

NDW1A Series of Air Circuit Breaker Manual

Project Name: NDW1A Series of Air Circuit Breaker

Project No.: P05022

Date: July 30, 2020

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Product overview

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1.1 NDW1A Serial Products



NDW1A-1600



NDW1A-2000



NDW1A-3200



NDW1A-4000



NDW1A-6300

1.2 Rated current of NDW1A series of circuit breaker

Rated current (A) Frame size level	200	400	630	800	1000	1250	1600	2000	2500	2900	3200	3600	4000	5000	6300
NDW1A-1600															
NDW1A-2000															
NDW1A-3200															
NDW1A-4000															
NDW1A-6300															

1.3 Breaking capacity and short-time withstand current of NDW1A circuit breaker

circuit breaker	NDW1A-1600	NDW1A-2000	NDW1A-3200	NDW1A-4000	NDW1A-6300
Number of poles	3、4	3、4	3、4	3、4	3、4
Rated current I_n +40℃	200A~1600A	400A~2000A	2000A~3200A	2000A~4000A	4000A~6300A
N-pole rated current	100% I_n	100% I_n	100% I_n	100% I_n	100% I_n
Rated operational voltage U_e	AC690V	AC690V	AC690V	AC690V	AC690V
Rated limit short-circuit breaking capacity I_{cu} (kA) I_{cu} (AC415V)	65kA	80kA	100kA	100kA	120kA
Rated operating short-circuit breaking capacity I_{cs} (AC415V)	55kA	80kA	85kA	85kA	100kA
Rated short-time withstand current I_{cw} (AC415V)1s	42kA	60kA	85kA	85kA	100kA

1.4 Structure Design

■ Installation Mode



Fixed type



Drawout type

■ Brief Description of Structure and Indications

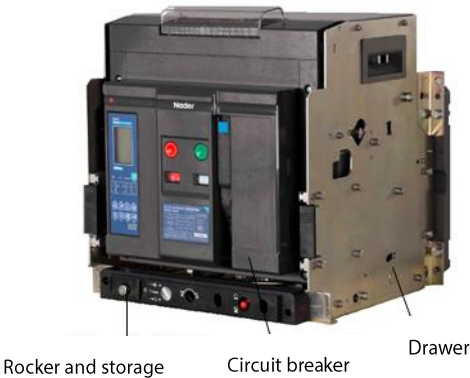
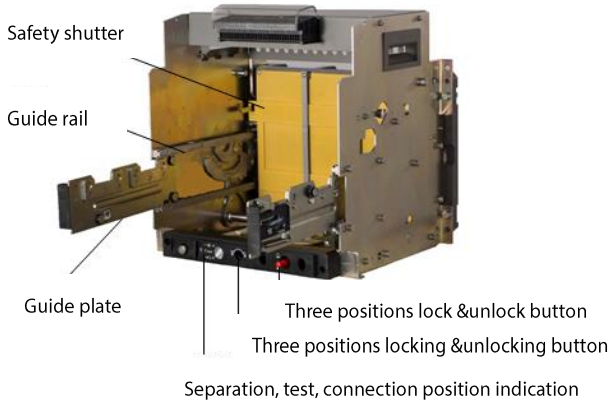


- | | |
|--|--|
| 1. Reset button | 9. Opening and closing indication |
| 3. Specification sign | 10. Nameplate |
| 3. Off-position Key Lock (Optional function) | 11. "Connection", "Test", "Separation" Position locking and unlocking device |
| 4. Nader sign | 12. Rocker operating position |
| 5. Disconnection button | 13. "Connection", "Test", "Separation" position indicator |
| 6. Closing button | 14. Rocker and its storage |
| 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 itself 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 tube display, practical function and simplicity, can adapt to the low-temperature places, and with optional voltage measurement function
- NWK32 or NWK22 - Conventional function, LCD display, 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 (8 times), historical current peak record, contact wear equivalent, query of operation times, clock 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 Low temperature, plateau type circuit breaker

Low temperature, plateau type circuit breaker for used in special places can meet the use 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.

1.5.4 TH (thermal-humidity) type circuit breaker

The TH (thermal-humidity) type circuit breaker can meet the three-proofing requirements of moisture-proofing, mould-proofing and salt spray-proofing, and complies with JB/T834 Technical Requirements of Tropical Type Low-voltage Apparatus while having passed the following standard related tests:

- Thermal-humidity test: GB/T 2423.4-2008 Environmental Testing for Electric and Electronic Products. Part 2: Test Method Test Db: Alternating Thermal-humidity (12h + 12h Cycle);
- Mould growth test: GBT2423.16-2008 Environmental Testing for Electric and Electronic Products. Part 2: Test Method Test J and Guidelines: Mould
- Enclosure protection grade: GB/T 4208-2008 Enclosure Protection Grade (IP code).
- Salt spray test: GBT2423.17-2008 Environmental Testing for Electric and Electronic Products. Part 2: Test Method Test Ka: Salt spray

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 design of the circuit breaker arc extinguishing chamber and contact system has a number of invention patents. It adopts the principle of air-blast and magnetic 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 electrical 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

It has drawout type circuit breaker door interlocking, drawout type triolocation locking and unlocking device and disconnected position key lock, connection terminal protective cover, closing ready device 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: Alternating Thermal-humidity (12h + 12h Cycle)

GB/T 4207-2003 Methods for the Determination of the Proof and the Comparative Tracking Indices of Solid Insulating Materials

GB/T 14048.1-2012 Low-voltage Switchgear and Control Equipment - Part 1: General Principles (IEC 60947-1:2001, MOD);

GB/T 14048.2-2008 Low-voltage Switchgear and Control Equipment - Part 2: Circuit Breaker (IEC 60947-2:2006, IDT)

GB 14048.5-2008 Low-voltage Switchgear and Control Equipment - Part 5-1: Control Circuit Electrical Appliances and Switch Elements - Electromechanical Control Circuit Electrical Appliances (IEC 60947-5-1:2003, 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 20645-2006 Specific Environmental Condition - Technical Requirements of Low-voltage Apparatuses for Plateau

GB/T 20626.3-2006 Specific Environmental Condition - Electric and Electronic Products for Plateau - Part 3: Protection Requirement of Thunder and Lightning, Pollution, Condensation

NDW1A series of air circuit breaker has obtained China Compulsory Certification CCC for products.

1.7 Product Model

<div><div>NDW1A-16□□/□/□</div><div>12345678</div></div>		
SN	Meaning	NDW1A
1	Enterprise code	Nader 牌低压电器
2	Product code	W: air circuit breaker
3	Design SN	1: Design SN A: Improved model
4	Rated current of housing	16-16, 20-2000, 32-3200, 40-4000, 63-6300
5	Installation mode	Not-marked - Fixed type
		Drawout type: C
6	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
7	Number of poles	3:3 poles; 4:4 poles; 5: 3P+N
8	Controller type	KM: NWK31 (Nixie tube display), applicable to NDW1A-1600 NWK21 (Nixie tube display), applicable to NDW1A-2000/3200/6300
		KY: NWK32 (LCD display), applicable to NDW1A-1600 NWK22 (LCD display), applicable to NDW1A-2000/3200/6300

Chapter 2 Technical Characteristics

2.1 NDW1A-1600 Technical Parameter List..... 12

2.2 NDW1A-2000/3200 Technical Parameter List..... 13

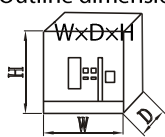
2.3 NDW1A-4000 Technical Parameter List..... 14

2.4 NDW1A-6300 Technical Parameter List..... 15

Technical Characteristics

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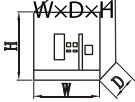
2.1 NDW1A-1600 Technical Parameter List

Circuit breaker model		NDW1A-1600					
Rated current In (A)		200, 400, 630		800, 1000		1250, 1600	
N-pole rated current		100%In					
Rated operational 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		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 performan ce (times)	Electrical life	AC415V	10000	9000	8000		
		AC690V	10000	10000 (800A) 6000 (1000A)	4000		
		Operation frequency	20 times/hour				
	Mechanic al life	Maintenance-fr ee	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 and lower vertical), mixed wiring (upper vertical and lower horizontal)					
Outline dimension: 	Fixed type 3P	260mm×205.5mm×319.5mm					
	Fixed type 4P	330mm×205.5mm×319.5mm					
	Drawout type 3P	268.5mm×303.5mm×352mm					
	Drawout type 4P	338.5mm×303.5mm×352mm					
Weight	Fixed type 3P	20kg				21kg	

	Fixed type 4P	24kg	26kg
	Drawout type 3P	40kg	42kg
	Drawout type 4P	50kg	52kg

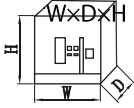
2.2 NDW1A-2000/3200 Technical Parameter List

Circuit breaker model		NDW1A-2000				NDW1A-3200		
Rated current In (A)		400, 630, 800	1000, 1250, 1600		2000	2000, 2500	2900, 3200	
N-pole rated current		100%In						
Rated operational voltage Ue		AC220V/230V/240V, AC380V/400V/415V, AC660V				AC400V/415V, AC690V		
Rated frequency f		50/60Hz						
Rated insulation voltage Ui		1250V				1000V		
Rated impulse withstand voltage Uimp		12kV						
Number of poles		3、4						
Full break time		≤30ms						
Closing time		≤70ms						
Rated limit short-circuit breaking capacity Icu (kA) Icu (effective value)	AC415V	80kA				100kA		
	AC690V	65kA				75kA		
Rated operating short-circuit breaking capacity Ics (effective value)	AC415V	80kA				85kA		
	AC690V	65kA				65kA		
Rated short circuit making capacity Icm (peak value)	AC415V	176kA				220kA		
	AC690V	143kA				176kA		
Rated short-time withstand current Icw (effective value) 1s	AC415V	60kA				85kA		
	AC690V	40kA				55kA		
Operating performance (times)	Electrical life	AC415V	15000	14000	10000	15000	12500 (2900A) 10000(3200A)	
		AC690V	15000	15000 (1000-1250A) 7000 (1600A)	5000	15000 (2000A) 9000 (2500A)	5000	
		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" wiring			Horizontal wiring, horizontal extended wiring	
	Drawout type	Horizontal wiring, horizontal extended wiring, vertical wiring, "L" wiring			Horizontal wiring, horizontal extended wiring, vertical wiring	
Outline dimension: 	Fixed type 3P	362mm×331mm×397mm			422mm×302mm×397mm	
	Fixed type 4P	457mm×331mm×397mm			537mm×302mm×397mm	
	Drawout type 3P	375mm×398mm×432mm			435mm×398mm×432mm	
	Drawout type 4P	470mm×398mm×432mm			550mm×398mm×432mm	
Weight	Fixed type 3P	39kg	40kg	41kg	46kg	56kg
	Fixed type 4P	48kg	49kg	50kg	58kg	68kg
	Drawout type 3P	68kg	70kg	71kg	92kg	96kg
	Drawout type 4P	86kg	88kg	91kg	108kg	118kg

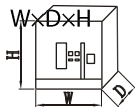
2.3 NDW1A-4000 Technical Parameter List

Circuit breaker model		NDW1A-4000	
Rated current I_n (A)		2000, 2500	3200, 3600, 4000
N-pole rated current		100% I_n	
Rated operational voltage U_e		AC220V/230V/240V, AC380V/400V/415V, AC440V/480V, AC660V/690V	
Rated frequency f		50/60Hz	
Rated insulation voltage U_i		1000V	
Rated impulse withstand voltage U_{imp}		12kV	
Number of poles		3、4	
Full break time		≤30ms	
Closing time		≤70ms	
Rated limit short-circuit breaking capacity I_{cu} (kA) I_{cu} (effective value)	AC415V	100kA	
	AC690V	80kA	
Rated operating short-circuit breaking capacity I_{cs} (effective value)	AC415V	85kA	
	AC690V	70kA	
Rated short circuit making capacity I_{cm} (peak value)	AC415V	220kA	
	AC690V	176kA	
Rated short-time withstand current I_{cw} (effective value) 1s	AC415V	85kA	
	AC690V	70kA	
Operating	Electrical life	AC415V	6000 (2000A-3600A) 6000 (4000A)

performance (times)		AC690V	4500 (2000A-3600A)	3000 (4000A)
		Operation frequency	(20 times/hour)	
	Mechanical life	Maintenance-free	12500 (3P), 6500 (4P)	
		With maintenance	25000 (3P), 15000 (4P)	
		Operation frequency	60 times/hour	
Installation mode		Fixed type, drawout type		
Wiring method of the main circuit		Horizontal wiring, vertical wiring, horizontal extended wiring,, vertical extended wiring		
Outline dimension: 	Fixed type 3P		428mm×300mm×393.5mm	
	Fixed type 4P		543mm×300mm×393.5mm	
	Drawout type 3P		435mm×403mm×432mm (2000A-2500A)	435mm×397.5mm×432mm (3200A-4000A)
	Drawout type 4P		550mm×403mm×432mm (2000A-2500A)	550mm×397.5mm×432mm (3200A-4000A)
Weight	Fixed type 3P		59kg	60kg
	Fixed type 4P		70kg	71.5kg
	Drawout type 3P		97kg	103kg
	Drawout type 4P		114kg	120kg

2.4 NDW1A-6300 Technical Parameter List

Circuit breaker model		NDW1A-6300	
Rated current In (A)		4000, 5000	6300
N-pole rated current		100%In	
Rated operational voltage Ue		AC220V/230V/240V, AC380V/400V/415V, AC440V/480V, AC660V/690V	
Rated frequency f		50/60Hz	
Rated insulation voltage Ui		1000V	
Rated impulse withstand voltage Uimp		12kV	
Number of poles		3、4	
Full break time		≤30ms	
Closing time (ms)		≤70ms	
Rated ultimate short circuit Breaking capacity Icu (effective value)	AC415V	120kA	
	AC690V	85kA	
Rated operating short circuit Breaking capacity Ics (effective value)	AC415V	100kA	
	AC690V	75kA	
Rated short circuit making capacity	AC415V	264kA	
	AC690V	187kA	

Icm (peak value)			
Rated short-time withstand current Icw (effective value) 1s kA		AC415V	100kA
		AC690V	75kA
Operating performance (times)	Electrical life	AC415V	1000
		AC690V	800
		Operation frequency	(20 times/hour)
	Mechanical life	Maintenance-free	5000
		With maintenance	10000
		Operation frequency	60 times/hour
Installation mode		Fixed type, drawout type	
Wiring method of the main circuit		Horizontal wiring, vertical wiring, horizontal extended 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)	
Outline dimension: 	Fixed type 3P	803mmx302.5mmx392mm	
	Fixed type 4P	1033mmx302.5mmx392mm	
	Drawout type 3P	809mmx401.5mmx475mm	
	Drawout type 4P	1039mmx401.5mmx475mm	
Weight	Fixed type 3P	125kg	125kg
	Fixed type 4P	167kg	167kg
	Drawout type 3P	193kg	193kg
	Drawout type 4P	257kg	257kg

- Notes: 1. Full break time: Interval from the beginning of the circuit breaker disconnection to the end of the arcing time;
2. Closing time: Interval from the beginning of the circuit breaker closing to the end of the contact time for all pole contacts.

Chapter 3 Controller

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3.5 Working Power Supply of Controller..... 33

3.6 Introduction of Controller Functions..... 34

3.7 Protection Characteristic Curve..... 35

Controller

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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			
Remark: NWK31 and NWK32 are applicable to NDW1A-1600; NWK21 and NWK22 are applicable to NDW1A-2000, NDW1A-3200, NDW1A-4000 and NDW1A-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 (8 times) and query	√	√	√	√	√
	Displacement 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 unit	▲	▲	▲	▲	▲
	Communication	—	—	▲	▲	▲

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

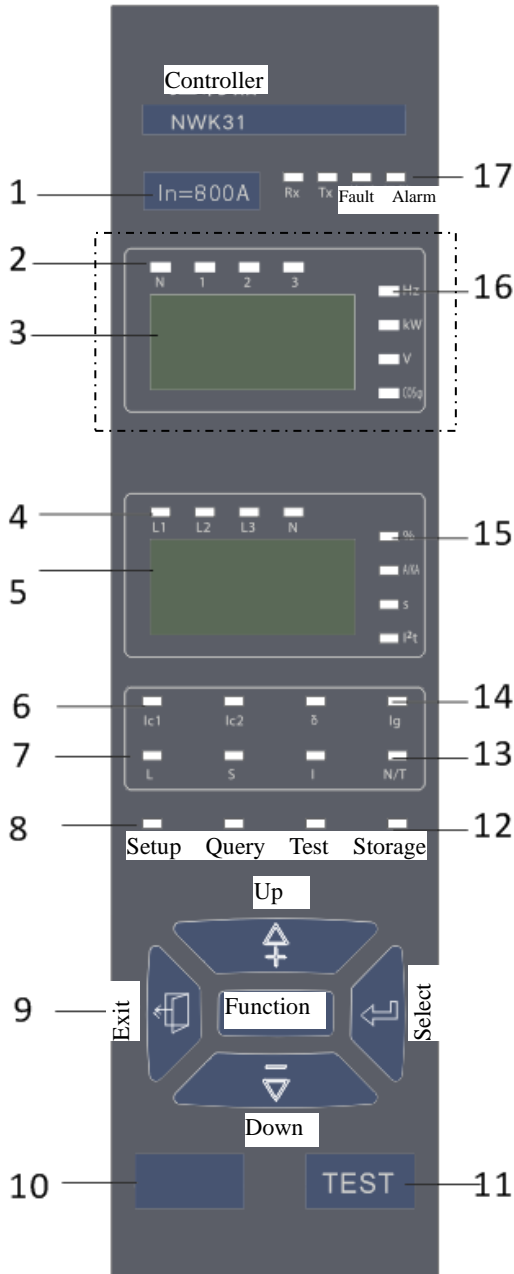
2. NWK21/V, NWK31/V, NWK22/V, NWK32/V, NWK22/P and NWK32/P controllers are only applicable to the rated voltage of 500V and below;

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

3.3 Controller Panel Description

■ NWK21/NWK31 Controller

NWK21/ NWK31 Controller Panel Description

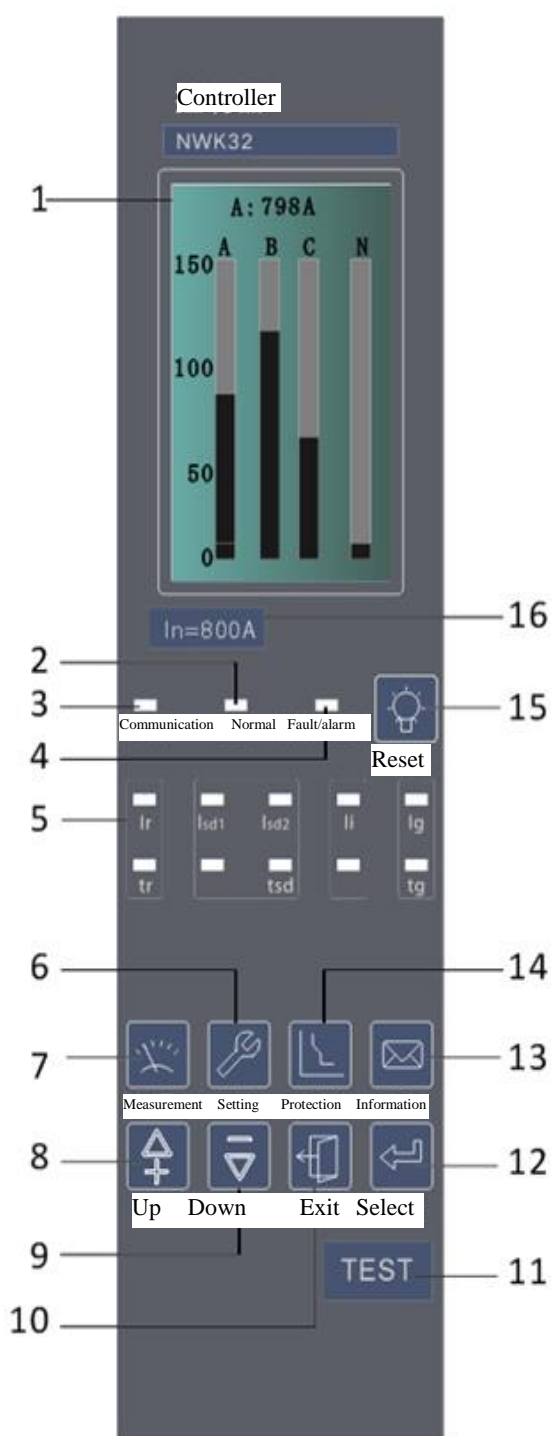


- 1. Rated current sign
- 2. N-phase and A, B, C phases voltage indicators in order
- 3. Three-phase voltage and frequency value display screen
- 4. Three-phase current, N-phase current indicators
- 5. Three-phase electric current display screen
- 6. Load monitoring signals 1 and 2 operation indicators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

Note: 1. The double-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,Rx is only used for internal testing in the company.

■ NWK22/NWK32 Controller

NWK22/ NWK32 Controller Panel Description



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 quickly; in case of an alarm, the red LED is always on.
5. Protection indicator (LED): The upper level LED flashes respectively from left to right 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. "Set" button: switch to the parameter setting menu ("Right" button in the password entering interface).
7. "Measure" button: switch to the default measurement menu ("Left" button in the password entering interface).
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. TEST test interface: Plugged into the portable power box or test unit.
12. "Select" button: Go to the next menu pointed by the specified item, or select and store parameters.
13. "Information function" button: Switch to the topic menu of history and maintenance.
14. "Protection function" button: Switch to the topic menu of protection parameter settings.
15. Fault and alarm reset buttons.
16. Rated current sign.

Note: Only one of the grounding protection function and grounding alarm function can be selected, and the factory setting is grounding protection.

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 power distribution protection I²t: tr= 2.25 Tr/ N²(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/ (N²-1) 3) Express inverse time limit (motor protection) EI(M): tr= 1.3974 Tr×Ln[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 I²t; NWK22/NWK32 controller provides 4 types of protection curves.										
Standard power distribution protection I²t.Time setting value Tr (@1.5 Ir)		NWK21/NWK31: 15s, 30s, 60s, 120s, 240s, 480s NWK22/NWK3: 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 features (accuracy of ±10%)		Current (I/Ir)					Tripping time					
		≤1.05					> 2h Inaction					
		≥1.3 (power distribution protection)					< 1h Action					
		≥1.2 (generator 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 (function off), 10min, 20 min, 30 min, 45min, 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; 										

Short-circuit short time-delay protection NWK21/NWK31 &NWK22/NWK32			
NWK21/NWK31			
Current setting value I_{sd}	(1.5～15) I_r or OFF (OFF-Function off)		
Time setting value T_{sd} (s)	0.1, 0.2, 0.3, 0.4		
I_{2t}	ON or OFF		
Protective features (accuracy of $\pm 10\%$)	Current	Tripping time	
	$I_{sd} \leq 8I_r$	$(8I_r)^2 \times T_{sd} / I^2$ inverse time-limit characteristic	
I_{2t} -ON	$I > 8I_r$	T_{sd} fixed time limit characteristic	
I_{2t} -OFF	$I \geq I_{sd}$	T_{sd} fixed 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) I_r or OFF (OFF-Function off)		
I_{sd2} fixed time-limit current setting value	(1.5～15) I_r or OFF (OFF-Function off)		
Fixed time-limit time setting value T_{sd} (s)	0.1～1.0		
Protective features (accuracy of $\pm 10\%$)	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 long time delay, and $\geq T_{sd}$
		Fixed time limit	T_{sd}
Thermal memory time	Instantaneous (Function off), 10min, 20 min, 30 min, 45min, 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)I _n or OFF (OFF-Function off)	
Protective features (accuracy of ±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) I _n or OFF (factory default as 10I _n)	
Protective features (accuracy of ±10%)	Current (I/I_{MCR})	Tripping time
	≤0.8	Inaction
	≥1.1	<30ms
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 for 100ms, the MCR protection will be automatically cancelled.		
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) I _n or OFF (OFF-Function off)	
Time setting value T _g (s)	0.1～0.4 Fixed time limit	
Protective features (accuracy of ±10%)	Current (I/I_g)	Tripping time
	≤0.8	Inaction (no alarm)
	Inherent absolute error: ±40ms	≥1.0
The signal output is required to add a signal unit. Without the signal output, observe the controller display screen or read from the display indicator.		
Grounding alarm output		
Ground protection/alarm NWK22/NWK32		
Current setting value I _{gb}	(0.2~1.0) I _n 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) I _n	Only when the execution mode is “alarm”, this setting is available
Alarm return time setting value (s)	0.1～1.0	
Protective/alarm features (accuracy of ±10%)	Current (I/I_g)	Tripping time
	≤0.8	Inaction (no alarm)
	Inherent absolute error: ±40ms	≥1.0
Returnable features (accuracy of ±10%)		
Inherent absolute error: ±40ms	≥1.0	Non-return
	≤0.8	For alarm, see the alarm return time setting value

Grounding alarm output	<p>The signal output is required to add a signal unit; set one DO of the signal unit as "grounding alarm".</p> <p>Without the signal output, observe the controller display screen or read from the display indicator.</p>
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Note: For details of the reverse and definite time limit, see the User Manual of NWK22 and NWK32 Controller, with the definite time limit as T_g .

