

Shanghai Liangxin Electrical Co., Ltd.

NDW2 Series of Universal Circuit Breaker

Product Specification

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

Prepared by	_____	Date	_____
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Approved by	_____	Date	_____

Revision History					
Version	Revision Reason/Content	Implementation Date	Prepared by	Reviewed by	Approved by
1	1. Punctuations such as () and , are corrected to Chinese characters; correct the descriptions of terms such as undervoltage, voltage loss, energy storage, horizontal extended and vertical extended are corrected wiring; correct LOGO and typesetting, which are basically consistent with the printed version; 2. Add the altitude derating coefficient table (power frequency withstand voltage), correct the related technical parameter data; 3. Correct the electrical wiring diagram of circuit breaker, design and typeset the text part again, remove the separate controller interface diagram and related text; 4. Related content on NDW2-6300 is added; 5. A signal capacity of the signal output accessory is added, and the accessory drawing is updated. 6. Content on voltage-check closing device is added.	20200730	Zhang Ying Zhou Yongqian	Zhuang Yangyang Zuo Yaoguo Zhu Shenfeng	Zhang Xiangang
2	Review and add content and correct errata.	20200828	Zuo Yaoguo	Zhou Yongqian	Wang Qinshan
3	1. Add the content related to the four open and four closed specifications for NDW2-1600 shell frame auxiliary contact; 2. Add the six open and six closed specifications for NDW2-4000 shell frame auxiliary contact, and delete the content related to five open and five closed specifications; NDW2-4000 four open and four closed auxiliary contacts maintain the original terminal number definition; 3. Add four-group conversion and six-group conversion specifications for NDW2-2000/3200/6300 shell frame auxiliary contact, and delete the content related to five open and five closed specifications; 4. Add a language type option to the order specification.	20210225	Zhang Fei Jia Jia	Zhou Yongqian Yang Xiuwen	Luo Guorui Zhang Xiangang
4	Add specification for NDW2-4000HU; Add specification for NDW2-6300HU; Machine life frequency of NDW2-6300 is changed to 20 times/hour, and the electric life frequency is changed to 10 times/hour	20210712	Tian Jing	Huan Jianjun	Yin Jiacan
5	1. Change controller power module built-in, installation dimensions and secondary wiring diagram;	20211111	Xu Youzhi	Zhao Haiguan Zuo Yaoguo	Wang Qinshan

	2. Wiring bolts and instruction manuals are changed to optional accessories; 3. Cancel the secondary circuit 20# grounding wire; 4. The power of the electric operating mechanism is changed from output power to input power; 5. Delete the statement that the interrupter and contact system have a number of patents; 6. Add recommendations for the use of phase partition;			Zhu Mengjun Zhou Yongqian	
6	1. Update the content related to off-position locks and safety locks 2. Add IP54 transparent cover content 3. Update the electrical wiring diagram of NDW2-1600 4. Add the content related to retention shunt release 5. Update ATS wiring diagram for 2000 and above shell frame	20220124	Niu Li Xu Youzhi Chen Kai	Wang Cheng	Luo Guorui
7	1. Correction 2. Update 6300 Shell Frame Fixed Outline and Installation Dimensions 3. Modify the logo 4. Increase the number of notes and fault records	20240429	Xu Jiewei Huang chengxiu	Wang Qinshan	Luo Guorui
8	1. The fixed extension busbar hole of 2000 shell frame was changed from $\phi 15$ to $\phi 13$; 2. 2000 shell frame drawer type adds vertical extension wiring; 3. Add 5.5 preventive maintenance.	20240812	Huangwenfang	Chenkai	Luogurui
9	1. 2000 shell frame fixed products add J5, J6, J7, and J8 2. Update 1.6 standards and certifications	20240318	Huangwenfang	Chenkai	Luogurui

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Product overview 1

1.1 NDW2 series circuit breaker current shell frame



NDW2-1600



NDW2-2000



NDW2-3200



NDW2-4000



NDW2-6300

1.2 NDW2 series circuit breaker rated current

Rated current (A) Shell frame level	200	400	630	800	1000	1250	1600	2000	2500	2900	3200	4000	5000	6300
NDW2-1600														
NDW2-2000														
NDW2-3200														
NDW2-4000														
NDW2-6300														

1.3 NDW2 series circuit breaker technical specifications

Circuit breaker	NDW2-1600	NDW2-2000	NDW2-3200	NDW2-4000	NDW2-6300
Number of poles	3, 4	3, 4	3, 4	3, 4	3, 4
Rated current In 40°C	200A□1600A	400A□2000A	2000A□3200A	800A□4000A	4000A□6300A
N-pole rated current	100%In	100%In	100%In	100%In	100%In
Maximum rated operating voltage Ue	AC690V	AC690V	AC690V	AC1140V	AC1140V
Rated limit short-circuit breaking capacity Icu (AC415V) ¹⁾	65kA	80kA	100kA	100kA	120kA
Rated operating short-circuit breaking capacity Ics (AC415V) ¹⁾	55kA	80kA	85kA	100kA	120kA
Rated short-time withstand current Iew (AC415V) ¹⁾ 1s	42kA	66kA	85kA	85kA	100kA

Note: 1) Product 4000 refers to AC400V

1.4 Structure Design

■ Installation Mode

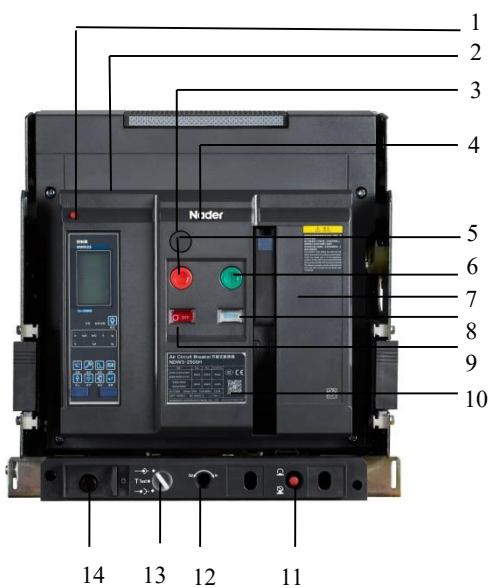


Fixed type



Drawout type

■ Brief Description of Structure and Indications

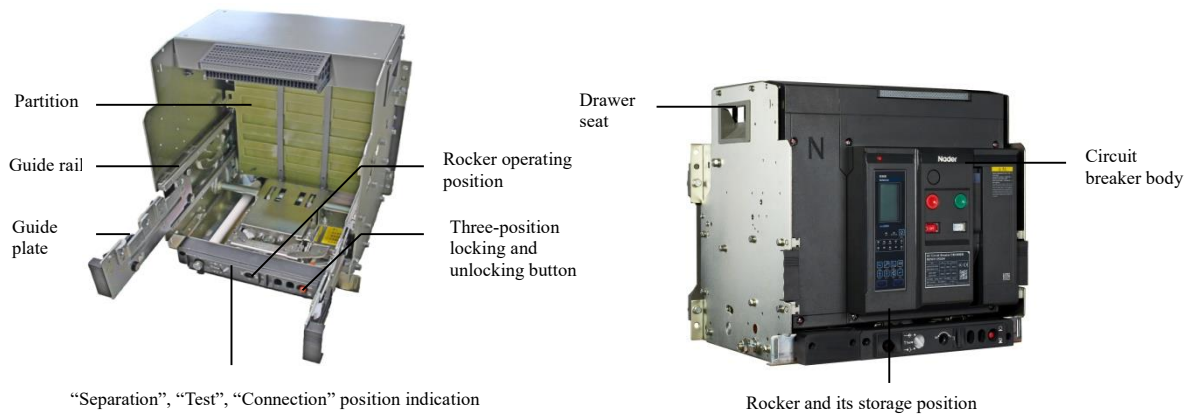


- | | |
|---|--|
| 1. Reset button | 9. Opening and closing indication |
| 3. Specification sign | 10. Nameplate |
| 3. Off-position Key Lock (Optional functions) | 11. "Connection", "Test", "Separation" Position locking and unlocking device |
| 4. Nader sign | 12. Rocker operating position |
| 5. Disconnection button | 13. "Connection", "Test", "Separation" position indicator |
| 6. Closing button | 14. Rocker and its storage position |
| 7. Counter (optional function) | |
| 8. Energy releasing and storing indicator | |

Note: 1 ~ 11 is fixed type, while 1 ~ 14 is drawout type.

■ Drawout Type Circuit Breaker Structure

Drawout type circuit breaker is composed of the circuit breaker and the drawer seat. The drawer seat has guide rails on both sides. There's guide plate on the guide rail. The circuit breaker body is placed on the left and right guide plates. The drawout type circuit breaker connects to the main circuit by inserting the busbar on the circuit breaker into the bridge contact on the drawer seat.



1.5 Product Features

1.5.1 The controllers are of full range and versatile

- NWK31 or NWK21: Conventional function, digital display, practical function and simplicity, adaptability to low-temperature places, and optional voltage measurement function;
- NWK22 or NWK32: Conventional function, LCD, multiple and diversified functions, with optional voltage and harmonics measurement and protection functions, applicable to high-end application places, and more powerful if applied to intelligent system
- Measurement and protection: With current, voltage, frequency, phase sequence, power, power factor and harmonics measurement and protection functions
- Current protection features: A variety of overload long-time delay protection, a variety of short circuit short-time delay protection, short circuit transient protection, earthing protection, neutral Linear N-pole protection, current unbalance protection, MCR protection
- Maintenance function: With fault record (30 times), historical current peak record, contact wear equivalent, query of operation times, clock function function, self-diagnostic function, test function and fault display function
- With a remote reset device, can realize remote recovery after fault tripping of the controller

1.5.2 Integrated communication network

NWK22 and NWK32 type controller can realize remote sensing, remote control, remote regulating and remote communication - "four remotes" data transmission function through communication interface Modbus protocol requirements.

1.5.3 Thermal-humidity type circuit breaker

TH (thermal-humidity) type circuit breaker can meet the requirements of the three-proofing products, namely, moisture-proof, mildew-proof and salt-spray-proof, and complies with JB/T 834 Technical Requirements of Tropical Type Low-voltage Apparatus while having passed the following standard related tests:

- Damp heat test: GB/T 2423.4-2008 Environmental Testing for Electric and Electronic Products - Part 2: Test Method - Test Db: Damp Heat, Cyclic (12h + 12h Cycle)
- Mould growth test: GBT2423.16-2008 Environmental Testing for Electric and Electronic Products - Part 2: Test Method - Test J and Guidance: Mould Growth
- Enclosure protection grade: GB/T 4208-2008 Enclosure Protection Grade (IP code).
- Salt spray test: GB/T 2423.18-2012 Environmental Testing. Part 2: Test Method Test Kb: Salt Spray, Alternating (Sodium Chloride Solution)

1.5.4 Wind power, plateau type circuit breaker

On the basis of satisfying the requirements of thermal-humidity type circuit breaker, wind power, plateau type circuit breaker used in special places can be used under the environment condition of plateau and low temperature below 40°C, is in line with the GB/T20645 Technical Requirements of the Plateau Low-voltage Apparatus under Special Circumstances, and has passed standard related test.

1.5.5 Convenient wiring mode

Either zero flashover or upper and lower wiring.

Connection mode: horizontal or vertical connection, elongated horizontal or vertical connection, L-shape connection, mixed connection, mixed and elongated connection

1.5.6 Efficient arc extinguishing and breaking

The arc extinguishing chamber and contact system of circuit breaker have been optimized, using the principle of air-blast arc extinguishing, optimizes the arc extinguishing gate design, increases the driving force of arc, and improves the breaking ability of the product. In addition, it also designs and optimizes the time for acquiring signal and giving command by the controller, and can greatly shorten the time when there is a large fault current.

1.5.7 High electrical life and short time tolerance ability

The body design adopts high strength DMC material, and has high impact strength and insulating properties. The design of the double-contact structure improves the electric life of products; the optimized design of the mechanism realizes compensation to the contact pressure, and improves the product reliability and short circuit tolerance ability.

1.5.8 Multiple safety protection devices

Equipped with drawout type circuit breaker door interlock, drawout type three-position locking and unlocking device and off-position key lock, connection terminal protective cover and other protection devices.

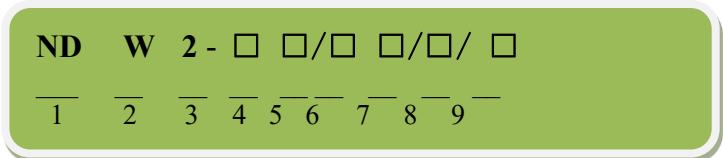
1.6 Conforming Standards and Certification

- | | |
|-------------------|---|
| GB/T 2423.4-2008 | Environmental Testing for Electric and Electronic Products - Part 2: Test Method - Test Db: Damp Heat, Cyclic (12h + 12h Cycle) |
| GB/T 4207-2022 | Methods for the Determination of the Proof and the Comparative Tracking Indices of Solid Insulating Materials |
| GB/T 14048.1-2023 | Low-voltage Switchgear and Control Equipment - Part 1: General Rules (IEC |

- 60947-1:2020, MOD)
- GB/T 14048.2-2020 Low-voltage Switchgear and Control Equipment - Part 2: Circuit Breaker (IEC 60947-2:2019, IDT)
- GB 14048.5-2017 Low-voltage Switchgear and Control Equipment - Part 5-1: Control Circuit Electrical Appliances and Switch Elements - Electromechanical Control Circuit Electrical Appliances (IEC 60947-5-1:2016, MOD)
- GB/T 14092.3-2009 Environmental Condition for Machinery Products - High Altitude
- GB/T 19608.3-2004 Classification of Special Environmental Condition Part 3: Plateau
- GB/T 20645-2021 Specific Environmental Condition - Technical Requirements of Low-voltage Apparatuses for Plateau
- GB/T 20626.3-2022 Specific Environmental Condition - Electric and Electronic Products for Plateau - Part 3: Protection Requirement of Thunder and Lightning, Pollution, Condensation

NDW2 series of universal circuit breaker has obtained China Compulsory Certification (CCC) for products.

1.7 Product Model

		
SN	SN name	NDW2
1	Enterprise code	Nader 牌低压电器
2	Product code	W: Air circuit breaker
3	Design SN	2
4	Rated current of frame	16: 1600, 20: 2000, 32: 3200, 40: 4000, 63: 6300
5	Breaking type	HU: High-voltage class; not marked: non-high voltage class
6	Installation Mode	Fixed type not marked, drawout type: C
7	Rated current	02-200A, 04-400A, 06-630A, 08-800A, 10-1000A, 12-1250A, 16-1600A, 20-2000A, 25-2500A, 29-2900A, 32-3200A, 36-3600A, 40-4000A, 50-5000A, 63-6300A
8	Number of poles	3:3 poles; 4:4 poles; 5: 3 P+N;
9	Controller type	KM: NWK31 (digital display), applicable to NDW2-1600 NWK21 (digital display), applicable to NDW2-2000/3200/4000/6300
		KY: NWK32 (LCD), applicable to NDW2-1600 NWK22 (LCD), applicable to NDW2-2000/3200/4000/6300

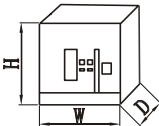
Note: For the HU-type breaking type, No. 6 is located after No. 7, example: NDW2-40HU/40C

Chapter 2 Technical Characteristics

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Technical Characteristics 2

2.1 NDW2-1600 Technical Parameter List

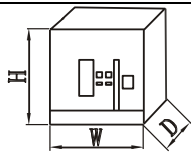
Circuit breaker model		NDW2-1600			
Rated current In (A)		200, 400, 630	800, 1000	1250, 1600	
N-pole rated current		100%In			
Rated operating voltage Ue		AC220V/230V/240V, AC380V/400V/415V, AC440V, AC660V/690V			
Rated frequency f		50/60Hz			
Rated insulation voltage Ui		1000V			
Rated impulse withstand voltage Uimp (V)		12kV			
Number of poles		3, 4			
Full break time		≤30ms			
Closing time		≤70ms			
Rated ultimate short circuit Breaking capacity Icu (effective value)	AC415V	65kA			
	AC690V	42kA			
Rated operating short circuit Breaking capacity Ics (effective value)	AC415V	55kA			
	AC690V	35kA			
Rated short circuit making capacity Icm (peak value)	AC415V	143kA			
	AC690V	88kA			
Rated short-time withstand current Icw (effective value) 1s	AC415V	42kA			
	AC690V	35kA			
Operating performance (Number of times)	Electrical life	AC415V	10000	10000	10000
		AC690V	10000	10000 (800A) 7000 (1000A)	6000
		Operation frequency	20 times/hour		
	Mechanical life	Maintenance-free	15000		
		With maintenance	30000		
		Operation frequency	60 times/hour		
Installation Mode		Fixed type, drawout type			
Wiring method of the main circuit		Horizontal wiring, vertical wiring, horizontal extended wiring, mixed wiring (upper horizontal, lower vertical), mixed wiring (upper vertical, lower horizontal)			
External dimension: W×D×H(mm) 	Fixed type 3P	260×205.5×319.5			
	Fixed type 4P	330×205.5×319.5			
	Drawout type 3P	268.5×303.5×352			
	Drawout type 4P	268.5×303.5×352			
Weight(kg)	Fixed type 3P	20			21
	Fixed type 4P	24			26
	Drawout type 3P	40			42
	Drawout type 4P	50			52

Note 1: Full break time: Interval from the beginning of the circuit breaker disconnection to the end of the arcing time.

Note 2: Closing time: Interval from the beginning of the circuit breaker closing to the end of the contact time for all pole contacts.

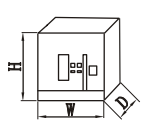
2.2 NDW2-2000/3200 Technical Parameter List

Circuit breaker model		NDW2-2000				NDW2-3200		
Rated current In (A)		400, 630, 800	1000, 1250, 1600		2000	2000, 2500	2900, 3200	
N-pole rated current		100%In						
Rated operating voltage Ue		AC220V/230V/240V, AC380V/400V/AC415V AC440V/AC480V, AC660V/690V						
Rated frequency f		50/60Hz						
Rated insulation voltage Ui		1250			1000			
Rated impulse withstand voltage Uimp (V)		12kV						
Number of poles		3, 4						
Full break time		≤30ms						
Closing time		≤70ms						
Rated limit short-circuit breaking capacity Icu (effective value)	AC415V	80kA				100kA		
	AC690V	65kA				80kA		
Rated operating short-circuit breaking capacity Ics (effective value)	AC415V	80kA				85kA		
	AC690V	65kA				65kA		
Rated short circuit making capacity Icm (peak value)	AC415V	176 kA				220kA		
	AC690V	143 kA				176kA		
Rated short-time withstand current Icw (effective value) 1s	AC415V	66kA				85kA		
	AC690V	50kA				55kA		
Operate performance (Number of times)	Electrical life	AC415V	15000	15000	11000	15000	12500(2900A) 11000(3200A)	
		AC690V	15000	15000(1000-1250A) 8000(1600A)	6000	15000(2000A) 9000(2500A)	6000	
		Operation frequency	20 times/hour				20 times/hour	
	Mechanical life	Maintenance-free	15000				15000	
		With maintenance	30000				20000	
		Operation frequency	60 times/hour				60 times/hour	
Installation Mode		Fixed type, drawout type						
Wiring method of the main circuit	Fixed type	Horizontal wiring, horizontal extended wiring, L-type wiring vertical extended wiring, Mixed wiring (upper horizontal and lower vertical), mixed wiring (upper vertical and lower horizontal) Mixed extended wiring (upper horizontal and lower vertical), Mixed extended wiring (upper vertical and lower horizontal)				Horizontal wiring, horizontal extended wiring		
	Drawout type	Horizontal wiring, horizontal extended wiring, vertical wiring, L-type wiring Vertical extended wiring				Horizontal wiring, horizontal extended wiring, vertical wiring		
External dimension: W×D×H (mm)	Fixed 3P	362×331×397				422×302×397		
	Fixed 4P	457×331×397				537×302×397		
	Drawout 3P	375×398×432				435×398×432		
	Drawout 4P	470×398×432				550×398×432		

						
Weight(kg)	Fixed 3P	39	40	41	46	56
	Fixed 4P	48	49	50	58	68
	Drawout 3P	68	70	71	92	96
	Drawout 4P	86	88	91	108	118
Note: ▲ represents this function is available						

2.3 NDW2-4000/6300 Technical Parameter List

Circuit breaker model		NDW2-4000				NDW2-6300		
Rated current In (A)		800, 1000, 1250, 1600	2000, 2500	3200, 4000		4000, 5000	6300	
N-pole rated current		100%In						
Rated operating voltage Ue		AC220V/230V/240V, AC380V/400V, AC415V, AC440V/480V, AC660V/690V, AC800V, AC1000/1140V						
Rated frequency f		50/60Hz						
Rated insulation voltage Ui		AC1000V(AC415V, AC690V) AC1250V(AC800V, AC1000/1140V)						
Rated impulse withstand voltage Uimp (V)		12kV						
Number of poles		3, 4						
Full break time		≤30ms						
Closing time		≤70ms						
Rated ultimate short circuit	AC400V	100kA				120kA		
	AC690V	75kA				85kA		
Breaking capacity Icu (effective value)	AC800V	70 kA				75 kA		
	AC1000/ 1140V	55 kA				60 kA		
Rated operating short circuit	AC400V	100kA				120kA		
	AC690V	75kA				85kA		
Breaking capacity Ics (effective value)	AC800V	70 kA				75 kA		
	AC1000/ 1140V	55 kA				60 kA		
Rated short circuit making capacity Icm (peak value)	AC400V	220kA				264kA		
	AC690V	165kA				187kA		
	AC800V	154kA				165 kA		
	AC1000/ 1140V	121kA				132 kA		
Rated short-time withstand current Icw (effective value) 1s	AC400V	85kA				100kA		
	AC690V	75kA				85kA		
	AC800V	70 kA				75 kA		
	AC1000/ 1140V	55 kA				60 kA		
Operating performance (Number of times)	Electrical life	AC415V	10000	8000	6000	3000		
		AC690V	10000	6000	3000	2000		
		AC800V	2000	1000	1000	3000(4000A) 1500(5000A) 1000(6300A)		
		AC1000/ 1140V	2000	1000	600	2000(4000A) 1000(5000A) 500 (6300A)		
	Mechanical life	Operation frequency	20 times/hour				10 times/hour	
		Maintenance-free	10000				5000	
		With maintenance	15000				10000	
		Operation frequency	60 times/hour				20 times/hour	
Installation Mode		Fixed type, drawout type				Fixed type, drawout type		
Wiring method of the main circuit		Horizontal wiring, vertical wiring, horizontal extended wiring, Vertical extended wiring				Horizontal wiring, vertical wiring, horizontal extended wiring, vertical extended wiring, mixed wiring (upper horizontal, lower vertical), mixed wiring (upper vertical, lower horizontal), mixed extended wiring (upper horizontal, lower vertical), mixed extended wiring (upper vertical, lower horizontal).		

				mixed extended wiring (upper vertical, lower horizontal)	
External dimension: W×D×H (mm) 	Fixed type 3P	428×298×394	428×298×394	803×302.5×392	
	Fixed type 4P	543×298×394	543×298×394	1033×302.5×392	
	Drawout type 3P	435×403×432	435×397.5×432	809×401.5×475	
	Drawout type 4P	550×403×432	550×397.5×432	1039×401.5×475	
Weight(kg)	Fixed type 3P	59	60	125	127
	Fixed type 4P	70	71.5	167	170
	Drawout type 3P	97	103	193	195
	Drawout type 4P	114	120	257	260

Note: 1. Closing time: The closing (or connecting) time is the time interval from the moment when the closing electromagnet is energized to the moment when all poles' contacts are in contact;

2. Separating time: The separating (or disconnecting) time is the time interval from the moment the shunt release is energized to the moment when all poles' arcing contacts are separated;

3. Reclosing time: The time interval from when the circuit breaker receives a tripping command to the moment when it receives a closing command again;

4. Make-break time: Interval from the beginning of the circuit breaker disconnection to the end of the arcing time;

5. Contact resistance: Contact resistance is the additional resistance that occurs when fixed and moving contacts come into contact with each other. Electric's HLY-200A loop resistance tester is used as the test equipment. Please refer to "HLY-200A Loop Resistance Tester User Manual" for the testing method.

6. Maintenance-free means that the product can continue to operate normally without repair or replacement of parts under the use environment specified in the specification.

7. Maintainable means that the product can continue to operate normally with replacement of parts under the use environment specified in the specification.

8. Unless otherwise noted in the above table, all parameters are measured in the laboratory environment (room temperature 25±5°C, humidity controlled at: 30%-70%RH, dust-free, pollution-free, impact-free and vibration-free).

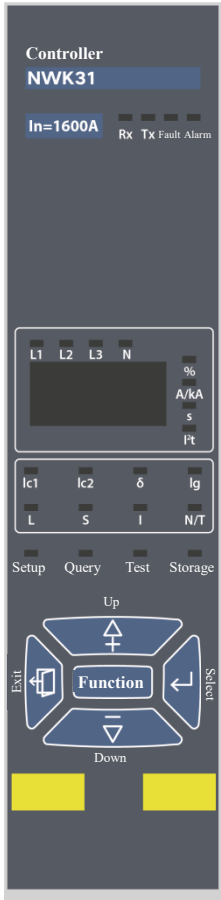
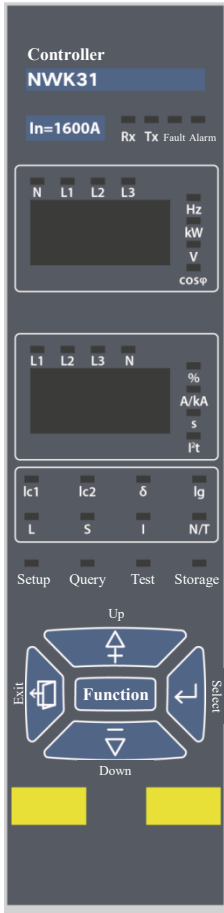
Chapter 3 Controller

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Controller 3

Controller is one of the main components of the circuit breaker, which can provide the function of protecting the overload, short circuit, grounding, current unbalance, overvoltage, undervoltage, voltage unbalance, overfrequency, underfrequency, reverse power and other failures, and realize reasonable operation of the power grid through the load monitoring, required value protection, regional interlocking and other functions. Controller has the function of measuring the current, voltage, power, frequency, electric energy, required value, harmonic and other power grid parameters; and the function of recording the fault, alarm, operation, maximum historical current, contact wear and other operating maintenance parameters. When the power network is carrying on communication network, the controller can realize the remote sensing, remote communication, remote control and remote regulating at the remote terminal of the electric power automation network.

3.1 Type of Controller

Model	NWK21/NWK31	NWK21 (V) /NWK31 (V)	NWK22 /NWK32 NWK22 (V) /NWK32 (V) NWK22 (P) /NWK32 (P)
Controller Pictures			
Note: NWK31 and NWK32 are applied to NDW2-1600, NWK21 and NWK22 are applied to NDW2-2000, NDW2-3200, NDW2-4000 and NDW2-6300.			

3.2 Controller Functions

Functional items		NWK21 NWK31	NWK21/V NWK31/V	NWK22 NWK32	NWK22/V NWK32/V	NWK22/P NWK32/P
Display interface	Digital tube numbers and symbols display	√	√	—	—	—
	LCD panel symbols and graphics display in Chinese	—	—	√	√	√
Protection function	Overload long-time delay protection	√	√	√	√	√
	Overload thermal memory	√	√	√	√	√
	Overload pre-alarm/alarm output	√/▲	√/▲	√/▲	√/▲	√/▲
	Short circuit short-time delay protection	√	√	√	√	√
	Short-time delay thermal memory	√	√	√	√	√
	Short circuit instantaneous protection	√	√	√	√	√
	Ground protection (differential type)	√	√	√	√	√
	Grounding alarm/alarm output	√/▲	√/▲	√/▲	√/▲	√/▲
	Current leakage protection/alarm/alarm output	—	—	√/√/▲	√/√/▲	√/√/▲
	Neutral wire protection	√	√	√	√	√
	Current unbalance protection/alarm/alarm output	√/—/—	√/—/—	√/√/▲	√/√/▲	√/√/▲
	MCR	√	√	√	√	√
	Load monitoring/alarm/alarm output	▲/▲/▲	▲/▲/▲	√/√/▲	√/√/▲	√/√/▲
	Undervoltage protection/alarm/alarm output	—	—	—	√/√/▲	√/√/▲
	Overvoltage protection/alarm/alarm output	—	—	—	√/√/▲	√/√/▲
	Voltage unbalance protection /alarm/alarm output	—	—	—	√/√/▲	√/√/▲
	Phase sequence protection/alarm/alarm output	—	—	—	√/√/▲	√/√/▲
	Underfrequency protection/alarm/alarm output	—	—	—	√/√/▲	√/√/▲
	Overfrequency protection/alarm/alarm output	—	—	—	√/√/▲	√/√/▲
	Current required value protection/alarm/alarm output	—	—	—	√/√/▲	√/√/▲
	Reverse power protection/alarm/alarm output	—	—	—	—	√/√/▲
Measuring function	Current measurement (phase pole, N-pole, grounding)	√	√	√	√	√
	Voltage (phase voltage, circuit voltage, voltage unbalance rate)	—	√	—	√	√
	Phase sequence detection	—	—	—	√	√
	Frequency measurement	—	√	—	√	√
	Required value measurement (current)	—	—	—	√	√
	Required value measurement (power)	—	—	—	—	√
	Power measurement (active power, reactive power, apparent power)	—	√	—	—	√
	Power factor measurement	—	√	—	—	√
	Electric energy measurement (active electric energy, reactive electric energy, apparent electric energy)	—	—	—	—	√
	Harmonics measurement	—	—	—	—	√
Maintenance function	LED fault status indication	√	√	√	√	√
	Fault record (30 times) and query	√	√	√	√	√
	Historic peak current record	—	—	√	√	√
	Alarm history query	—	—	√	√	√
	Fault tripping signal output	√	√	√	√	√
	Self-diagnostic function	√	√	√	√	√
	Simulating tripping test function	√	√	√	√	√
	Contact wear equivalent (alarm) query	▲	▲	√	√	√
	Query of number of operations	▲	▲	√	√	√
	Clock function	—	—	√	√	√
Other	Remote reset of controller	▲	▲	▲	▲	▲
	Signal element	▲	▲	▲	▲	▲
	Communication	—	—	▲	▲	▲

Note: 1. "√" represents with this function, "▲" represents optional function for users, and "—" represents without this function

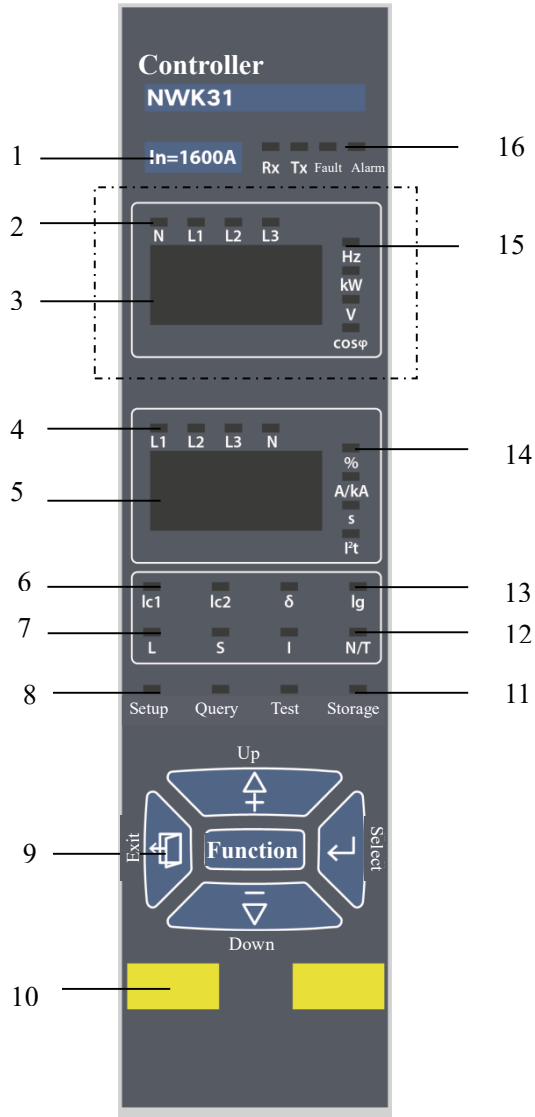
2. NWK21/V, NWK31/V, NWK22/V, NWK32/V, NWK22/P and NWK32/P controllers are only applicable to the rated voltage of 500V and below;

3. The controller with “V” and “P” functions is optional for the conventional controller.

3.3 Controller Panel Description

■ NWK21/NWK31 Type Controller

NWK21/ NWK31 Controller Panel Description



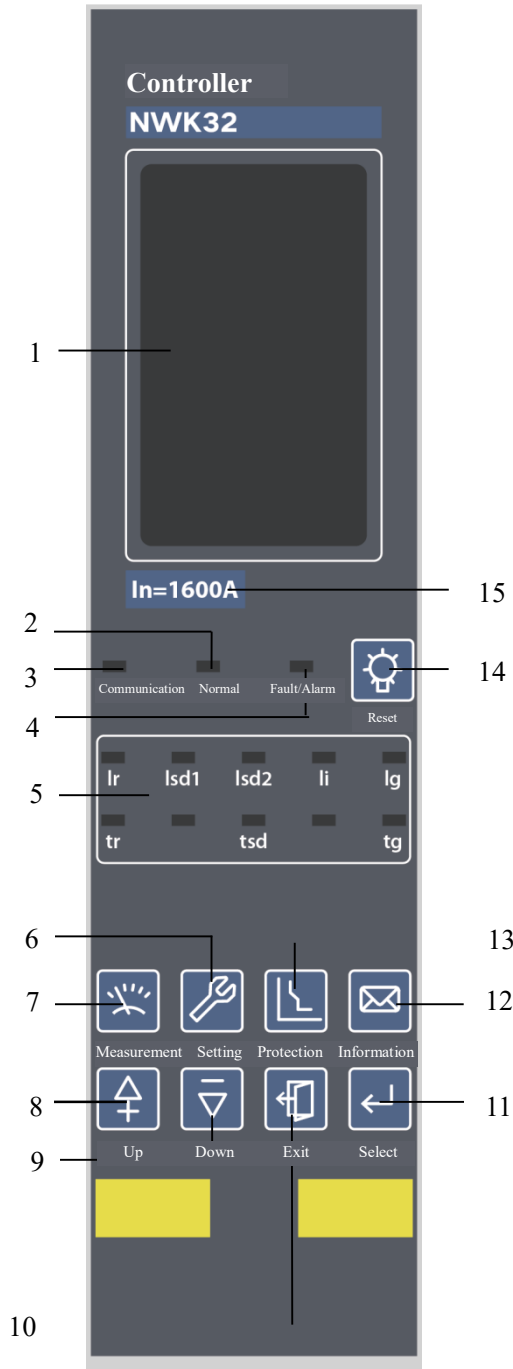
1. Rated current
2. N-phase and A-, B-, and C-phase voltage indicators in order
3. Three-phase voltage and frequency value display screen
4. Three-phase current, N-phase current indicators, etc.
5. Three-phase electric current display screen, etc.
6. Load monitoring signals 1 and 2 operation indicators
7. Long time delay and short time delay protection operation indicators
8. Setup, query indicators
9. 5 operation buttons
10. Unused temporarily
11. Test, storage indicators
12. Instantaneous, N-phase current or self-diagnosis operation indicators
13. Unbalance, ground current protection operation indicators
14. Unbalance rate, current, time and I²t (inverse time limit) indicators in order
15. Frequency, power, voltage and power factor indicators in order
16. Rx, Tx, fault and alarm indicators in order

Note: 1. Dot box is the controller with a voltage displaying function, and it is not displayed if there is no such voltage displaying function;

2. Tx and Rx are for internal testing only.

■ NWK22/NWK32 Type Controller

NWK22/ NWK32 Controller Panel



1. LCD interface display
2. “Normal” indicator (LED): the green LED always flashes as long as the controller is turned on and works properly.
3. ‘Communication’ indicator (LED): It flashes during the communication connection.
4. ‘Fault/Alarm’ indicator (LED): During normal operation, LED is not on; in case of fault tripping, the red LED flashes; in case of an alarm, the red LED is always on.
5. Protection indicator zone (LED): The corresponding LED flashes respectively from left to right in the upper indicator zone to indicate the fault type in case of fault disconnection; for the protection parameter settings, the LED is always on to indicate the currently selected items.
6. “Setting” button: Switch to the topic menu of parameter settings.
7. “Measurement” button: Switch to the default topic menu of measurement.
8. “Up” button: Move the menu content up on the current option, or incrementally change the parameters.
9. “Down” button: Move the menu content down on the current option, or decrementally change the parameter.
10. “Exit” button: Exit the current option to the previous menu, or cancel the current parameter settings.
11. “Select” button: Go to the next menu pointed by the specified item, or select and store parameters.
12. “Information” function button: Switch to the topic menu of history and maintenance.
13. “Protection” function button: Switch to the topic menu of protection parameter settings
14. Fault and alarm reset buttons.
15. Rated current

3.4 Setting Values and Protective Features of Controller

Setting Values and Protective Features of Controller

Overload long time-delay protection NWK21/NWK31 & NWK22/NWK32													
Current setting value IR		(0.4□1.0 or 1.25 Note) In or OFF (OFF - function off) Note: 1.0In in case of the power distribution protection; 1.25In in case of the generation protection.											
4 types of protection curve		1) Standard distribution protection I 2 t: tr = 2.25 Tr/N 2 (factory default) Standard generator protection I²t (F): tr = 2.25 Tr/N² 2) Express inverse time limit (power distribution protection) EI(G): tr= 1.25 Tr/ (N 2 -1) 3) Extra fast inverse time (motor protection) EI (M): tr = 1.3974 Tr × In [N²/(N² -1.15)] 4) High-voltage fuse compatible HV: tr = 4.0625 Tr/ (N⁴ -1) N= I/Ir I—Fault current tr—Long time-delay action time Ir—Long time-delay setting current Tr—Long time-delay setting time Description: NWK21/NWK31 controller has only standard power distribution protection I 2 t; NWK22/NWK32 controller provides 4 types of protection curves.											
Standard power distribution protection I 2 t		NWK21/NWK31: 15s, 30s, 60s, 120s, 240s, 480s											
Time setting value Tr (1.5 Ir)		NWK22/NWK32: 15s, 30s, 60s, 120s, 240s, 360s, 480s, 600s, 720s, 840s, 960s											
Tripping timetr (s) (Accuracy of ±10%)	1.5Ir	15	30	60	120	240	360	480	600	720	840	960	
	2.0 Ir	8.44	16.88	33.75	67.5	135	202.5	270	337.5	405	472.5	540	
	6.0 Ir	0.94	1.88	3.75	7.5	15	22.5	30	37.5	45	52.5	60	
	7.2 Ir	0.65	1.30	2.60	5.21	10.4	15.6	20.8	26	31.3	36.5	41.7	
Protection curve type		NWK22/NWK32: See the table below for the overload long-time delay protection action delay time of C1~C16											
Protective feature (Accuracy ±10%)		Current (I/Ir)					Tripping time						
		≤1.05					> 2h Inaction						
		≥1.3 (power distribution protection)					< 1h Action						
		≥1.2 (motor protection)					< 1h Action						
		≥1.2 Ir					The action time is calculated according to four types of protection formula or curve queried						
Thermal memory time		NWK21/NWK31: 30min (ON) or OFF NWK22/NWK32: Instantaneous (namely function OFF), 10min, 20 min, 30 min, 45 min, 1h, 2h, 3h Description: 1. The auxiliary power supply of controller features the thermal memory function; turn off the auxiliary power supply to clear the thermal memory; 2. Setting OFF, it is possible to turn off the thermal memory function.											
Overload pre-alarm NWK21/NWK31 & NWK22/NWK32													
Current setting value Ip		OFF+ (0.75□1.05) Ir											
Overload pre-alarm output		The signal output is required to add a signal unit. If there is no signal unit output, observe the controller display screen or read from the display indicator.											

