release, single auxiliary contact		
72	Under-voltage release, two sets of single auxiliary contacts		
73	Under-voltage release, three sets of single auxiliary contacts		
74	Under-voltage release, four sets of single auxiliary contacts		
31	Under-voltage release, shunt release, alarm contact		
37	Under-voltage release, shunt release, two sets of single alarm contacts		
51	Under-voltage release, shunt release, single auxiliary contact		
52	Under-voltage release, shunt release, two sets of single auxiliary contacts		
53	Under-voltage release, shunt release, three sets of single auxiliary contacts		
54	Under-voltage release, shunt release, four sets of single auxiliary contacts		
19	Shunt release, two sets of single alarm contacts		
70	Under-voltage release, two sets of single alarm contacts		
63	Single auxiliary contact, two sets of single alarm contacts		
64	Two sets of single auxiliary contacts, two sets of single alarm contacts		
65	Three sets of single auxiliary contacts, two sets of single alarm contacts		
66	Four sets of single auxiliary contacts, two sets of single alarm contacts		
43	Shunt release, single auxiliary contact, two sets of single alarm contacts		
A11	Two sets of undervoltage releases, single auxiliary contact, two sets of single alarm contacts		
A13	Two sets of undervoltage releases, two sets of single auxiliary contacts, two sets of single alarm contacts		
A15	Two sets of undervoltage releases, three sets of single auxiliary contacts, two sets of single alarm contacts		
A17	Two sets of undervoltage releases, four sets of single auxiliary contacts, two sets of single alarm contacts		
A05	Two sets of undervoltage releases, alarm contact		
A06	Two sets of undervoltage releases, two sets of single alarm contacts		
K04	Two sets of shunt releases, single auxiliary contact		
K06	Two sets of shunt releases, two sets of single auxiliary contacts		
K07	Two sets of shunt releases, three sets of single auxiliary contacts		
K08	Two sets of shunt releases, four sets of single auxiliary contacts		
K12	Two sets of shunt releases, single auxiliary contact, alarm contact		
K09	Two sets of shunt releases, two sets of single auxiliary contacts, alarm contact		
K10	Two sets of shunt releases, three sets of single auxiliary contacts, alarm contact		
K11	Two sets of shunt releases, four sets of single auxiliary contacts, alarm contact		
K13	Two sets of shunt releases, single auxiliary contact, two sets of single alarm contacts		
K14	Two sets of shunt releases, two sets of single auxiliary contacts, two sets of single alarm contacts		
K15	Two sets of shunt releases, three sets of single auxiliary contacts, two sets of single alarm contacts		
K16	Two sets of shunt releases, four sets of single auxiliary contacts, two sets of single alarm contacts		
K02	Two sets of shunt releases, alarm contact		
K05	Two sets of shunt releases, two sets of single alarm contacts		

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4. Main Technical Parameters of Circuit Breaker

Table 2 Main Technical Parameters of Circuit Breaker

Model	NDM3-1600		
Rated current of frame Inm (A)	1600		
Rated current In (A)	800, 1000, 1250		
Rated insulation voltage Ui (AC V)	1000		
Rated impulse withstand voltage Uimp (V)	12000		
Rated working voltage Ue (AC V)	400/415, 500, 660/690		
Power frequency withstand voltage U (1min) (V)	3500		
Utilization category	A		
Number of poles	3, 4		
Breaking capacity level	M		
Rated limit short-circuit breaking capacity Icu (kA)	AC400/415V	70	
	AC500V	50	
	AC660/690V	20	
Rated operating short-circuit breaking capacity Ics (kA)	AC400/415V	50	
	AC500V	50	
	AC660/690V	20	
Operating performance (times)	Electrical life	AC400/415V	1000
		AC500V	800
		AC690V	500
	Mechanical life		10000

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

Table 3 Selection of the Connecting Copper Bar or Cable Cross-section Area

Rated current (A)	800	1000	1250
Copper bar size (mm ²)	50×5	50×6	50×8
Quantity	2	2	2

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 diameter (mm)	Torque (N m)
NDM3-1600	M10	20
	M5	4

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							
	Temperature (°C)	40	45	50	55	60	65	70
NDM3-1600	Derating factor	1	0.96	0.92	0.87	0.82	0.76	0.70

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

Altitude (km)	Correction factor of the working current	Correction factor of the working voltage	Correction factor of the power frequency withstand voltage
2	I_n	U_e	U
3	$0.94I_n$	$0.87U_e$	$0.90U$
4	$0.88I_n$	$0.73U_e$	$0.77U$
5	$0.81I_n$	$0.64U_e$	$0.63U$

