

Shanghai Liangxin Electrical Co., Ltd.

Product Specification

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

Product Name: Moulded Case Circuit Breaker (MCCB)

Product type: NDM5Z-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	Change of the outline and installation dimensions	1/25/2018	Xu Tao	Zhang Ying	Gan Feiming

1 Applicable scope and purpose

The NDM5Z-250 series of moulded case circuit breakers (referred to as circuit breakers) have a rated insulation voltage of 1200V and apply to circuits with the rated working voltage of DC500V (2P in series), DC750V (2P/3P in series), DC1000V (3P/4P in series) and DC1200V (4P in series) as well as the rated working current (160A, 200A, 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.

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

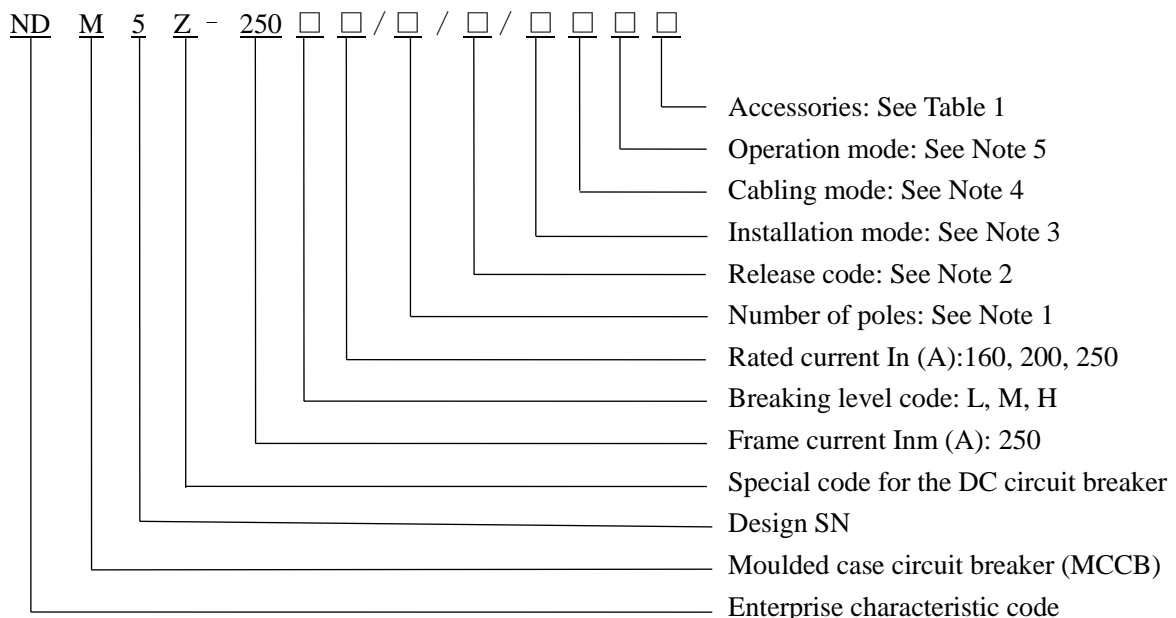


3P Product



4P Product

3 Specification and model description



Note: 1) Number of poles:

2: 2 poles; 3: 3 poles; 4: 4 poles;

2) Release code: TMDC (DC thermo-magnetic distribution release)

[thermo-adjustable (0.8-0.9-1.0) In, magnet-adjustable (5-6-7-8-9-10) In];

3) Installation mode: fixed type: no code; plug-in type: "P"; guide rail type: "G".

4) Cabling mode: front connection: no code; front extended connection: "ES"; rear screw connection: "R".

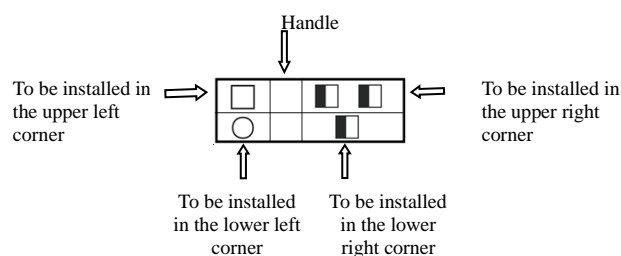
5) Operation mode: direct handle-operated: no code; rotation handle operated: "R"; motor-operated: "M" (2P

