

Shanghai Liangxin Electrical Co., Ltd.

# NDM3E-250 Product Specification

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Revision History					
Version	Revision Reason/Content	Implementati on Date	Prepared by	Reviewe d by	Approve d by
0	Newly added	2020/10/28	Sun Lanping	Xun Funping	Ding Fei
1	Update the product appearance picture and product dimension outline drawing	2021/09/30	Sun Lanping	Xun Funping	Ding Fei

## 1. Applicable Scope and Purpose of Circuit Breaker

The NDM3E-250 electronic 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 250A 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. The circuit breaker can provide modules with the communication function, which can make the original circuit breaker upgrade to the communication circuit breaker conveniently, thus realizing "Four remotes" functions, namely, remote control, remote adjustment, remote measuring and remote measurement.

## 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	E	-	250			/		/							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
SN	SN name		NDM3E														
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		E: Electronic														
5	Shell frame level		250														
6	Breaking capacity level		M: Relatively high breaking type														
			H: High breaking type														
7	Operation mode		No code: Direct handle-operated mode														
			P: Motor-operated														
			Z: Rotation handle														
8	Derived code of the function		No code: Basic type intelligent release														
			G: Ground protection type intelligent release														
			T: Communication type intelligent release														
			GT: Ground protection communication type intelligent release														
9	Number of poles		3, 4														
10	Accessory code		See Table 1														
11	Application code		No code: Power distribution type														
			2: Motor protection type														
12	N-pole (neutral pole) type of the 4P product		C: The N-pole is installed with an overcurrent tripper, and on-off with the other three poles														
			D: The N-pole is installed with an overcurrent tripper, but always connected														
13	Special use		Q: Voltage-check self-reset														
14	Special function code		I: Non-tripping at the time of alarming														
15	Setting current		See Table 2														
16	Cabling type		No code: Normal product														
			P: Connection busbar														
			Z1: Rear-plate connection														
			Z2H: Plug-in rear-plate connection														
			Z2Q: Plug-in front-plate connection														

Table 1: Comparison Table of Accessory Code:

Diagram illustrating the handle and installation positions for the accessory code. The handle is shown at the top, and the installation positions are labeled "Left installation" and "Right installation".

#### 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	NDM3E-250 (Non-communication type)	
				3	4
300	N/A			—	
310	Shunt release				
320	Dual-auxiliary contact				
321	Single auxiliary contact				
330	Under-voltage release				
340	Shunt release, dual-auxiliary contact				
341	Shunt release, single auxiliary contact				
350	Shunt release, under-voltage release			—	
360	Two sets of single auxiliary contacts				
361	Two sets of dual-auxiliary contacts				
362	Dual-auxiliary contact, single auxiliary contact				
370	Under-voltage release, dual-auxiliary contact				
371	Under-voltage release, single auxiliary contact				
308	Alarm contact				
318	Shunt release, alarm contact			—	
328	Dual-auxiliary contact, alarm contact				
338	Under-voltage release, alarm contact			—	
348	Shunt release, auxiliary alarm contact				
358	Auxiliary alarm contact				
368	Dual-auxiliary contact, auxiliary alarm contact				
378	Under-voltage release, auxiliary alarm contact				

Accessory code	Accessory name	Installation Position	Model	NDM3E-250 (Communication type)	
				3	4
300	No internal accessories/communication type			—	
310	Shunt release (left)/communication type				
320	Dual-auxiliary contact (left)/communication type				
321	Single auxiliary contact (left)/communication type				
330	Undervoltage release (left)/communication type				
341	Shunt release (left)/single auxiliary (right)/communication type				
308	Alarm contact (left)/communication type				
318	Shunt release (left)/alarm contact (right)/communication type				
328	Dual-auxiliary contact (left)/alarm contact (right)/communication type				
338	Undervoltage release (left)/alarm contact (right)/communication type				
358	Auxiliary alarm contact (left)/communication type				
361	Single auxiliary contact (left)/single auxiliary contact (right)/communication type				
371	Undervoltage release (left)/single auxiliary contact (right)/communication type				

## Note :

- 1) The first number "3" of the release accessory code represents the intelligent controller with the three-section protection while the last two numbers represent the inner accessory code;
- 2) Since the communication type requires to use a set of right-side auxiliary contacts, the single auxiliary or alarm contact output is only located on the right side of the above accessory mode.
- 3) "I" in "32\*\*I" identifies overload alarm without tripping, with output function, and the last two digits \*\* identify internal accessory code.