Neutral line protection NWK21/NWK31 & NWK22/NWK32	
Neutral wire protection setting value	<p>NWK21/NWK31 controller: 50%In, 100%In or OFF;</p> <p>NWK22/NWK32 controller: 50%In, 100%In, 160%In, 200%In or OFF.</p> <p>OFF— Turn off N-phase protection function</p>
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 IΔn (A)			0.5~30.0 or OFF (OFF-Function off)											
Action delay time TΔn (s)			Instantaneous, 0.06, 0.08, 0.17, 0.25, 0.33, 0.42, 0.5, 0.5 , 0.67, 0.75 , 0.83											
Alarm delay time TΔn (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/IΔn)				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							
(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	
	IΔn	0.04	0.36	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	
	2IΔn	0.04	0.18	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	
	5IΔn	0.04	0.072	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	
	10IΔn													
Current leakage alarm output			The signal output is required to add a signal unit; set one DO of the signal unit as “current leakage fault”. Without the signal 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 tδ(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 features (accuracy of ±10%) Inherent absolute error: ±40ms	Actual current unbalance rate/setting value	Tripping time	
	≤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	
	≥1.1	Non-return	
	≤0.9	Returns according to the alarm return delay time	
Current unbalance protection alarm DO output	The signal output is required to add a signal unit; set one DO of the signal unit as I unbalance alarm. Without the signal 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

Required current value protection/alarm NWK22/NWK32		
Protection/alarm start setting value	(0.2~1.0) In	
Protection 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 features (accuracy of ±10%) Inherent absolute error: ±40ms	Multiple of current (Required curren/setting value)	Tripping time
	≤0.9	Inaction (no alarm)
	≥1.1	Acts (or gives an alarm) according to the set delay time
Return features (accuracy of ±10%) Inherent absolute error: ±40ms	Multiple of current (Required curren/setting value)	Tripping time
	≥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”. Without the signal 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	
			Ic2		Tc2	60s, 120s, 240, 480s
	Off (OFF)					
Thermal memory		30min (ON), OFF				
NWK22/NWK32	Operation mode		Current/power setting		Time setting	
	Un load I	Current way 1	0.2~1.0Ir		20~80%Tr	
		Current mode 2				
		Power way 1	200kW~10000kW		10s~3600s	
		Power mode 2				
	Un load II	Current way 1	0.2~1.0Ir		20~80%Tr	
		Current mode 2	0.2Ir~unloading I		10s~600s	
		Power way 1	200kW~10000kW		10s~3600s	
		Power mode 2				100kW~unloading I
	Off (OFF)					
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”. Without the signal 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			
Protection 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			Umin/return setting value		Tripping time	

protection	<0.9		Non-return
(Accuracy of ±10%) inherent absolute error: ±40 ms	≥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”. Without the signal output, observe the controller display screen or read from the display indicator.		
Execution mode	Alarm/tripping/close		
Undervoltage protection/alarm NWK22/NWK32			
Protection/alarm start setting value V	Return value~1200		
Protection 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”. Without the signal 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%		
Protection 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	Actual voltage unbalance rate/setting value	Tripping time
(Accuracy of $\pm 10\%$) inherent absolute error: ± 40 ms	≥ 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 unbalance alarm" output. Without the signal 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". Without the signal 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
Protection 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		Reverse power value/Setting Tripping time

action/alarm features	value		
(Accuracy of ±10%) inherent absolute error: ±40 ms	≤0.9	Inaction (no alarm)	
	≥1.1	Acts (or gives an alarm) according to the set delay time	
Reverse power protection/alarm return features	Reverse power value/Setting value	Tripping time	
	≥1.1	Non-return	
	(Accuracy of ±10%) inherent absolute error: ±40 ms	≤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. Without the signal 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”. Without the signal 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 2
	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		Field of Application
	S1		No regional interlocking
	S2		Regional interlocking between air circuit breakers
	S3		Regional interlocking between air circuit breakers
	DI	Function	Alarm, tripping, regional interlocking, general, grounding interlocking, short circuit

	setting	interlocking			
	Input form	Normally opened		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	N/A		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 alarm		Grounding/current leakge 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-control closing	Remote-control 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		—	—	—	—

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
I2t	1.5×I _r	15.00	30.00	60.00	120.00	240.00	360.00	480.00	600.00	720.00	840.00	960.00					
	2×I _r	8.44	16.88	33.75	67.50	135.00	202.0	270.00	337.50	405.00	472.50	540.00					
	6×I _r	0.94	1.88	3.75	7.50	15.00	22.50	30.00	37.50	45.00	52.50	60.00					
	7.2×I _r	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×I _r	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×I _r	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×I _r	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×I _r	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×I _r	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×I _r	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×I _r	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×I _r	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×I _r	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×I _r	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×I _r	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×I _r	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, I ₂ t-OFF
	NWK22/NWK32	I _{sd1} -6I _r , I _{sd2} -8I _r	0.2s	I _{sd1} Inverse time lag, I _{sd2} Constant time lag
Short circuit instantaneous		10I _n	-	-
Neutral wire protection		100%I _n	-	-
Ground protection		0.5I _n	0.2s	3P products usually close this function as a default, and 4P opens it as a default; clients of 3P products can open the function according to their requirements
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%~110%) U_s. AC power voltage (50/60Hz): AC230V, AC400V; the allowable error is ±15%

DC power voltage: DC220V, DC110V, DC24V; the allowable error is ±15%.

3) Test port power supply

Rated voltage: DC24V, allowable error ±5%. Panel power supply, used for independent test of the controller, not for normal operation

■ 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;

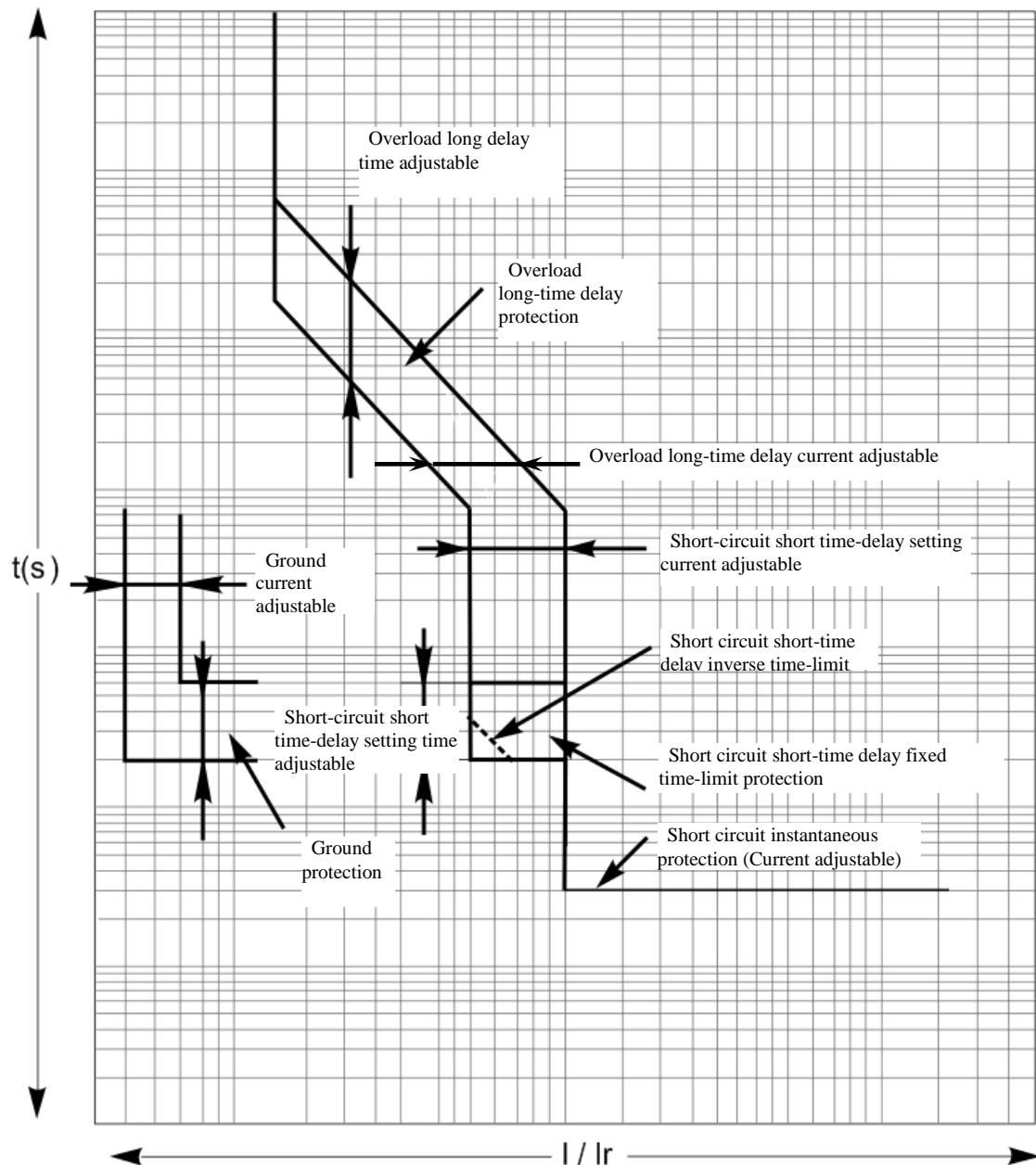
Auxiliary contact output of the circuit breaker status, contact capacity: 10A/AC250V.

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 details of each protective characteristic curve of the controller, please see the controller manual NWK21, NWK31 and NWK22, NWK32

Chapter 4 Accessories

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4.7 Power Supply Conversion System50

Accessories

4

4.1 Accessory List

Accessory name	For what kind of circuit breakers	Supply mode
Controller power supply module	Fixed type/drawout type	Optional supply (standard configuration of the controller voltage is AC for shell 1600)
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
Door interlocking	Drawout type	Optional ordering for customers
Circuit breaker triolocation locking device	Drawout type	Standard configuration
Circuit breaker drawer seat 3-position signal output	Drawout type	Optional ordering for customers
Auxiliary switch	Fixed type/drawout type	Standard configuration
Closed electromagnet	Fixed type/drawout type	Standard configuration
Shunt release	Fixed type/drawout type	Standard configuration
Motor operating mechanism	Fixed type/drawout type	Standard configuration
Phase partition	Fixed type/drawout type	Optional supply (standard configuration for shell 4000)
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
Counter	Fixed type/drawout type	Optional ordering for customers
Door frame	Fixed type/drawout type	Optional ordering for customers
Dustproof cover	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)
Power Automatic Transfer Switches device	Fixed type/drawout type	Optional supply (without this accessory in the fixed type product 1600)

4.2 Electrical Control Accessories

4.2.1

Closed electromagnet is mainly composed of coil, iron core component and electronic parts. In the condition of mechanism energy storage, as long as the closed electromagnet is energized, the circuit breaker can be closed.

◆ 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) The closed electromagnetic is mainly composed of coils, iron core components and electronic components.

4) As long as the electromagnet is energized in the stored energy state, the circuit breaker can be closed. There is a control circuit inside, which can be energized for a long time, and the energization time > 200ms. The user should not connect it in series with the auxiliary switch contacts of the circuit breaker itself. See the table for instantaneous power.

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

◆ Technical Parameters of Closed Electromagnet

4.2.2 Shunt release

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 shunt release

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;

The shunt release is mainly composed of coils, iron core components and electronic components, which can be operated remotely to disconnect the circuit breaker. There is a control circuit inside, which can be energized for a long time, and the power-on time is > 200ms. The user should not connect it in series with the auxiliary switch contacts of the circuit breaker itself. See the table for instantaneous power.



Technical Parameters of Shunt Release

Power Consumption Table of Shunt Release

Rated insulation voltage (Ui)	Rated control supply voltage (Us)	Instantaneous power	
		1600 Frame size	2000 Frame size 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 Motor operating mechanism

The circuit breaker can only be closed after the motor operating mechanism make the circuit breaker to store energy in advance.

◆ 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)	Energy storage time	Rated control supply voltage (Us)	Operating power			
			1600 Frame size	2000 Frame size	3200/4000 Frame size	6300 Frame size
400V	3s~5s	AC220V/AC230V AC380V/AC400V (50/60Hz)	90VA	85VA (3P), 110VA (4P)	110VA	150VA
		DC220V/DC110V	90W	85W (3P), 110W (4P)	110W	150W



4.2.4 Undervoltage release

◆ Action features of the undervoltage release

1) When the applied voltage drops, even slowly drops to 70%~35% of the rated operational voltage,

the undervoltage release will work to disconnect the circuit breaker;

2) When the applied voltage is less than 35% of the rated operational voltage of the undervoltage release,

the undervoltage release will make the circuit breaker cannot be closed;

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

◆ Undervoltage release can be divided into two types (instantaneous release and delayed release), which is mainly composed of coil, iron core component and electronic parts.

◆ Undervoltage 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 as required, and the factory default is 1 s.

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



Power Consumption Table of Undervoltage Release

Rated insulation voltage (Ui)	Frequency (f)	Rated operational voltage (Ue)	Operating power	
			1600 Frame size	2000 Frame size 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	1.9W	3.5W

4.2.5 Loss-of-voltage release

◆ ◆ Action features of the loss of 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 35% of the rated operational voltage of the loss of voltage release, the loss of voltage release the loss of voltage release will make the circuit breaker cannot be closed;



3) When the applied voltage is 85%~110% of the rated operational voltage of the loss of voltage release, the loss of voltage release can guarantee the reliable closing of the circuit breaker.

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

◆ The loss of voltage release can be divided into instantaneous release and delayed release, which is mainly composed of coil, iron core component and electronic parts.

◆ Loss of 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. NDW1A-1600/6300 time delay 1s-10s, step length 1s; NDW1A-2000/3200/4000 time delay 1s, 3s, or 5s. 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 working voltage (Ue)	Operating power	
			1600/6300 Frame size	2000/3200/4000 Frame size
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 6A;
- ◆ Auxiliary contact form: Four groups switch, six groups switch, four normally opened and four normally closed, five normally opened and five normally closed, six normally opened and six normally closed.



◆ Technical Parameters of Auxiliary Contact

Applicable Frame size		1600 Frame size	4000 Frame size	2000/3200/6300
Auxiliary contact form	Conventional	■ Four groups switch	■ Four groups switch	■ Four normally opened and four normally closed
	Special	■ Six groups switch	■ Four normally opened and four normally closed ■ Six groups switch	■ Five normally opened and five normally closed ■ Six normally opened and six normally closed
Minimum load		2mA/DC15V		
Agreed thermal current I _{th}		6A		
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 the following mechanical states. See the table below for technical parameters.

- ◆ Circuit breaker off state;
- ◆ Energy storage in place;
- ◆ No disconnection instruction;
- ◆ Undervoltage release closing in place; The loss of voltage release (optional accessory) remains closed;
- ◆ Controller fault tripping reset. Reset button reset;
- ◆ The disconnected position lock (interlock accessory) is not locked;
- ◆ The mechanical interlock (interlocking accessory) is not locked.



Table of Technical Parameters

Breaking capacity	Category	1600 Frame size	2000/3200/4000/6300 Frame size
	AC	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 of the drawer seat, the triolocation electric indication device can output the electrical status signal corresponding to the three positions with the signal output terminal located on the left side of the drawer seat. 3 position signal contact is in series with the drawer seat's position locking signal contact. For shaking in or out operation, when the red button on the drawer seat pops out, 2# and 3# in the separation 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

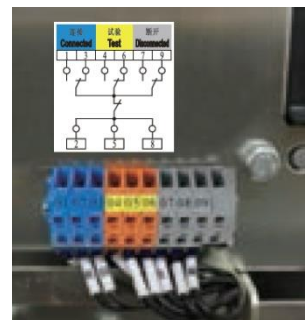


Table of Technical Parameters

Breaking capacity	DC	125V	0.4A
	AC	250V	10A

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 Chapter 8 for the definition and its electrical wiring diagram of each terminal number.

- ◆ See the table below for parameters of the secondary wiring terminal

Item	Parameter
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 14048.7-2006
Maximum load current	10A
Rated current	10A
Rated voltage	500V
Minimum cross section area of the rigid (flexible) conductor	0.5mm 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

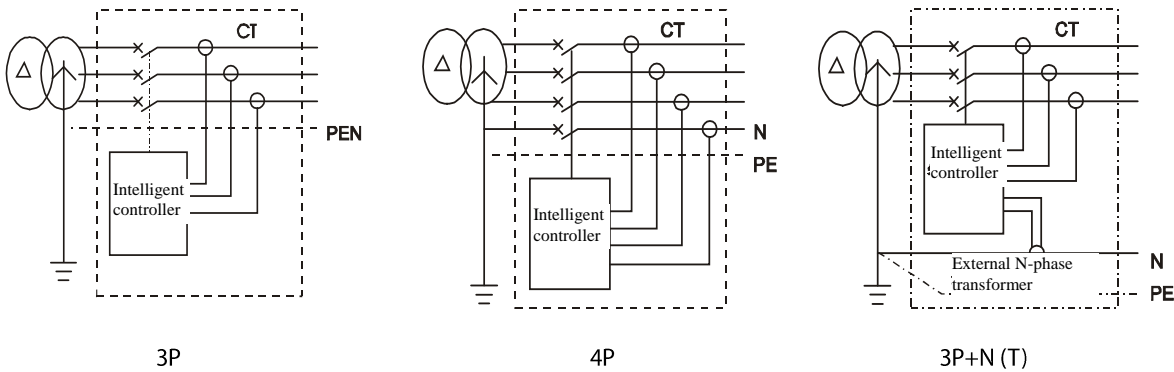
4.4 Related Accessories of Controller

4.4.1 External N-pole transformer

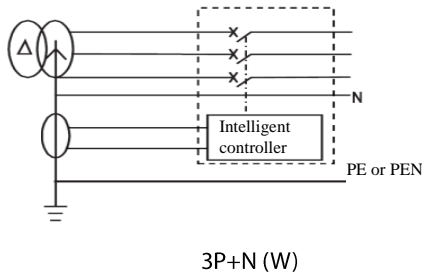
◆ Ground type

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 Frame size current (or N-pole current) and dimensions.

1) Rectangular transformer

★ Rectangular transformer code

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

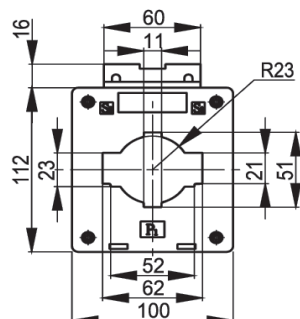
★ See the figure below for outline and installation dimensions of the rectangular transformer.

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

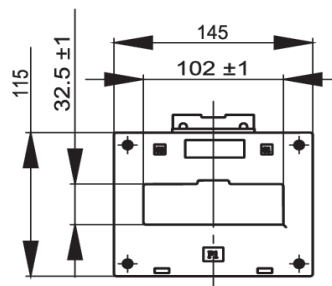
★ With conductors to be supplied by customers, it is recommended to use the shielded twisted pair (with the metal shield layer, 0.2~0.3mm², namely the AWG24/AWG22 conductor).

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.

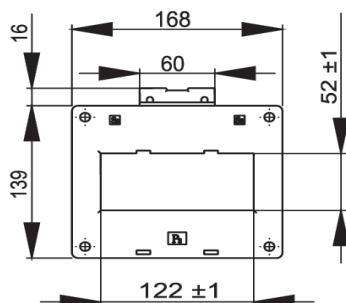
N1 external transformer



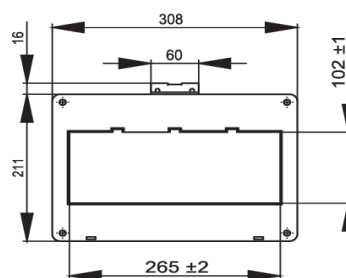
N2 external transformer



N3 external transformer

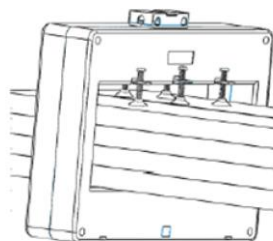
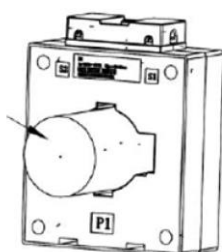


N4 external transformer



Outline and Installation Dimension
Diagram of the N-pole Transformer

The busbar current enters from the P1 terminal and flows out from the P2 terminal



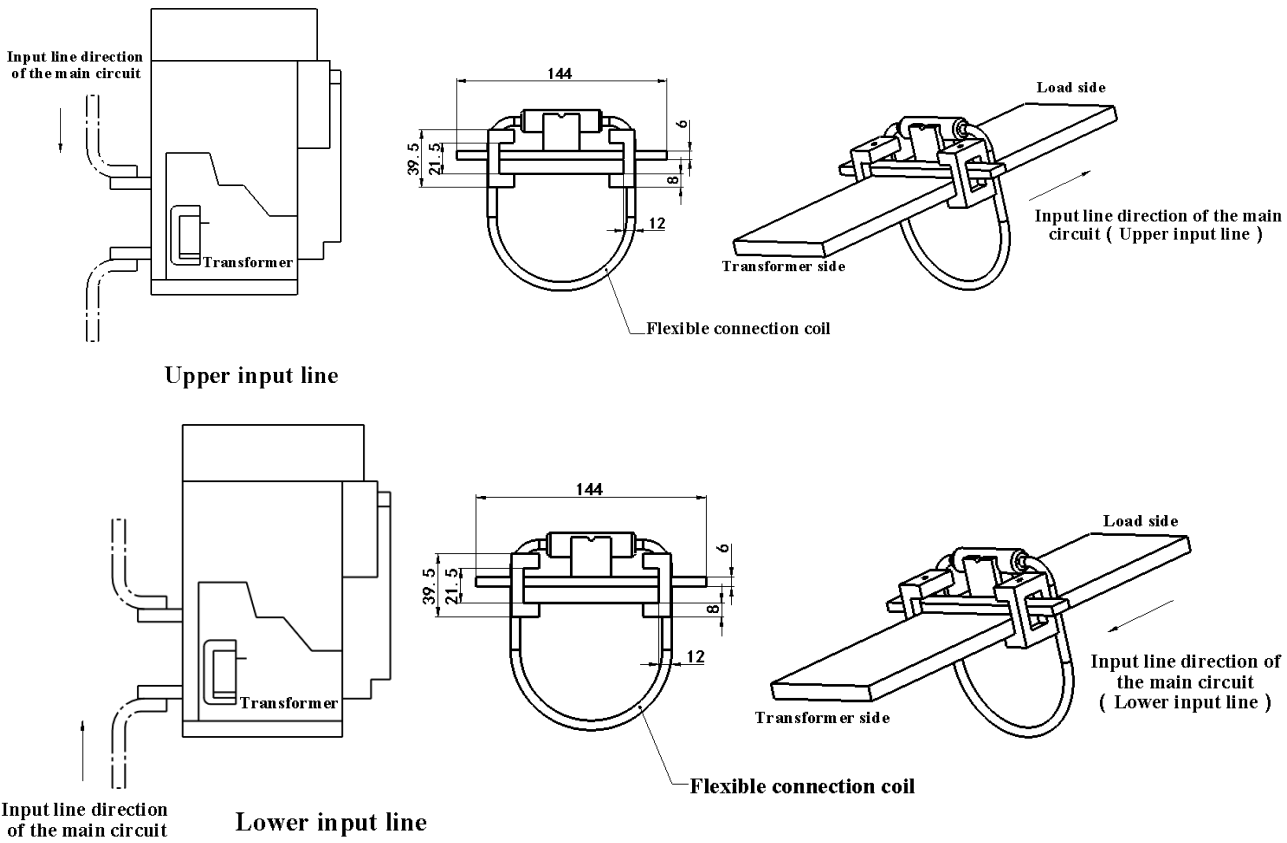
Flexible transformer

★ 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.

