

Product Specification

(IPD-ENG-DEV-T22 A1 2016-09-23)

Product Name: Moulded Case Circuit Breaker (MCCB)

Product type: NDM5-250

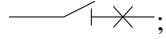
Date: 1/25/2018

Prepared	<u>Xu Tao</u>	Date	<u>2018-01-25</u>
Reviewed	<u>Sun Conglin</u>	Date	<u>2018-01-25</u>
Approved	<u>Gan Feiming</u>	Date	<u>2018-01-25</u>

Revision information					
Version	Revised contents and reasons	Date	Prepared	Reviewed	Approved
0	Newly added	10/27/2015	Hu Gang	Cai Yuchang	Wu Chunyan
1	Change of the breaking letter code and addition of the accessory contents.	4/15/2016	Wang Hengyang	Zhang Ying	Wu Chunyan
2	Add parameters of AC 800V and AC 1000V	1/25/2018	Xu Tao	Zhang Ying	Gan Feiming

1 Applicable scope and purpose

The NDM5-250 series of moulded case circuit breakers (referred to as circuit breakers) have a rated insulation voltage of 1000V and apply to circuits with the AC 50Hz/60Hz, the rated working voltage (AC230V/240V, AC400V/415V, AC690V, AC800V, AC1000V) and rated working current (63A to 250A). The circuit breakers are used for distributing power while protect the overload, short circuit and under-voltage (with a under-voltage release) of lines and power units as well as the infrequent starting, braking, overload and short circuit of motors.

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

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

2 Picture of the product



2P Product



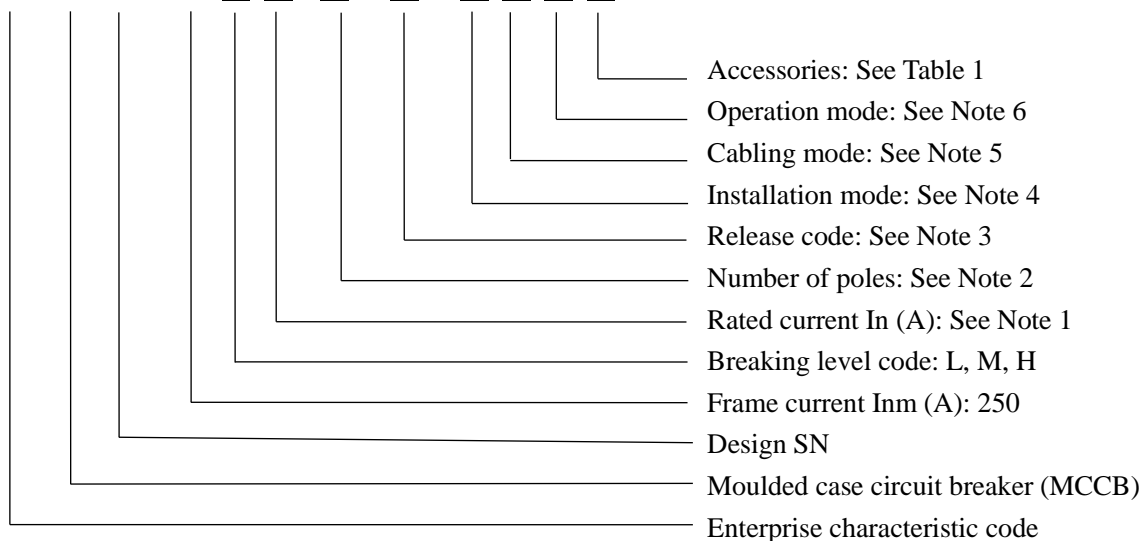
3P Product



4P Product

3 Specification and model description

ND M 5 - 250 □ □ / □ / □ □ □ □



Note: 1) Rated current In(A): 63A, 80A, 100A, 125A, 160A, 200A, 250A.

2) Number of poles:

2: 2 poles;

3: 3 poles;

4A: N-pole without the over-current protection, but is always on;

4B: N-pole without the over-current protection, but is on-off together with other three poles (N-pole is on and then off);

4C: N-pole with the over-current protection, but is on-off together with other three poles (N-pole is on and then off);

4D: N-pole with the over-current protection, but is always on.

3) Release code:

TMD (distribution protection): [thermo-adjustable (0.8-0.9-1.0) In, magnet-adjustable (5-6-7-8-9-10) In,

for the distribution];

TMM (motor protection): [thermo-adjustable (0.8-0.9-1.0) In, magnet-adjustable (9-10-11-12-13-14) In, for the motor] (3P products).

4) Installation mode: fixed type: no code; plug-in type: “P”; guide rail type: “G”.

5) Cabling mode: front connection: no code; front extended connection: “ES”; front bare-copper cable connection: “FCu”; rear screw connection: “R”.

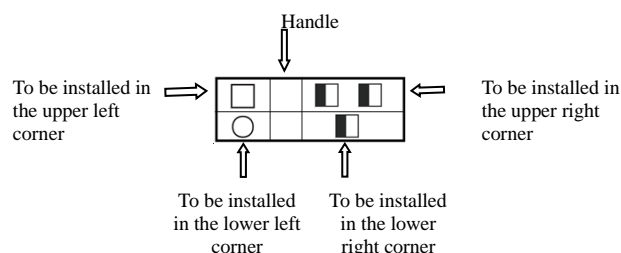
6) Operation mode: direct handle-operated: no code; rotation handle operated: “R”; motor-operated: “M” (2P not applicable).

