Shanghai Liangxin Electrical Co., Ltd.

NDM3E-800 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	2020/10/28	Sun Lanping	Li Yang	Ding Fei
1	Update the product appearance picture and product dimension outline drawing	2021/09/30	Sun Lanping	Li Yang	Ding Fei

1. Applicable Scope and Purpose of Circuit Breaker

The NDM3E-800 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 800A 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)

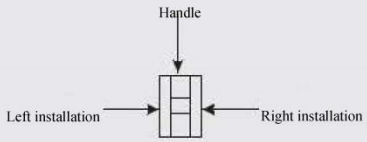
Picture of the Product

3. Specification and Model Description

ND	M	3	E	-	800	□	□	/	□	/	□	□	□	□	□	□	□
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	800
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
		Z3H: Integrated plug-in rear-plate connection
		Z3Q: Integrated plug-in front-plate connection

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	NDM3E-800 (Non-communication type) 3	NDM3E-800 (Non-communication type) 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	NDM3E-800 (Communication type) 3	NDM3E-800 (Communication type) 4
300	None/communication type	——	
320	Dual-auxiliary contact/communication type	◧	
321	Single auxiliary contact/communication type	◧	
330	Undervoltage release/communication type	○	
361	Two sets of dual-auxiliary contacts	◧	◧
362	Dual-auxiliary contact, single auxiliary contact/communication type	◧	◧
371	Under-voltage release, single auxiliary contact/communication type	○	◧
308	Alarm contact/communication type	□	
358	Auxiliary alarm contact/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 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-800		
Rated current of frame Inm (A)			800		
Setting current I_R(A)			320, 400, 450, 500, 550 600, 630, 700, 750, 800		
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			B		
Short-time withstand current Icw (kA/1s)			10		
Number of poles			3		4
Breaking capacity level			M	H	/
Rated limit short-circuit breaking capacity Icu (kA)	AC380/400/415V		70	100	70
	AC660/690V		20	/	20
Rated operating short-circuit breaking capacity Ics (kA)	AC380/400/415V		65	70	65
	AC660/690V		15	/	15
Operating performance (times)	Electrical life		7500		
	Mechanical life	Maintainable free life	10000		
		Maintainable life	20000		

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

Table 3 Selection of the NDM3E-800 Connecting Bus or Cable Cross-section Area

Rated current A	Cable section		Copper bar size	
	Quantity	Cross section (mm^2)	Quantity	Dimension (mm^2)
320	1	185	-	-
400	1	240	-	-
450, 500	2	150	2	30×5
550, 600, 630	2	185	2	40×5
700, 800	2	240	2	50×5

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-800	M12	28
	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							
NDM3E-800	Temperature (℃)	40	45	50	55	60	65	70
	Derating factor	1	1	1	0.980	0.958	0.936	0.913

Note: 1) When the operating ambient temperature is below + 50℃, 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

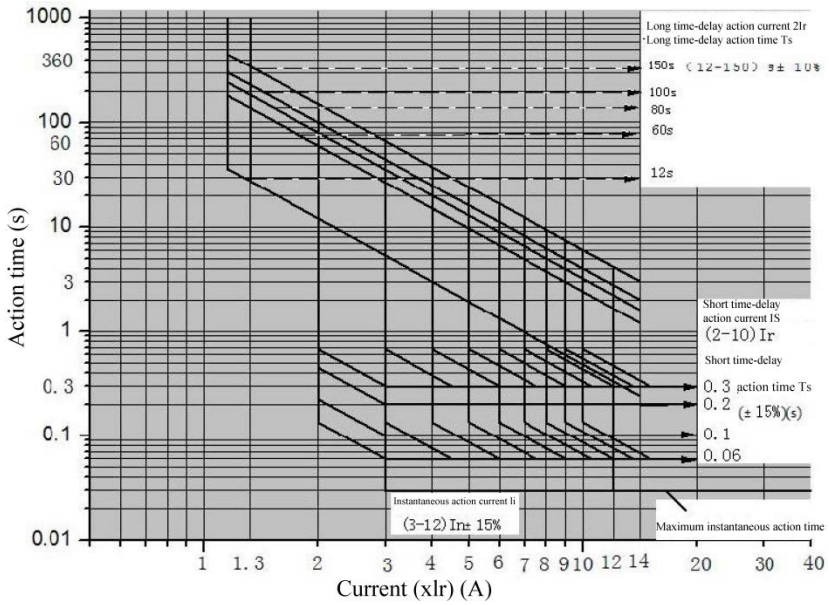
3500	0. 97	580	3000	850
4000	0. 95	550	2800	810
4500	0. 94	520	2650	770
5000	0. 93	500	2500	730