## 4. Main Technical Parameters of Circuit Breaker

Table 2 Main Technical Parameters of Circuit Breaker

Model			NDM3E-250		
Rated current of frame Inm (A)			250		
Setting current Ir(A)			63, 80, 90, 100, 125,140,160	100,125,140,160, 180,200,225,250	
Rated insulation voltage Ui (AC V)			1000		
Rated impulse withstand voltage Uimp (V)			8000		
Rated working voltage Ue (AC V)			380/400/415, 660/690		
Power frequency withstand voltage U (1min) (V)			3500		
Utilization category			A		
Rated short-time withstand current Icw (kA/1s)			1.6(160A), 2.5(250A)		
Number of poles			3		4
Breaking capacity level			M	H	/
Rated limit short-circuit breaking capacity Icu (kA)	AC380/400/415V		70	85	70
	AC660/690V		20	/	20
Rated operating short-circuit breaking capacity Ics (kA)	AC380/400/415V		50	65	50
	AC660/690V		15	/	15
Operating performance (times)	Electrical life		8000		
	Mechanical life	Maintainable free life	20000		
		Maintainable life	40000		

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

Table 3 Selection of the NDM3E-250 Connecting Bus or Cable Cross-section Area

Setting current (A)	63	80	90, 100	125, 140	160	180, 200, 225	250
Cross-section area of conductor copper (mm <sup>2</sup> )	16	25	35	50	70	95	120

## 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)
NDM3E-250	M8	12
	M4	2.4

## 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							
NDM3E-250	Temperature (°C)	40	45	50	55	60	65	70
	Derating factor	1	1	1	0.976	0.952	0.927	0.902

Note: 1) When the operating ambient temperature is below 50°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

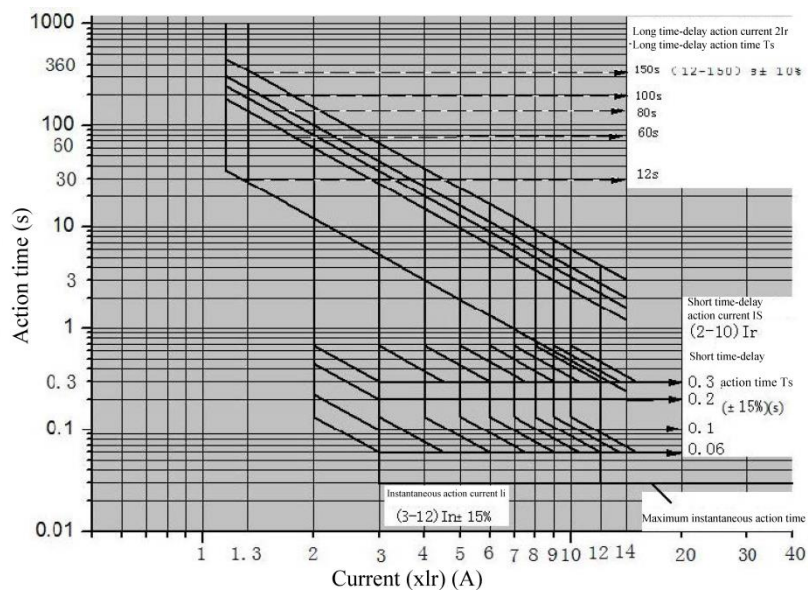
## 5. Normal Working Environment of Circuit Breaker

- 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  $+50^{\circ}\text{C}$ , 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  $20^{\circ}\text{C}$  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.