Table 1

Accessory code	Accessory name	Installation position	
		2P	3P, 4P
00	None	—	—
08	Alarm contact		
10	Shunt release		
30	Under-voltage release		
21	Single auxiliary contact	—	
61	Two sets of single auxiliary contacts	—	
23	Three 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	—	
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	—	
75	Under-voltage Release, single auxiliary contact, alarm contact	—	
77	Under-voltage release, two sets of single auxiliary contacts, alarm contact	—	
81	Under-voltage release, three 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	—	
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	—	
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Note: Single auxiliary contact; Alarm contact; Shunt release; Under-voltage release.



Combination Table of Product Installation and Cabling Modes

Installation mode Cabling mode	Fixed type (none)	Plug-in type (P)	Guide rail type (G)
Front connection (none)	Common terminal	Plug-in front-plate connection	Common guide rail
Extended connection (ES)	Fixed-type extended busbar	/	Guide-rail extended busbar
Front bare copper cable (FCu)	Common connection frame	/	Guide-rail connection frame
Rear connection (R)	Rear-plate connection	/	/
Rear horizontal connection (HR)	/	Plug-in rear-plate horizontal connection	/
Rear vertical connection (VR)	/	Plug-in rear-plate vertical connection	/

4 Main technical parameters

Frame current Inm		250A		
Rated current In		63A,80A,100A,125A,160A,200A,250A		
Rated voltage Ue (V)		AC230V/AC240V,AC400V/AC415V,AC690V,AC800V,AC1000V		
Usage category		A		
Rated impulse withstand voltage Uimp		8000V		
Rated insulation voltage Ui		1000V		
Power frequency withstand voltage (1min)		3500V		
Rated Ultimate/Service Short-circuit breaking capacity Icu/Ics (kA)	Code	L	M	H
	AC230V/AC240V	70/70	100/100	150/150
	AC400V/AC415V (3P/4P)	70/70	100/100	150/150
	AC690V (3P/4P)	10/10	15/15	25/25
	AC800V (3P)	/	/	20/15
	AC1000V (3P)	/	/	15/10
Life	Mechanical life		25,000 times	
	Electrical life	AC230V/AC240V	10000 times	
		AC400V/AC415V	10000 times	
		AC690V	4000 times	
		AC800V	1500 times	
		AC1000V	1000 times	

5 Normal working environment

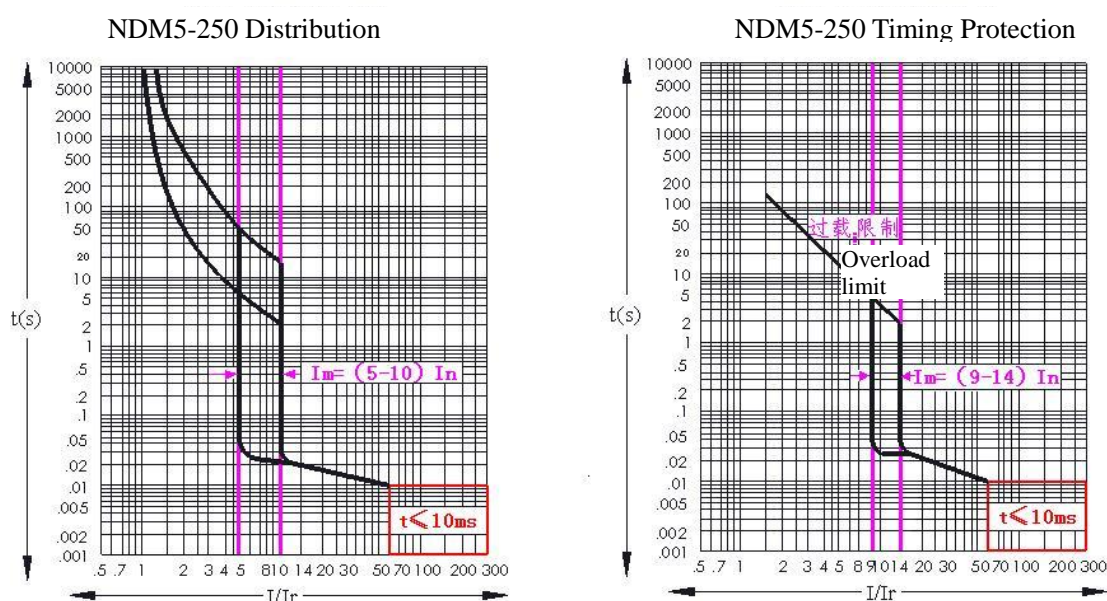
- 1) Ambient air temperature: $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$; the average value within 24 hours doesn't exceed $+35^{\circ}\text{C}$;
- 2) Storage environment: -40°C to $+75^{\circ}\text{C}$;

- 3) Elevation: $\leq 2000\text{m}$;
- 4) Atmospheric conditions: ambient air temperature of $+40^{\circ}\text{C}$, with a relative humidity of 95%;
- 5) Class of pollution: 3;
- 6) Protection class: IP20;
- 7) Installation category: main circuit and under-voltage release: installation category III; auxiliary circuit and control circuit: installation category II;

Note: The tripping parameters of NDM5-250 circuit breakers are set according to the ambient temperature of $+40^{\circ}\text{C}$; in case of the ambient temperature within $+40^{\circ}\text{C} \sim +70^{\circ}\text{C}$, users need to use the equipment for derating capacity. See "Derating Factor Table of Product Temperature Change" for the derating factory.