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℃ ~ + 70℃; the average within 24 h shall not be more than +35℃. If the ambient temperature is higher than +50℃, 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℃ should not exceed 50%. A higher relative humidity is allowed at a lower temperature. For example, the relative humidity at 20℃ 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.

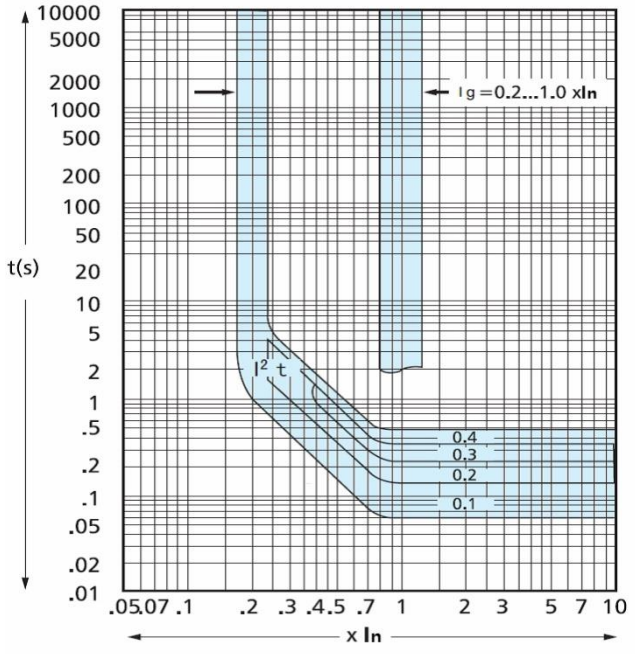
6. Short-circuit Overload Protection Characteristic Curve of Circuit Breaker