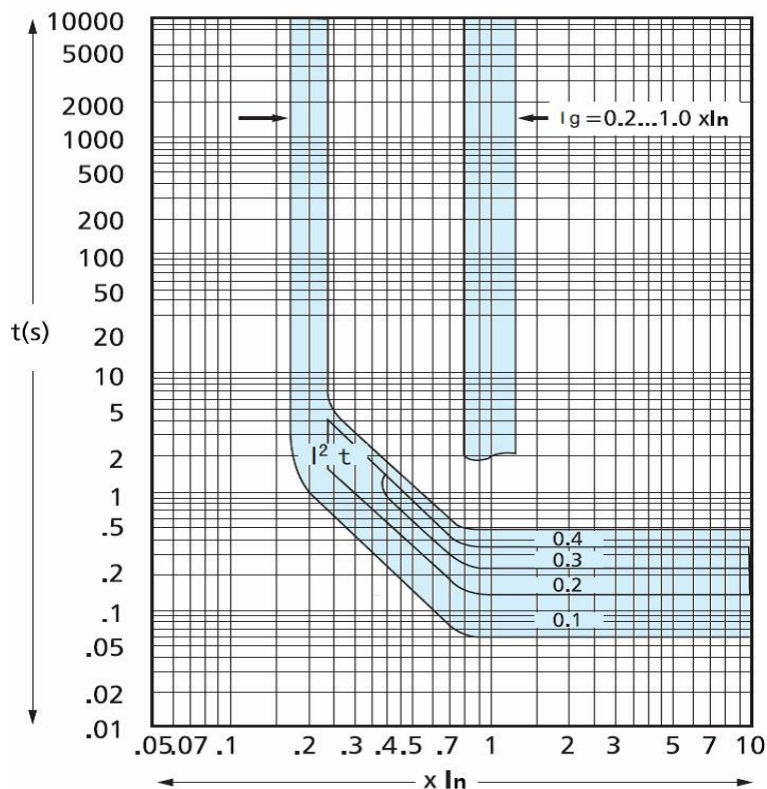
## 6. Short-circuit Overload Protection Characteristic Curve of Circuit Breaker

### 6.1 Long time-delay, short time-delay and instantaneous protection characteristic curve of power distribution type



Time/Current Characteristic Curve

### 6.2 Ground protection characteristic curve of power distribution type



Ground protection characteristic curve

## 6.3 Setting value of the intelligent controller

Table 7: Communication Type

Model	Rated current of frame In (A)	Current and time parameters						
		I <sub>R</sub> (A)	T <sub>R</sub> (s)	I <sub>sd</sub> (*I <sub>R</sub> )	T <sub>sd</sub> (s)	I <sub>i</sub> (A)	T <sub>i</sub> (s)	I <sub>p</sub> (*I <sub>R</sub> )
NDM3E-250	160	63, 80 90, 100 125, 140 160, OFF	12 60 80	2, 3 4, 5 6, 7	0.06 0.1 0.2	3, 4 5, 6.4 7.2, 8 9, 10	<0.05	Built-in 0.9
	250	100, 125 160, 180 200, 225 250, OFF	100 OFF	8, 10 OFF	0.3	12		

Table 7: Communication Type (Continued)

Model	Rated current of frame In (A)	Current and time parameters	
		I <sub>RN</sub> (*I <sub>R</sub> )	T <sub>RN</sub> (s)
NDM3E-250	160	0.5, 1.0, OFF	T <sub>R</sub>
	250		

Note: When I<sub>sd</sub> is in the OFF position, the short time-delay is closed.