6 Tripping characteristics

6.1 Tripping characteristics curve under normal environment (ambient air temperature: 40°C)



6.2 Parameter setting and function description of the NDM5-250 thermo-magnetic AC distribution release

Setting gear of the overload long time-delay Ir		0.8In, 0.9In, 1.0In
Setting gear of the instantaneous short circuit	AC distribution	63A-125A: 10In (accuracy $\pm 20\%$)
	AC and DC distribution	160A-250A: 5In, 6In, 7In, 8In, 9In, 10In (accuracy $\pm 20\%$)
	Motor protection (only 3P)	160A-250A: 9In, 10In, 11In, 12In, 13In, 14In (accuracy $\pm 20\%$)
Action time	AC and DC distribution	1.05 In (cold state) doesn't operates within 2 hours, 1.3 In (thermal state) operate within 2 hours
	Motor protection (only 3P)	1.0 In (cold state) doesn't operate within 2 hours, 1.2 In (thermal state) operates within 2 hours
160A-250A: It features the thermo-magnetic parameter dual-adjustable functions and dual-display functions of overload and short-circuit fault actions (this functions is not available for 2P).		

6.3 The tripping characteristics should be corrected due to small changes when the ambient air temperature varies

Ambient air temperature	Correction factor
40℃	1.0
45℃	0.97
50℃	0.94
55℃	0.91
60℃	0.88
65℃	0.85
70℃	0.83

Note: 1. The above derating factors are measured at the frame current;

2. When the operating ambient temperature is below +40℃, the product can be used normally without derating capacity.

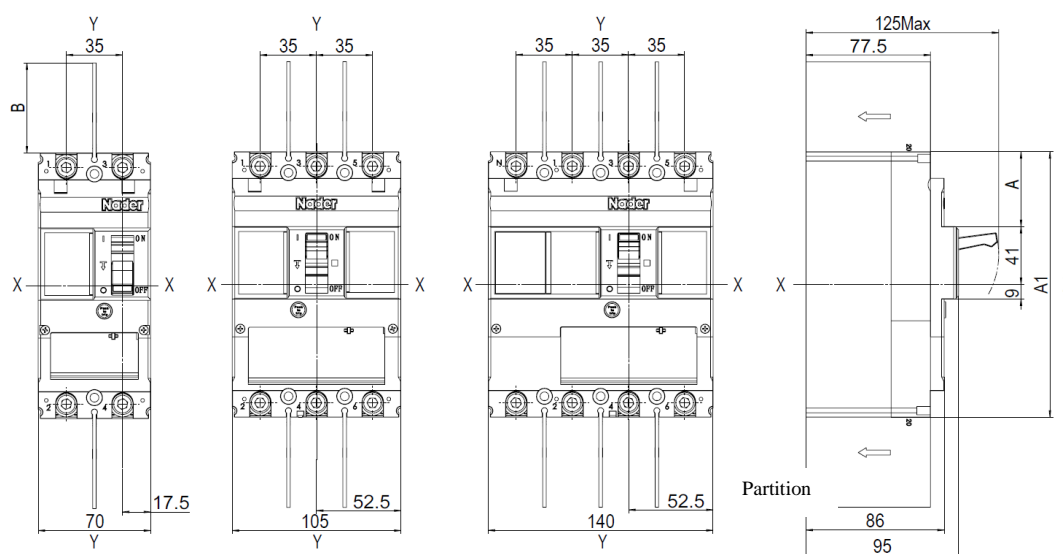
6.4 The tripping characteristics should be corrected due to small changes by considering the air insulation characteristics and cooling capacity with the ambient temperature of +40℃ and the altitude above 2,000m

Altitude (m)	2000	3000	4000	5000
Power frequency withstand voltage (v)	3500	3000	2500	2000
Average insulation class (v)	1Ui	0.9Ui	0.8Ui	0.7Ui
Maximum working voltage (v)	1Ue	0.9Ue	0.8Ue	0.7Ue
Average working current (+40℃)	1In	0.96In	0.93In	0.9In

7. Outline and installation dimensions

7.1 External dimensions of products

7.1.1 External dimensions of front-plate connection products



Note: Dimensions of conductive bar or terminal front-plate connection products: A=82.5, A1=165;

Dimensions of bare cable front-plate connection products (FCu): A=92.5, A1=185;

Dimensions of partition: B=56 (Ue ≤ 690V), B=100 (Ue > 690V)