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	—	

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 I_{nm}		250A		
Rated current I_n		160A, 200A, 250A		
Rated voltage U_e (V)		DC500, DC750, DC1000, DC1200		
Usage category		A		
Rated impulse withstand voltage U_{imp}		8000V		
Rated insulation voltage U_i		1200V		
Power frequency withstand voltage (1min)		3500V		
Rated ultimate breaking capacity I_{cu} (kA)	Code	L	M	H
	DC500V (2P in series)	50	85	100
	DC750V (2P in series)	None		25
	DC750V (3P in series)	50	85	100
	DC1000V (3P in series)	None		25
	DC1000V (4P in series)	50	70	85
	DC1200V (4P in series)	None		40
Rated running breaking capacity I_{cs} (kA)		$I_{cs}=100\%I_{cu}$		
Life	Mechanical life		25,000 times	
	Electrical life	DC 500V (2P in series)	5000 times	
		DC 750V (2P in series)	5000 times	
		DC 750V (3P in series)	5000 times	
		DC1000V (3P in series)	4000 times	

		DC1000V (4P in series)	4000 times
		DC1200V (4P in series)	3000 times

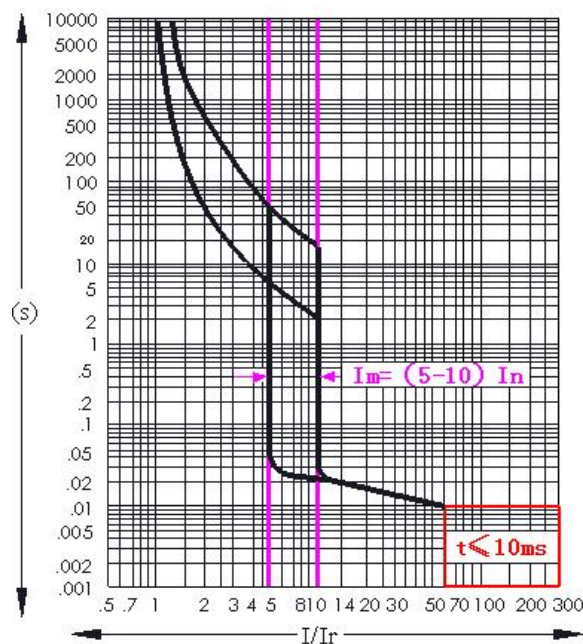
5 Normal working environment

- 1) Ambient air temperature: $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$ (ETC products: $-30^{\circ}\text{C} \sim +70^{\circ}\text{C}$); 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;
- 8) The product can be disposed in places that are free from explosive media, media corrosive to metal, insulation damaging gas, and conductive dust.
- 9) The product should be installed free from snow and rain.

Note: The tripping parameters of NDM5Z-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 NDM5Z-250 thermo-magnetic DC distribution release

Setting gear of the overload long time-delay I_r	0.8 I_n , 0.9 I_n , 1.0 I_n
Setting gear of the instantaneous short-circuit I_m	5 I_n , 6 I_n , 7 I_n , 8 I_n , 9 I_n , 10 I_n (accuracy $\pm 20\%$)
Action time	1.05 I_n (cold state) doesn't operates within 2 hours, 1.3 I_n (thermal state) operate within 2 hours
It features the thermo-magnetic parameter dual-adjustable functions and dual-display functions of overload and short-circuit fault actions (this function 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.

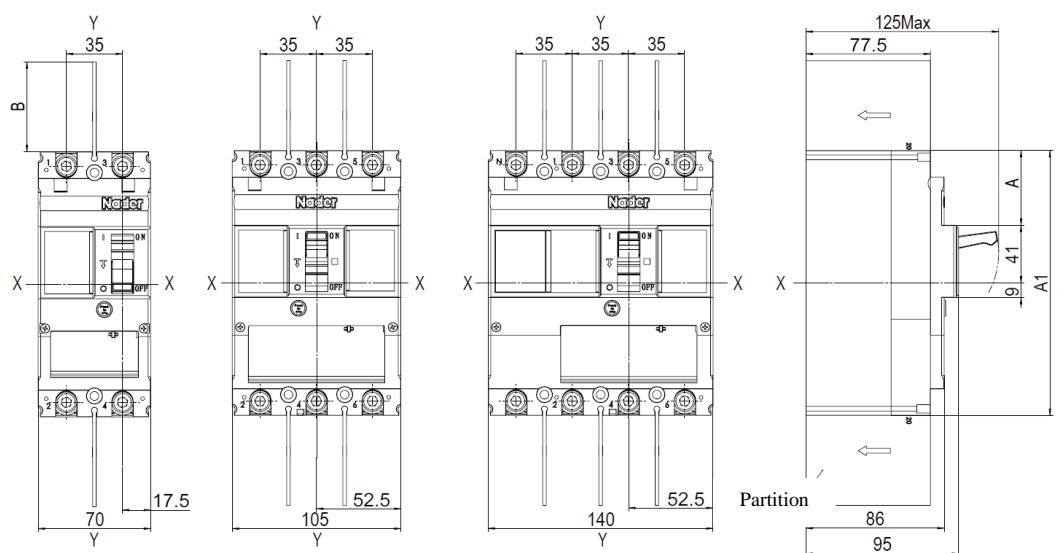
6.4 The tripping characteristics should be corrected due to small changes by considering the air insulation characteristics and cooling capacity with the ambient temperature of +40℃ and the altitude above 2,000m