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



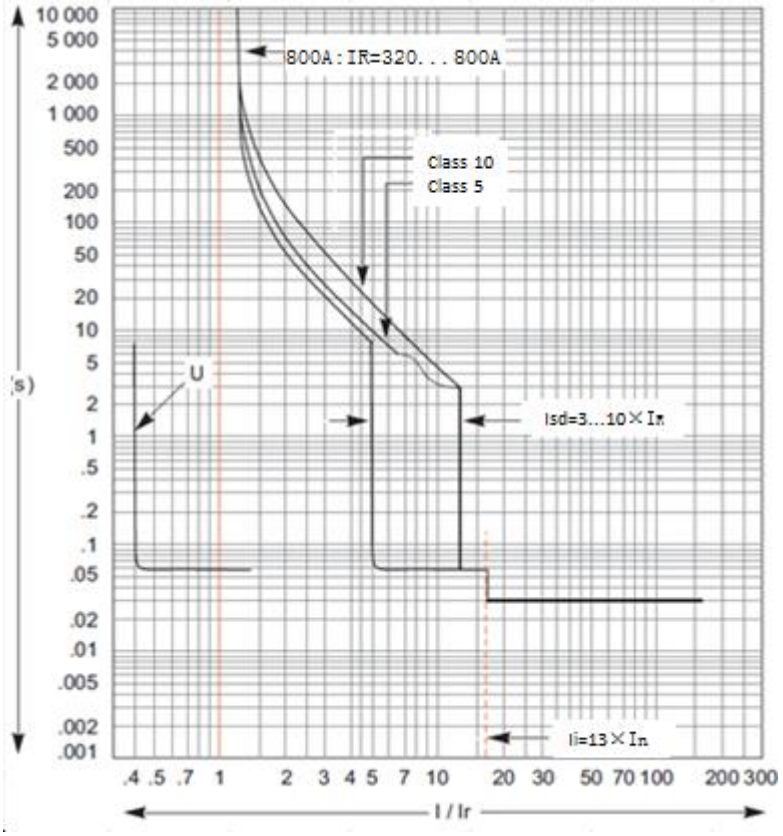
Time/Current Characteristic Curve

6.2 Ground protection characteristic curve of power distribution type



Ground protection characteristic curve

6.3 Motor-type protection characteristic curve



6.4 Setting value of the intelligent controller

Table 7: Basic type

Model	Shell frame level Rated current In(A)	Current and time parameters							
		IR (A)	TR(s)	Isd(*IR)	Tsd(s)	Ii(*In)	Ip(*IR)	IRN(*IR)	TRN(s)
NDM3E-800 3P	800	400, 450 500, 550 600, 630 700, 750 800, OFF	12 60 100 150 OFF	2,3, 4 5, 6, 7 8, 10, OFF	0.06 0.1 0.2 0.3	3, 4, 5 6, 7, 8 9, 10, 12 14	0.7, 0.8 0.9, 1.0	/	/
NDM3E-800 4P							Built-in 0.9	0.5, 1.0 OFF	TR

Table 8: Ground Type

Model	Shell frame level Rated current In(A)	Current and time parameters							
		IR(A)	TR(s)	Isd(*IR)	Tsd(s)	Ii(*In)	Ip(*IR)	Ig(*In)	Tg(S)
NDM3E-80 0	800	400, 450 500, 550 600, 630 700, 750 800, OFF	12 60 100 150 OFF	2,3, 4 5, 6, 7 8, 10, OFF	Built-in 0.3	3, 4, 5 6, 7, 8 9, 10, 12 14	Built-in 0.9	0.2, 0.3 0.4, 0.5 0.6, 0.8 1.0, OFF	0.1 0.2 0.3 0.4

Note: For the ground-type 4P product, IRN can't be set with the factory default as 1.0IR in case of no requirements for the order

Table 9: Communication Type

Model	Rated current of frame In(A)	Current and time parameters					
		I_R(A)	T_R(s)	Isd (A)	Tsd(s)	Ii(A)	Ip(A)
NDM3E-800	800	400-800, OFF In step of 1A	12, 60 100, 150, OFF	800-8000, OFF In step of 1A	0.06, 0.1 0.2, 0.3	2400-11200 In step of 1A	280-800 In step of 1A

Model	Rated current of frame In(A)	Current and time parameters	
		I_{RN}(*I_R)	T_{RN}(s)
NDM3E-800 4P	800	0.5, 1.0, OFF	T_R

Table 10: Ground Communication Type

Model	Rated current of frame In(A)	Current and time parameters							
		I_R (A)	T_R(s)	Isd(A)	Tsd(s)	Ii(A)	Ip(A)	Ig(*In)	Tg(S)
NDM3E-800	800	400-800 OFF In step of 1A	12, 60 100, 150 OFF	800-8000 OFF In step of 1A	0.06 0.1 0.2 0.3	2400-11400 In step of 1A	280-800 In step of 1A	160-800 OFF In step of 1A	0.1, 0.2 0.3, 0.4

Model	Rated current of frame In(A)	Current and time parameters	
		I_{RN}(*I_R)	T_{RN}(s)
NDM3E-800 4P	800	0.5, 1.0, OFF	T_R

Note: 1. When I_R is in the OFF position, the long and short time-delay is closed at the same time; when Isd is in the OFF position, the short time-delay is closed;

2. When the 4P product adopts the basic type, Ip can't be set with the factory default as 0.9I_R in case of no requirements for the order;

3. When the product adopts the ground type, Tsd can't be set with the factory default as 0.3s in case of no requirements for the order;

4. When the product adopts the ground type, Ip can't be set with the factory default as 0.9I_R in case of no requirements for the order;

5. When the 4P product adopts the ground type, I_{RN} can't be set with the factory default as 1.0I_R in case of no requirements for the order;

6. The gear setting of the communication type product needs to be performed by the upper computer, and it is not displayed on the control panel.