7.1.2 External dimensions of extended front-plate connection products (ES)

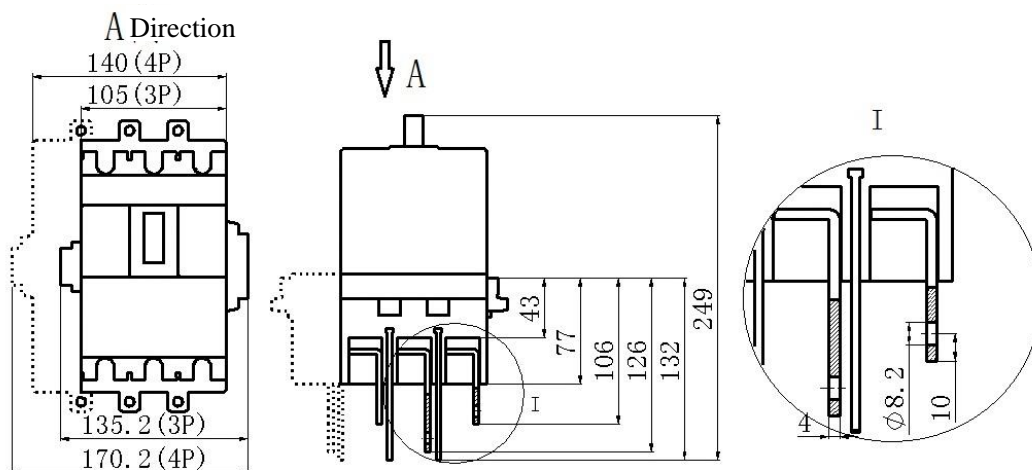
7.1.3 External dimensions of plug-in connection products

a) External dimensions of plug-in front-plate connection

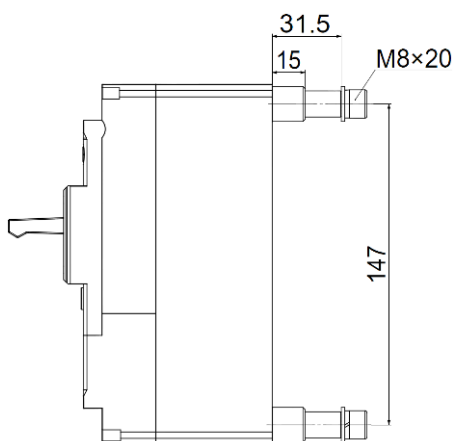
b) External dimensions of plug-in rear-plate horizontal connection (HR)



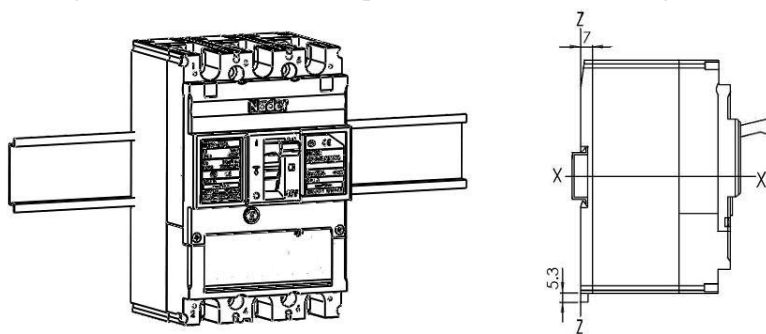
c) External dimensions of plug-in rear-plate vertical connection (VR)



