Shanghai Liangxin Electrical Co., Ltd.

NDM5E-250 Molded Case Circuit Breakers

Product Specification

（IPD-ENG-DEV-T22 A1 2016-09-23）

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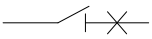
Revision information					
Version	Revised contents and reasons	Date	Prepared	Reviewed	Approved
0	Newly added	10/27/2015	Hu Gang	Cai Yuchang	Wu Chunyan
1	Change of the breaking letter code and addition of the accessory contents.	4/15/2016	Wang Hengyang	Zhang Ying	Wu Chunyan
2	Change of the outline and installation dimensions	1/25/2018	Xu Tao	Zhang Ying	Gan Feiming
4	Update specification and model description and add relevant contents of accessories.	1/12/2020	Wu Yali	Feng Daijun	Wu Chunyan
5	Change operation mode and model	2/25/2020	Wu Yali	Feng Daijun	Wu Chunyan
6	Rewrite for new template	04/07/2020	Wu Yali	Feng Daijun	Wu Chunyan
7	Update product related information	08/07/2022	Yang rong rong	Xu jun cheng	Ding fei
8	Add the terminal pin to the accessory package	05/12/2022	Yang rong rong	Xu jun cheng	Ding fei

1. Application

The NDM5E-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 (AC400V/415V,AC690V) and rated working current (40A,100A,250A). It is used to distribute electric energy. In addition to the functions of long time delay inverse time limit of overload, short time delay definite time limit of short circuit, short time delay inverse time limit of short circuit, short circuit instantaneous time, grounding, overload alarm, alarm without tripping, it can protect the line and power equipment from damage and damage. It also has the functions of feedback the current, voltage, power, electric energy, frequency, life and minute to the upper computer or other energy efficiency management system. Information such as closing status and operation times are used for detection and monitoring of circuit breakers, reducing the operation and maintenance cost of power grid, and providing necessary data for future energy efficiency system.

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

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

Each voltage level and short-circuit section capacity of the circuit breaker can be connected with the lower incoming line.

2. Product Pictures

Fig.1 Picture of Product

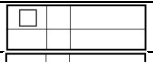
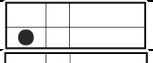
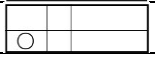
3. Model and implication

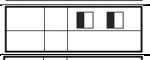
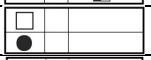
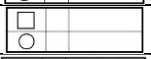
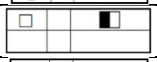
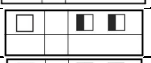
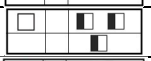
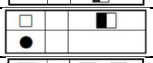
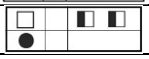
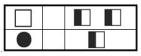
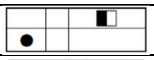
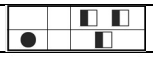
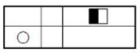
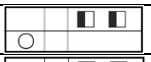
ND 1	M 2	5 3	E - 250 4 5	□ 6	□ / □ / □ / □ 7 8 9 10	□ 11	□ 12	□ 13

S.N.	Name of S.N.	Interpretation
1	Enterprise characteristic code	ND：Nader low-voltage apparatus
2	Product type code	M：Molded case circuit breaker (MCCB)
3	Design S.N.	5
4	Derived code	E: Electronic
5	Current of the frame size (A)	250
6	Interrupting level code	L:standard M:medium-high H:high
7	Rated current(A)	40、63、80、100、125、160、200、250
8	Pole	3:3 poles 4A: N-pole is without the over-current protection and always connect 4B: N-pole is without the over-current protection and acts together with other three poles(N-pole close first and open last) 4C: N-pole is with the over-current protection and acts together with other three poles(N-pole close first and open last) 4D: N-pole is without the over-current protection and always connect
9	Trip release code	ETB: electronic release (3P/4P products) ETC: intelligent release (3P/4P products) ETC-P: energy efficiency intelligent release ETB-T: communication electronic release ETC-T: communication intelligent release ETB-PT：communication energy efficiency electronic release ETC-PT: communication energy efficiency intelligent release
10	Installation code+ Wiring method	Null: Stationary connector + front panel wiring ES：Stationary connector+ front extension wiring board R0：Stationary connector + screw connector +on after terminal Fcu：Stationary connector +front bare copper cable wiring G：Guide rail type+ front panel wiring GES：Guide rail type+ front extension wiring board GFcu：Guide rail type+ front bare copper cable wiring P0FH：plug-in without secondary connector +horizontal wiring in front of board

		P0RH：plug-in without secondary connector + horizontal wiring behind the board P0RV：plug-in without secondary connector +rear vertical wiring P1FH：plug-in with secondary connector + horizontal wiring in front of board P1RH：plug-in with secondary connector + horizontal wiring behind the board P1RV：plug-in with secondary connector + rear vertical wiring
11	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 Z1F650rotary handle with round square hole and square axis length 650 M02:motor operation DC24V M11:motor operation AC110V/DC110V M22:motor operation AC230V/DC220V M40:motor operation AC400V
12	Accessory code	See table 2
13	Other codes	J:Mechanical interlocking
		MS2：MS2 lock

Table 1 Accessory Code

Accessory code	Accessory name	Installation position
		3P, 4P
-	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

The ETB-T/ETC-T/ETC-P/ETB-PT/ETC-PT in NDM5E-250 has no three auxiliary codes.

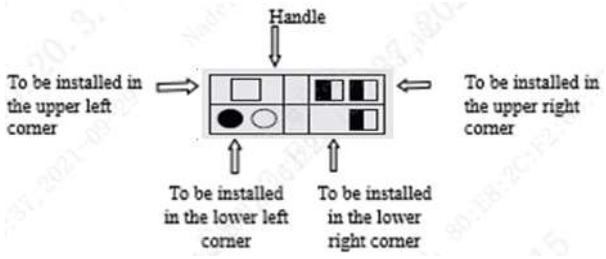
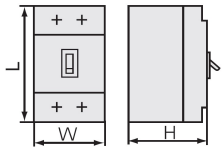


Fig1. Diagram for Accessory Installation

4. Main technical parameters

Table 2 Main Technical Parameters

Frame current Inm	250A
Pole number	3P, 4P
Rated current In	40A, 100A, 250A

Rated voltage Ue (V)			AC400/AC415，AC690					
Usage category			A					
Rated impulse withstand voltage Uimp			8000V					
Rated insulation voltage Ui			1000V					
Power frequency withstand voltage (1min)			3500V					
Pole			3			4		
Rated Ultimate/Service ort-circuit breaking capacity Icu/Ics(kA)		Code	L	M	H	L	M	H
		AC400V/AC415V	70	100	150	70	100	150
		AC690V	8	12	15	8	12	15
Rated Service short-circuit breaking Capacity Ics (kA)			Ics=100%Icu					
Life （times）	Mechanical life	Maintainable free life	25000					
		Maintainable life	50000					
	Electrical life	AC400/AC415V	10000					
		AC690V	4000					
External dimension		L(mm)	165					
		W(mm)	105			140		
		H(mm)	86					
Flashover distance （mm）			≤50					

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 Wire and Screw Parameters

Rated current(A)	40	100	250
Sectional area of conductor(mm^2)	10	35	120

4.2 High altitude deration factor of circuit breaker

Table 4 Tightening Torque of the Circuit Breaker Terminal and Mounting Screw

Model	Screw application	Thread specification	Torque value(N.m)
NDM5E-250	Wiring screw	M8	15
	Set screw	M5	2

4.3 Derating factor of temperature change for the circuit breaker

Table 5 Deration Factor Table of Temperature Change for the Circuit Breaker

Model	Deration factor of product temperature change							
NDM5E-250	Temperature(℃)	40	45	50	55	60	65	70
	Deration factor	1.0	1.0	1.0	0.98	0.94	0.92	0.90

Note: 1)When the operating ambient temperature is below +50℃, and do not need to reduce capacity。

2)The above deration factors are measured under the rated current of the shell frame。

4.4 High altitude deration factor of circuit breaker

Table 6 Altitude drop correction factor

Altitude (m)	2000	2500	3000	3500	4000	4500	5000
Working current correction coefficient	1	1	0.98	0.97	0.95	0.94	0.93
Maximum operating voltage(V)	690	690	620	580	550	520	500
Power frequency withstand voltage (V)	3500	3500	3150	3000	2800	2650	2500
Average insulation class (V)	1000	1000	900	850	810	770	730

4.5 Power consumption of circuit breaker

Table 7 Product current specification single phase power consumption able

Model	Rated current (A)	Single phase power consumption (W)		
		Front and rear wiring	Plug in front of plate、rear board wiring	Extended row wiring
NDM5E-250	40	1	3	2
	100	3	4	4
	250	19	27	19.7
Note：The above data is the single-phase loss measured when the circuit breaker is connected to the rated current at the ambient temperature of 40℃.				

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）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. Time-Current curves (tripping characteristic)

6.1 Tripping characteristics curve under normal environment (ambient air temperature: +40℃)

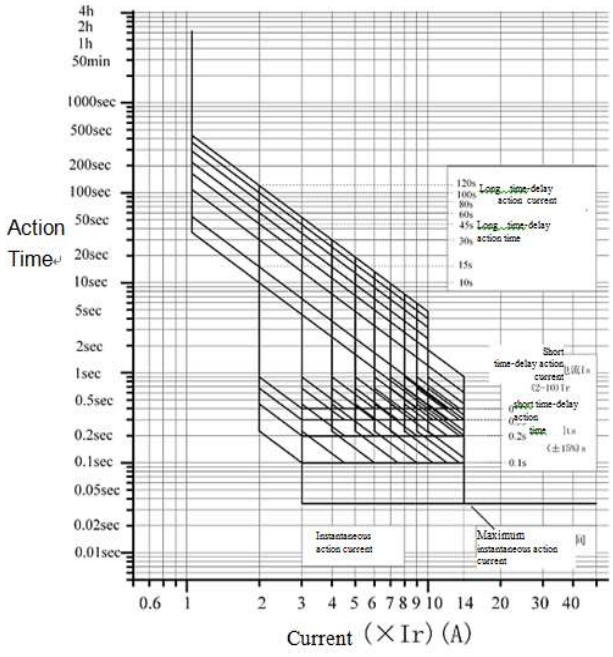


Fig.3 Ir/Is/Ii Tripping Plot

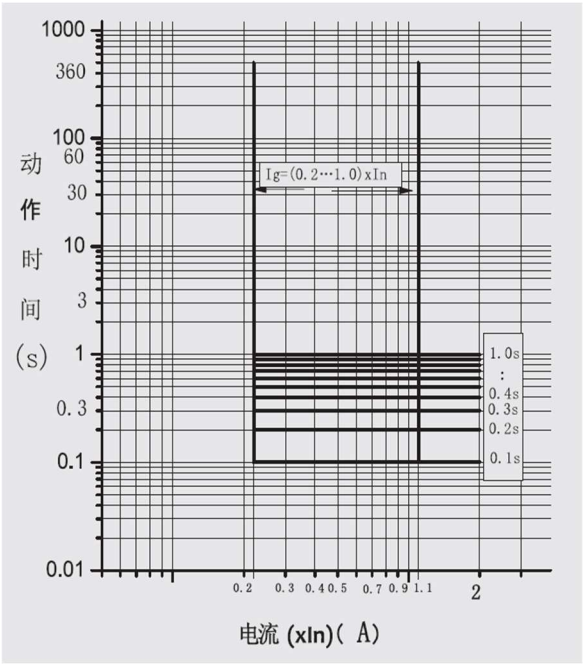
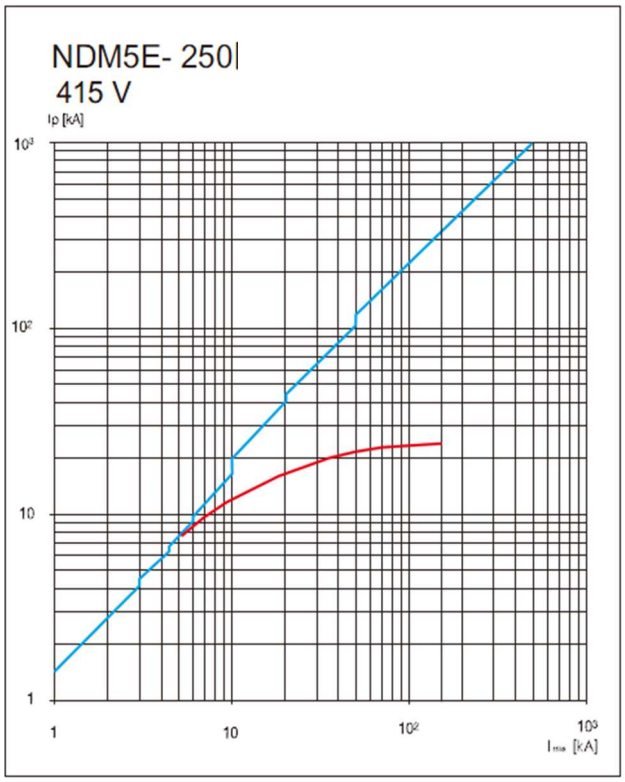