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

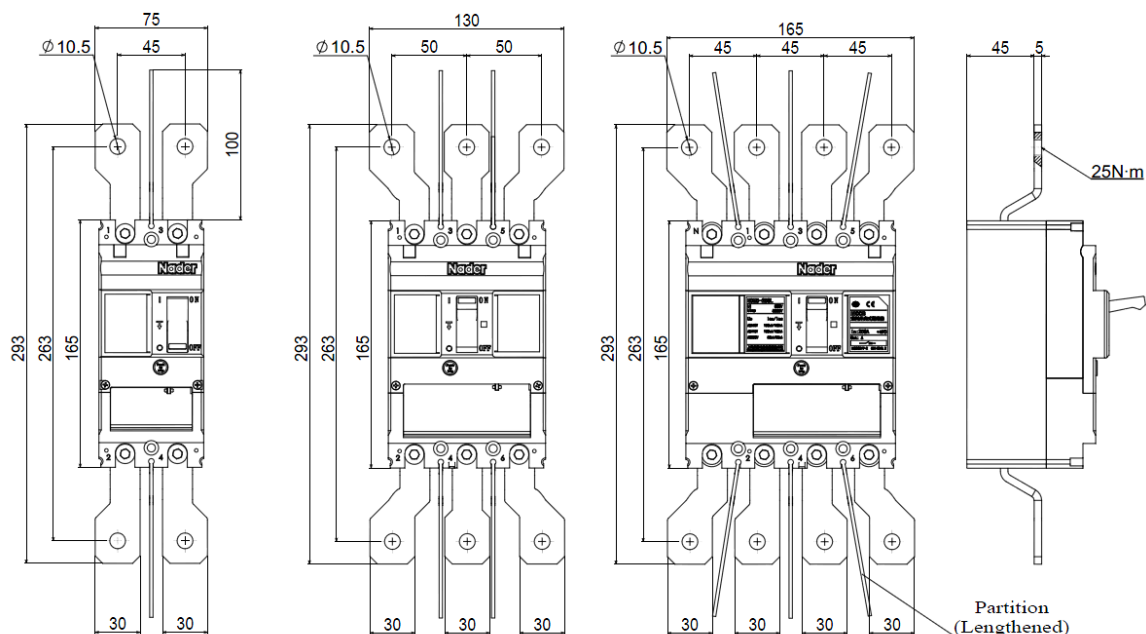
7.1 External dimensions of products

7.1.1 External dimensions of front-plate connection products



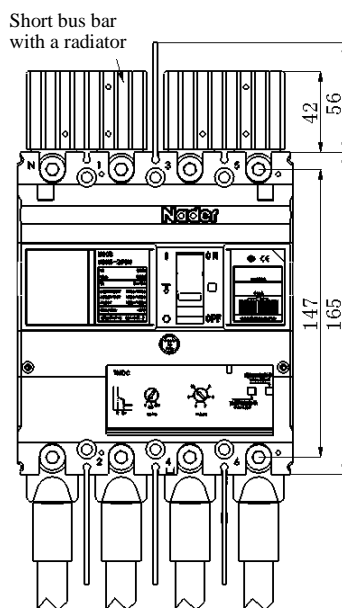
Note: dimensions of conductive bar or terminal front-plate connection products: A=82.5, A1=165.