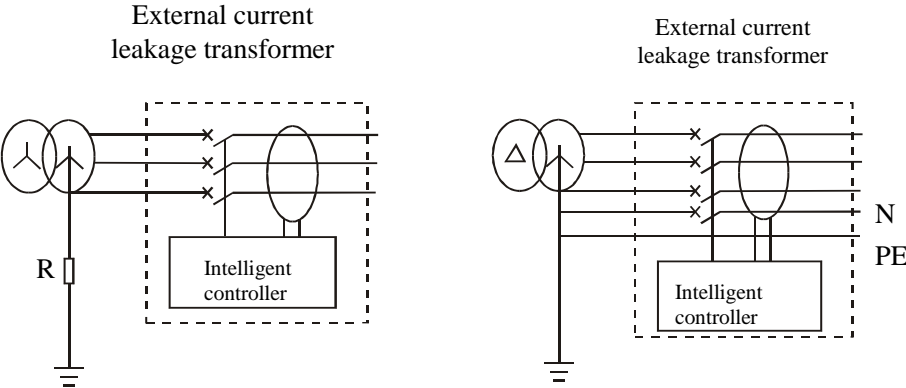
Standard configuration of the conductor is 3m.



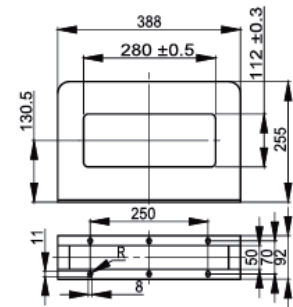
4.4.2 External leakage transformer

◆ 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



External Dimension Diagram

- ★ 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 (ST-1V)

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



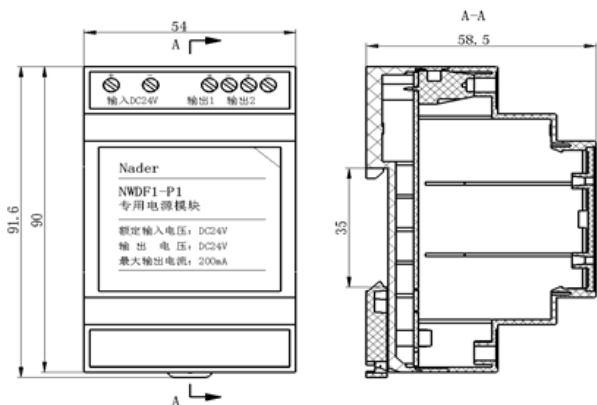
		NWDF1-P1	NWDF1-P3	NWDF1-P5
Power	Rated Voltage	24 VDC	400/230VAC	220/110VDC
	Acceptable Voltage	12-36 VDC	180VAC-430VAC	85VDC-265VDC
	Isolation voltage	1500Vrms	1500Vrms	1500Vrms
	Polarity reversal	Yes	No	No
Protection level		IP20	IP20	IP20
size (mm)		90 x 54 x 58.5mm	90×72×58.5	90×72×58.5
Installation method		Use 35mm standard DIN rail installation	1、 Use 35mm standard DIN rail installation 2、 Screw installation	1、 Use 35mm standard DIN rail installation 2、 Screw installation

- ◆ Features: (85%~110%) the Us power supply module operates normally;
- ◆ Installation mode: Using 35 mm standard guide or direct fixation;

- ◆ Supply mode: Optional ordering by customers;

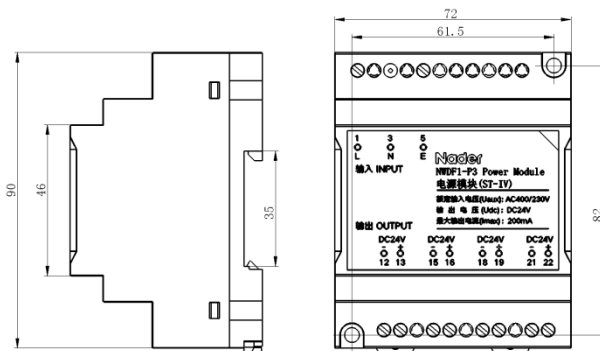
Users indicate the rated operational voltage and carry out installation by themselves. Pay attention to "+" and "-" polarities of wiring, which cannot be wrongly wired.

- ◆ See the figure below for outline and installation dimensions.



Outline and Installation Dimension Diagram of Power Supply

Module NWDF1-P1

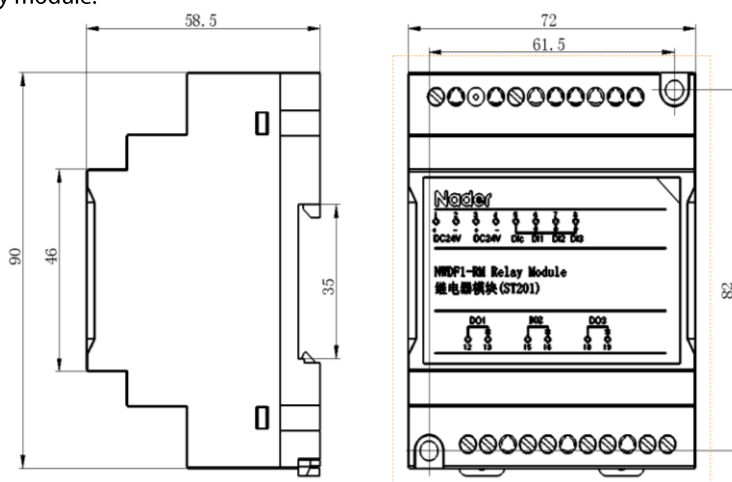


Outline and Installation Dimension Diagram of Power Supply

Module NWDF1-P3/P5

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.



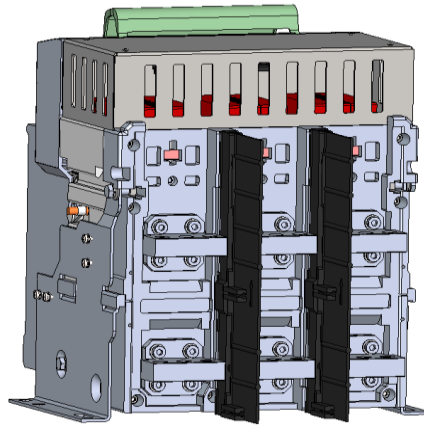
Installation Diagram of Relay Module

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.

◆ Conventional phase partition



Phase partition and bracket

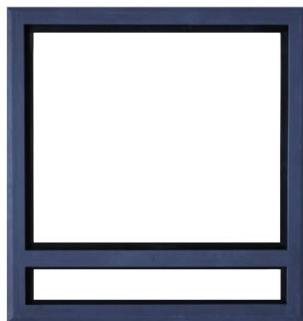
4.5.2 Counter

Counter is used to record the number of the "close-open" operation of the circuit breaker.

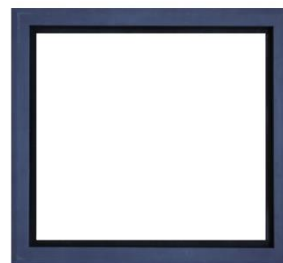


4.5.3 Doorframe

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 reaches IP40. It is beautiful and practical.



Drawout type



Fixed type

4.5.4 Dustproof cover

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



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.



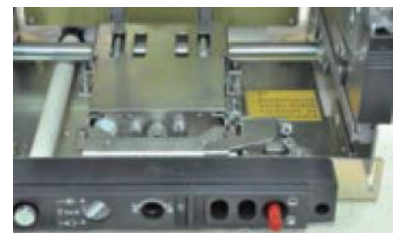
Models and types of off-position key locks

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

4.6.2 Drawout triolocation lock (standard configuration on the drawer seat)

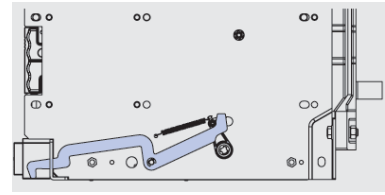
On the drawer seat, there's "connection", "test" and "separation" position status, which is indicated through an indicator.

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)



4.6.3 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.

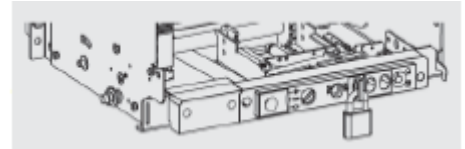


4.6.4 Drawout type circuit breaker "separation" position lock (on the drawer seat)

When the drawout type circuit breaker is in the separation position, pull out the black lever below the drawer to lock.

Then the main body of the circuit breaker can only pull out the drawer seat, and cannot be shaken to "test" or "connection" position.

Padlock should be prepared by users, with the specification of 40 mm or less.



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

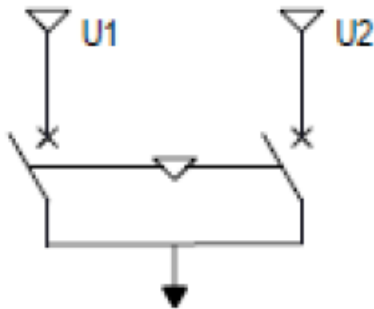
Selection mode	Code	Type	Number of circuit breakers
1	SR11	Two sets of cables, one for closing and one for opening	2
2	SR12	Three sets of cables, one for closing and two for opening	3
3	SR21	Three sets of cables, two for closing and one for opening	3
4	SY11	Two sets of hard rods, one for closing and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



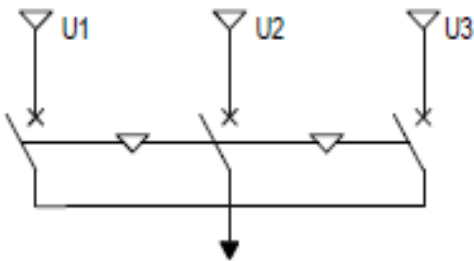
Status Table of Two Circuit Breaks

U1	U2
Close	Shunt
Shunt	Close
Shunt	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)

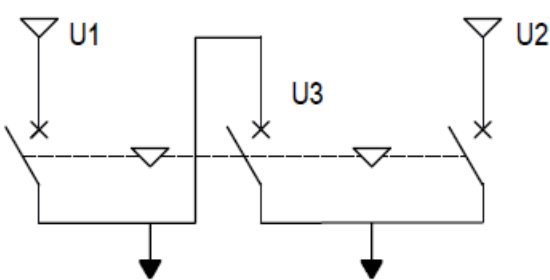


U1	U2	U3
Close	Shunt	Open
Open	Close	Open
Shunt	Open	Close
Open	Shunt	Open

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 Table 64.

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

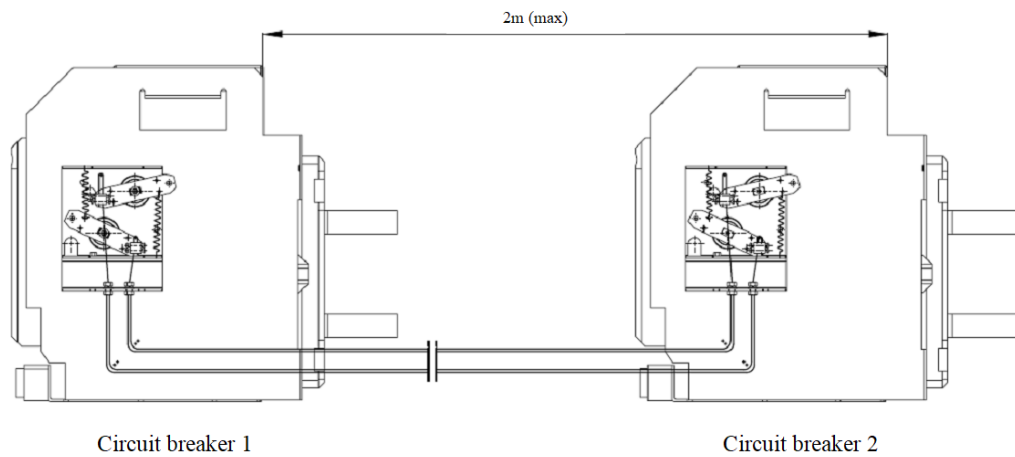


U1	U2	U3
Shunt	Open	Open
Close	Close	Shunt
Close	Open	Close
Open	Close	Close

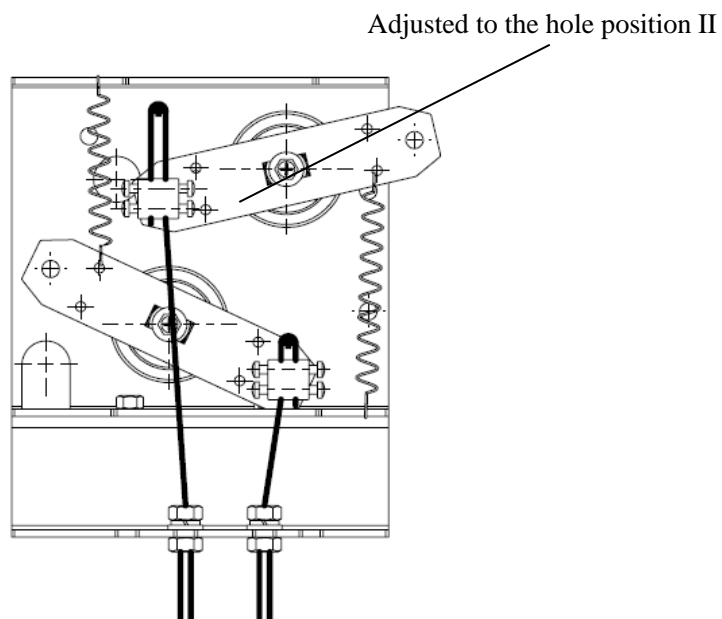
◆ Type description

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

Installation Schematic Diagram:

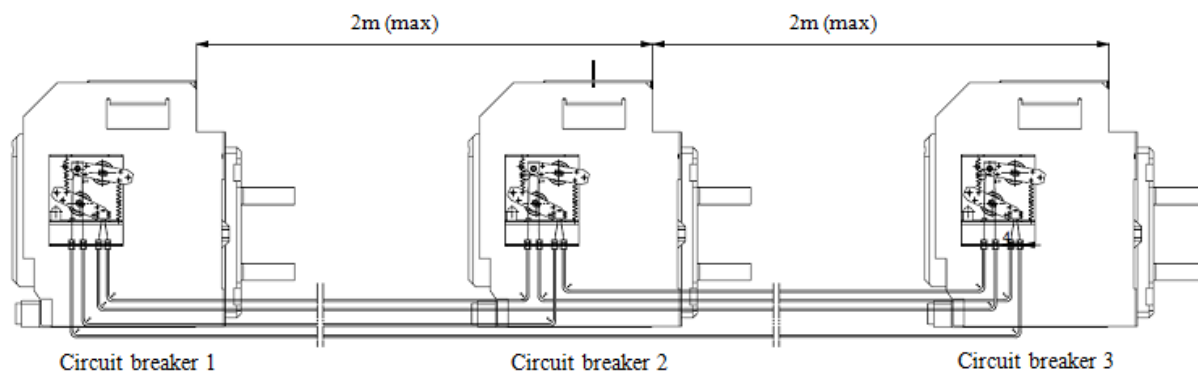


Adjustment schematic diagram:

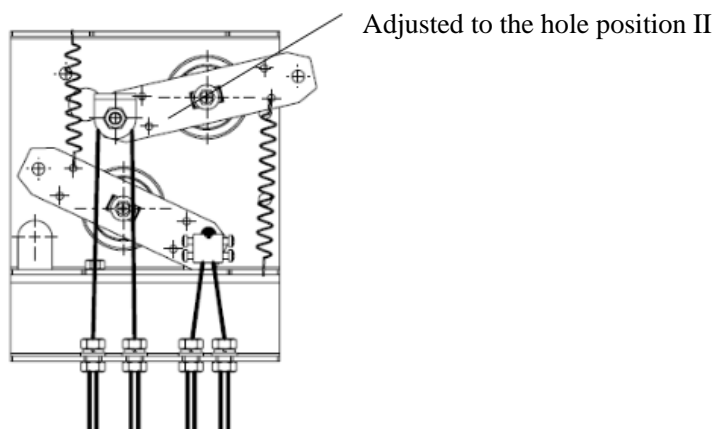


2) Three interlocking cables

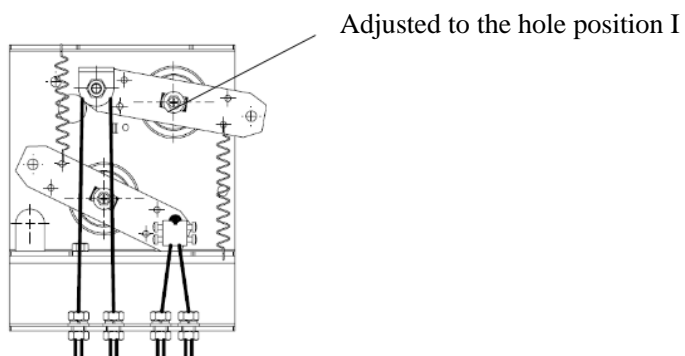
Installation schematic diagram:



Adjustment schematic diagram: One for closing and two for opening

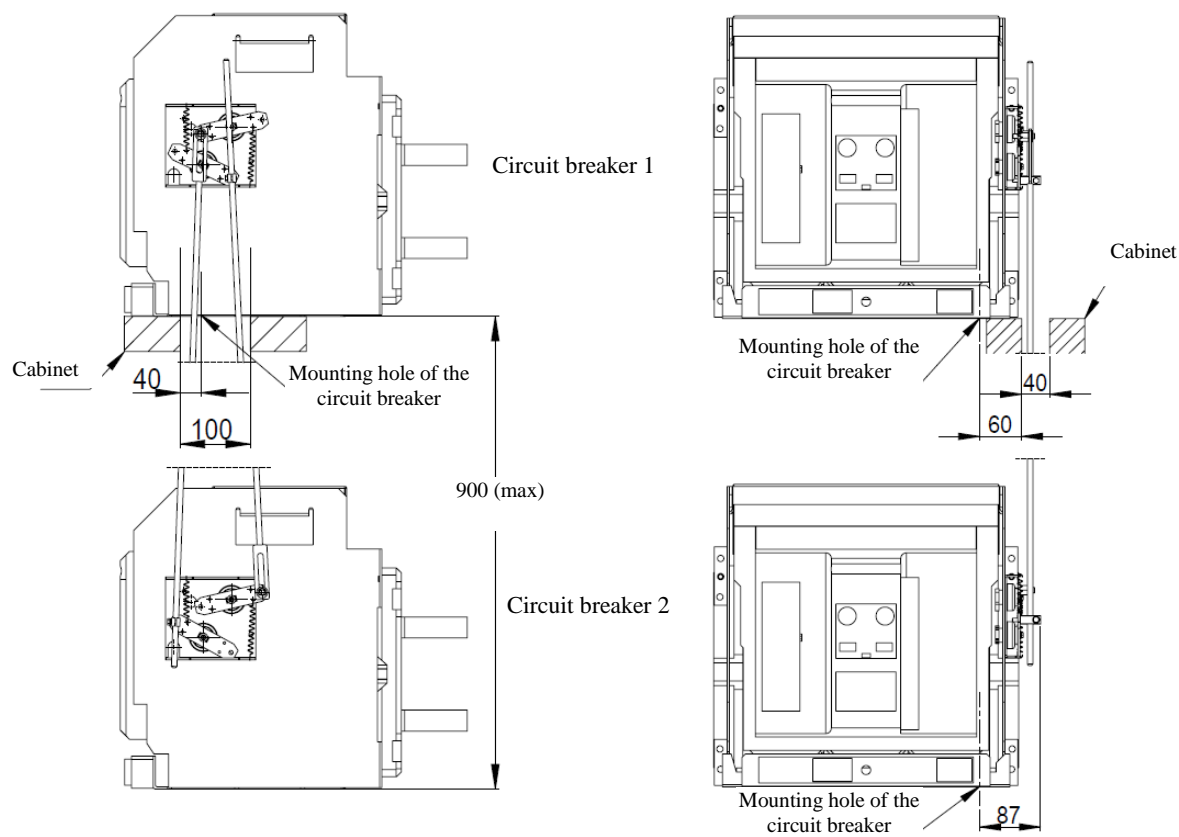


Adjustment schematic diagram: Two for closing and one for opening



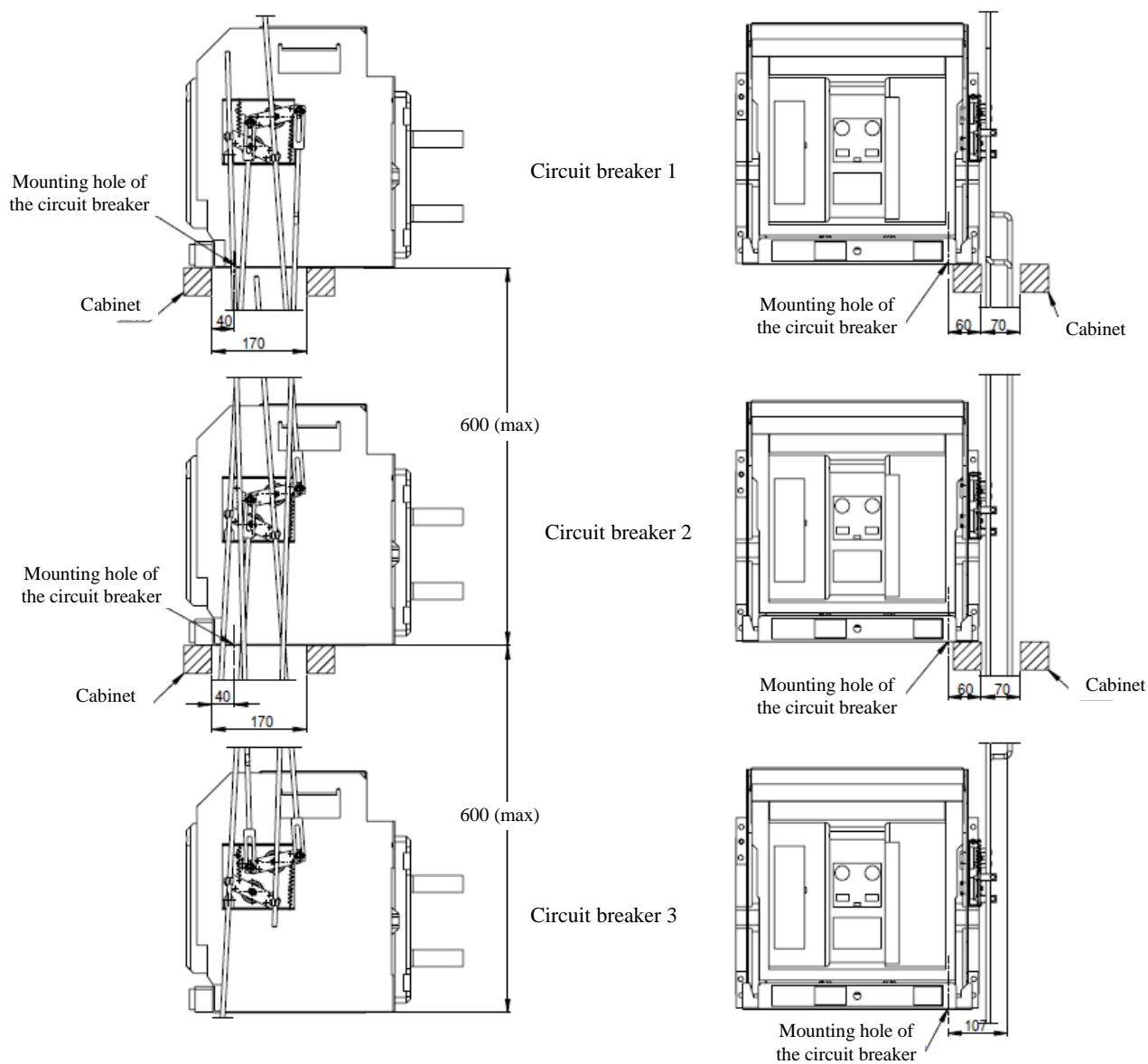
3) Two interlocking hard rods

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



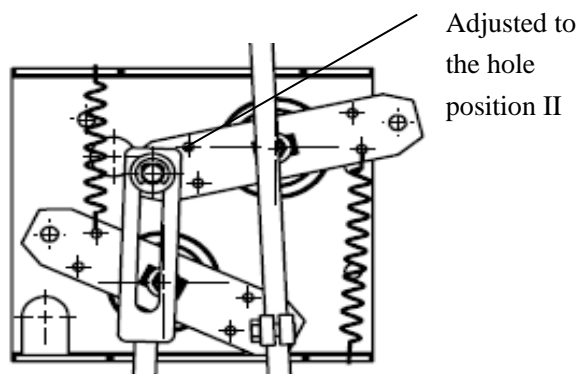
4) Three interlocking hard rods

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



Note: During the process of assembly adjustment, the overlong part of the connecting rod can be appropriately eliminated.