Short circuit short-time delay protection NWK21/NWK31 & NWK22/NWK32			
NWK21/NWK31			
Current setting value I sd	(1.5~15) Ir or OFF (OFF-Function off)		
Time setting value T sd (s)	0.1, 0.2, 0.3, 0.4		
I²t	ON or OFF		
Protective feature (Accuracy ±10%)	Current	Tripping time	
	I _{sd} ≤I≤8Ir	(8Ir) 2 × T sd /I 2 inverse time-limit characteristic	
I²t-ON	I□8Ir	T sd definite time limit characteristic	
I²t-OFF	I≥ I _{sd}	T sd definite time limit characteristic	
Thermal memory time	15min (ON) or OFF (OFF-Function off)		
NWK22/NWK32			
I sd1 inverse time limit current setting value	(1.5~15) Ir or OFF (OFF-Function off)		
I sd2 fixed-time current setting value	(1.5~15) Ir or OFF (OFF-Function off)		
Time setting value T sd (s) of definite time limit	0.1□1.0		
Protective feature (Accuracy ±10%)	Current (I/I sd1 or I/I sd2)		Tripping time
	≤0.9		Inaction
	≥1.1	Reverse time limit	The delay features of the short time delay inverse time limit are the same with those of the overload long time delay, but the time is 1/10 of the longtime delay, and ≥T sd
		Definite time limit	Tsd
Thermal memory time	Instantaneous (namely function off), 10 min, 20 min, 30 min, 45 min, 1h, 2h, 3h		

Continued: Setting Values and Protective Features of Controller

Short-circuit instantaneous protection NWK21/NWK31 & NWK22/NWK32

Current setting value I _i	(1.0~20) In or OFF (OFF - function off)	
Protective feature (Accuracy ±10%)	Current (I/I_i)	Tripping time
	≤0.85	Inaction
	≥1.15	<40ms Action

MCR protection NWK21/NWK31 & NWK22/NWK32

Current setting value I _{MCR}	(1.0~20) In or OFF (factory default as 10In)	
Protective feature (Accuracy ±10%)	Current (I/I_{MCR})	Tripping time
	≤0.8	Inaction
	≥1.1	<30ms Action

The MCR provides the high-speed instantaneous protection, which is valid at the closing moment of the circuit breaker. When the circuit breaker is closed after 100ms, MCR protection will be canceled automatically.

Ground protection/alarm NWK21/NWK31

Protection type	Differential type (T), ground current type (W), with the latter as the optional function	
Current setting value I _g	(0.2~1.0) In or OFF (OFF - function off)	
Time setting value T _g (s)	0.1~0.4 definite time limit	
Protective feature (Accuracy ±10%) Inherent absolute error: ±40ms	Current (I/I_g)	Tripping time
	≤0.8	Inaction (no alarm)
	≥1.0	For action (or alarm), see the time setting value
Grounding alarm output	The signal output is required to add a signal unit. If there is no signal unit output, observe the controller display screen or read from the display indicator.	

Ground protection/alarm NWK22/NWK32

Current setting value I _{gb}	(0.2~1.0) In or OFF (OFF - function off)	
Action/alarm time setting value T _g (s)	0.1□1.0	
Alarm return current setting value	(0.2□1.0) In	Only when the execution mode is alarm, this item is set
Alarm return time setting value (s)	0.1□1.0	
Protective/alarm features (accuracy of ±10%) Inherent absolute error: ±40ms	Current (I/I_g)	Tripping time
	≤0.8	Inaction (no alarm)
	≥1.0	For action (or alarm), see the action time as the inverse or definite time limitNote
Returnable features (accuracy of ±10%)	≥1.0	Non-return
Inherent absolute error: ±40ms	≤0.8	For alarm, see the alarm return time setting value
Grounding alarm output	The signal output is required to add a signal unit; set one DO of the signal unit as "Grounding alarm". If there is no signal unit output, observe the controller display screen or read from the display indicator.	

Note: For details of the reverse and definite time, see the User Manual of NWK22 and NWK32 Controller, with the definite time as T_g

Neutral wire protection NWK21/NWK31 & NWK22/NWK32

Neutral wire protection setting value	NWK21/NWK31 controller: 50%In, 100%In or OFF; NWK21/NWK31 controller: 50%In, 100%In, 160%In, 200%In or OFF. OFF— Turn off N-phase protection function	
Protective features	Same-phase pole overload long time-delay protection, short-circuit short time-delay protection, short-circuit instantaneous protection, ground protection	

Continued: Setting Values and Protective Features of Controller

Current leakage protection/alarm (namely the residual current protection) NWK22/NWK32														
Current setting value $I_{\Delta n}$ (A)			0.5~30.0 or OFF (OFF - function off)											
Action delay time $T_{\Delta n}$ (s)			Instantaneous, 0.06, 0.08, 0.17, 0.25, 0.33, 0.42, 0.5, 0.5, 0.5□ , 0.67, 0.75□ 0.83											
Alarm delay time $T_{\Delta nb}$ (s)			0.1□1.0											
Alarm return current setting value (A)			0.5□30.0											
Alarm return delay time (s)			0.1□1.0											
Protective action/alarm features (accuracy of ±10%) Inherent absolute error: ±40ms			Current ($I/I_{\Delta n}$)				Tripping time							
			□0.8				Inaction (no alarm)							
			≥1.0				Action (see the data below) or alarm (see the alarm delay time)							
Alarm return features (accuracy of ±10%) Inherent absolute error: ±40ms			≥1.0				Non-return							
			≤0.9				For alarm, see the alarm return delay time							
Tripping time t (s) (Accuracy of ±10%)	Setting time	Instantaneous	0.06	0.08	0.17	0.25	0.33	0.42	0.5	0.58	0.67	0.75	0.83	
	$I_{\Delta n}$	0.04	0.36	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	
	$2I_{\Delta n}$	0.04	0.18	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	
	$5I_{\Delta n}$	0.04	0.072	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	
	$10I_{\Delta n}$													
Current leakage alarm output			The signal output is required to add a signal unit; set one DO of the signal unit as “Current leakage alarm”. If there is no signal unit output, observe the controller display screen or read from the display indicator.											
Current unbalance protection/alarm NWK21/NWK31 & NWK22/NWK32														
NWK21/NWK31			Current unbalance setting value δ				(40□□100□) + OFF (OFF - function off)							
			Action delay time t δ (s)				0.1□1.0							
NWK22/NWK32			Protection/alarm start setting value				5%□60%							
			Action/alarm delay time (s)				0.1□40.0							
			Alarm action return setting value				5%□start value				Only when the execution mode is "alarm", this setting is available			
			Alarm return delay time (s)				10□200							
			Protective feature (Accuracy ±10%) Inherent absolute error: ±40ms			Actual current unbalance rate/setting value				Tripping time				
Protective return features (accuracy of ±10%) Inherent absolute error: ±40ms			≤0.9				Inaction (no alarm)							
			≥1.1				Acts (or gives an alarm) according to the set delay time							
			Protective return features (accuracy of ±10%) Inherent absolute error: ±40ms			Actual current unbalance rate/setting value				Tripping time				
Current unbalance protection alarm DO output			≥1.1				Non-return							
			≤0.9				Returns according to the alarm return delay time							
			Execution mode			Alarm/tripping/close								

Continued: Setting Values and Protective Features of Controller

Required current value protection/alarm NWK22/NWK32							
Protection/alarm start setting value		(0.2~1.0) In					
Protective action delay time setting value (s)		15~1500					
Alarm action return setting value		0.2In~start value					
Alarm return delay time (s)		15~1500					
Protective feature (Accuracy ±10%) Inherent absolute error: ±40ms		Multiple of current (I/setting value)		Tripping time			
		≤0.9		Inaction (no alarm)			
Return features (accuracy of ±10%) Inherent absolute error: ±40ms		≥1.1		Acts (or gives an alarm) according to the set delay time			
		Multiple of current (I/setting value)		Tripping time			
Return features (accuracy of ±10%) Inherent absolute error: ±40ms		≥1.1		Non-return			
		≤0.9		Returns according to the set delay time			
Required current value protection alarm DO output		The signal output is required to add a signal unit; set one DO of the signal unit as “Required value fault”. If there is no signal unit output, observe the controller display screen or read from the display indicator.					
Protection execution□ mode		Alarm/tripping/close					
Load monitoring function NWK21/NWK31 &NWK22/NWK32							
NWK21/NWK31	Operation mode			Current setting		Time setting	
	Current way 1		Ic1	(0.2~1.0) In+OFF	Tc1	15s, 30s, 60s, 120s, 240s, 480s	
			Ic2		Tc2		
	Current way 2		Ic1		Tc1	60s, 120s, 240, 480s	
			Ic2		Tc2		
	Thermal memory		15min (ON), OFF				
NWK22/NWK32	Operation mode		Current/power setting		Time setting		
	U n l o a d I	Current mode 1	0.2~1.0Ir		20~80%Tr		
		Current way 2					
		Power mode 1	200kW~10000kW		10s~3600s		
		Power mode 2					
	U n l o a d II	Current mode 1	0.2~1.0Ir		20~80%Tr		
		Current way 2	0.2Ir~unload I		10s~600s		
		Power mode 1	200kW~10000kW		10s~3600s		
		Power mode 2	100kW~unloading I				
Load monitoring alarm DO output			The signal output is required to add a signal unit; set one DO of the signal unit as “load monitoring 1”, another as “load monitoring 2”. If there is no signal unit output, observe the controller display screen or read from the display indicator.				
Undervoltage protection/alarm NWK22/NWK32							
Protection/alarm start setting value V			100~return value				
Protective action delay time setting value (s)			0.2~60				
Alarm action return setting value V			Start value~600				
Alarm return delay time (s)			0.2~60				

Continued: Setting Values and Protective Features of Controller

Undervoltage protection/alarm NWK22/NWK32		
Undervoltage protection action/alarm features (Accuracy of ±10%) inherent absolute error: ±40 ms	Umin/action setting value	Tripping time
	□1.1	Inaction (no alarm)
	≤0.9	Acts (or gives an alarm) according to the set delay time
Alarm return features of undervoltage protection (Accuracy of ±10%) inherent absolute error: ±40 ms	Umin/return setting value	Tripping time
	□0.9	Non-return
	≥1.1	Returns according to the set delay time
Undervoltage protection alarm DO output	The signal output is required to add a signal unit; set one DO of the signal unit as “Undervoltage fault”. If there is no signal unit output, observe the controller display screen or read from the display indicator.	
Execution mode	Alarm/tripping/close	
Overvoltage protection/alarm NWK22/NWK32		
Protection/alarm start setting value V	Return value ~ 1200	
Protective action delay time setting value (s)	0.2□60	
Alarm return setting value V	100□start value	
Alarm return delay time (s)	0.2□60	
Undervoltage protection/alarm action features (Accuracy of ±10%) Inherent absolute error: ±40ms	Umin/action setting value	Tripping time
	≤0.9	Inaction (no alarm)
	≥1.1	Acts (or gives an alarm) according to the set delay time
Undervoltage alarm return features (Accuracy of ±10%) inherent absolute error: ±40 ms	Umin/return setting value	Tripping time
	≥1.1	Non-return
	≤0.9	Returns according to the set delay time
Overvoltage protection alarm DO output	The signal output is required to add a signal unit; set one DO of the signal unit as “Overvoltage fault”. If there is no signal unit output, observe the controller display screen or read from the display indicator.	
Protection execution mode	Alarm/tripping/close	
Voltage unbalance protection/alarm NWK22/NWK32		
Protection/alarm start setting value	2%□30%	
Protective action delay time setting value (s)	0.2□60	
Protection action return setting value	2%□ start value	
Protection return delay time (s)	0.2□60	
Action features of voltage unbalance protection/alarm (Accuracy of ±10%) inherent absolute error: ±40 ms	Actual voltage unbalance rate/setting value	Tripping time
	≤0.9	Inaction (no alarm)
	≥1.1	Acts (or gives an alarm) according to the set delay time
Alarm action features of voltage unbalance protection (Accuracy of ±10%) inherent absolute error: ±40 ms	Actual voltage unbalance rate/setting value	Tripping time
	≥1.1	Non-return
	≤0.9	Returns according to the set delay time
Voltage unbalance protection alarm DO output	The signal output is required to add a signal unit; set one DO of the signal unit as “U unbalanced alarm” output. If there is no signal unit output, observe the controller display screen or read from the display indicator.	
Execution mode	Alarm/tripping/close	

Continued: Setting Values and Protective Features of Controller

Underfrequency, overfrequency protection/alarm NWK22/NWK32			
Underfrequency	Protection/alarm start setting value (Hz)	45.0□ return value	
	Action delay time setting value (s)	0.2□5.0	
	Alarm action return setting value (Hz)	Start value~65.0	
	Alarm return delay time (s)	0.2~36.0 (the return value must be greater than or equal to the start value)	
Overfrequency	Protection/alarm start setting (Hz)	Return value~65.0	
	Action delay time setting value (s)	0.2□5.0	
	Alarm return setting value (Hz)	45.0□start value	
	Alarm return delay time (s)	0.2~36.0 (the return value must be greater than or equal to the start value)	
Underfrequency, overfrequency protection alarm DO output		The signal output is required to add a signal unit; set one DO of the signal unit as “underfrequency fault” or "overfrequency fault". If there is no signal unit output, observe the controller display screen or read from the display indicator.	
Execution mode		Alarm/tripping/close	
Reverse power protection/alarm NWK22/NWK32			
Protection/alarm start setting value (kW)		5□500	
Protective action delay time setting value (s)		0.2□20	
Alarm return setting value (kW)		5~start value	
Alarm return delay time (s)		1.0□360 (the return value must be greater than or equal to the start value)	
Reverse power protection action/alarm features (Accuracy of ±10%) inherent absolute error: ±40 ms		Reverse power value/Setting value	Tripping time
		≤0.9	Inaction (no alarm)
		≥1.1	Acts (or gives an alarm) according to the set delay time
Reverse power protection/alarm return features (Accuracy of ±10%) inherent absolute error: ±40 ms		Reverse power value/Setting value	Tripping time
		≥1.1	Non-return
		≤0.9	Returns according to the set delay time
Reverse power protection alarm DO output		The signal output is required to add a signal unit; set one DO of the signal unit as “reverse power fault” output. If there is no signal unit output, observe the controller display screen or read from the display indicator.	
Execution mode		Alarm/tripping/close	
Phase sequence protection/alarm NWK22/NWK32			
Setting range of action phase sequence		Δφ: A□B□C / Δφ: A□C□B	
Phase sequence protection alarm DO output		The signal output is required to add a signal unit; set one DO of the signal unit as “phase sequence protection/alarm fault”. If there is no signal unit output, observe the controller display screen or read from the display indicator.	
Execution mode		Alarm/tripping/close	
Signal unit NWK21/NWK31 & NWK22/NWK32			
NWK21/NWK31	DO output	General functions	Optional Load Monitoring Functions
	DO1	Overload pre-alarm output	Load monitoring 1
	DO2	Grounding pre-alarm output	Load monitoring 1
	DO3	Fault tripping output	Fault tripping output
	DO4	Short circuit instantaneous action output	Short circuit instantaneous action output

Continued: Setting Values and Protective Features of Controller

Signal unit NWK21/NWK31 & NWK22/NWK32

NWK22/NWK32

Type of signal unit		Rated current		Field of Application	
S1		4DO (4 output contacts)		Without regional interlocking	
S2		3DO (3 output contacts) 1DI (1 input contact)		Regional interlocking between air circuit breakers	
S3		2DO (2 output contacts) 2DI (2 input contacts)		Regional interlocking between air circuit breakers	
DI	Function setting	Alarm, tripping, regional interlocking, general, grounding interlocking, short circuit interlocking			
	Input form	Normally open		Normally closed	
DO	Function setting	See the table below, “Parameter Settings of Switch Output (DO)”			
	Execution mode	Normally opened level	Normally closed level	Normally opened impulse	Normally closed impulse
	Impulse time	None		1□360s	
Parameter Settings of Switch Output (DO)					
General		Alarm	Fault tripping	Self-diagnosis alarm	Load monitoring 1
Load monitoring 2		Overload pre-alarm	Overload fault	Short time delay fault	Transient fault
Grounding/current leakage fault		Grounding/current leakage alarm	Current unbalance fault	Middle-phase fault	Undervoltage fault
Overvoltage fault		Voltage unbalance fault	Underfrequency fault	Overfrequency fault	Required value fault
Reverse power fault		Regional interlocking	Remote closing	Remote opening	Phase sequence fault
MCR fault		Grounding interlocking	Short circuit interlocking	A-phase required value fault	B-phase required value fault
C-phase required value fault		N-phase required value fault	Required value out-of-limit	Alarm of operation times	Contact wear alarm
Remote reset		Temperature alarm	—	—	—

See the table below for the overload long-time delay protection action delay setting time and the corresponding multiple of current time

Curve type	Fault Current	Delay time (s)																
		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	
I ² t	1.5×Ir	15.00	30.00	60.00	120.00	240.00	360.00	480.00	600.00	720.00	840.00	960.00						
	2×Ir	8.44	16.88	33.75	67.50	135.00	202.0	270.00	337.50	405.00	472.50	540.00						
	6×Ir	0.94	1.88	3.75	7.50	15.00	22.50	30.00	37.50	45.00	52.50	60.00						
	7.2×Ir	0.65	1.30	2.60	5.21	10.42	15.63	20.83	26.04	31.25	36.46	41.67						
EI (G)	1.5×Ir	8.00	12.80	19.20	32.00	48.00	64.00	80.00	108.0	144.00	224.00	320.00	480.00	640.00	800.00	960.00	1120.00	
	2×Ir	3.33	5.33	8.00	13.33	20.00	26.67	33.33	45.00	60.00	93.33	133.33	200.0	266.67	333.33	400.00	466.67	
	6×Ir	0.29	0.46	0.69	1.14	1.71	2.29	2.86	3.86	5.14	8.00	11.43	17.14	22.86	28.57	34.29	40.00	
	7.2×Ir	0.20	0.31	0.47	0.79	1.18	1.57	1.97	2.26	3.54	5.51	7.87	11.80	15.74	19.67	23.60	27.54	
EI (M)	1.5×Ir	6.22	9.96	14.90	24.90	37.30	49.80	62.20	84.00	112.00	174.00	249.00	373.00	498.00	622.00	747.00	871.00	
	2×Ir	2.95	4.72	7.06	11.79	17.67	23.59	29.46	39.79	53.05	82.42	117.95	176.68	235.89	294.63	353.84	412.58	
	6×Ir	0.28	0.45	0.68	1.13	1.69	2.26	2.82	3.81	5.08	7.89	11.30	16.92	22.59	28.22	33.89	39.52	
	7.2×Ir	0.19	0.31	0.47	0.78	1.17	1.56	1.95	2.63	3.51	5.45	7.81	11.69	15.61	19.50	23.42	27.30	
HV	1.5×Ir	2.46	3.94	5.90	9.85	14.80	19.70	24.60	33.20	44.30	68.90	98.50	147.00	197.00	246.00	295.00	344.00	
	2×Ir	0.67	1.07	1.60	2.67	4.01	5.34	6.66	8.99	12.00	18.66	26.68	39.81	53.35	66.63	79.90	93.17	
	6×Ir	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.10	0.14	0.22	0.31	0.46	0.62	0.77	0.93	1.08	
	7.2×Ir	0.00	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.07	0.10	0.15	0.22	0.30	0.37	0.45	0.52	

Controller Factory Setting

Protective features		Setting current	Setting time	Remarks
Overload long-time delay protection		1.0I _n	60s	Thermal memory ON
Short circuit short-time delay protection	NWK21/NWK31	8I _r	0.2s	Definite time limit, I 2 t-OFF
	NWK22/NWK32	I _{sd1} -6I _r □I _{sd2} -8I _r	0.2s	I sd1 inverse time limit, I sd2 fixed time limit
Short circuit instantaneous protection		10I _n	-	-
Neutral wire protection		100%I _n	-	-
Ground protection		0.5I _n	0.2s	This function is off in default for 3P, and this value is on in default for 4P; users can open it as needed for the 3P product
Current unbalance protection		OFF	-	Users can open it as needed

3.5 Working Power Supply of Controller

■ The working power supply of controller is provided by the transformer and auxiliary power supply. To ensure reliable operation and breaking of small current in case of failure, please adopt the following 1), 2)

Dual-power supply mode, as below:

1) To be powered by the power supply CT

Normal operating conditions of the controller: the primary current single-phase and three-phase are no less than 0.4I_n and 0.2I_n respectively. When the rated current is ≤400A, the primary current single-phase and three-phase of the main circuit are no less than 1.0I_n and 0.6I_n respectively. Otherwise, it must be powered by the auxiliary power supply.

2) To be powered by the auxiliary power supply

Normal operating conditions of the controller: (85%□115%) U_s.

AC power supply voltage (50/60Hz): AC230V, AC400V.

DC power supply voltage: DC220V, DC110V, DC24V.

3) To be powered by the test port

Rated voltage: DC24V, with an allowable error of ±5%. The panel power supply is used for separately testing the controller, rather than the working power supply.

■ Rated power consumption of controller

Rated power consumption: <7W.

■ Contact capacity of controller

DO signal alarm output, contact capacity: 5A/AC250V;

Fault tripping contact output, contact capacity: AC250V/16A;

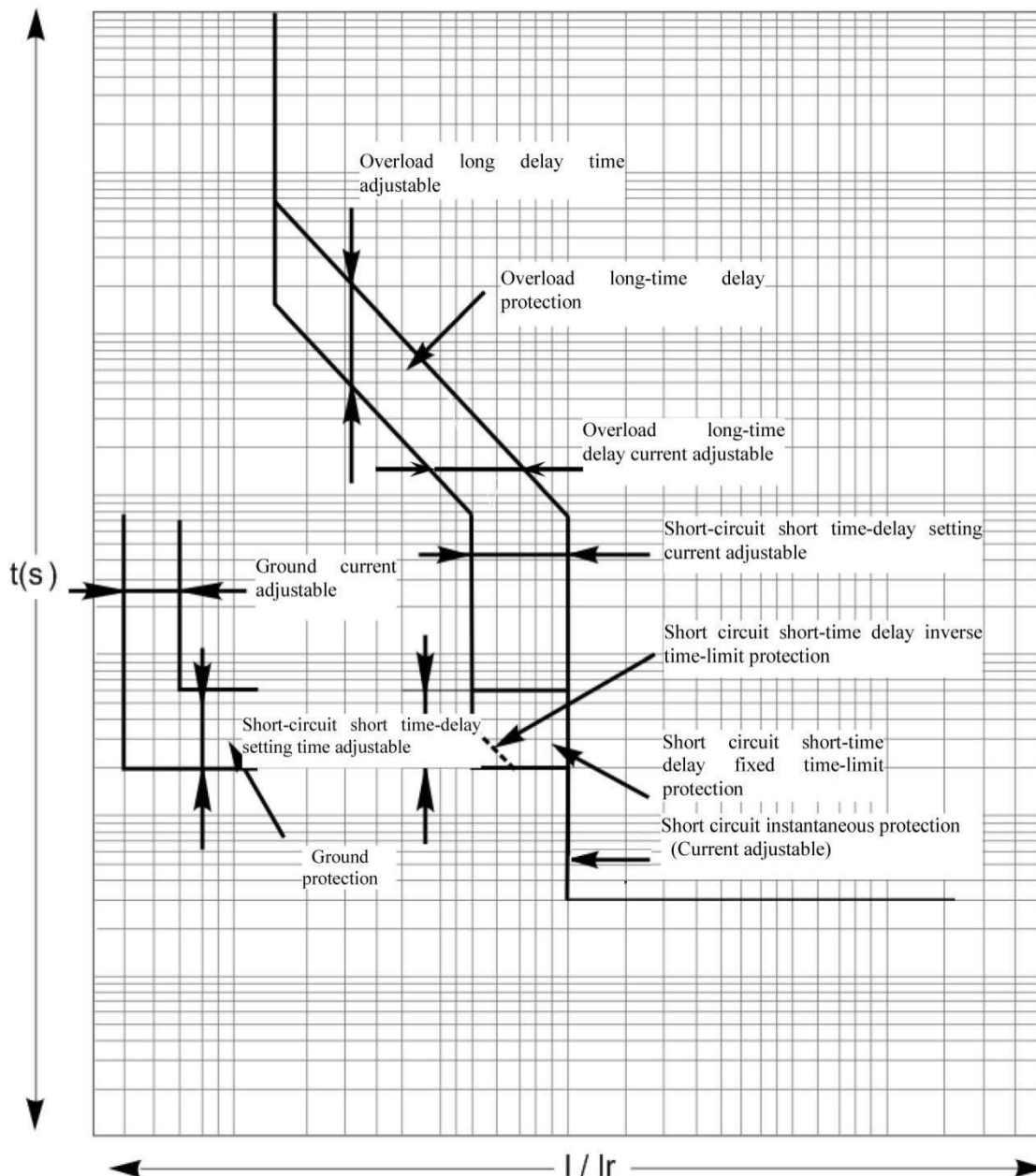
Circuit breaker status auxiliary contact output, contact capacity: 10A/AC250V.

3.6 Introduction of Controller Functions

For introduction of controller functions, see the User Manual of NWK21 and NWK31 Controller and User Manual of NWK22 and NWK32 Controller

3.7 Protection Characteristic Curve

See the figure below for the overload long time delay, short-circuit short time delay, short-circuit instantaneous and ground protection curve.



For each protection characteristic curve of controller, see the User Manual of NWK21 and NWK31 Controller and User Manual of NWK22 and NWK 32 Controller

Chapter 4 Accessories

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Accessories 4

4.1 List of accessories (Add instructions for optional accessories and wiring bolts)

Accessory name	For what kind of circuit breakers	Supply mode
Controller power supply module	Fixed type/drawout type	Optional ordering for customers (standard configuration when the 1600 shell frame controller voltage is AC voltage)
Relay module	Fixed type/drawout type	Optional supply, matched with the power supply module
Off-position key lock	Fixed type/drawout type	Optional ordering for customers
Safety lock	Fixed type/drawout type	Optional ordering for customers (only applicable to 2000 and above shell frames)
Door interlocking	Drawout type	Optional ordering for customers
Circuit breaker triolocation locking device	Drawout type	Standard configuration
Auxiliary switch	Fixed type/drawout type	Standard configuration
Closed electromagnet	Fixed type/drawout type	Standard configuration
Shunt release/retention shunt release	Fixed type/drawout type	Standard (either) Retention type applicable to 2000/4000 shell frame
Motor operating mechanism	Fixed type/drawout type	Standard configuration
Phase partition	Fixed type/drawout type	Optional ordering for customers (standard for 4000 shell frame)
Closing ready signal output device	Fixed type/drawout type	Optional ordering for customers
Under-voltage release/loss of voltage release	Fixed type/drawout type	Optional ordering for customers
Voltage-check closing device	Fixed type/drawout type	Optional ordering for customers
Counter	Fixed type/drawout type	Optional ordering for customers
Doorframe	Fixed type/drawout type	Optional ordering for customers
Dust cover	Fixed type/drawout type	Optional ordering for customers
IP54 transparent cover	Fixed type/drawout type	This accessory comes with a special door frame, which cannot be selected at the same time as the regular door frame, as they have different sizes of door openings; Optional ordering for customers (single order)
Operating manual	Fixed type/drawout type	Optional ordering for customers
Connection bolt	Fixed type/drawout type	Optional ordering for customers
Mechanical interlocking	Fixed type/drawout type	Optional supply (without this accessory in the fixed type product 1600)
Automatic transfer switching equipment	Fixed type/drawout type	Optional supply (without this accessory in the fixed type product 1600)

4.2 Electrical Control Accessories

Note: Unless otherwise noted, the calibration parameters of the following accessories are all measured in the laboratory environment (room temperature 25±5°C, humidity controlled at: 30%-70%RH, dust-free, pollution-free, impact-free and vibration-free).

4.2.1 Closed electromagnet (standard configuration)

◆ Action features of the closed electromagnet:

1) When the power supply voltage of the closed electromagnet maintains at 85%~110% of the rated control supply voltage U_s , operation of the closed electromagnet can make reliable closing of the circuit breaker.

2) Closed electromagnet is the short-time duty-type;

3) Closed electromagnet is mainly composed of coil, iron core component and electronic parts.

4) In the condition of energy storage, as long as the closed electromagnet is energized, the circuit breaker can be closed. With the control circuit inside, it can be energized for a long time, with the power-on time >200ms. Users shall not connect the auxiliary switch contact of the circuit breaker in series. Instantaneous power is shown in the table below.

◆ Technical Parameters of Closed Electromagnet

Power Consumption Table of Closed Electromagnet

Rated insulation voltage (U_i)	Rated control supply voltage (U_s)	Instantaneous power	
		1600 shell frame	2000 shell frame and above
400V	AC380V/AC400V 50/60Hz	380VA	620VA
	AC220V/AC230V 50/60Hz	330VA	500VA
	DC220V	330W	500W
	DC110V	270W	400W
	DC24V	200W	145W



4.2.2 Shunt release (standard configuration)

◆ Action features of the shunt release

1) When the power supply voltage of the shunt release maintains at 70%~110% of the rated control supply voltage, operation of the shunt release can make the circuit breaker disconnect;

2) Shunt release is mainly composed of coil, iron core component and electronic parts, and can disconnect the circuit breaker by remote operation. It is designed for short-term operation and includes a control circuit that can be energized for extended periods, with an energization time exceeding 200ms. Users shall not connect the auxiliary switch contact of the circuit breaker in series.

◆ Technical Parameters of Shunt Release

Power Consumption Table of Shunt Release

Rated insulation voltage (U_i)	Rated control supply voltage (U_s)	Instantaneous power	
		1600 shell frame	2000 shell frame and above
400V	AC380V/AC400V 50/60Hz	380VA	620VA
	AC220V/AC230V 50/60Hz	330VA	500VA
	DC220V	330W	500W
	DC110V	270W	400W
	DC24V	200W	145W



4.2.3 Retention shunt release

Retention shunt release is mainly composed of coil, iron core component and electronic parts, and can disconnect the circuit breaker by remote operation.

◆ Action features of the retention shunt release

1) When the power supply voltage of the retention shunt release maintains at 70%~110% of the rated control supply voltage, operation of the shunt release can make the circuit breaker disconnect.

2) When the applied voltage is 85%~110% of the rated operating voltage of the retention shunt release, the retention shunt release can guarantee the circuit breaker reliable without closing.

3) The retention shunt release is the long-term duty type, which can send closing signal with an interval of more than 500ms after power failure.

4) Each power-on trigger time $t > 200\text{ms}$.

5) 1.3Us withstand time is 9.5s without damage, 1.4Us withstand time is 0.5s without damage.

◆ Technical parameters of retention shunt release



Power Consumption Table of Retention Shunt Release

Rated insulation voltage (Ui)	Rated control supply voltage (Us)	Instantaneous power	Operating power
400V	AC230V 50/60Hz	□600VA	□5VA
	DC220V	□600W	□5W

4.2.4 Motor operating mechanism (standard configuration)

The electric storage of the circuit breaker is achieved through the motor operating mechanism.

◆ Operation features

1) If the rated supply voltage of the motor operating mechanism is between 85%~110%, energy storage of the circuit breaker can be made in place.

2) The motor will close the power supply automatically and stop operation after it stores energy in place.

3) The motor operating mechanism can realize the automatic pre-energy storing.

◆ Technical Parameters of Motor Operating Mechanism



Power Consumption Table of Motor Operating Mechanism

Rated insulation voltage (Ui)			400V				
Energy storage time			3s□5s				
Rated operating voltage (Us)			AC380V	AC220V	DC220V	DC110V	DC24V
Apparent power (Input power)	1600 shell frame	Transient	760VA	680VA	770VA	710VA	340VA
		Steady state	230VA	180VA	290VA	220VA	220VA
	2000 shell frame	Transient	880VA	750VA	880VA	720VA	1000VA
		Steady state	230VA	240VA	240VA	250VA	230VA
	Applicable to 3200, 4000 shell frames	Transient	950V	920VA	970VA	780VA	/
		Steady state	150VA	240VA	180VA	190VA	/
	6300 shell frame	Transient	1330VA	1250VA	1430VA	1210VA	/
		Steady state	300VA	310VA	220VA	220VA	/
Active power (Output power)	1600 shell frame		90W				
	2000 shell frame		85W(3P), 110W (4P)				
	Applicable to 3200, 4000 shell frames		110W				
	6300 shell frame		180W				

Remarks:

Apparent power is the input power that drives the operation of the electric operating mechanism.