Table 11: Motor Protection Type

Model	Shell frame level Rated current In(A)	Current and time parameters			
		I_R (*In)	Class(s)	Isd(*I_R)	Iunbl(%)
NDM3E-800	800	0.4, 0.5, 0.6, 0.7 0.8, 0.9, 1.0	4~10	3, 4, 5, 6, 7 8, 9, 10, OFF	10%, 20%, 30% 40%, OFF

Note: 1. When Isd is in the OFF position, the short time-delay is closed;

2. When Iunbl is in the OFF position, the current imbalance protection is off;

3. The short circuit instantaneous Ii has built-in 13In.

6.5 Protection characteristics of power distribution-type circuit breaker

Table 12: Protection Characteristics of Intelligent Release

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)	In = 800A			
		12	60	80	100
	≤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	11.11	16.66
	t(s) at 7.2I_R	0.93	4.63	6.17	7.72
	Accuracy (%)	±10			
Note: The action curve conforms to $t=(2I_R/I)^2 \times T_R$ t: overload long time-delay action time T_R: 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 Isd, Tsd					
Setting current Isd		See Table 7 or 8			
Action characteristics	Reverse time limit Isd≤I＜1.5Isd	Tsd setting value (s)	0.06	0.1	0.2	0.3
		t action time (s)	$t=(1.5Isd/I)^2 \times Tsd$			
	Fixed time limit 1.5Isd≤I＜Ii	t action time (s)	0.06	0.1	0.2	0.3
		Returnable time (s)	/	/	0.14	0.21
		Accuracy (%)	±10（Inherent error±20ms）			
Note: The inverse time limit action curve conforms to $t=(1.5Isd/I)^2 \times Tsd$ The reverse time limit is ON while the fixed time limit is OFF t: short-circuit short time-delay action time Tsd: setting value of the short-circuit short time-delay action time I: Actual running current Isd: setting value of the short-circuit short time-delay action current					

Table 12 (Continued) Protection Characteristics of Intelligent Release

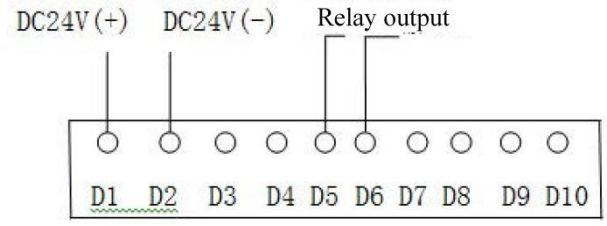
<table>
<tr><td colspan="7">Short circuit instantaneous protection Ii</td></tr>
<tr><td colspan="2" rowspan="2">Action characteristics</td><td colspan="2">Setting current Ii</td><td colspan="3">See Table 7 or 8</td></tr>
<tr><td colspan="2">Action time</td><td colspan="3">＜50ms</td></tr>
<tr><td colspan="7">Neutral wire protection IRN TRN</td></tr>
<tr><td colspan="3">Setting current Ip</td><td colspan="4">See Table 7 or 8</td></tr>
<tr><td colspan="2" rowspan="2">Action characteristics</td><td colspan="2">T_{RN} action time</td><td colspan="3">T_R</td></tr>
<tr><td colspan="2">Accuracy (%)</td><td colspan="3">±10</td></tr>
<tr><td colspan="7">Pre-alarm Ip</td></tr>
<tr><td colspan="3">Setting current Ip</td><td colspan="4">See Table 7 or 8</td></tr>
<tr><td colspan="2" rowspan="2">characteristics</td><td colspan="2">Alarm indicator</td><td colspan="3">The indicator changes to be constantly on from flashing</td></tr>
<tr><td colspan="2">Accuracy (%)</td><td colspan="3">±10</td></tr>
<tr><td colspan="7">Overload indicator (maximum load)</td></tr>
<tr><td colspan="2" rowspan="3">characteristics</td><td colspan="2">Current value range</td><td colspan="3">1.15×I_R</td></tr>
<tr><td colspan="2">Overload indicator</td><td colspan="3">Constantly on</td></tr>
<tr><td colspan="2">Accuracy (%)</td><td colspan="3">±10</td></tr>
<tr><td colspan="7">Ground fault protection Ig, Tg</td></tr>
<tr><td colspan="3">Setting current Ig</td><td colspan="4">(0.2, 0.3, 0.4, 0.5, 0.6, 0.8, 1.0)×I_n+OFF</td></tr>
<tr><td rowspan="4">Action characteristics</td><td rowspan="2">Reverse time limit Ig≤I_Δ＜2Ig</td><td>Tg setting value (s)</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td></tr>
<tr><td>t action time (s)</td><td colspan="4">$t=(2I_{g/I})^2\times T_g$</td></tr>
<tr><td rowspan="2">Fixed time limit I_Δ≥2Ig</td><td>t action time (s)</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td></tr>
<tr><td>Accuracy (%)</td><td colspan="4">±10</td></tr>
<tr><td colspan="7">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 $t=(2Ig / I)^2\times Tg$
t: Action time Tg: Setting time of ground protection
I: Actual operating current Ig: Setting current of ground protection</td></tr>
</table>