7.1.4 External dimensions of rear-plate connection (R) products

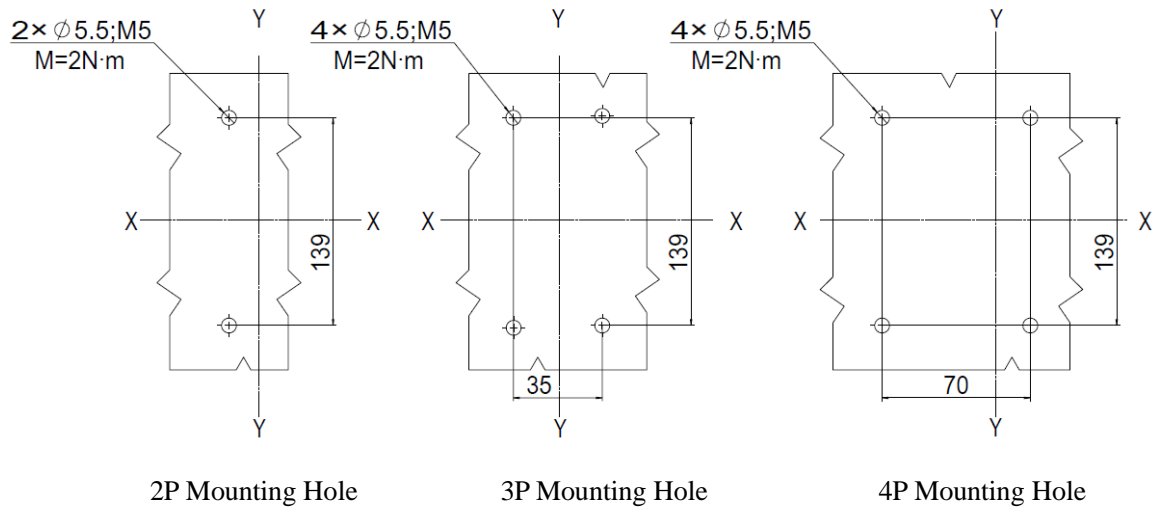


7.1.5 External dimensions of guide-rail connection (G) products installed on DIN guide rails

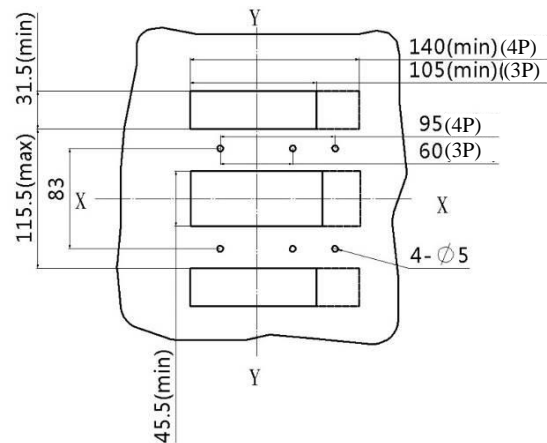


7.2 Product installation dimensions

7.2.1 Installed on the baseplate

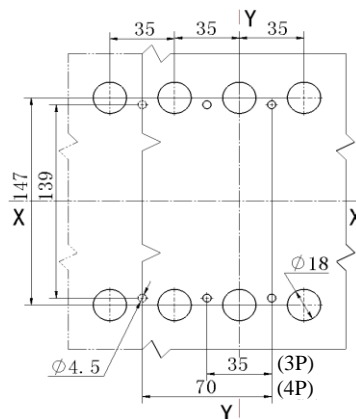


7.2.2 Mounting hole dimensions of plug-in connections



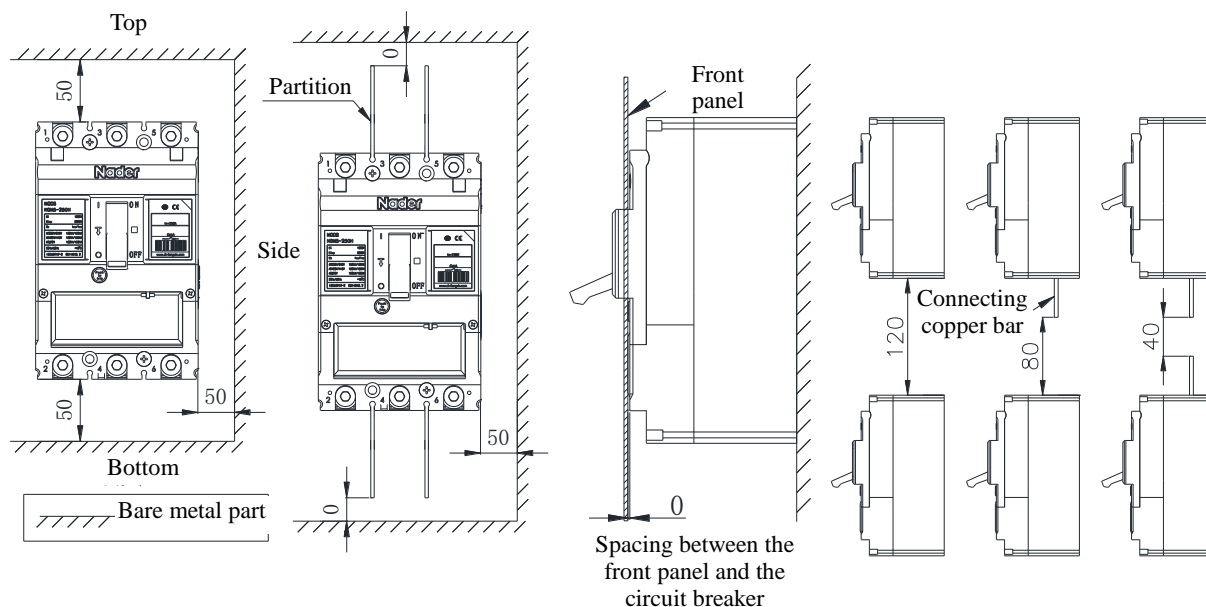
Note: The crosspoint between X-X and Y-Y is the center of the 3-P circuit breaker, as shown in the figure.

7.2.3 Mounting hole dimensions of rear-plate connection products



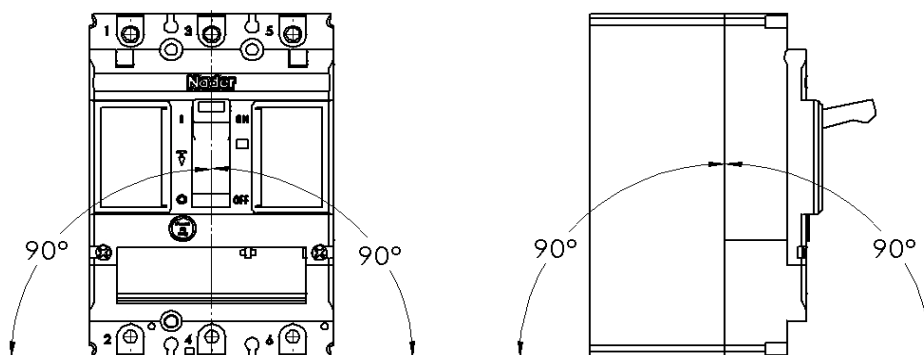
7.2.4 Safety spacing

See the figure below for the minimum safety distance of the circuit breaker from the top, bottom, side and front panel during installation.



8 Installation mode

The product allowable installation mode is shown as the figure below.