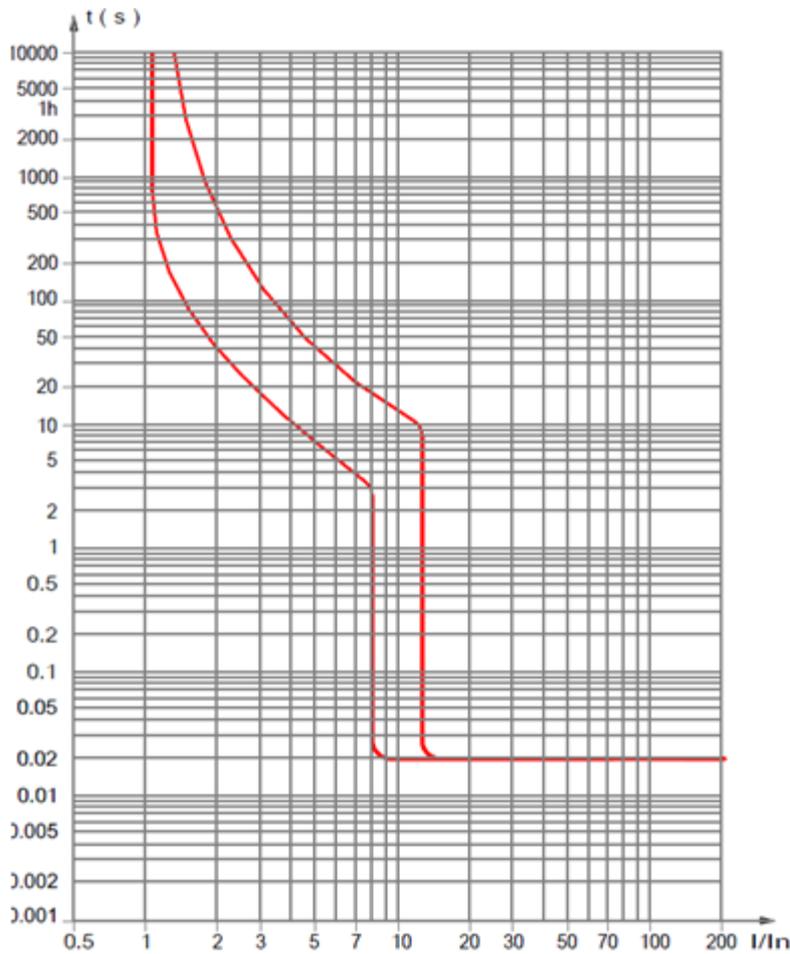


5. Normal Working Environment of Circuit Breaker

- 1) The altitude of the installation site doesn't exceed 2,000m. 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) Wet heat resistance: Meets the standard IEC60086-2-30 wet heat (95% relative humidity at 40°C);
- 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.