6.6 Motor-type circuit breaker protection characteristics

Table 13: Motor Protection-type Protection Characteristics

Overload protection I_R, Class								
Setting current I_R		See Table 7 or 8						
Action features (reverse time limit)	Class setting value (s)	4	5	6	7	8	9	10
	≤1.05 I_R	＞2h inaction						
	＞1.20 I_R	＜1h action						
	t_R (s) at 1.5 IR	92.2	115.2	138.2	161.3	184.3	207.4	230.4
	t_R (s) at 6.0 IR	5.8	7.2	8.6	10.1	11.5	12.9	14.4
	t_R (s) at 7.2 IR	4	5	6	7	8	9	10
	Accuracy (%)	±10						
Note: The action curve conforms to $t=(7.2)^2\times(I_R)^2\times Class/I^2t$: Overload protection action time Class: Setting value of the tripping level time								
Short circuit short-time delay protection Isd								
Setting current Isd			See Table 7 or 8					
Action characteristics	Fixed time limit Isd<I	t action time (s)	0.06					
		Accuracy (%)	±10					
Current unbalance protection Iunbl								
Setting value Iunbl(%)								See Table 7 or 8
Action characteristics	δ≥Iunbl(%)	During startup (＜ Class)	t action time (s)					0.7
		During normal operation (≥Class)						4
	δ＜Iunbl(%)	Inaction						
Note: The calculation of the actual current unbalance conforms to δ=(Imax-Imin)×3×100% / (Ia+Ib+Ic) δ: Percentage value of the actual current unbalance of the three-phase electricity Imax: Maximum current value Imin: Minimum current value Ia: A-phase current value Ib: B-phase current value Ic: C-phase current value								
Open-phase protection								
Action characteristics	I＜0.4I_R	During startup (＜ Class)	t action time (s)					0.7
		During normal operation (≥Class)						4
Short circuit instantaneous protection I i								
Setting current Ii	13In							
Action time	＜ 50 ms							

6.7 Overload alarm non-tripping signal output module



Wiring Connection Diagram of Output Module

Table 14: 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: ±15%, power: ≤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;