Fig.4 Ig Tripping Plot

6.2 Current limiting and permissive characteristic curve



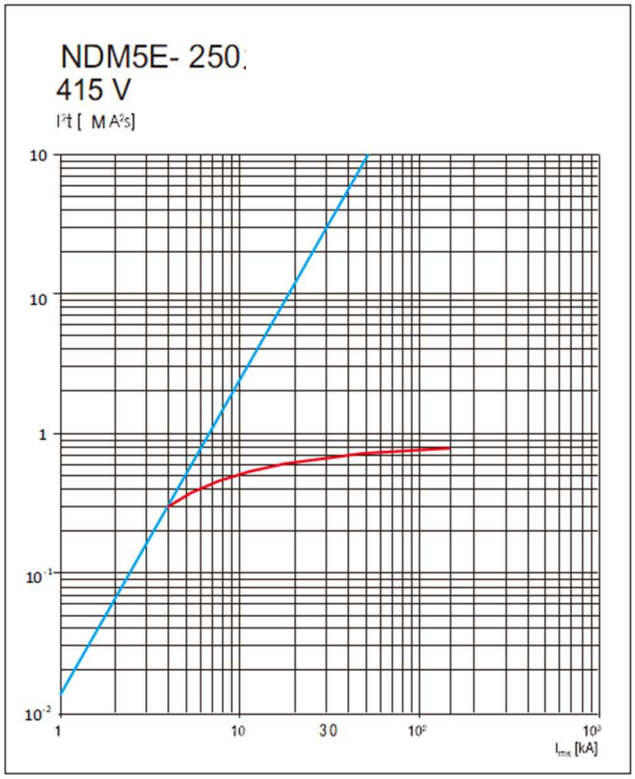


Fig.5 Current limiting characteristic curve chart

Fig.6 Permissive characteristic curve chart

7、Over Current Release Operation

7.1 Controller Panel of Circuit Breaker

7.1.1 Components of Controller Panel

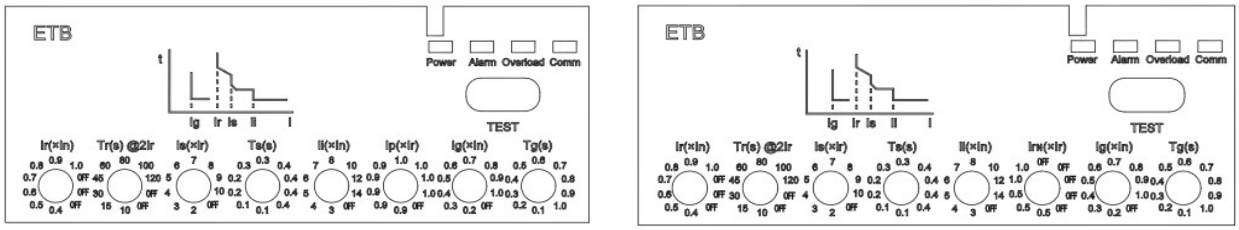


Fig. 7 Gear for electronic release

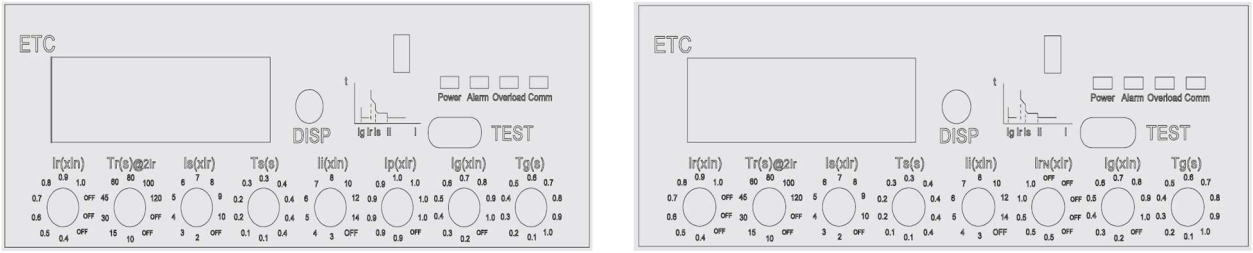


Fig 8 Gear for intelligent release

3P 4P

Components of Controller Panel

1. Ir Overload long delay current setting 2. Tr Overload long delay time setting

3. Is Short circuit short delay current setting 4. Ts Short circuit short delay time setting

5. Ii Short circuit instantaneous current setting 6. Ip Pre-alarm current setting

7. Ig GF current setting 8. Tg GF time setting

9. IrN N phase protection current setting 10. In rated current

11. DISP display in turns 12. TEST test port

13. Power power indicator 14. Alarm Pre-alarm indicator

15. Over Overload indicator 16. Comm Communication indicator

Note: Settings must be operated by professionals.

7.1.2 Controller panel component of circuit breaker

(1) Test port

Special test equipment can be connected to via this port to test and adjust.

Meanwhile the port is also used to communication connection.

(2) Current and time knob

Rotating to set up the current and time. Good combination of these parameters can give protection to cable and device. This must be operated by professionals.

Tr indicates the time to trip under the condition that the actual current is 2 times of the setting value Ir. For products at a rated current of In=250A, when Ir is set to 1.0, Tr@2Ir to 10s and the main loop is powered on at the current of I=2×250A, the circuit breaker will break the main loop after lasting 10s with an accuracy of the action time ±10%.

At the overload current, the breaking time of the main loop performed by the circuit breaker depends on the formula below: $t=(2\times Ir/I)^2\times Tr@2Ir$.

I--- indicates the actual current value in main circuit when overload.

(3) DISP DISP button

Press to view the data and refresh the relative information in the screen， and long press the key to enter the fault recording interface,and automatically exit the interface after a certain time.

7.1.3 Indicator light

(1) Power indicates Power

Indicator is on when working

(2) Pre-alarm indicates Alarm

Indicator flashes when actual working current is over the set Ip and turns constant on after certain time.

(3) Overload indicates over

Indicator is on when actual working current is over 1.15 times of the set Ir. The breaker trips after certain time.

(4) Communication indicates Comm

Indicator is flashed when communicating

7.2 Setting of Controller Parameters

7.2.1 Parameters of distribution protection controller（See table 8）

Table 8 Parameter Setting Gear Table of the 3P Electronic Controller

Rated current In (A)	poles	Current and time parameters							
		Ir (×In)	Tr@2Ir (s)	Is (×Ir)	Ts (s)	Ig (×In)	Tg (s)	Ii (×In)	Ip (×Ir)
40 100 250	3	0.4, 0.5 0.6, 0.7 0.8, 0.9 1.0, OFF	10, 15, 30, 45, 60, 80, 100,120, OFF	2,3, 4 5, 6, 7 8, 9, 10 OFF	0.1 0.2 0.3 0.4	0.2, 0.3 0.4, 0.5 0.6, 0.7 0.8, 0.9 1.0,OFF	0.1, 0.2 0.3, 0.4 0.5, 0.6 0.7, 0.8 0.9, 1.0	3, 4 5, 6 7, 8 10,12 14,OFF	0.9 1.0 OFF

Table 9 Parameter Setting Gear Table of the 4P Electronic Controller

Rated current In (A)	poles	Current and time parameters							
		Ir (×In)	Tr@2Ir (s)	Is (×Ir)	Ts (s)	Ig (×In)	Tg (s)	Ii (×In)	I_{rN} (×Ir)
40 100 250	4	0.4, 0.5 0.6, 0.7 0.8, 0.9 1.0, OFF	10, 15, 30, 45, 60, 80, 100,120, OFF	2, 3, 4 5, 6, 7 8, 9, 10 OFF	0.1 0.2 0.3 0.4	0.2, 0.3 0.4, 0.5 0.6, 0.7 0.8, 0.9 1.0,OFF	0.1, 0.2 0.3, 0.4 0.5, 0.6 0.7, 0.8 0.9, 1.0	3, 4 5, 6 7, 8 10,12 14,OFF	0.5 1.0 OFF

Note: For 4P products, Ip=0.9Ir，For ETB-T/ETB-PT/ETC-T/ETC-P/ETC-PT products, the P and T in release derived code are displayed in side label of the products.

7.3 Detail Demonstration of Controller Function

7.3.1 Basic function table（See table 10）

Table 10 Comparison Table for Basic Function

Release code			ETB	ETC	ETB-T	ETC-T	ETB-PT	ETC-P	ETC-PT
Protection alarm	Long-delay protection		√	√	√	√	√	√	√
	Short-delay protection		√	√	√	√	√	√	√
	Instant protection for short circuit		√	√	√	√	√	√	√
	Neutral pole protection(4C/4D)		√	√	√	√	√	√	√
	Ground protection		√	√	√	√	√	√	√
	Over/under voltage protection		—	—	—	—	√	√note1	√
	Pre-alarm for overload		√	√	√	√	√	√	√
	Heat simulation(heat memory)		√	√	√	√	√	√	√
Measurement	Current measurement		—	√	√	√	√	√	√
	Voltage	Line/phase voltage	—	—	—	—	√	√	√
	Power	Active、Reactive、Apparent、PF	—	—	—	—	√	√	√
	Energy	Active、Reactive Apparent	—	—	—	—	√	√	√
	Frequency		—	—	—	—	√	√	√
Maintenance	Setting	Knob	√	√	√	√	√	√	√
		Menu	—	—	—	—	—	—	—
	Storage for Fault memory	Overload, short-delay for short circuit, instant for short circuit, action time, fault phase	1 note2	1	20	20	20	1	20
		Over/under voltage, action time, fault phase	—	—	—	—			
	Operation time with electricity		—	—	√	√	√	—	√
	Contact wearing		—	—	√	√	√	—	√
	Storage for log		—	1	20	20	20	1	20
Display	Real-time current		—	√	√	√	√	√	√
	Real-time voltage		—	—	—	—	√	√	√
	Power, energy, frequency		—	—	—	—	√	√	√
	Setting value		—	—	—	—	√	√	√
	Last fault type, fault current and voltage, action time length, occurrence time		—	√	√note3	√	√note3	√	√
Extended	Diplay module note4		○	○	○	○	○	○	○

module	Temperature testing module note4	○	○	○	○	○	○	○

Note 1：ETC-P the value for under/over voltage is fixed, can't be changed

Note 2：communication adaptor DF-MB/C3 or display module DF-XS1 need to be deployed；

Note 3：displayed by the upper system

Note 4：○ means optional function

All protections must meet the power supply requirements of the circuit breaker, with three-phase energization of 0.2in and single-phase energization of 0.4in。

7.3.2 Setting value for controller

(1) Setting value of the overload long time-delay protection:

The overload long time-delay protection is based on the true RMS value for protecting the load.