Adjustment schematic diagram:

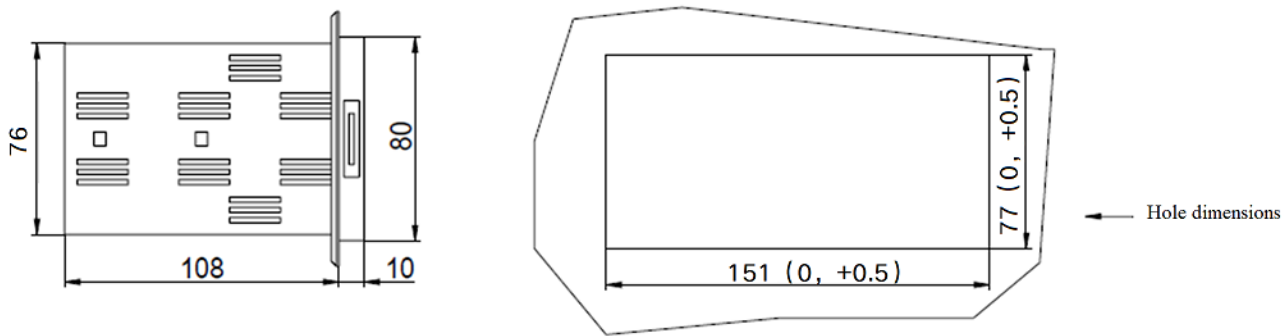


4.7.2 Power Automatic Transfer Switches Device



<p>Four-position switch state</p> <ul style="list-style-type: none">★ Automatic Transfer Switches;★ Forced with "common" power supply;★ Forced with "standby" power supply;★ Double-open state (both "common" power supply and "standby" power supply are disconnected).	<p>Automatic operation</p> <ul style="list-style-type: none">★ Monitor the "common" power supply and Automatic Transfer Switches;★ 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.
<p>Indication state</p> <ul style="list-style-type: none">★ 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.	<p>Function</p> <ul style="list-style-type: none">★ 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 are adjustable.
<p>Selection of power supply</p> <ul style="list-style-type: none">★ Rated control supply voltage U_s: 220V~240V 50/60Hz;★ Rated current I_n: 200A~6300A optional.	<p>Threshold value</p> <ul style="list-style-type: none">★ Undervoltage steps: AC187V, AC176V, AC165V, AC154V;★ overvoltage steps: AC253V, AC264V, AC275V, AC286V;★ switch-off time delay and switch-in time delay steps: 0.5s, 2s, 5s, 10s.

◆ See the figure below for outline and installation dimensions



Note: Due to the power Automatic Transfer Switches control device has overvoltage and undervoltage protection functions, in order to guarantee the consistency and reliability of the system protection, the air circuit breaker used for power supply Automatic Transfer Switches control device can't install undervoltage release, and the power Automatic Transfer Switches control device and the mechanical interlocking (two interlocking) shall be used together.

Chapter 5 Field of Application

5.1 Working Environment..... 58

5.2 Installation conditions..... 60

5.3 Main Circuit Wiring of the Circuit Breaker 60

5.4 The power loss of the incoming and outgoing lines of the circuit breaker (ambient temperature +40°C)..... 61

Scope of application

5

"The NDW1A series of air 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 1250V/1000V, the rated working voltage of AC220V/230V/240V, AC380V/400V/415V, AC440V/480V, AC660V/690V 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 ambient 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, and the reduced capacity coefficient is shown in the following table:

Ambient temperature		+40°C	+45°C	+50°C	+55°C	+60°C	+70°C
NDW1A-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
NDW1A-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
NDW1A-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
NDW1A-4000	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
	3600A	1.0 In	1.0 In	1.0 In	1.0 In	0.95 In	0.85 In
	4000A	1.0 In	0.95 In	0.89 In	0.85 In	0.78 In	0.73 In
NDW1A-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℃, 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 +25℃, 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 2,000 m to 5,000 m, it can be specially customized. For the working performance, refer to the high-altitude derating table 1 and table 2.

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

Altitude	Rated working voltage	Power frequency withstand voltage
2000m	690V	3500V
3000m	590V	3150V
4000m	520V	2500V
5000m	460V	2200V

Tab. 2 High-altitude Derating Coefficient (Current)

Working current		Altitude			
Model	Rated current (A)	2000m	3000m	4000m	5000m
NDW1A-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
NDW1A-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
NDW1A-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	0.75 In
NDW1A-4000	2000-2500	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
	3600-4000	1.0 In	0.93 In	0.88 In	0.82 In
NDW1A-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

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: $\pm 1.5\text{mm}$ (2~9Hz);
- ◆ Constant acceleration: 5 m/s^2 (9~200 Hz)
- ◆ 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 (EMC) test stipulated by following standards

- ◆ GB/T 14048.2-2008 Low-voltage Switchgear and Control Equipment - Part 2: Circuit Breaker - Appendix F
- ◆ GB/T 14048.2-2008 Low-voltage Switchgear and Control Equipment - Part 2: Circuit Breaker - Appendix N

The above tests can ensure that the circuit breaker won't wrongly occur tripping.

5.2 Installation conditions

With the vertical gradient no more than 5° , the circuit breaker shall be installed under the environment condition without explosion danger, conductive dust or 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 and IP40 (installed in a cubicle and equipped with protective doorframe).

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 housing I_{nm} (A)	Rated current I_n (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	2
	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	2000	80mm×10mm	2
	2500	80mm×10mm	3
	3200, 3600, 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℃ and the open wide installation under the heating condition meets the stipulation in GB/T 14048.2. If the temperature is higher than +40℃, 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℃.

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℃)

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
NDW1A-1600	$\leq 150\text{ W}$	$\leq 400\text{ W}$
NDW1A-2000	$\leq 208\text{ W}$	$\leq 380\text{ W}$
NDW1A-3200/4000	$\leq 650\text{ W}$	$\leq 900\text{ W}$
NDW1A-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 (maximum rated current of the circuit breaker) for 8 h and after the main circuit temperature rise tends to the steady state. The test method is in accordance with G.2 in Appendix G of GB14048.2.

Chapter 6 Outline and Installation Dimensions

6.1 NDW1A-1600.....63

6.2 NDW1A-2000.....69

6.3 NDW1A-3200.....73

6.4 NDW1A-4000.....76

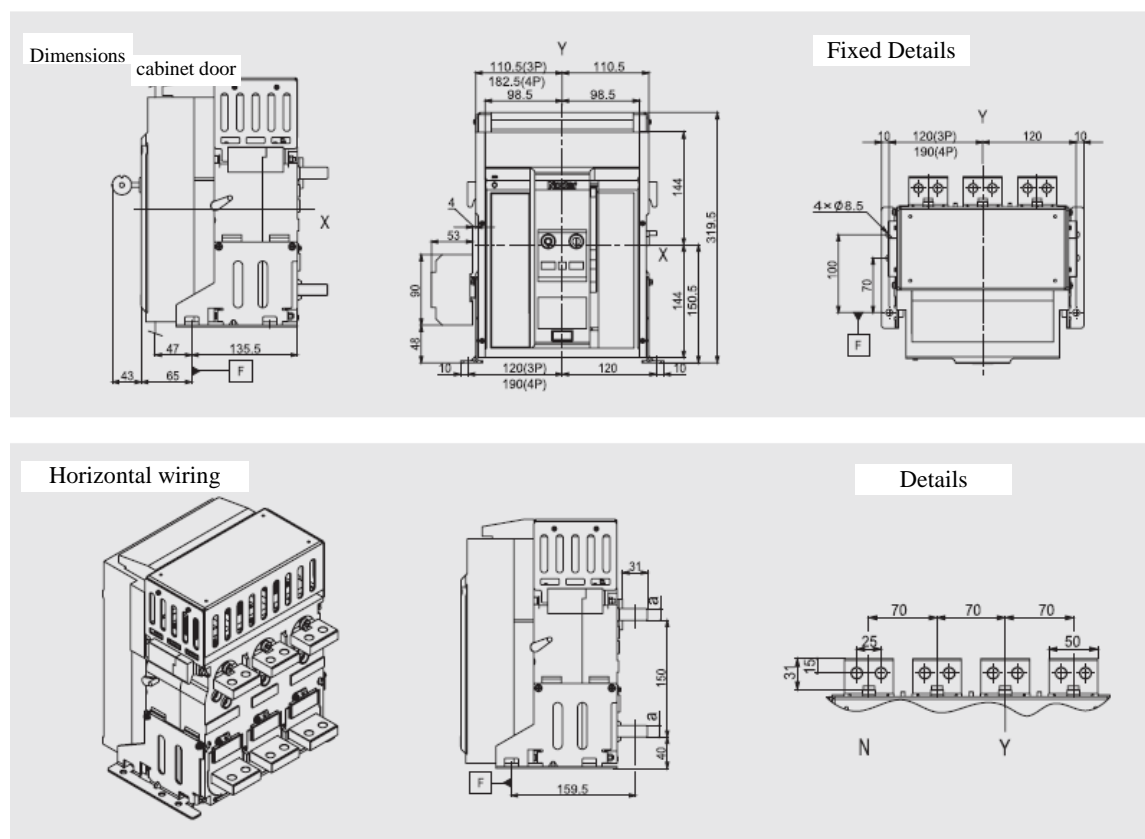
6.6 The Circuit Breaker Cabinet Door Open Hole and the Installation Pitch.....90

Outline and Installation Dimensions

6

NDW1A-1600

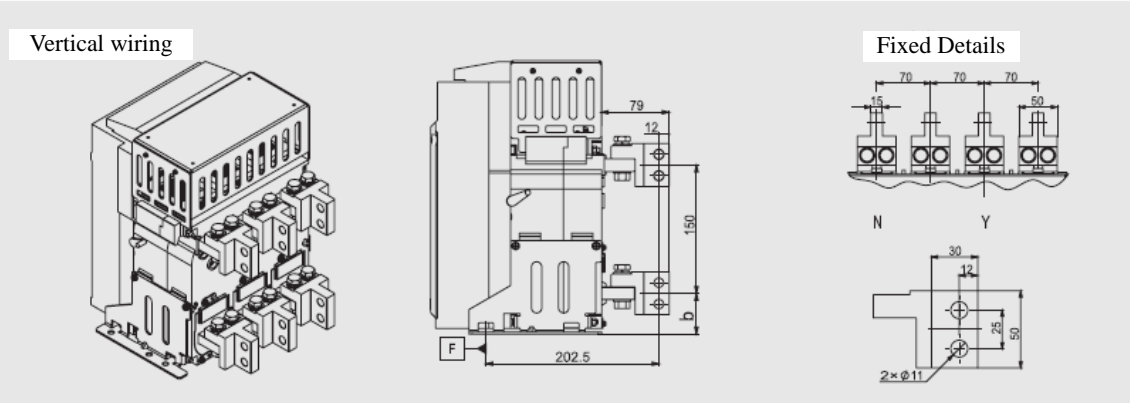
NDW1A-1600 fixed type (unit: mm)



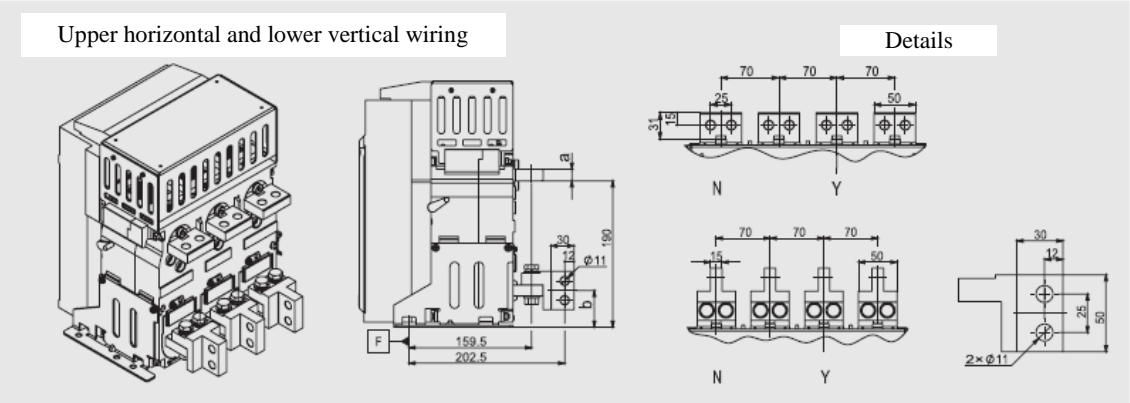
Note: the circuit breaker's X and Y are symmetric axes of the front mask

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

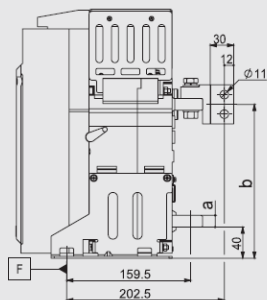
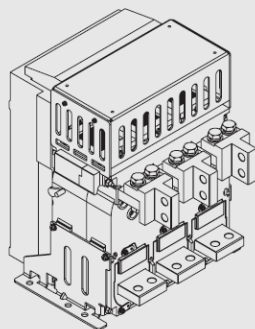


Rated current	b Dimension (mm)
200A, 400A, 630A, 800A,1000A	42.5
1250A, 1600A	47.5

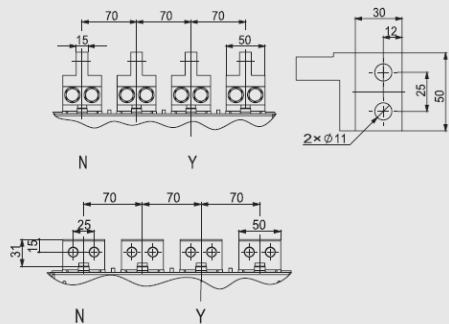


Rated current	Size of busbar a (mm)	b Dimension (mm)
200A, 400A, 630A, 800A,1000A	10	42.5
1250A, 1600A	15	47.5

Upper vertical and lower horizontal wiring

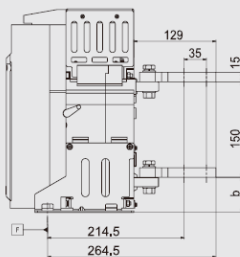
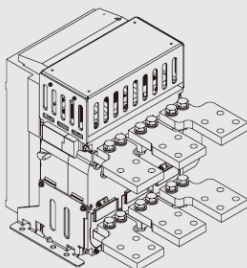


Fixed Details

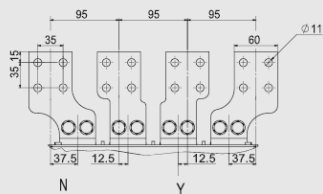
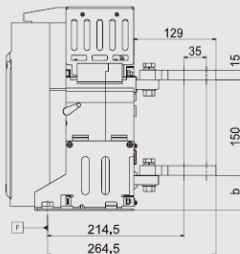
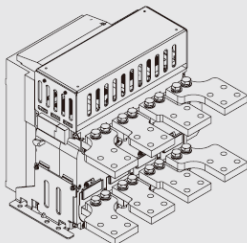
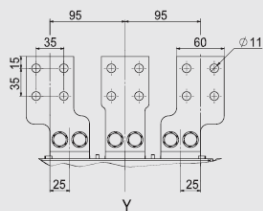


Rated current	Size of busbar a (mm)	b Dimension (mm)
200A, 400A, 630A, 800A,1000A	10	192.5
1250A, 1600A	15	197.5

Horizontal extended wiring

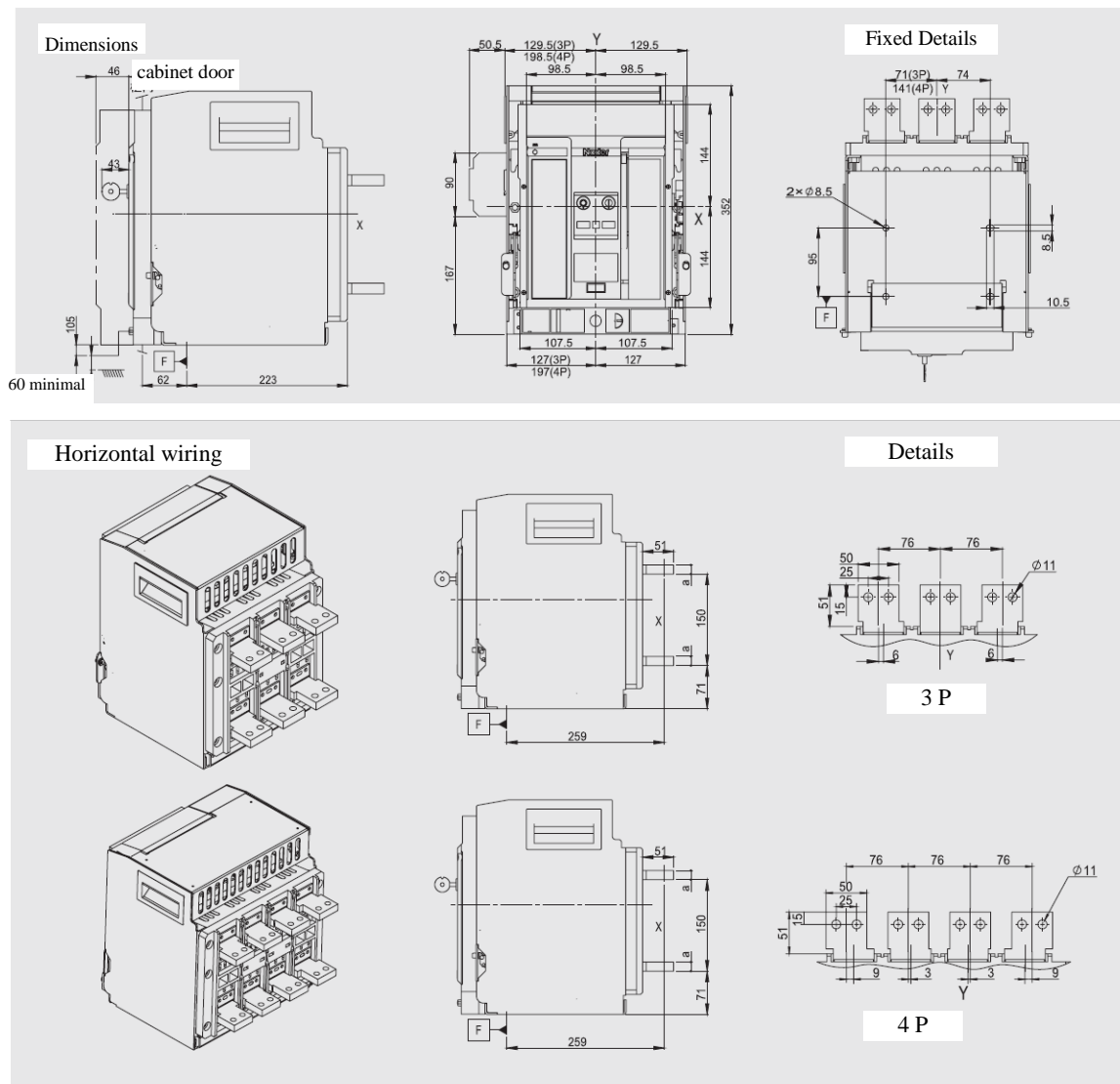


详图



Rated current	b Dimension (mm)
200A, 400A, 630A, 800A,1000A	50
1250A, 1600A	50

NDW1A-1600 drawout type (unit: mm)

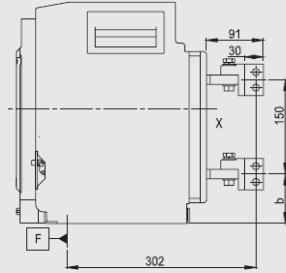
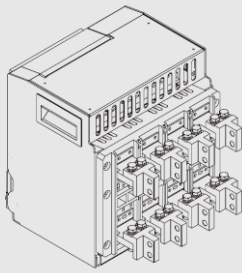


Note: the circuit breaker's X and Y are symmetric axes of the front mask

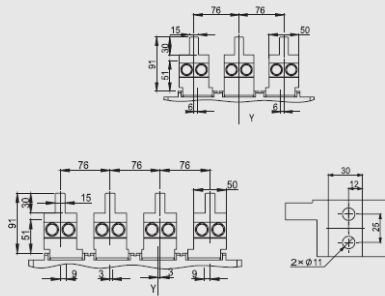
Connection bolt between bus and terminal	Torque applied with a flat washer (N.m)
M10	45

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

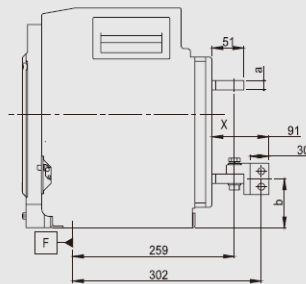
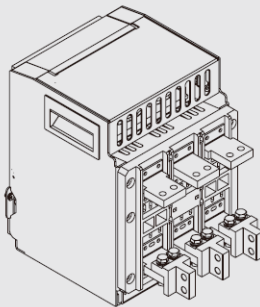
Vertical wiring



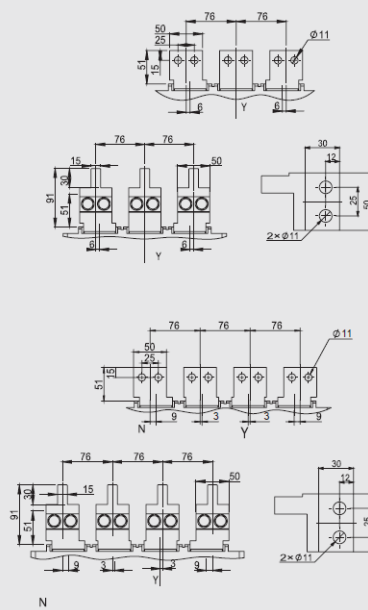
Details



Upper horizontal and lower vertical wiring



Details

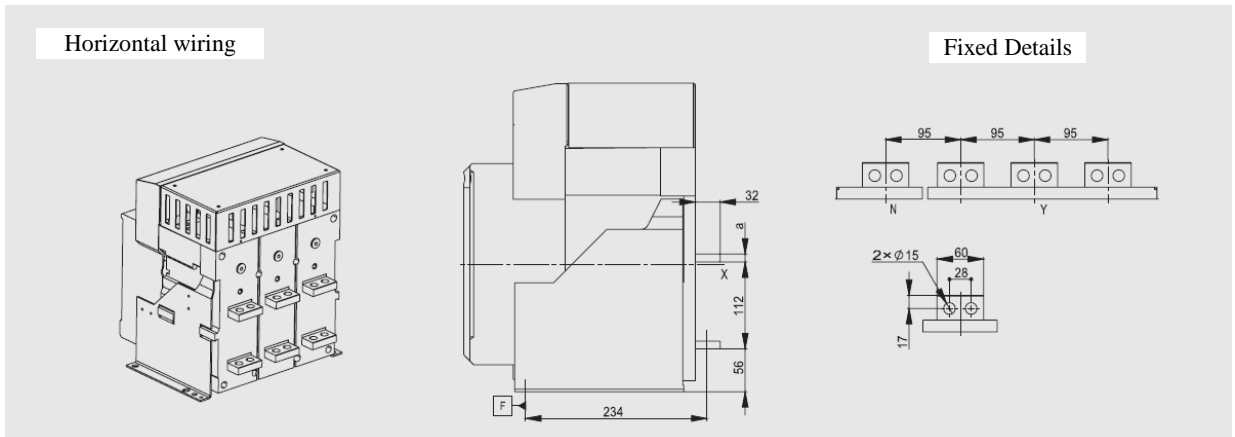
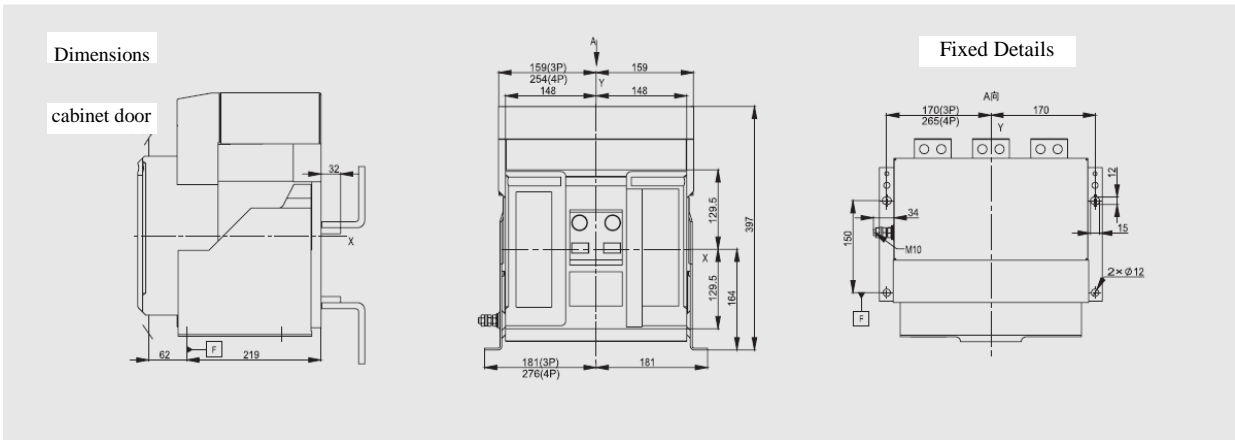


