

Shanghai Liangxin Electrical Co., Ltd.

NDM5-400V/630V Moulded Case Circuit Breaker Product Specification

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

Product name: Moulded Case Circuit Breaker (MCCB)

Product model: NDM5-400V/630V

Date: July. 25, 2024

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Revision History					
Version	Revision Reason/Content	Implementation Date	Prepared by	Reviewed by	Approved by
0	Newly added file	June 20, 2018	Xu Tao	Sun Cong lin Zhang Yin	Gan Fei ming
1	1)Update the specification of shunt release and undervoltage release. 2) Add the insulating partition to the list of accessories.	September 19, 2018	Xu Tao	Sun Cong lin Zhang Yin	Gan Fei ming
2	Add NDM5-400/630 U/R (AC690V) related content	July 9, 2019	Huang Xie jun	Ding Fei	Cao Jian
3	Add manual accessories and remarks on model selection	August 9, 2019	Huang Xie jun	Ding Fei	Cao Jian
4	Delete NDM5-400/630 U/R (AC690V) related content	August 20, 2019	Huang Xie jun	Ding Fei	Cao Jian
5	Update product related information	Dec 12, 2022	Yang rong rong	Xu juncheng	Ding Fei
6	Add attachment package information	July 22,2024	Yang rong rong	Huang jin hua	Ding Fei

1 、 Applicable scope and purpose

The NDM5-400V series of moulded case circuit breakers have a rated insulation voltage of 1000V and apply to circuits with the AC 50Hz/60Hz, the rated working voltage (AC800V, AC1000V) and rated working current (250A, 320A, 400A for 400 shell frame). 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 NDM5-630V series of moulded case circuit breakers have a rated insulation voltage of 1000V and apply to circuits with the AC 50Hz/60Hz, the rated working voltage (AC800V, AC1000V) and rated working current (400A, 500A, 630A for 630 shell frame). 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 $\text{---}\diagup\diagdown\text{---}$.

Comply with standards: IEC 60947-2, GB/T 14048.2.

2 、 Picture of the Product



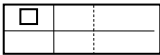
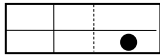
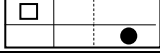
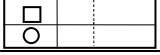
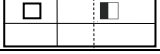
Product picture

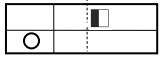
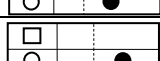
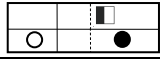
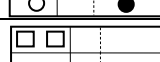
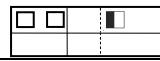
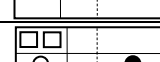
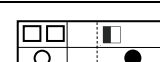
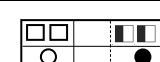
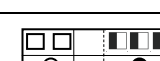
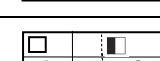
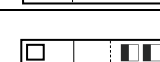
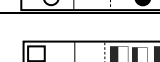
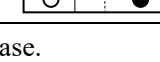
3、Specification and model description

ND 1	M 2	5 - 3	☐ 4	☐ 5	☐ 6	☐ 7	☐ 8	/ ☐ 9	/ ☐ 10	/ ☐ 11	☐ 12	☐ 13	☐ 14
S.N.	Name of S.N.	NDM5											
1	Enterprise	ND: Nader low-voltage apparatus											
2	Product type code	M:Moulded case circuit breaker (MCCB)											
3	Design S.N.	5											
4	Current of the	400、630											
5	Derived code of the series	V: High voltage											
6	Interrupting level	M:medium-high											
7	Reference temperature	Null: Normal temperature type											
		T: High temperature type											
8	Rated current	See table 2											
9	Pole	3:3 poles											
10	Trip release code	TMF: Thermal magnetic fixed release											
		TMD: AC protection-thermo-magnetic distribution release											
11	Installation code+ Wiring method	Null: Stationary connector + front panel wiring											
12	Operation method	Null: directly handle operation											
		Z1A150:rotary handle with round center hole and square axis length 150											
		Z1A200:rotary handle with round center hole and square axis length 200											
		Z1A300:rotary handle with round center hole and square axis length 300											
		Z1A350:rotary handle with round center hole and square axis length 350											
		Z1A650:rotary handle with round center hole and square axis length 650											
		Z1F150:rotary handle with round square hole and square axis length 150											
		Z1F200:rotary handle with round square hole and square axis length 200											
		Z1F300:rotary handle with round square hole and square axis length 300											
		Z1F350:rotary handle with round square hole and square axis length 350											
		Z1F650:rotary handle with round square hole and square axis length 650											
		Z2A/150: Circular eccentric hole rotary handle + shaft length 150mm											
		Z2A/200: Circular eccentric hole rotary handle + shaft length 200mm											

		Z2A/300: Circular eccentric hole rotary handle + shaft length 300mm
		Z2A/350: Circular eccentric hole rotary handle + shaft length 350mm
		Z2A/650: Circular eccentric hole rotary handle + shaft length 650mm
		Z2F/150: Square eccentric hole rotary handle + shaft length 150mm
		Z2-F/200: Square eccentric hole rotary handle + shaft length 200mm
		Z2F/300: Square eccentric hole rotary handle + shaft length 300mm
		Z2F/350: Square eccentric hole rotary handle + shaft length 350mm
		Z2F/650: Square eccentric hole rotary handle + shaft length 650mm
13	Accessory code	See table 1
14	Other codes	Customer name or special needs