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



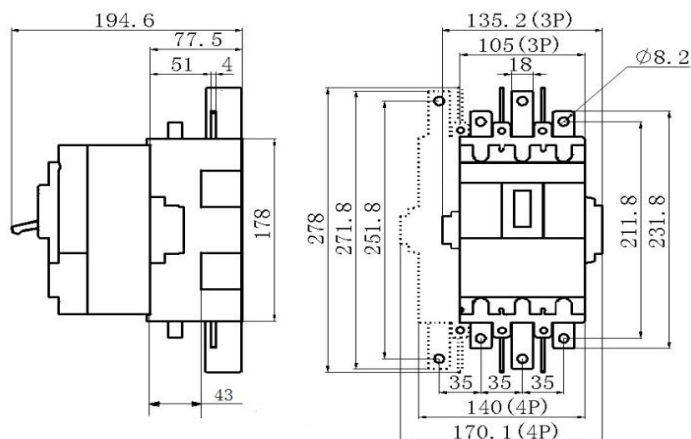
7.1.3 External dimensions of DC products installed with a "Short bus bar with a radiator" (ambient temperature: +40°C)

Note: The radiator short-bus bar provided with the DC product is installed by customers according to the requirements of wiring diagrams.

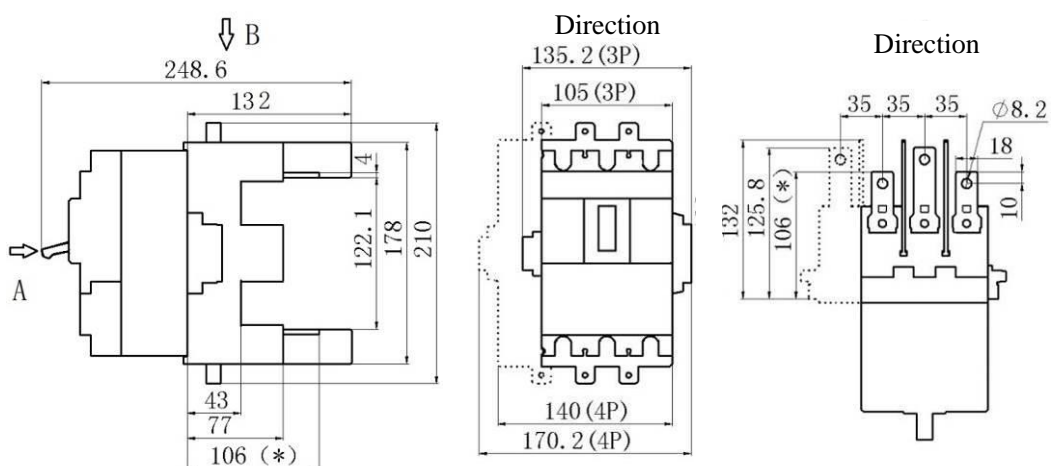


7.1.4 External dimensions of plug-in connection products

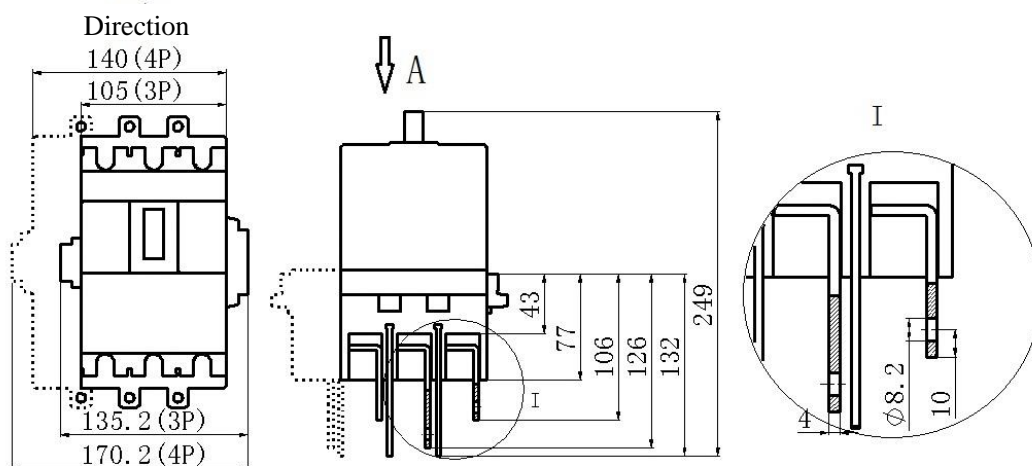
a) External dimensions of plug-in front-plate connection



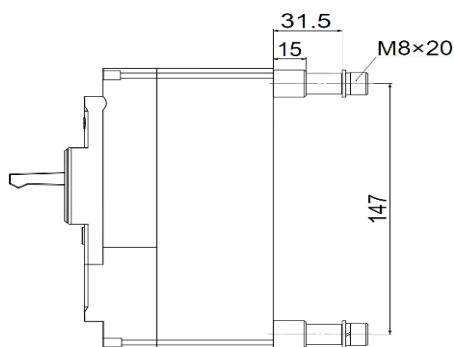
b) External dimensions of plug-in rear-plate horizontal connection (HR)