Table 11 Overload Long-Delay Protection Parameter Setting

Setting gear of the current Ir		(0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0,OFF) ×In tolerence±3%							
Action characteristics	Tr@2Ir setting gear (s)	10	15	30	45	60	80	100	120
	≤1.05Ir	＞2h (no action)							
	＞1.30Ir	＜1h (action)							
	At 1.5Ir, tr (s)	17.77	26.67	53.33	79.99	106.67	142.22	177.77	213.33
	At 2.0Ir, tr (s)	10	15	30	45	60	80	100	120
	Accuracy (%)	±10							

Note: The action curve complies with tr=(2Ir)2×Tr@2Ir /I2

Tr: overload long time-delay action time Tr@2Ir: setting value of the overload long time-delay action time,

I: Actual running current Ir: setting value of the overload long time-delay action current

When Tr is off, MCCB will not trip if overloaded.

(2) Setting value of the short-circuit short time-delay protection:

The short time-delay protection prevents the impedance short-circuit of the distribution system. Divided into two segments: reverse time limit and fixed time limit.

Table 12 Short Circuit Short Delay Protection Parameter Setting

Setting gear of the current Is		(2, 3, 4, 5, 6, 7, 8, 9, 10,OFF)×Ir				
Action characteristics	Reverse time limit Is≤I＜1.5Is	Ts setting gear (s)	0.1	0.2	0.3	0.4
		ts action time (s)	$ts=(1.5Is)^2\times Ts/I^2$			
	Fixed time limit 1.5Is≤I＜Ii	ts action time (s)	0.1	0.2	0.3	0.4
		Accuracy (%)	±20	±10		
	I＜0.9 Is	no action				

Note: The action curve of the reverse time limit complies with $ts=(1.5Is)^2\times Ts/I^2$, while the action time of the fixed time limit tracks the Ts setting value.

ts: short-circuit short time-delay action time

Ts: setting value of the short-circuit short time-delay action time

I: Actual running current

Is: setting value of the short-circuit short time-delay action current

There is an additional fixed error 20ms except from the time accuracy in table above.

When Ir is ture off Is will turn off synchronously.

(3) Setting Value of the Short-Circuit Instant Protection:

The instantaneous protection function can prevent short circuit of metal solids of the distribution system. Due to larger short-circuit current of the fault, the system requires being disconnected rapidly.

Table 13 Short-Circuit Instant Protection Parameter Setting

Action characteristic	setting current gear Ii(×In)	3	4	5	6	7	8	10	12	14
	current accuracy(%)	±15								
	I≥1.15Ii action time	＜50ms								
	I≤0.85Ii	no action								

(4) Setting value of the ground fault:

Ground fault protection function prevents the distribution system from metallic solid grounding short circuit. The time-delay for this protection is fixed.

Table 14 Ground Fault Protection Parameter Setting

Setting gear of the current Ig			(0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0,OFF) ×In							
Action characteristics	Fixed time limit In≥1.1Ig	Tg setting gear (s)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
		t action time (s)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
		Action time accuracy (%)	±10									
	I□≤0.9Ig		no action									
Note: I□ is the three-phase current vector sum of the circuit breaker or the vector sum of three phases plus N-phase current.												

Note: When NDM5E-250/40A Ig=0.2～0.4×In single-phase power on requires auxiliary power supply, DF-MC/C3 or DF-XS1 module is configured.

In addition to the accuracy of action time allowed in the above table, the inherent error ±20ms shall also be considered.

(5) Setting value of the N-phase protection:

The 4-pole controller features the N-phase overload long time-delay protection.

Table15 N-Phase Protection Setting Value

N-phase protection type	Description
0.5Ir	The protective action point is half of the setting value in case of a N-phase overload fault
1.0Ir	The protective action point equals to the setting value in case of a N-phase overload fault
OFF	N-phase protection turned off

Note: The N-phase overload long delay protection time tracks the setting value of Tr, and the n-phase short delay protection time tracks the setting value of Ts.

The instantaneous protection of n-phase short circuit of quadrupole controller is the same as that of other phases.

(6) Setting value of the overload pre-alarm:

Table 16 Controller with Pre-Alarm Function

Setting current Ip		(0.9,1.0,OFF)×Ir tolerence±3%	Tolerence	Note
Action characteristic	＜ 0.9 IP	Change from flashing to keeping on	±3	The overload alarm of the 4P controller is fixed in the controller Ip=0.9Ir.
	＞1.1 IP	Change from flashing to keeping on		
	OFF	OFF	OFF	
Function Description		when I ≥ IP, the warning indicator (yellow light) flashes. After t = t / 2, the indicator turns to be on continuously		

Note: The overload alarm of the 4P controller is fixed in the controller Ip=0.9Ir.

7.3.3 Measurement accuracy

Table 17 Measurement Accuracy Parameter

		Measurement range	Accuracy
Current	Ia, Ib, Ic, In	（0.2～2）In	±1%;
Voltage	Line voltage	（0.5～1.5）Ue	±0.5%
	Phase volatge	（0.5～1.5）Ue/1.732	±0.5%
Power	Active power	（0.2～2）In, （0.5～1.5）Ue	±1%
	Reactive power		
	Apparent power		
	Power function	-0.5～-1，0.5～1；	±1 %
Energy	Active energy	（0.2～2）In, （0.5～1.5）Ue	±1%
	Reactive energy		

	Apparent energy		
Frequency		/	±0.1Hz

7.3.4 Health management

The indication of circuit breaker health is expressed by 0 to 100%，and the superposition management id carried out form the three dimensions of production date, operation tmes and contact wear。

Note: It can only be read through communication 。

8、Product outline and installation dimensions

8.1 Overall dimension and installation dimension of front board wiring products

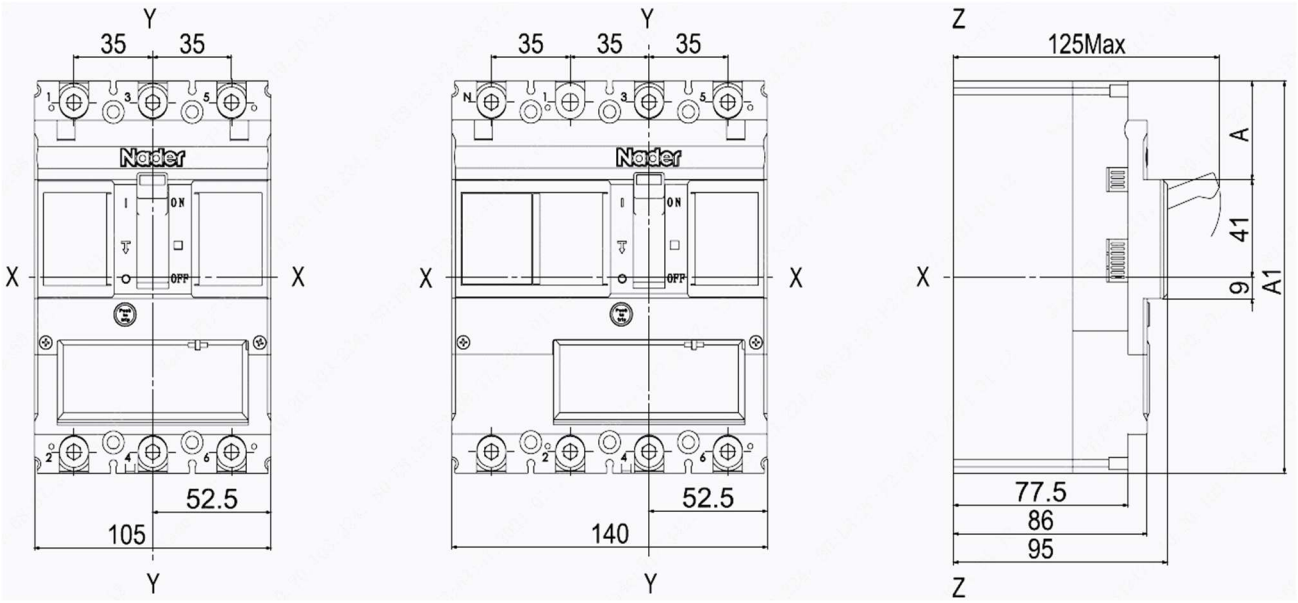
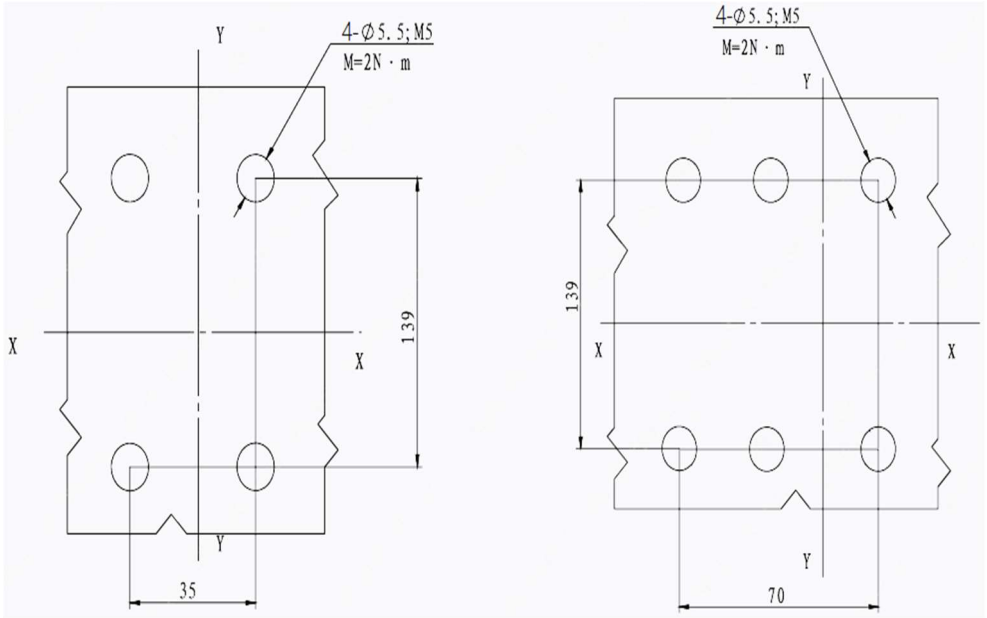


Fig.9 External Dimensions Of Front-Panel Connection Products



3P 4P

Fig.10 Mounting Holes Installed on the Base Plate

Note1: Dimensions of copper bar front-Panel connection products: A=82.5，A1=165;