Table 8: Non-Communication Type

Model	Rated current of frame In (A)	Current and time parameters							
		I <sub>R</sub> (A)	T <sub>R</sub> (s)	I <sub>sd</sub> (*I <sub>R</sub> )	T <sub>sd</sub> (s)	I <sub>i</sub> (*I <sub>N</sub> )	I <sub>p</sub> (*I <sub>R</sub> )	I <sub>g</sub> (*I <sub>N</sub> )	T <sub>g</sub> (S)
NDM3E-250	160	63, 80	12	2, 3	0.06	3, 4	0.7	0.2	0.1
		90, 100		4, 5				0.3	
		125, 140		6, 7				0.4	
		160		80				0.5	
				8, 10				0.6	
	250	100, 125	100	OFF	0.3	7.2, 8	0.9	0.8	0.4
		160, 180						0.9	
		200, 225						1.0	
		250, OFF						OFF	

Table 8: Non-communication Type (Continued)

Model	Rated current of frame In (A)	Current and time parameters	
		I <sub>RN</sub> (*I <sub>R</sub> )	T <sub>RN</sub> (s)
NDM3E-250	160	0.5, 1.0, OFF	T <sub>R</sub>
	250		

Note: 1) When I<sub>R</sub> is in the OFF position, the long and short time-delay is closed at the same time; when I<sub>sd</sub> is in the OFF position, the short time-delay is closed;

2) When the product adopts the ground type, T<sub>sd</sub> can't be set with the factory default as 0.3S in case of no requirements for the order;

3) When the product adopts the ground type, I<sub>p</sub> can't be set with the factory default as 0.9I<sub>R</sub> in case of no requirements for the order;

4) When the 4P product adopts the basic type, I<sub>p</sub> can't be set with the factory default as 0.9I<sub>R</sub> in case of no requirements for the order;

5) When the 4P product adopts the ground type, I<sub>RN</sub> can't be set with the factory default as 1.0I<sub>R</sub> in case of no requirements for the order.

## 6.4 Intelligent release protection features

Table 9: Ground Protection Characteristics

Overload long time-delay protection $I_R$ , $T_R$						
Setting current $I_R$			See Table 7 or 8			
Action features (reverse time limit)	$T_R$ setting value (s)	$I_n=160, 250$				
		12	60	80	100	
	$\leq 1.05I_R$	$>2h$ inaction				
	$> 1.30I_R$	$<1h$ action				
	t(s) at $1.5I_R$	21.3	106.7	142.2	177.8	
	t(s) at $2.0I_R$	12	60	80	100	
	t(s) at $6.0I_R$	1.33	6.67	8.89	11.11	
	t(s) at $7.2I_R$	0.93	4.63	6.17	7.72	
	Accuracy (%)		$\pm 10$			
Note: The action curve conforms to $t=(2I_R/I)^2\times T_R$ t: overload long time-delay action time Tr: setting value of the overload long time-delay action time I: Actual running current $I_R$ : setting value of the overload long time-delay action current						
Short circuit short-time delay protection $I_{sd}$ , $T_{sd}$						
Setting current $I_{sd}$			See Table 7 or 8			
Action characteristics	Reverse time limit $I_{sd}\leq I<1.5I_{sd}$	$T_{sd}$ setting value (s)	0.06	0.1	0.2	0.3
		t action time (s)	$t=(1.5I_{sd}/I)^2\times T_{sd}$			
	Fixed time limit $1.5I_{sd}\leq I<I_i$	t action time (s)	0.06	0.1	0.2	0.3
		Returnable time (s)	/	/	0.14	0.21
		Accuracy (%)	$\pm 10$			
Note: The inverse time limit action curve conforms to $t=(1.5I_{sd}/I)^2\times T_{sd}$ The reverse time limit is ON while the fixed time limit is OFF t: short-circuit short time-delay action time $T_{sd}$ : setting value of the short-circuit short time-delay action time I: Actual running current $I_{sd}$ : setting value of the short-circuit short time-delay action current						