Table 1 NDM5-400V/630V

Accessory code	Accessory name	Installation position
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	Alarm contact+ shunt release	
38	Alarm contact+ under-voltage release	
22	Alarm contact+ single auxiliary contact	
88	Alarm contact+ two sets of single auxiliary contacts	
26	Alarm contact+ three sets of single auxiliary contacts	
42	Alarm contact+ shunt release+ single auxiliary contact	
44	Alarm contact+ shunt release+ two sets of single auxiliary contacts	
46	Alarm contact+ shunt release+ three sets of single auxiliary contacts	
75	Alarm contact+ under-voltage release+ single auxiliary contact	
77	Alarm contact+ under-voltage release+ two sets of single auxiliary contacts	
81	Alarm contact+ under-voltage release+ three sets of single auxiliary contacts	
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	
50	Shunt release+ under-voltage release	
31	Alarm contact+ shunt release+ under-voltage release	
51	Shunt release+ under-voltage release+ single auxiliary contact	
52	Shunt release+ under-voltage release+ two sets of single auxiliary contacts	
53	Shunt release+ under-voltage release+ three sets of single auxiliary contacts	
98	Two sets of single alarm contacts	
63	Two sets of single alarm contacts+ single auxiliary contact	
64	Two sets of single alarm contacts+ two sets of single auxiliary contacts	
65	Two sets of single alarm contacts+ three sets of single auxiliary contacts	
37	Two sets of single alarm contacts+ shunt release+ under-voltage release	
39	Two sets of single alarm contacts+ shunt release+ under-voltage release+ single auxiliary contact	
55	Two sets of single alarm contacts+ shunt release+ under-voltage release+ two sets of single auxiliary contacts	
56	Two sets of single alarm contacts+ shunt release+ under-voltage release+ three sets of single auxiliary contacts	
32	Shunt release+ under-voltage release, single auxiliary contact	
33	Alarm contact+ shunt release+ under-voltage release+ two sets of single auxiliary contacts	
34	Alarm contact+ shunt release+ under-voltage release+ three sets of single auxiliary contacts	

Note: ■ Single auxiliary contact; □ Alarm contact; ● Shunt release; ○ Under-voltage release.

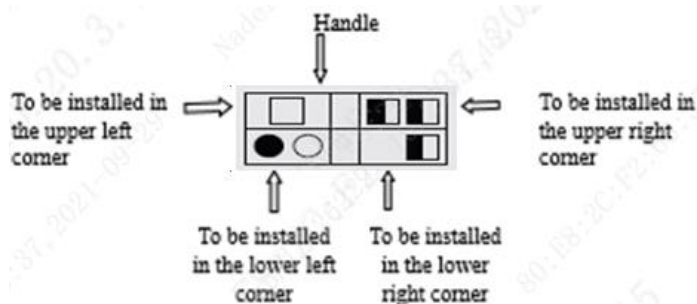
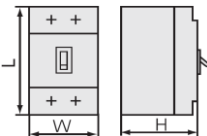


Fig.2 Attachment installation diagram

4. Main Technical Parameters

Table 2

Model		NDM5-400V	NDM5-630V
Frame current Inm (A)		400	630
Rated current In (A)		250, 320, 400	400, 500, 630
Rated voltage Ue (V)		AC800, AC1000	
Utilization category		A	
Rated impulse withstand voltage Uimp (V)		8000	
Rated insulation voltage Ui (V)		1000	
Power frequency withstand voltage (1min) (V)		4000	
Rated frequency (Hz)		50/60	
Rated Ultimate breaking capacity Icu (kA)	AC800V	50	
	AC1000V	35	
Rated Service breaking capacity Ics (kA)	AC800V	50	
	AC1000V	18	
Mechanical life (times)	Maintainable free life	15000	
	Maintainable life	30000	
Electrical life (times)	AC800V	1500	
	AC1000V	1000	
Boundary dimension 	L (mm)	250	
	W (mm)	140	
	H (mm)	130.5	
Flashover distance(mm)		≤100	
Breaking ability level		M	
Number of poles		3	

Note: The overall dimension does not include the dimension of terminal cover.

4.1 sectional area and applicable rated current adopted in wiring

Table 3-1 Wire parameters

Rated current (A)	250	320	400
Conductor area (mm ²)	120	185	240

Table 3-2 Wire parameters

Rated current (A)	cable		Copper bar	
	Conductor are(mm ²)	Quantity	Size(mm ²)	Quantity
500	150	2	30×5	2
630	185	2	32×6	2

4. 2 Derating factor of temperature change for the circuit breaker

Table 4 Derating factor table of temperature change for the circuit breaker

Model	Screw application	Thread specification	Torsional moment (N·m)
NDM5-400V/630V	Wiring screw	M10	50
	Set screw	M5	2

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						
Temperatu (°C)	40	45	50	55	60	65	70
NDM5-400V	1	1	1	0.95	0.91	0.86	0.80
NDM5-630V	1	1	1	0.94	0.90	0.85	0.80

Note: 1)When the operating ambient temperature is below + 50℃,the product can be used normally without derating capacity. and do not need to reduce capacity.

2)The above derating factors are measured under the rated current of the shell frame.

4. 4 High altitude derating factor of circuit breaker

Table 6 Altitude drop correction factor

Altitude (m)	Working current correction coefficient	Maximum working current correction coefficient (V)		Power frequency withstand voltage (V)	Isolation voltage correction coefficient (V)
2000	1	1000	800	4000	1000
2500	1	1000	800	4000	1000
3000	0.98	900	720	3600	900
3500	0.97	850	670	3400	850
4000	0.95	810	630	3200	810
4500	0.94	770	600	3000	770
5000	0.93	730	560	2800	730

4. 5 Power consumption of circuit breaker

Table 7 NDM5-400V/630V Product current specification single phase power consumption able

Model	Current specification	Single phase power consumption (W)
		Front panel wiring
NDM5-400V	400A	19.8
NDM5-630V	630A	39.5

Note: The above data are the single-phase loss measured under the rated current of the circuit breaker when the ring temperature is 40°C。

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°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) Degree of protection : IP 20;
- 8) 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;
- 9) In case of stricter user conditions than the above description, negotiate with the manufacturer.