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

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

8.2 Outline and installation dimension of terminal cover

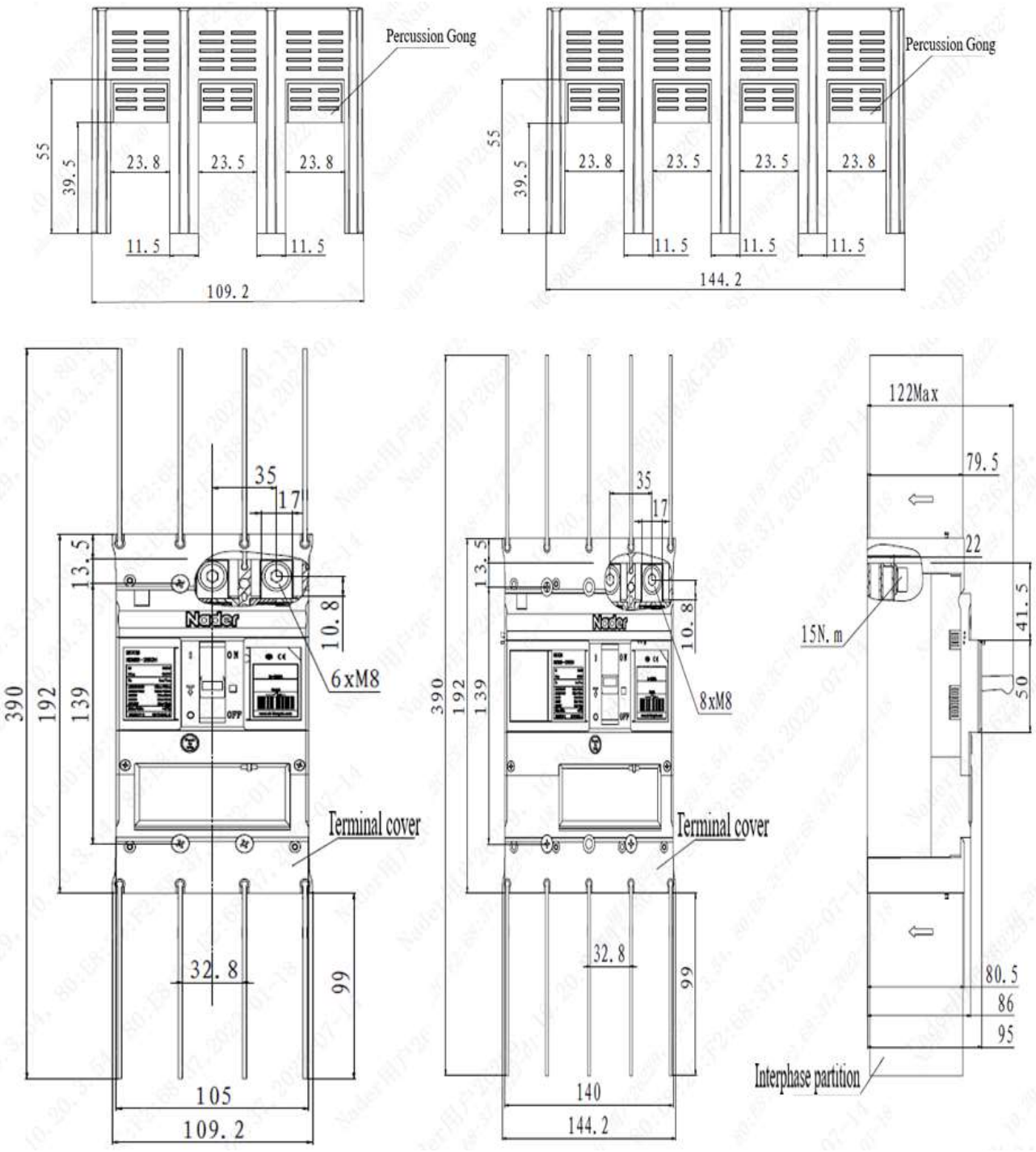


Fig.11 Mounting Holes Installed on the Base Plate

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

8.2 External Dimensions of Extended Front-Panel Connection Products

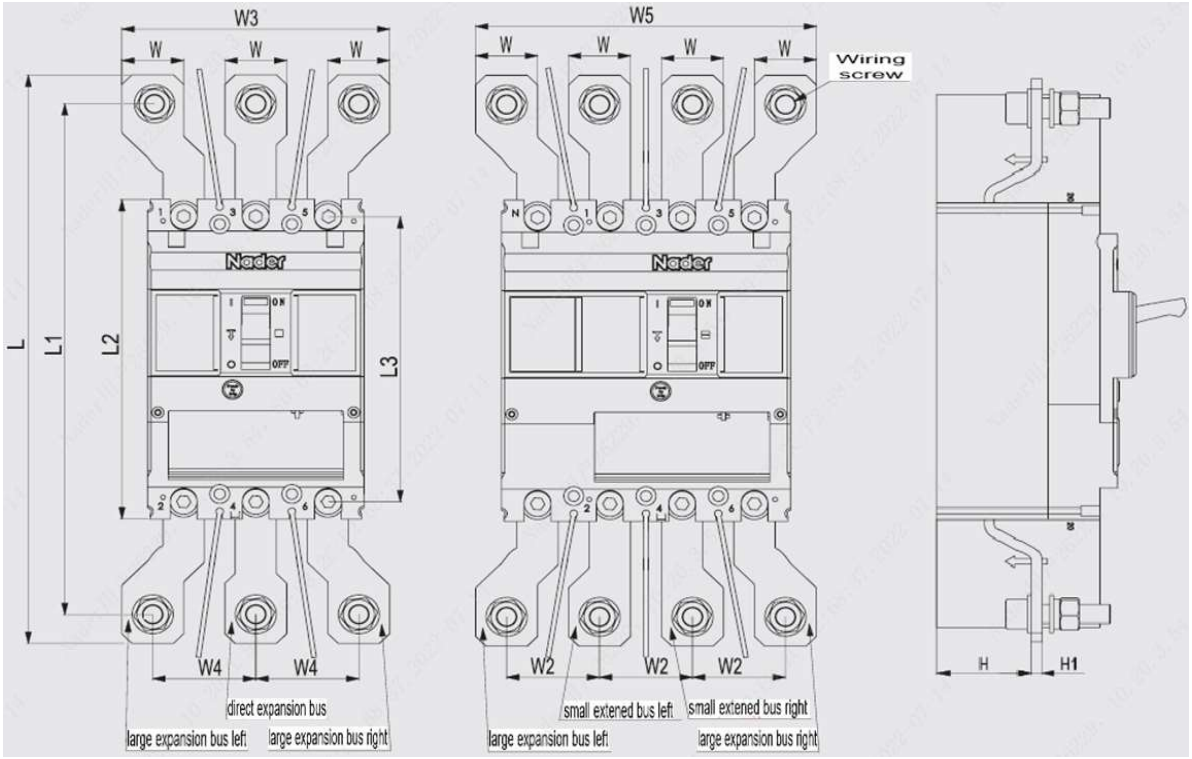


Fig.10 External Dimensions Of Extended Front-Panel Connection Products

Table 17 The overall dimensions of the front wiring expansion bar and the circuit breaker after combined installation are shown in the figure below (unit:mm)

Extended bus	L	L1	L2	L3	W	W2	W3	W4	W5	H	H1	Wiring screw
KM1/M5-250	293	263	165	147	30	45	130	50	165	45	5	M10×40

Note 1：3p Extended bus combination mode：large expansion bus（2 pieces on the left、 right）+2 –piece direct expansion busbar；

2：4p Extended bus combination mode：small expansion bus（2 pieces on the left、 right）large expansion bus（2 pieces on the left、 right）；

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

8.3 3P、4P、Outline and installation dimension of rear wiring board

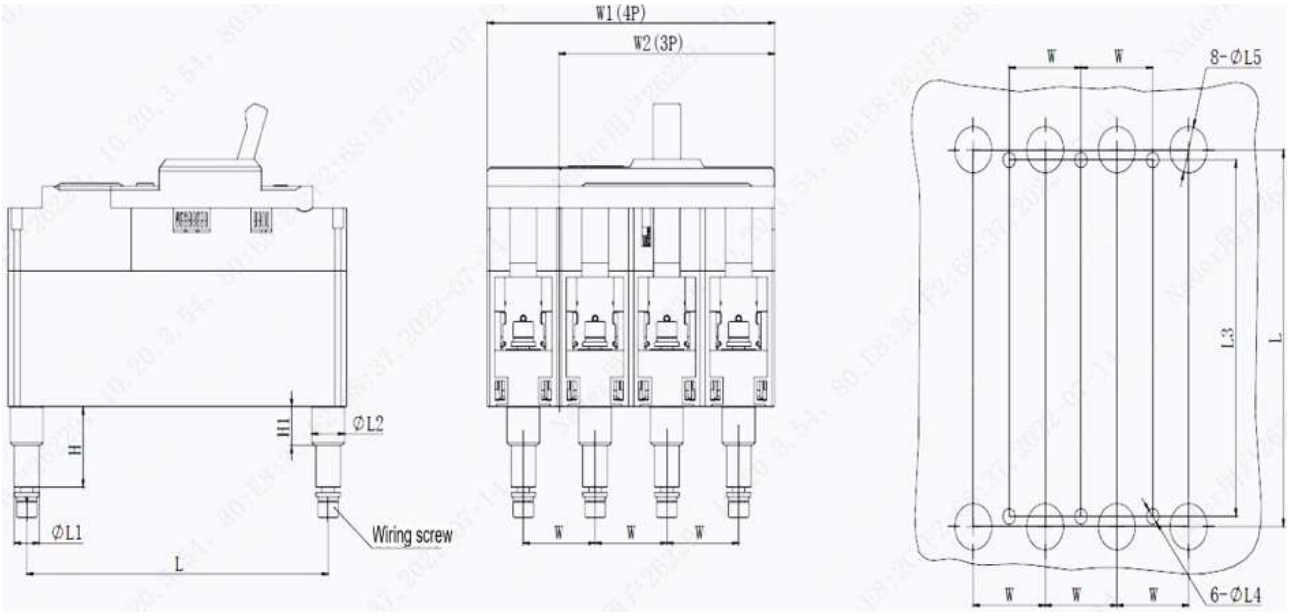


Fig.10 3P、4P outline dimension drawing of rear wiring board

Table 18 The installation dimensions of wiring products behind the board are shown in the table below (unit:mm)

Pear panel wiring	L	L1	L2	L3	L4	L5	H	H1	H2	W	W1	W2	Wiring screw
BH1/M5-250	147	12	16	139	6	18	31.6	15	30	35	140	105	M8×20