Note: the circuit breaker's X and Y are symmetric axes of the front mask

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

6.2 NDW1A-2000

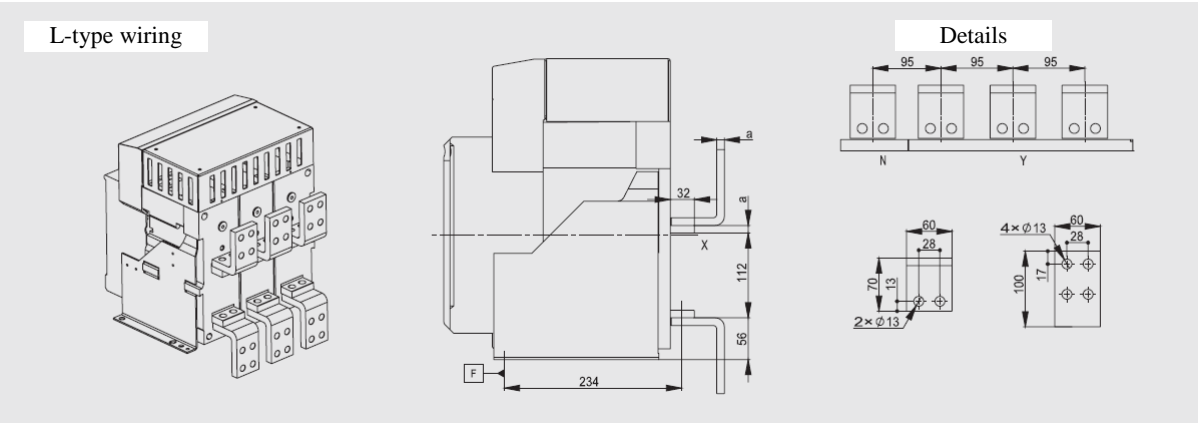
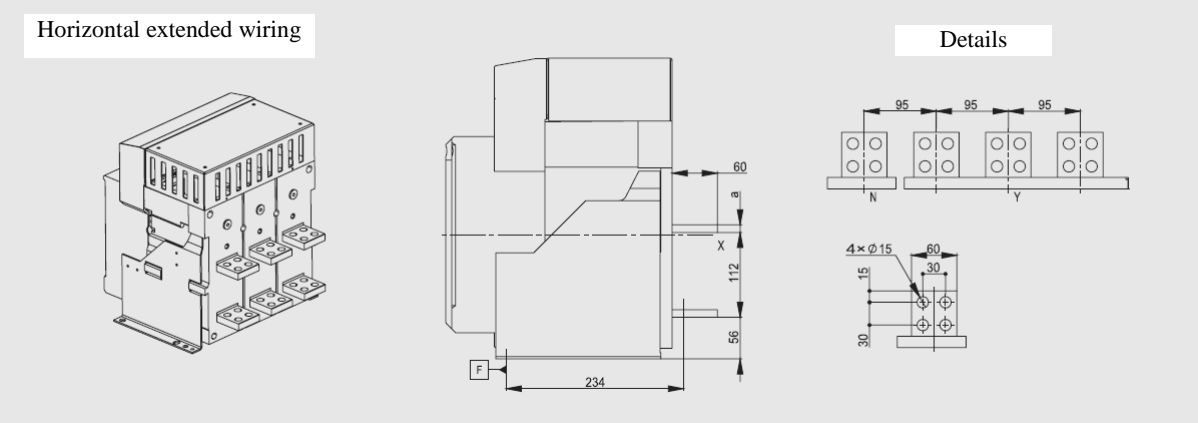
NDW1A-2000 fixed type wiring



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

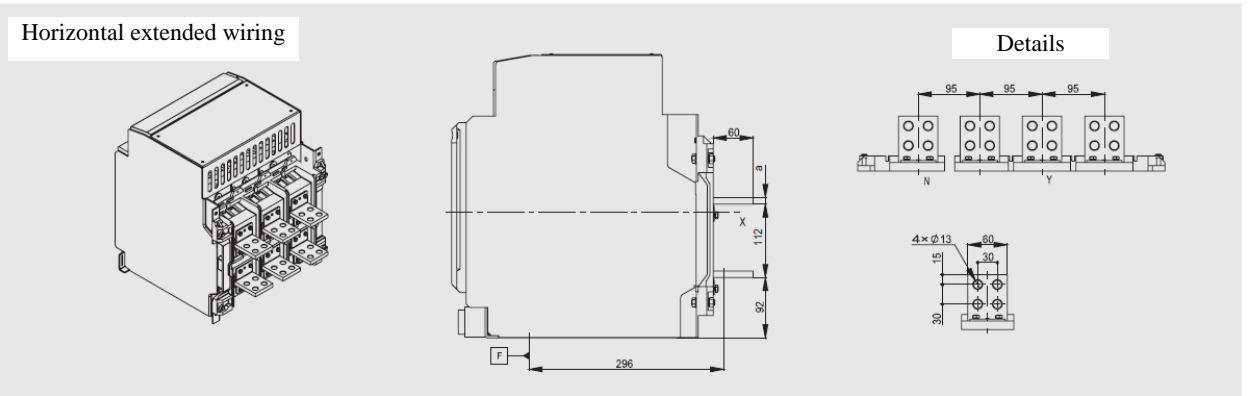
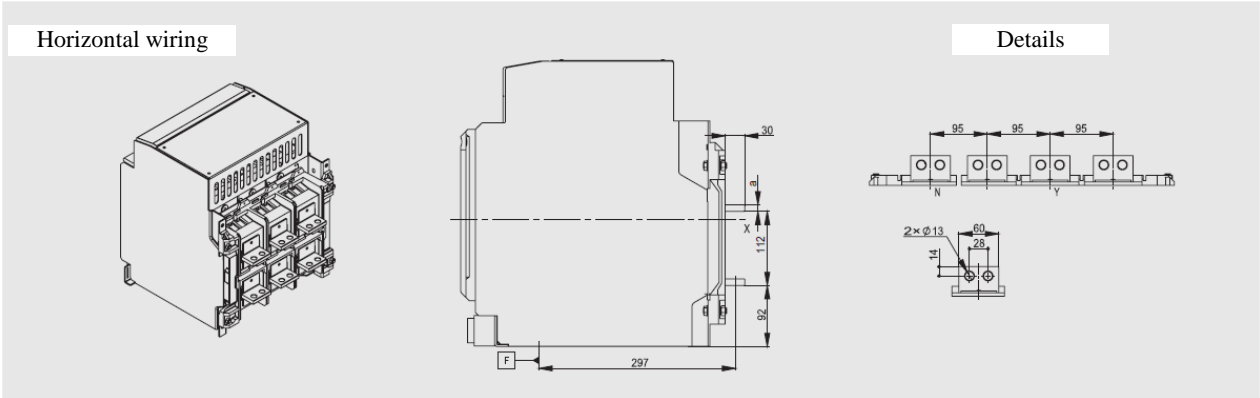
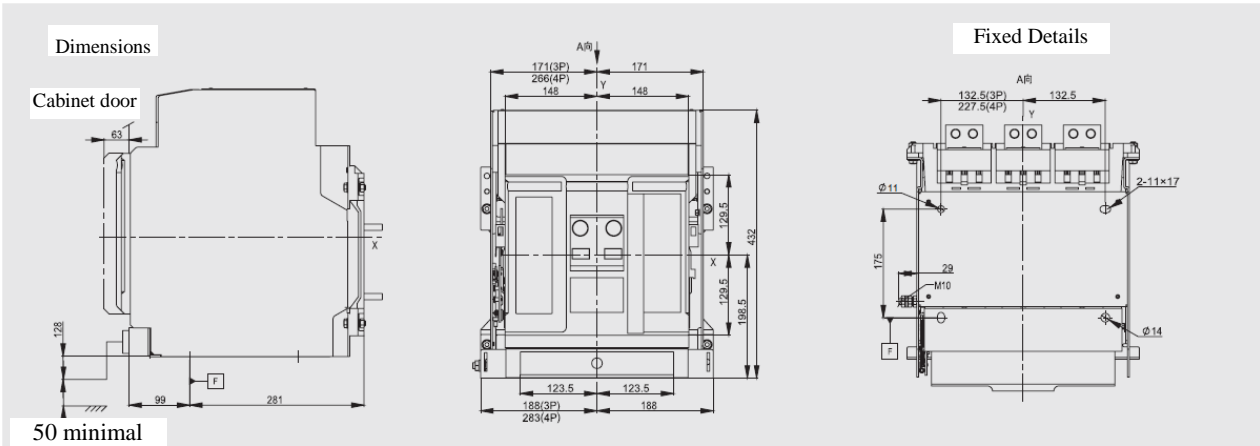
Rated current	Size of busbar a (mm)
400A, 630A, 800A	10
1000A, 1250A, 1600A	15
2000A	20



Note: 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

NDW1A-2000 drawout type

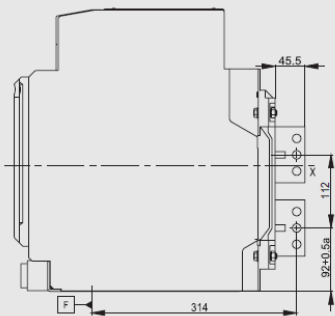
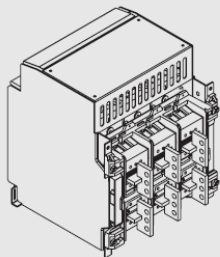


Note: the circuit breaker's X and Y are symmetric axes of the front mask

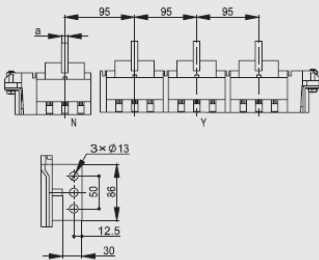
Connection bolt between bus and terminal	Torque applied with a flat washer (N.m)
M12	60

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

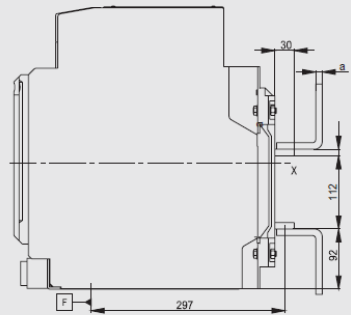
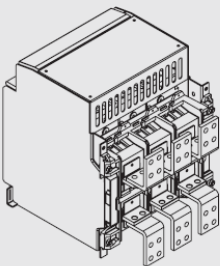
Vertical wiring



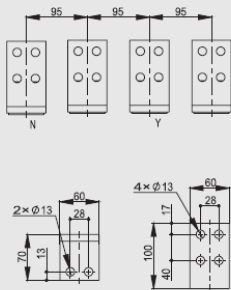
Details



L-type wiring



Details

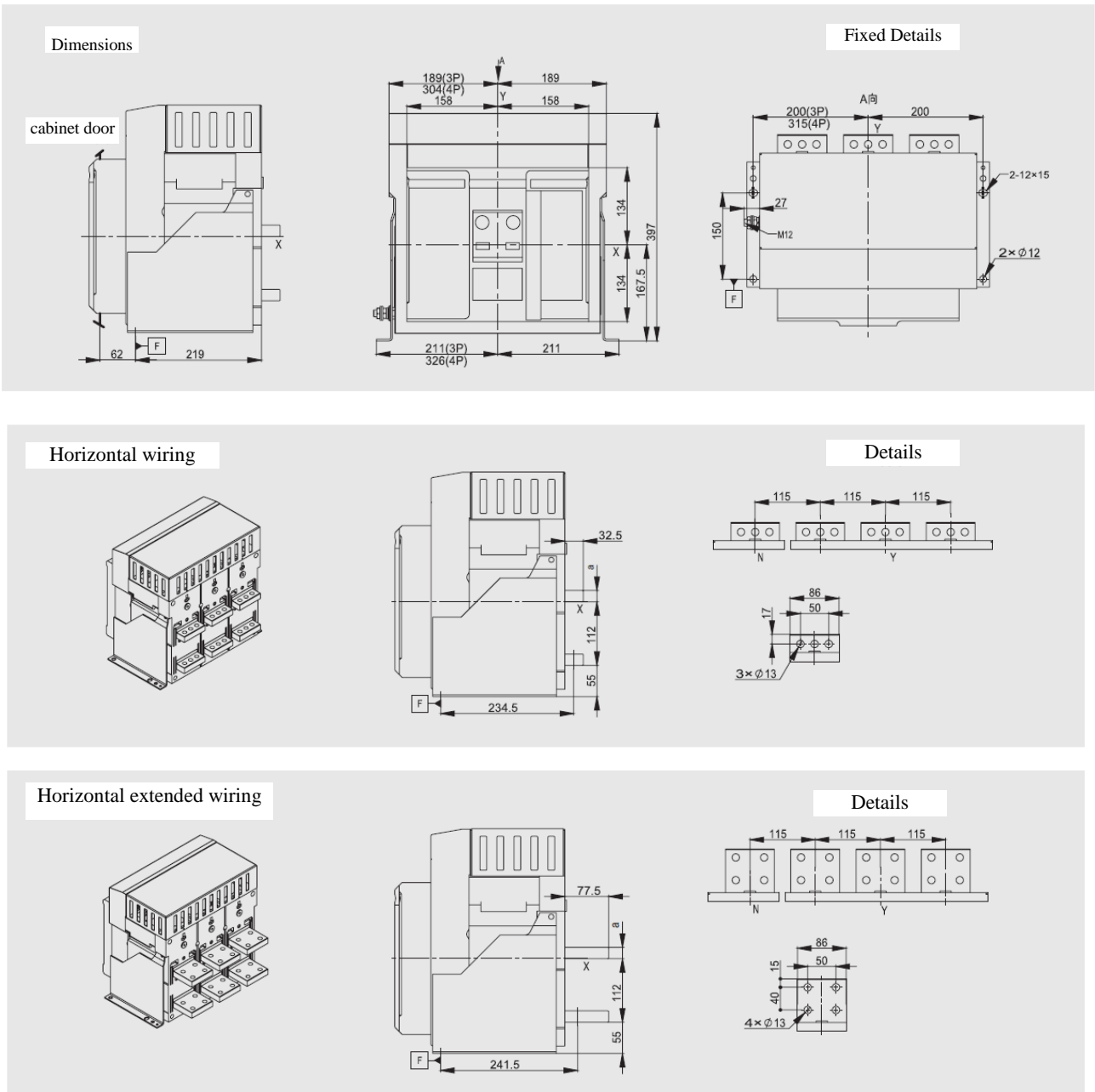


Note: the circuit breaker's X and Y are symmetric axes of the front mask

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

6.3 NDW1A-3200

NDW1A-3200 fixed type

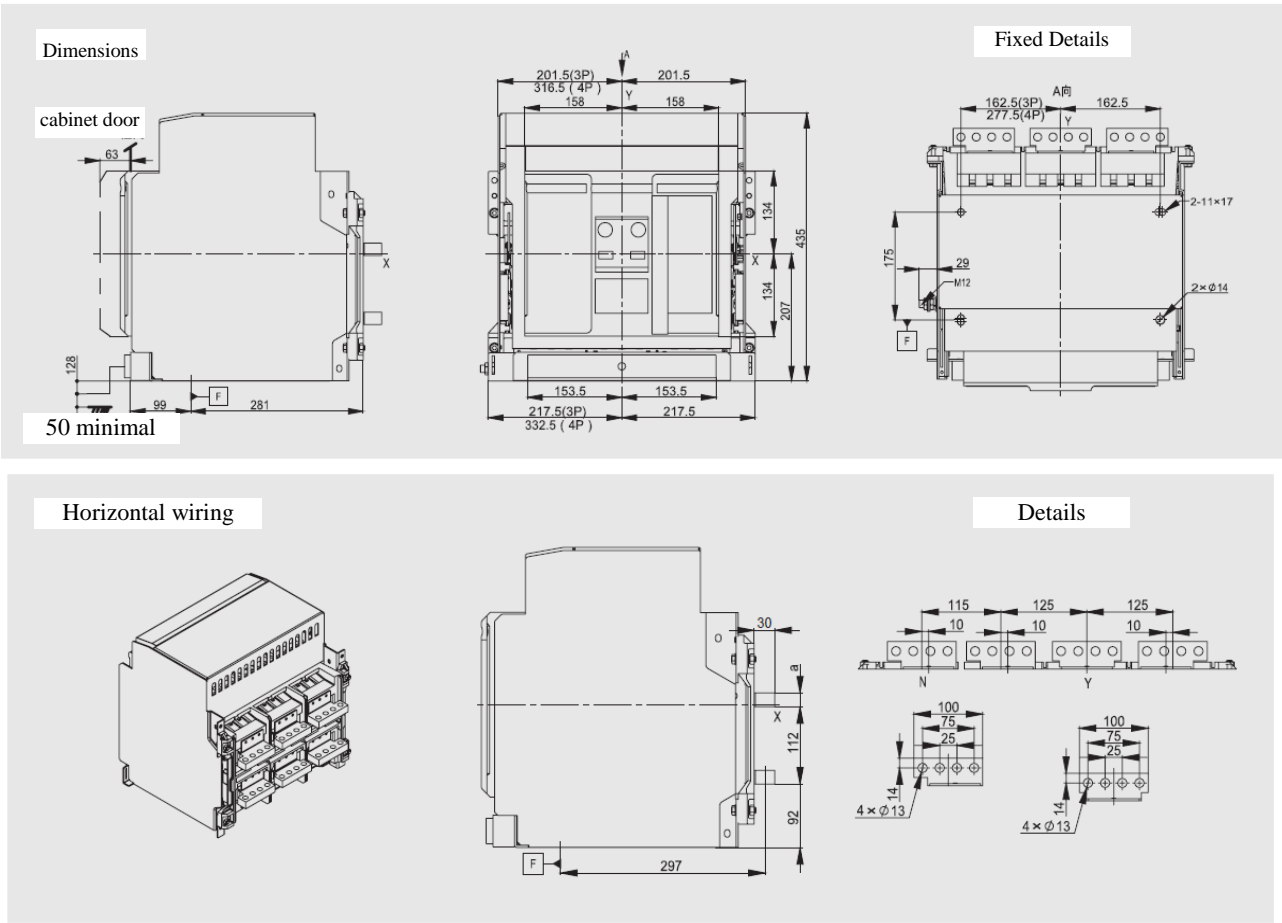


Note: the circuit breaker's X and Y are symmetric axes of the front mask

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

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

NDW1A-3200 drawout type

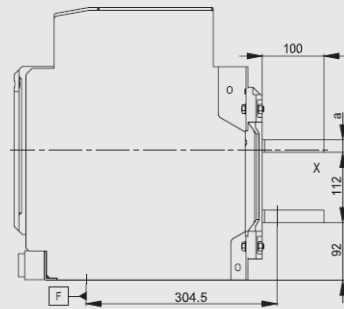
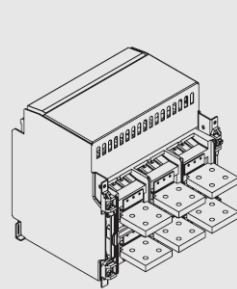


Note: the circuit breaker's X and Y are symmetric axes of the front mask

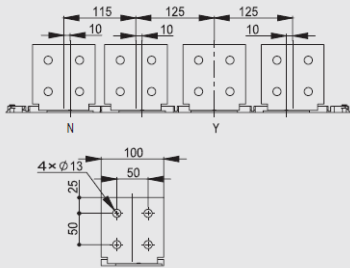
Connection bolt between bus and terminal	Torque applied with a flat washer (N.m)
M12	60

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

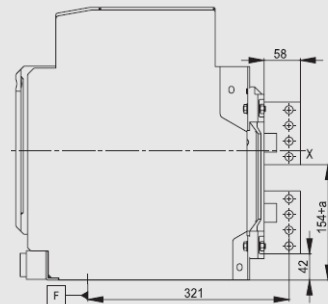
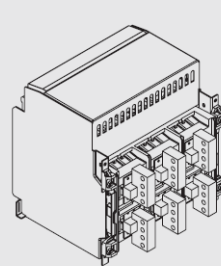
Horizontal extended wiring



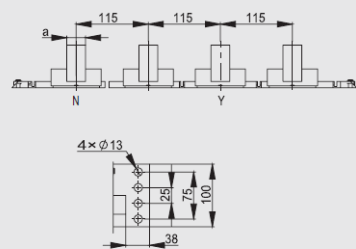
Fixed Details



Vertical wiring



Details

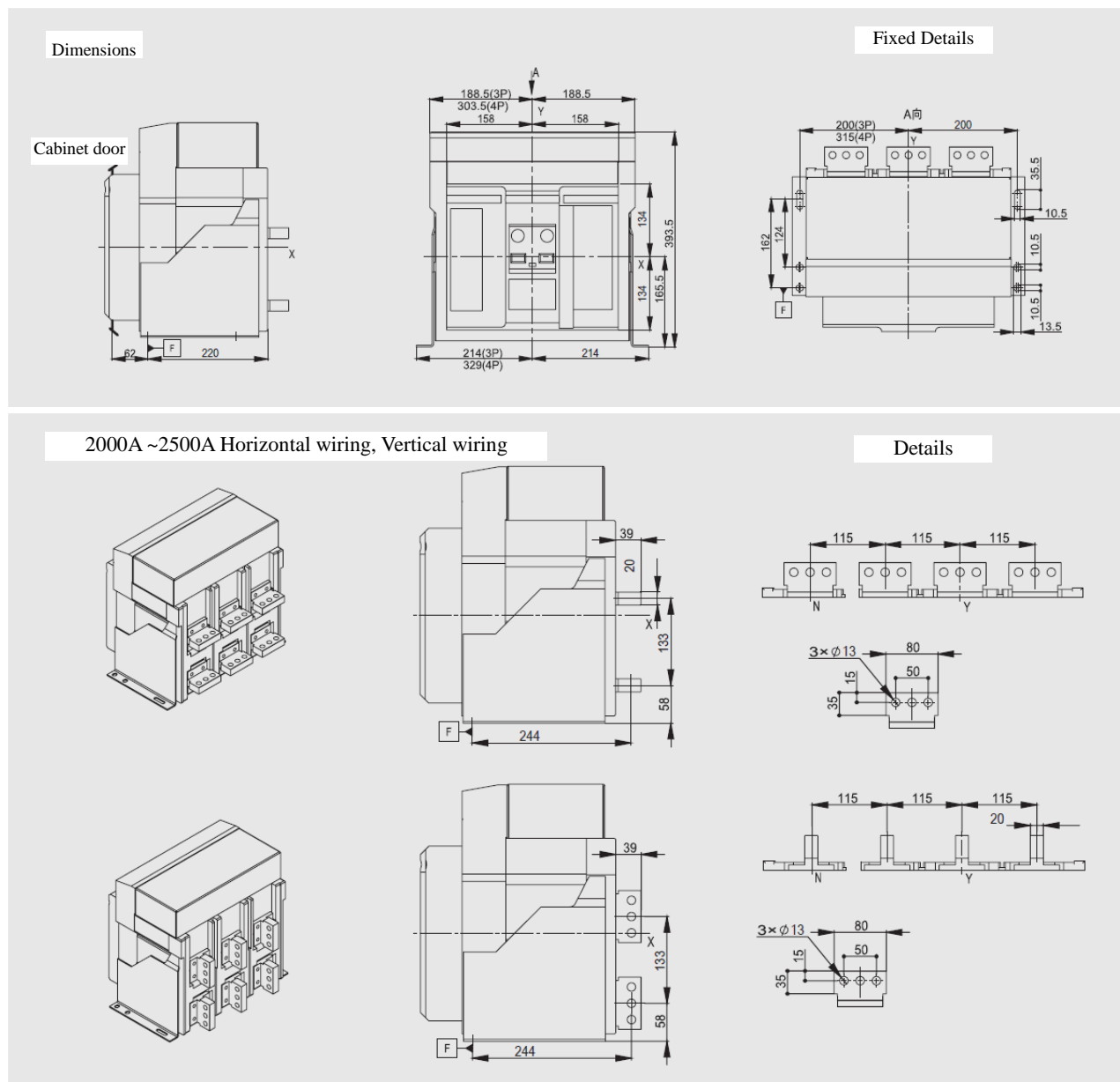


Note: the circuit breaker's X and Y are symmetric axes of the front mask

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

6.4 NDW1A-4000

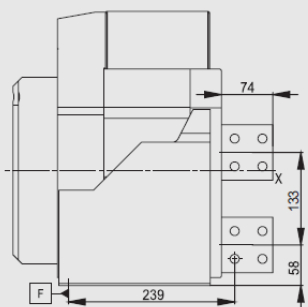
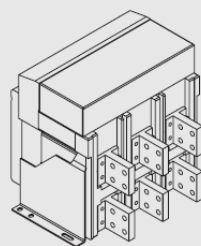
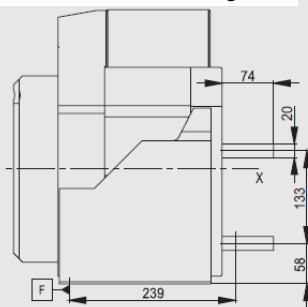
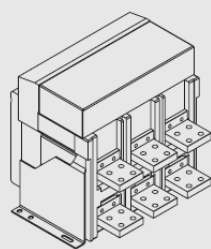
NDW1A-4000 fixed type