6 Tripping characteristics

6.1 Tripping characteristics curve under normal environment (ambient air temperature: 50°C), see the picture below:

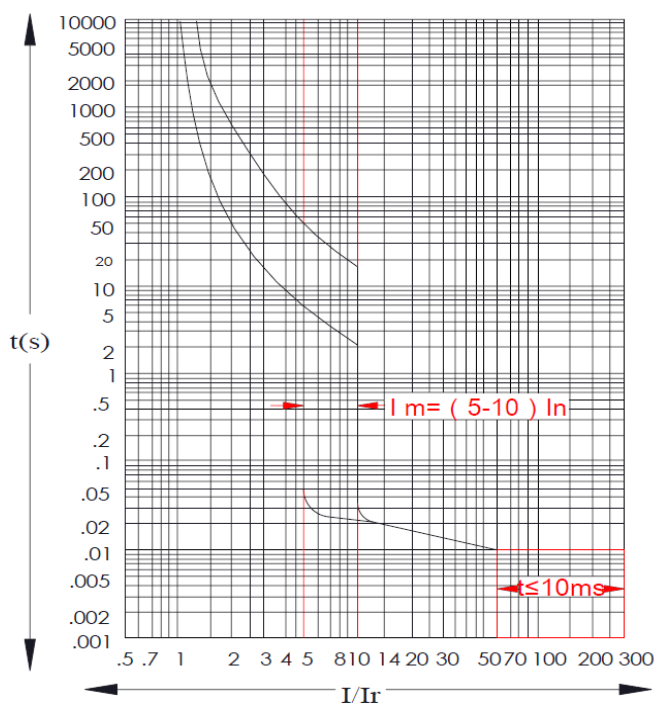


Fig.2 NDM5-400V

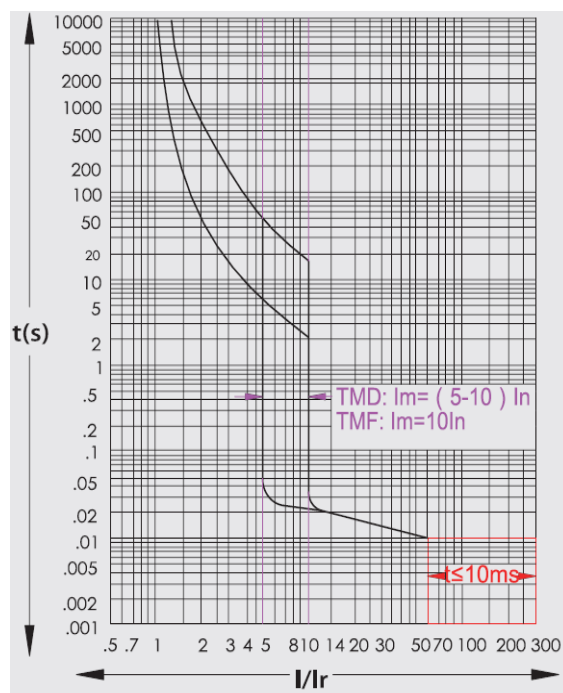


Fig.3 NDM5-630V

6.2 Current limiting and permissive characteristic curve

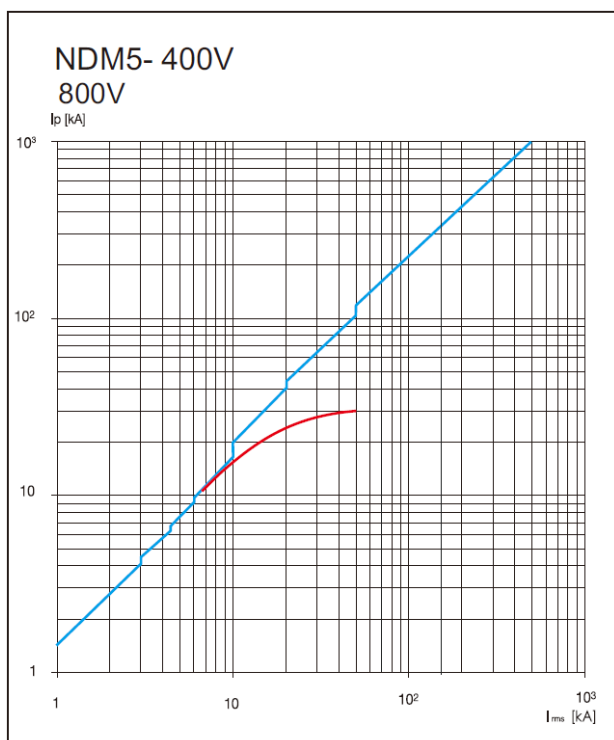


Fig.4 NDM5-400V Current limiting characteristic curve chart

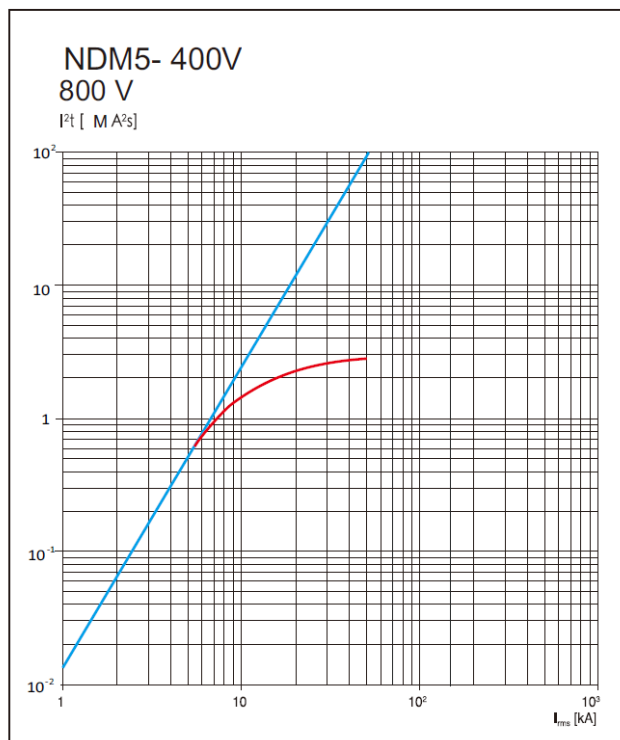


Fig.5 NDM5-400V Permissive characteristic curve chart

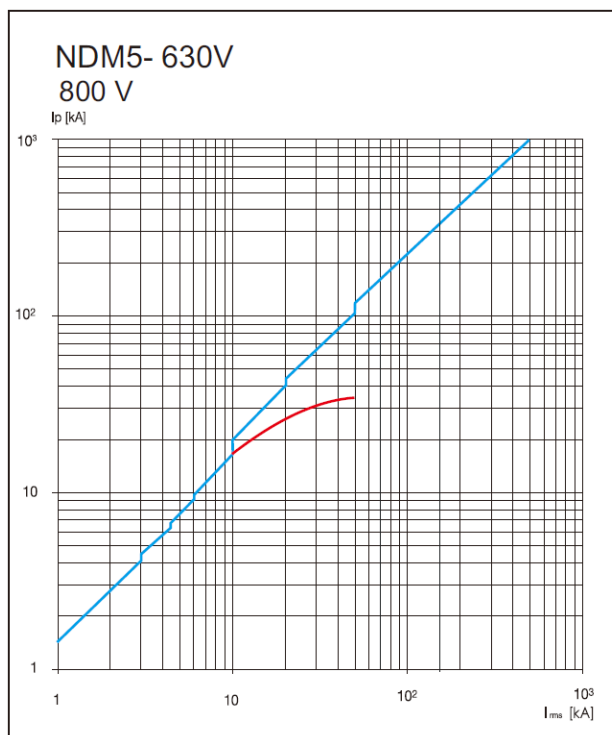


Fig.6 NDM5-630V Current limiting characteristic curve chart