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

8.4 External Dimensions of Plug-In Front-Panel Connection

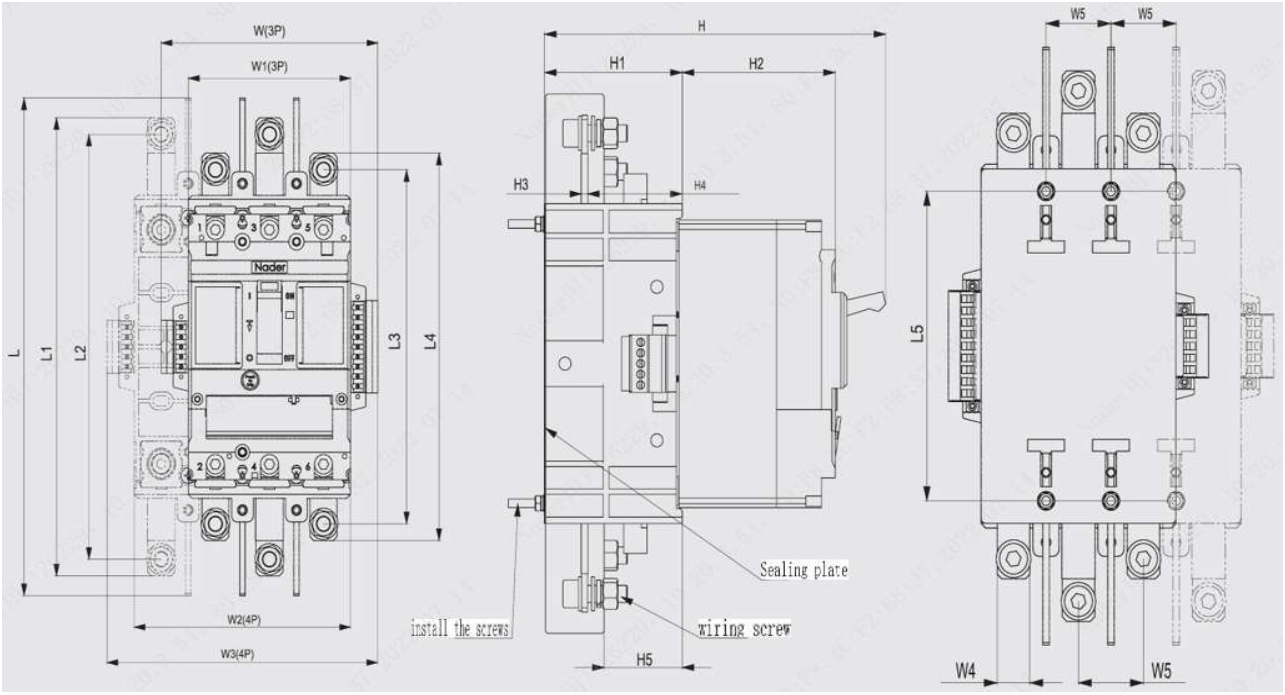


Fig.11 3P、4P Outline and installation dimensions of plug-in board front wiring

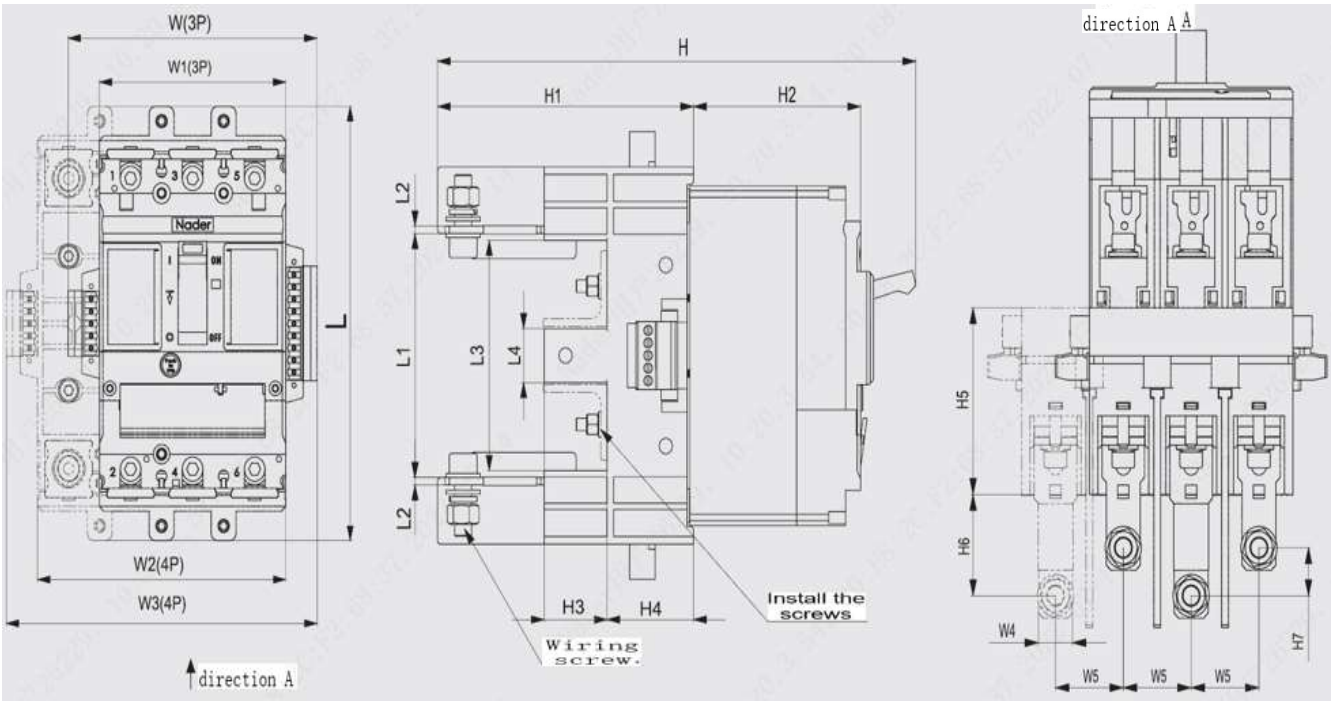
Table 19 The overall dimensions of plug-in board front wiring (horizontal) and circuit breaker after

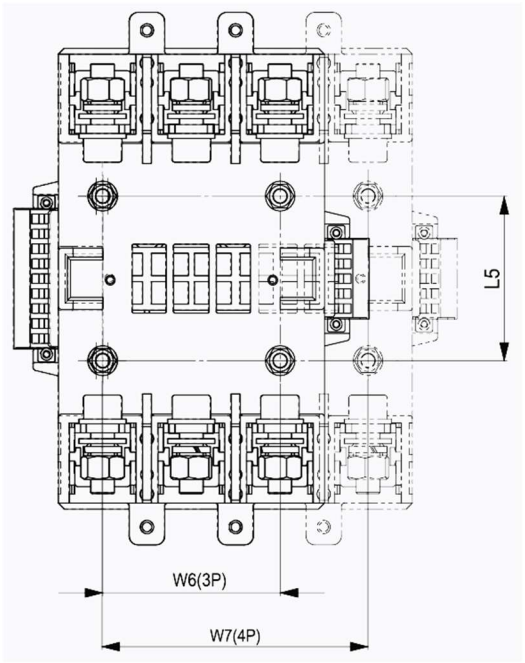
installation are shown in the figure below (unit:mm)

Plug in specification	W	W1	W2	W3	W4	W5	L	L1	L2	Wiring screw
CR1-Q/M5-250	136	105	140	171	18	35	278	272	252	M8×25
Plug in specification	L3	L4	L5	H	H1	H2	H3	H4	H5	Install the screws
CR1-Q/M5-250	212	232	160	197	81	83	4	54	50	M4×80

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

8.5 3P、4P Mounting hole dimensions of plug-in connections





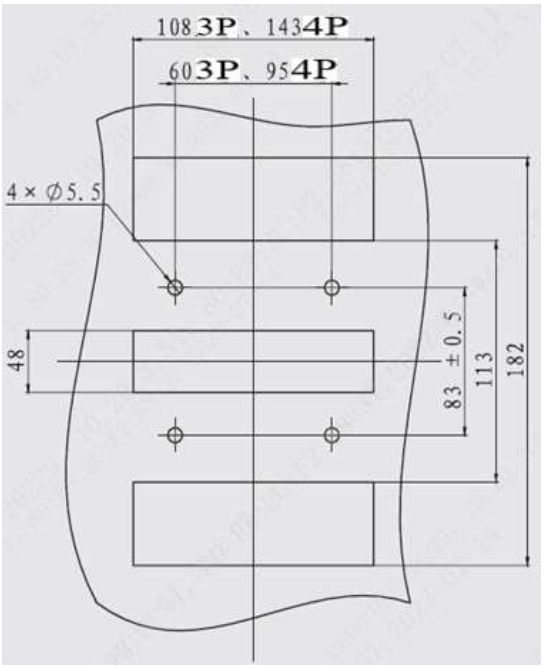


Fig.12 Mounting hole dimensions of plug-in connections

Table 20 The overall dimensions of plug-in device (horizontal wiring behind the board) and circuit breaker after installation are shown in the table below (unit:mm)

Plug in board rear wiring	W	W1	W2	W3	W4	W5	W6	W7	L	L1	L2	Wiring screw
CR1-H/M5-250	136	105	140	171	18	35	60	95	210	122	4	M8×25
Plug in board rear wiring	L3	L4	L5	H	H1	H2	H3	H4	H5	H6	H7	Install the screws
CR1-H/M5-250	115	46	83	248	135	83	34	46	80	19	20	M5×35

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

8.6 DIN-Rail mounting

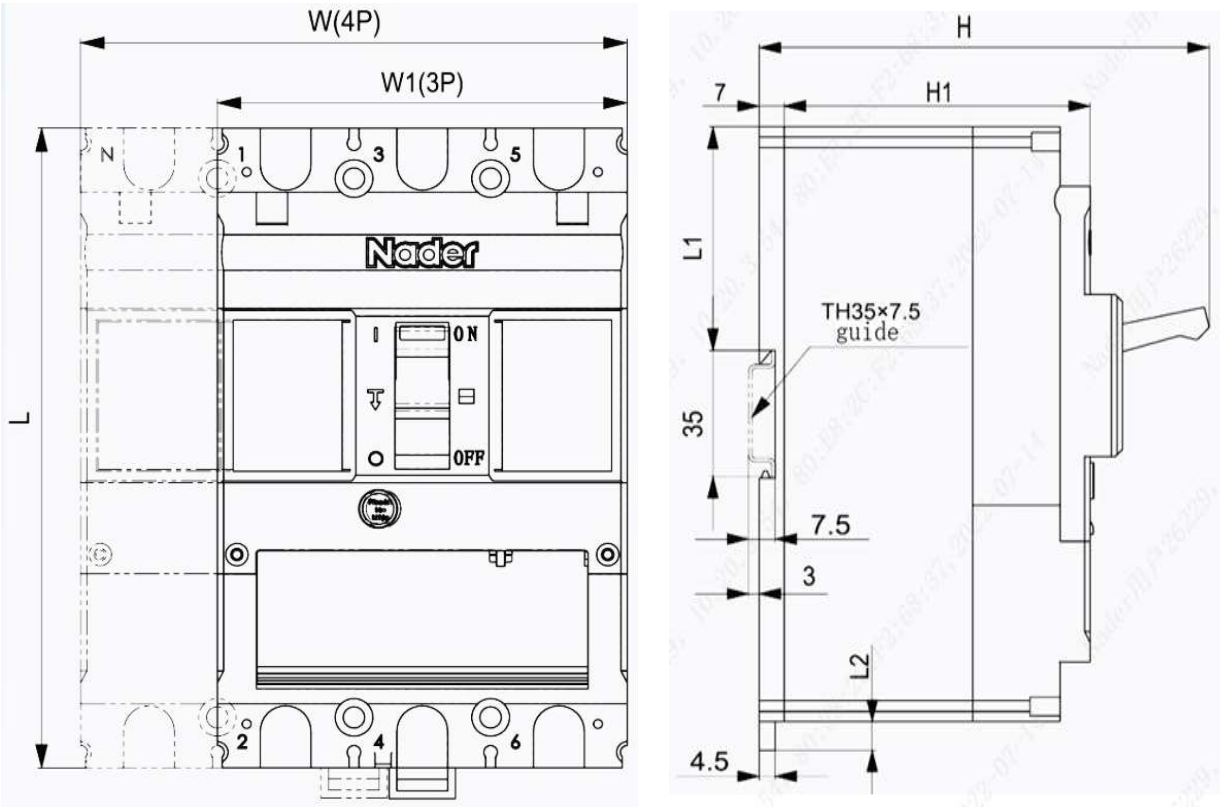


Fig. 13 Installation Dimensions of Guide Rails

Table 21 Overall dimension of guide rail installation table (unit:mm)