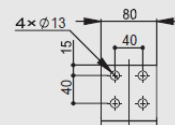
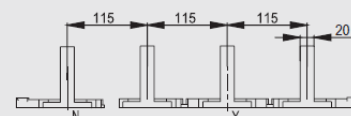
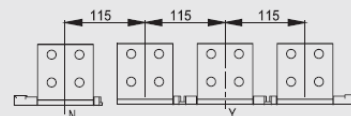
Note: the circuit breaker's X and Y are symmetric axes of the front mask

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

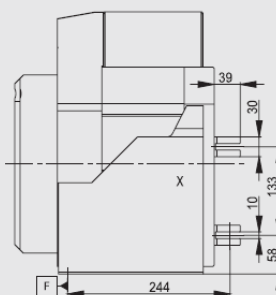
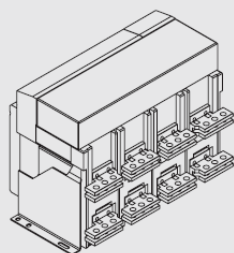
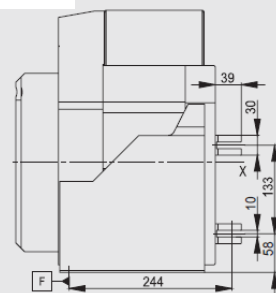
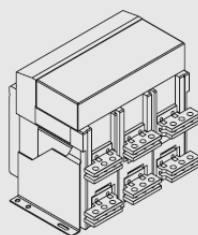
2000A-2500A horizontal extended, vertical extended wiring



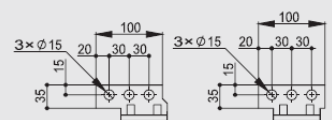
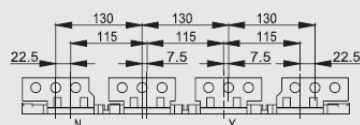
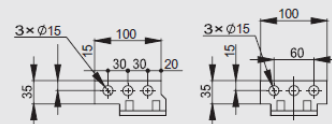
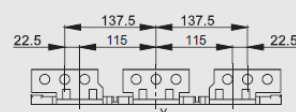
Details



3200A-4000A horizontal wiring

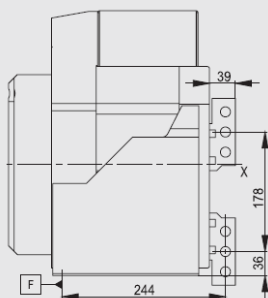
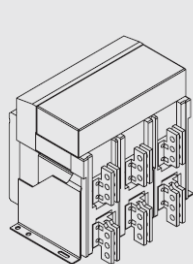


Details

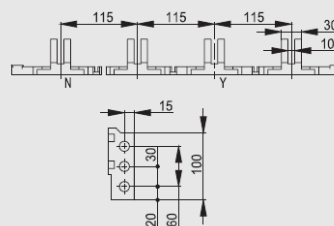


Note: the circuit breaker's X and Y are symmetric axes of the front mask

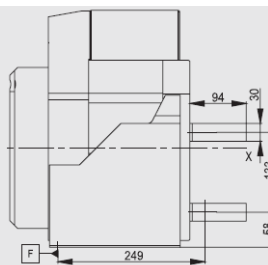
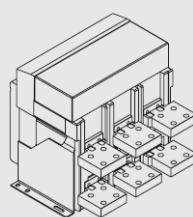
3200A-4000A vertical wiring



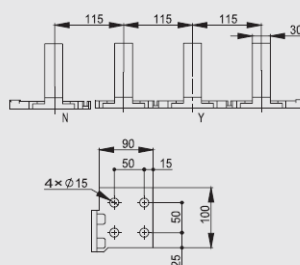
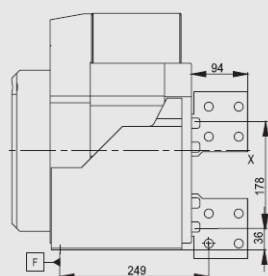
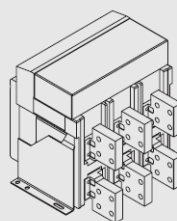
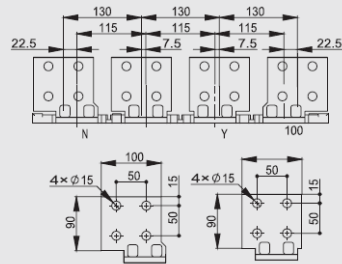
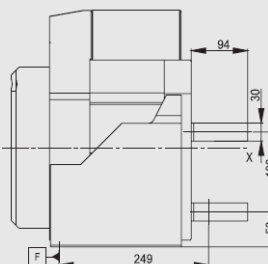
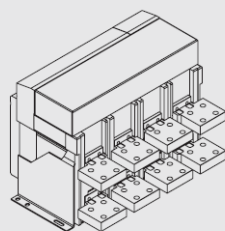
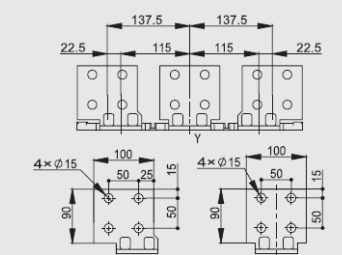
Details



3200A-4000A horizontal extended and vertical extended wiring

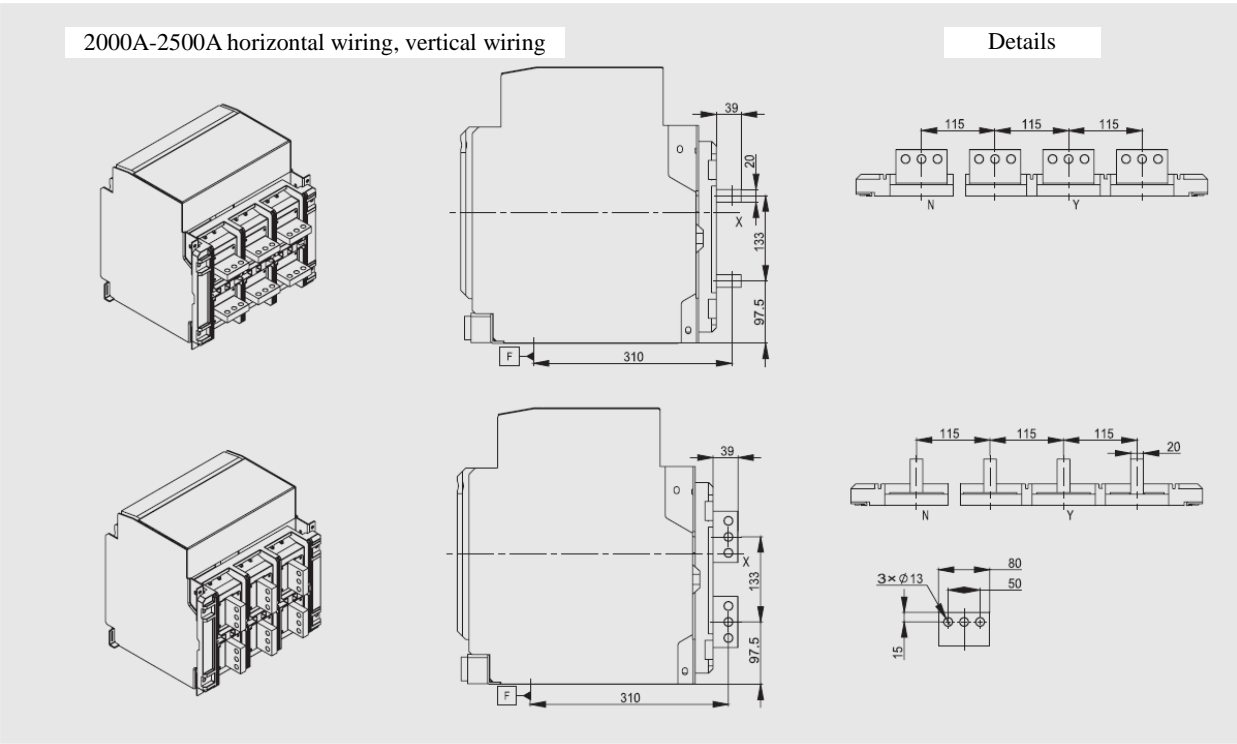
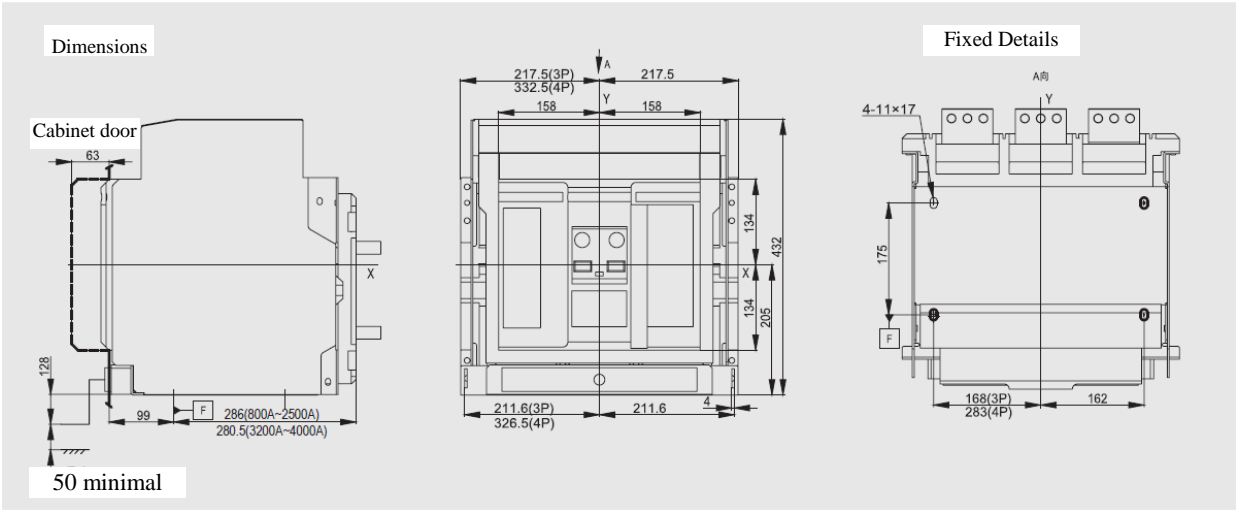


Details



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

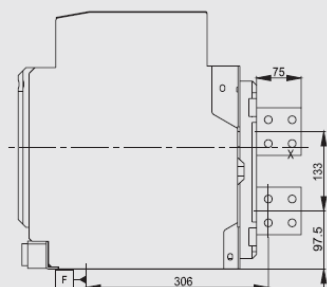
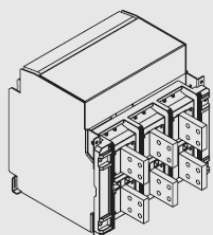
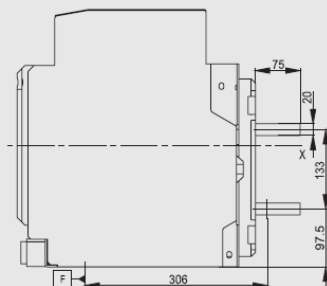
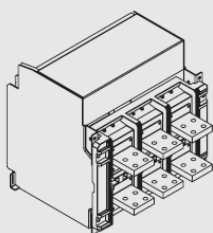
NDW1A-4000 drawout type



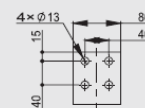
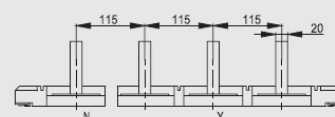
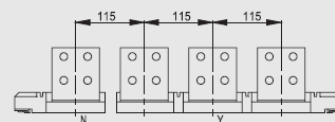
Note: the circuit breaker's X and Y are symmetric axes of the front mask

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

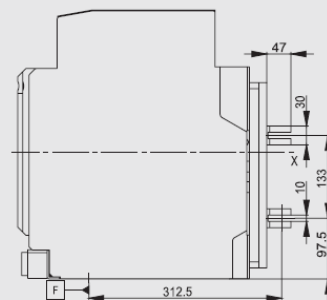
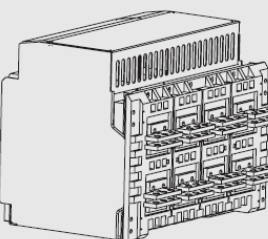
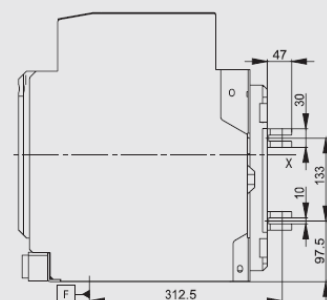
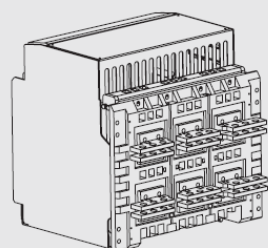
2000A-2500A horizontal extended wiring, vertical extended wiring



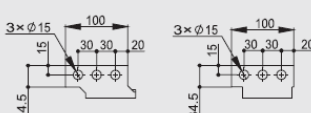
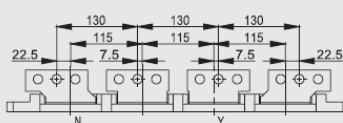
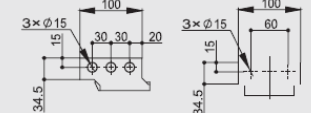
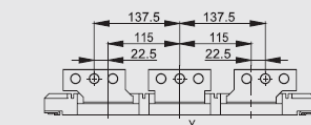
Details



3200A-4000A horizontal wiring

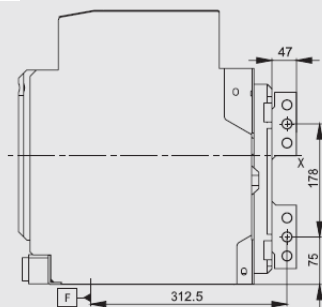
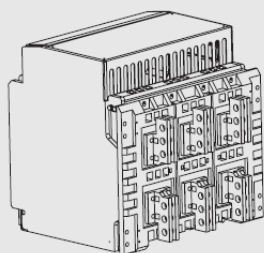


Details

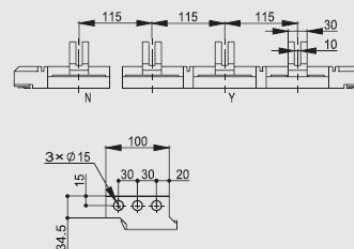


Note: the circuit breaker's X and Y are symmetric axes of the front mask

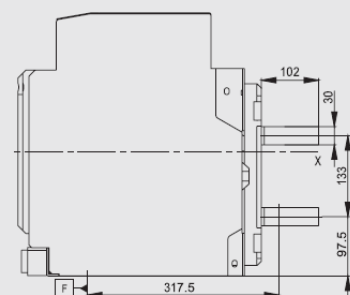
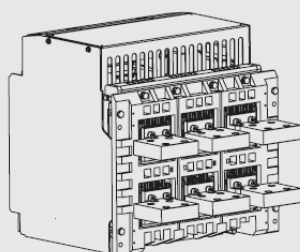
3200A-4000A vertical wiring



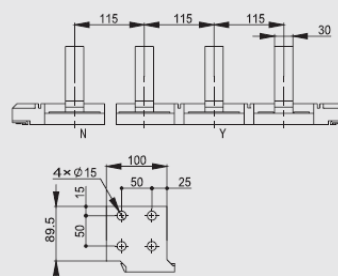
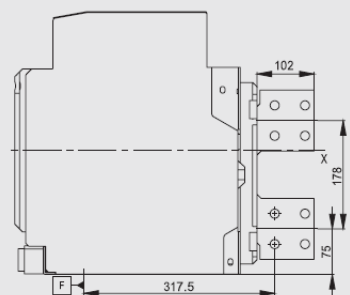
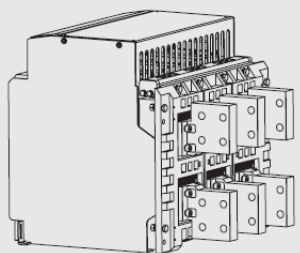
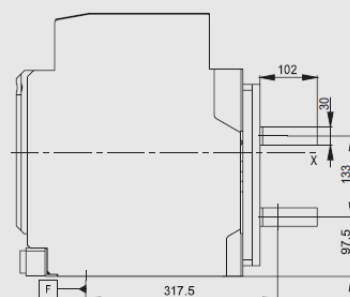
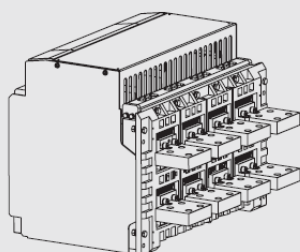
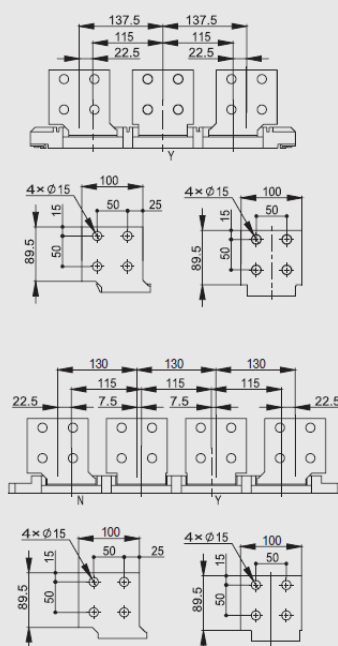
Details



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

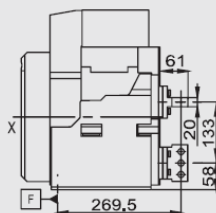
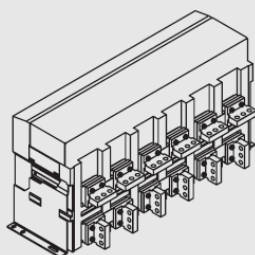


Details

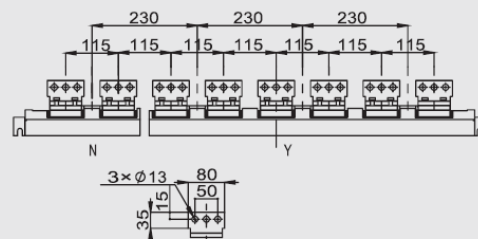


Note: the circuit breaker's X and Y are symmetric axes of the front mask

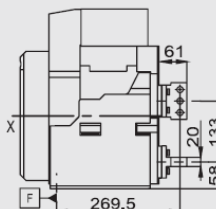
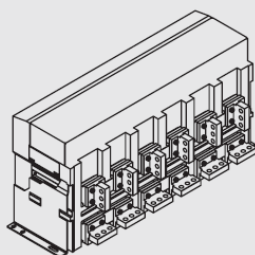
Mixing wiring (upper horizontal and lower vertical)



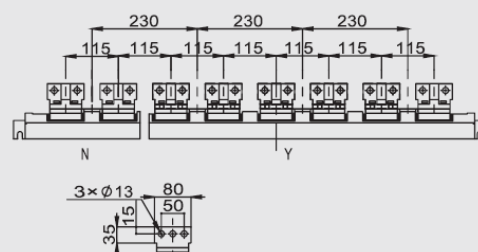
Details



Mixing wiring (upper vertical and lower horizontal)

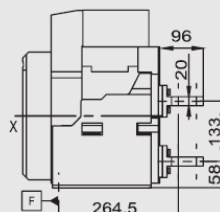
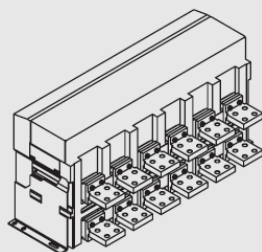


Details

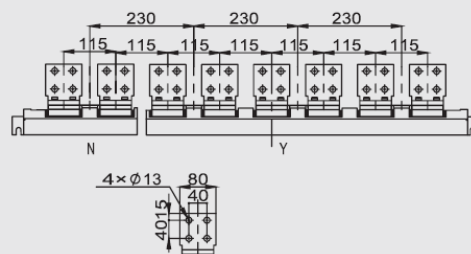


4000A-5000A Horizontal Extended, Vertical Extended and Mixed Extended Wiring

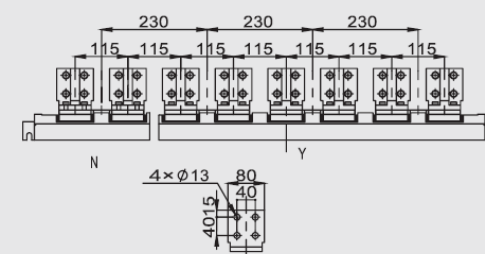
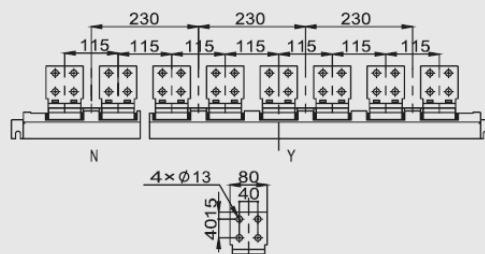
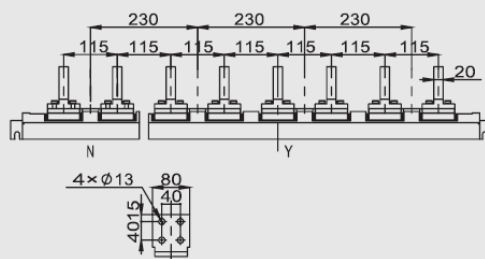
Horizontal extended wiring