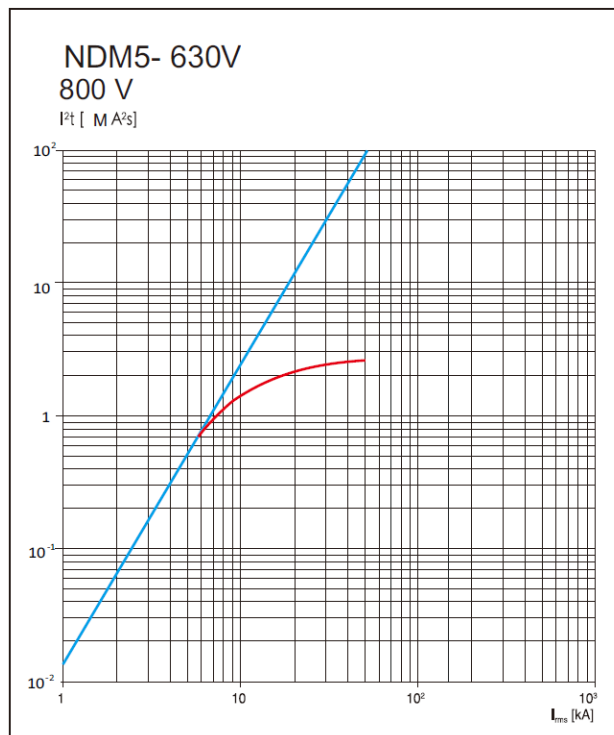
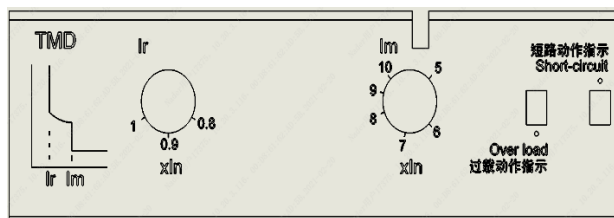
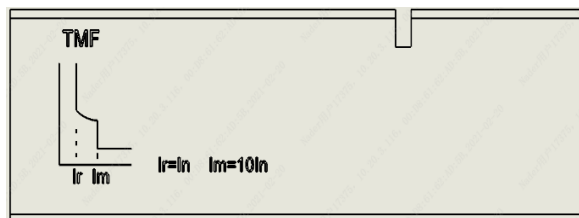


Fig.7 NDM5-630V Permissive characteristic curve chart

7、Products outline and installation dimensions



TMD

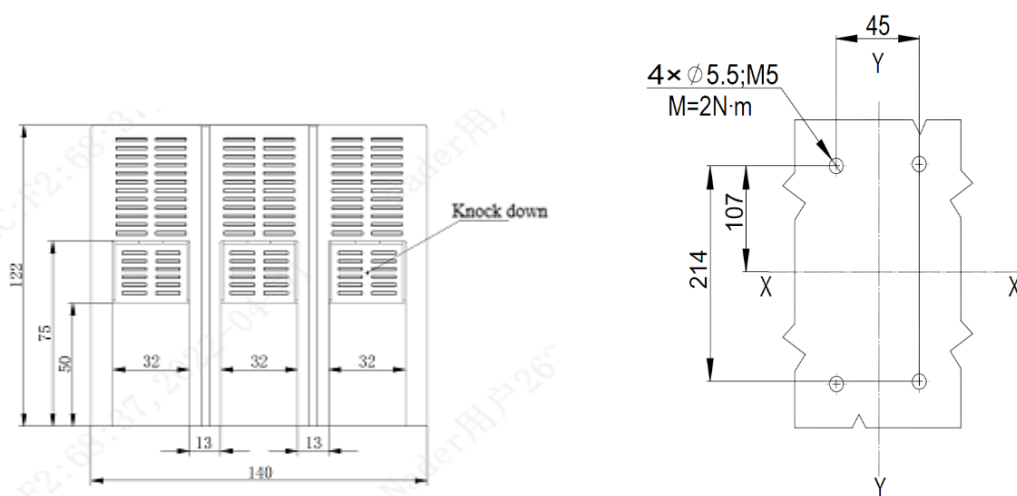


TMF

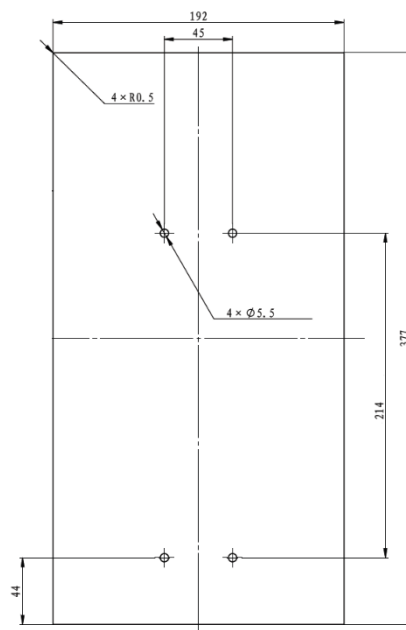
Fig.8 Release adjustment gear chart

8 Product outline and installation dimensions

8.1 Appearance and installation dimensions of the three pole board front wiring product



Installation hole size



Insulating Plate Dimension

Fig.9

Note: Unmarked tolerance level should follow GB/T 1804-c.