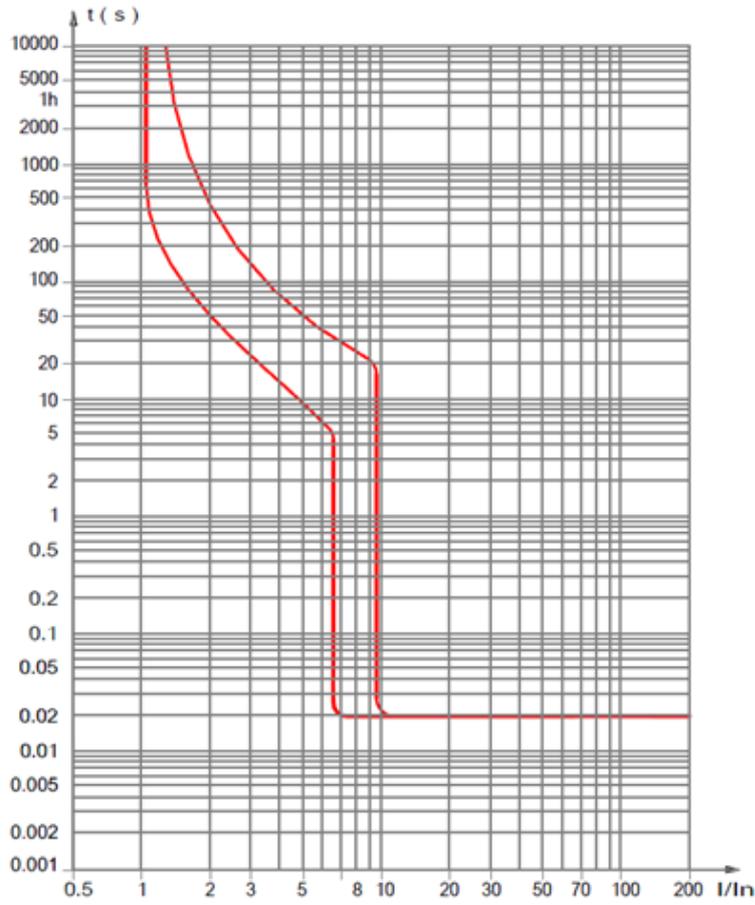


6. Short-circuit Overload Protection Characteristic Curve of Circuit Breaker

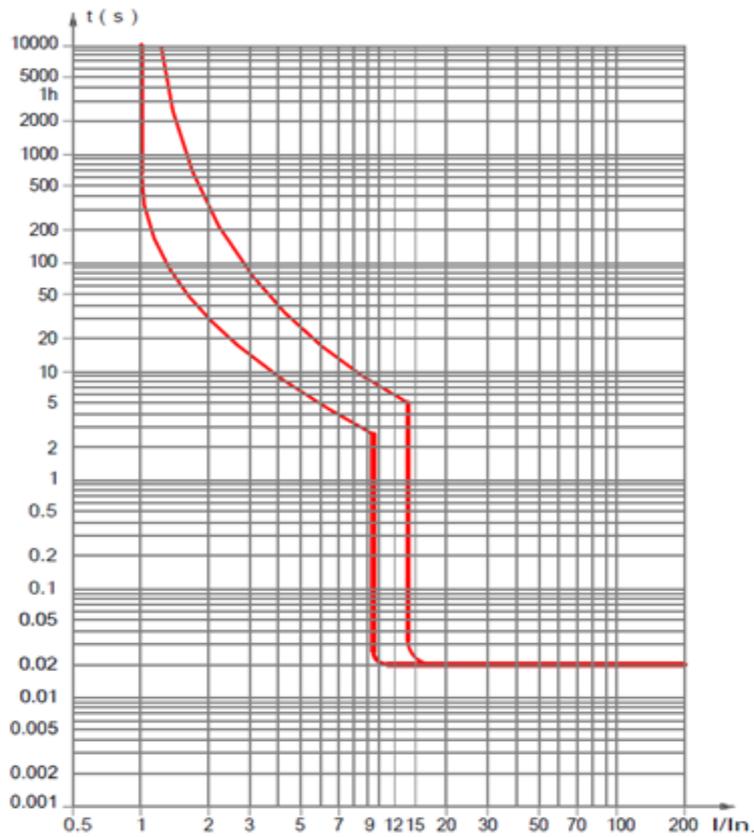


Power distribution type time/current characteristic curve (800A, 1000A)





Power distribution type time/current characteristic curve (1250A)

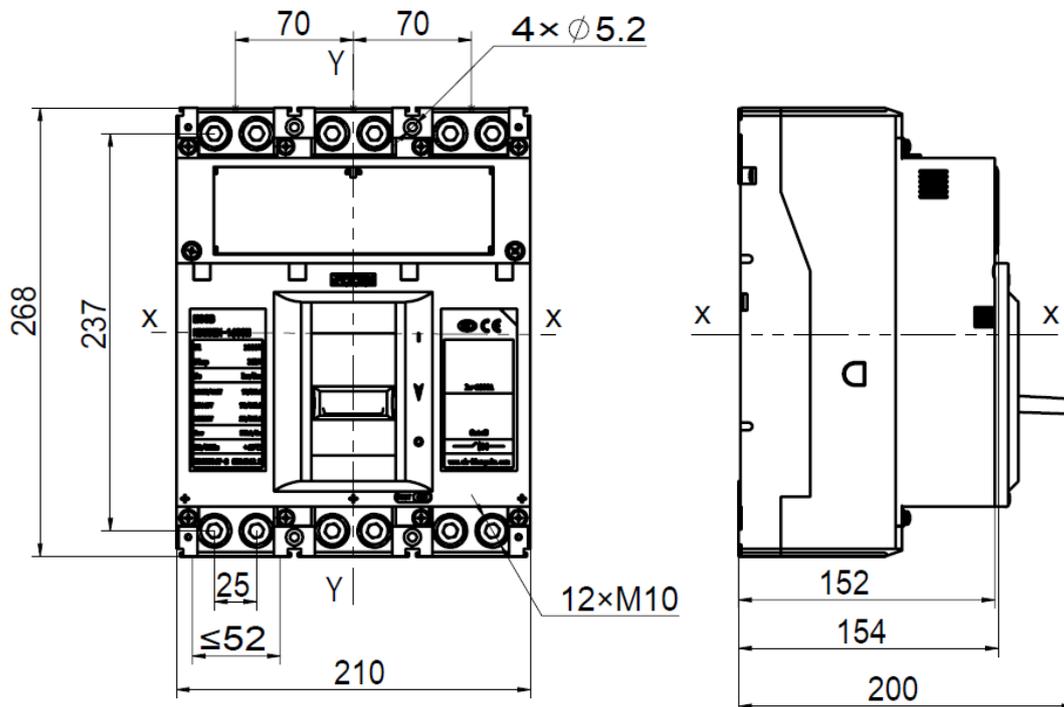


Motor type time/current characteristic curve (800A, 1000A)