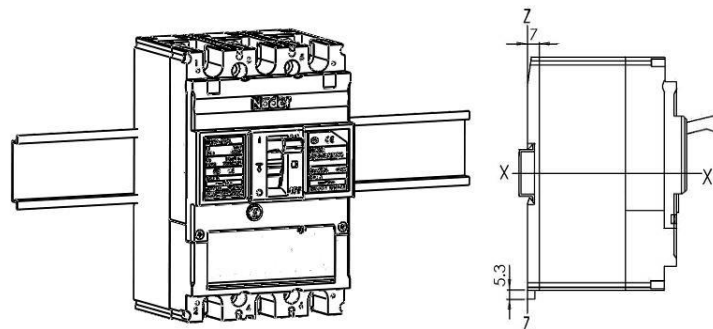
c) External dimensions of plug-in rear-plate vertical connection (VR)



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

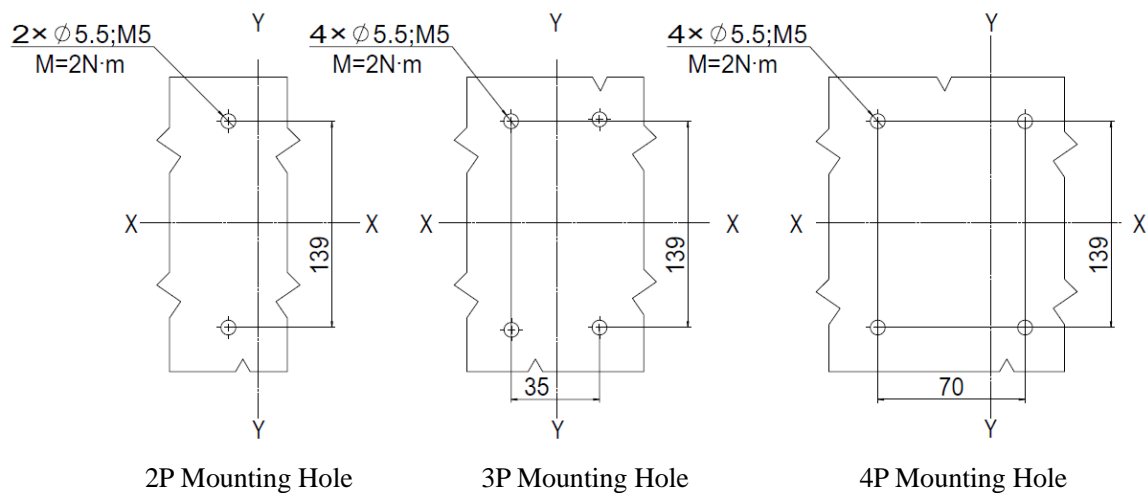


7.1.6 External dimensions of guide-rail connection (G) products installed on DIN guide rails

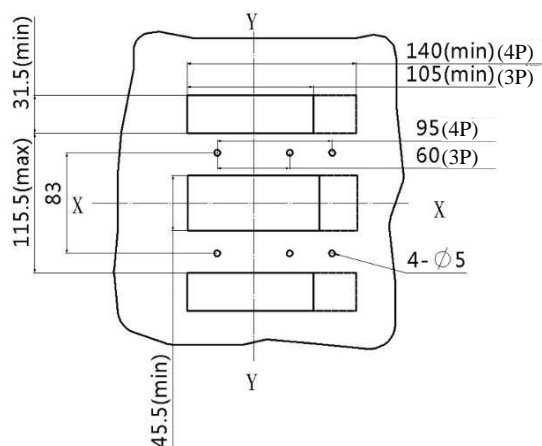


7.2 Product installation dimensions

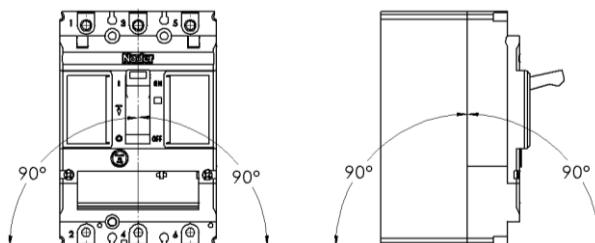