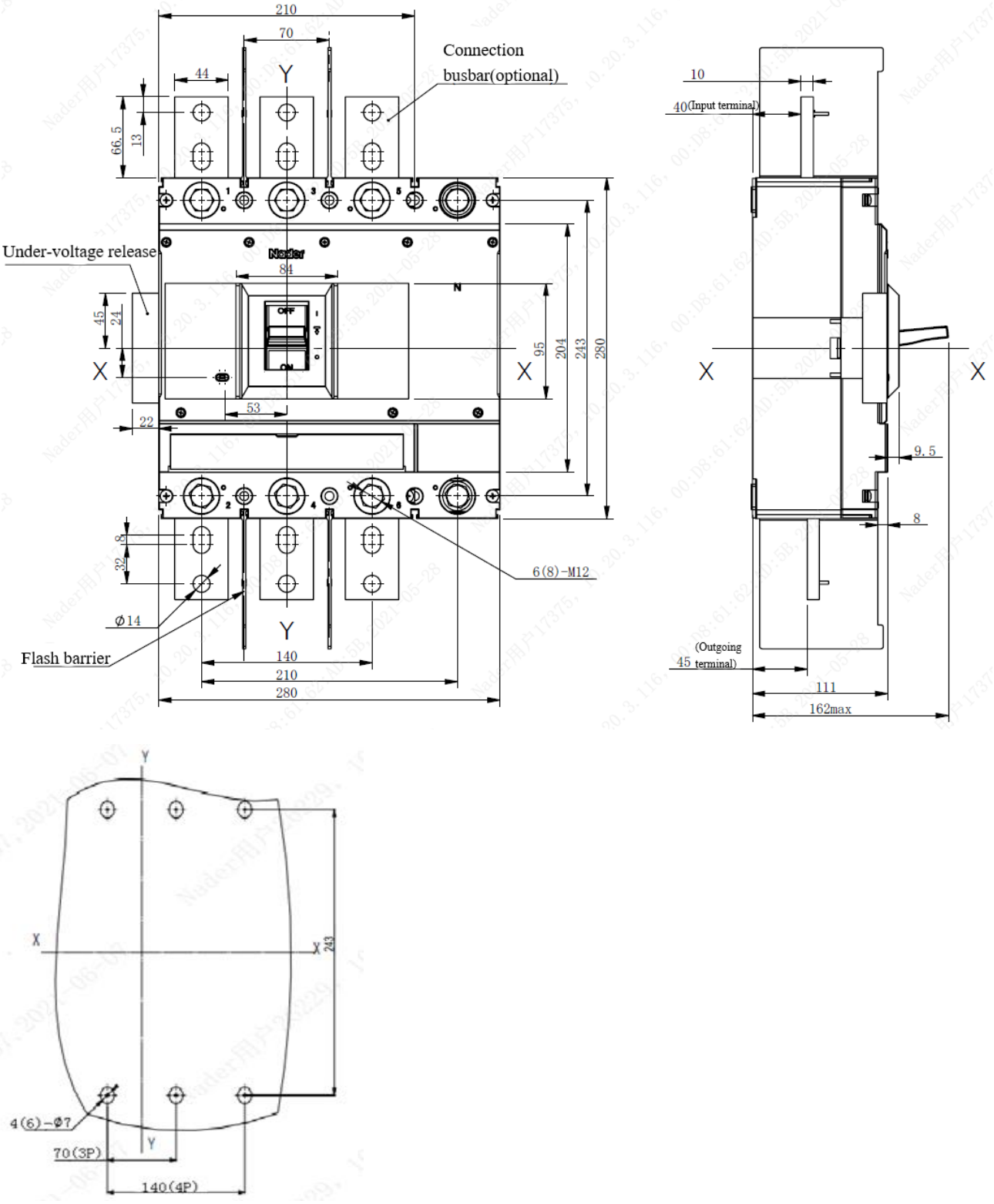
5. It is necessary to realize the function of overload alarm non-tripping. At this time, the corresponding controller should exit the long time-delay protection (long time-delay TR is set to OFF), otherwise the product will still protect the action;

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.

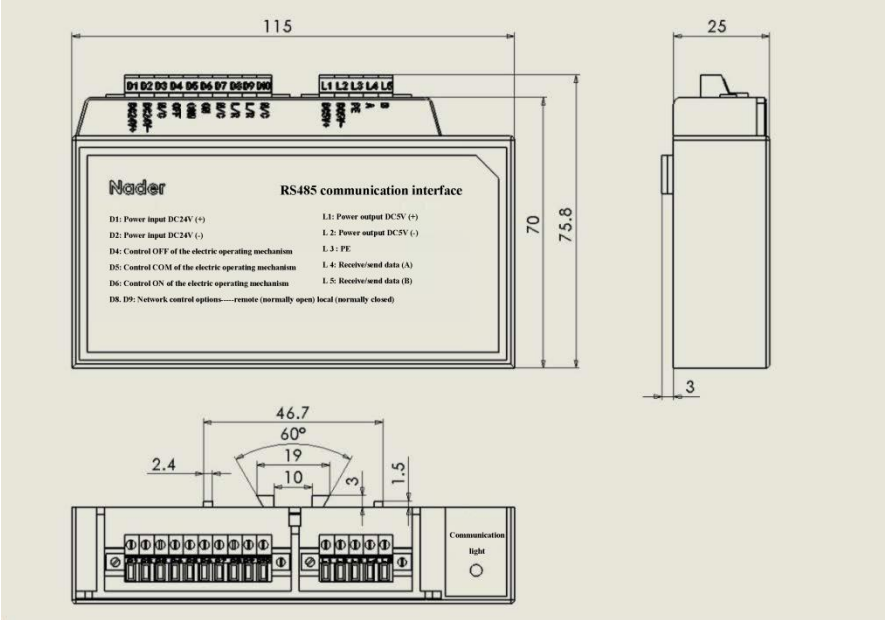
7. Outline and Mounting Hole Dimensions of Circuit Breaker