Active power is the output power of the electric operating mechanism during its operation.

4.2.5 Undervoltage release

◆ Action features of the undervoltage release

1) When the applied voltage drops, even slowly drops to 30%~70% of the rated operating voltage, the undervoltage release will work to disconnect the circuit breaker;

2) When the applied voltage is less than 35% of the rated operating voltage of the undervoltage release, the undervoltage release will make the circuit breaker unable to be closed;

3) When the applied voltage is 85%~110% of the rated operating voltage of the undervoltage release, the undervoltage release can be closed reliably to guarantee the reliable closing of the circuit breaker.

◆ Undervoltage tripper is mainly composed of coil, iron core component and electronic parts. It can be divided into instantaneous and delayed release. The undervoltage delayed release sets the delay time of the release action through toggling the toggle switch on the undervoltage delayed device. The delay time is set as 1 s, 3 s, 5 s and instantaneous as required.

◆ See the table below for the power consumption of undervoltage release

Power Consumption Table of Undervoltage Release

Rated insulation voltage (Ui)	Frequency (f)	Rated operating voltage (Ue)	Operating power	
			1600 shell frame	2000 shell frame and above
400V	50/60Hz	AC380V(AC400V)	0.8W	5.2W
		AC220V(AC230V)	0.8W	3.9W
		DC220V	0.8W	3.9W
		DC110V	0.8W	3.9W
		DC24V	1.2W	3.5W



4.2.6 No-voltage release

◆ Action features of the no-voltage release

1) When the applied voltage suddenly drops to 35%~10% of the rated operational voltage, the loss of voltage release will work to disconnect the circuit breaker;

2) When the applied voltage is less than 30% of the rated operating voltage of the no-voltage release will make the circuit breaker cannot be closed;

3) When the applied voltage is 85%~110% of the rated operating voltage of the no-voltage release, the no-voltage release can guarantee the reliable closing of the circuit breaker;

4) When the applied voltage drops no less than 35% of the rated operating voltage, the no-voltage release can be closed to guarantee the reliable closing of the circuit breaker.

◆ The no-voltage release can be divided into instantaneous release and delayed release, which is mainly composed of coil, iron core component and electronic parts.



◆ No-voltage delayed release

The loss of voltage delayed release sets the delay time of the release action through toggling the toggle switch on the loss of voltage delayed device. NDW2-1600/6300's delay time is optional for 1s~10s with a step of 1s; NDW2-2000/3200/4000's delay time is optional for 1s, 3s and 5s. See the table below for the power consumption of loss of voltage release.

◆ See the table below for the power consumption of loss of voltage release.

Power Consumption Table of Loss of Voltage Release

Rated insulation voltage (Ui)	Frequency (f)	Rated operating voltage (Ue)	Operating power	
			1600/6300 shell frame	2000/3200/4000 shell frame
400V	50Hz/60Hz	AC220V (AC230V)	1.75W	0.8W
		AC380V (AC400V)	1.35W	0.8W

4.3 Signal Output Accessories

4.3.1 Auxiliary switch

- ◆ The conventional thermal current of the auxiliary switch is 10A.
- ◆ Auxiliary contact form: Four groups conversion, six groups conversion, four normally opened and four normally closed, six normally opened and six normally closed.
- ◆ Technical Parameters of Auxiliary Contact



Table of Technical Parameters

Applicable shell frame		1600 shell frame	4000 shell frame	2000/3200/6300
Auxiliary contact form		■ Four groups switch ■ Six groups switch ■ Four normally open and four normally closed	■ Four groups switch ■ Four normally open and four normally closed ■ Six groups switch ■ Six normally opened and six normally closed	■ Four normally open and four normally closed ■ Four groups switch ■ Six normally opened and six normally closed ■ Six groups switch
Minimum load		DC30V/100mA	Note: DC5V/1mA (special customization required)	
Agreed thermal current I th		10A		
Breaking capacity	DC-12	0.3A/DC250V	0.3A/DC250V	5A/DC250V
	AC-12	10A/AC250V	10A/AC250V	10A/AC250V
	DC-13	0.2A/DC220V	0.2A/DC220V	1.2A/DC220V
	AC-15	0.29A/AC400V	3A/AC400V	3A/AC400V

4.3.2 Closing ready signal output device

Closing ready signal output device of the circuit breaker is the output signal device that reflects the operating mechanism to achieve the closed state. It can output signals if it meets all of the following mechanical states. See the table below for technical parameters.

- ◆ Circuit breaker off state;
- ◆ Energy storage in place;
- ◆ No disconnection instruction;
- ◆ Under-voltage release, no-voltage release (optional accessories) maintain the pull-in state;
- ◆ Rest of the reset button after the controller fault tripping;
- ◆ The drawout-type circuit breaker is in the "test" or "connection" position;
- ◆ Off-position lock (interlocking accessory) not interlocked;



- ◆ Mechanical interlocking (interlocking accessory) not interlocked;

Table of Technical Parameters

Breaking capacity	1600 shell frame	2000/3200/4000/6300 shell frame
	1A /AC250V	3A /AC250V

4.3.3 Position status signal output device of the drawer seat (on the drawer seat)

When the drawout-type circuit breaker body is in the "Separation", "Test" and "Connection" positions respectively in the drawer seat, the electrical indicating devices of the three positions can respectively output electrical status signals corresponding to the three positions, with the signal output terminal located on the left side of the drawer seat. The three-position signal contact is internally connected in series with the position locking signal contact of the drawer seat. For rocking in or out operation, when the red button on the drawer seat pops out, 2# and 3# in the connected position will be connected, 5# and 6# in the test position, and 8# and 9# in the off position will also be connected. See the table below for technical parameters

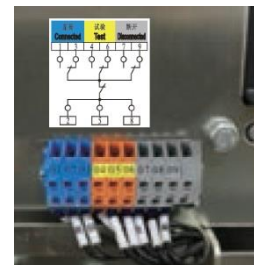


Table of Technical Parameters

Breaking capacity	0.4A/DC125V
	10A/AC250V

4.3.4 Secondary wiring terminal

- ◆ For the number of secondary wiring terminal, there is a total of 62 groups (identical for the fixed type and drawout type).
- ◆ See the table below for parameters of the secondary wiring terminal



Project	parameters
Connection mode	Clamping
Flame retardant rating, according to UL 94	V0
Pollution level	3
Voltage category	III
Material group	IIIa
Applicable connection standards	GB/T 14048.7-2016
Maximum load current	10A
Rated current	10A
Rated voltage	500V
Minimum cross section area of the rigid (flexible) conductor	0.5 mm ²
Maximum cross section area of the rigid (flexible) conductor	1.5mm ²
Recommended striping length	10±1mm
Minimum test pull-force after the conductor connection	30N

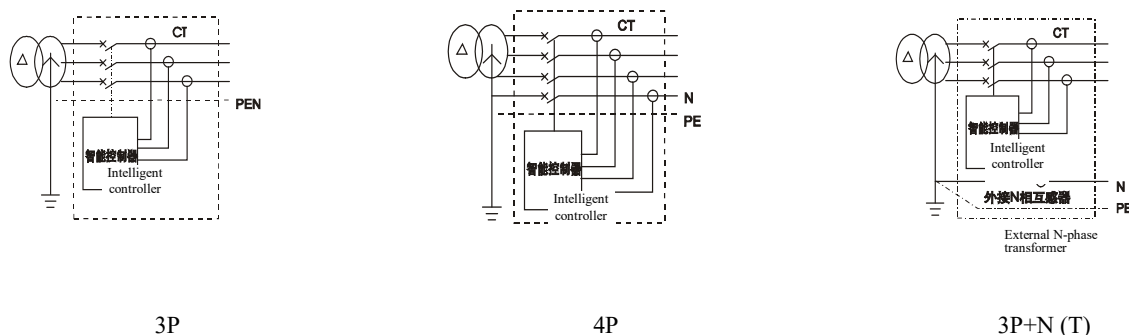
4.4 Related Accessories of Controller

4.4.1 External N-pole transformer

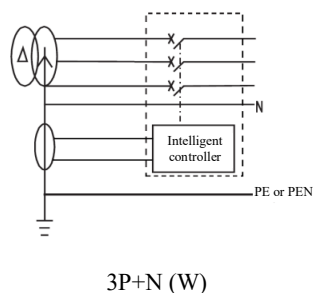
- ◆ Ground type

The 3P+N system can be formed by using a 3P circuit breaker and an external N-phase transformer. It can measure data on the grounding cable via an external N-pole transformer to realize the ground protection of the differential type (T) or the ground current type (W). The electric circuit diagram is shown as below:

1) Electric circuit diagram of differential type (T)



2) Electric circuit diagram of ground current type (W)



◆ Transformer type

For rectangular and flexible-type transformers, users can select the shell frame current (or N-pole current) and dimensions.

1) Rectangular transformer

★ Rectangular transformer code

Transformer code	Hole dimensions	Configured with fixing accessories	Applicable shell frame
N1	62×21	1 set	1600
N2	102×32.5	1 set	1600
N3	122×52	2 sets	2000, 3200, 4000, 6300
N4	262×102	3 sets	3200, 4000, 6300

★ See the figure below for outline and installation dimensions of the rectangular transformer.

★ Pay attention to the direction for use: The busbar current flows from the P1 terminal and flows out from the P2 terminal.

★ The conductor shall be provided by the customer. It is recommended to use the shielded twisted pair (with the metal shielding layer, 0.2~0.3mm ; i.e. AWG24/AWG22 cable).

The recommended conductor length is no more than 3 meters for connection of Y-type terminals at the wire end, with a tightening torque of 1.2N.m.

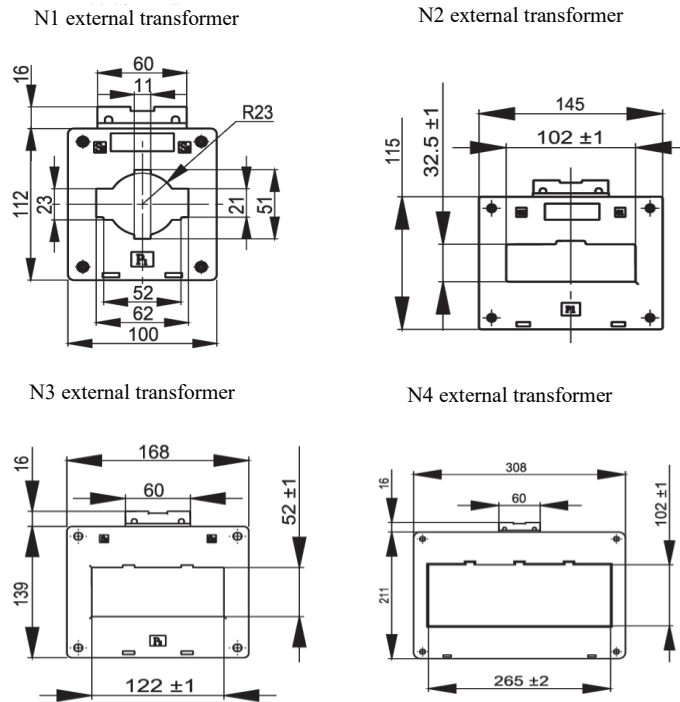
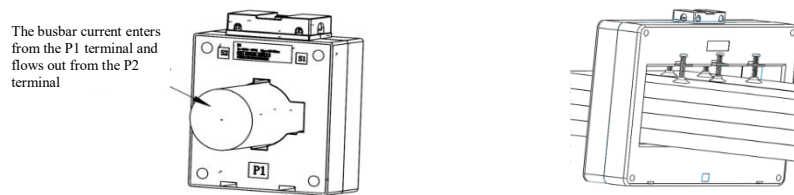


Figure for outline and installation dimensions of the N-pole transformer

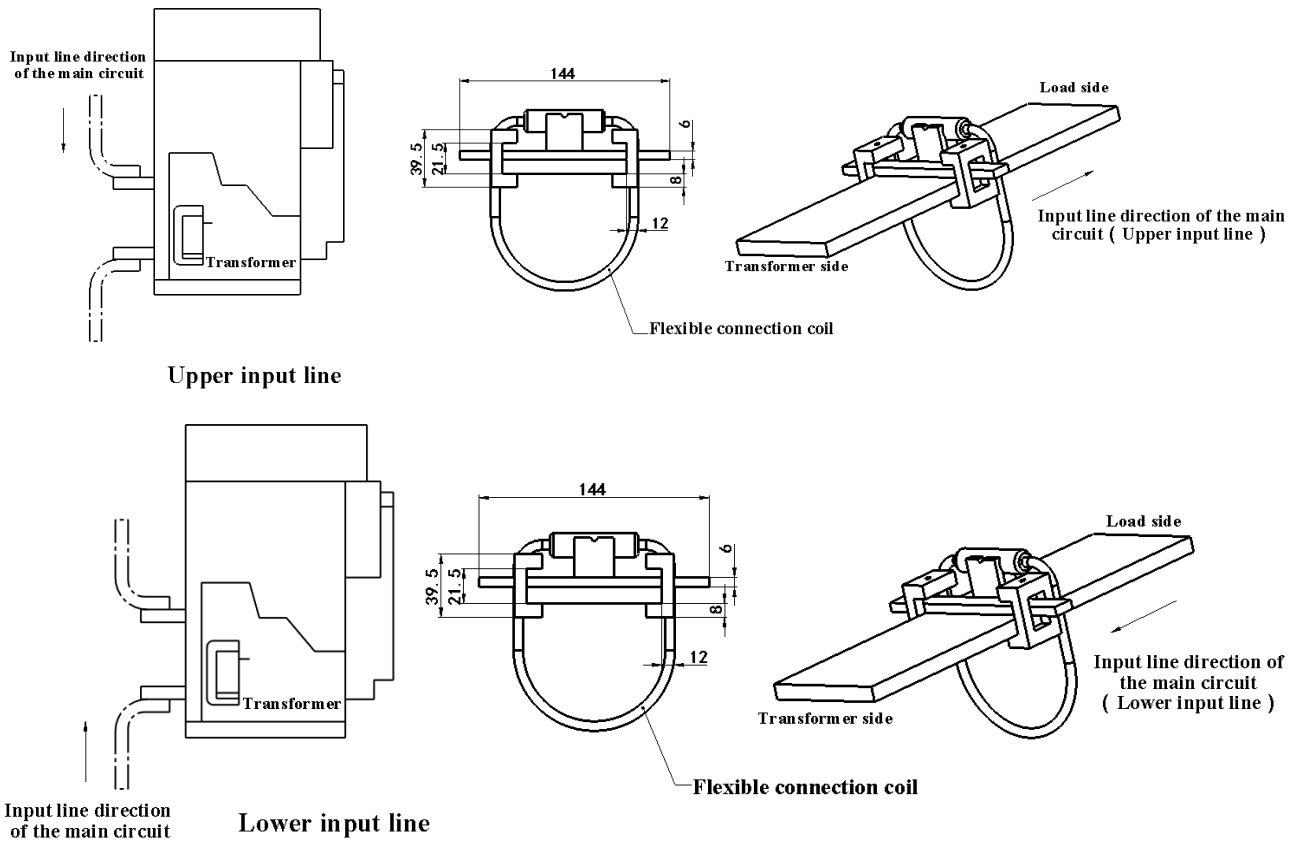


2) Flexible transformer

★ Flexible transformer code

Transformer code	Soft cable circumference	Applicable current range
NR1	280mm	200A-800A
NR2	370mm	1000A-2000A
NR3	450mm	1000A-6300A

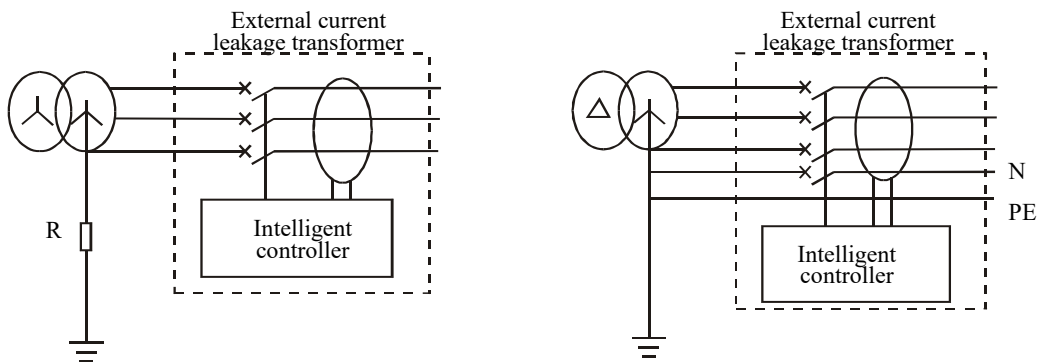
- ★ See the figure below for outline and installation dimensions of the flexible transformer.
- ★ Pay attention to the direction for use: The inlet wire direction is shown in the figure.
- ★ Install the flexible transformer on the busbar as shown in the figure, and connect the transformer conduction to the secondary circuit: Red to No. 25 and green to No. 26. Standard configuration of the conductor is 3m.



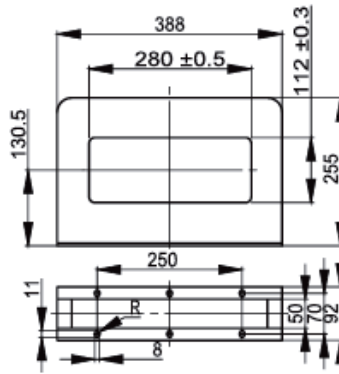
4.4.2 External leakage transformer

□ When the grounding protection mode is aftercurrent protection (E) type, an external current leakage transformer is required. The controller judges action via the output signal of the external current leakage transformer.

□ See the diagram for current leakage protection (3P and 4P systems).



Schematic Diagram of Current Leakage Protection



External and installation dimensions of the leakage transformer

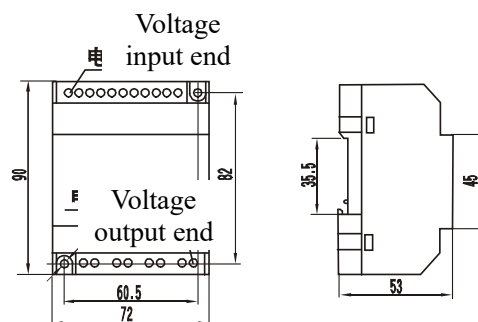
- ★ Connect the transformer terminals with No. 25 and 26 terminals of the frame secondary circuit with conductors; (it is not necessary to distinguish the positive and negative polarities)
- ★ Conductors shall be prepared by customers with the recommended length no more than 3m.

4.4.3 Power supply module NWDF1

- ◆ Role: As the power source of relay module NWDF1-RM, the output voltage is DC24V;
- ◆ Type: See the table below

Model	Voltage specification (V)	Size specifications (mm)	Reverse polarity effects
NWDF1-P1	DC24	90×54×58.5	With polarity effects
NWDF1-P3	AC230/400	90×54×58.5	Without polarity effects
NWDF1-P5	DC110/220	90×54×58.5	With polarity effects

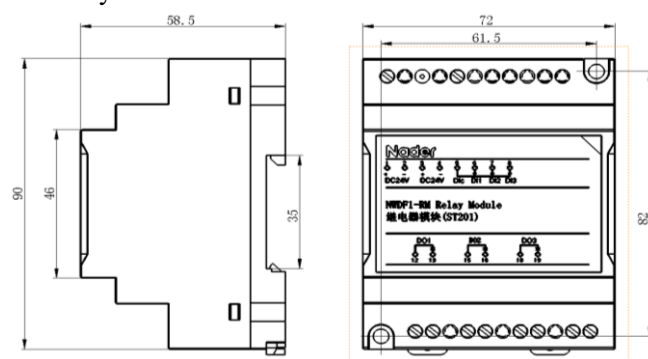
- ◆ Features: (85%~110%) Us power supply module operates normally;
- ◆ Installation mode: Using 35 mm standard guide or direct fixation;
- ◆ Supply mode: Optional ordering by customers;
- ◆ Users indicate the rated operating voltage and carry out installation by themselves. Pay attention to “+” and “-” polarities of wiring, which cannot be wrongly wired.
- ◆ See the figure below for outline and installation dimensions.



Outline and Installation Dimension Diagram of Power Supply Module NWDF1

4.4.4 Relay module NWDF1-RM (ST201)

- ◆ Function: Signal unit of controller is commonly used in fault alarm or indication, etc. When the circuit breaker is opened, closed or when the load capacity is larger, the control should be carried out after conversion through this module. Match with the power supply module NWDF1 to achieve the "four remotes" function;
- ◆ Contact capacity: 10A/AC250V, 10A/DC24V;
- ◆ Appearance and installation: To be used with the controller power supply module ST-IV, see the installation diagram of relay module.

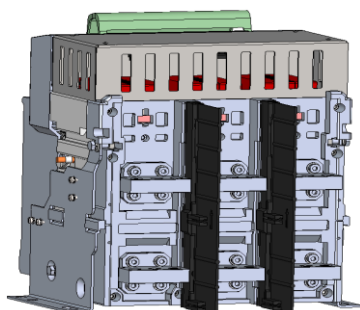


Installation Diagram of Relay Module

4.5 Safety Accessories

4.5.1 Phase partition

Divided into fixed type and drawout type, the phase partition is installed in the groove between all the phase bus bars, used to increase the insulation strength between phases of the main circuit so as to prevent the short circuit in case of the insulation breakdown and improve the power reliability. For product types FD (wind power, plateau) and TH (humid, thermal), it is recommended to install phase partitions.



Phase partition and bracket

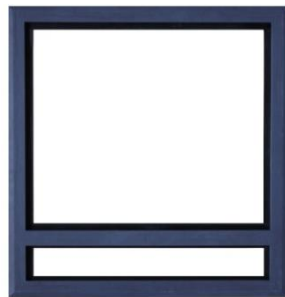
4.5.2 Counter

Counter is used to record the number of the "close-open" operation of the disconnecting switch.

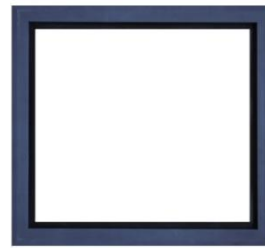


4.5.3 Doorframe

Divided into fixed type and drawout type, it is mainly placed on the door of the cubicle for sealing effect, and can make the protection level of the circuit breaker reach IP40. It is beautiful and practical.



Drawout type



Fixed type

4.5.4 Dust cover

Installed on the beam of the wiring terminal, it can prevent dust and other debris from falling into the wiring terminal and causing poor contact. It is an optional accessory.

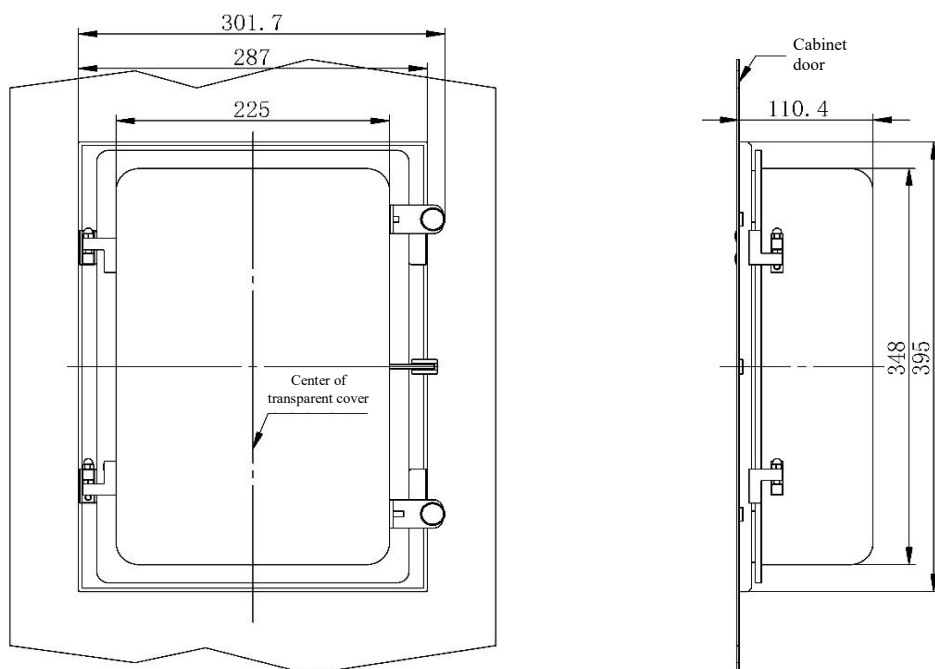


4.5.5 IP54 dust cover

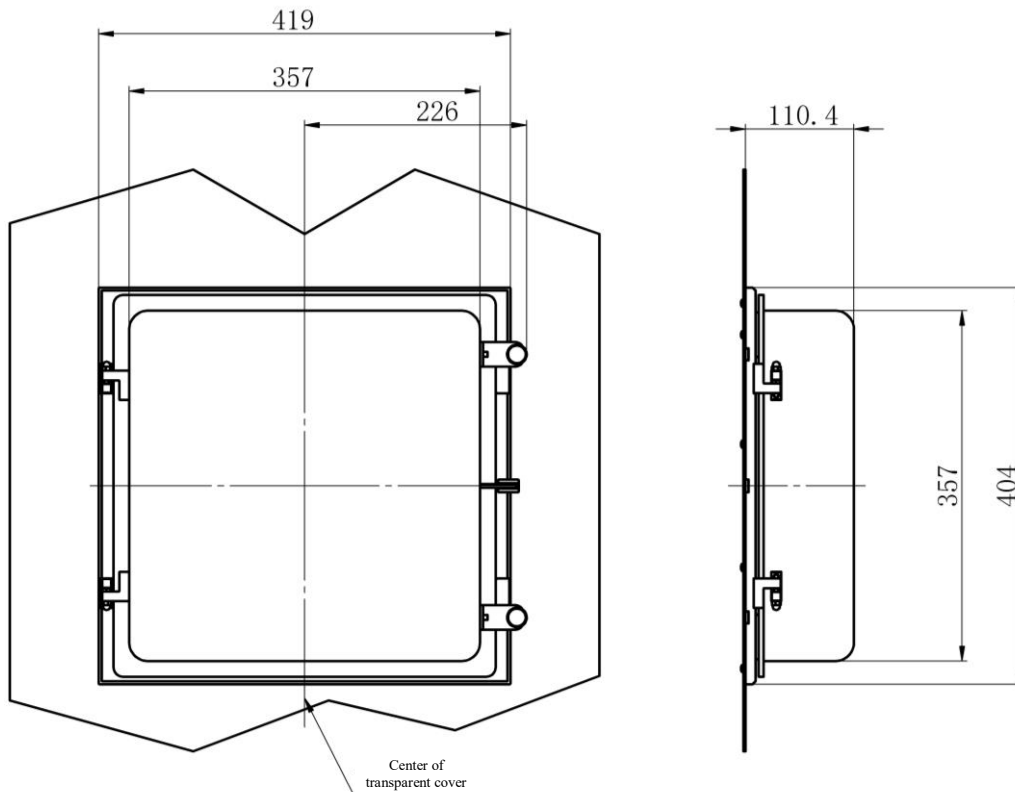
The IP54 transparent cover is an accessory that can be mounted on the cabinet door to increase the protection rating to IP54. The protective cover is supplied with a special door frame assembly. Selecting this accessory eliminates the need to select a conventional door frame. The hole dimensions for the cabinet door are different from those of the conventional door frame; refer to the cabinet door hole diagram for specific dimensions. The door frame and IP54 transparent cover are pre-assembled for shipment. Customers can choose either a left or right opening door. Installation is simple, following the instructions provided, directly onto the cabinet door.



a. External dimensions of IP54 transparent cover of NDW2-1600 product



b. External dimensions of IP54 transparent cover of NDW2-2000/3200/4000/6300 product



4.6 Lock and Interlocking Device

4.6.1 Off-position key lock (on the circuit breaker)

◆ This key lock is locked on the manually disconnected position of the circuit breaker.

When the key is anticlockwise locked and pulled out, the circuit breaker cannot carry out closed operation, so as to prevent irregular operation. Model and type are shown in the table below. Our off-position locks are available as direct operated (one-handed operation, which is also the default delivery method) and hand-pressure operated (two-handed operation). These two types can be selected in the order specification.



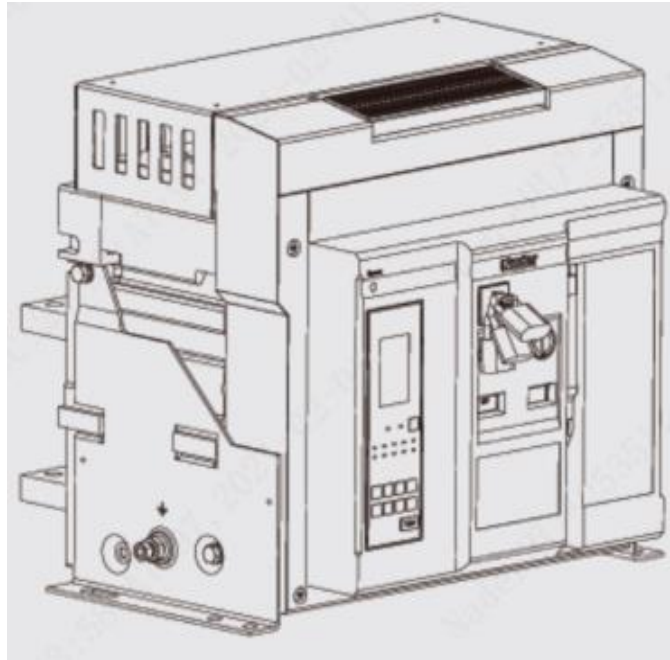
Model and Type Table of Off-position Key Lock

Model	Name	Number of circuit breakers	Number of keys
SF11	One lock one key	1	1
SF21	Two locks one key	2	1
SF31	Three locks one key	3	1
SF32	Three locks two keys	3	2
SF53	Five locks three keys	5	3
SF53			
Remarks: 1. All shell frames can be interlocked. 2. For other special interlocking requirements, please contact us for advice.			

4.6.2 Safety locks (on the circuit breaker body)

After the handle of the safety lock is hung with a padlock, the product will be locked in separating state and cannot be closed. The product can only be closed when all the padlocks have been unlocked and removed. 1-3 padlocks with a diameter of 5mm or 1-2 padlocks with a diameter of 6mm can be used to lock beams. Safety locks are only available to 2000 shell frame and above.

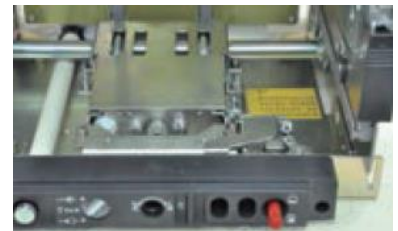
Either the safety lock or the off-position key lock function can be selected. They are installed at the same central position. Padlock should be prepared by the user.



4.6.3 Drawout type three-position lock (standard configuration on drawer seat)

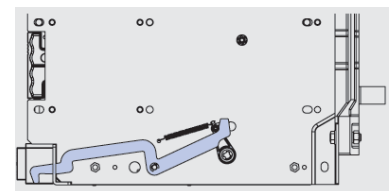
On the drawer seat, there's "connection", "test" and "separation" position status, which is indicated through an indicator.

When the handle is operated, the main body of the circuit breaker will be pulled to and locked at the three positions above, then the locked state can be released by the releasing button (red)



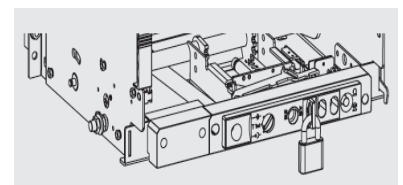
4.6.4 Door interlock (on the drawer seat)

Installed on the right or the left side of the drawer seat. When the drawout type circuit breaker is in the separation position, It can avoid opening of the cubicle door.



4.6.5 Operating position lock of the drawout-type circuit breaker rocker (standard configuration on the drawer seat)

At any position, when the rocker is not placed in the rocker operating position, the rocker operating position of drawout type circuit breaker can be locked by padlock. At this time, the rocker can't be normally inserted into the



operating position of the rocker, so it can't be rocked in or out. Padlock should be prepared by the user. For 1600 shell frame drawout-type products, the diameter of the lock beam is 3mm to 5 mm; the diameter of the lock beam is 3mm to 5 mm; for 2000 shell frame and above, the diameter of the lock beam is 4mm to 8 mm.

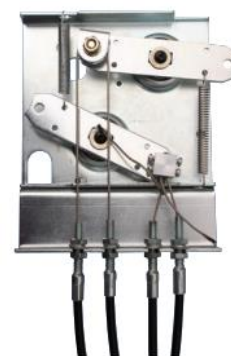
It is generally applied to the following scenarios: When the drawout type circuit breaker is in the separation position and the rocker isn't placed in the rocker operating position, pull out the black lever below the drawer seat and pass through the lever with the padlock beam. Then the circuit breaker body can only pull out the drawer seat, but cannot be rocked to the "test" or "connection" position.

4.7 Power Supply Conversion System

4.7.1 Mechanical interlocking

- ◆ Mechanical interlocking mechanism can be used for interlocking of the drawout circuit breaker and the fixed circuit breaker;
- ◆ Interlocking mechanism shall be installed by users. First, demount the nut for connecting the rear part of the interlocking device with four combination screws;
- then, fix the interlocking mechanism on the right-side plate of the circuit breaker with four combination screws;
- ◆ Interlocking pattern selection is shown in the table below.

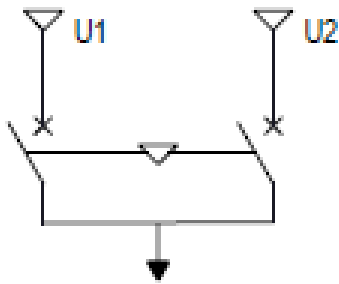
Selection mode	Code	Type	Number of circuit breakers
1	SR11	Two sets of cables, one for closing and one for opening	2
2	SR12	Three sets of cables, one for closing and two for opening	3
3	SR21	Three sets of cables, two for closing and one for opening	3
4	SY11	Two sets of hard rods, one for closing and one for opening	2
5	SY12	Three sets of hard rods, one for closing and two for opening	3



- ◆ Circuit breaker can be applicable to the following power supply state interlocking

1) Two circuit breakers (one for closing and one for opening)

Usage mode is shown in the figure below, while interlocking action state is shown in the figure below.

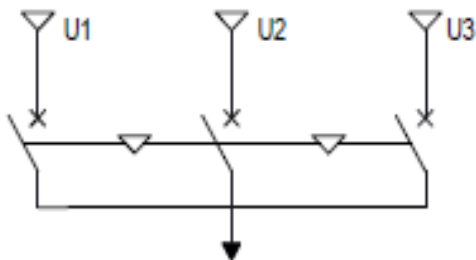


Status Table of Two Circuit Breaks

U1	U2
Closed	Open
Open	Closed
Open	Open

2) Three circuit breakers (one for closing and two for opening)

Usage mode is shown in the figure below, while interlocking action state is shown in the figure below.

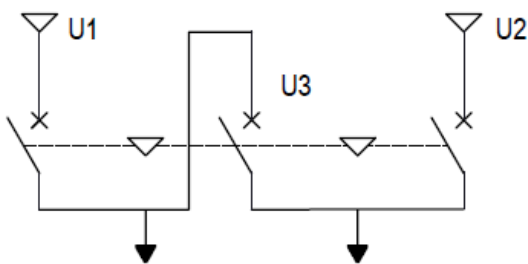


Status Table of Three Circuit Breakers (One for Closing and Two for Opening)

U1	U2	U3
Closed	Open	Open
Open	Closed	Open
Open	Open	Closed
Open	Open	Open

3) Three circuit breakers (Two for Closing and One for Opening)

Usage mode is shown in the figure below, while interlocking action state is shown in the figure below.