8.2 Rotary handle operating mechanism

Manual operation-the schematic diagram of handle installation and opening and the outline dimension diagram of manual operation are shown below respectively:

Installation drawing of rotary handle operating mechanism

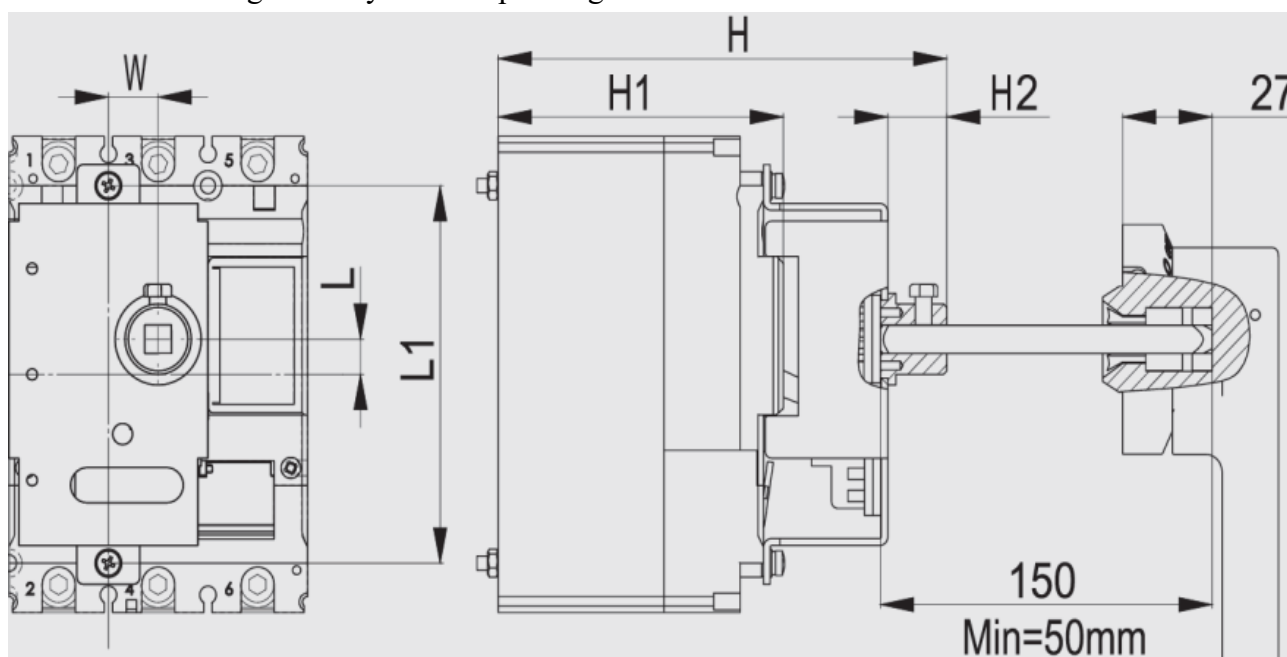


Fig. 10 Installation drawing of rotary handle operating mechanism

Table 8 Installation drawing of rotary handle operating mechanism

Model	W	L	L1	H	H1	H2	Square shaft specification
NDM5-400V/630V	22.5	19	214	223.5	144.5	18	10×10

Installation opening diagram of rotary handle

The schematic diagram of the installation hole for the handle and the external dimensions of the manual operation are shown below: (Z2A/Z2F)