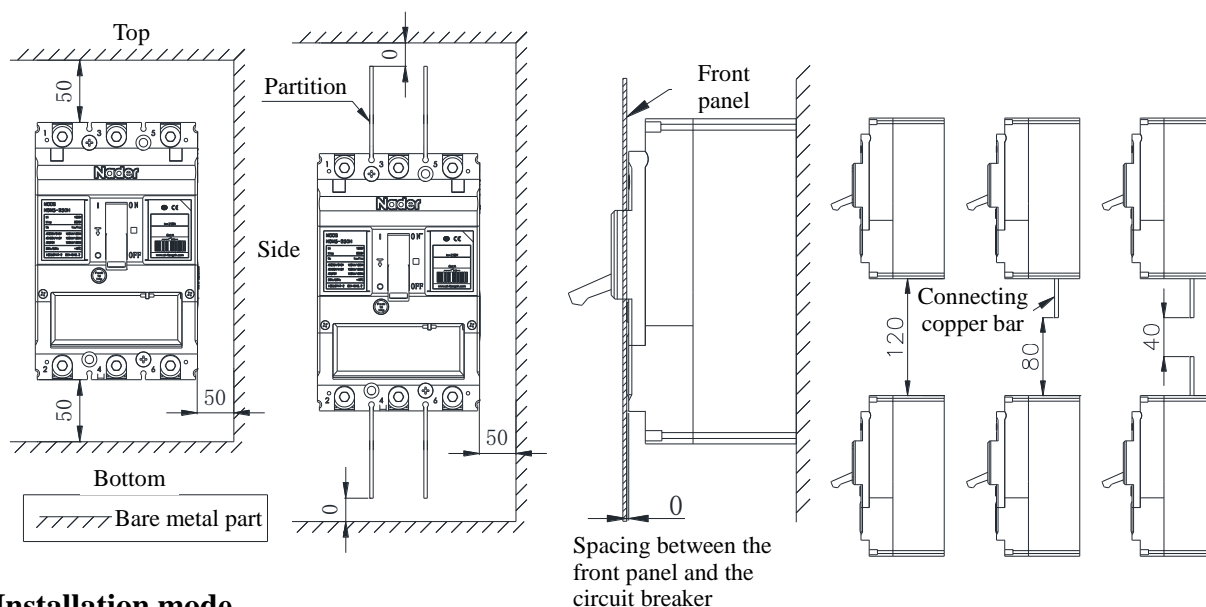
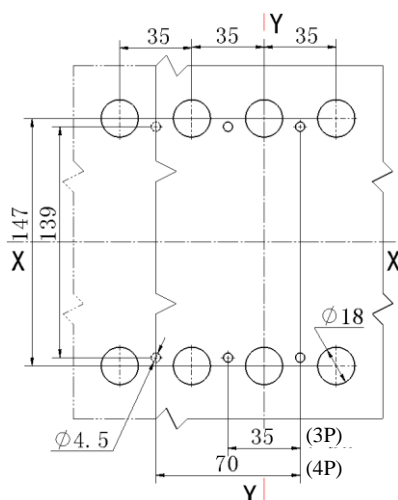
7.2.1 Installed on the baseplate



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.

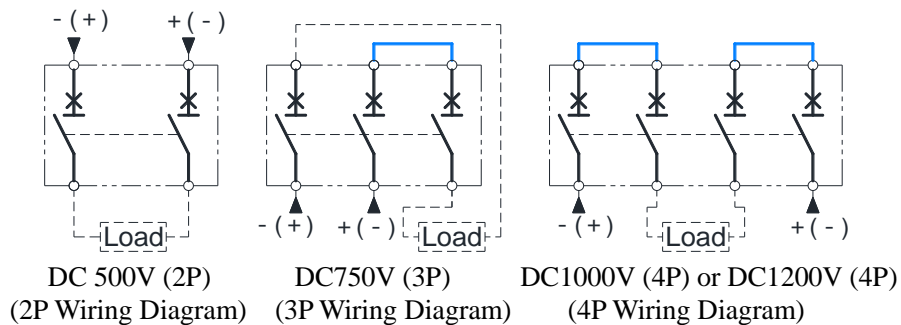


Product model	Current specifications	Single-phase power consumption(W)		
		Front-plate connection	Plug-in connection	Rear-plate connection
NDM5Z-250	160	9.4	10.9	10.2
	200	15.4	17.9	16.6
	250	12	16	14