9 Product power consumption

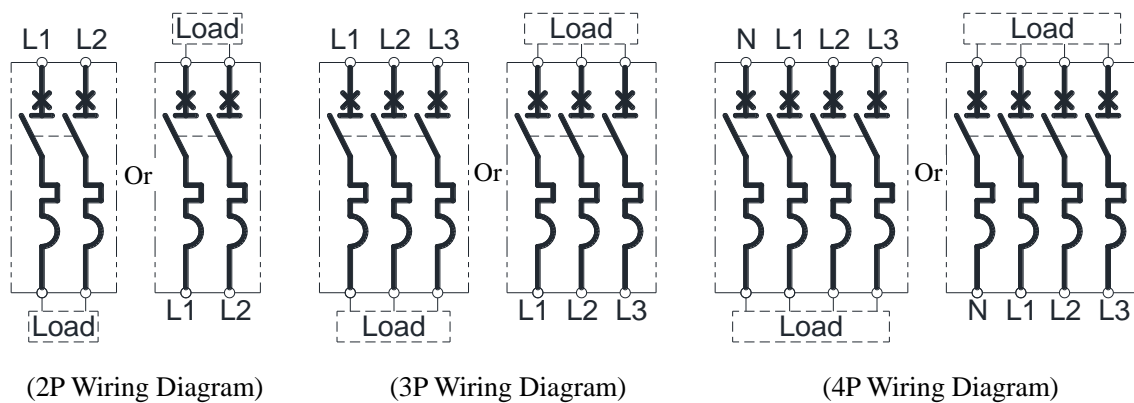
Single-phase Power Consumption Table of NDM5-250 Product Current Specifications

Product model	Current specifications	Single-phase power consumption(W)		
		Front-plate connection	Plug-in connection	Rear-plate connection
NDM5-250	63A	5.6	6	5.8
	80A	7.7	8.3	8
	100A	12	13	12.5
	125A	9.4	10.9	10.2
	160A	15.4	17.9	16.6
	200A	12	16	14
	250A	18.8	25	21.9

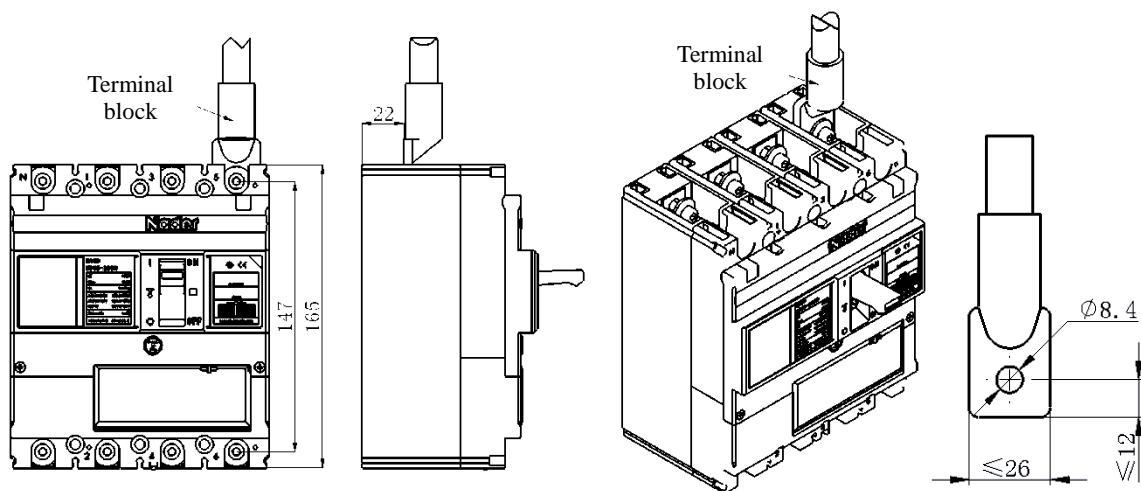
Note: The above data is the single power consumption of the circuit breaker measured at an ambient temperature of 40°C when the frame current is on.

10 Connection capacity

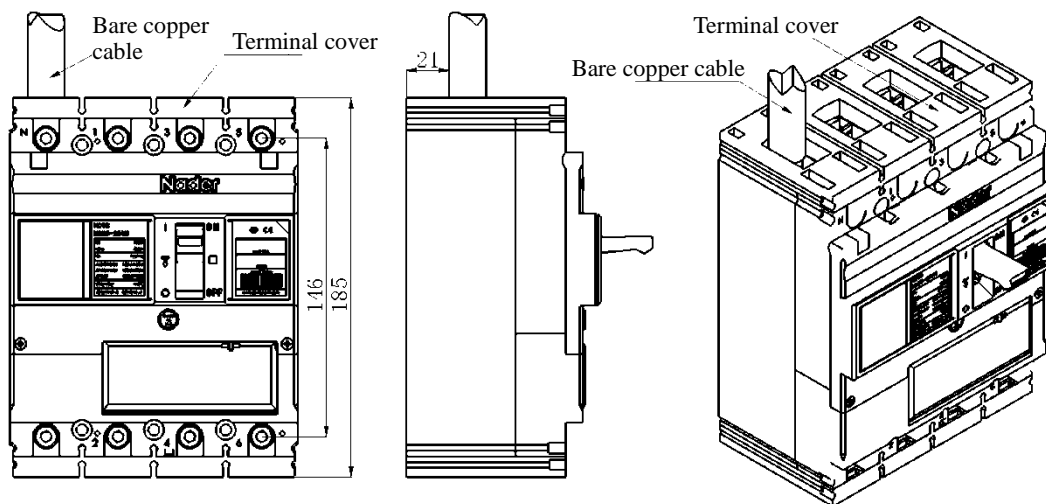
1. Wiring diagrams of the product main circuit