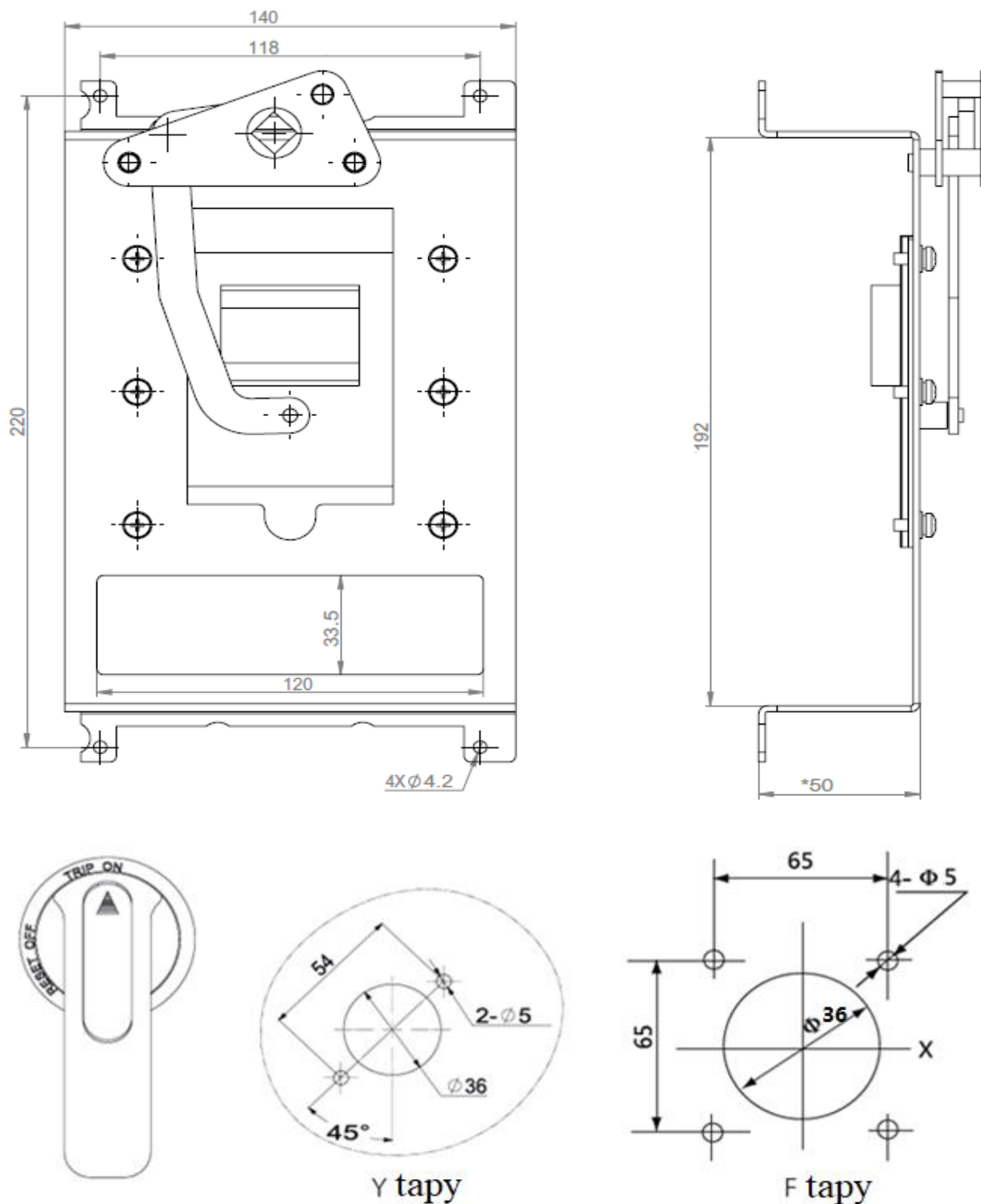


Fig.11 Installation opening diagram of rotary handle

Note:1)During manual operation, it shall rotate 180° clockwise, and counterclockwise operation is prohibited.

2) Unmarked tolerance level should follow GB/T 1804-c.。

8.3 Copper bar in front of board or copper cable with wiring terminal

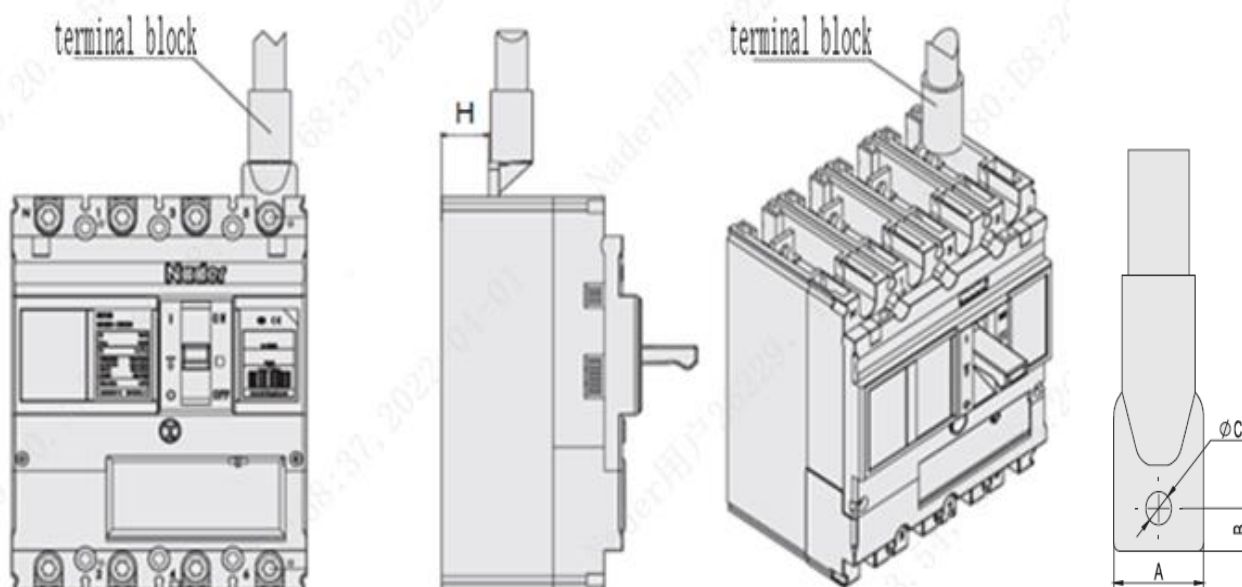


Fig.12 Connection diagram of copper bar in front of board or copper cable with wiring terminal

Table 9 Connection size of copper bar in front of board or copper cable with wiring terminal

Model	A (mm)	B (mm)	Φ C (mm)	H (mm)
NDM5-400V	≤36	≤14	11	26.6
NDM5-630V	≤36	≤14	11	28.6

8.4 Safety spacing

8.4.1 Insulation requirement between phases

a. Cable

Naked metal at cable lug must be insulated with interphase partition

b. Busbar (see picture below for size of insulated cover)

Stright bar:insulation covers all around

curved bar: Insulation covers to 100mm long to the curve.

Extended row: The thickness of NDM5-400V shell frame shall not be less than 6mm, the thickness of NDM5-630V shell frame shall not be less than 6mm 10mm , and can also be superimposed by multiple rows;

Stright bar: insulation covers all around

curved bar: Insulation covers to 100mm long to the curve.