DIN-Rail mounting	W	W1	L	L1	L2	H	H1
DK1/M5-250	140	105	165	62	8	126.4	86

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

8.7 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：

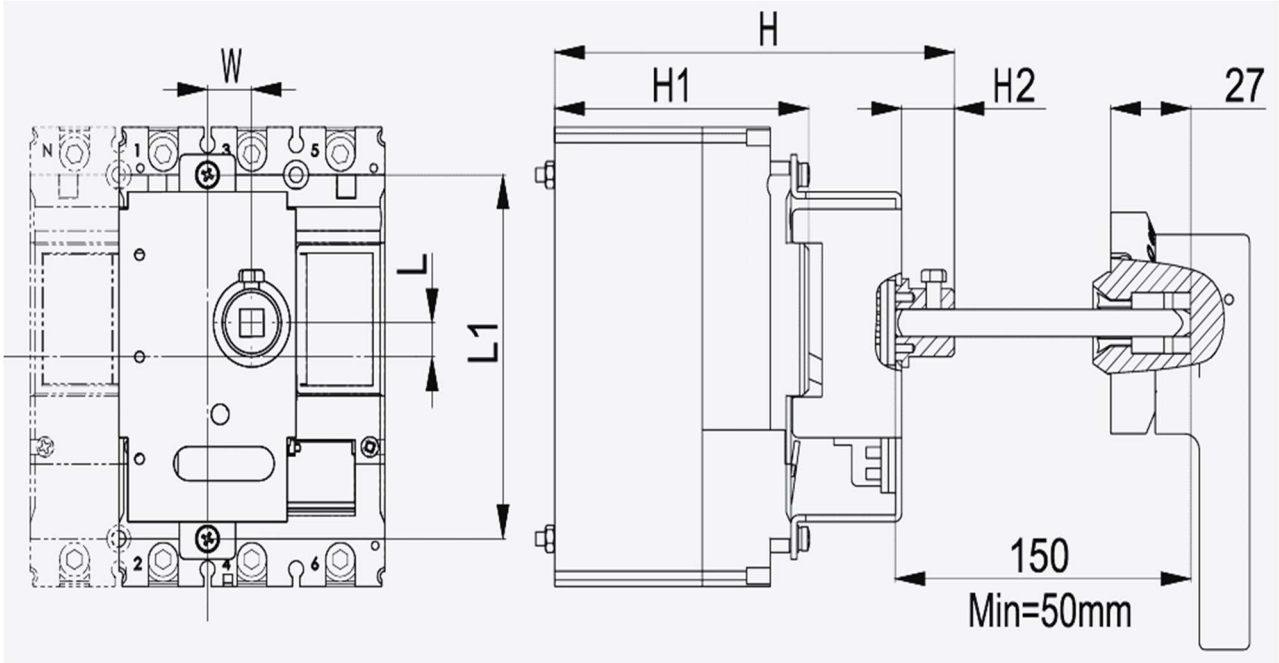


Fig.11 External Dimension Diagram of Manual Operation

Table 22 Overall dimension of manual operation (unit: mm)

Manual operating mechanism	W	L	L1	H	H1	H2	Square shaft specification
SC1-Y/M5-250	17.5	13	139	148	94	20	8×8

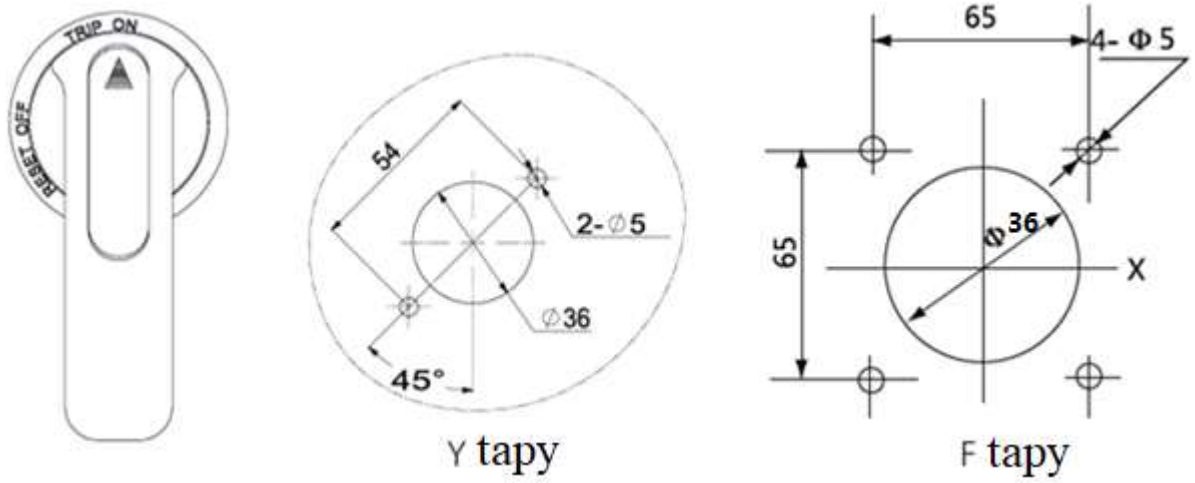


Fig.12 Handle Mounting Hole Diagram

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.

8.8 Electric operation

Electric operation-overall dimension of circuit breaker and its electric operating mechanism after installation：

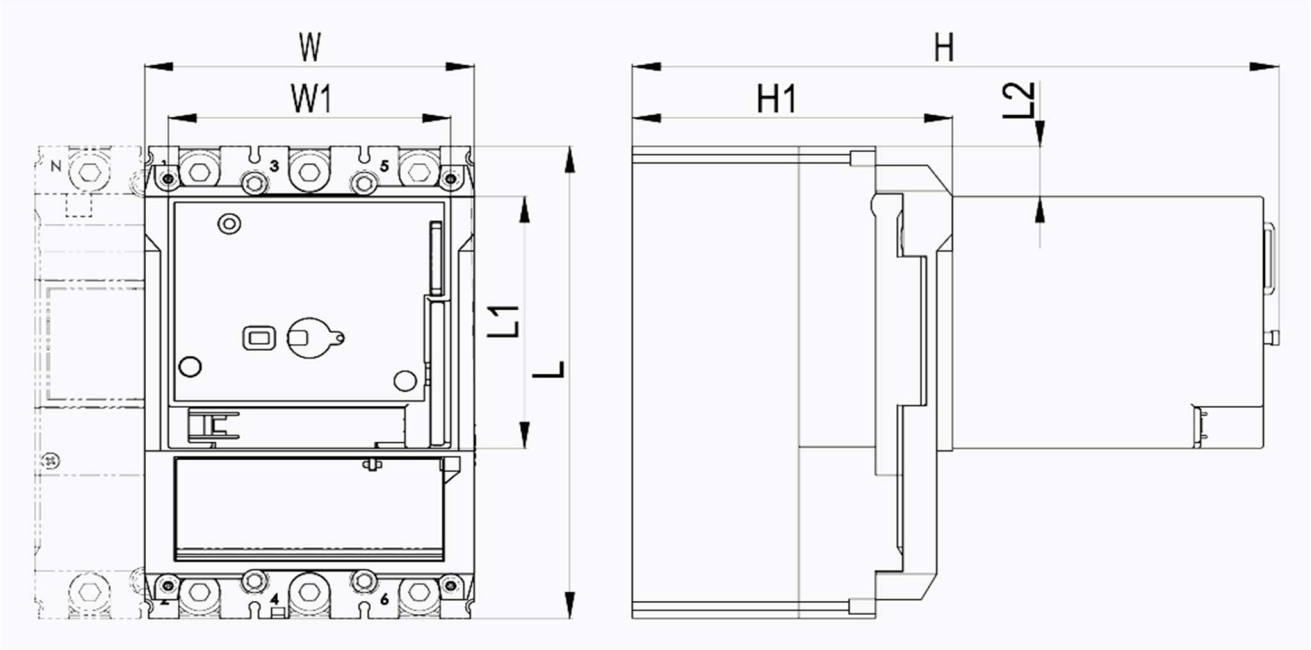


Fig.13 External Dimension Diagram of Electric Operation

Table 23 Overall dimensions of circuit breaker and is electric operating mechanism after installation (unit: mm)

Electric operation	W	W1	L	L1	L2	H	H1
DC1-□/M5-250	105	90	165	88	17.5	206	103

Note：1）□ Indicates Voltage specification

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

Table 22 Voltage specification and power of electric operation

Attachment Name	Electric operation			
Voltage specification	DC24V	AC110V/DC110V	AC230V/DC220V	AC400V
power (W)	80	150	150	200

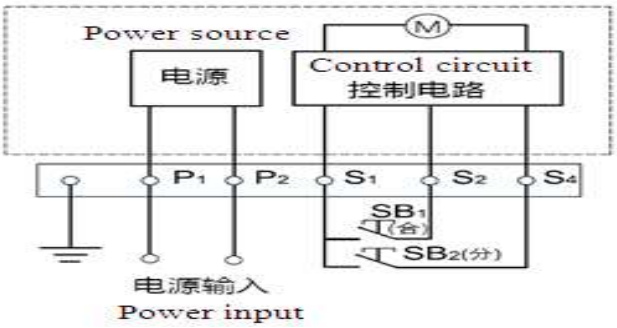


Fig.17 Electric operation wiring diagram

Note：1）During manual operation,180° shall be operated clockwise ,and counterclockwise operation is prohibited

2）P1 and P2 shall not be connected with S1 and S2 and S4 during electric operation wiring

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

8.9 Connection of Copper Bar in Front of Board or Copper Cable with Terminal Block

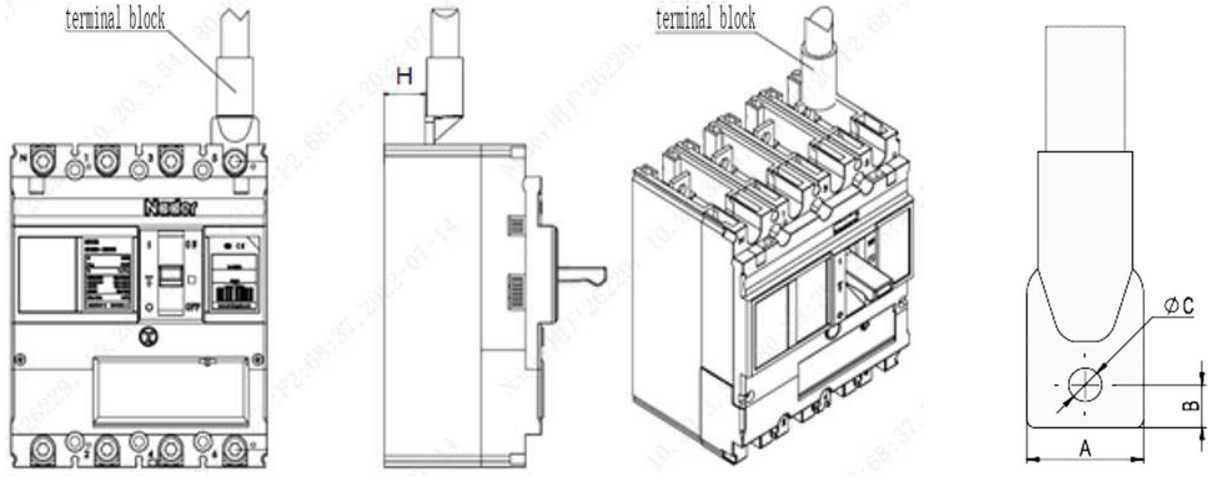


Fig.7 Connection of Copper Bar in Front of Board or Copper Cable with Terminal Block

Table 23 Connection size of copper bar in front of board or copper cable with wiring terminal

Model	A(mm)	B(mm)	ΦC(mm)	H(mm)
NDM5E-250	≤26	≤12	8.4	22

Note 1：Connect with the circuit breaker and select the appropriate wiring mode according to (appearance, installation dimension and wiring method)；

Note 2：If the copper connecting bar is selected, the copper with bar cannot be directly connected with the circuit breaker body, and it is necessary to purchase extended busbar accessories；

Note 3: Unmarked tolerance level should follow GB/T 1804-c.