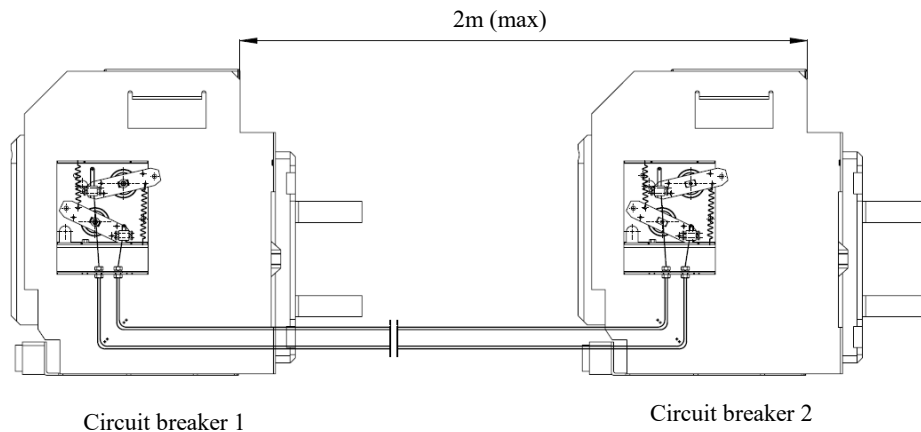
Status Table of Three Circuit Breakers (Two for Closing and One for Opening)

U1	U2	U3
Open	Open	Open
Closed	Closed	Open
Closed	Open	Closed
Open	Closed	Closed

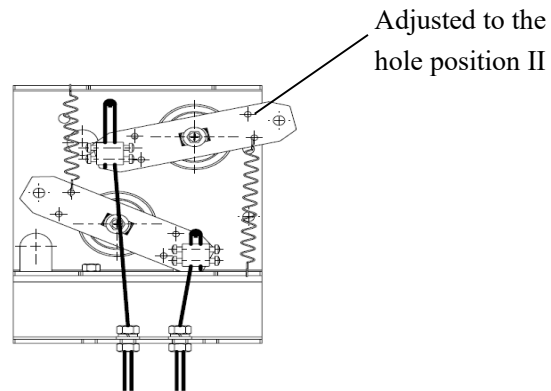
◆ Type description

1) Two interlocking cables (one for closing and one for opening)

Installation schematic diagram:

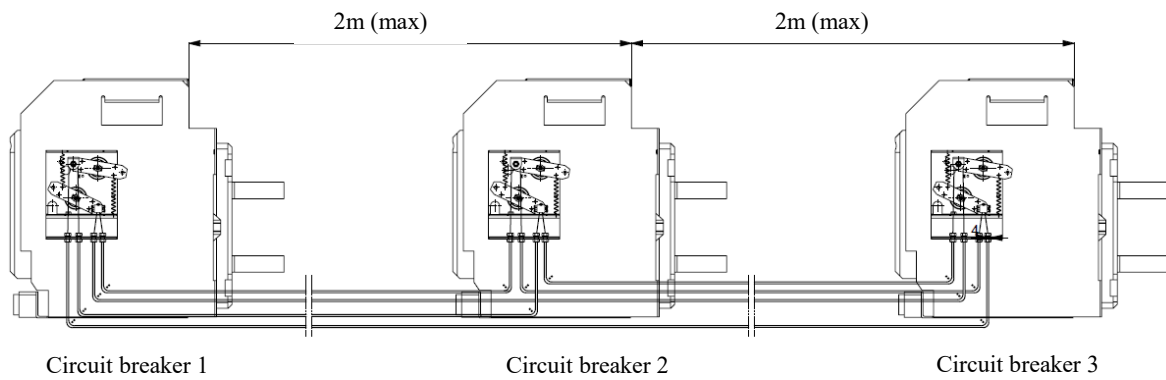


Adjustment schematic diagram:

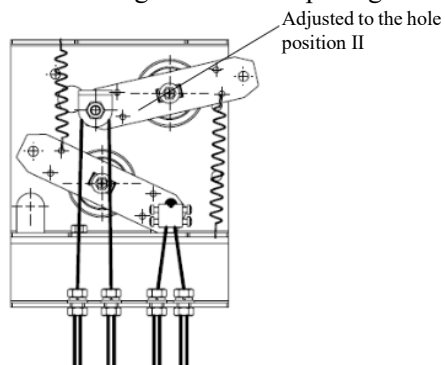


2) Three interlocking cables

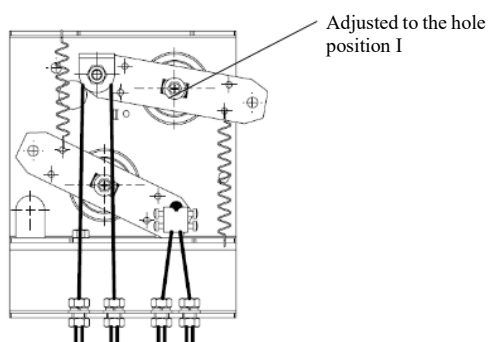
Installation schematic diagram:



Adjustment schematic diagram: One for closing and two for opening

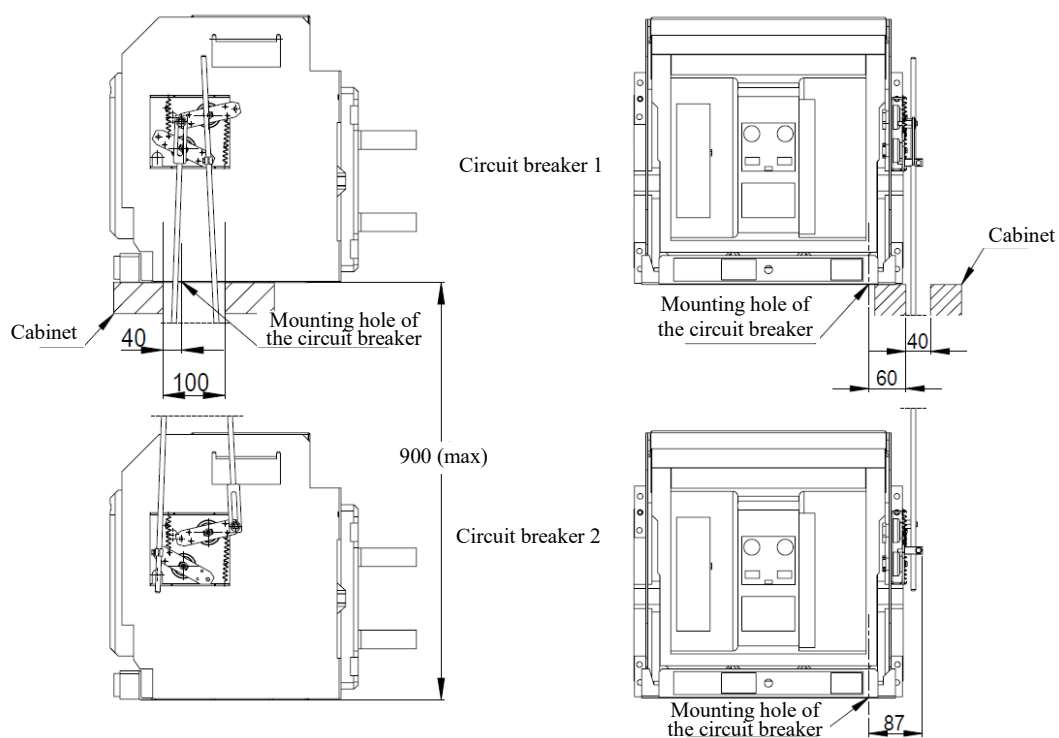


Adjustment schematic diagram: Two for closing and one for opening



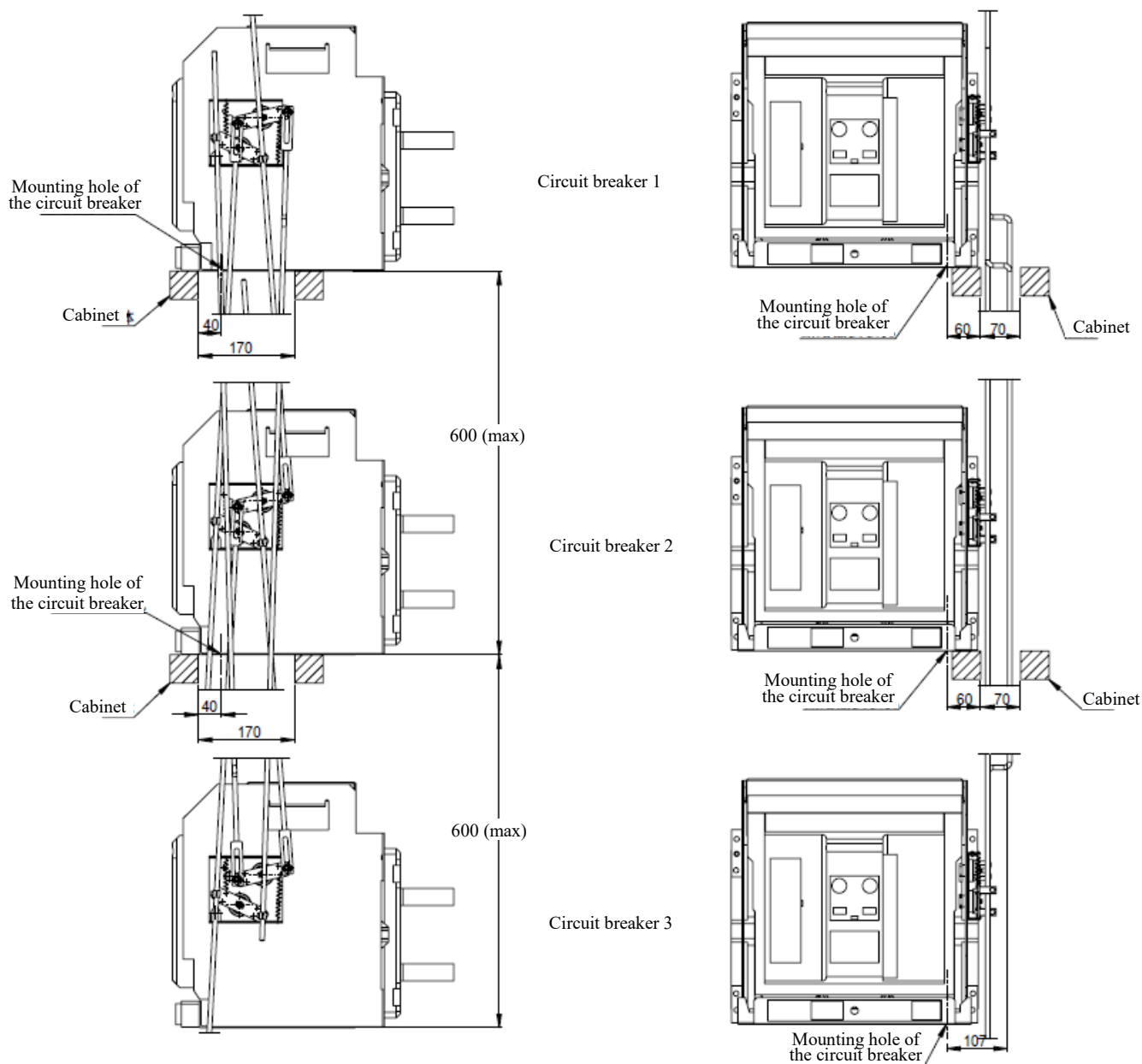
3) Two interlocking hard rods

Installation schematic diagram: (One for closing and one for opening)

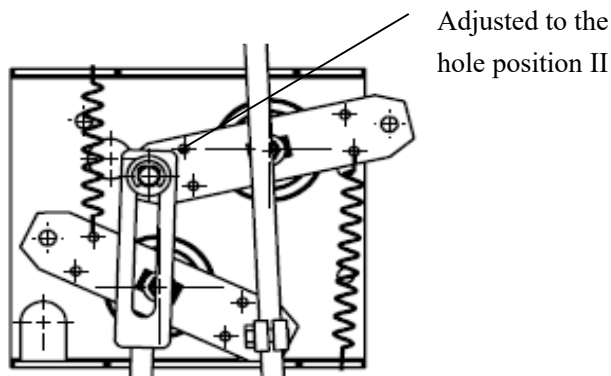


4) Three interlocking hard rods

Installation schematic diagram: (One for closing and two for opening)



Adjustment schematic diagram:

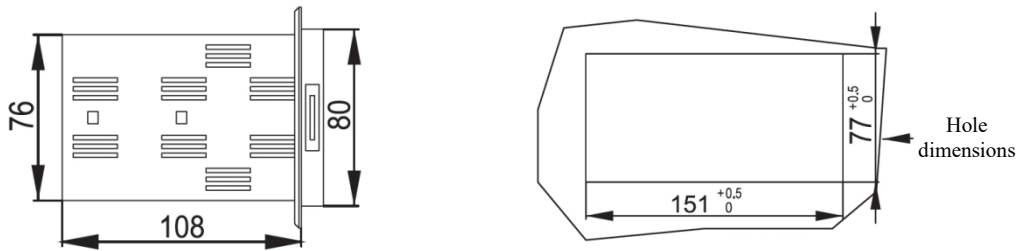


4.7.2 Automatic transfer switching equipment



Four-position switch state ★ Automatic switching; ★ Forced with "common" power supply; ★ Forced with "standby" power supply; ★ Double-open state (both "common" power supply and "standby" power supply are disconnected).	Automatic operation ★ Monitor the "common" power supply and automatic switching; ★ Generator set start control; ★ Generator set close control; ★ Unloading and restoring the non-priority load; ★ Alarm control in case of abnormality of the "standby" power supply.
Indication state ★ Display the power supply state of the power supply system; ★ Display the closing and opening state of the air circuit breaker; ★ Display the energy storage state of the air circuit breaker mechanism;	Function ★ Closing delay and opening delay can be adjustable by section; ★ Overvoltage and undervoltage protection can be adjustable by section; ★ Mode of the control function is optional (R, S, F); ★ Manual control and automatic control is adjustable.
Selection of Power Supply ★ Rated control supply voltage U_s: 220V~240V 50/60Hz; ★ Rated current I_n: 400A~6300A optional.	Threshold value ★ Undervoltage selection range: AC187V, AC176V, AC165V, AC154V; ★ Overvoltage selection range: AC253V, AC264V, AC275V, AC286V; ★ Selection range of the tripping delay and closing delay: 0.5s, 2s, 5s, 10s.

- ◆ See the figure below for outline and installation dimensions



Note: Due to the automatic transfer switching equipment has overvoltage and undervoltage protection functions, in order to guarantee the consistency and reliability of the system protection, the air circuit breaker used for automatic transfer switching equipment can't install undervoltage release, and the automatic transfer switching equipment and the mechanical interlocking (two interlocking) shall be used together.

4.8 Voltage-check closing device

4.8.1 Scope of application and usage

Voltage-check products for NWJY1 is applicable to electrical systems where rated voltage is AC230V or AC400V. This type of products is used to trip its controlled circuit breaker when the power supply voltage of this breaker is below the set threshold value, and reclose the circuit breaker when the power supply voltage is restored above the set threshold value.

4.1 Specifications and Model Description

Voltage-check closing device model description table

Model and Description					
<u>N</u>	<u>W</u>	<u>JY 1</u>	<u>— 230</u>	<u>/ □</u>	
1	2	3 4	5	6	
SN	SN name		Code		
1	Enterprise code		N Nader low-voltage apparatus		
2	Product code		W Accessory code of the frame product		
3	Function code		Accessory code of the JY voltage check function		
4	Design code		1		
5	Derived code		Rated voltage of 230: AC230V; Rated voltage of 400: AC400V		
6	Harness		0 means there is no optional circuit group and 1 means there is optional circuit group.		

4.8.3 Major technical specifications

Voltage-check closing device technical specifications list

Model classification	Voltage-check closing device
Operating temperature	-40°C□+70°C

Operating voltage	AC230V/AC400V 50Hz
Starting power	AC230V: 340W AC400V: 490W
Operating power	AC230V/400V: 5W
Under-voltage action value range	When the control supply voltage drops to 20%~70%U _e (voltage allowable error no more than 5%), the undervoltage release is released according to the set delay time, and the product opens. When the control power supply voltage slowly rises back to 85%U _e (allowable voltage error ≤ 2%), the undervoltage release pulls in, and the product closes according to the set time.
Closing voltage	Set to 85%U _e , 90%U _e , 95%U _e , 100%U _e , OFF
Closing delay	1s,2s,3s,4s,5s,6s,7s,8s,9s,10s
Undervoltage delay	0s,1s,2s,3s,4s,5s,6s,7s,8s,10s

4.8.4 Working environment

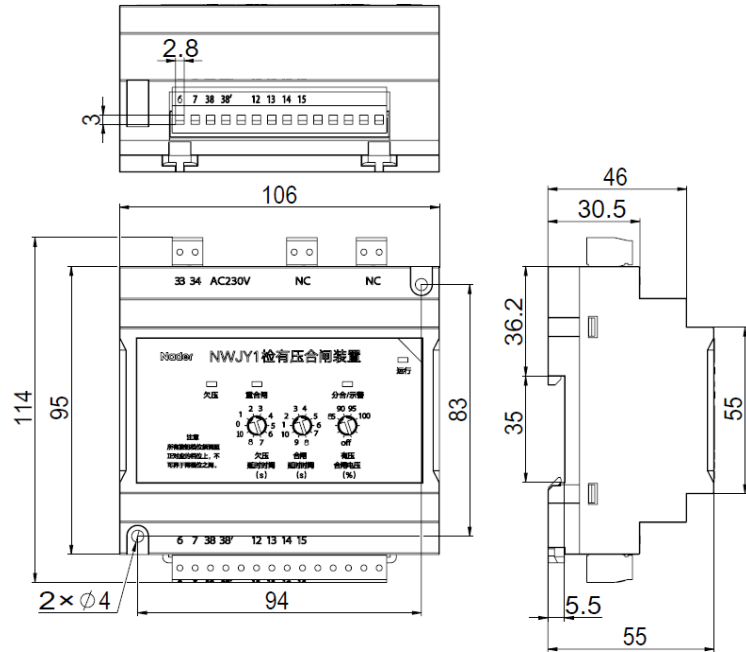
Environmental requirements	Description of the specific parameters
Operating ambient temperature	The operating ambient temperature is -40°C~+ 70°C; the average within 24 h shall not be more than +35°C.
Pollution degree	Pollution level: Level 3
Protection class	IP30
Electromagnetic compatibility should be in accordance with the following	standards: 1. GB/T 14048.2 Low-voltage Switchgear and Control Equipment - Part 2: Circuit Breaker - Appendix N 2. GB/T 17626.2 Electromagnetic Compatibility (EMC) - Testing and Measurement Techniques - Electrostatic Discharge Immunity Test 3. GB/T 17626.3 Electromagnetic Compatibility (EMC) - Testing and Measurement Techniques - Radiated, Radio-frequency, Electromagnetic Field Immunity Test 4. GB/T 17626.4 Electromagnetic Compatibility (EMC) - Testing and Measurement Techniques - Electrical Fast Transient/burst Immunity Test 5. GB/T 17626.5 Electromagnetic Compatibility (EMC) - Testing and Measurement Techniques - Surge Immunity Test 6. GB/T 17626.6 Electromagnetic compatibility - Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields 7. Q GDW 1973 Test Code for Low-Voltage Circuit-Breaker for Distributed Grid-Connected PV Station

4.8.5 Outline drawing, installation diagram and electric schematic diagram

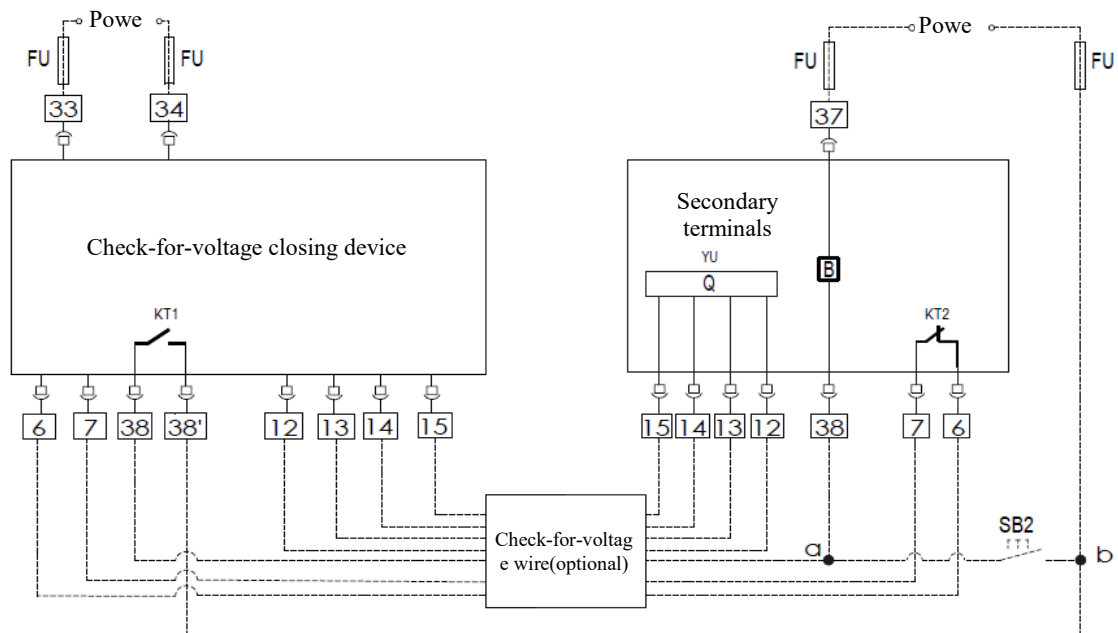
Outline drawing



Installation diagram



Electrical Wiring Diagram of Voltage-check Closing Device



1) 6, 7 - The voltage-check closing device needs to monitor the status of the circuit breaker or disconnect the contact output function with the circuit breaker. Please note that voltage-check module 6 and 7 need to connect to the passive normally-closed contact of the circuit breaker;

- 2) 12 & 13 and 14 & 15 - Select one of the dedicated undervoltage release controlled by the voltage check closing device, dedicated photovoltaic undervoltage (no-voltage) release (adjustable within 0-10s) and signal unit function;
- 3) 33, 34 - The customer may connect to the power supply for voltage-check closing device or that for normal under-voltage release based on the actual need (but only AC220V/230V and AC380V/AC400V are allowed);
- 4) 37, 38 - When the voltage-check closing device function is selected, the power supply of the closed electromagnet is 37 and 38. Rotate the "closing voltage knob" of the voltage-check closing device to non-OFF position, the closed electromagnet will be automatically controlled by the voltage-check closing device; connecting to wire a-b is not recommended;
- 5) To separately and manually control the closed electromagnet, rotate the "closing voltage knob" of the voltage check closing device to OFF position, and wire a□b (including SB2) needs to be connected;
- 6) If the voltage-check closing device is not selected, the power supply of the closed electromagnet is still 37 and 38, and the wire should be connected according to the electrical wiring diagram of the universal circuit breaker;
- 7) 6, 7, 12, 13, 14, 15 and 38 are connected to wire number of the secondary terminal via a wiring harness;
- 8) Dotted lines are connected by users, while solid lines are within the product. (Note: The electrical wiring diagram of NDW2-1600 is the same as that of NDW2/NDW2F-2000/3200/4000 except that contacts 6 and 7 in Items 1 and 5 are changed to contacts 7 and 8.)

4.8.6 Rotary switch setting description

Closing threshold voltage setting: The allowed closing voltage setting is 85%, 90%, 95%, 100%, or OFF. When the closing threshold voltage is set to non-OFF, the circuit breaker can be reclosed; when set to OFF, the reclosing function of the voltage-check product is disabled.

Under-voltage delay duration: When a voltage-check product detects a power supply voltage less than the set threshold under-voltage value, a countdown starts. When the countdown duration is 0 s, the voltage-check product sends a signal indicating an under-voltage tripping. In the countdown of under-voltage duration, if the power supply voltage rises above the threshold value, the countdown is restored. Before sending an under-voltage release signal, the circuit breaker is not tripped. If the circuit breaker is tripped within 300 ms upon the sending of the under-voltage signal, the tripping is successful. Reclosing is allowed when the power supply voltage is restored.

Closing delay time: When the reclosing threshold voltage of the voltage-check product is set to non-OFF, and the last undervoltage tripping command is issued by the voltage-check product, and the current circuit breaker is still in tripping state, and the duration of the power supply voltage higher than the reclosing threshold voltage is longer than the closing delay time, a reclosing command is issued, and the tripping state signal of the circuit breaker disappears within 300ms after the reclosing command is issued, which is considered as successful closing.

4.8.7 LED indicator status description

Normal running indicator: When a voltage-check product is running properly, the indicator blinks at 1 Hz.

Under-voltage indicator: When the power supply voltage is in the under-voltage status, the indicator is steady on; When the power supply voltage is normal, the indicator is steady off; When the product is in the time-delay period of under-voltage tripping or circuit breaker closing delay, the indicator blinks at long intervals.

Reclosing indicator: When a circuit breaker is reclosed, this indicator is on, and when the reclosing of a circuit breaker is complete, this indicator is off.

Closing/Fault indicator: When rotary switches of under-voltage delay, closing delay and threshold value closing are faulty, this indicator blinks. When a circuit breaker is tripped, this indicator is steady off. When a circuit breaker closing is unsuccessful, this indicator blinks at short intervals.

4.8.8 Installation method

Installation mode: Using horizontal or vertical 35 mm standard guide or direct fixation;

Chapter 5 Field of Application

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<u>5.1 Working Environment</u>	<u>60</u>
<u>5.2 Installation conditions</u>	<u>62</u>
<u>5.3 Main Circuit Wiring of the Circuit Breaker</u>	<u>63</u>
<u>5.4 The power loss of the incoming and outgoing lines of the circuit breaker</u>	<u>63</u>
<u>5.5 Preventive maintenance</u>	<u>64</u>

Scope of application 5

The NDW2 series of universal circuit breakers (hereinafter referred to as circuit breakers) can be applied to the distribution network with the AC 50Hz/60Hz, the rated current of 200A~6300A, the rated insulation voltage of 1000 V, the rated working voltage of AC220V/230V/240V, AC380V/400V/415V, AC440V/480V, AC660V/690V. NDW2-4000 and NDW2-6300 can also be applied to the distribution network with the rated operating voltage of AC800V, AC1000V/AC1140V (rated insulation voltage of 1250V) for distribution of electrical energy and protecting circuit and power equipment from overload, under-voltage, short circuit, single phase grounding and harm of other faults, and can also be used as isolation switch at the same time. The circuit breaker has multiple protection functions. It can avoid unnecessary sudden power failure while realizing highly accurate selective protection, and improve the reliability and security of the power supply system.

5.1 Working Environment

5.1.1 Ambient temperature

Applicable environment temperature is $-25^{\circ}\text{C} \sim +70^{\circ}\text{C}$, the average within 24 h shall not be more than $+35^{\circ}\text{C}$.

The circuit breaker with the ambient temperature below $-25^{\circ}\text{C} \sim -40^{\circ}\text{C}$ can be specially customized. If the ambient temperature is higher than $+40^{\circ}\text{C}$, the user needs to reduce the capacity. The reduced capacity coefficient is shown in the following table.

Ambient temperature		+40°C	+45°C	+50°C	+55°C	+60°C	+70°C
NDW2-1600	200A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	400A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	630A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	800A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	0.97 In
	1000A	1.0 In	1.0 In	0.95 In	0.89 In	0.85 In	0.78 In
	1250A	1.0 In	1.0 In	1.0 In	0.95 In	0.89 In	0.85 In
	1600A	1.0 In	0.95 In	0.89 In	0.85 In	0.78 In	0.73 In
NDW2-2000	400A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	630A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	800A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	1000A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	1250A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	1600A	1.0 In	1.0 In	1.0 In	1.0 In	0.97 In	0.94 In
	2000A	1.0 In	0.98 In	0.95 In	0.90 In	0.88 In	0.80 In
NDW2-3200	2000A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	2500A	1.0 In	1.0 In	1.0 In	1.0 In	0.95 In	0.90 In
	2900A	1.0 In	1.0 In	1.0 In	1.0 In	0.97 In	0.95 In
	3200A	1.0 In	1.0 In	1.0 In	0.97 In	0.95 In	0.90 In
NDW2-4000	800A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	1000A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	1250A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	1600A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	2000A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In

	2500A	1.0 In	1.0 In	1.0 In	1.0 In	0.95 In	0.90 In
	3200A	1.0 In	1.0 In	1.0 In	1.0 In	0.95 In	0.90 In
	4000A	1.0 In	0.95 In	0.89 In	0.85 In	0.78 In	0.73 In
NDW2-6300	4000A	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In	1.0 In
	5000A	1.0 In	1.0 In	1.0 In	1.0 In	0.98 In	0.92 In
	6300A	1.0 In	0.95 In	0.89 In	0.85 In	0.78 In	0.73 In

Note: The above data is calculated according to the test and theory. The data represent only guidelines and recommendations.

5.1.2 Atmospheric environment conditions

When the ambient air temperature is +40°C, the relative humidity of atmosphere shall not be more than 50%. At low temperature, a higher relative humidity is allowed, for example, in case of +20°C, the relative humidity of atmosphere can be 90%. For condensation due to temperature change, dehumidification or corresponding measures should be taken.

5.1.3 Altitude

Altitude of the installation site shall not exceed 2,000 m.

If the altitude of the installation site is between 2,000m to 5,000m, it can be specially customized. For the working performance, refer to High Altitude Derating Tables 1 and 2.

Tab. 1 Altitude derating coefficient table (power frequency withstand voltage)

Altitude	Rated operating voltage		Power frequency withstand voltage
2000m	690V	1140V ⁽¹⁾	3500V
3000m	590V	850V ⁽¹⁾	3150V
4000m	520V	750V ⁽¹⁾	2500V
5000m	460V	660V ⁽¹⁾	2200V

Note: (1) is applicable to NDW2-4000 and NDW2-6300 products with rated operating voltage of AC1140V.

Tab. 2 High-altitude Derating Coefficient (Current)

Operating current		Altitude			
Model	Rated current (A)	2000m	3000m	4000m	5000m
NDW2-1600	200-630	1.0 In	1.0 In	1.0 In	1.0 In
	800-1000	1.0 In	1.0 In	0.97 In	0.87 In
	1250-1600	1.0 In	1.0 In	0.97 In	0.87 In
NDW2-2000	400-800	1.0 In	1.0 In	1.0 In	1.0 In
	1000-1600	1.0 In	1.0 In	1.0 In	1.0 In
	2000	1.0 In	1.0 In	0.97 In	0.87 In
NDW2-3200	2000-2500	1.0 In	1.0 In	1.0 In	1.0 In
	2900-3200	1.0 In	0.83 In	0.80 In	0.75In
NDW2-4000	800-2500	1.0 In	1.0 In	1.0 In	1.0 In
	3200	1.0 In	1.0 In	1.0 In	1.0 In
	4000	1.0 In	0.93 In	0.88 In	0.82 In
NDW2-6300	4000	1.0 In	1.0 In	1.0 In	1.0 In
	5000	1.0 In	1.0 In	1.0 In	1.0 In

	6300	1.0 In	0.93 In	0.88 In	0.82 In
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5.1.4 Anti-corrosion Level

Salt mist: Severe Level 2

5.1.5 Pollution level

Pollution level: Level 3

5.1.6 Shockproof requirements

☐ The circuit breaker can ensure resistance to electromagnetic or mechanical shock, and has passed the GB/T 4798.3 standard test.

☐ Amplitude: $\pm 1.5\text{mm}$ (2Hz -9Hz)

☐ Constant acceleration: 5 m/s^2 (9Hz -200Hz)

☐ Super strong shock may result in damage to the parts, and impact the reliable action of the circuit breaker

5.1.7 Electromagnetic interference

1) The circuit breaker can resist the following electromagnetic interference

☐ Overvoltage caused by electromagnetic interference

☐ Overvoltage due to aging of the distribution system or environmental interference

☐ Radio wave

☐ Electrostatic discharge

2) The circuit breaker has passed the electromagnetic compatibility test (EMC) specified in the following standards

☐ GB/T 14048.2-2020 Low-voltage Switchgear and Control Equipment - Part 2: Circuit Breaker - Appendix F

☐ GB/T 14048.2-2020 Low-voltage Switchgear and Control Equipment - Part 2: Circuit Breaker - Appendix N

The above test can ensure that the circuit breaker does not trip by mistake.

5.2 Installation conditions

With the vertical gradient of no more than 5° , the circuit breaker shall be installed under the environment condition without explosion danger, without conductive dust and without the possibility of corroding metal and damaging the insulation.

5.2.1 Installation type

The circuit breaker's main circuit and undervoltage release coils, power transformer primary coil installation category is IV; the rest auxiliary circuit and control circuit installation category is III.

5.2.2 Protection level

IP30, IP40 (mounted in cabinet compartment with protective door frame), IP54 (IP54 transparent cover assembly with special door frame, mounted in cabinet compartment)

5.2.3 Utilization category

Category B

5.3 Main Circuit Wiring of the Circuit Breaker

Main Circuit Wiring of the Circuit Breaker

Rated current of frame Inm (A)	Rated current In (A) +40°C	Copper bar specification	
		Dimensions	Number
1600	200, 400, 630	40mm×5mm	2
	800	50mm×5mm	2
	1000	60mm×5mm	2
	1250	60mm×5mm	3
	1600	60mm×10mm	2
2000	400, 630	60mm×5mm	2
	800	60mm×5mm	2
	1000	60mm×5mm	2
	1250	60mm×10mm	2
	1600	60mm×10mm	2
	2000	60mm×10mm	3
3200	2000	100mm×5mm	3
	2500	100mm×10mm	2
	2900	100mm×10mm	3
	3200	100mm×10mm	4
4000	800~1600	80mm×5mm	3
	2000	80mm×10mm	2
	2500	80mm×10mm	3
	3200, 4000	100mm×10mm	5
6300	4000	100mm×10mm	5
	5000, 6300	100mm×10mm	6

- Note: 1. The table indicates the copper bar specifications adopted when the circuit breaker is under the ambient temperature of +40°C and the open wide installation under the heating condition meets the stipulation in GB/T 14048.2. If the temperature is higher than +40°C, the quantity of copper bar should be increased, or the capacity should be reduced.
2. The above data is calculated according to the test and theory, and for reference only.
3. The maximum permissible temperature of the copper bar is no more than +110°C.
4. The electrical gap of copper bar is $\geq 15\text{mm}$ with the altitude more than 5,000m and relative humidity more than 90%; the electrical gap shall be adjusted according to the content of 7.1.1 Table 1 in GB/T 20645.

5.4 The power loss of the incoming and outgoing lines of the circuit breaker (ambient temperature +40 °C)

The power loss of the incoming and outgoing lines of the circuit breaker

Model	Power loss of the fixed type	Power loss of the drawout type
NDW2-1600	$\leq 150\text{ W}$	$\leq 400\text{ W}$
NDW2-2000	$\leq 208\text{ W}$	$\leq 380\text{ W}$
NDW2-3200/4000	$\leq 650\text{ W}$	$\leq 900\text{ W}$
NDW2-6300	$\leq 787\text{ W}$	$\leq 1145\text{ W}$

Note: The above power loss value is measured when the circuit breaker is powered on test current I_n (maximum rated current of the circuit breaker) for 8h and after the main circuit temperature rise tends to become steady. The test method complies with G.2 in Appendix G of GB/T 14048.2.

5.5 Preventive maintenance

Preventive maintenance refers to the regular inspection according to predetermined standards in order to lower the probability of system operation failures or performance degradation.

■ Regular maintenance

The technical department will provide maintenance suggestions for each product. Appropriate inspection procedures can ensure the system delivery components maintain normal operating conditions within the predetermined service cycle. Users can carry out such inspections within the cycle specified herein.

■ Conditional maintenance

Conditional maintenance can reduce the recommended regularly maintenance operations (lowering them to the required minimum level instead of completely replacing them), and thus reduce the equipment downtime caused by regularly scheduled maintenance operations each year.