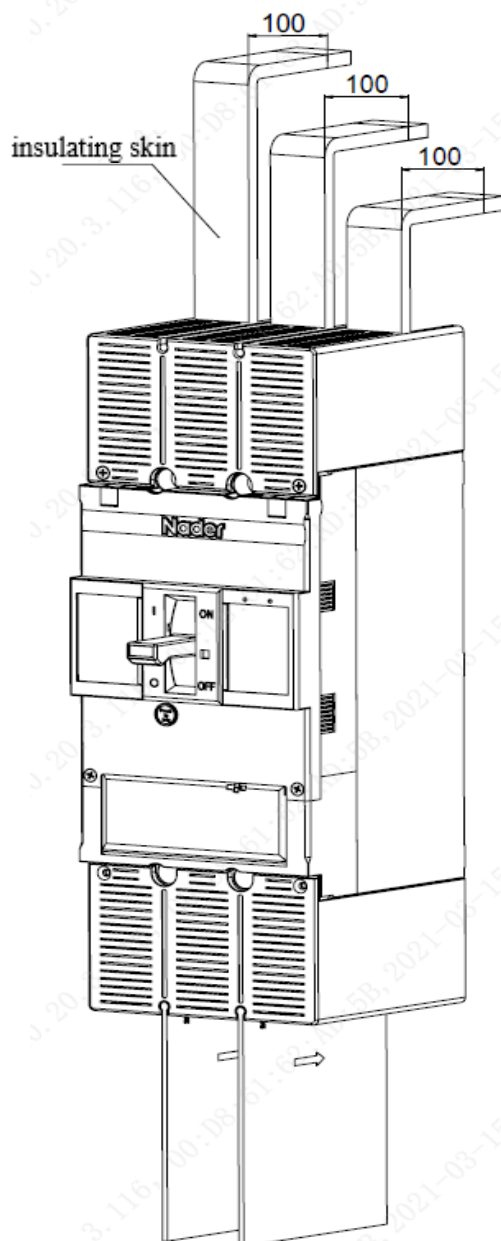


Fig.13 Size of insulated cover

Note: 1. Copper bar can be directly connected to the products. If aluminum bars are applied, extended

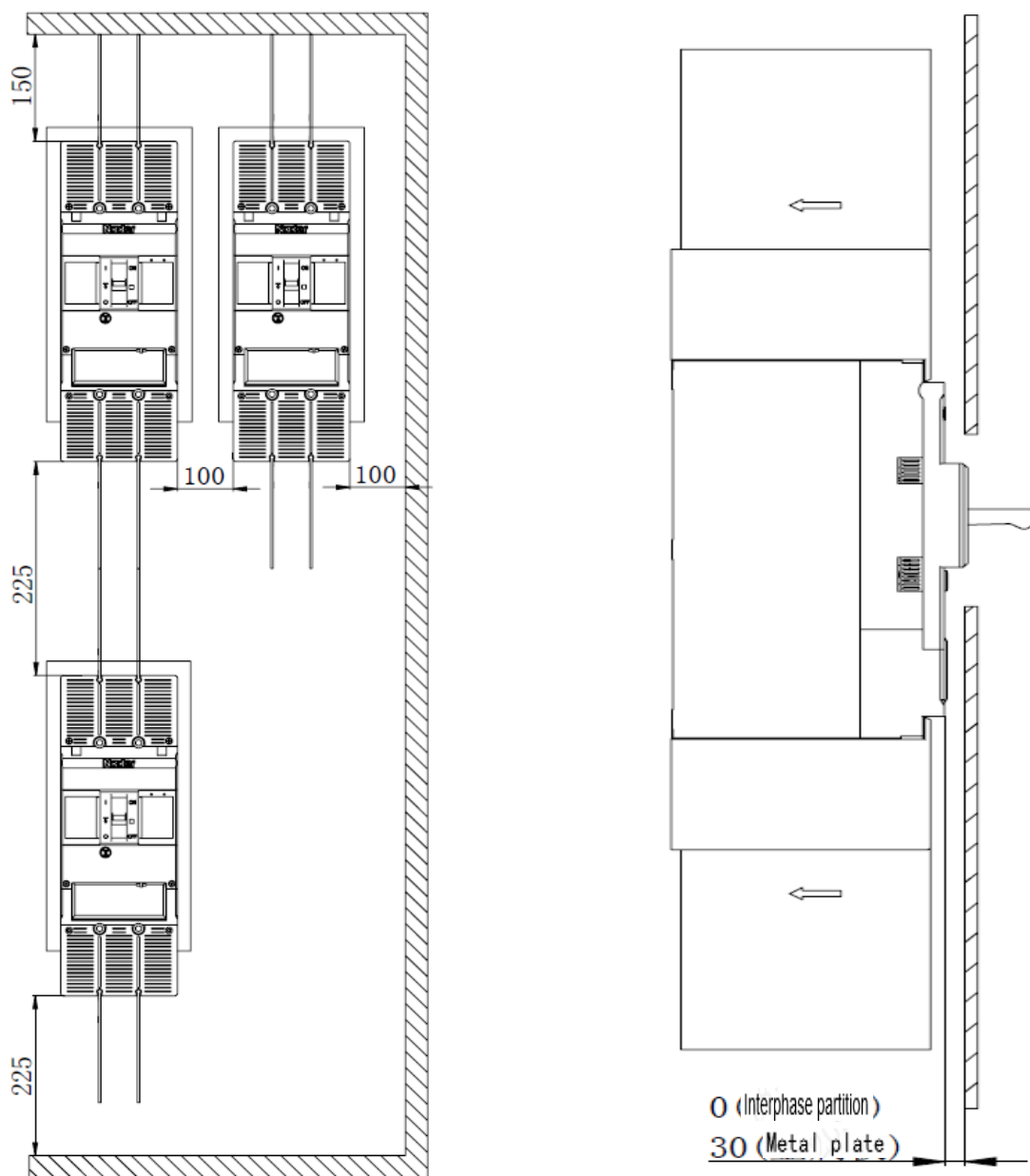
Copper bars must be used to reach out of the terminal shell and then connect to the aluminum bar. Plus, connection parts of the aluminum are suggested to plate with tin. Use partitions to insulate the bars after connection. (If aluminum bars are intended to be applied, please contact us. we will provide two more partitions for insulation.)

2. Partitions are not allowed to be pressed between bars.

The picture above is only for identifying the sizes of insulation cover. There is no requirement of bar connection method here.

8.4.2 Safety distance

The minimum safety distance between the top, bottom, side and front panel when installing the circuit breaker, see the figure below.



Distance requirement of installation in cabinet

Front panel Safety distance

Fig.14 Safety distance of front panel

8.5 Wiring diagram of circuit breaker

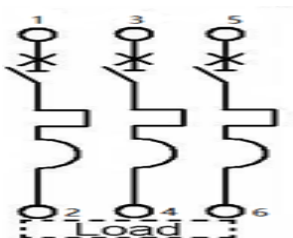


Fig.15 Main circuit wiring mode of AC products

9、 Attachment function description

9.1 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 10 Rated parameters of the under-voltage release

Accessory name	voltage release			Tightening torque value of wiring screw
Voltage specifications (V)	AC110/DC110	AC230/DC250	AC400	
Maintain power consumption (W)	0.5	1.0	2.2	
Code name	Q11	Q22	Q40	1.2N.m

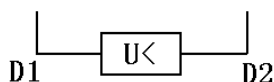


Fig.16 Working diagram of under-voltage release

9.2 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 11 Rated parameters of the shunt release

Voltage specifications (V)	Shunt release				Tightening torque value of wiring screw
Maintain power consumption (W)	AC/DC24	AC/DC48	AC/DC110	AC230/DC250	
Voltage specifications (V)	20	9.5	8	20	1.2N.m
Code name	FT02	FT04	FT11	FT22	

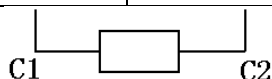


Fig.17 Working diagram of shunt release

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.