Details

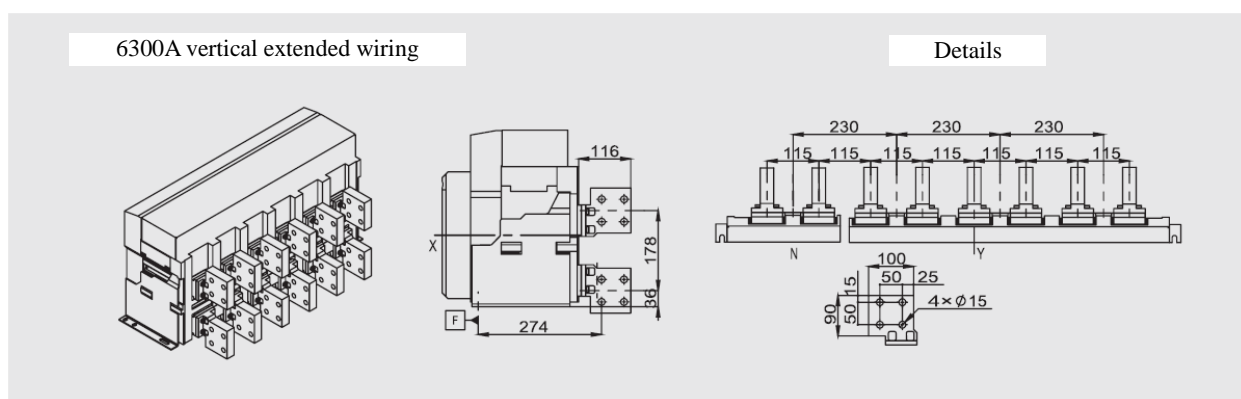
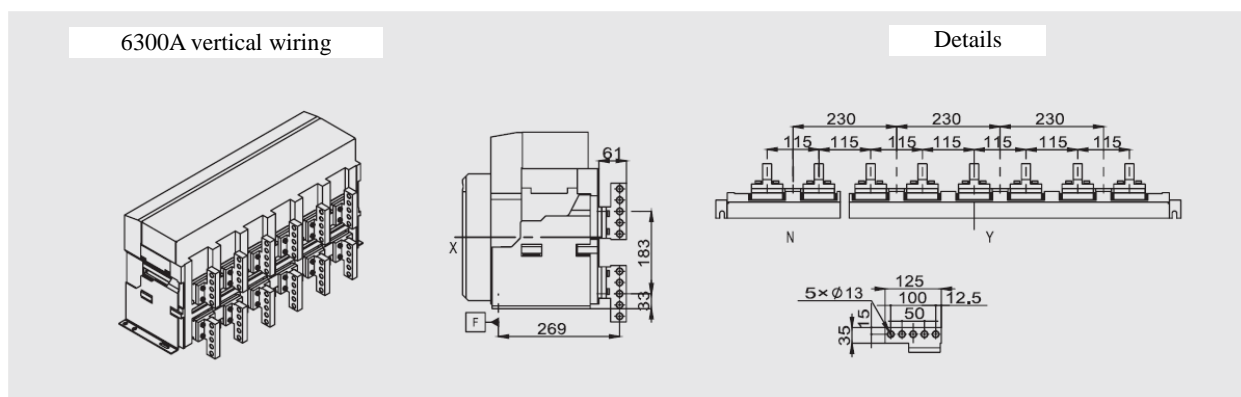


Note: the circuit breaker's X and Y are symmetric axes of the front mask

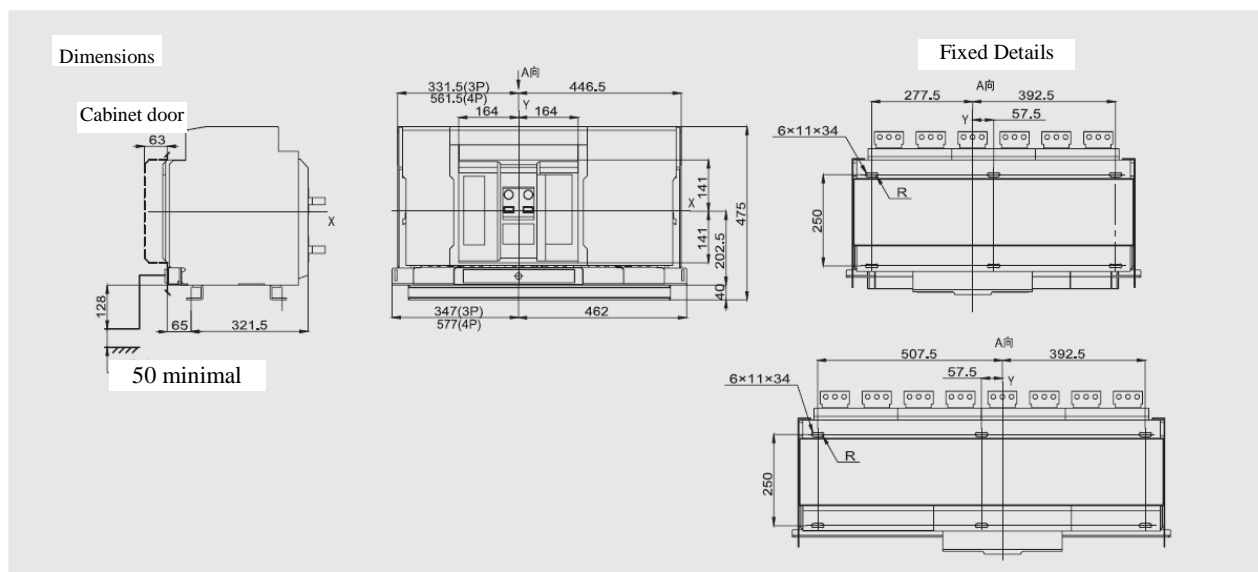


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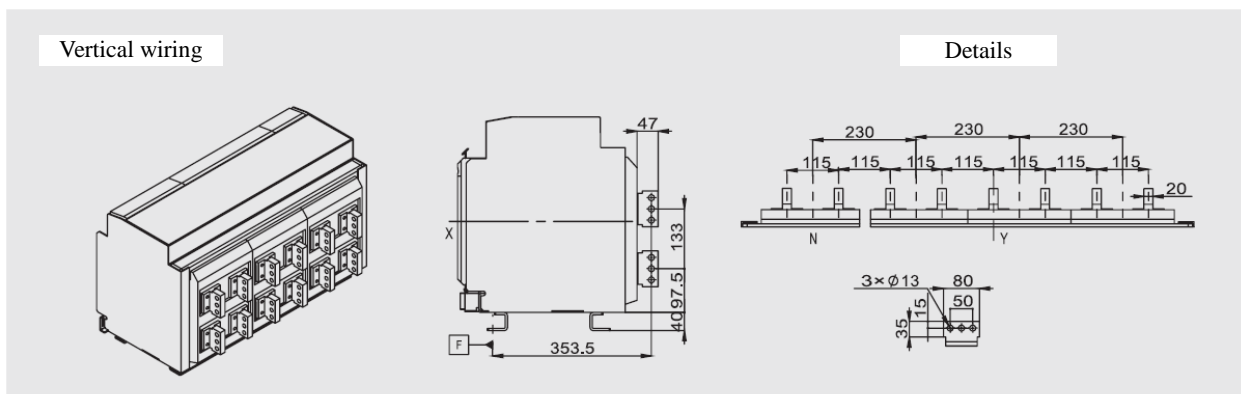
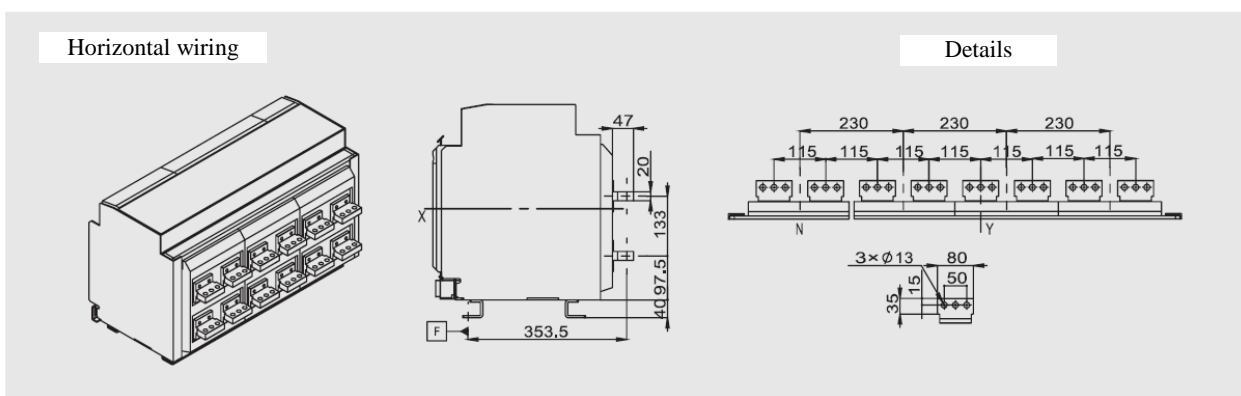
6300A vertical wiring and vertical extended wiring



NDW1A-6300 drawout type (unit: mm)

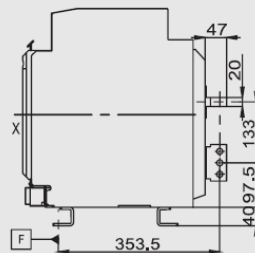
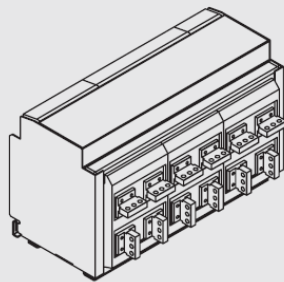


4000A-5000A horizontal, vertical, mixed wiring

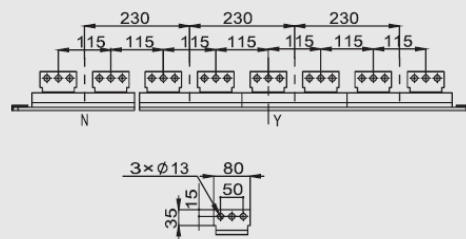


Note: the circuit breaker's X and Y are symmetric axes of the front mask

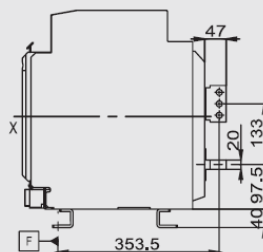
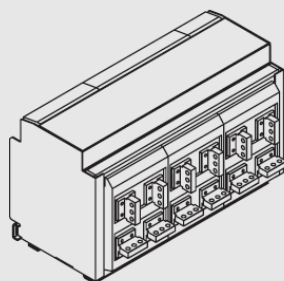
Mixing wiring (upper horizontal and lower vertical)



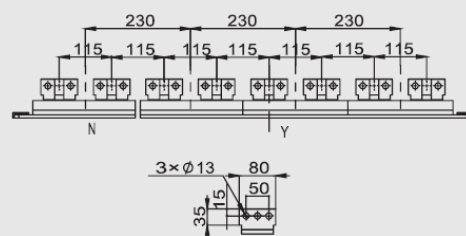
Details



Mixing wiring (upper vertical and lower horizontal)

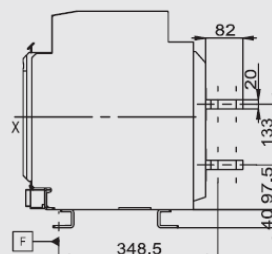
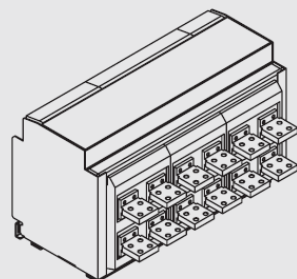


Details

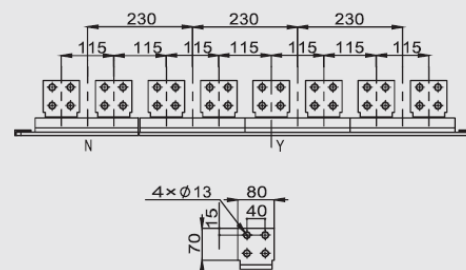


4000A-5000A horizontal extended, vertical extended, mixed extended wiring

Horizontal extended wiring

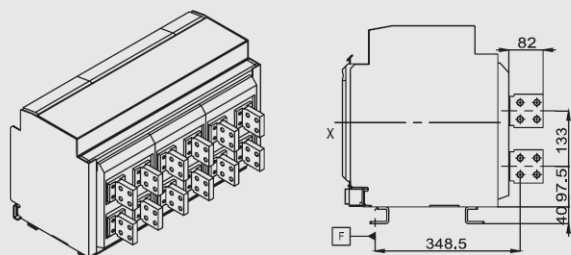


Details

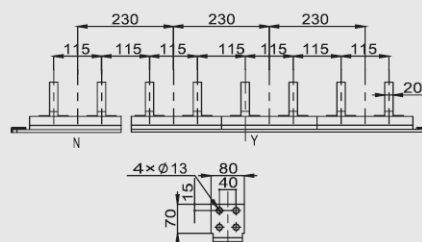


Note: the circuit breaker's X and Y are symmetric axes of the front mask

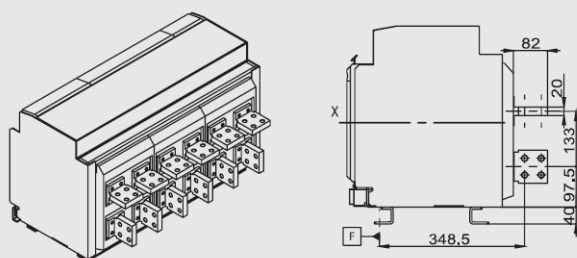
Vertical extended wiring



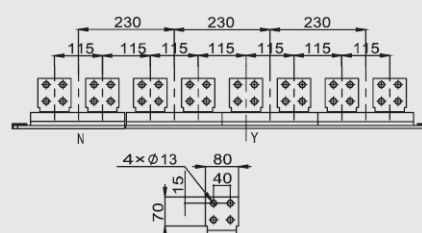
Details



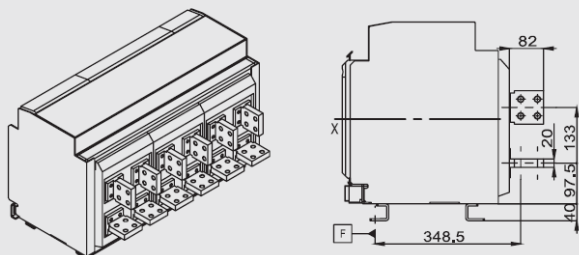
Mixed extended wiring (upper horizontal, lower vertical)



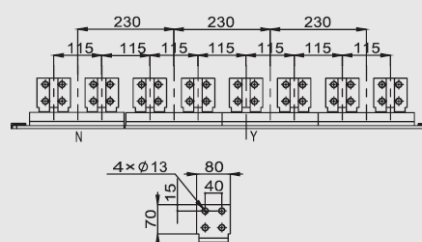
Details



Mixed extended wiring (upper vertical, lower horizontal)

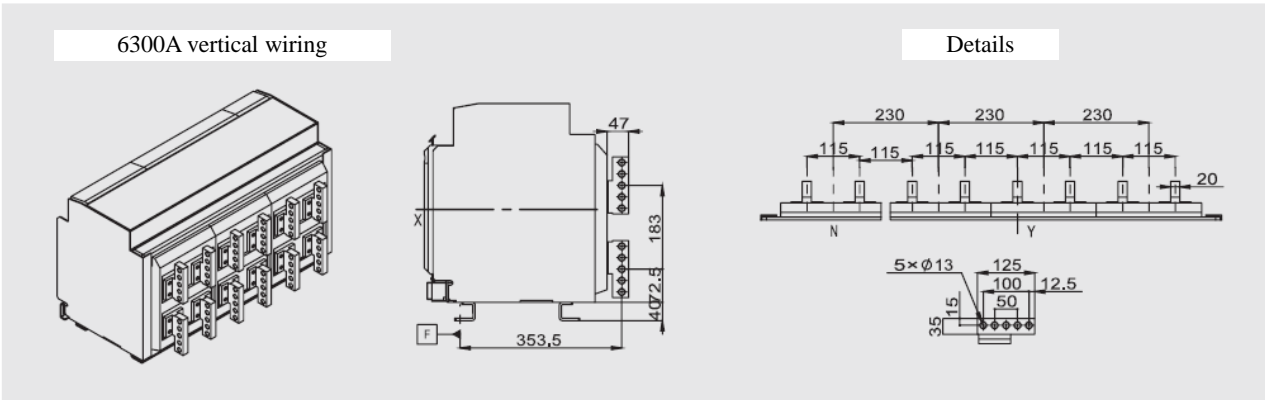


Details

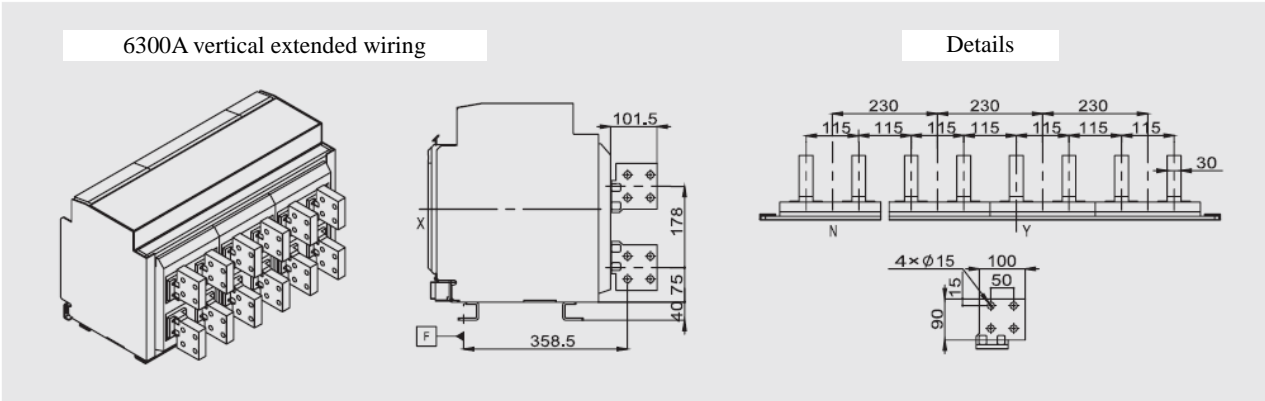


Note: the circuit breaker's X and Y are symmetric axes of the front mask

6300A vertical wiring and vertical extended wiring



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



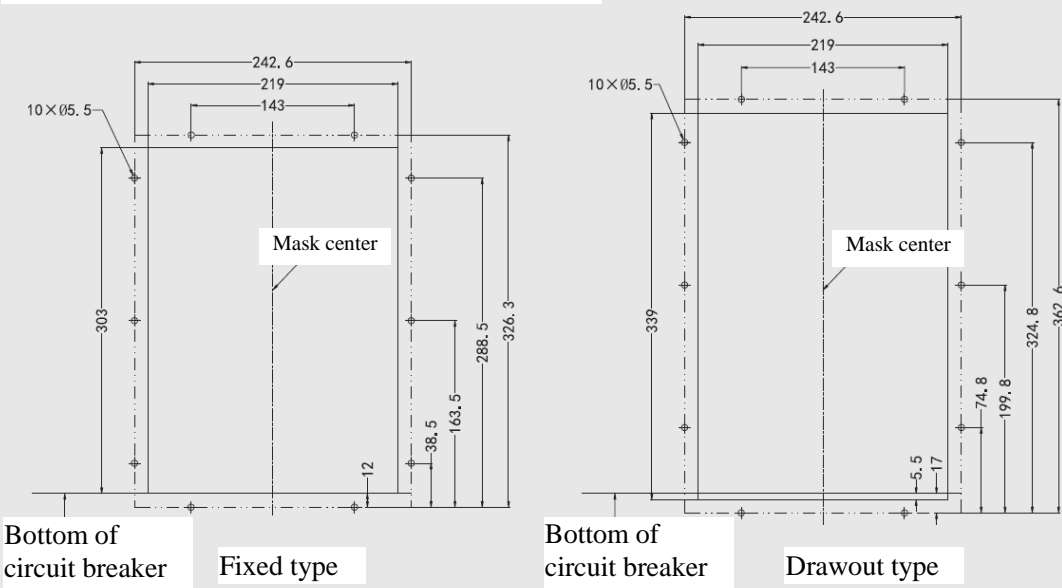
Note: the circuit breaker's X and Y are symmetric axes of the front mask

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

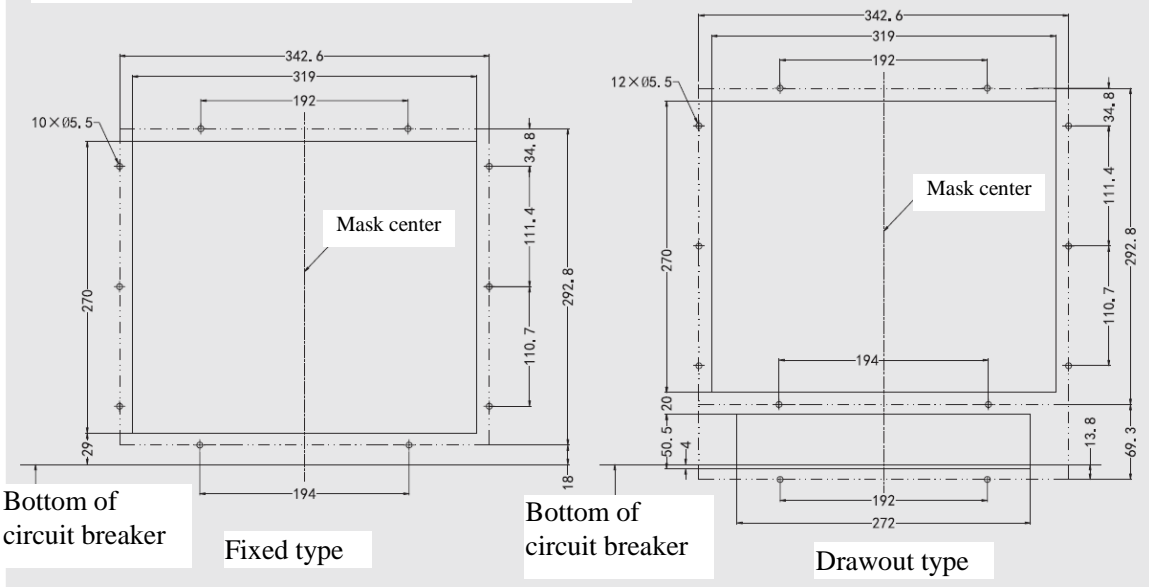
circuit breaker		Connection conditions between bus and terminal
NDW1A-1600		M10 bolt, level 8.8, with contact washer, tightening torque 45N.m
NDW1A-2000		M12 bolt, level 8.8, with contact washer, tightening torque 60N.m
NDW1A-3200		M12 bolt, level 8.8, with contact washer, tightening torque 60N.m
NDW1A-4000	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
NDW1A-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

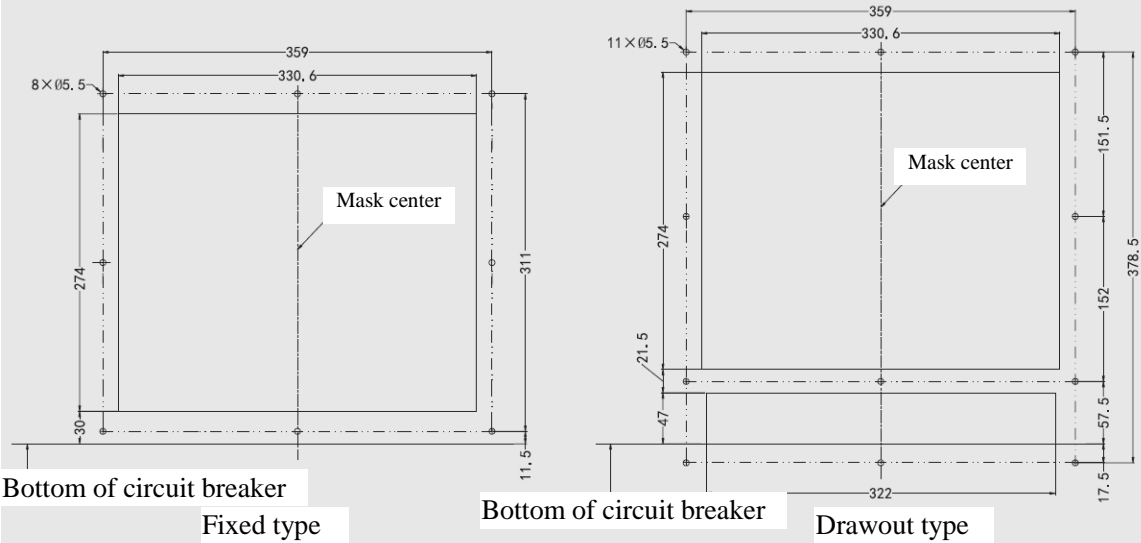
Hole dimensions of NDW1A-1600 door frame