8.10 Safety distance

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

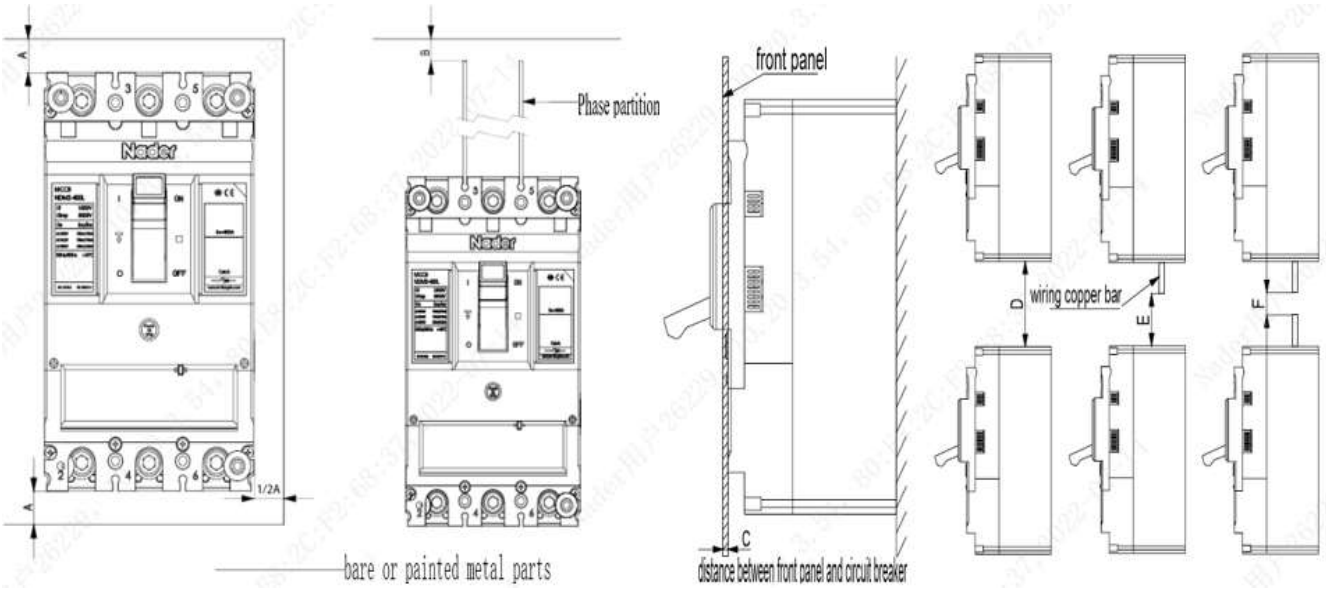


Fig.18 Insulation distance mounted in the metal cabinet

Table 24 Insulation distance mounted in the metal cabinet (unit: mm)

Model	Spacing A	Spacing B	Spacing C	Spacing D	Spacing E	Spacing F
NDM5E-250	≥50	≥0	≥0	≥120	≥80	≥40

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

8.11 Product Main Circuit Wiring Diagram

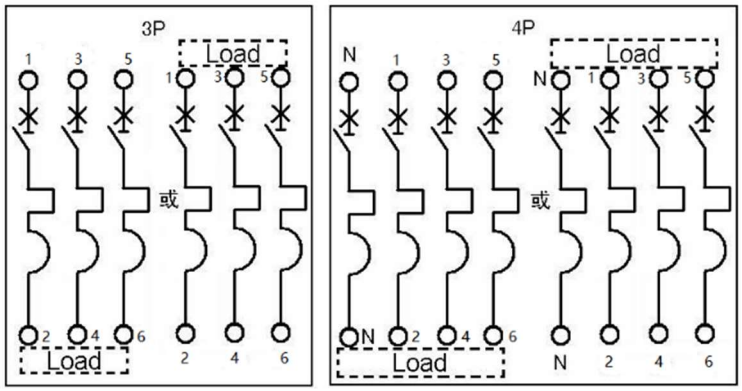


Fig.6 Product Main Circuit Wiring Diagram

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 25 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	1.5	
Code name	Q11	Q22	Q40	1.2N.m

Fig. 20 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 26 Rated Parameters of the Shunt Release

Accessory name	Shunt release				Tightening torque value of wiring screw
Voltage specifications (V)	AC/DC24	AC/DC48	AC/DC110	AC230/DC250	
Power waste(W)	20	13	8	19	1.2N.m
Code name	FT02	FT04	FT11	FT22	

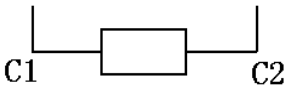


Fig.21 Working Diagram of Shunt Release

Note：shunt tripper is working principle：it is a single pulse action。If it needs to act again, the shunt release must be power on before it can act again.

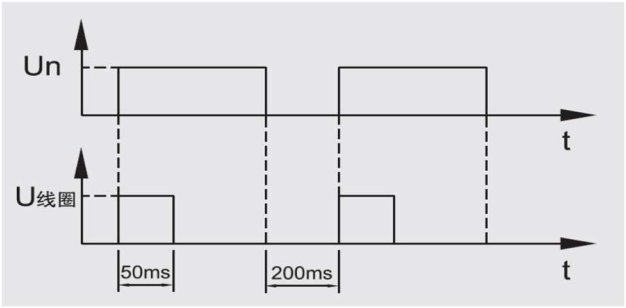
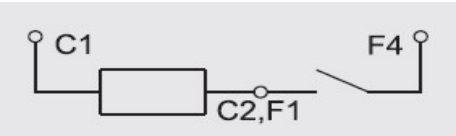


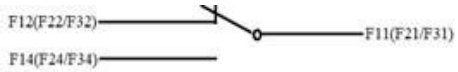
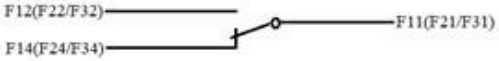
Fig.22 Working principle diagram of shunt tripper

If long-term power supply is required so that the circuit breaker cannot be closed normally, one auxiliary contact can be connected in series as shown in the figure below.



9.3 Rated parameters of the auxiliary contact

Table 27 Parameter of Auxiliary Contact

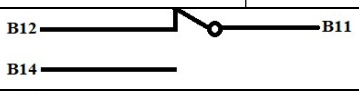
Accessory name		Auxiliary contact(conventional)	Auxiliary contact(Low power consumption)
Voltage specifications (V)/conventional thermal current (Ith)		AC250V/10A、AC400V/3A、DC220V/0.2A	DC30V/0.1A
Wiring diagram	Off		
	On		
Internal resistance		＜30mΩ	＜50mΩ

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 28 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

Note：1)If need DC30V/0.1A Alarm contact，please explain when ordering。

2): Alarm harness is identified as B11 (red), B12 (white), B14 (yellow).

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。

9. 5 Communication Adaptor DF-MB/C3

Installing by DIN35 standard slide rail, the dimension of single product is shown as below. If there is a T in the MCCB release code, this unit is contained NDT2570020.

The main parameters are as follows：

Table 24 Main Parameter of Communication Adaptor

Communication adaptor common parameter		
Electrical characteristic	Power supply	24V DC(19.2～28.8VDC)
	Power dissipation	40mA
Communication	Port	RS485，2 Modbus RTU
	Optional address	1～99
	Baud rate	2400/4800/9600/19200bps
	Check bit	CRC check odd-even check not supported
	Maximum number of single unibus	32
Physical characteristic	Demension	90×71.7×22.5mm(terminal not included)
		109.5×71.7×22.5mm(terminal included)
	Weight	0.075kg
	Installation method	2*35mm standard DIN35 slide rail
Environment characteristic	Working temperature	-25℃～70℃
	Restoring temperature	-40℃～75℃
	Ambient condition	surrounding temperature 40℃， relative humidity 95%
	Pollution	3
	Fire resistance	UL94-V0

	Protection level	IP20

Outline and installation dimensions and terminal signal definition：

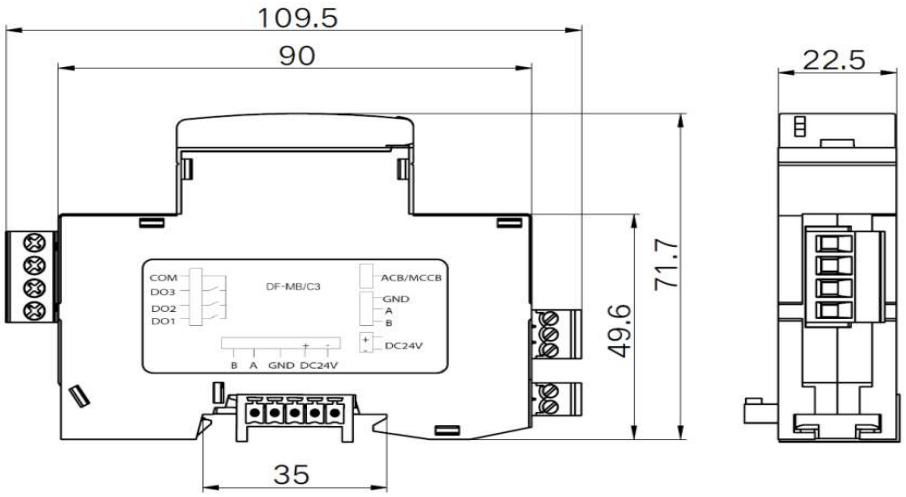


Fig.31 External Dimension of Communication Adaptor

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

Definition of front knob and indicator light of communication adapter：

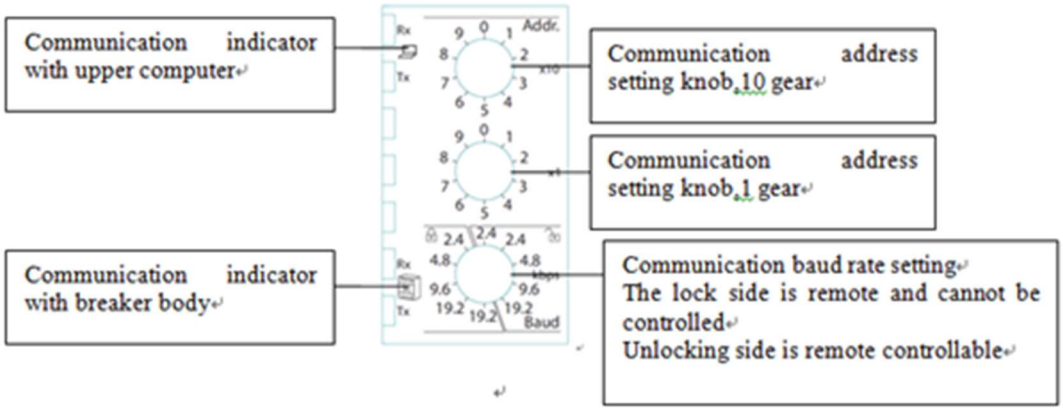


Fig. 32 Gear Adjustment of Communication Adaptor

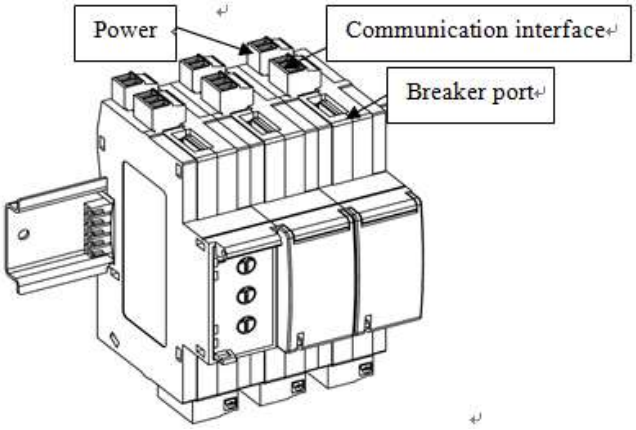


Fig.33 Terminal Ports of Communication Adaptor

Note:1.DO1~DO3 are three ways output control and can be customized the output functions. For example, the on/off control singal for motor operator.