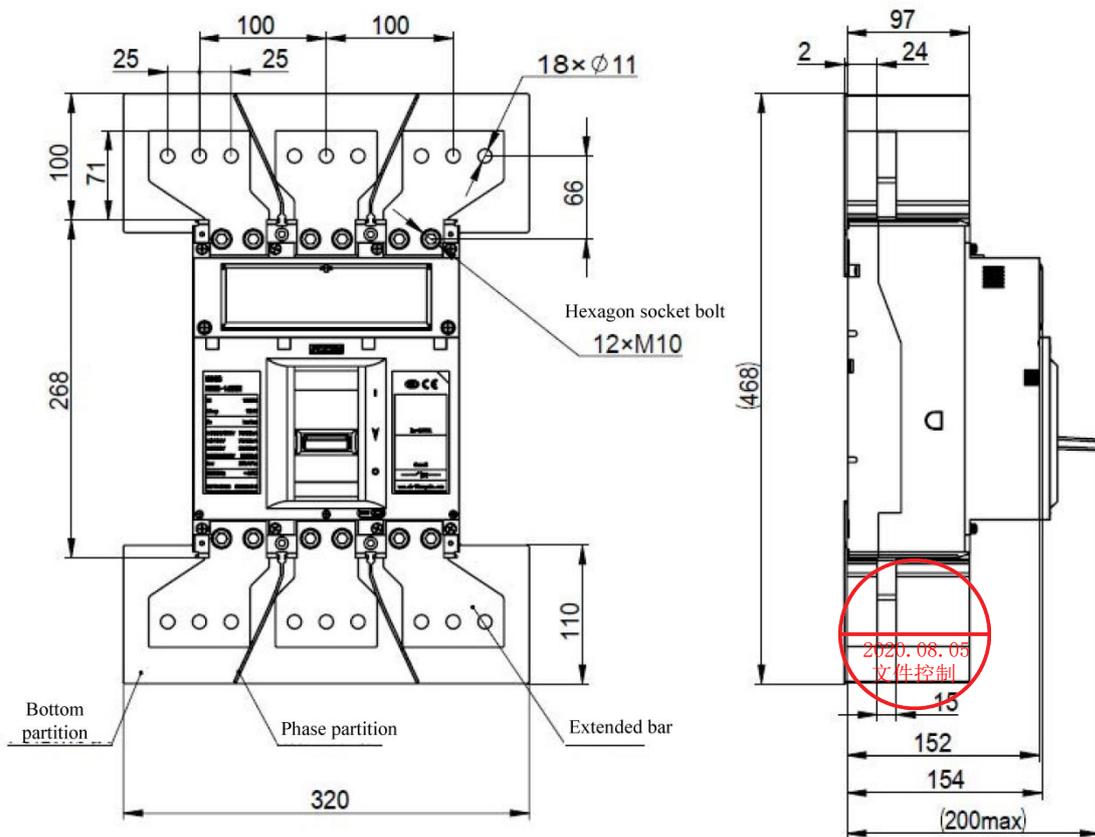
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7. Outline and Mounting Hole Dimensions of Circuit Breaker

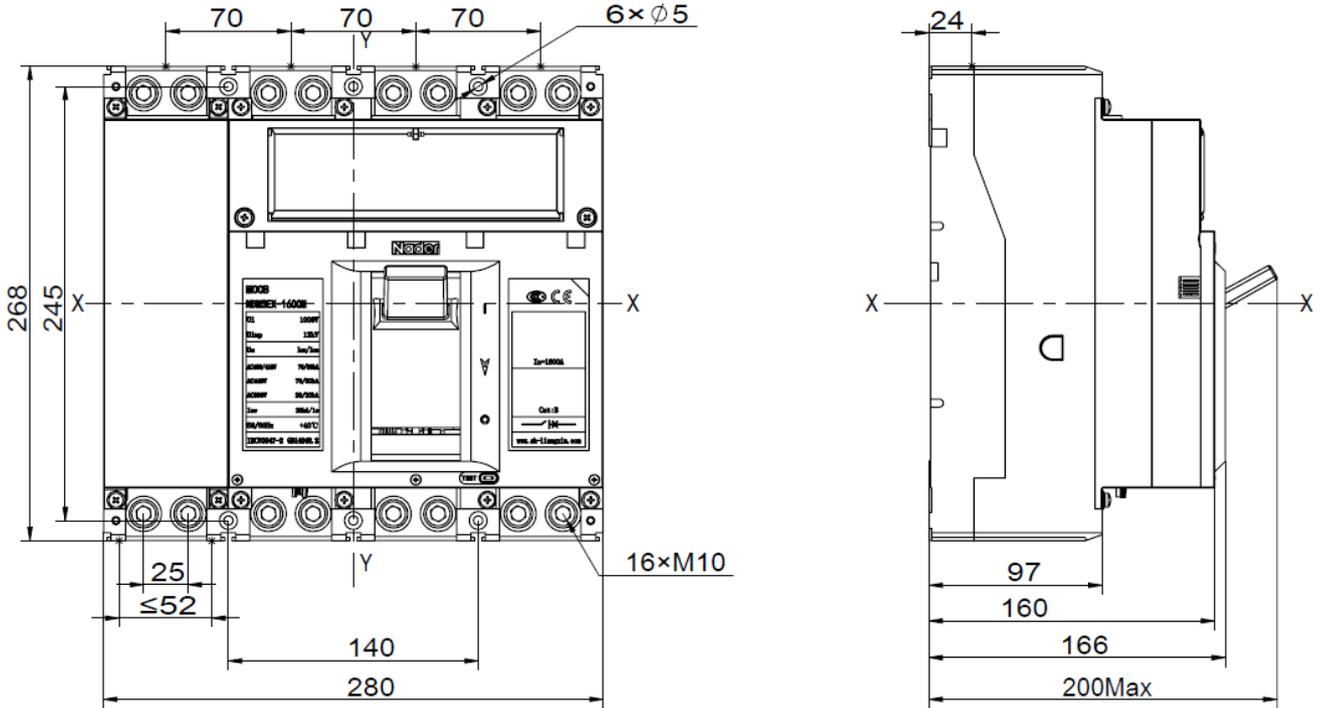
7.1 External dimensions of 3P front-plate connection products