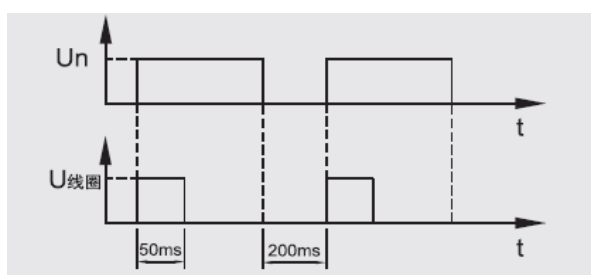
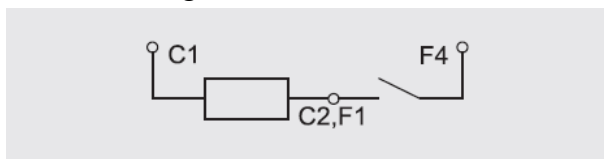


Fig.18 Working principle diagram of shunt tripper

If the circuit breaker cannot be closed normally due to long-term power on, an auxiliary contact can be connected in series as shown in the figure.



9.3 Rated parameters of the auxiliary contact

Table 12 Parameter of auxiliary contact

Accessory name		Auxiliary contact(conventional)	Auxiliary contact(Low power consumption)
Voltage specifications(V)/ conventional thermal current (Ith)		AC250V/10A、AC400V/3A、 DC220V/0.2A	DC30V/0.1A
Wiring diagram	Off		
	On		
Internal resistance		<30mΩ	<50mΩ

Note1: If need DC30V/0.1A auxiliary contact, please explain when ordering.

2: The first auxiliary harness is identified as F11 (red), F12 (white), F14 (yellow), and the second auxiliary harness is identified as F21 (red), F22 (white), F24 (yellow), and so on. At most three groups of auxiliary harness are installed.

9.4 Rated parameters of the alarm contact

Table 13 Rated parameters of the alarm contact

Accessory name		Alarm contact(conventional)	Alarm contact(Low power consumption)
Voltage specifications(V)/ conventional (Ith)		AC250V/10A、AC400V/3A、 DC220V/0.2A	DC30V/0.1A
Wiring diagram	On, off		
	Free tripping		
Internal resistance		<30mΩ	<50mΩ

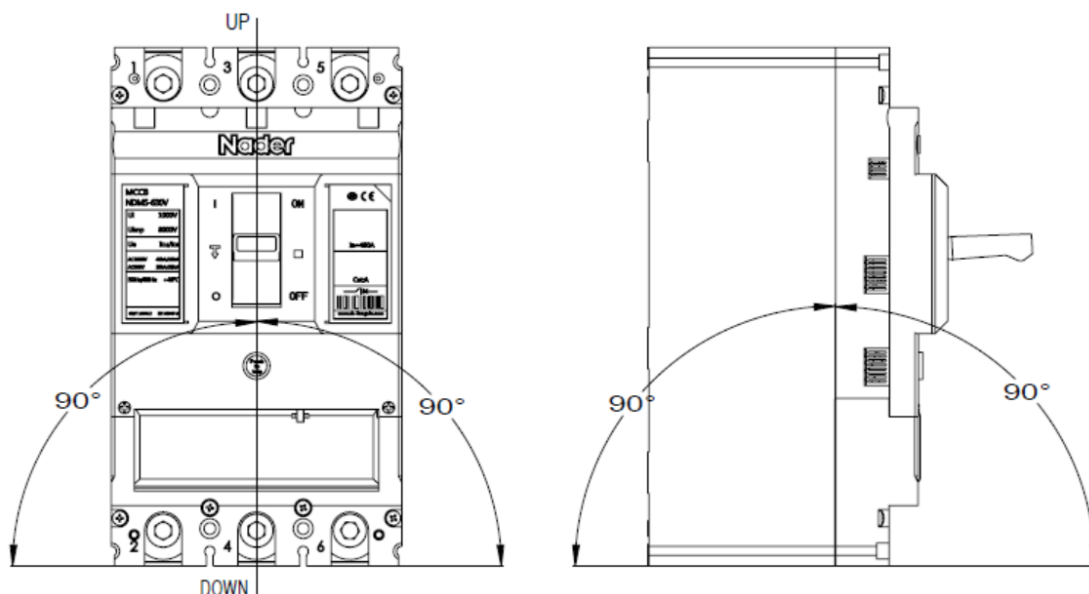
Note1: If need DC30V/0.1A Alarm contact, please explain when ordering.

2: The first alarm harness is identified as B11 (red), B12 (white), B14 (yellow), and the second auxiliary harness is identified as B21 (red), B22 (white), B24(yellow), and so on. At most two groups of alarms are installed.

Under-voltage release、Shunt Release、Auxiliary contact、Alarm contact , the standard wiring line is 0.7m long , 1m、2m、4m can be customized according to requirements.

10、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 $\pm 22.5^\circ$



Vertical installation

Fig. 18 Mounting method of product

11、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.

12、Environment

The environment that comply with RoHS instruction.

13、Packaging and Storage

S.N.	Name	Specification	3P Quantity/Set
1	Cross small pan-head screw	M5×130	4
2	Plain washer	M5	4
3	Spring washer	5	4
4	Hexagon nut	5	8
5	Phase partition	— — —	4
6	Insulating Plate Dimension	— — —	1
7	Terminal cover	— — —	2
8	Terminal cover screw	M4×12	4
9	Terminal screw	M10×30	6

14、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.