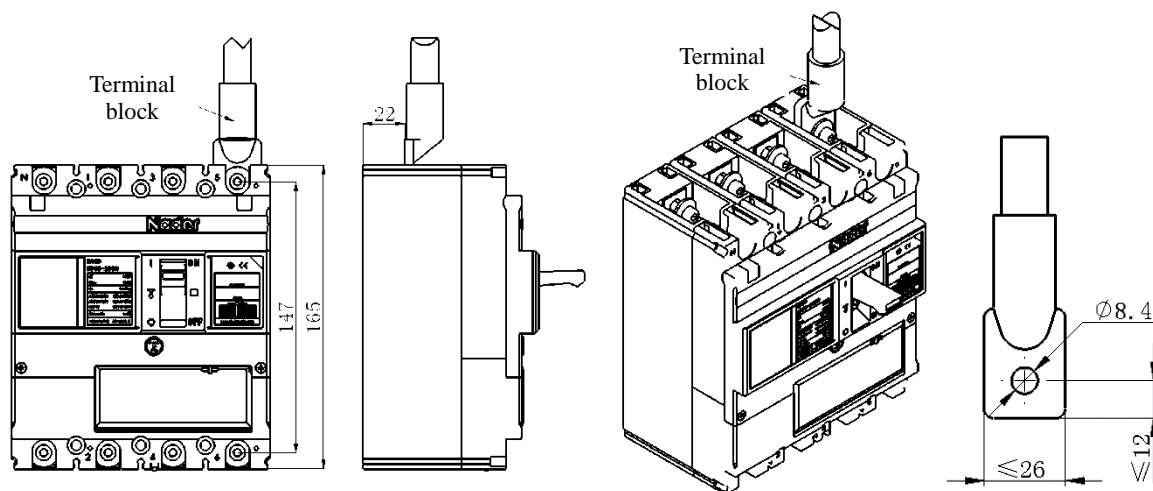
Note: The above data is the single power consumption of the circuit breaker measured at an ambient temperature of 40°C when the frame current is on.

10 Connection capacity

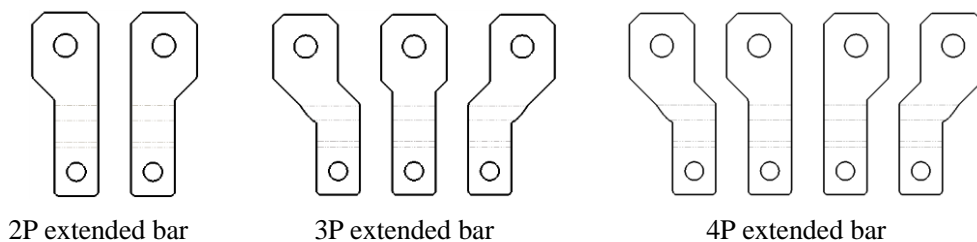
1. Wiring diagrams of the product main circuit



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



3. Connection sorting of the extended terminal (ES)



4. Reference section of the connecting wire

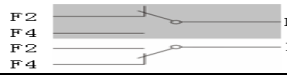
Rated current (A)	160	200	250
Wire cross-section area (mm ²)	70	95	120
Tightening torque value of the terminal screw M8	Tightening torque, 15N.m		

Note: The radiator short-bus bar provided with the DC product is installed by customers according to the requirements of wiring diagrams.

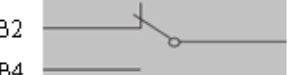
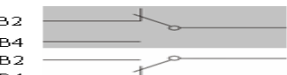
11 Operation instructions for accessories

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

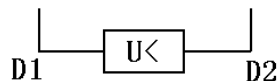
Accessory name		Alarm contact
Voltage specifications (V)/conventional		AC250V/3A, DC220V/0.2A
Wiring diagram	On, off	
	Free tripping	
Internal resistance		< 30 mΩ

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.

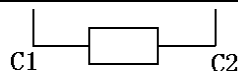
Accessory name	Under-voltage release		
Voltage specifications (V)	AC110/DC110	AC230/DC250	AC400
Power consumption (W)	0.5	1.0	1.5



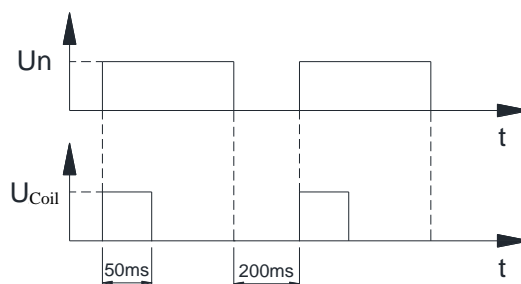
11.4 Shunt release

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

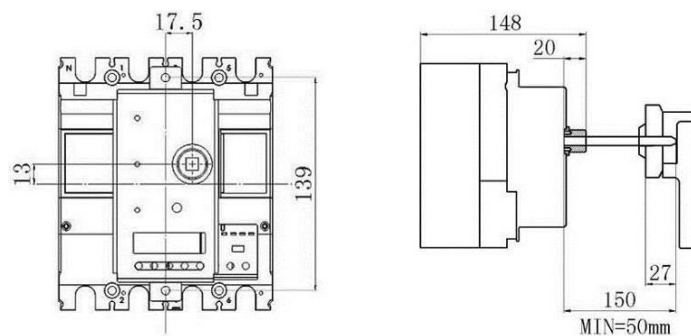
series is required.