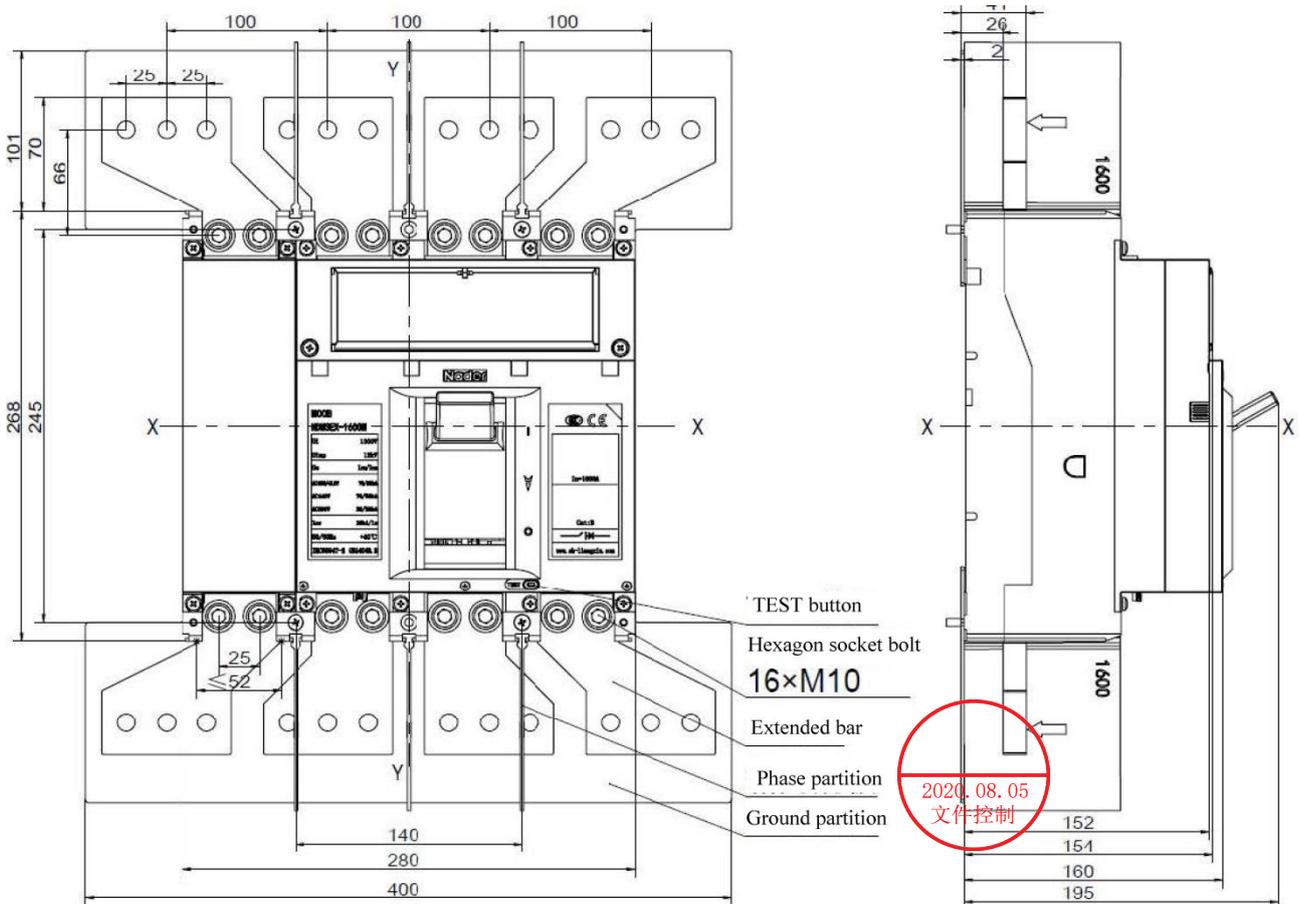
7.2 External dimensions of 3P extended front-plate connection products