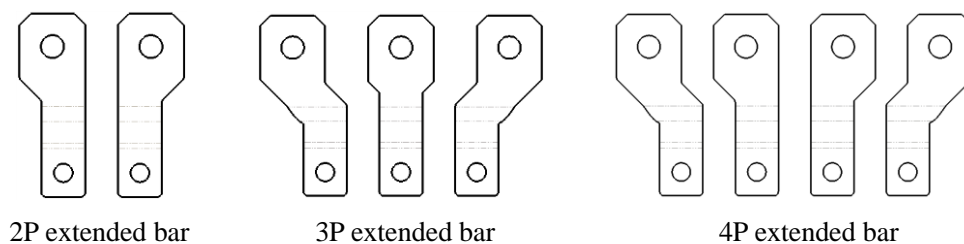
2. Connection of the front-plate copper bar or copper cable with terminal blocks



3. Connection of the front-plate bare copper cable (FCu)



4. Connection sorting of the extended terminal (ES)

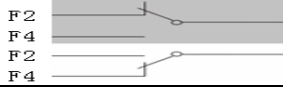
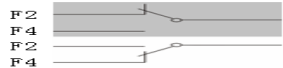


5. Reference section of the connecting wire

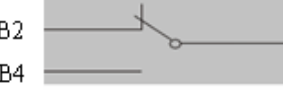
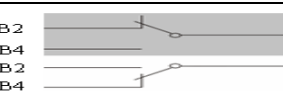
Rated current (A)	63	80	100	125	160	200	250
Wire cross-section area (mm²)	16	25	35	50	70	95	120
Tightening torque value of the terminal screw M8	Tightening torque 15N.m						
Note: The radiator short-bus bar provided with the DC product is installed by customers according to the requirements of wiring diagrams.							

11 Operation instructions for accessories

11.1 Rated parameters of the auxiliary contact

Accessory name		Auxiliary contact
Voltage specifications (V)/conventional		AC250V/10A, DC220V/0.2A
Wiring diagram	Off	
	On	
Internal resistance		< 30 mΩ

11.2 Rated parameters of the alarm contact

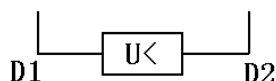
Accessory name		Alarm contact
Voltage specifications (V)/conventional		AC250V/3A, DC220V/0.2A
Wiring diagram	On, off	
	Free tripping	
Internal resistance		< 30 mΩ

11.3 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.

Voltage specifications of the under-voltage release: AC110V/DC110V, AC230V/DC250V, AC400V.

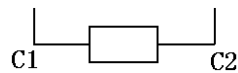
Accessory name	Under-voltage release		
Voltage specifications (V)	AC110/DC110	AC230/DC250	AC400
Power consumption (W)	0.5	1.0	1.5



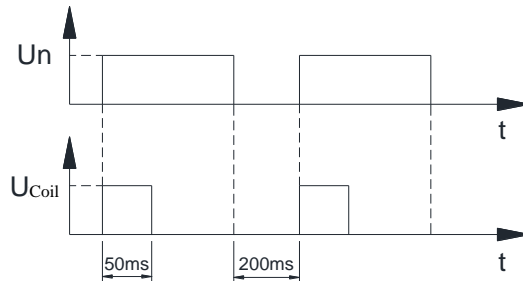
11.4 Shunt release

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.

Accessory name	Shunt release			
Voltage specifications (V)	AC24/DC24	AC48/DC48	AC110/DC110	AC230/DC250
Power consumption (W)	20	13	8	19



Working principle of the shunt release: a single pulse action. If another action is required, the shunt release can only be operated after being off, reset and energized.



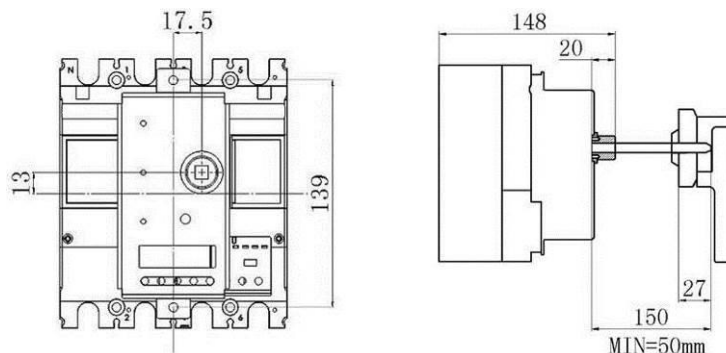
To make the circuit breaker fail to be closed normally during long-term energization, an auxiliary contact in series is required.



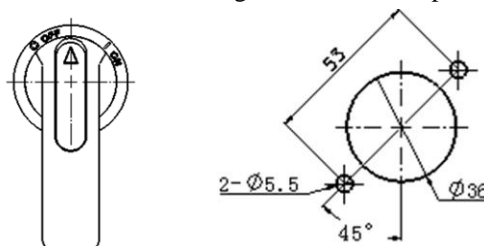
11.5 The standard wire length of the internal accessories (auxiliary contact, alarm contact, under-voltage release, and shunt release) is 0.7m.