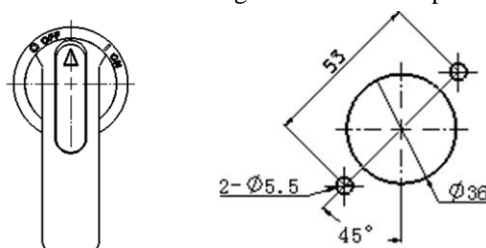
11.5 The standard wire length of the internal accessories (auxiliary contact, alarm contact, under-voltage release, shunt release) is 0.7m.

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:

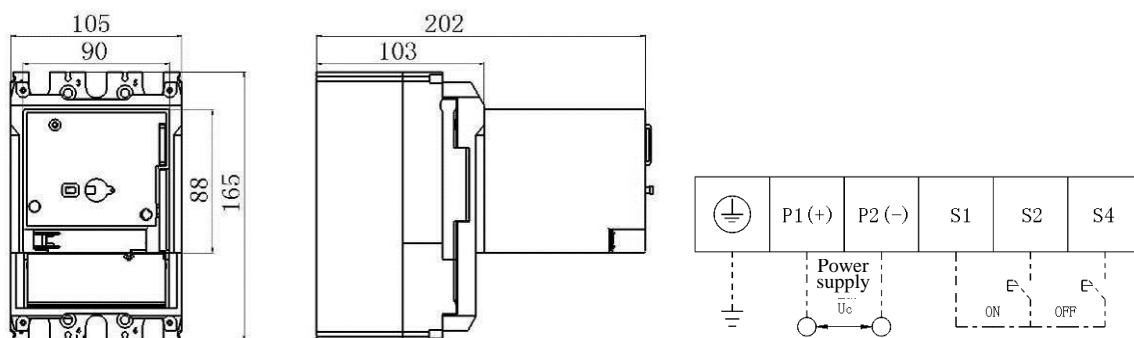


External Dimension Diagram of Manual Operation



Handle Mounting Hole Diagram

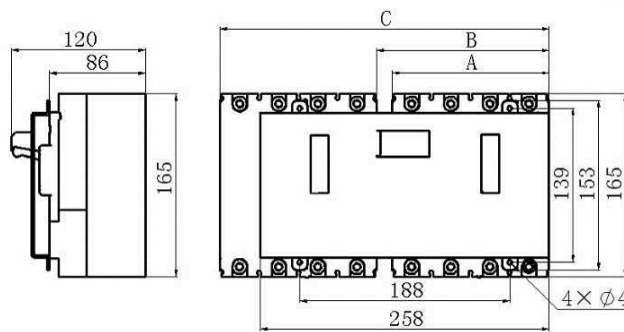
11.7 Electric operation—the external dimensions of the circuit breaker and its electric operating mechanism installed are shown as below:



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

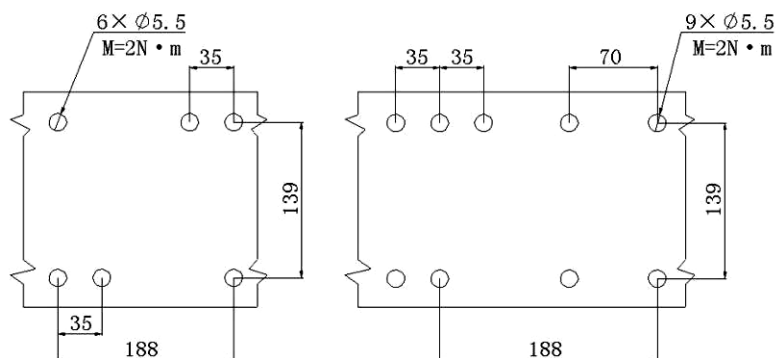
11.8 Interlocking-the external dimensions of the interlocked circuit breaker installed are shown as below:



Interlocking mechanism and its related dimensions

Product model	A	B	C
NDM5Z-250/3P	105	154	258
NDM5Z-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 product accessories

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	3	4
6	Short bus bar with a radiator (or short bus bar)	—	0	1	2

13 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;
- 3) Ensure that the power supply is off before installing or removing any device;