7.3 External dimensions of 4P front-plate connection products



7.4 External dimensions of 4P extended front-plate connection products



7.5 Mounting hole dimensions

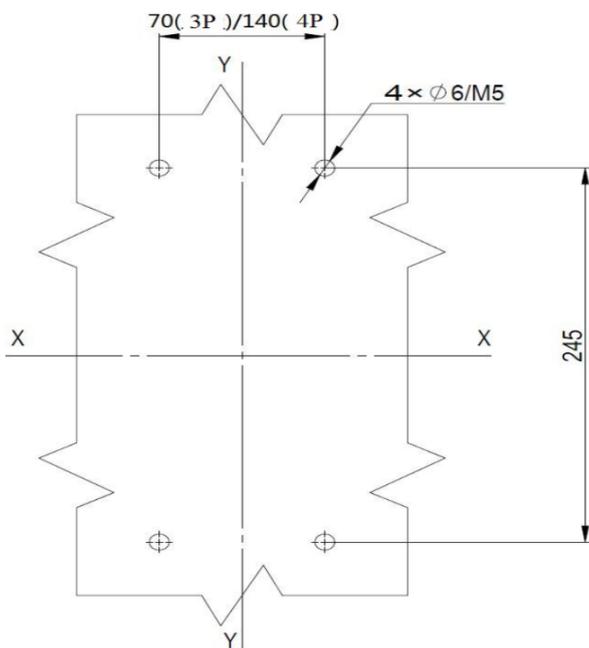


Table 7 Wiring Copper Bar Thickness and Screw Length

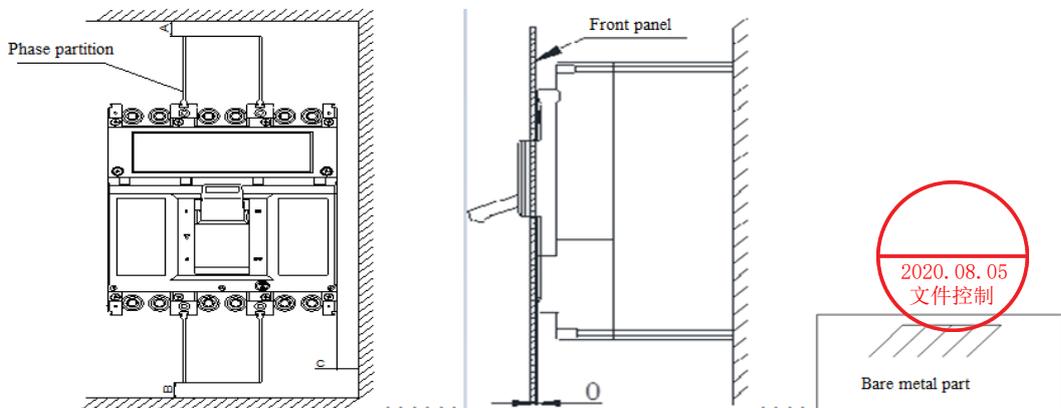
SN	Thickness of the wiring	Wiring hexagon screw length
1	6, 8	M10X30
2	10, 12	M10X35

Note: The hexagon screw length shall be indicated when ordering.

7.6 Safe mounting distance of circuit breaker

Table 8 Minimum Safety Distance during Installation (Unit: mm)

Model	Phase partition installation			With a terminal cover		
	A	B	C	A	B	C
NDM3-1600	0	0	35	25	25	35



Bottom

Gap between front panel and circuit breaker

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

8. Accessories 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 9 Voltage Specifications and Power Consumption of Undervoltage Release

Accessory name	Under-voltage release		
Voltage specifications (V)	AC/DC 110	AC/DC 230	AC 400
Retention power consumption (W)	7	8	10
Instantaneous power consumption (W)	230	500	270

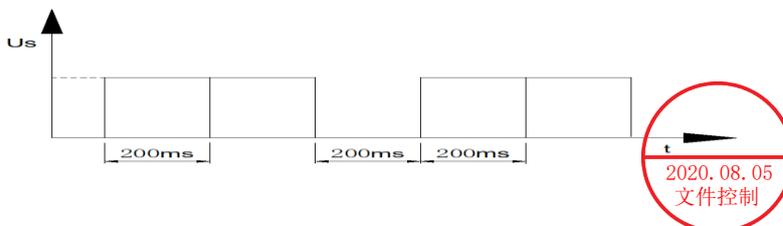
8.2 Shunt release

When the external voltage of the shunt release is between 70% and 110% of the rated control power voltage, the release can break the circuit breaker reliably.