Preventive maintenance includes testing, measurement, and maintenance and repairs according to specially designed technical plans. It can lower the probability of equipment failure and reduce the wear and tear on machinery during operation.

a) Environmental Type, Table 1

Environmental type	Range of conditions
Normal environment	Temperature: Average temperature outside the switch cabinet $<25^{\circ}\text{C}$ Load: $<80\%$ (I_n) (24-hour operation per day) Harmonic: Harmonic current per phase $<30\%$ (I_n) Relative humidity: $<70\%$ Pollution level: III Salt-spray environment: None Dust: Low, equipment protected by a switch with filter or ventilated IP54 enclosure Vibration: None
Special environment	Temperature: Average temperature outside the switch cabinet $-40^{\circ}\text{C}-70^{\circ}\text{C}$ Load: $>80\%$ (I_n) (8-hour or 24-hour operation per day) Relative humidity: $>80\%$ Pollution level: Salt-spray environment: III Dust: High, equipment unprotected.

	Vibration: Continuous vibration between 0.2 and 0.5g
--	--

b) Table of Preventive Maintenance, Table 2

Maintenance operation	Time interval	
	Normal environment	Special environment
Level 1 maintenance	One year or operate 10,000 times	Six months or operate 5,000 times
Level 2 maintenance	One year	Six months

For the specific maintenance content, please refer to the Maintenance Manual for NDW Series of Universal Circuit Breaker.

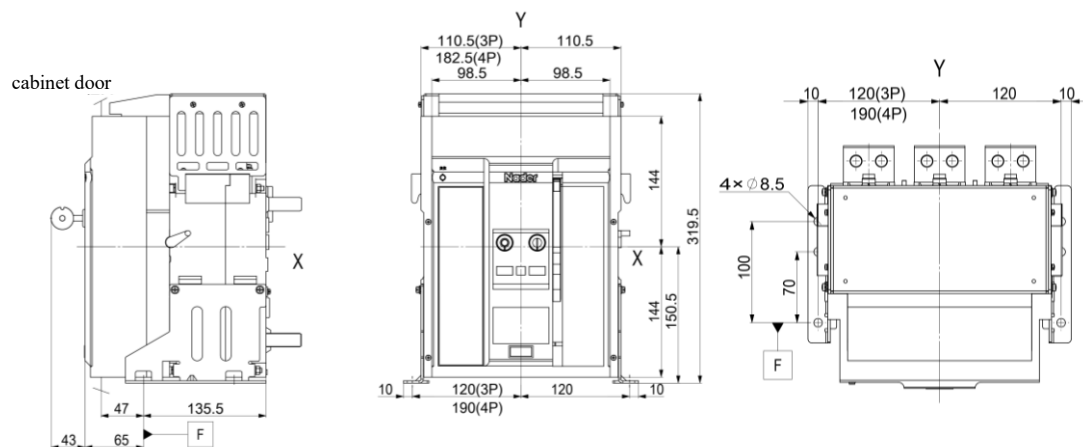
Chapter 6 Outline and Installation Dimensions

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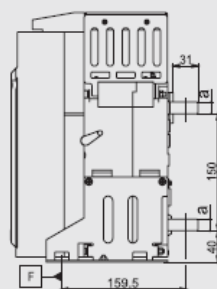
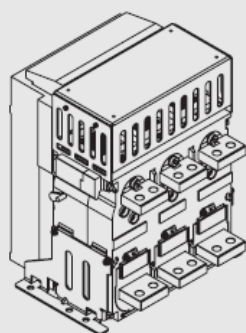
Outline and Installation Dimensions 6

6.1 NDW2-1600

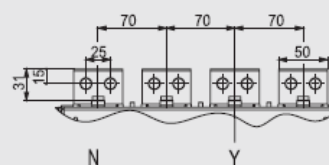
NDW2-1600 Fixed type (unit: mm) (power module removed)



Horizontal wiring



Details



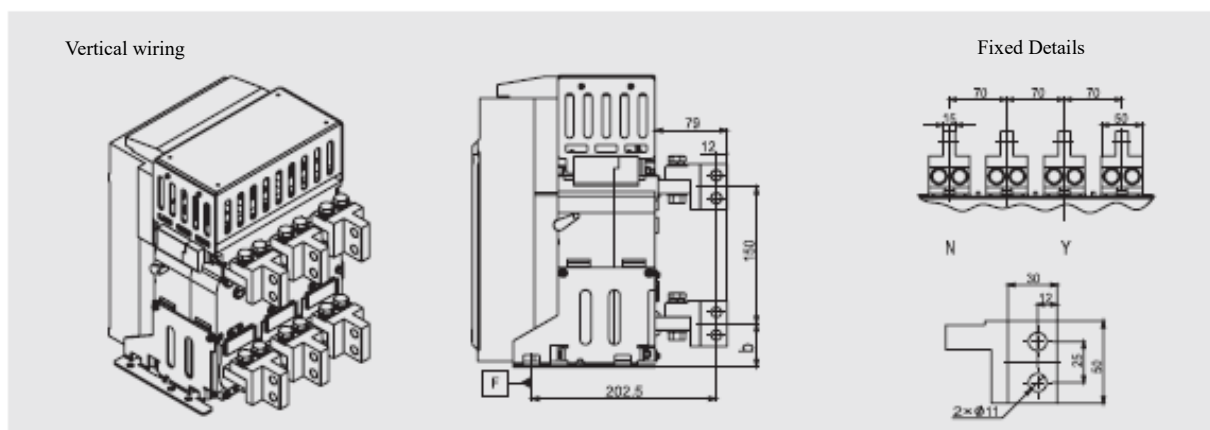
Note: the circuit breaker's X and Y are symmetric axes of the front mask

Connection bolt between bus and terminal	Torque applied with a flat washer (N.m)
M10	45

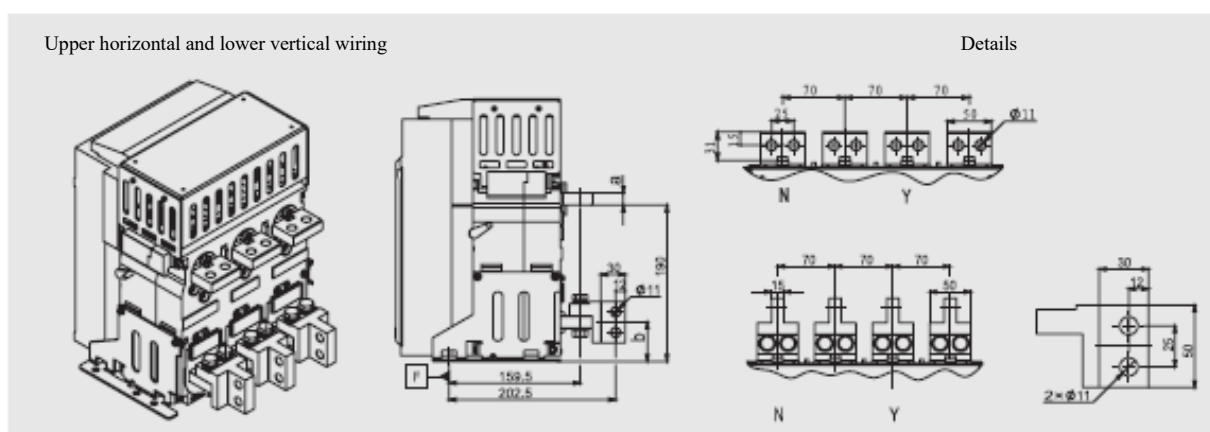
Rated current	Size of busbar a (mm)
200A, 400A, 630A, 800A, 1000A	10
1250A, 1600A	15

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)



Rated current	b Dimension (mm)
200A, 400A, 630A, 800A, 1000A	42.5
1250A, 1600A	47.5

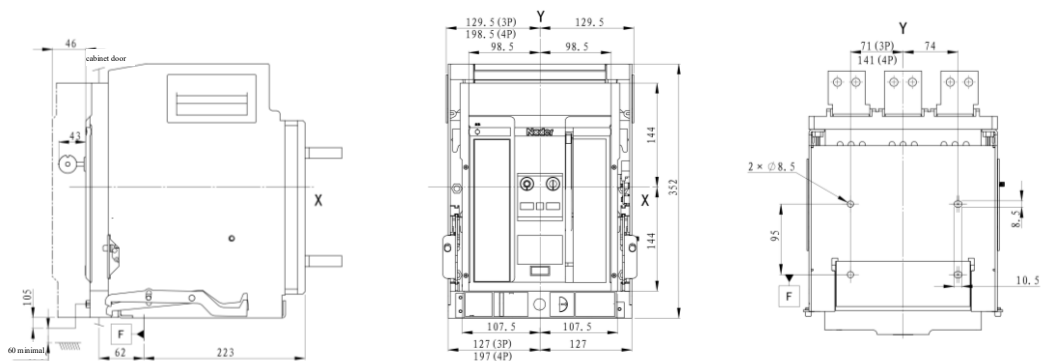


Rated current	Size of busbar a (mm)	b Dimension (mm)
200A, 400A, 630A, 800A, 1000A	10	42.5
1250A, 1600A	15	47.5

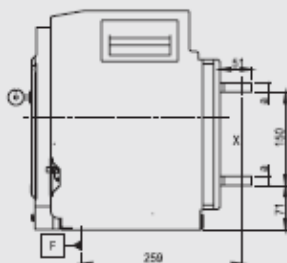
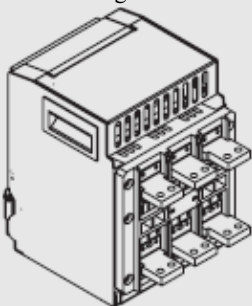
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

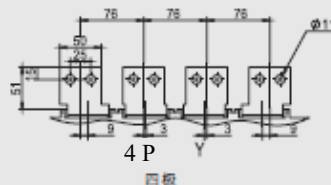
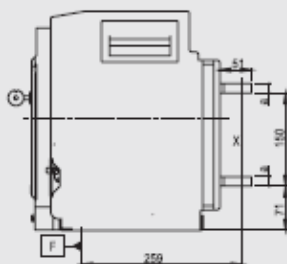
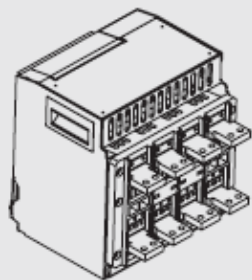
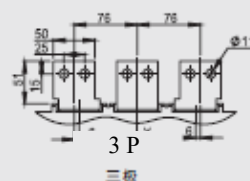
NDW2-1600 Drawout type (control power module removed)



Horizontal wiring



Details

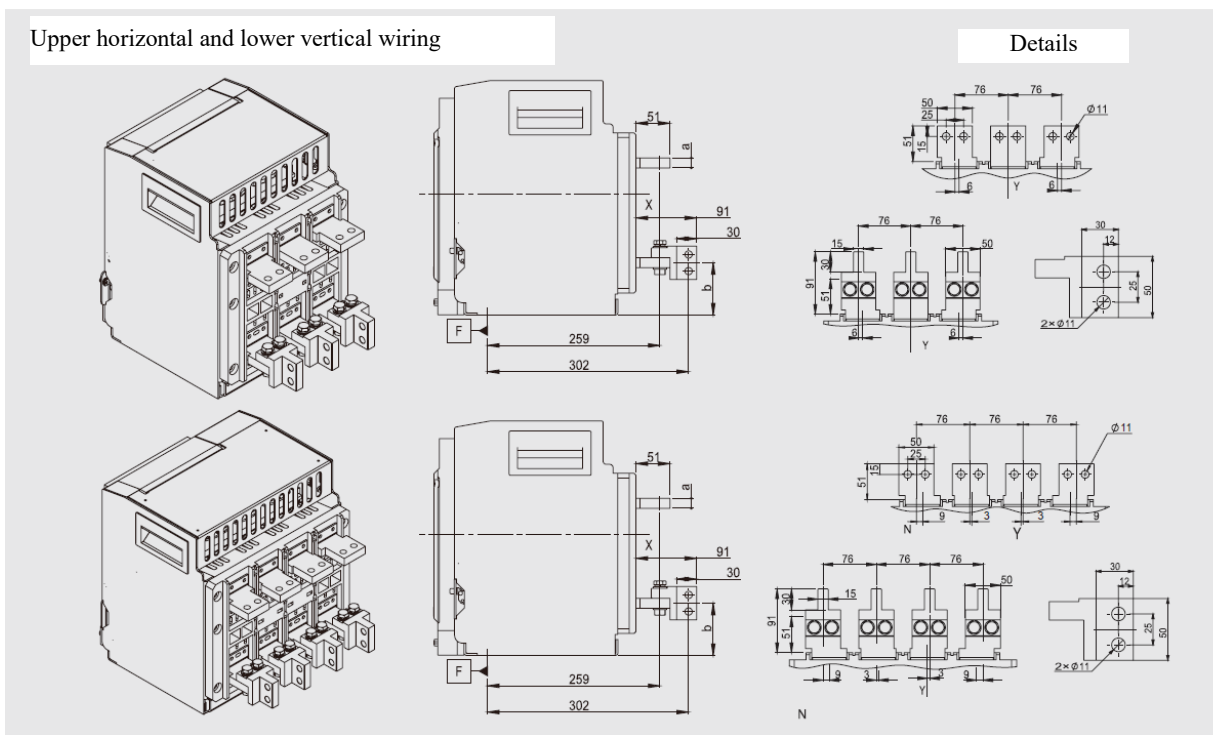
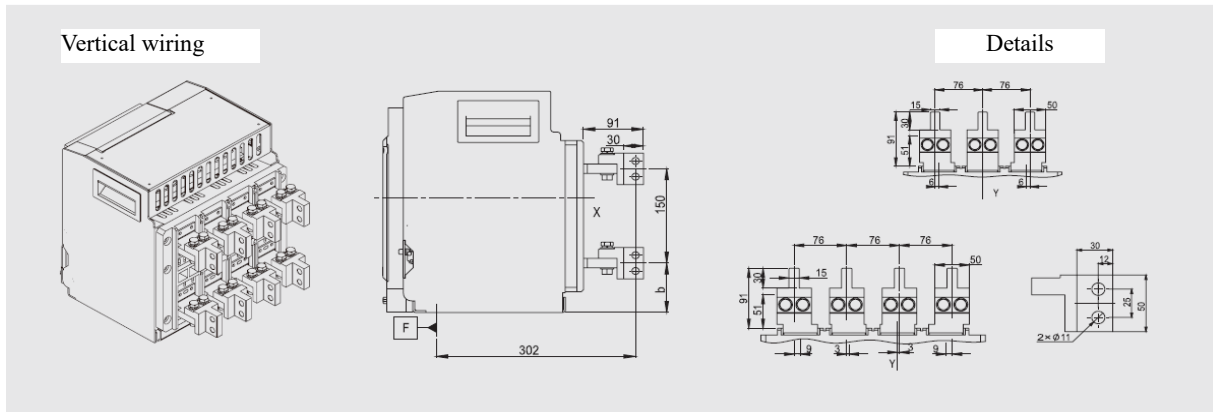


Note: the circuit breaker's X and Y are symmetric axes of the front mask

Connection bolt between bus and terminal	Torque applied with a flat washer (N.m)	Rated current	Size of busbar a (mm)
M10	45	200A, 400A, 630A, 800A, 1000A	10

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

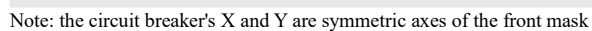


Note: the circuit breaker's X and Y are symmetric axes of the front mask

Rated current	Size of busbar a (mm)	b Dimension (mm)
200A, 400A, 630A, 800A, 1000A	10	73.5
1250A, 1600A	15	78.5

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

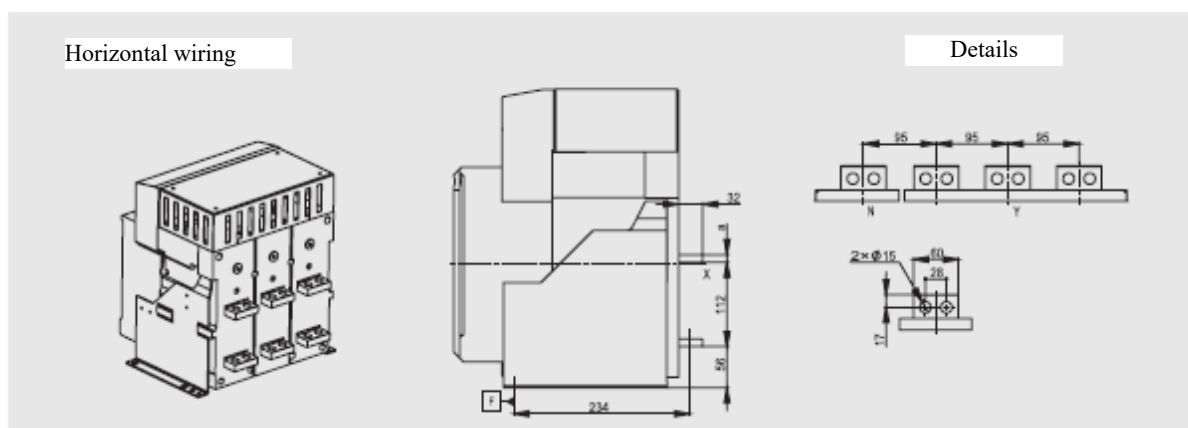
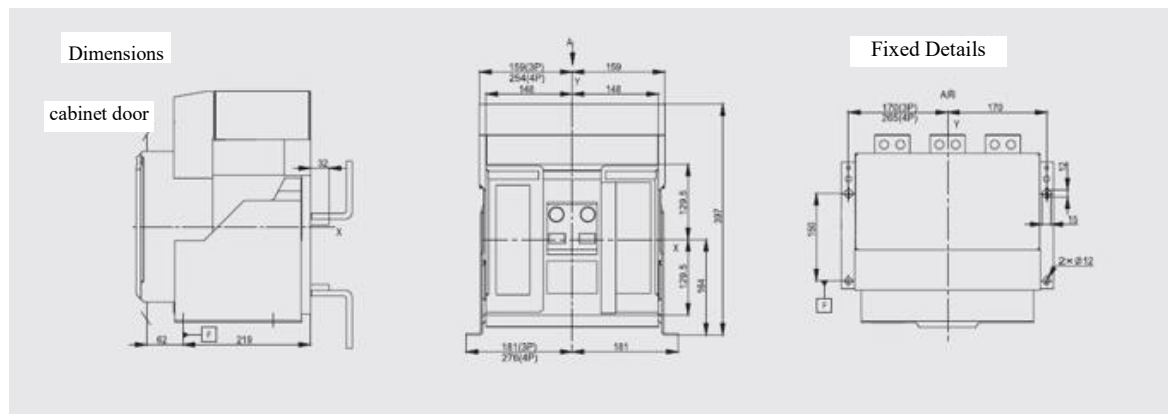


Horizontal extended wiring

Technical drawings of the horizontal extended wiring terminal block, including perspective views and detailed dimensioned drawings (side and top views) for both the main unit and the detail view.

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

NDW2-2000 fixed type



Note: the circuit breaker's X and Y are symmetric axes of the front mask

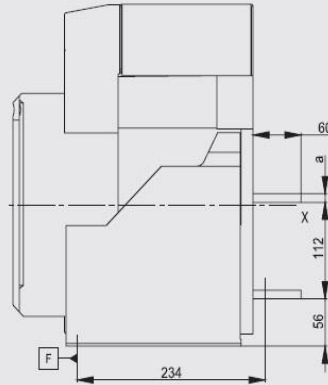
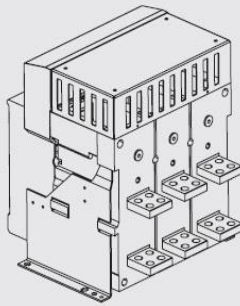
Connection bolt between bus and terminal	Torque applied with a flat washer (N.m)
M12	60

Rated current	Size of busbar a (mm)
400A, 630A, 800A	10
1000A, 1250A, 1600A	15
2000A	20

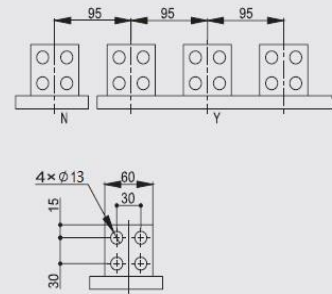
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

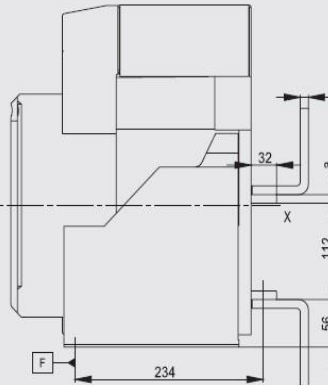
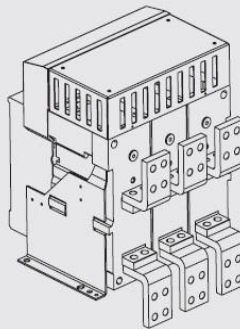
Horizontal extended wiring



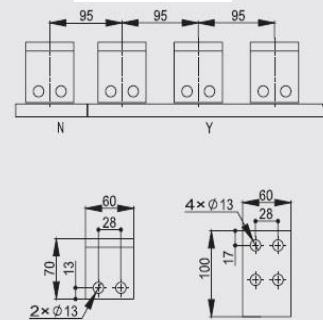
Details



L-type wiring



Details



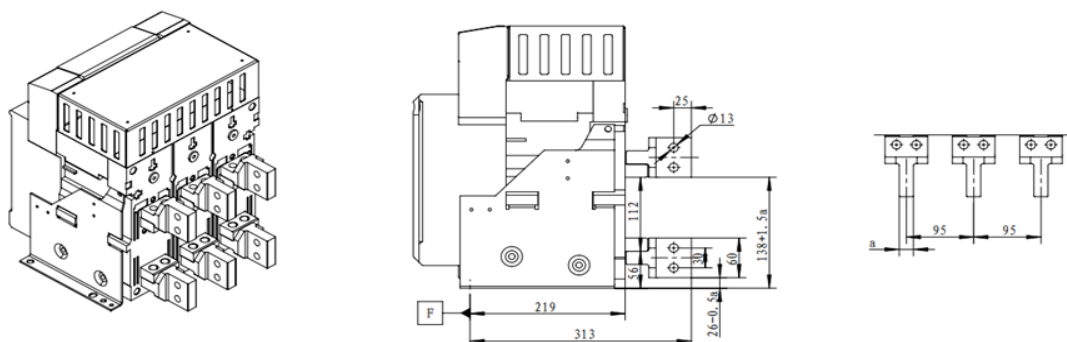
Note: the circuit breaker's X and Y are symmetric axes of the front mask

Rated current	Size of busbar a (mm)
400A, 630A, 800A	10
1000A, 1250A, 1600A	15
2000A	20

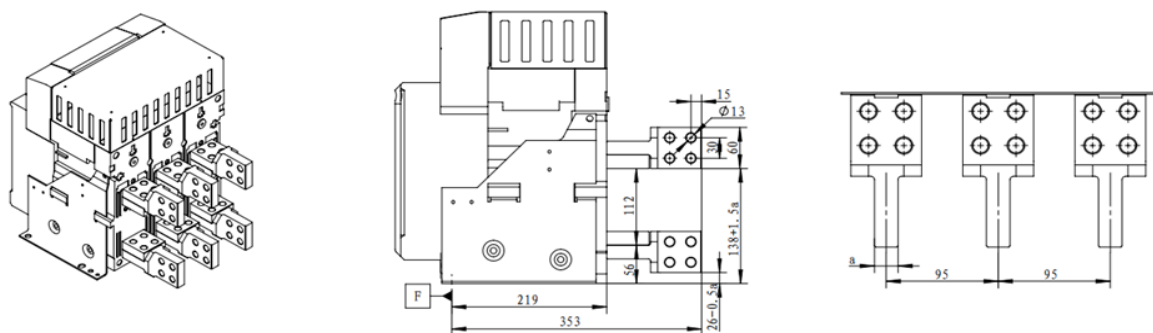
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

Vertical wiring



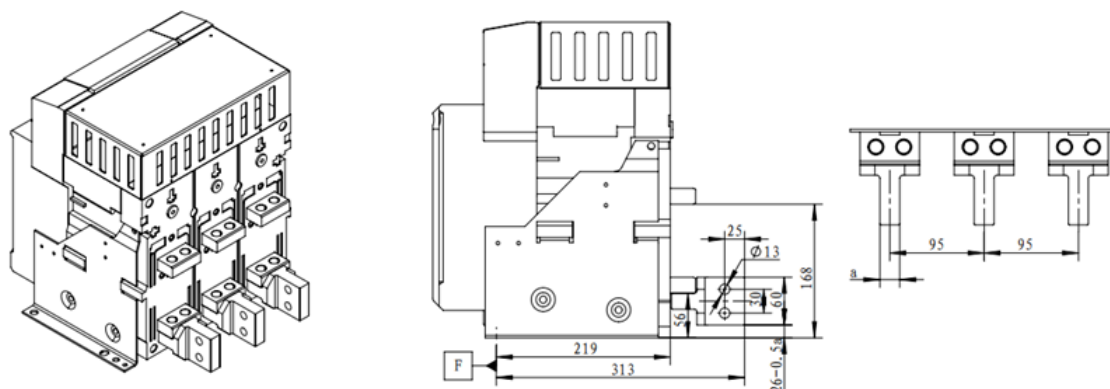
vertical extended wiring



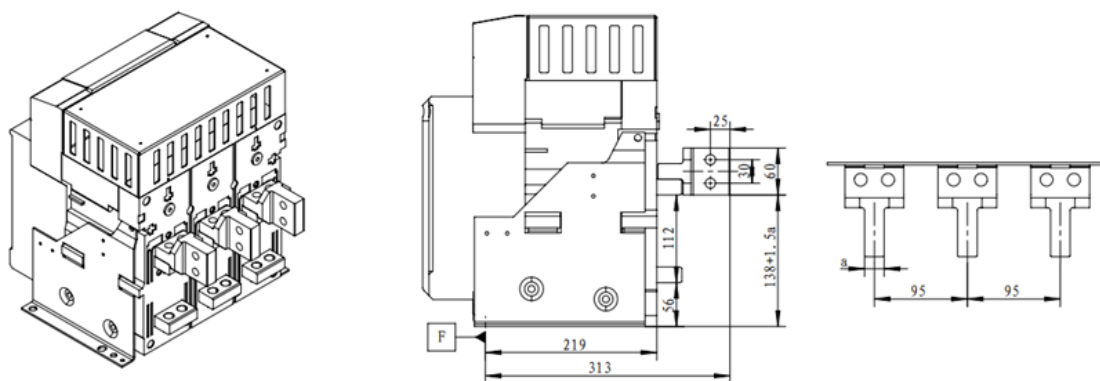
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

Mixing wiring (upper horizontal and lower vertical)



Mixing wiring (upper vertical and lower horizontal)



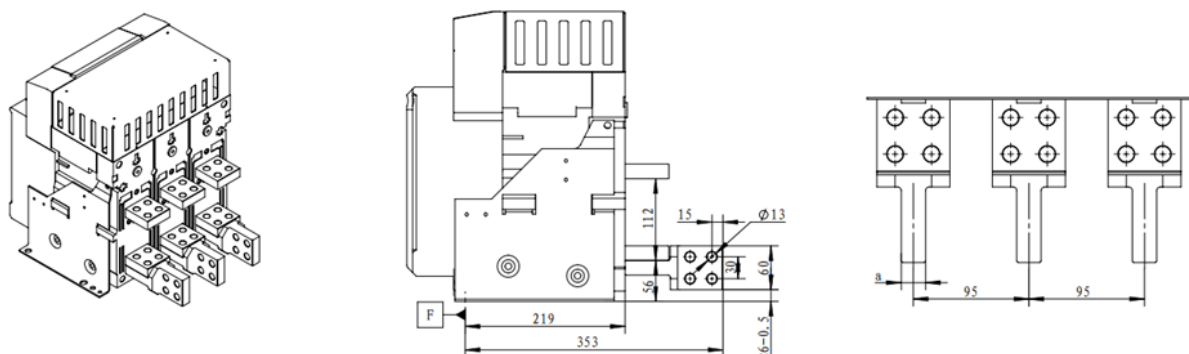
Note: For the circuit breaker, X and Y are the symmetric axes of the front mask

Rated current	Dimensions of bus a (mm)
400A、630A、800A	10
1000A、1250A、1600A	15
2000A	20

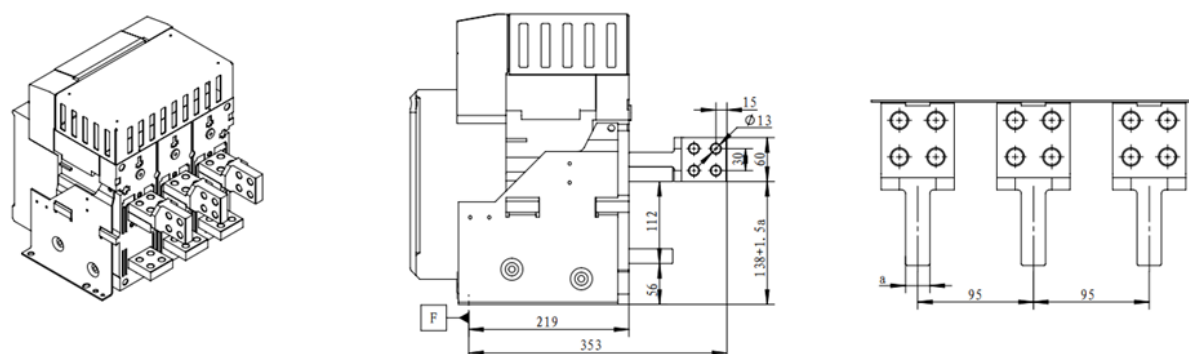
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is ± 3 mm

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

Mixed extended wiring (upper horizontal, lower vertical)



Mixed extended wiring (upper vertical, lower horizontal)

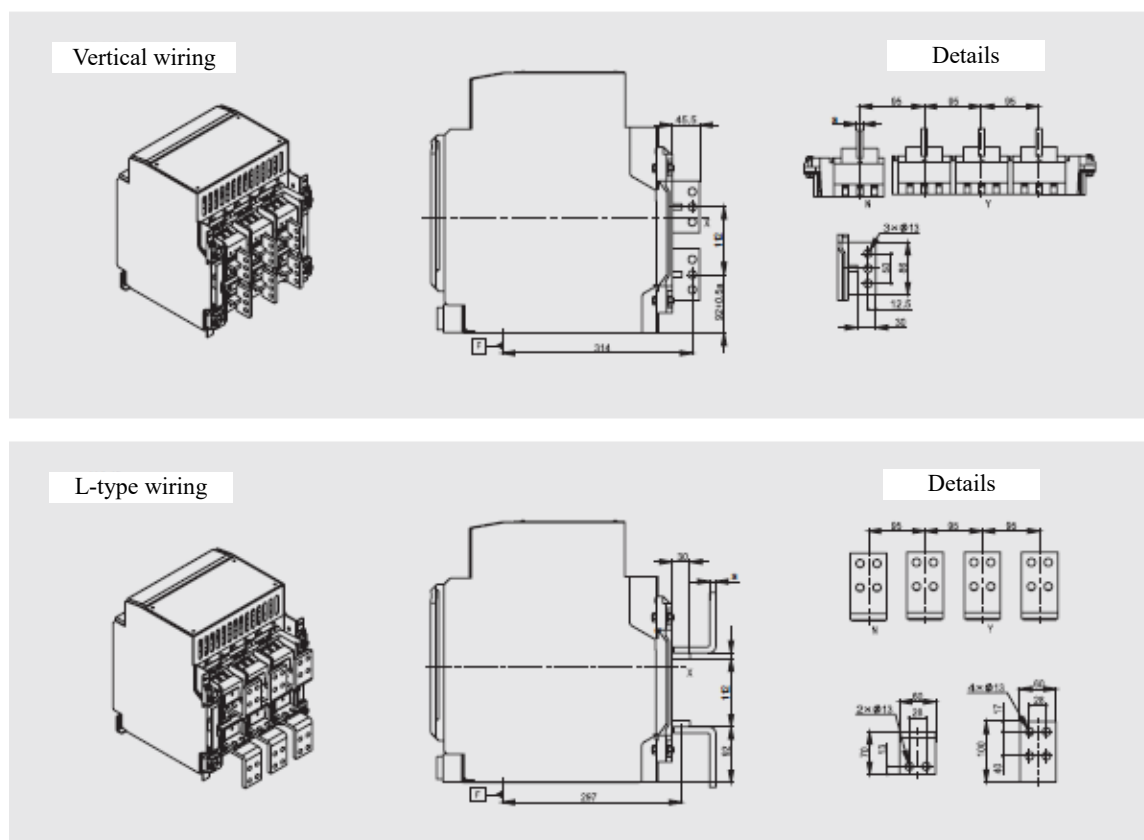


Note: For the circuit breaker, X and Y are the symmetric axes of the front mask

Rated current	Dimensions of bus a (mm)
400A、630A、800A	10
1000A、1250A、1600A	15
2000A	20

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)



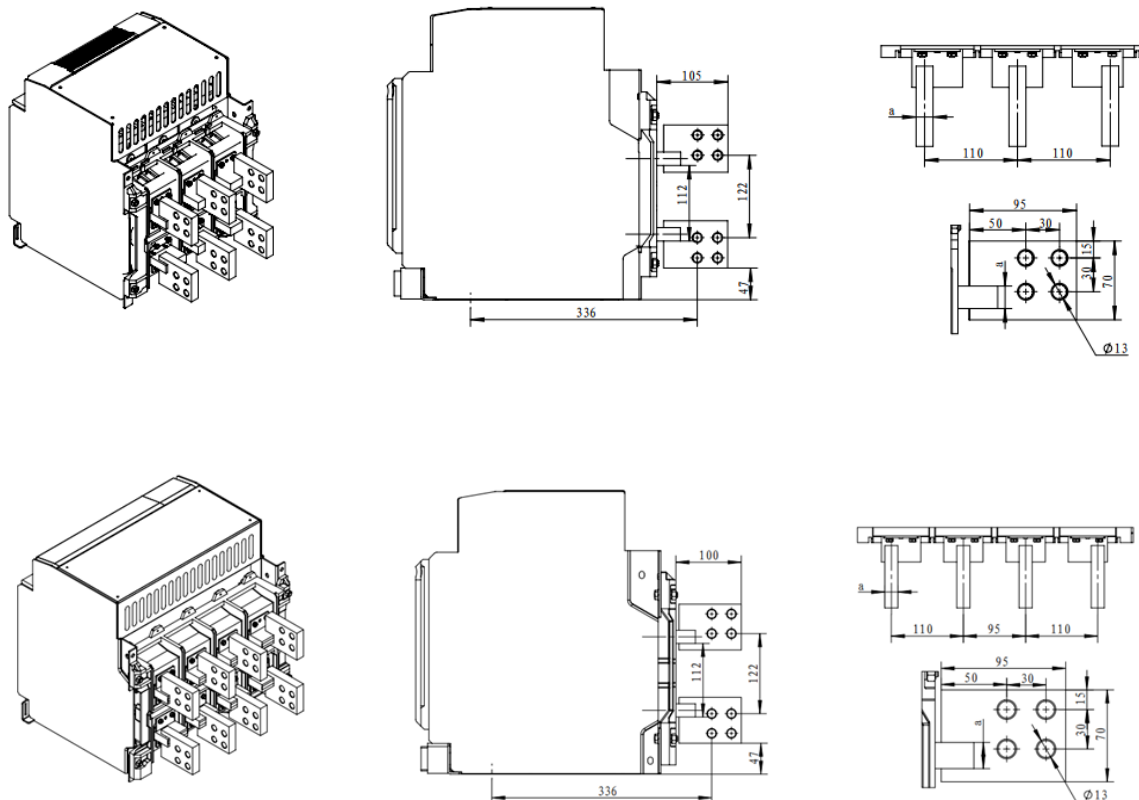
Note: the circuit breaker's X and Y are symmetric axes of the front mask

Rated current	Size of busbar a (mm)
400A, 630A, 800A	10
1000A, 1250A, 1600A	15
2000A	20