Note: Users must propose to the sales personnel of the special requirements of the accessory wire length.

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

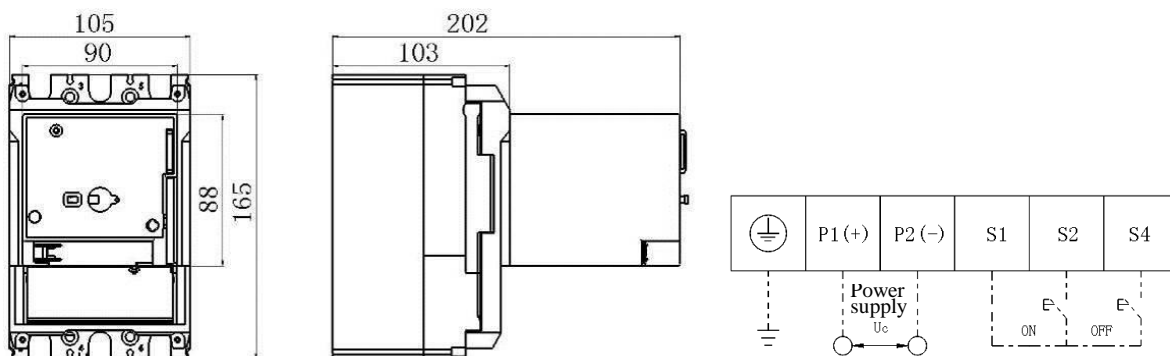


External Dimension Diagram of Manual Operation



Handle Mounting Hole Diagram

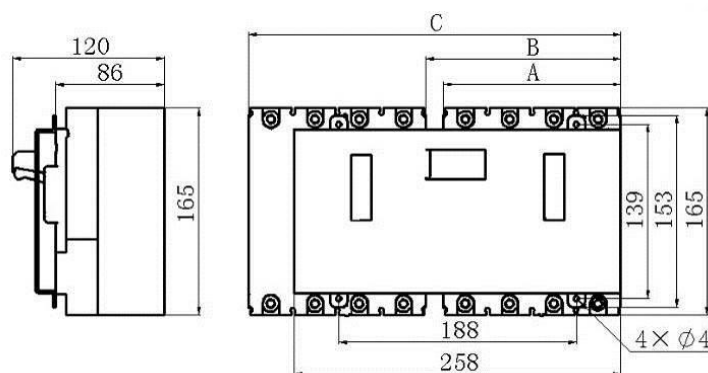
11.7 Electric operation-the external dimensions of the circuit breaker and its electric operating mechanism installed are shown as below:



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.

Accessory name	Voltage specifications
Electric operating mechanism	DC24V, AC110V/DC110V, AC230V/DC250V, AC400V
Motor power	14W

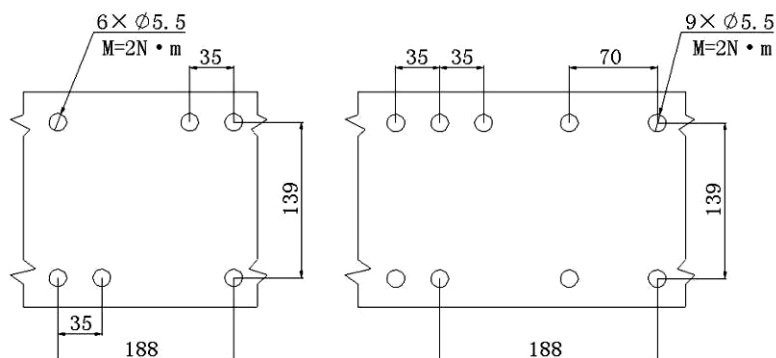
11.8 Interlocking-the external dimensions of the interlocked circuit breaker installed are shown as below:



Interlocking mechanism and its related dimensions

Product model	A	B	C
NDM5-250/3P	105	154	258
NDM5-250/4P	140	154	293

The dimensions of the mounting plate hole are shown as below with the interlocked circuit breaker installed:



12 Packaging and storage

Minimum packaging quantity: 1 piece/box. The packaged products should be stored in a warehouse without acidic, alkali or other corrosive gas in the surrounding air.

Users shall obey the storage and use conditions. In case of product damage or abnormal use due to manufacturing quality issues within 36 months from the date of factory delivery, the factory shall be responsible for free maintenance or replacement.

13 List of accessories and installation (see Table 8)

Table 8

SN	Name	Specifications	Quantity/Set		
			2P	3P	4P
1	Cross small pan-head screw(s)	M5×85	2	4	4
2	Plain washer	5	2	4	4
3	Spring washer	5	2	4	4
4	Hexagon nut(s)	M5	2	4	4
5	Partition	——	2	4	6

14 Precautions

- 1) The performance parameters of this specification are suitable for normal conditions. For special requirements, put the equipment into use after consulting the company with formal confirmation and re-adjusting parameters by the company.
- 2) The circuit breaker, tripping unit or other accessories can only be installed and maintained by the trained or qualified professionals;

Ensure th