Table 10 Voltage Specifications and Power Consumption of Shunt Release

Accessory name	Shunt release		
Voltage specifications (V)	DC 24	AC/DC 110	AC/DC 230
Retention power consumption (W)	3.5	3.0	3.0
Instantaneous power consumption (W)	170	230	280

Note: Working principle of the shunt release: a single pulse action (the suggested power-on time above 200ms). If another action is required, the shunt release can only be operated after being off (the suggested interval time above 200ms), reset and energized. The time from power on of the shunt release (receiving signal) to product tripping is 100ms.



8.3 Rated parameters of the auxiliary contact

Table 11 Rated Parameters of the Auxiliary Contact

Accessory name		Auxiliary contact
Voltage specifications/conventional thermal current (Ith)		AC250V/10A, AC400V/3A, DC220V/0.2A, DC24V/10mA
Wiring diagram	Off	
	On	
Internal resistance		<30mΩ

Note: For the DC24V/10mA auxiliary contact, please indicate it when ordering.

8.4 Rated parameters of the alarm contact

Table 12 Rated Parameters of the Alarm Contact

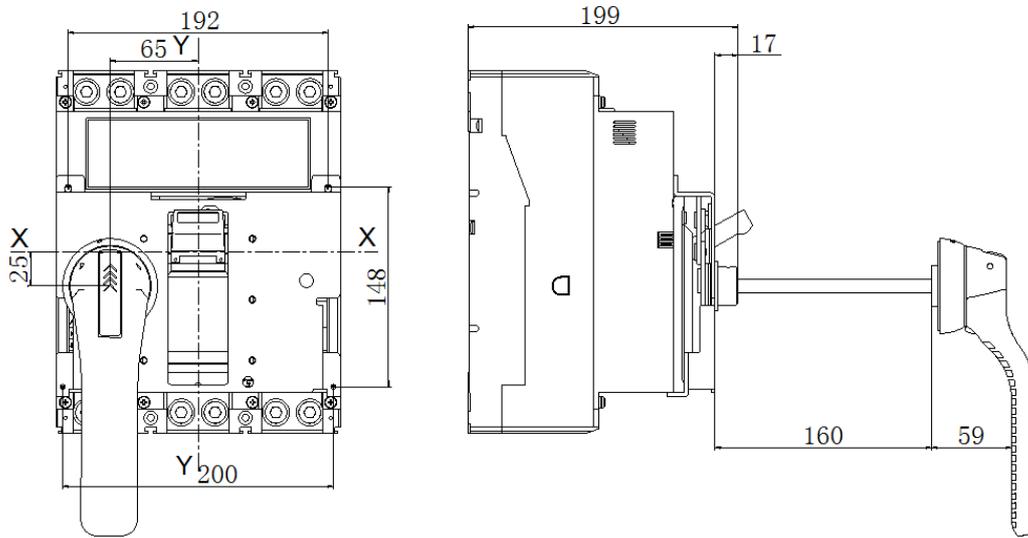
Accessory name		Alarm contact
Voltage specifications/conventional thermal current (Ith)		AC250V/10A, AC400V/3A, DC220V/0.2A
Wiring diagram	On, off	
	Free tripping	
Internal resistance		<30mΩ

Note: The standard wire length of the undervoltage release, shunt release, auxiliary contact and alarm contact wiring is 0.7m, which can be customized according to the requirements.

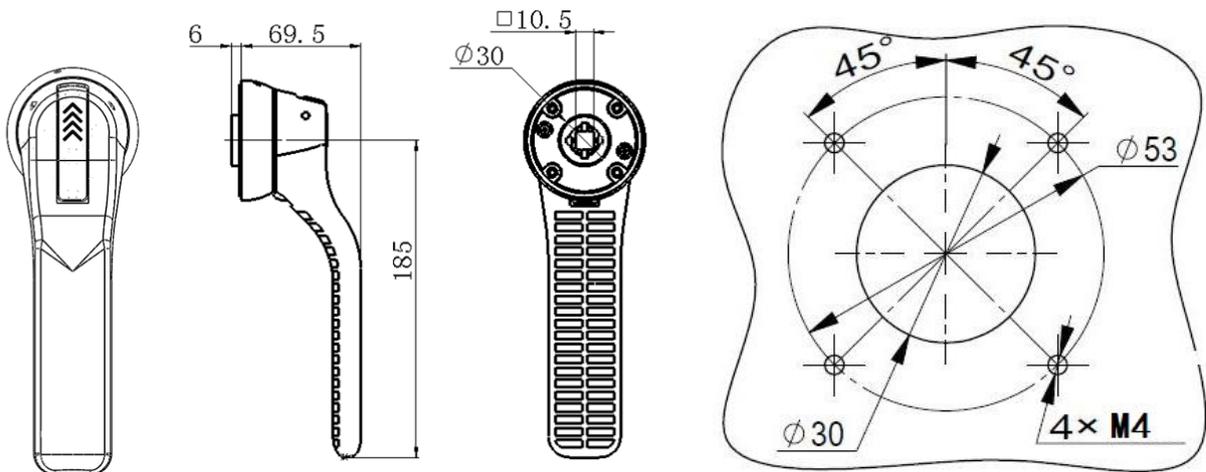


8.5 Operating mechanism of the rotation handle

Manual operation—the handle mounting hole diagram and external dimension diagram of manual operation are shown as below:



External Dimension Diagram of Manual Operation

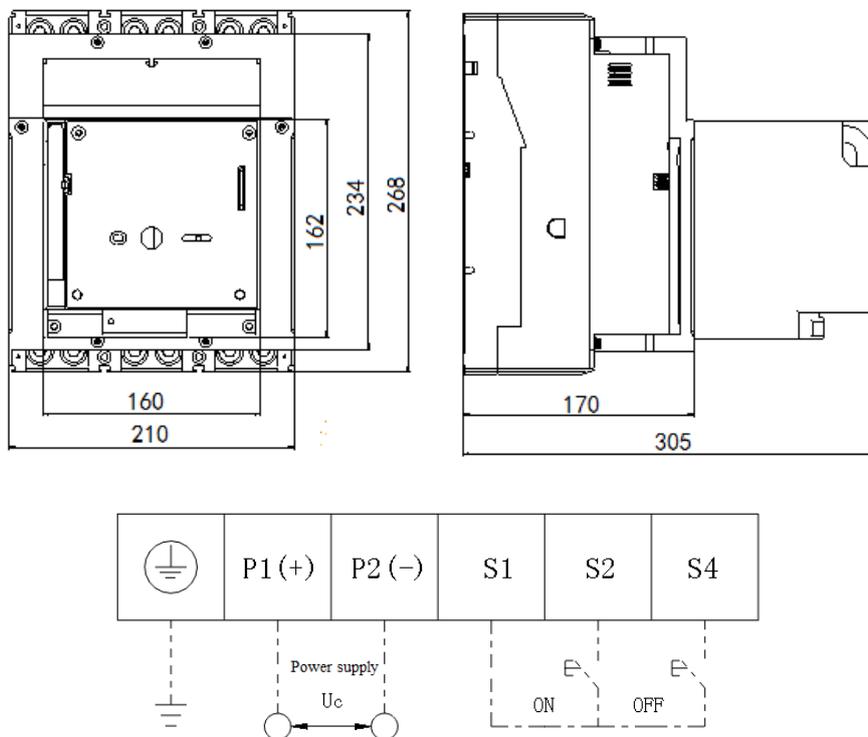


Handle Mounting Hole Diagram



8.6 Electric operating mechanism

Electric operation-the external dimensions of the circuit breaker and its electric operating mechanism installed:



Note: For manual operation, operate it 180° in the clockwise direction while operation in the counterclockwise direction is prohibited;

For electric operation connection, it is prohibited to connect P1 and P2 with S1, S2 and S4.

Table 13 Voltage Specifications and Power of Electric Operation

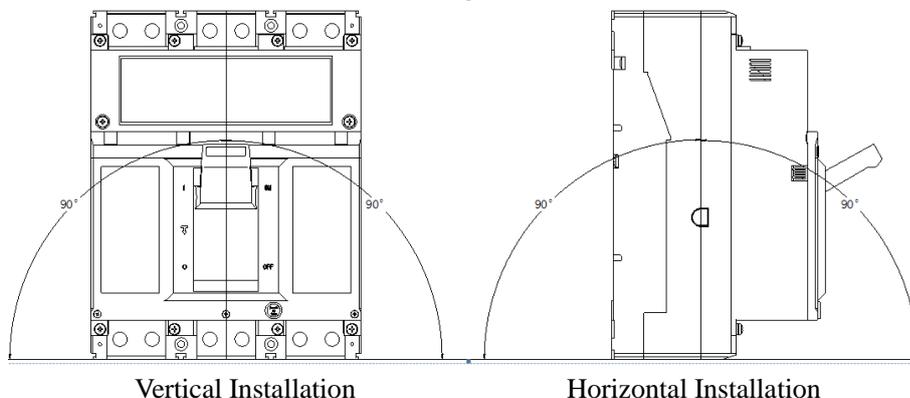
Accessory name	Electric operating mechanism			
Voltage specifications	DC24V	AC110V/DC110V	AC230V/DC220V	AC400V
Power	80W	400W	400W	400W



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 $\pm 5^\circ$.

Horizontal installation of the product.



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. List of Accessories and Installation

SN	Name	Specification	3P Quantity/Set	4P Quantity/Set
1	Cross small pan-head screw	M5×100	4	4
2	Hexagon nut	M5	4	4
3	Spring washer	5	4	4
4	Plain washer	5	4	4
5	Phase partition	—	4	6
6	Ground partition	—	2	2
7	Extended handle	—	1	1

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.



“The storage life is three years”

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