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

vertical extended wiring

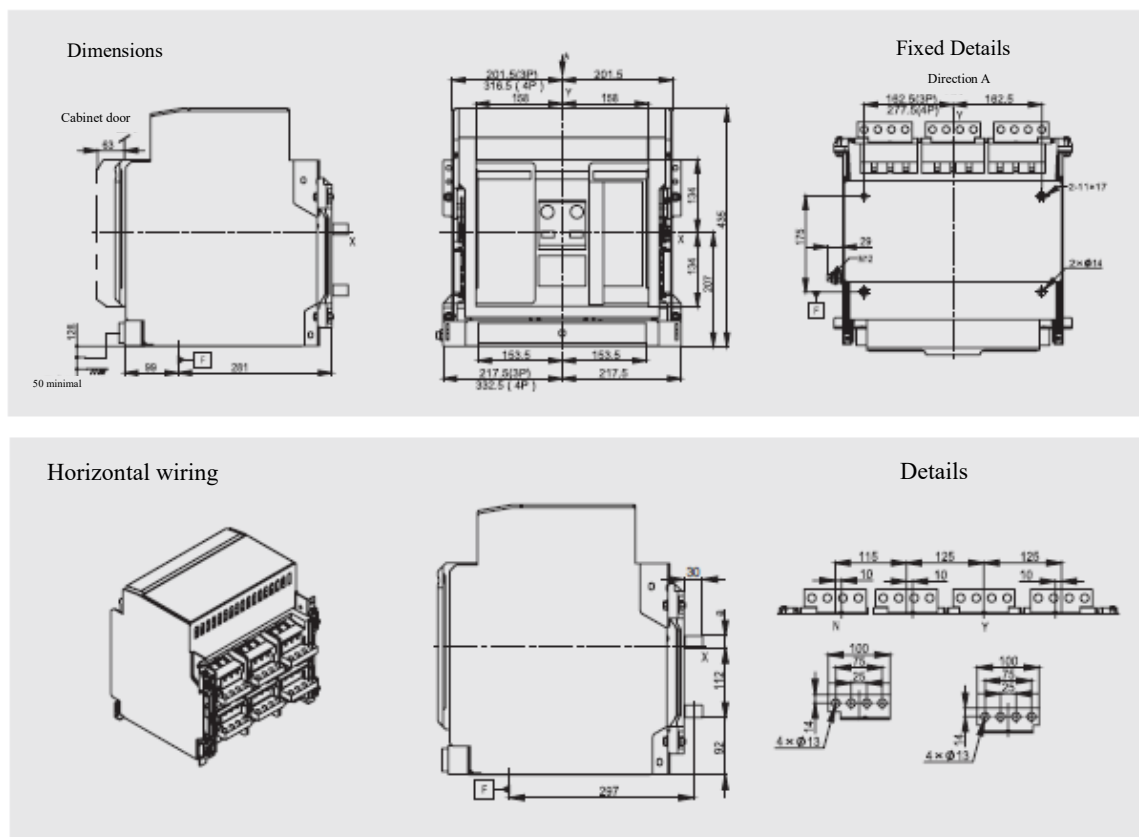


Rated current	Busbar a size (mm)
400A, 630A, 800A	20
1000A, 1250A, 1600A	
2000A	

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

NDW2-3200 drawout type

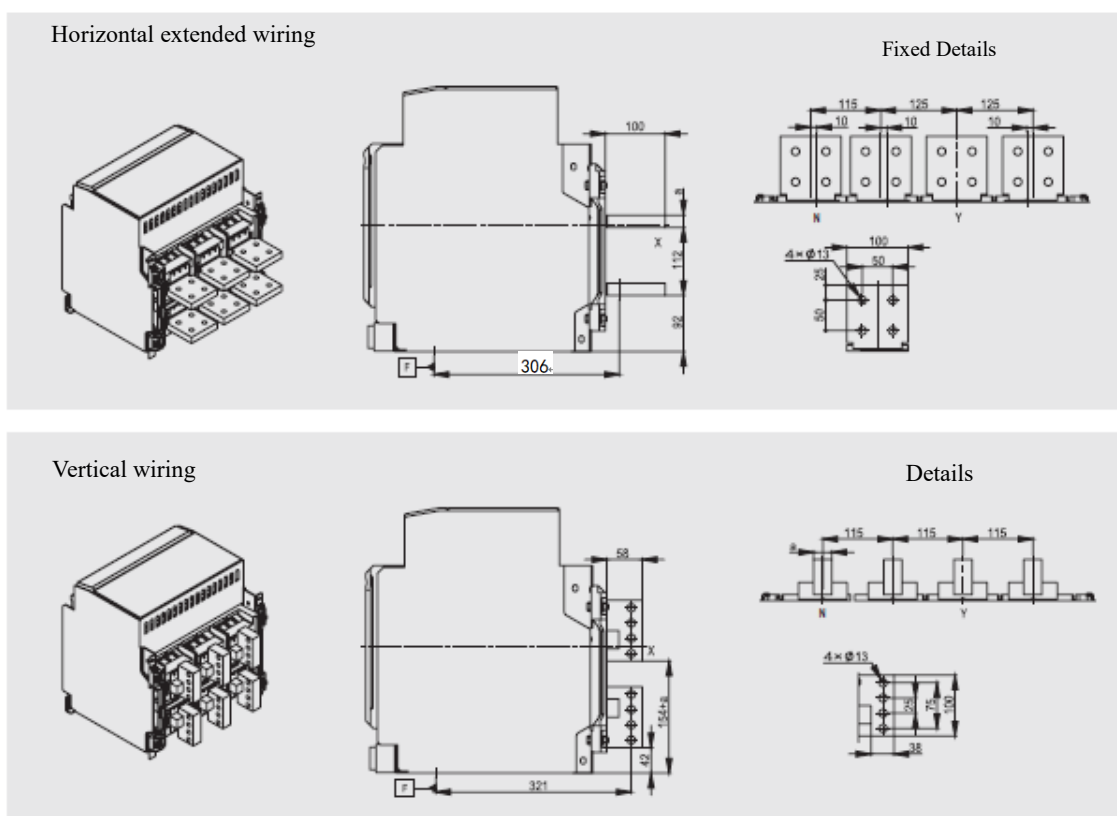


Note: the circuit breaker's X and Y are symmetric axes of the front mask

Connection bolt between bus and terminal	Torque applied with a flat washer (N.m)
M12	60
Rated current	Size of busbar a (mm)
2000A, 2500A	20
2900A, 3200A	30

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)



Note: the circuit breaker's X and Y are symmetric axes of the front mask

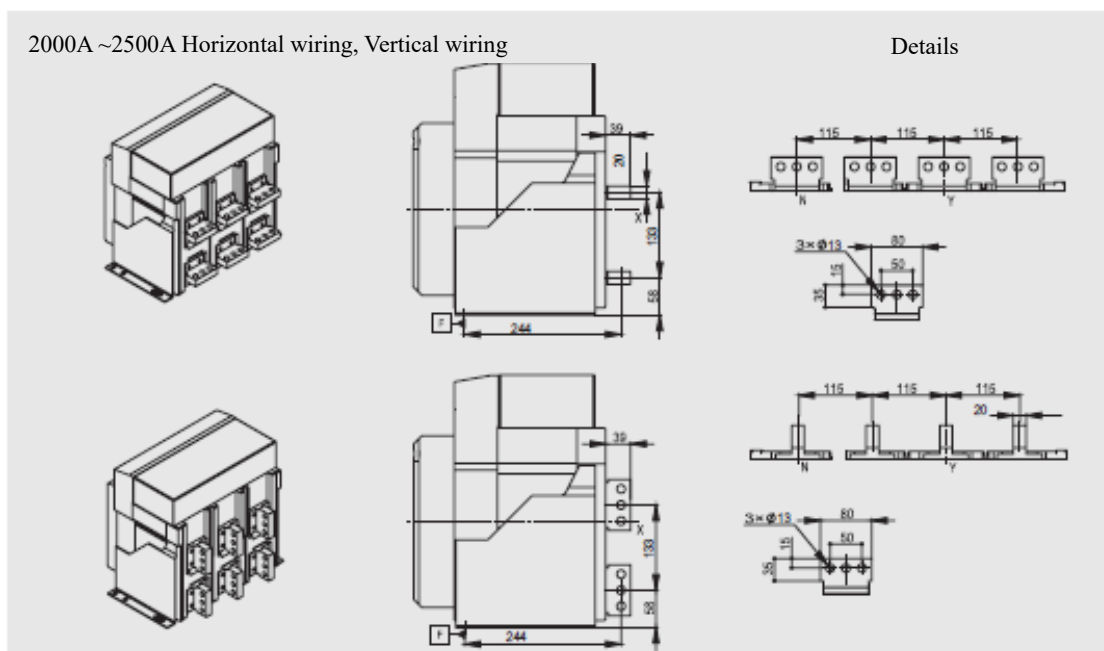
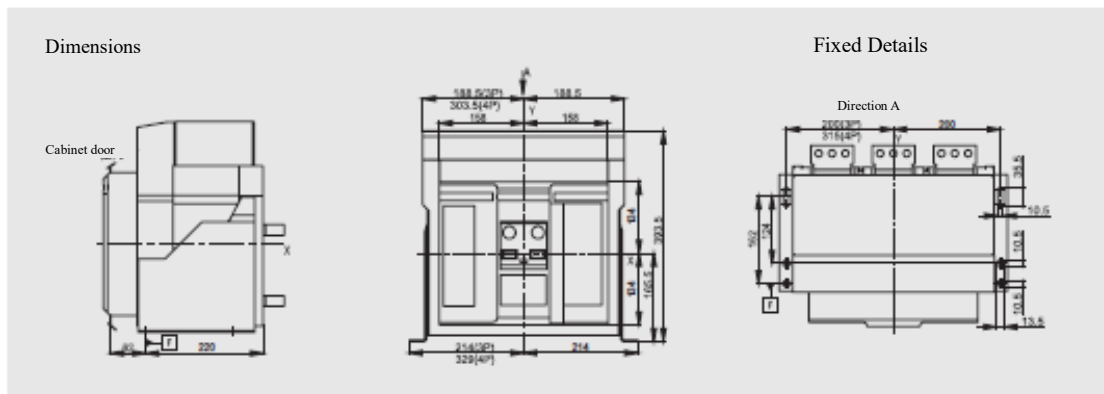
Rated current	Size of busbar a (mm)
2000A, 2500A	20
2900A, 3200A	30

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

6.4 NDW2-4000

NDW2-4000 Fixed type



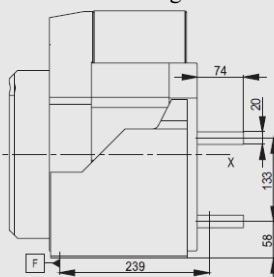
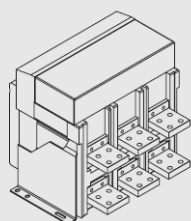
Note: the circuit breaker's X and Y are symmetric axes of the front mask

Connection bolt between bus and terminal	Torque applied with a flat washer (N.m)
M12(2000~2500A)	60
M14(3200~4000A)	97

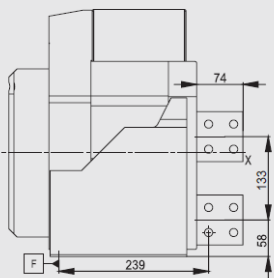
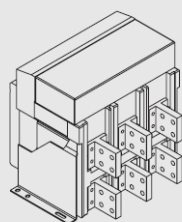
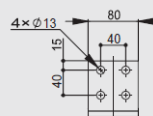
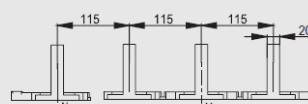
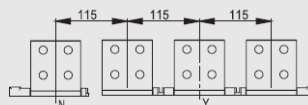
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

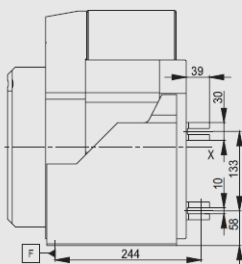
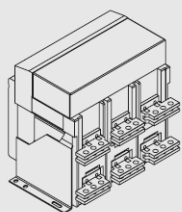
800A-2500A horizontal extended, vertical extended wiring



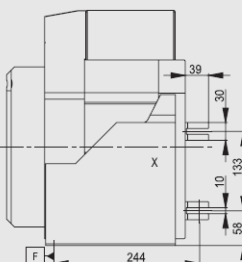
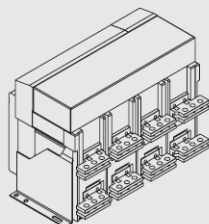
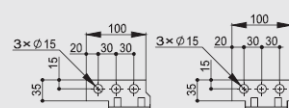
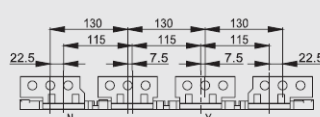
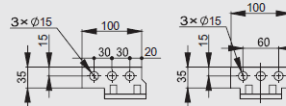
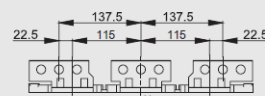
Details



3200A-4000A horizontal wiring



Details

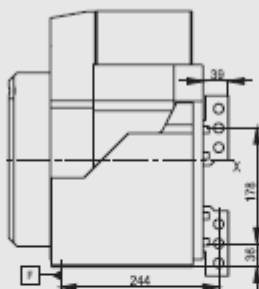
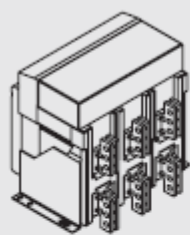


Note: the circuit breaker's X and Y are symmetric axes of the front mask

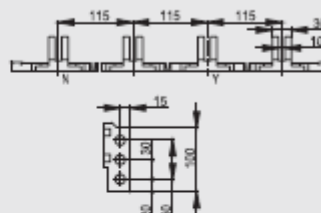
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

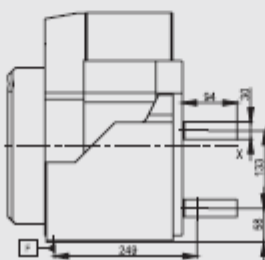
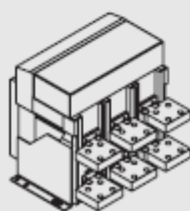
3200A-4000A vertical wiring



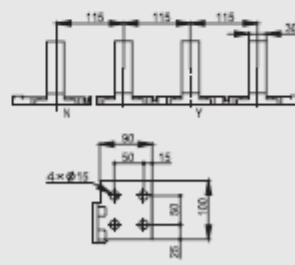
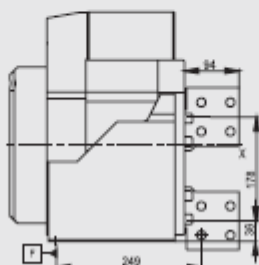
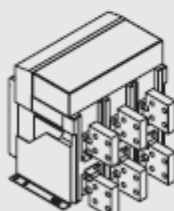
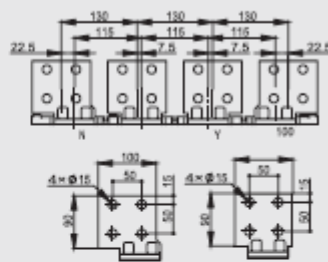
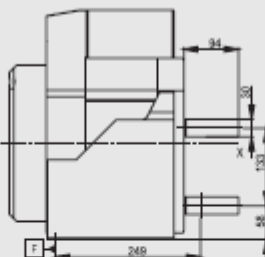
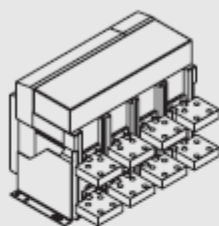
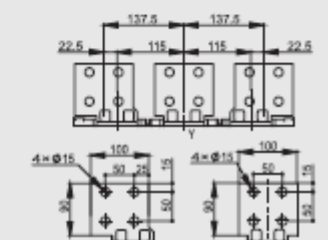
Details



3200A-4000A horizontal extended and vertical extended wiring



Details

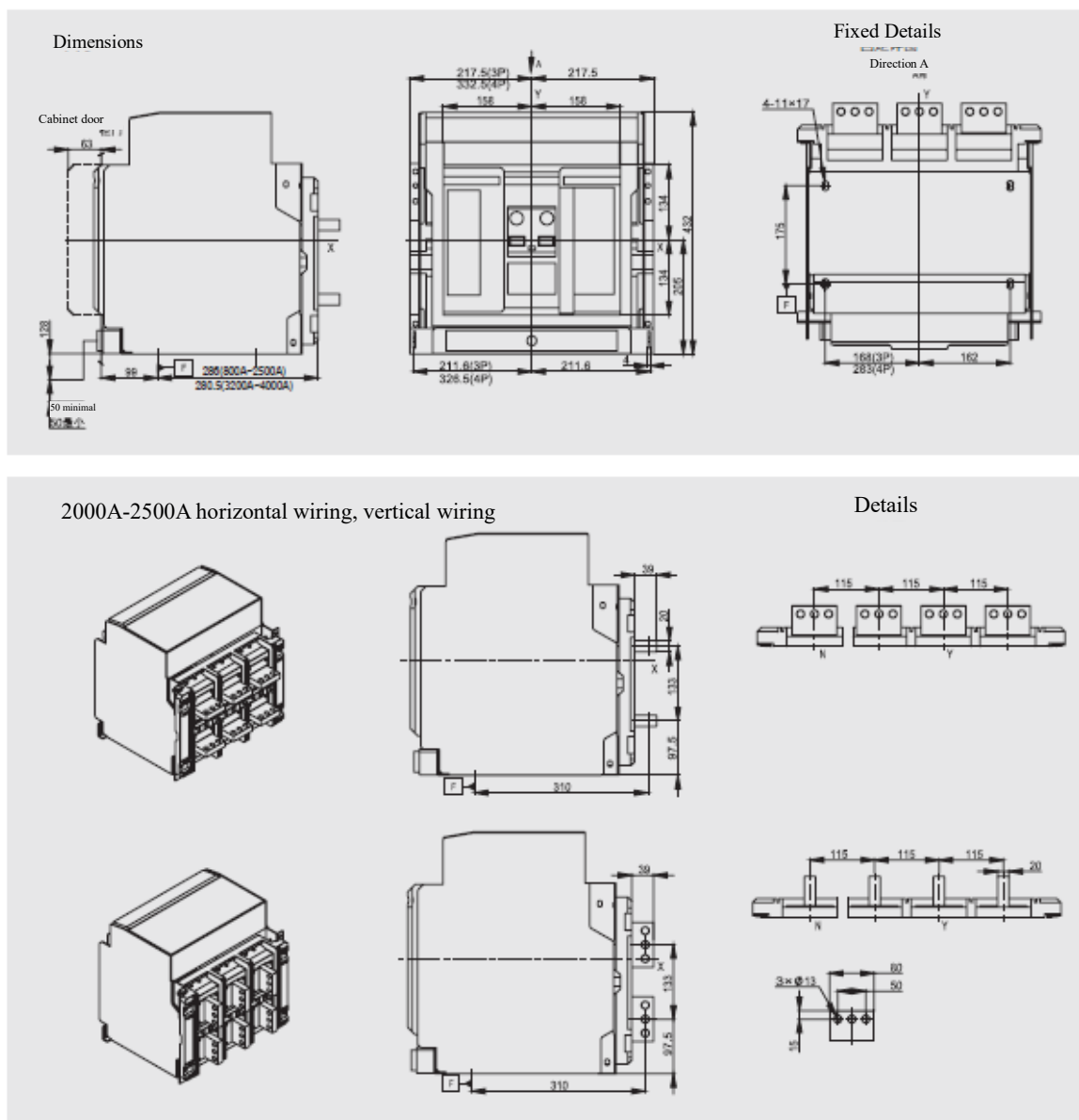


Note: the circuit breaker's X and Y are symmetric axes of the front mask

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

NDW2-4000 Drawout type



Note: the circuit breaker's X and Y are symmetric axes of the front mask

Connection bolt between bus and terminal	Torque applied with a flat washer (N.m)
M12(2000~2500A)	60
M14(3200~4000A)	97

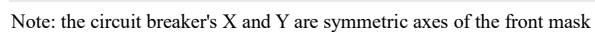
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

Details



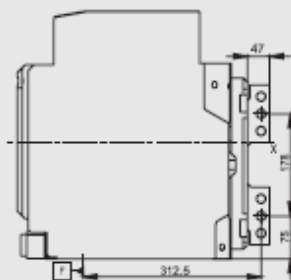
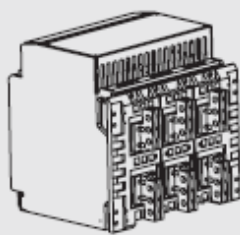
Details



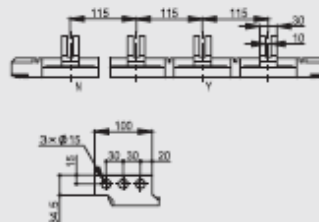
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

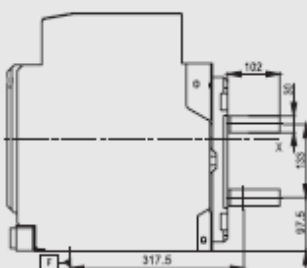
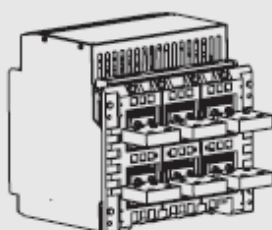
3200A-4000A vertical wiring



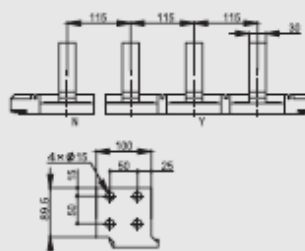
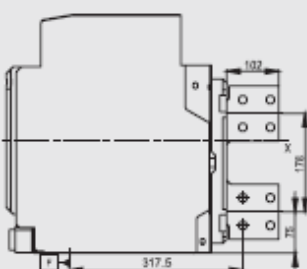
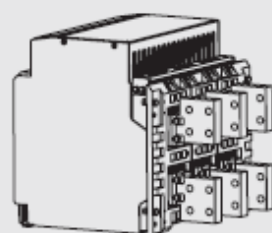
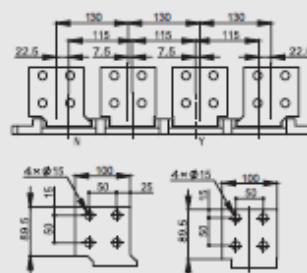
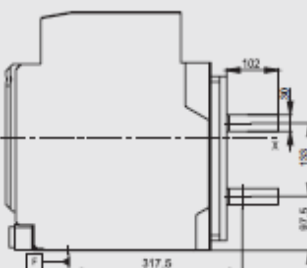
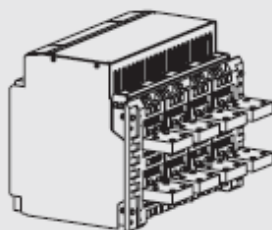
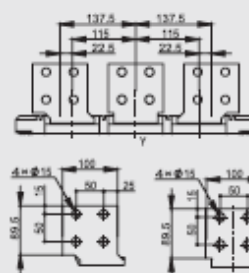
Details



3200A-4000A horizontal extended wiring, vertical extended wiring



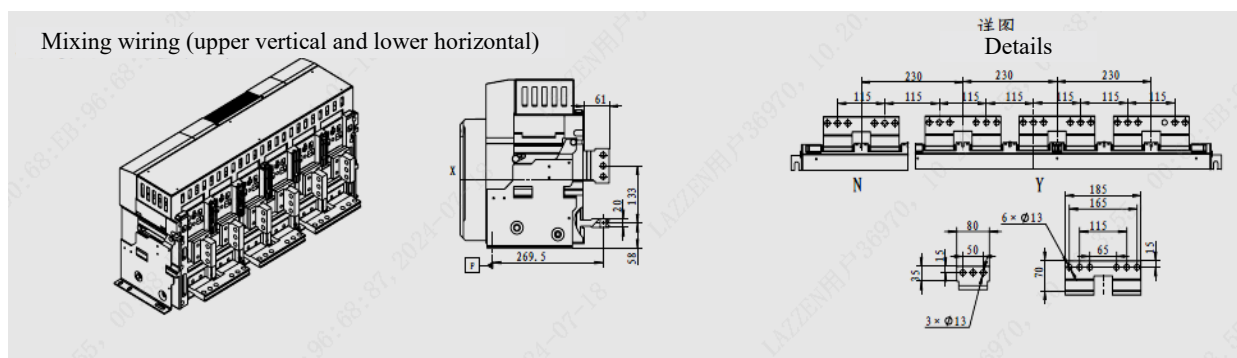
Details



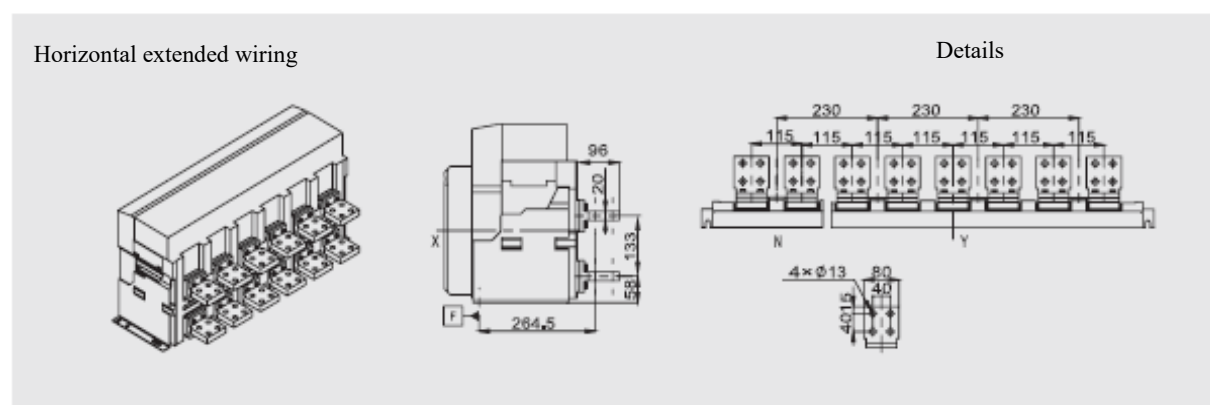
Note: the circuit breaker's X and Y are symmetric axes of the front mask

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)



4000A-5000A Horizontal Extended, Vertical Extended and Mixed Extended Wiring

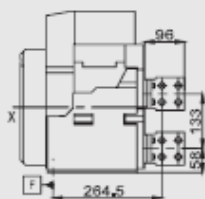
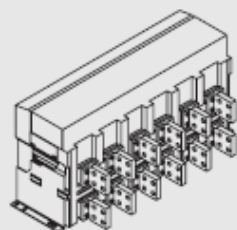


Note: the circuit breaker's X and Y are symmetric axes of the front mask

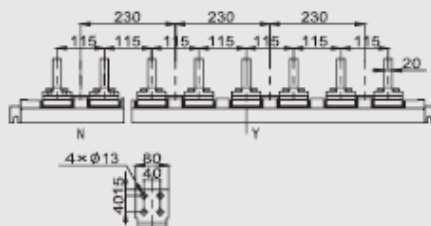
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

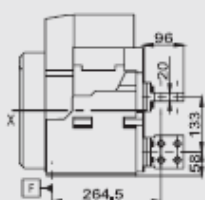
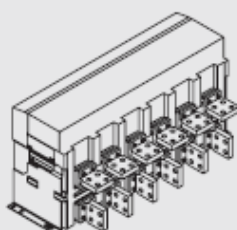
Vertical extended wiring



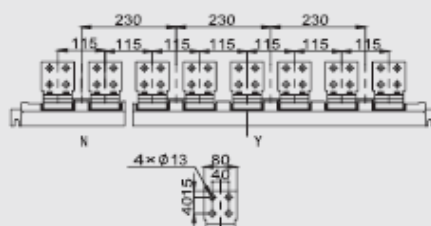
Details



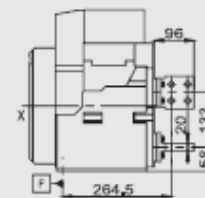
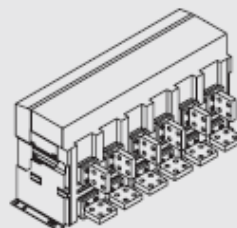
Mixed extended wiring (upper horizontal, lower vertical)



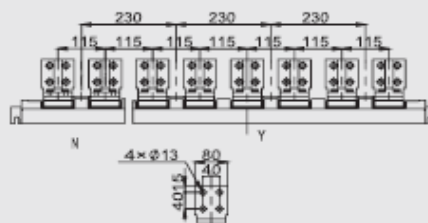
Details



Mixed extended wiring (upper vertical, lower horizontal)



Details

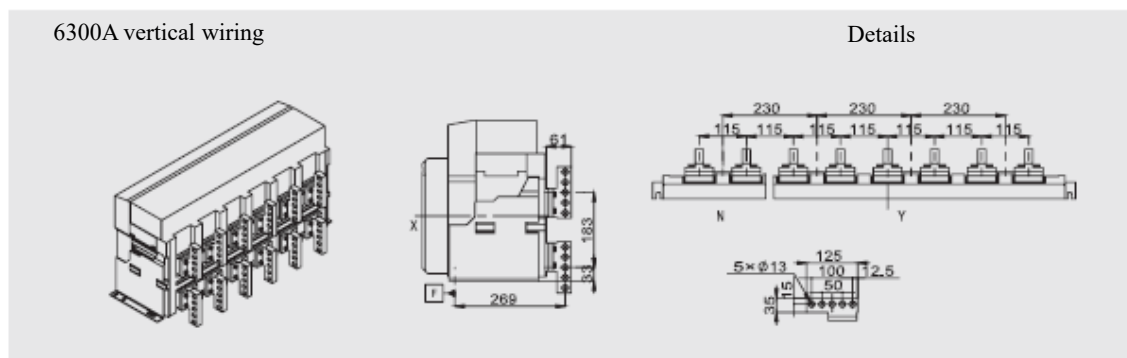


Note: the circuit breaker's X and Y are symmetric axes of the front mask

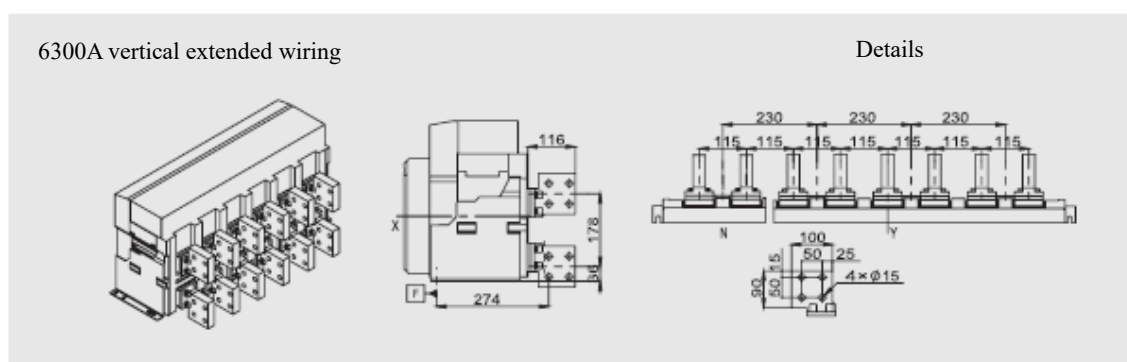
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

6300A vertical wiring and vertical extended wiring



Note: the circuit breaker's X and Y are symmetric axes of the front mask

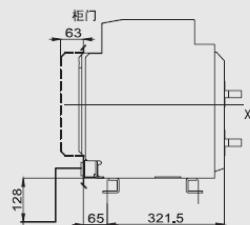


Note: the circuit breaker's X and Y are symmetric axes of the front mask

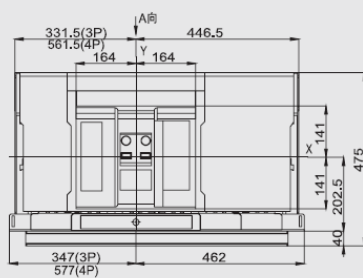
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

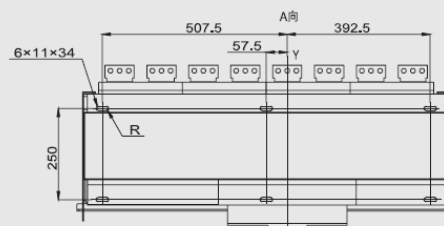
Dimensions



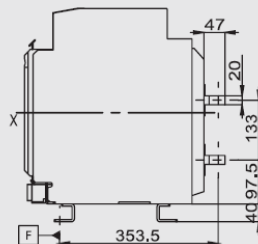
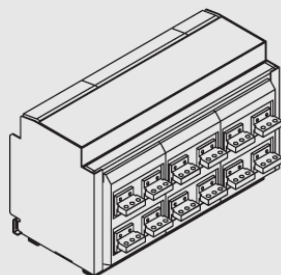
50 minimal



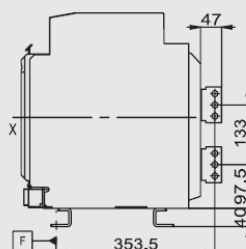
Technical drawing of the front view of a rectangular plate. The overall width is 392.5, and the overall height is 250. The plate features a central horizontal slot with a width of 277.5 and a height of 57.5. The distance from the center of the slot to the right edge is 392.5. The distance from the center of the slot to the left edge is 277.5. The plate has a thickness of 6x11x34. The corner radius is labeled R. The drawing includes dimension lines and arrows indicating the measurements.



Horizontal wiring



Technical drawing of a three-span continuous beam. The beam has three equal spans, each 230 units long. The total length is 690 units. The beam is supported by three supports, labeled N and Y. The reinforcement consists of 11 bars in each span, with 5 bars in the top and 6 bars in the bottom. The beam is shown in cross-section with dimensions: 35 units for the top flange, 15 units for the web, 50 units for the bottom flange, and 80 units for the total height. The reinforcement is labeled as 3 x Ø 13.



Technical drawing of a mechanical part showing a side view and a cross-section. The side view shows a long rectangular block with a series of vertical slots. The cross-section shows a rectangular profile with a central slot and a smaller rectangular feature on the right side. Dimensions are provided in millimeters.