7.1 Outline and Installation Dimensions of Circuit Breaker



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

7.2 Installation dimensions of communication backpack



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

7.3 Safe mounting distance of circuit breaker

Table 15 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-800	25	120	35	35

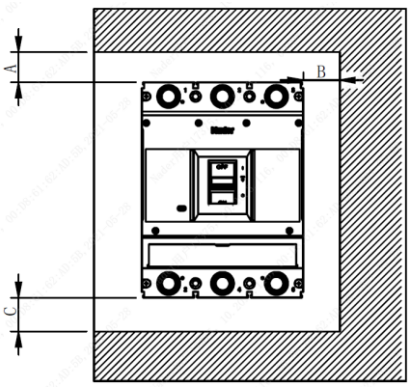


Table 16 Minimum Center Distance between Rowed Circuit Breakers (Unit: mm)

Model	Width of circuit breaker		Center distance	
	3 poles	4 poles	3 poles	4 poles
NDM3E-800	210	280	250	320

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.

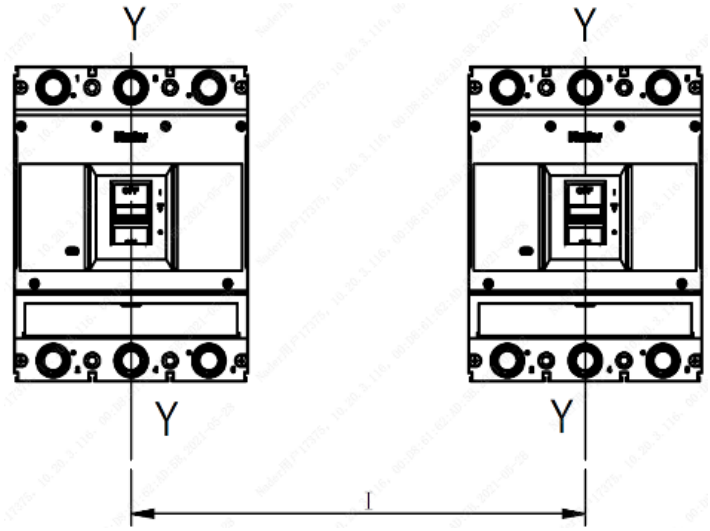


Table 17 Minimum Center Distance between Stacked Circuit Breakers (Unit: mm)

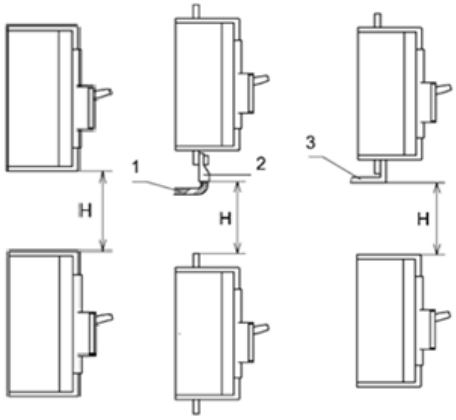
Model	H (distance of circuit breaker from bottom)	
	With a terminal cover	Without a terminal cover
NDM3E-800	155	155

Note: 1) Bare cable connection

2) Cable insulating connection

3) Connection without insulation

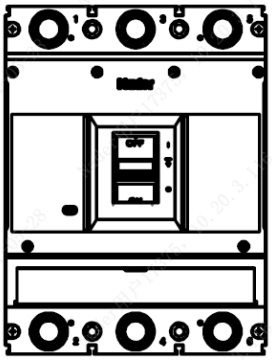
Requirements: Check whether the terminal cover or phase partition is assembled properly before products are energized.



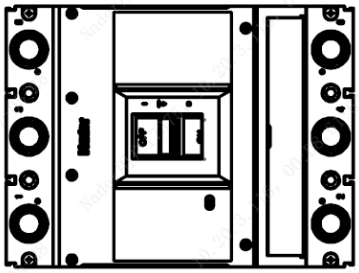
8. Installation Direction of Circuit Breaker

For vertical installation of the product, the gradient between the installation surface and the vertical plane is no more than ±22.5°.

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℃~+75 ℃. 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	M6×95	4	6
2	Hexagon nut	M6	4	6
3	Spring washer	6	4	6
4	Plain washer	6	8	12
5	Plug	——	6	8
6	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.