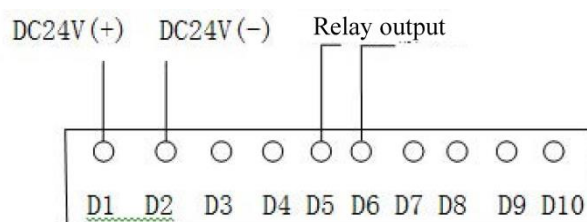
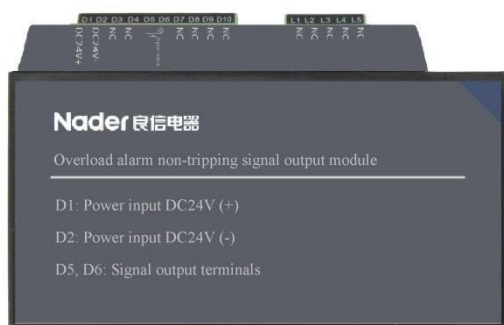
<b>Short circuit instantaneous protection Ii</b>						
Action characteristics		Setting current Ii		See Table 7 or 8		
		Action time		<50ms		
<b>Neutral wire protection IrN TRN</b>						
Setting current Ip				See Table 7 or 8		
Action characteristics		TRN action time		TR		
		Accuracy (%)		±10		
<b>Pre-alarm Ip</b>						
Setting current Ip				See Table 7 or 8		
characteristics		Alarm indicator		The indicator changes to be constantly on from flashing		
		Accuracy (%)		±10		
<b>Overload indicator (maximum load)</b>						
characteristics		Current value range		1.15×Ir		
		Overload indicator		Constantly on		
		Accuracy (%)		±10		
<b>Ground fault protection Ig, Tg</b>						
Setting current Ig			(0.2, 0.3, 0.4, 0.5, 0.6, 0.8, 1.0)×In+OFF			
Action characteristics	Reverse time limit Ig≤IΔ<2Ig	Tg setting value (s)	0.1	0.2	0.3	0.4
		t action time (s)	t =(2Ig/I)²×Tg			
	Fixed time limit IΔ≥2Ig	t action time (s)	0.1	0.2	0.3	0.4
		Accuracy (%)	±10			

Note: I: 3P product is A/B/C three-phase current vector sum, 4P product is A/B/C/N four-phase current vector sum.

Note: The inverse time limit action curve conforms to  $t = (2I_g / I)^2 \times T_g$

t: Action time  
Tg: Setting time of ground protection  
I: Actual operating current  
Ig: Setting current of ground protection

## 6.5 Overload alarm non-tripping signal output module



Wiring Connection Diagram of Output Module

Table 11: Table of Communication Module Terminals and Roles

Terminal code	Connection position	Input/output (IO)
D1	Power input DC24V(+)	Input
D2	Power input DC24V(-)	
D3	Reserved	Reserved
D4		
D5, D6	Alarm signal output	Output (DO)
D7, D8, D9, D10	Reserved	Reserved
L1, L2, L3, L4, L5		

Note: 1. Specification of the rated working voltage: DC 24V, allowed range:  $\pm 15\%$ , power:  $\leq 2W$ ;

2. DO switch output: D5, D6 are dry contact signals, contact capacity: Resistive load DC 30V/5A, AC 270V/3A;

3. Closed during overload alarm. Disconnected when there is no overload or non-overload fault;

4. Signal output with overload 1.15IR, the shortest maintenance time of this alarm signal is 30s;

5. It is necessary to realize the function of overload alarm non-tripping. At this time, the corresponding controller should exit the long time-delay protection (long time-delay TR is set to OFF), otherwise the product will still protect the action;

6. When using the overload alarm non-tripping function, it is necessary to eliminate the fault as soon as possible to avoid line heating due to overload for a long time;

7. This accessory can't be used simultaneously with communication accessories.



## 7.2 Safe mounting distance of circuit breaker

Table 12 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		
NDM3E-250	25	65	30	30

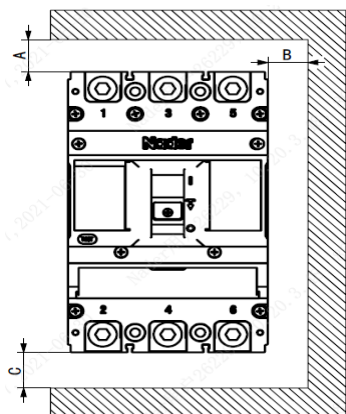


Table 13 Minimum Center Distance between Rowed Circuit Breakers (Unit: mm)

Model	Width of circuit breaker		Center distance	
	3 poles	4 poles	3 poles	4 poles
NDM3E-250	107	142	137	172

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.