Side View Dimensions:

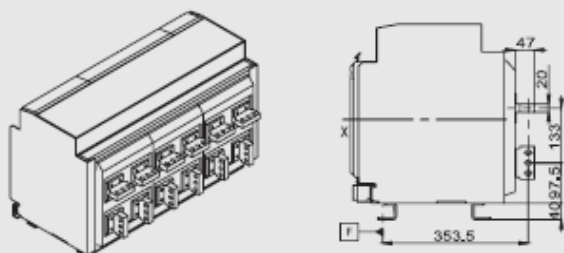
- Overall length: 690 mm (3 x 230 mm segments)
- Slot width: 115 mm (5 slots)
- Slot spacing: 115 mm (4 intervals)
- End slot width: 20 mm

Cross-section Dimensions:

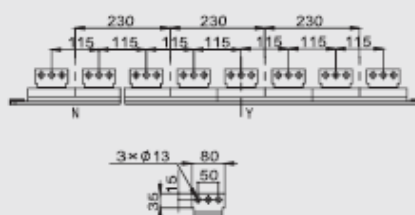
- Overall width: 80 mm
- Slot width: 50 mm
- Slot depth: 35 mm
- Slot position: 15 mm from the left edge
- Material: 3 x Ø 13

taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

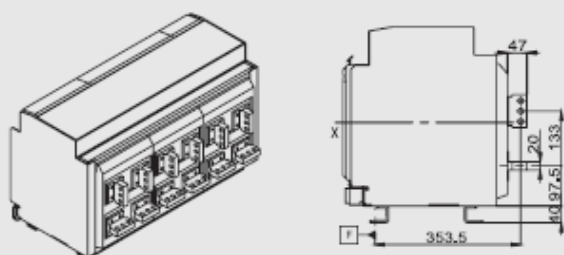
Mixing wiring (upper horizontal and lower vertical)



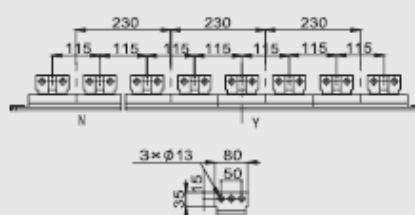
Details



Mixing wiring (upper vertical and lower horizontal)

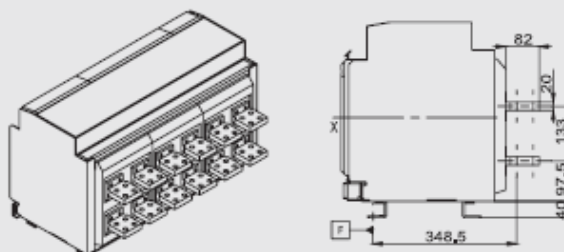


Details

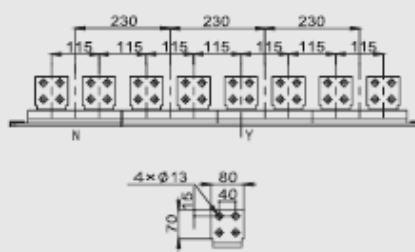


4000A-5000A horizontal extended, vertical extended, mixed extended wiring

Horizontal extended wiring



Details

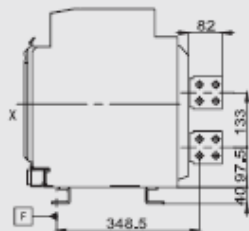
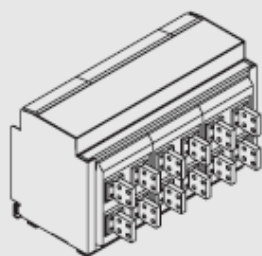


Note: the circuit breaker's X and Y are symmetric axes of the front mask

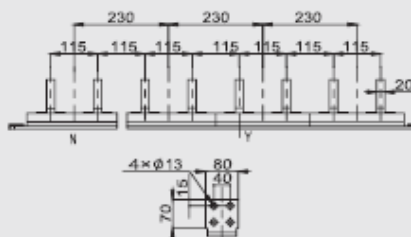
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

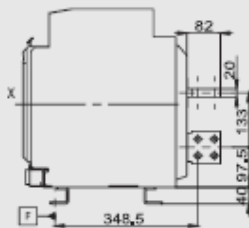
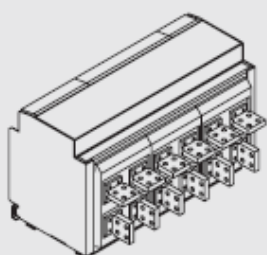
Vertical extended wiring



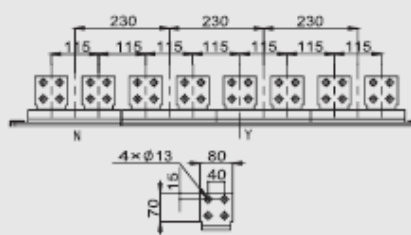
Details



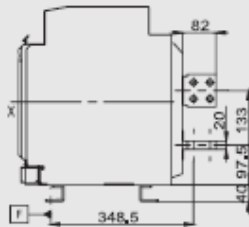
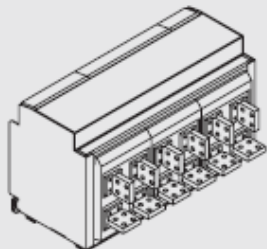
Mixed extended wiring (upper horizontal, lower vertical)



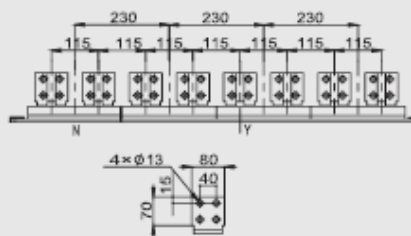
Details



Mixed extended wiring (upper vertical, lower horizontal)



Details

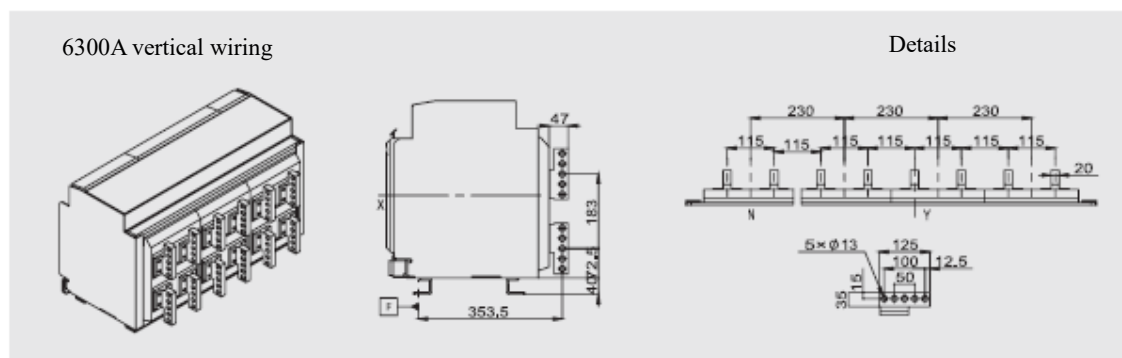


Note: the circuit breaker's X and Y are symmetric axes of the front mask

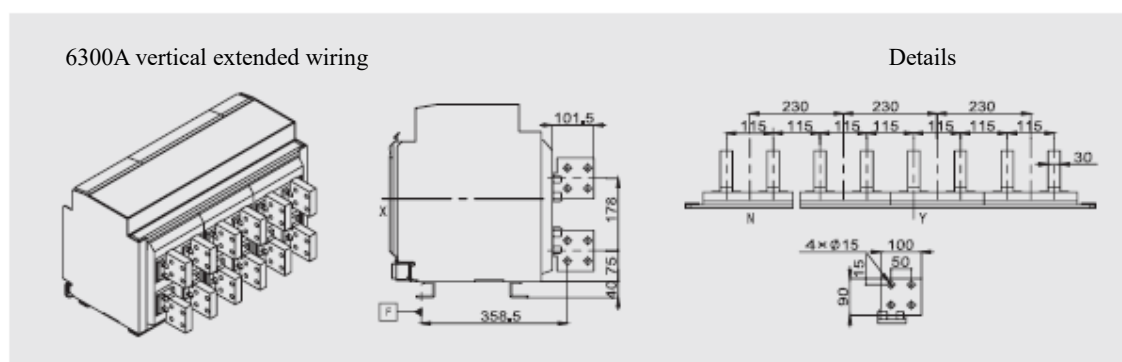
Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

6300A vertical wiring and vertical extended wiring



Note: the circuit breaker's X and Y are symmetric axes of the front mask



Note: the circuit breaker's X and Y are symmetric axes of the front mask

Note: 1. The default tolerance of all installation dimensions of the circuit breaker is $\pm 3\text{mm}$

2. The circuit breaker and mounting surface dimensions need to be measured against a flat plane. (When measurements are taken directly against the wooden bottom bracket of the circuit breaker package, the results will be biased due to the deformation of the wooden bottom bracket.)

Installation screws of the circuit breaker is shown in the table below

Circuit breaker		Connection conditions between bus and terminal
NDW2-1600		M10 bolt, level 8.8, with contact washer, tightening torque 45N.m
NDW2-2000		M12 bolt, level 8.8, with contact washer, tightening torque 60N.m
NDW2-3200		M12 bolt, level 8.8, with contact washer, tightening torque 60N.m
NDW2-4000	800-2500A	M12 bolt, level 8.8, with contact washer, tightening torque 60N.m
	3200-4000A	M14 bolt, level 8.8, with contact washer, tightening torque 97N.m
NDW2-6300	4000-6300A	M12 bolt, level 8.8, with contact washer, tightening torque 60N.m
	6300A vertical extended wiring	M14 bolt, level 8.8, with contact washer, tightening torque 97N.m

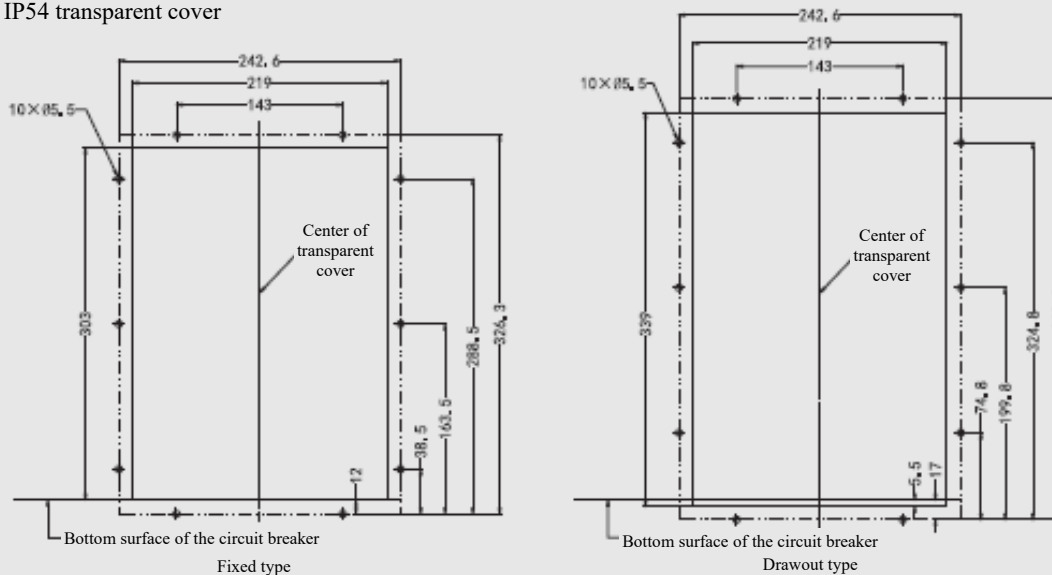
6.6 The Circuit Breaker Cabinet Door Open Hole and the Installation Pitch

Depending on whether to select the IP54 transparent cover, the cabinet door hole dimensions and installation hole spacing will differ. Refer to the dimensions below for cutting the hole based on specific requirements.

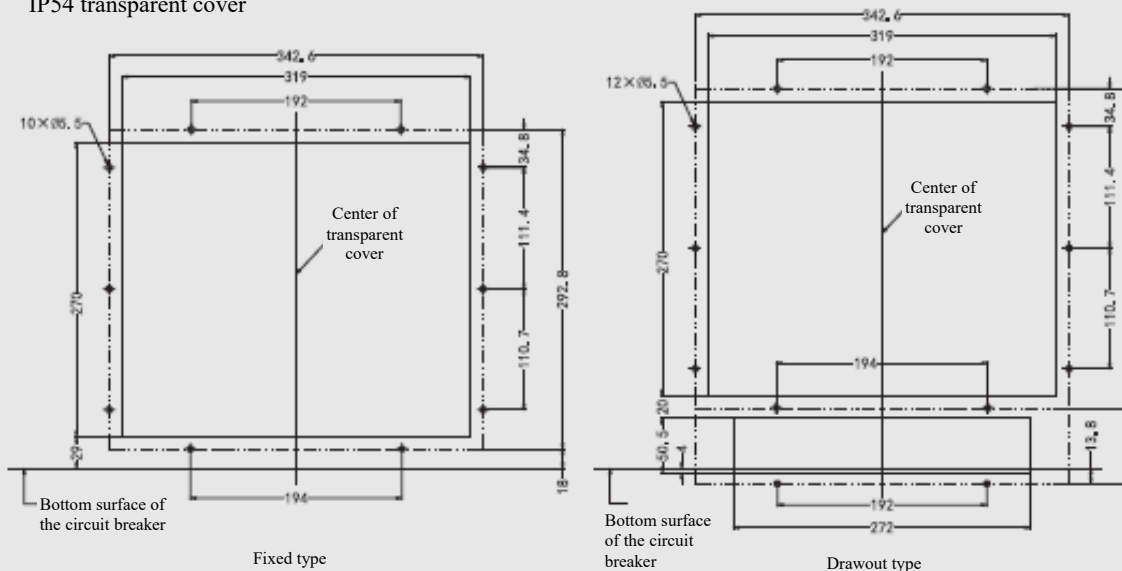
a. Hole dimensions of cabinet door without IP54 transparent cover

The Circuit Breaker Cabinet Door Open Hole and the Installation Pitch (unit: mm)

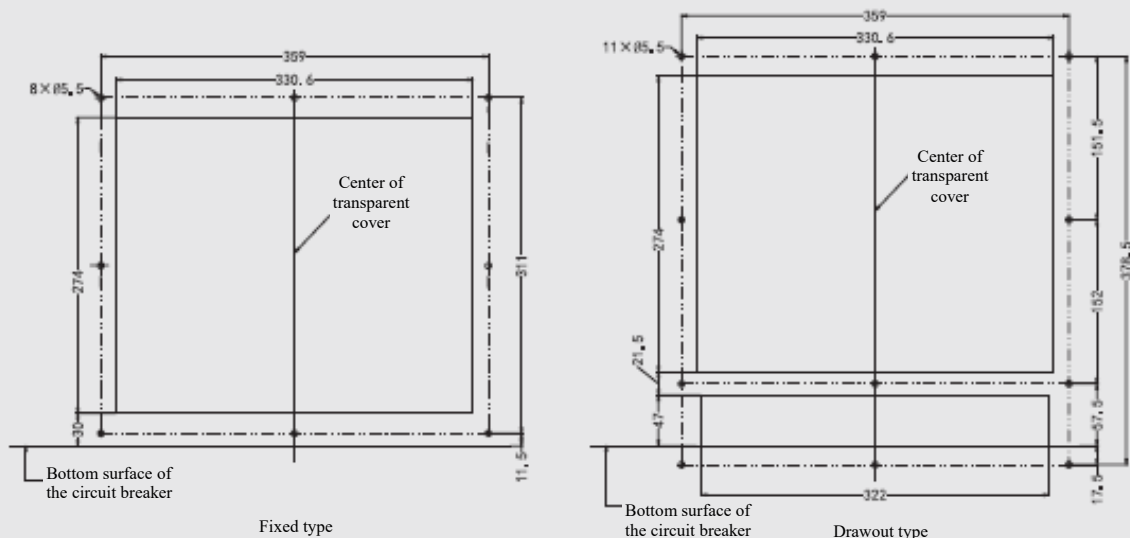
Hole dimensions of NDW2-1600 door frame (unit: mm) without IP54 transparent cover



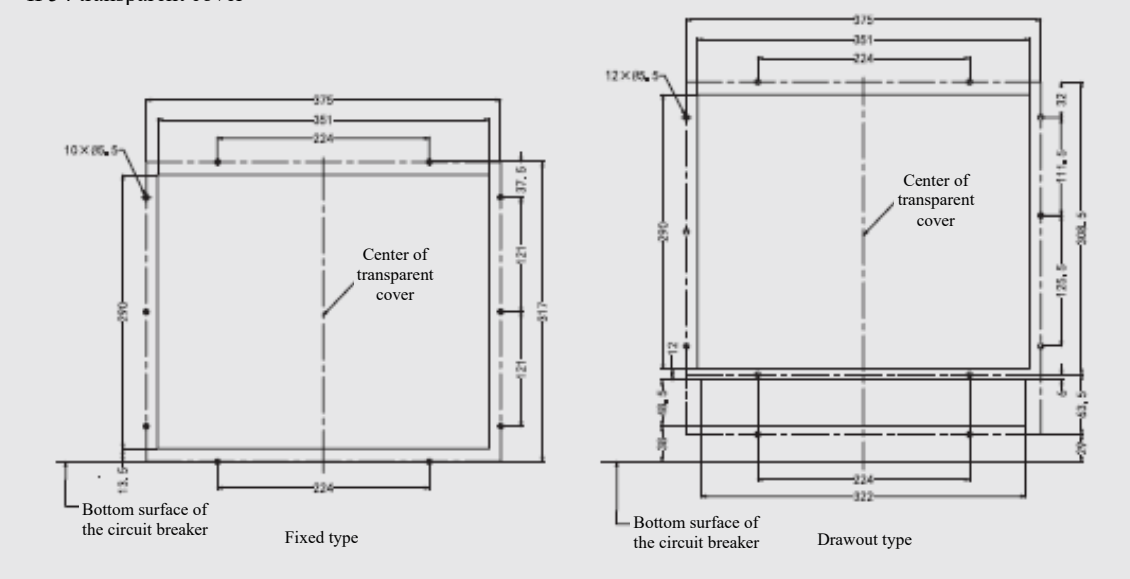
Hole dimensions of NDW2-2000 door frame (unit: mm) without IP54 transparent cover



Hole dimensions of NDW2-3200/4000 door frame (unit: mm) without IP54 transparent cover

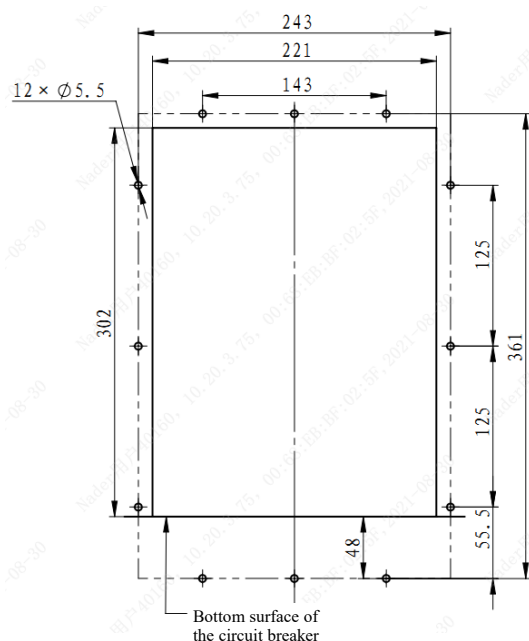


Hole dimensions of NDW2-6300 door frame (unit: mm) without IP54 transparent cover

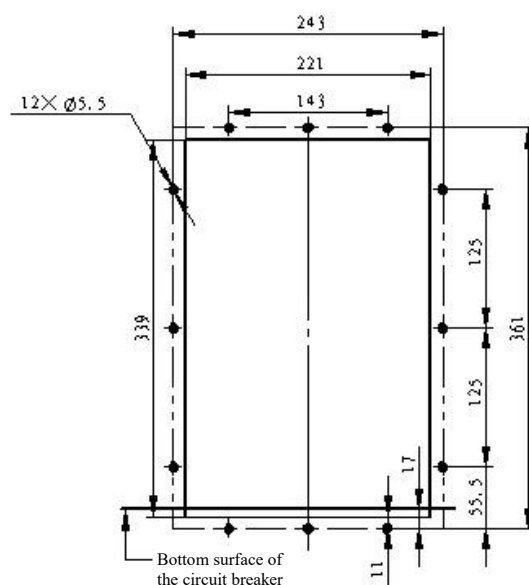


b. Hole dimensions of cabinet door without IP54 transparent cover

Hole dimensions of NDW3-1600 door frame (unit: mm) with IP54 transparent cover

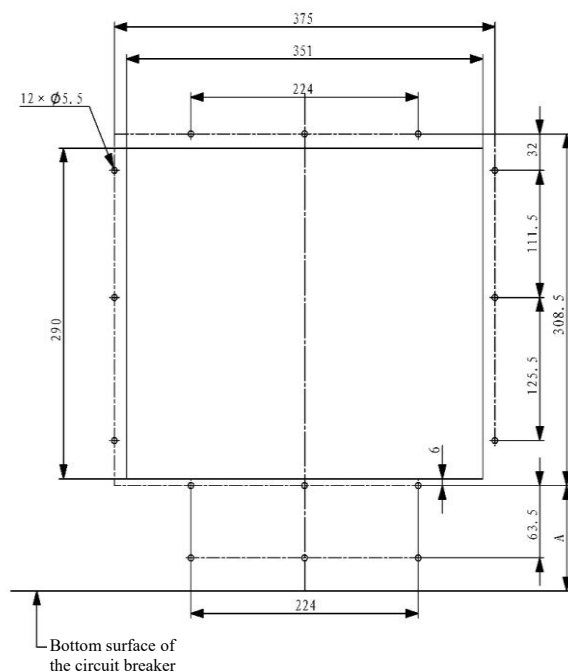


Fixed type

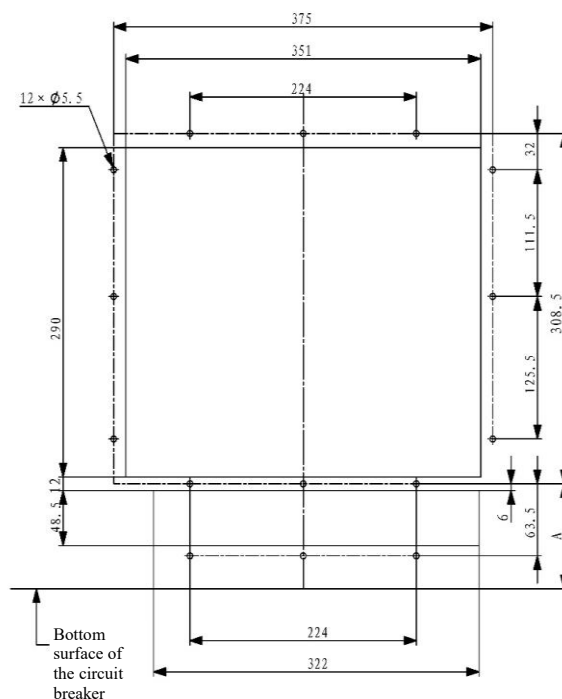


Drawout type

Hole dimensions of NDW2-2000/3200/4000/6300 door frame (unit: mm) with IP54 transparent cover



Fixed type



Drawout type

Shell frame current (A)	NDW2-2000		NDW2-3200		NDW2-4000		NDW2-6300	
Installation Mode	Fixed type	Drawout type	Fixed type	Drawout type	Fixed type	Drawout type	Fixed type	Drawout type
A (mm)	19.15	53.65	16.9	53.4	14.9	53.4	8.5	92.5

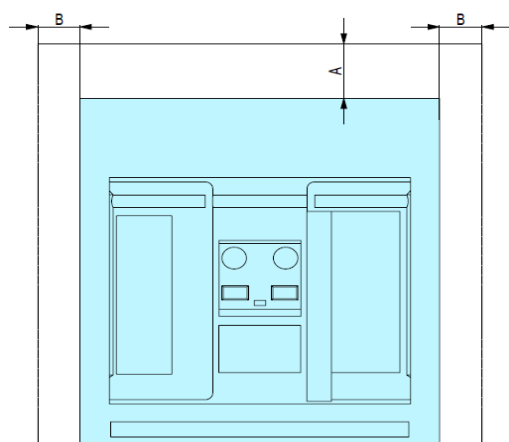
6.7 Safety Notes for Circuit Breaker Installation

To ensure the safety of you and the electric equipment, before put the circuit breaker into operation, users must:

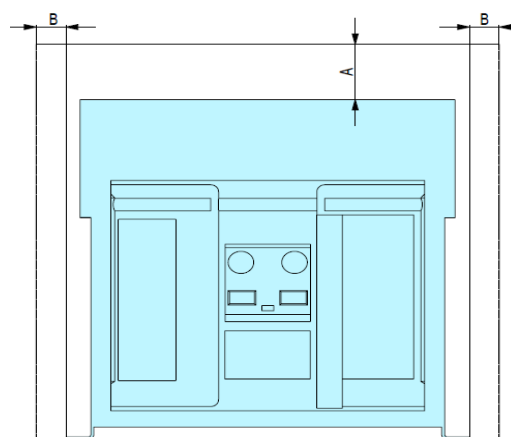
- ★ Carefully read the Operation Manual before installation and use of the circuit breaker.
- ★ Check whether the specification of the circuit breaker is in line with the requirements before installation.
- ★ Install the circuit breaker under the environment condition without explosion danger, conductive dust or the possibility of corroding metal and damaging the insulation.
- Measure the insulation resistance of the circuit breaker with a 1000V megohmmeter before installation of the circuit breaker. When the surrounding medium temperature is $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$, the relative humidity 50%-70% should not be less than 10 mge; otherwise, it needs to be dried, and it can be used until the insulation resistance meets the requirements.
- ★ Prevent foreign matters from falling into the circuit breaker when installing the circuit breaker.
- ★ Ensure the circuit breaker is flat without additional mechanical stress when installing the conductive busbar.
- ★ Conduct reliable grounding protection when installing the circuit breaker. The grounding place of the circuit breaker has an obvious grounding symbol.
- ★ Carry out wiring of the control circuit according to the wiring diagram when installing the circuit breaker; check whether the operating voltage of the undervoltage, shunt, closing electromagnet, motor, controller and related parts conforms to the actual voltage, and then carry out the secondary circuit energizing. In case of drawout circuit breaker, the circuit breaker should be shaken into the test position, then the undervoltage release will close and then the circuit breaker can be closed.
- ★ Pressing (or powering on) the closing button after the energy storage of the motor, the circuit breaker will close.
- Pressing (or powering on) the opening button, the circuit breaker will open.
- ★ For manual storage of energy, pull the handle on the front panel up and down, when a "click" sound can be heard after seven times; the panel shows "storage of energy", and the storage of energy ends. At this point, if there's undervoltage tripping, power on it (no need if without undervoltage tripping), then carry out closing operation.

The circuit breaker is installed in the cabinet, the safe distance between the circuit breaker and the cabinet

When users install the circuit breaker into the cabinet, the safe distance between the circuit breaker and the cabinet is shown in the figure below, and the installation dimensions are shown in the table below.



Drawout circuit breaker



Fixed circuit breaker

Unit: mm

Installation mode of the circuit breaker	To the insulator		To the metallic body grounded safely		To the live part	
	A	B	A	B	A	B
Drawout type	0	0	0	0	60	60
Fixed type	0	0	0	0	60	60

Note: 1. 150 mm space needed for removing the arc-extinguishing chamber should be considered for the safe spacing of the fixed type circuit breaker;

2. If dust cover is added, height space of 70 mm for installation and rotating of the dust cover should be considered.

Chapter 7 Electrical Wiring Diagram

Electrical Wiring Diagram 7	104
7.1 NDW2-1600 Full-function Wiring Diagram (power module removed)	104
7.2 NDW2-2000/3200/4000/6300 Full-function Wiring Diagram (#20 ground wire removed)	106
7.3 Wiring Diagram of NDW2-1600 Power Automatic Switching Device (ATS)	108
7.4 Wiring Diagram of NDW2-2000/3200/4000/6300 Power Automatic Switching Device (ATS)	109

Electrical Wiring Diagram 7

7.1 NDW2-1600 Full-function Wiring Diagram (power module removed)

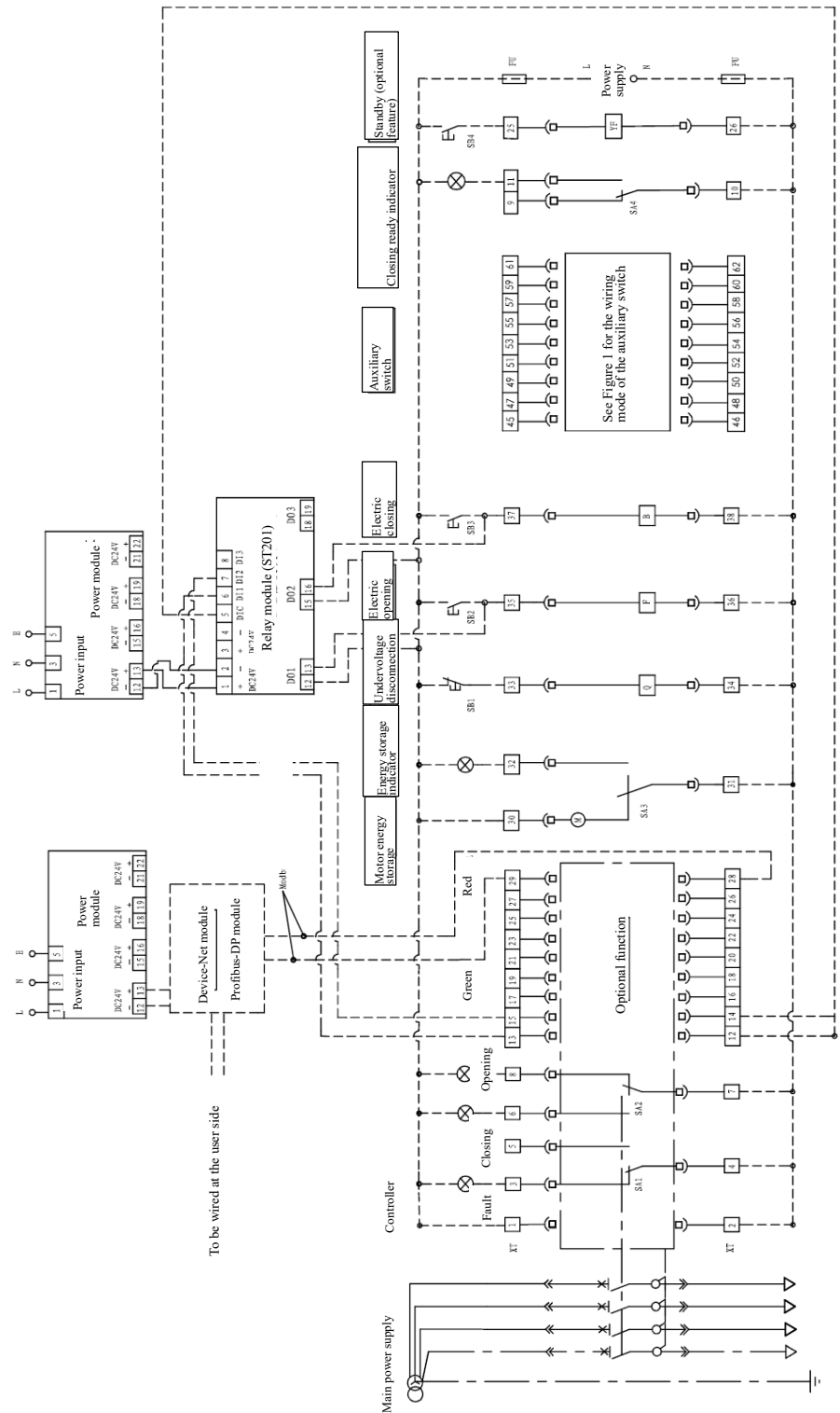
Precautions for users when designing the electrical engineering diagram:

Number/function of secondary terminal	3#~4#□5#	6#□7#□8#	No-voltage release	Auxiliary switch	39#~44#
NDW2-1600	4# and 5# are on	7# and 8# on	12#~15#	45#~62#	User-defined
NDW2-2000/3200/4000	4# and 3# on	7# and 6# on	33#~34#	39#~62#	/
NDW2-6300	4# and 3# on	7# and 6# on	12#~15#	39#~62#	/

Note: 1. 3#~8# in the above table show the states in case of no fault and opening for the circuit breaker.

2. NDW2-1600/6300's loss of voltage release can be divided into the execution module and control module. The control module shall be installed outside the circuit breaker with the power supply connected to the controller module.

Terminal numbers 12#~15# of the control module shall be wired with secondary terminal numbers 12#~15# of the circuit breaker.



1#, 1#, 2#: Working power supply, in case of DC, 1# is the positive polarity and 2# is the negative polarity
(Power module built-in)
3#, 4#, 5#: Fault tripping contact output, contact capacity: 10A/AC250V
6#, 7#, 8#: Opening and closing contact output, contact capacity: 10A/AC250V
9#, 10#, 11#: Closing ready electric indicator
12#, 13#: S1/S2/S3 signal unit DO output signal or undervoltage release
14#, 15#: S1/S2/S3 signal unit DO output signal or undervoltage release
16#, 17#: S1/S2 signal unit DO output signal or S3 signal unit DI input signal
18#, 19#: S1 signal unit DO output signal or S2/S3 signal unit DI input signal

When 12#□19# are signal unit DO/DI output signal, DO's contact capacity is 0.5A/DC110V, 5A/AC250V; DI signal input: short circuit.

21#, 22#, 23# and 24#: voltage signal input end (N, A, B and C respectively)

When the power distribution system is the three-phase and three-wire system, 21# is shorted with 23#, and the connected with phase B
25#, 26#: External N-phase transformer output end, external leakage transformer output or remote reset can be chosen.

27#: Communication shielding ground wire
28#, 29#: Communication interface, 28# in red (A), 29# in green (B)
30#, 31#, 32#: Electric energy storage and energy storage indicator
33#, 34#: Undervoltage release
35#, 36#: Shunt release
37#, 38#: Closed electromagnet
39#, 40#, 41#, 42#, 43#, 44# - User-definable
45#~56#: Auxiliary contact (four groups conversion)
45#~62#: Auxiliary contact (six groups conversion)
47#~62#: Auxiliary contact (four normally opened and four normally closed)

Breaking capacity of the auxiliary contacts:

AC-15: AC400V/0.29A; AC-12: AC250V/10A;
DC-13: DC220V/0.2A; DC-12: DC250V/0.3A

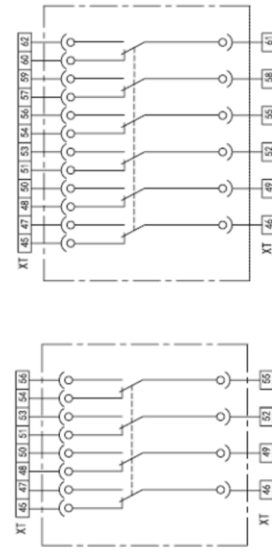
SB1: Undervoltage release button (to be prepared by users)
SB2: Shunt button (to be prepared by users)
SB3: Close button (to be prepared by users)
SB4: Remote reset button (optional/to be prepared by users)
SA1: Fault tripping travel switch
SA2: Opening and closing indicating travel switch
SA3: Energy storage mechanism travel switch
SA4: Closing ready travel switch

XT: Secondary terminal
M: Energy storage motor
F: Shunt release
B: Closed electromagnet
Q: Undervoltage release
YF: Remote reset
Fu: Fuse (to be prepared by users)

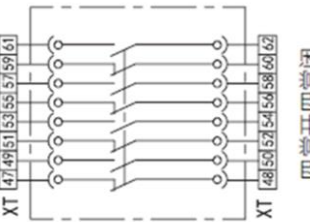
Notes:

- 1) Current state of the circuit breaker is de-energized, disconnected, and no energy stored.
- 2) Status indicator light, button switch and communication equipment are provided by users, and the dashed part shall be wired by users.
- 3) If the rated operating voltages of Q, F, B, M and controller are not the same, please connect to the rated voltage of control power supply power supply.
- 4) If aftercurrent protection or communication function is additionally selected, in order to ensure the controller reliably operates, 1# and 2# need to connect to the auxiliary power supply.
- 5) 25#, 26# - N-pole transformer output end (3P+N), leakage transformer output end, or remote reset function input end can be chosen. If the ground current type protection or current leakage protection is optional without connecting to the external transformer, then it shall be short connected to terminals 25# and 26#;
- 6) Conductor capacity connected to the secondary terminal, minimum 0.5mm²/20AWG, maximum 1.5mm²/16AWG.
- 7) There are control circuits within the shunt release and closed electromagnet, which can be energized for more than 200ms. Users shall not connect the auxiliary switch contact of the circuit breaker in series.