2.Multiple numbers of adapters can be cascade installed (maximum 32). Each MCCB can set address(1~99), there are 2400,4800,9600,19200bps, four option for baud rate set.

3.When communication adaptor in temperature -35℃~-25℃, we suggest to decline baud rate to increase communication reliability。

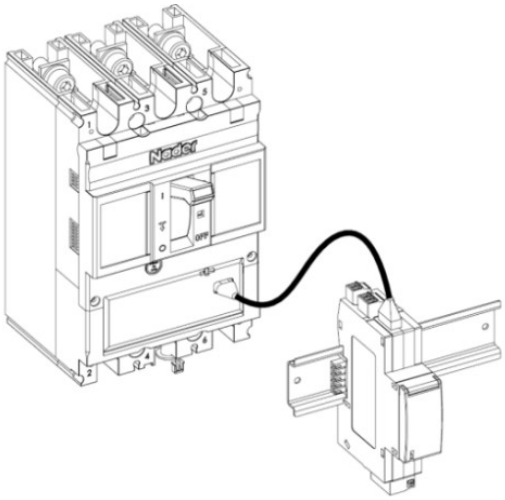


Fig.26 Terminal Ports of Communication Adaptor

9.6 DF-XS1 Display Module

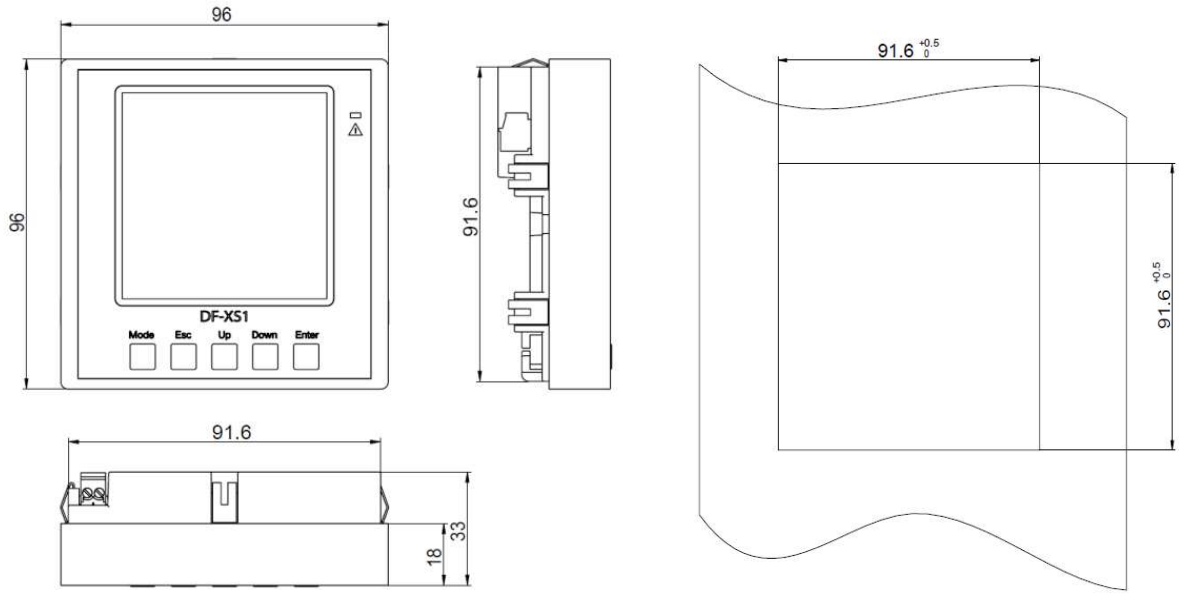
This module installs in the cabinet door. The opening of cabinet should be $91.6_{0}^{+0.5} \times 91.6_{0}^{+0.5}$.

Detailed operation should follow the instruction book if DF-XS1 display module

The main parameters are as follows：

Table 25 Main parameters of Display Module

Electrical characteristic	Power supply	24VDC(19.2～28.8VDC)
	Power dissipation	40mA
Physical characteristic	Dimension	96×96×33mm
	Weight	0.22kg
	Display	160*160 pixel ,white back light
	Installation method	Horizontal installation (surface installation)
Environment characteristic	Working temperature	-25℃～70℃
	Restoring temperature	-40℃～75℃
	Ambient condition	Surrounding temperature40℃，relative humidity 95%
	Pollution	3
	Fire resistance	UL94-V0
	Protection level	IP20



Outline dimension drawing Schematic diagram of opening size

Fig.34 External Dimension for Display Module

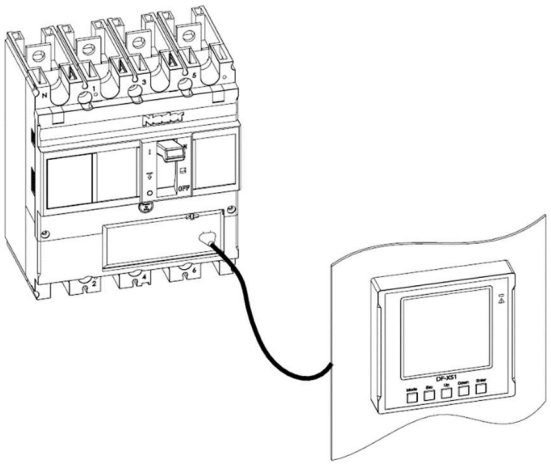


Fig.35 Display Module Connected to Product

Note: This module has four ports, can connect to four MCCB in the same time in order to set and display MCCB parameter.

Display module can't be selected with ETB-T,ETB-PT,ETC-T,ETC-PT circuit breaker at this stage.

9.7 DF-WK6 Temperature Module

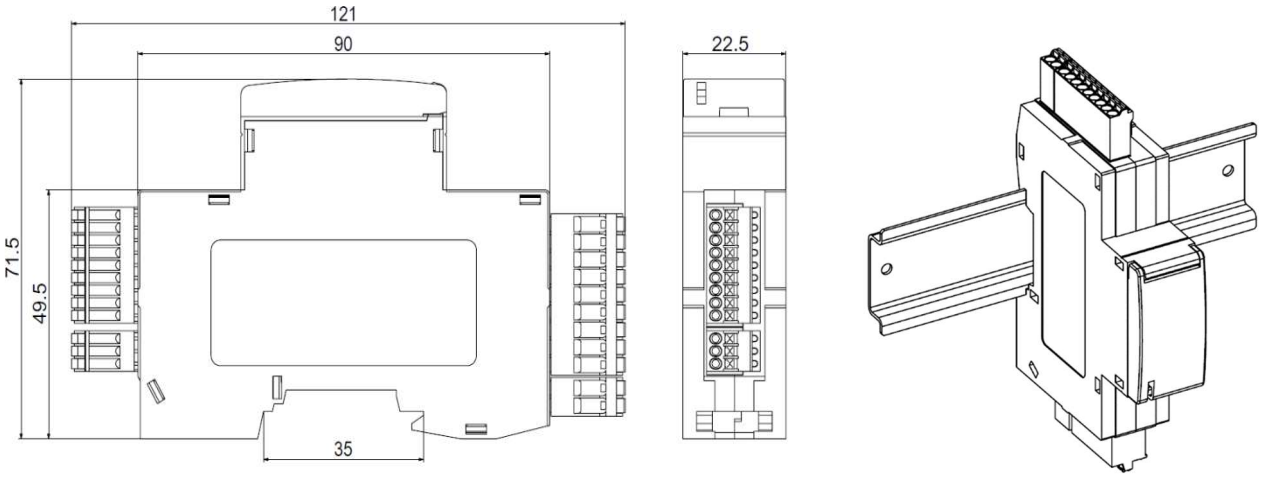
Table 26 Parameter of Temperature Module

Temperature alarm module common parameter		
Electrical characteristic	Working power supply	20～55V(Wide voltage)
	Static power consumption	2.4W
	DO static power dissipation	250VAC/30VDC 2.5A Resistive load
	Measurable temperature range	0℃-150℃
	Temperature resolution	1℃
	Temperature accuracy	±3℃

Communication	Port	RS485，2 Modbus RTU
	Optional address	1~9
	Baud rate	2400/4800/9600/19200bps
	Check bit	CRC check odd-even check not supported
Physical characteristic	Dimension	90×71.5×22.5mm(without extended terminal)
		121×71.5×22.5mm(with extended terminal)
	Weight	0.25kg
	Installation method	35mm standard DIN slide rail
Environment characteristic	Working temperature	-35℃～70℃
	Restoring temperature	-40℃～75℃
	Ambient temperature	Surrounding temperature 40 relative hunmiduty 95%
	Pollution	3
	Fire resistance	UL94-V0
	Protection level	IP20

Installing with standard DIN35 slide rail, outside dimension and installation dimension of single product shows as below. can be cascade installed. Temperature sampling points can be optional from 1 to 6 according to need. Each point can be monitored and have alarm output.

Note: When communication adaptor in temperature -35℃~-25℃, we suggest to declinebaud rate to increase communication reliability.



Outline dimension drawing Installation diagram

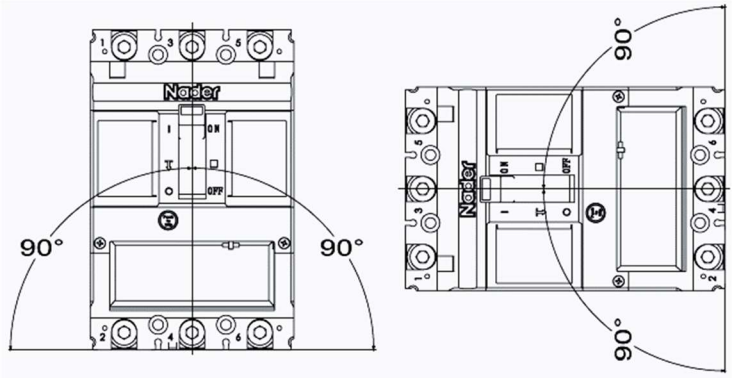
Fig.36 External Dimension of Temperature Module

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

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 ±22.5°.

Horizontal installation of the product.



Vertical Installation Horizontal Installation

Fig.30 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℃~+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.

12、Environment

The environment that comply with RoHS instruction.

13、Attachment Pachage List

Table 34 Accessories list form

SN	Name	Specifications	3P Quantity/Set	4P Quantity/Set
1	Cross small pan-head screw(s)	M5×85	4	4
2	Plain washer	M5	4	4
3	Spring washer	5	4	4
4	Hexagon nut(s)	5	4	4
5	Partition	——	4	6
6	Terminal screw	M8×22	6	8

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.