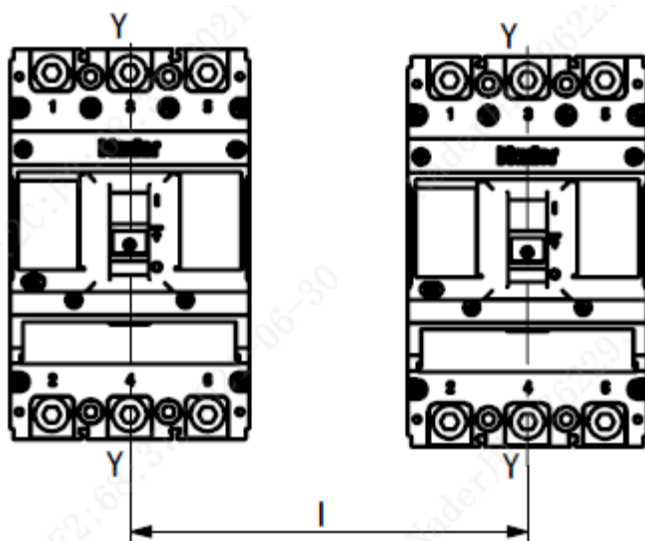




Table 14 Minimum Center Distance between Stacked Circuit Breakers ( Unit: mm)

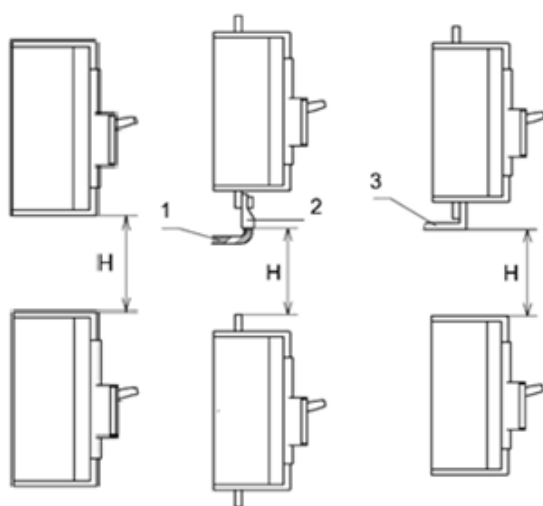
Model	H (distance of circuit breaker from bottom)	
	With a terminal cover	Without a terminal cover
NDM3E-250	90	93

Note: 1) Bare cable connection

2) Cable insulating connection

3) Connection without insulation

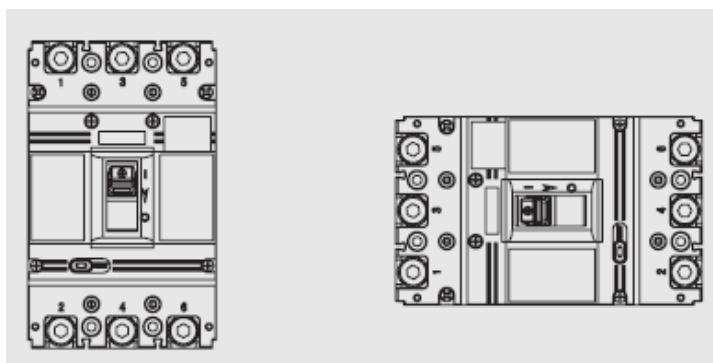
Requirements: Check whether the terminal cover or phase partition is assembled properly before products are energized.



## 8. 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

## 9. 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.

## 10. Installation Direction of Circuit Breaker

SN	Name	Specification	3P Quantity/Set	4P Quantity/Set
1	Cross small pan-head screw	M4×45	4	6
2.	Hexagon nut	M4	4	6
3	Spring washer	4	4	6
4	Plain washer	4	4	6
5	Phase partition	——	4	6

## 11. 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.