NDW2-1600 Auxiliary switch wiring mode



Six-group conversion contacts

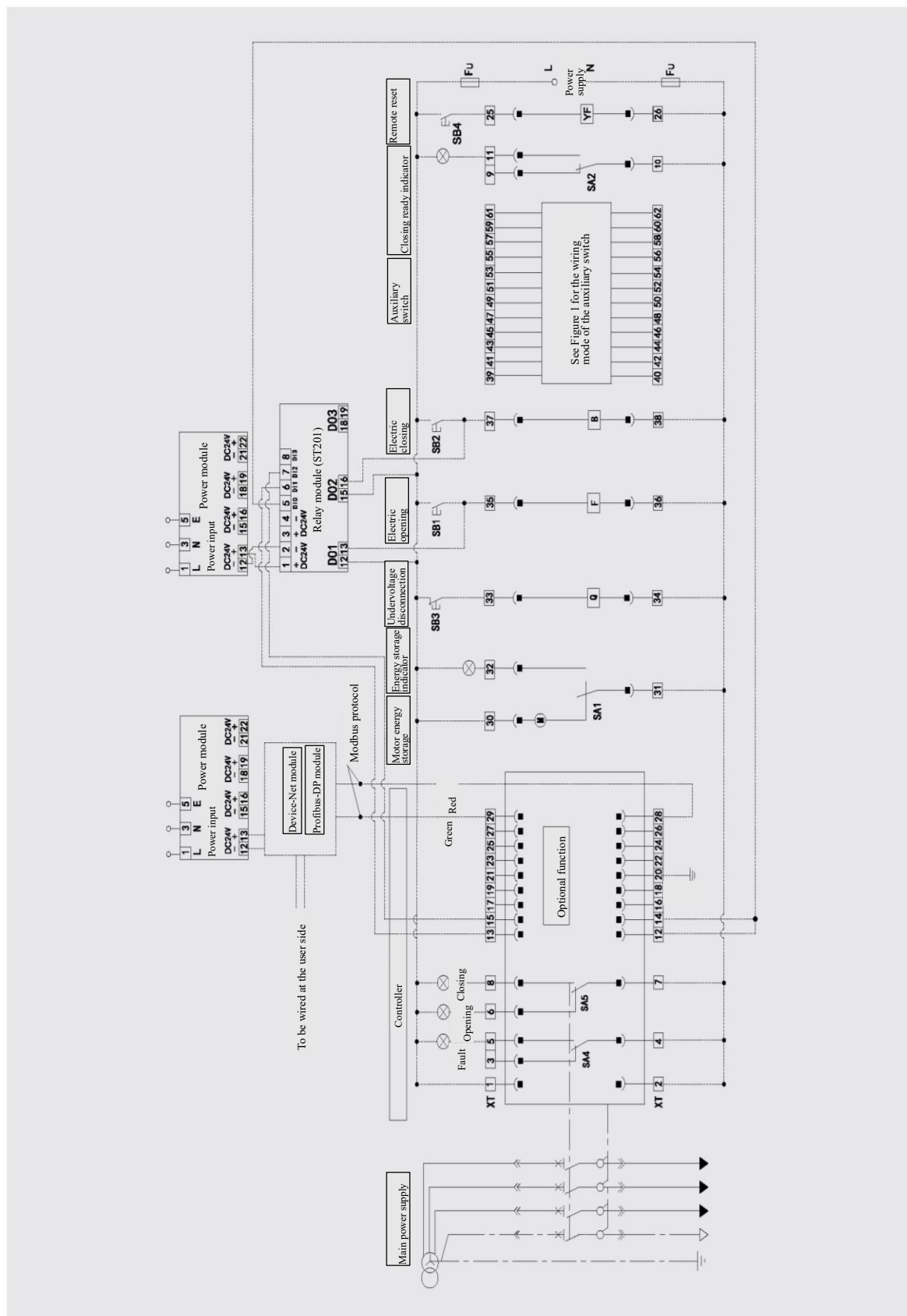


Four normally open and four normally closed

四组转换触点

Four-group conversion contacts

7.2 NDW2-2000/3200/4000/6300 Full-function Wiring Diagram (#20 ground wire removed)



1#, 2#: Working power supply, in case of DC, 1# is the positive polarity and 2# is the negative polarity
(built-in power supply conversion module, with the power supply connected to 1# and 2#)
3#, 4#, 5#: Fault tripping contact output, contact capacity: 10A/AC250V
6#, 7#, 8#: Opening and closing contact output, contact capacity: 10A/AC250V
9#, 10#, 11#: Closing ready electric indicator, only 6300 shell frame is not provided with 9#
12#, 13#: S1/S2/S3 signal unit DO output signal or undervoltage release
14#, 15#: S1/S2/S3 signal unit DO output signal or undervoltage release
16#, 17#: S1/S2 signal unit DO output signal or S3 signal unit DI input signal
18#, 19#: S1 signal unit DO output signal or S2/S3 signal unit DI input signal

When 12#□19# are signal unit DO/DI output signal, DO's contact capacity is 0.5A/ DC110V,
5A/AC250V; DI signal input: shorted.

21#, 22#, 23# and 24#: voltage signal input end (N, A, B and C respectively)
When the power distribution system is the three-phase and three-wire system, 21# is shorted with 23#, and the connected with phase B

25#, 26#: External N-phase transformer output end or external leakage transformer output end or remote reset input end
27#: Communication shielding ground wire
28#, 29#: Communication interface, 28# in red (A), 29# in green (B)
30#, 31#, 32#: Electric energy storage and energy storage indicator
33#, 34#: Undervoltage release
35#, 36#: Shunt release
37#, 38#: Closed electromagnet

47#~62#: Auxiliary contact (four normally open and four normally closed, applicable to NDW2-2000/3200/6300)
45#~56#: Auxiliary contacts (four groups conversion, applicable to NDW2-2000/3200/4000/6300)
39#~62#: Auxiliary contacts (six normally open and six normally closed, applicable to NDW2-2000/3200/4000/6300)
45#~62#: Auxiliary contacts (six groups conversion, applicable to NDW2-2000/3200/4000/6300)
45#~60#: Auxiliary contact (four normally open and four normally closed, applicable to NDW2-4000)

Breaking capacity of the auxiliary contacts:

AC-15: AC400V/3A; AC-12: AC250V/10A;
DC-13: DC220V/1.2A; DC-12: DC250V/5A

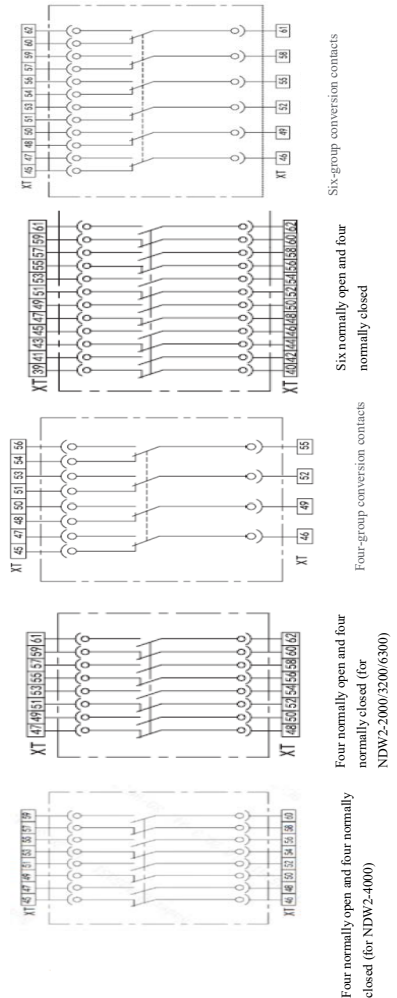
SB1: Shunt button (to be prepared by users)
SB2: Close button (to be prepared by users)
SB3: Undervoltage release button (to be prepared by users)
SB4: Remote reset button (to be prepared by users)
SA1: Energy storage mechanism travel switch
SA2: Closing ready travel switch
SA4: Fault tripping travel switch
SA5: Opening and closing indicating travel switch

XT: Secondary terminal
M: Energy storage motor
F: Shunt release
B: Closed electromagnet
Q: Undervoltage release
YF: Remote reset
Fu: Fuse (to be prepared by users)

Notes:

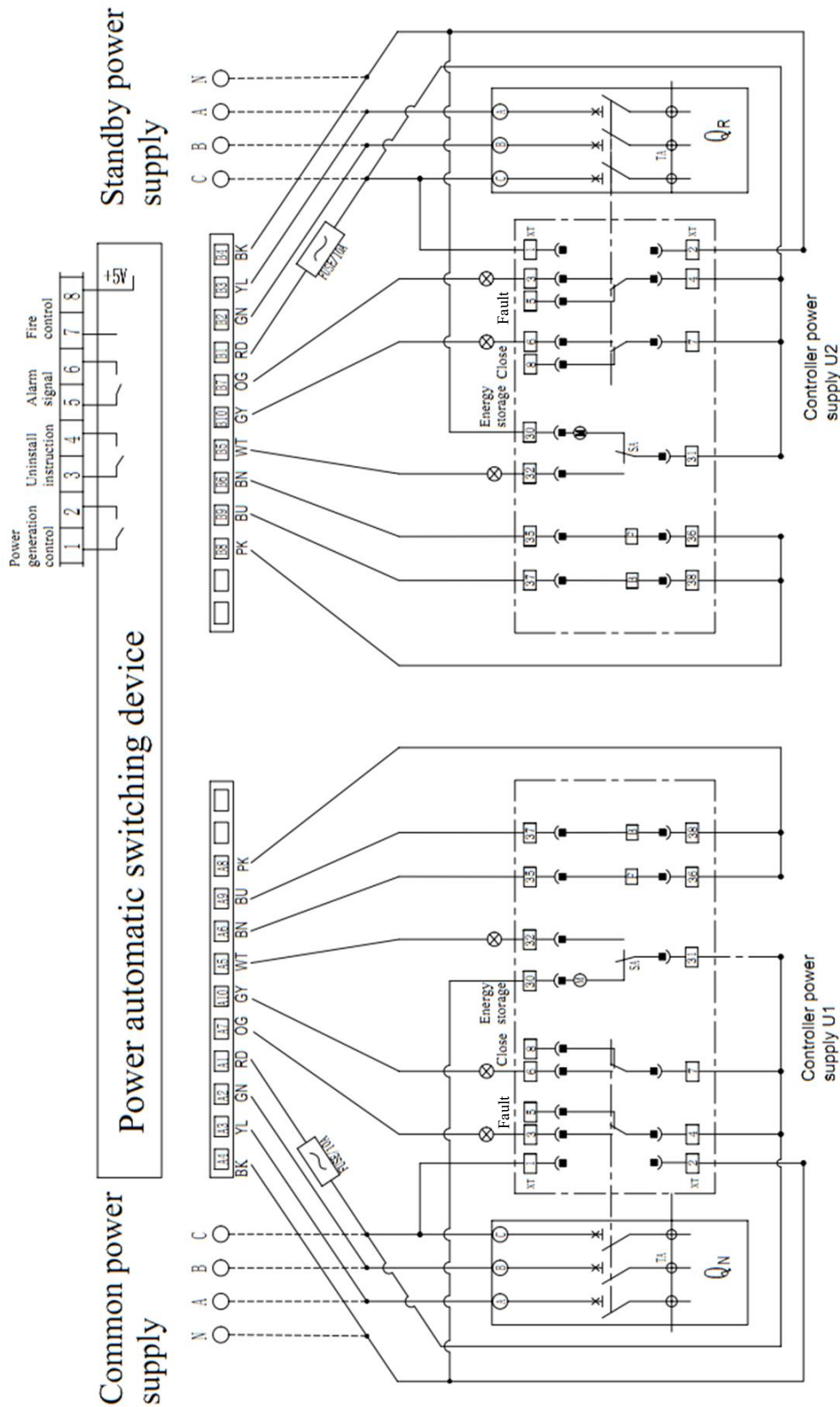
- 1) Current state of the circuit breaker is de-energized, disconnected, and no energy stored.
- 2) Status indicator light, button switch and communication equipment are provided by users, and the dashed part shall be wired by users.
- 3) If the rated operating voltages of Q, F, B, M and controller are not the same, please connect to the rated voltage of control power supply power supply.
- 4) If aftercurrent protection or communication function is additionally selected, in order to ensure the controller reliably operates, 1# and 2# need to connect to the auxiliary power supply.
- 5) 25#, 26# - N-pole transformer output end (3P+N), leakage transformer output end, or remote reset function input end can be chosen. If the ground current type protection or current leakage protection is optional without connecting to the external transformer, then it shall be short connected to terminals 25# and 26#.
- 6) Conductor capacity connected to the secondary terminal, minimum 0.5mm²/20AWG, maximum 1.5mm²/16AWG.
- 7) There are control circuits within the shunt release and closed electromagnet, which can be energized for more than 200ms. Users shall not connect the auxiliary switch contact of the circuit breaker in series.

NDW2-2000/3200/4000/6300 Auxiliary switch wiring mode





7.3 Wiring Diagram of NDW2-1600 Power Automatic Switching Device (ATS)



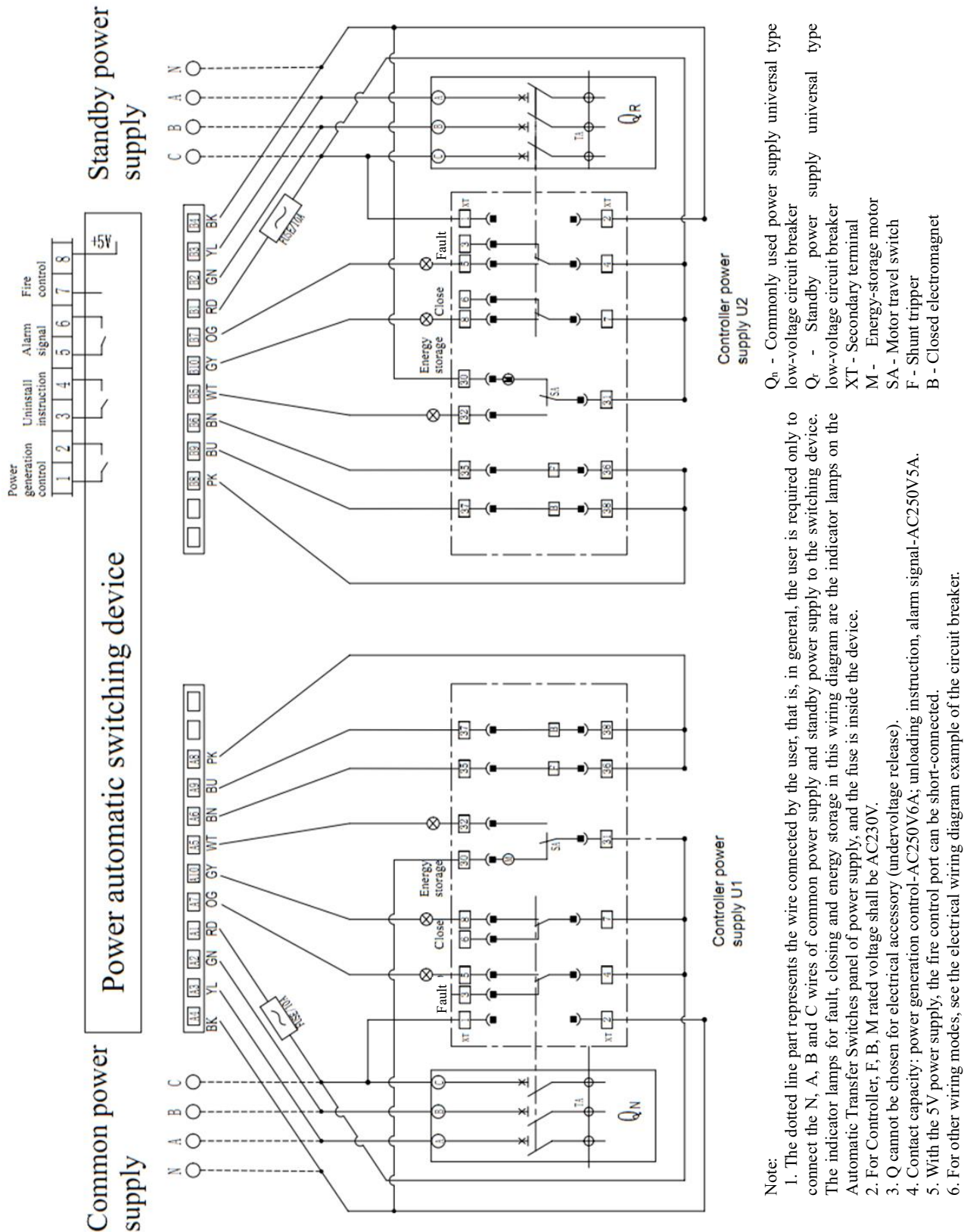
Note:

1. The dotted line part represents the wire connected by the user, that is, in general, the user is required only to connect the N, A, B and C wires of common power supply and standby power supply to the switching device. The indicator lamps for fault, closing and energy storage in this wiring diagram are the indicator lamps on the Automatic Transfer Switches panel of power supply, and the fuse is inside the device.
2. For Controller, F, B, M rated voltage shall be AC230V.
3. Q cannot be chosen for electrical accessory (undervoltage release).
4. Contact capacity: power generation control-AC250V6A; unloading instruction, alarm signal-AC250V5A.
5. With the 5V power supply, the fire control port can be short-connected.
6. For other wiring modes, see the electrical wiring diagram example of the circuit breaker.

Q_N - Commonly used power supply universal type low-voltage circuit breaker
Q_R - Standby power supply universal type low-voltage circuit breaker
XT - Secondary terminal
M - Energy-storage motor
SA - Motor travel switch
F - Shunt tripper
B - Closed electromagnet



7.4 Wiring Diagram of NDW2-2000/3200/4000/6300 Power Automatic Switching Device (ATS)



Chapter 8 Ordering Type Selection Specification

Ordering type selection specification 8 111

8.1 NDW2 Series of Circuit Breaker Model Explanation and Encoding Rules . 111

8.2 Order Specification (Please fill the number in and check in □. Related contents can be found in the Manual) 114

Ordering type selection specification 8

8.1 NDW2 Series of Circuit Breaker Model Explanation and Encoding Rules

ND W 2- □ □ / □ □ / □ □ / □ □ □ / □ □ □ □ / □ / □ / □ / □ / □ / □
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

SN	Name	Specification, type code	Description
1	Enterprise code	Nader 牌低压电器	
2	Product code	W: Air circuit breaker	
3	Design code	2	
4	Shell frame level current	16-1600, 20-2000, 32-3200, 40-4000, 63-6300	
5	Breaking type	HU: High-voltage class; not marked: non-high-voltage class	
6	Installation Mode	Not marked - Fixed type, C - Drawout type	
7	Rated current	02-200A, 04-400A, 06-630A, 08-800A, 10-1000A, 12-1250A, 16-1600A, 20-2000A, 25-2500A, 29-2900A, 32-3200A, 40-4000A, 50-5000A, 63-6300A	
8	Number of poles	3-3 poles, 4-4 poles, 5-3P+N	3P+N: 3P products are provided with N-phase external transformers
9	Controller	KM1-NWK31 (AC380V/AC400V), KM2-NWK31 (AC220V/AC230V), KM3-NWK31 (DC220V), KM4-NWK31 (DC110V), KM5-NWK31 (AC24V/DC24V)	Applicable to 1600 shell frame
		KY1-NWK32 (AC380V/AC400V), KY2-NWK32 (AC220V/AC230V), KY3-NWK32 (DC220V), KY4-NWK32 (DC110V), KY5-NWK32 (AC24V/DC24V)	
		KM1-NWK21 (AC380V/AC400V), KM2-NWK21 (AC220V/AC230V), KM3-NWK21 (DC220V), KM4-NWK21 (DC110V), KM5-NWK21 (AC24V/DC24V)	Applicable to 2000, 3200, 4000, 6300 shell frames
		KY1-NWK22 (AC380V/AC400V), KY2-NWK22 (AC220V/AC230V), KY3-NWK22 (DC220V), KY4-NWK22 (DC110V), KY5-NWK22 (AC24V/DC24V)	
10	Optional functions of controller	Protection type: Not-standard - conventional type, V - voltage measurement and protection, P - harmonic measurement and protection	1. Omitted when controller has no optional function, NWK21/31 only HAS S1- 4DO 2. Z1 is not available with the NDW2-1600 remote reset function 3. Choose one from the communication functions of "H", "MP" and "MD"; 4. For the controller with "V" and "P" functions, the voltage module P2 is optional for the main circuit rated voltage AC500V and above. 5. The signal unit, voltage-check closing device and PV undervoltage release can't be selected at the same time
		Communication function: H (communication protocol: Modbus), MP (Profibus-DP), MD (Devicenet)	
		Signal unit: S1- 4DO; S2- 3DO, 1DI; S3-2DO, 2DI	
		Remote reset function: Z1 (AC380V/400V), Z2 (AC220V/AC230V), Z3 (DC220V), Z4 (DC110V), Z5 (DC24V)	
		3P+N grounding mode (optional external N-pole transformer): T - Differential type (not shown by default) W - Ground current type	
		N1 - External N-phase transformer (62*21)	
		N2 - External N-phase transformer (102*32.5)	
		N3 - External N-phase transformer (122*52)	
		N4 - External N-phase transformer (262*102)	
		NR1 - External flexible transformer (280mm)	
		NR2 - External flexible transformer (370mm)	
		NR3 - External flexible transformer (450mm)	
		Protection form of current leakage: E-type (including the external residual current transformer)	
		Contact wear equivalent, operation times query (NWK21/NWK31)	



		optional): J		
11	Electric energy storage mechanism	D1-AC380V/AC400V, D2-AC220V/AC230V, D3-DC220V, D4-DC110V, D5-DC24V		1.6300 shell frame without DC24V 2. Either shunt release or retention shunt release can be chosen when 2000/4000 shell frame is selected
12	Shunt release/retention shunt release	F1-AC380V/AC400V, F2-AC220V/AC230V, F3-DC220V, F4-DC110V, F5-DC24V F6-AC230/DC220V (retention type)		
13	Closed electromagnet	B1-AC380V/AC400V, B2-AC220V/AC230V, B3-DC220V, B4-DC110V, B5-DC24V		
14	Internal Accessories	Under-voltage/loss of voltage release/voltage-check closing device	Q1-AC380V/AC400V, Q2-AC220V/AC230V, Q3-DC220V, Q4-DC110V, Q5-DC24V	1. One out three of the under-voltage release, No-voltage release and voltage-check closing device 2. This shall be omitted if without this accessory 3. No DC24V specification for 6300 shell frame 4.Voltage detection not applicable to HU type
			S1-AC380V/AC400V, S2-AC220V/AC230V	
			J1-AC380V/AC400V, J2-AC220V/AC230V	
15		Whether harness is included with the undervoltage/loss of voltage release delay time/voltage-check	Conventional undervoltage: 0-Instantaneous, 1-1s delay, 3-3s delay, 5-5s delay	
			Voltage loss: 0-Instantaneous, 1-1s delay, 3-3s delay, 5-5s delay	Applicable to 2000, 3200, 4000 shell frame
			No voltage: 0s~10s, step 1s	Applicable to 1600, 6300 shell frames
			0 - Without harness, 1 - With harness	
16		Auxiliary contact	A4 - Four groups conversion, A6 - Six groups conversion, A44 - Four normally open and four normally closed	Applicable to NDW2-1600
			A4 - Four groups conversion, A6 - Six groups conversion, A44 - Four normally open and four normally closed A66-Six normally opened and six normally closed	Applicable to NDW2-2000/3200/4000/6300
17		BX - Closing ready signal output unit		This shall be omitted if without the accessory
	JS - Counter function unit (1600 shell frame without this function)			
	CM1-Drawout type (with door interlock on the right); CM2-Drawout type (with door interlock on the left)			
	CX - Drawer seat three-position signal output			
18	External accessories	M - Doorframe		1. ST-IV power supply module and ST201 relay module should be used with the controller 2. For product types FD (wind power, plateau) and TH (humid, thermal), it is recommended to install phase partitions.
		G - Phase partition (standard configuration for 4000 shell frame)		
		F - Dust cover		
		R - ST201 relay module		
		P-NWDF1(ST-IV) Power Module P1-DC24V P3-AC380V/400V, AC220V/230V P5-DC220V/110V		
		S - Button lock		
		P2 - Voltage conversion module		
		Z - Installation & Operating Instructions and Controller Manual		
L- Connection bolt				
19	Wiring mode	Not-marked-horizontal wiring, J1-horizontal extended wiring, J2-L wiring, J3-vertical wiring, J4-vertical extended wiring, J5-mixed wiring (upper horizontal and lower vertical), J6-mixed wiring (upper vertical and lower horizontal), J7-mixed extended wiring (upper horizontal and lower vertical), J8-mixed extended wiring (upper vertical and lower horizontal)		NDW2-6300 with the rated current of 6300A only has two wiring modes: Vertical wiring and vertical extended wiring.
20	Rated operating voltage	Not marked - AC690V and below, KV4-AC800V, KV5-AC1000V, KV6-AC1140V		
21	Product usage type	Not marked - Conventional; TH - Thermal and humidity; FD - Wind power, plateau		
22	Special notes	Customer’s special requirements		
23	Language type	Not-marked - Chinese; Y - English; ZY - Chinese and English		1. Only NWK22/32 controller features Chinese/English switching 2. Chinese-English labels are used for Chinese and Chinese-English products except for the controller nameplate.

Interlocking Accessory Model Explanation and Encoding Rules

SF11 - key lock device (one lock and one key), SF21 - key lock device (two locks and one key), SF31 - key lock device (three locks and one key), SF32 - key lock device (three locks and two keys), SF53 - key lock device (five locks and three keys)	1. Select one from five key locks 2. NDW2-1600 shell frame can be interlocked with other shell frames
SR11 - Mechanical interlocking device (two sets of steel cables, one for closing and one for opening) SR12 - Mechanical interlocking device (three sets of steel cables, one for closing and two for opening) SR21 - Mechanical interlocking device (three sets of steel cables, two for closing and one for opening) SY11 - Mechanical interlocking device (two sets of hard rods, one for closing and one for opening) SY12 - Mechanical interlocking device (three sets of hard rods, one for closing and two for opening)	1. Select one from five mechanical interlocks 2. NDW2-1600 shell frame does not support the interlocking mode with two for closing and one for opening 3. NDW2-1600 shell frame cannot be interlocked with other shell frames 4. This accessory is not available in the NDW2-1600 shell frame fixed type product
ATS-R/S/F power automatic switching device (R: Auto switch and auto recover; S: Auto switch and non-auto recover; F: Mains - Generator)	It is standard with a mechanical interlock with the type selected by customers, This accessory is not available in the shell 1600 fixed type product

8.2 Order Specification (Please fill the number in and check in ☐. Related contents can be found in the Manual)

User unit		Number of units ordered:		Date of ordering:
Basic parameters	Shell frame level	☐ NDW2-1600 ☐ NDW2-2000 ☐ NDW2-3200 ☐ NDW2-4000 ☐ NDW2-6300		
	Installation Mode	☐ Fixed type ☐ C Drawout type		
	Rated current (A)	☐ 200 ☐ 400 ☐ 630 ☐ 800 ☐ 1000 ☐ 1250 ☐ 1600 ☐ 2000 ☐ 2500 ☐ 2900 ☐ 3200 ☐ 4000 ☐ 5000 ☐ 6300		
	Number of poles	☐ 3 (3-pole) ☐ 4 (4-pole) ☐ 5 (3P+N)		
	Rated operating voltage	☐ Not marked: Below AC690V ☐ KV4: AC800V ☐ KV5: AC1000V ☐ KV6: AC1140V		
	Wiring mode	1600 shell frame	☐ Horizontal wiring (standard configuration) ☐ J1 Horizontal extended wiring ☐ J3 Vertical wiring ☐ J5 Mixed wiring (upper horizontal, lower vertical) ☐ J6 Mixed wiring (upper vertical, lower horizontal)	
		2000 shell frame	☐ Horizontal wiring (standard) ☐ J1 Horizontal extended wiring ☐ J2 L-type wiring ☐ J3 vertical wiring ☐ J4 Vertical extended wiring ☐ J5 - Mixed wiring (upper horizontal, lower vertical), ☐ J6 - Mixed wiring (upper vertical, lower horizontal) ☐ J7-mixed extended wiring (upper horizontal, lower vertical) ☐ J8-Mixed extended wiring (upper vertical, lower horizontal) Note: J5, J6, J7, and J8 select fixed products.	
		3200 shell frame	☐ Horizontal wiring (standard configuration) ☐ J1 Horizontal extended wiring ☐ J3 vertical wiring	
		4000 shell frame	☐ Horizontal wiring ☐ J1 Horizontal extended wiring ☐ J3 Vertical wiring ☐ J4 Vertical extended wiring	
		6300 shell frame	☐ Horizontal wiring (In≤5000A standard configuration) ☐ J1 - Horizontal extended wiring ☐ J3- Vertical wiring (In=6300A standard configuration) ☐ J4-Vertical extended wiring ☐ J5 - Mixed wiring (upper horizontal, lower vertical), J6 - Mixed wiring (upper vertical, lower horizontal) ☐ J7-mixed extended wiring (upper horizontal, lower vertical) ☐ J8-Mixed extended wiring (upper vertical, lower horizontal) Note: In=6300A is not available with horizontal wiring and horizontal extended wiring.	
Product type	☐ Not marked - Conventional (standard configuration) ☐ TH - Thermal and humidity ☐ FD - Wind power, plateau			
Controller parameters	Controller model	1600 shell frame	☐ KM-NWK31 (digital screen) ☐ KY-NWK32 (LCD)	
		2000/3200/4000/6300 shell frame	☐ KM-NWK21 (digital screen) ☐ KY-NWK22 (LCD)	
	Controller voltage	☐ 1 (AC380V/400V) ☐ 2 (AC220V/AC230V) ☐ 3 (DC220V) ☐ 4 (DC110V) ☐ 5 (DC24V)		
	Protection type	☐ Conventional type (standard configuration) ☐ V-voltage measuring and protection type (NWK21/NWK31 only have the measuring function) ☐ P-harmonic measuring and protection type (only NWK22/NWK32 optional)		
	Communication function	☐ Modbus ☐ Profibus ☐ DeviceNet		
	Signal element	☐ S1-4DO ☐ S2-3DO, 1DI ☐ S3-2DO, 2DI		
	Remote reset	☐ Z1 (AC380V/AC400V) ☐ Z2 (AC220V/AC230V) ☐ Z3 (DC220V) ☐ Z4 (DC110V) ☐ Z5 (DC24V)		
	External transformer	3P+N required: ☐ N1 ☐ N2 ☐ N3 ☐ N4 ☐ NR1 ☐ NR2 ☐ NR3		☐ E type (standard current leakage transformer)
	Grounding mode	☐ T type (default) ☐ W type (external transformer is required for 3P+N)		
Contact wear equivalent	☐ J - Contact wear equivalent (only NWK21/NWK31 is optional)			
Required accessories	Electric operating mechanism	☐ D1 (AC380V/AC400V) ☐ D2 (AC220V/AC230V) ☐ D3 (DC220V) ☐ D4 (DC110V) ☐ D5 (DC24V)		
	Shunt release/retention shunt release	☐ F1 (AC380V/AC400V) ☐ F2(AC220V/AC230V) ☐ F3 (DC220V) ☐ F4 (DC110V) ☐ F5 (DC24V) ☐ F6 (AC230V/DC220V)	Either shunt release or retention shunt release can be chosen when 2000/4000 shell frame is selected	
		Closed electromagnet	☐ B1 (AC380V/AC400V) ☐ B2 (AC220V/AC230V) ☐ B3 (DC220V) ☐ B4 (DC110V) ☐ B5 (DC24V)	

Optional accessories	Undervoltage release	☐ Q1 (AC380V/AC400V) ☐ Q2 (AC220V/AC230V) ☐ Q3 (DC220V) ☐ Q4 (DC110V) ☐ Q5 (DC24V) ☐ 0-Instantaneous (0s) Delay: ☐ 1 (1s delay) ☐ 3 (3s delay) ☐ 5 (5s delay)	
	No-voltage release	☐ S1 (AC380V/AC400V) ☐ S2 (AC220V/AC230V) 2000/3200/4000 shell frame Delay: ☐ 0-Instantaneous (0s) ☐ 1 (1s delay) ☐ 3 (3s delay) ☐ 5 (5s delay) 1600/6300 shell frame Delay: ☐ 0-instantaneous (0s) ☐ 1 (1s delay) ☐ 2 (2s delay) ☐ 3 (3s delay) ☐ 4 (4s delay) ☐ 5 (5s delay) ☐ 6 (6s delay) ☐ 7 (7s delay) ☐ 8 (8s delay) ☐ 9 (9s delay) ☐ 10 (10s delay)	
	Voltage-check closing device	☐ J1 (AC380V/AC400V) ☐ J2 (AC220V/AC230V) Is there any wiring harness: ☐ 0 (no) ☐ 1 (yes)	Note: Not applicable to HU type
	Auxiliary contact	NDW2-1600 ☐ A4 - Four groups conversion ☐ A6 - Six groups conversion ☐ A44 - Four normally opened and four normally closed NDW2-2000/3200/4000/6300 ☐ A4 - Four groups conversion ☐ A6 - Six groups conversion ☐ A44 - Four normally opened and four normally closed ☐ A66-Six normally opened and six normally closed	
	Closing ready	☐ BX - Closing ready signal output unit	
	Counter	☐ JS - Counter	
	Drawer seat door interlock	☐ CM1 - Right side of the door interlock ☐ CM2 - Left side of the door interlock	
	Position indication	☐ CX - Drawer seat three-position signal output	
	Doorframe	☐ M Door frame	
	Phase partition	☐ G Phase partition (standard configuration for 4000 shell frame)	Note: For product types FD (wind power, plateau) and TH (humid, thermal), it is recommended to install phase partitions.
	Dust cover	☐ F Dust cover	
	IP54 transparent cover	Operation mode: ☐ TL - To left ☐ TR - To right Note: Separate order for purchase, including special door frame; the regular door frame will not be chosen if this accessory is selected; the two frames require different opening dimensions	Body type: ☐ 1:1600 shell frame ☐ 2: 2000 and above shell frames
	Relay module	☐ R - ST201 relay module	
	Power supply module	☐ P1-DC24V ☐ P3-AC380V/AC400V, AC220V/230V ☐ P5-DC220V, DC110V	
	Safety lock	☐ A safety lock Note: Safety locks are only available for 2000 and above shell frames. Users can either select safety lock or off-position key lock.	
	Button lock	☐ S Button lock	
	Voltage conversion module	☐ P2 - Voltage conversion module	
	Operating manual	☐ Z - Installation & Operating Instructions and Controller Manual	
	Connection bolt	☐ L- Connection bolt	
net locking accessories	Off-position lock	Operation mode: ☐ Direct operation (one-handed operation, default) ☐ SF11-One lock one key ☐ SF21-Two locks one key ☐ Hand-pressed (two-handed operation) ☐ SF31-Three locks one key ☐ SF32-Three locks two keys ☐ SF53-Five locks three keys Note: 1. All shell frames can be interlocked with each other; 2. Please consult us for other special interlocking.	
	Mechanical interlocking	Cable type ☐ SR11 - Two groups, one for closing and one for opening ☐ SR12 - Three groups, one for closing and two for opening ☐ SR21 - Three groups, two for closing and one for opening Cable rope length ☐ 2m (standard configuration) ☐ 3m Hard rod type ☐ SY11 - Two groups, one for closing and one for opening ☐ SY12 - Three groups, one for closing and two for opening Remarks: This accessory is not available in the fixed type 1600	
	Automatic transfer switching equipment	☐ ATS-R type ☐ ATS-S type ☐ ATS-F type Controller conductor length ☐ 2m (standard configuration) ☐ 3m ☐ 2m in normal use, 5m for standby Note: 1. Please select a type if mechanical interlocking is standard; 2. There's no need to select undervoltage release if undervoltage protection is included; 3. For the electrical accessories, the operating voltage of AC220V must be selected; 4. 1600 fixed type is not provided with this accessory.	



Language type	☐ Not marked - Chinese (standard configuration) ☐ Y - English ☐ ZY - Chinese and English (Only NWK22/32 controller features Chinese/English switching)	
Special requirements	As special requirements, NWK21/NWK31 must be set before the factory delivery: Overload long time-delay setting current _____ A Setting time _____ s Short-circuit short time-delay setting current _____ A Setting time _____ s Short-circuit instantaneous setting current _____ A Ground protection setting current _____ A Setting time _____ s	As special requirements, NWK22/NWK32 must be set before the factory delivery: Overload long time-delay setting current _____ A Setting time _____ s Setting current of short-circuit short time-delay inverse time limit _____ A Setting current of short-circuit short time-delay inverse time limit _____ A Setting time _____ s Short-circuit instantaneous setting current _____ A Ground protection setting current _____ A Setting time _____ s
	Other requirements:	
Note: 1. In case of no special requirements, the current and time setting value of controller shall be set according to the factory setting; 2. If you have special requirements, please indicate in the "special requirements" column.		