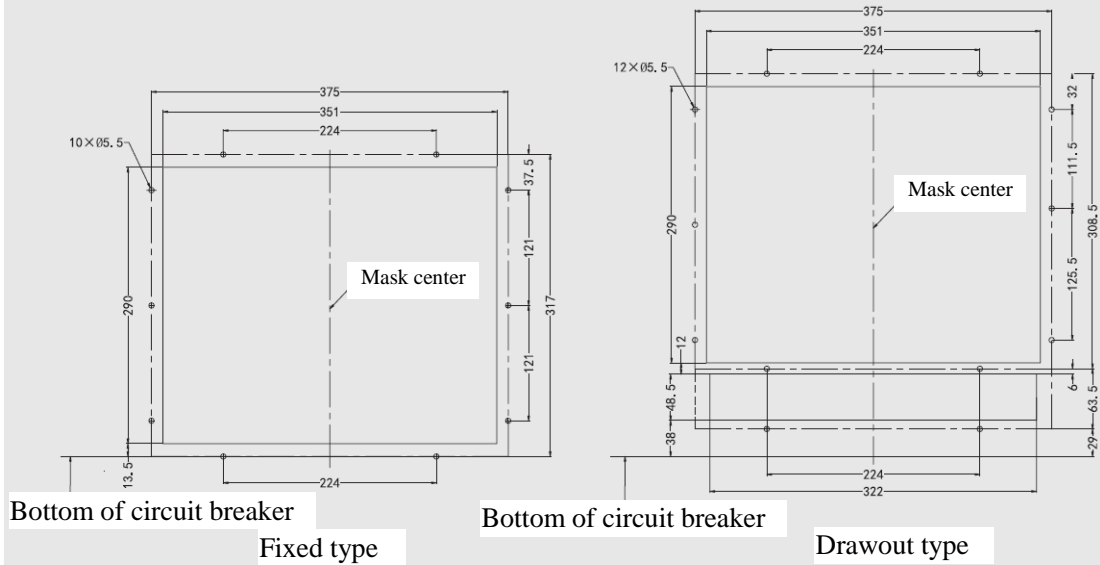
Hole dimensions of NDW1A-2000 door frame



Hole dimensions of NDW1A-3200/4000 door frame



Hole dimensions of NDW1A-6300 door frame



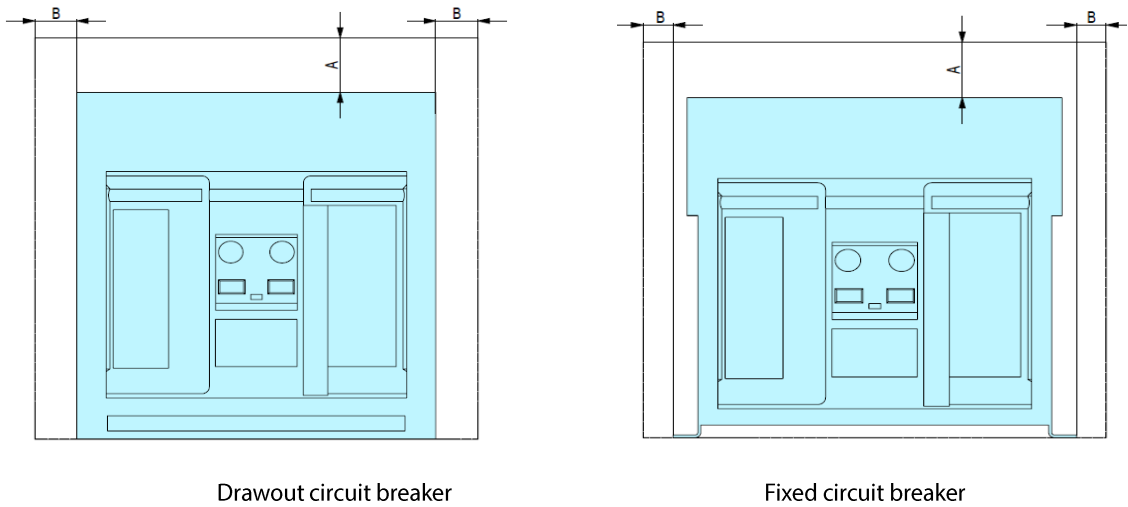
6.6 Circuit Breaker Installation Notes

To ensure your safety and the safety of electrical 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 working 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.



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

Chapter 7 Electrical Wiring Diagram

7.1 NDW1A-1600 Electrical Wiring Diagram and Terminal Number Definition.....96

7.2 NDW1A-2000/3200/6300 Electric Wiring Diagram and Terminal Number Definition.....98

7.3 NDW1A-4000 Electric Wiring Diagram and Terminal Number Definition.....100

7.4 NDW1A-1600 Wiring Diagram of the Power Automatic Transfer Switches Device (ATS).....102

7.5 Wiring diagram of the NDW1A-2000/3200/4000/6300 power Automatic Transfer Switches device (ATS)103

Electrical Wiring Diagram

7

The user shall pay special attention in design of electrical diagram:

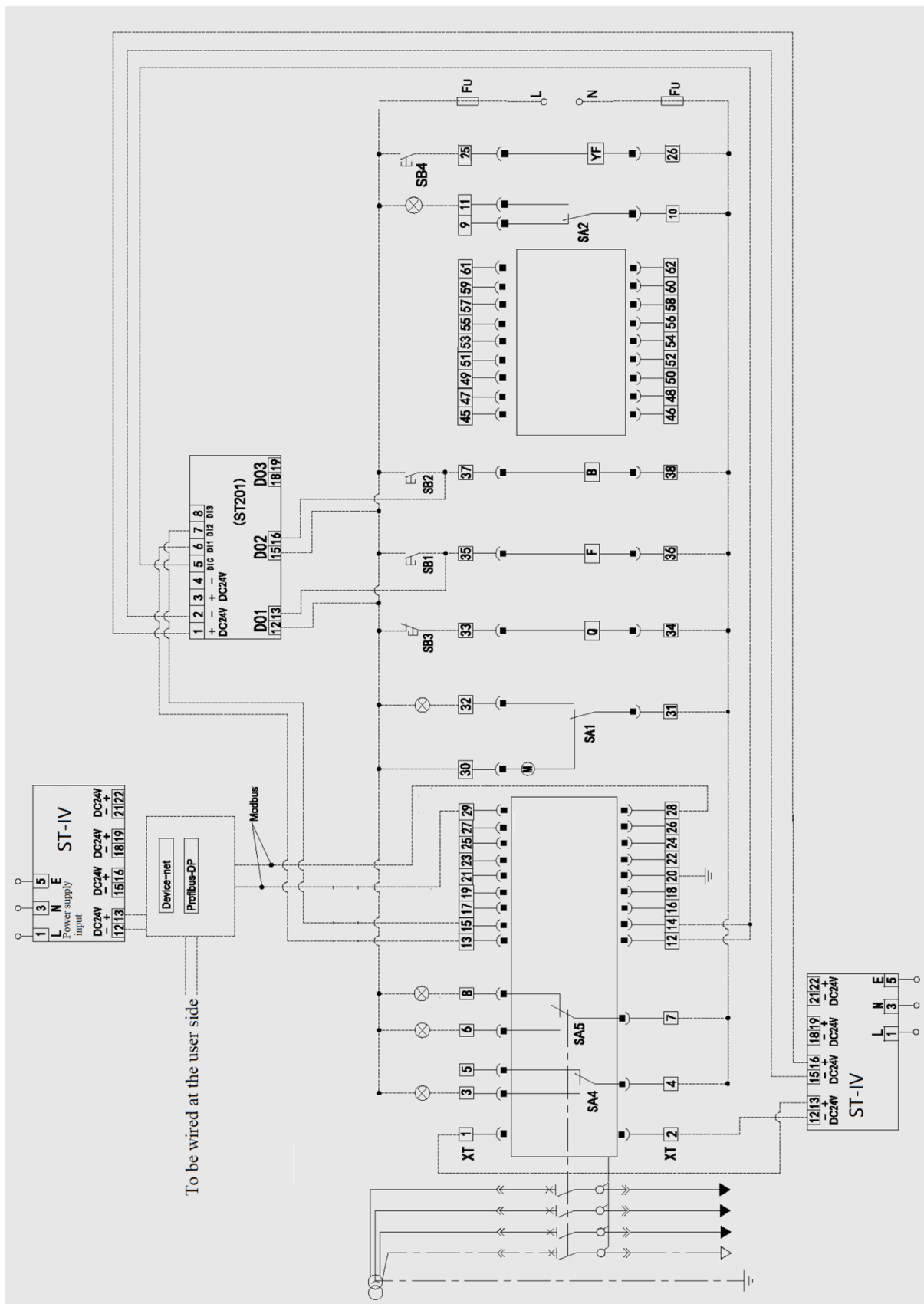
Secondary terminal number/function	3#、4#、5#	6#、7#、8#	Remote reset	Loss of voltage release	Auxiliary switch	41、42、43、44
NDW1A-1600	4# and 5# connected	7# and 8# connected	25#、26#	12#~15#	45#~62#	It may be defined by the user
NDW1A-2000/3200	4# and 3# connected	7# and 6# connected	25#、26#	33#、34#	39#~62#	/
NDW1A-4000	4# and 3# connected	7# and 6# connected	39#、40#	33#、34#	45#~62#	It may be defined by the user
NDW1A-6300	4# and 3# connected	7# and 6# connected	25#、26#	12#~15#	39#~62#	/

Note:

1. The 3#~8# in the above table is the status of no fault and in case of being open.
2. NDW1A-1600/6300 voltage loss release consists of an actuating module and a control module Control module. It shall be installed outside the circuit breaker, and the power is connected into the controller module. The controller module terminal number 12#~15# correspond to the wiring of the secondary terminal number 12#~15# of the circuit breaker.

7.1 NDW1A-1600 Electrical Wiring Diagram and Terminal Number Definition

■ NDW1A-1600 (full-function wiring diagram)



1#, 2#: Working power supply, 1# is positive pole and 2# is negative pole in case of DC power supply
(Power shall be supplied by the power module, and the module has been installed on the left side of the circuit breaker)
3#, 4#, 5#: Fault tripping contact output, contact capacity of 10A/AC250V
6#, 7#, 8#: Opening and closing contact output, contact capacity of 10A/AC250V
9#, 10#, 11# - Closing ready electric indication
12#, 13#: S1/S2/S3 signal unit DO output signal or no-voltage release
14#, 15#: S1/S2/S3 signal unit DO output signal or no-voltage 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# output the signal to the signal unit DO/DI, DO contact capacity: 0.5A/ DC110V,

5A/AC250V; DI signal input voltage: DC110V ~ DC130V or AC110V ~ AC250V.

20#: Grounding wire of controller

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#: N-phase transformer output end or electric leakage transformer output end or Remote reset

27# - Communication shielding ground wire

28#, 29# - Communication interface, 28# for red (A), and 29# for green (B)

30#, 31#, 32#: Electric energy storage and energy storage indicators

33#, 34#: Under-voltage tripper

35#, 36#: Shunt tripper

37#, 38#: Closed electromagnet

41#, 42#, 43#, 44# - customized by users

45#~56#: Auxiliary contact (4 groups of switch)

45#~62#: Auxiliary contact (6 groups of switch)

SB1: Shunt button (to be prepared by users)
SB2: Close button (to be prepared by users)
SB3: Undervoltage tripper button (to be prepared by users)

SB4 - Remote reset button (to be prepared by users)

SA1: Motor travel switch

SA2: Closing ready travel switch

SA4: Fault tripping travel switch

SA5: Opening and closing indicating travel switch

Note:

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 working voltages of Q, F, B, M and controller are not the same, please connect to the rated voltage of control power supply.

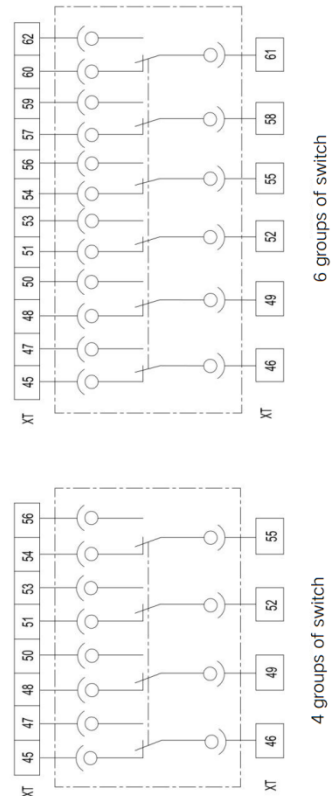
4) If aftercurrent protection or communication function is additionally selected, in order to ensure the controller reliably operates, 1# and 2# need to connect to the auxiliary power supply.

5) If earth current type ground protection or leakage protection is additionally selected, but external transformer is not connected, then terminal 25# and 26# should be short connected.

6) Secondary terminal may connect to wires of 0.5mm²20AWG - 1.5mm²16AWG.

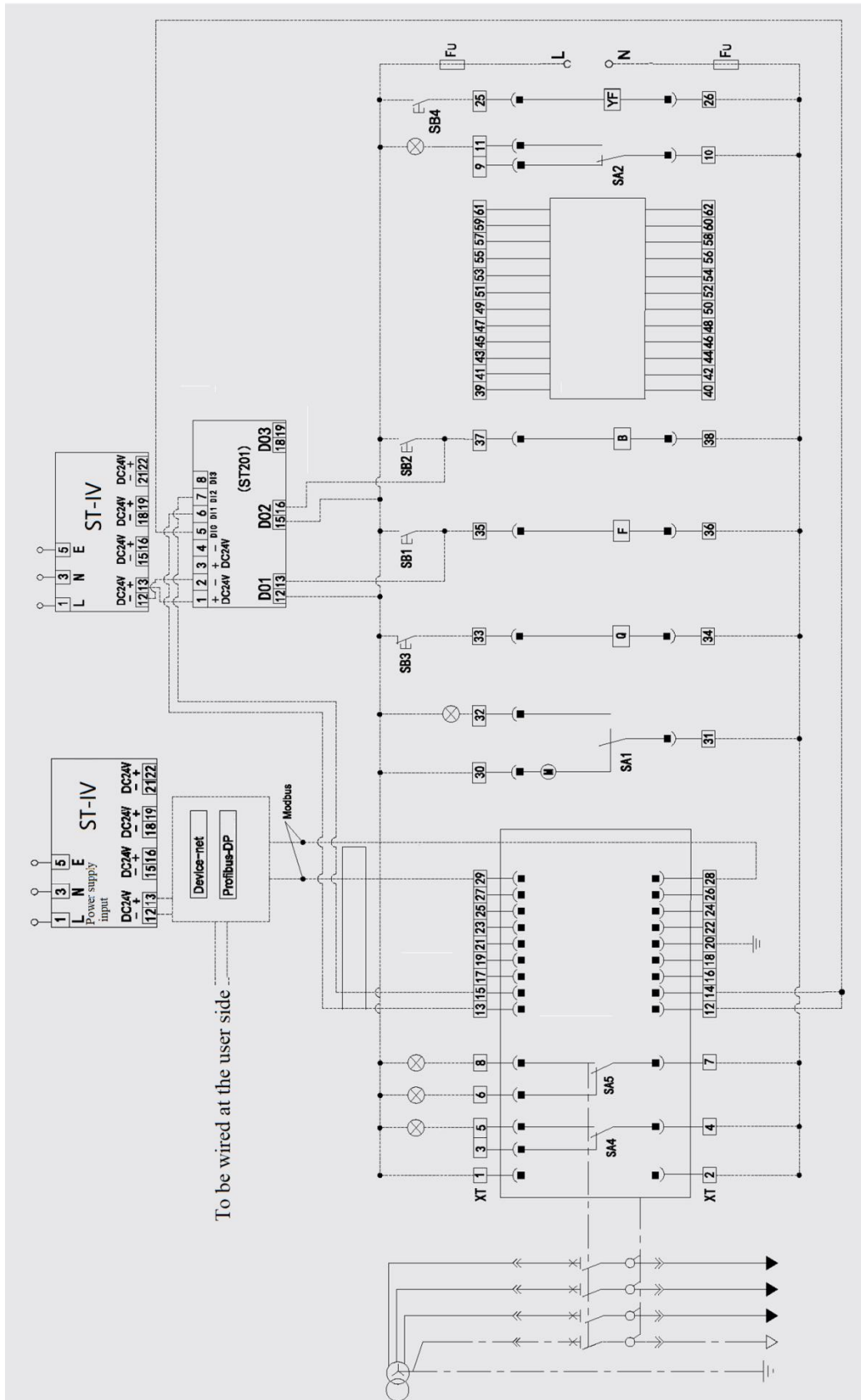
7) There are control circuits within the shunt release and closed electromagnet, which can be energized for more than 200ms. The user cannot connect it with the auxiliary switch point of the circuit breaker in series.

NDW1A-1600 Auxiliary switch wiring mode



7.2 NDW1A-2000/3200/6300 Electric Wiring Diagram and Terminal Number Definition

- NDW1A-2000, NDW1A-3200, NDW1A-6300 (full-function wiring diagram)



SB1: Shunt button (to be prepared by users)
 SB2: Close button (to be prepared by users)
 SB3: Undervoltage tripper button (to be prepared by users)
 SB4 - Remote reset button (to be prepared by users)
 SA1: Motor 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: Under-voltage release
 YF: Remote reset
 Fu: Fuse (to be prepared by users)

Note:
 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 working voltages of Q, F, B, M and controller are not the same, please connect to the rated voltage of control 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) If earth current type ground protection or leakage protection is additionally selected, but external transformer is not connected, then terminal 25# and 26# should be short connected.
 6) Secondary terminal may connect to wires of 0.5mm²20AWG - 1.5mm²16AWG.
 7) There are control circuits within the shunt release and closed electromagnet, which can be energized for more than 200ms. The user cannot connect it with the auxiliary switch point of the circuit breaker in series.

1#, 2#: Working power supply, 1# is positive pole and 2# is negative pole in case of DC power supply
 (There is the built-in power transfer module, where the power supply is connected with 1# and 2#)
 3#, 4#, 5#: Fault tripping contact output, contact capacity of 10A/AC250V
 6#, 7#, 8#: Opening and closing contact output, contact capacity of 10A/AC250V
 9#, 10# and 11#: the electrical indication for the closing ready, and only 6300 Frame size lacks 9#

12#, 13#: S1/S2/S3 signal unit DO output signal or no-voltage release
 14#, 15#: S1/S2/S3 signal unit DO output signal or no-voltage 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# output the signal to the signal unit DO/DI, DO contact capacity: 0.5A/ DC110V,

5A/AC250V; DI signal input voltage: DC110V ~ DC130V or AC110V ~ AC250V.

20#: Grounding wire of controller

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#: N-phase transformer output end or electric leakage transformer output end or remote rest input end is connected

27# - Communication shielding ground wire

28#, 29# - Communication interface, 28# for red (A), and 29# for green (B)

30#, 31#, 32#: Electric energy storage and energy storage indicators

33#, 34#: Under-voltage tripper

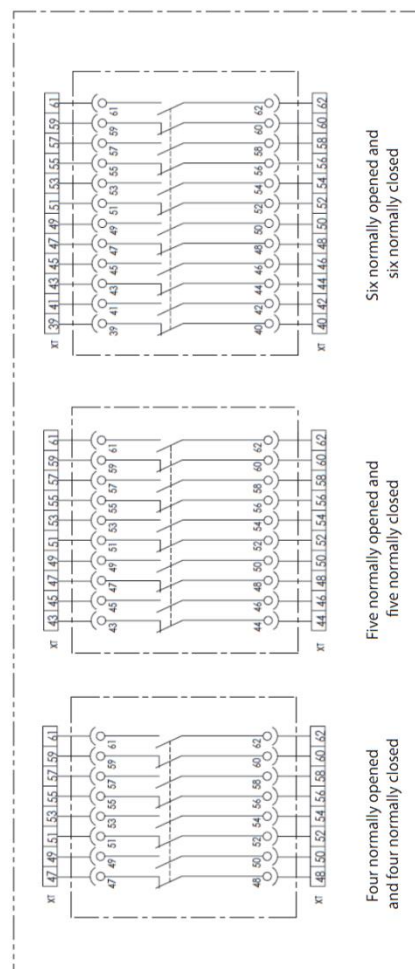
35#, 36#: Shunt tripper

37#, 38#: Closed electromagnet

47#- 62#: Auxiliary contact (4 normally open, 4 normally closed)

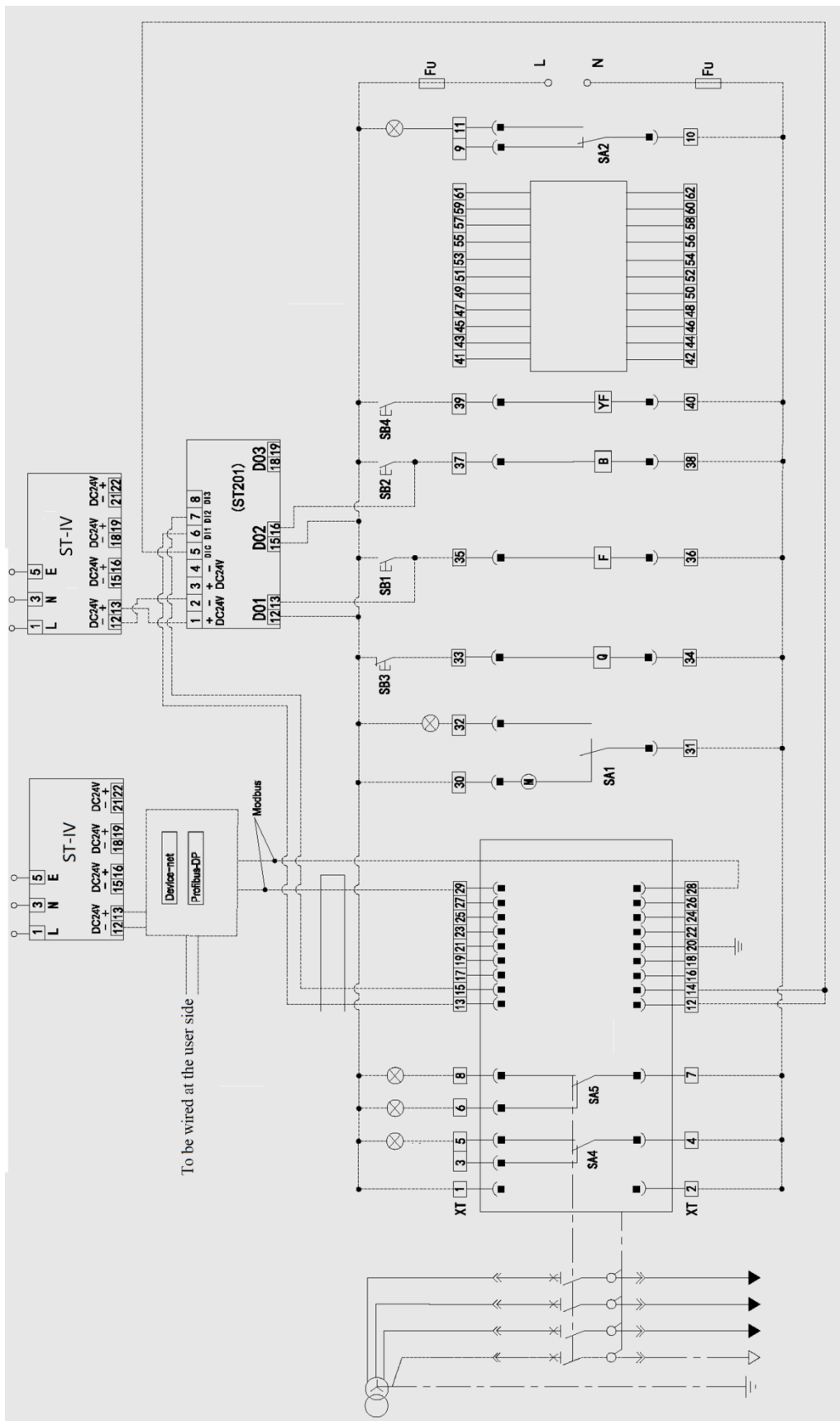
43#~62#: Auxiliary contact (5 always open, 5 always closed)

39#~62#: Auxiliary contact (6 always open, 6 always closed)



7.3 NDW1A-4000 Electrical Wiring Diagram and Terminal Number Definition

■ NDW1A-4000 (full-function wiring diagram)



1#, 2#: Working power supply, 1# is positive pole and 2# is negative pole in case of DC power supply
(There is the built-in power transfer module, where the power supply is connected with 1# and 2#)
3#, 4#, 5#: Fault tripping contact output, contact capacity of 10A/AC250V
6#, 7#, 8#: Opening and closing contact output, contact capacity of 10A/AC250V
9#, 10#, 11# - Closing ready electric indication
12#, 13#: S1/S2/S3 signal unit DO outputs signal
14#, 15#: S1/S2/S3 signal unit DO outputs signal
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

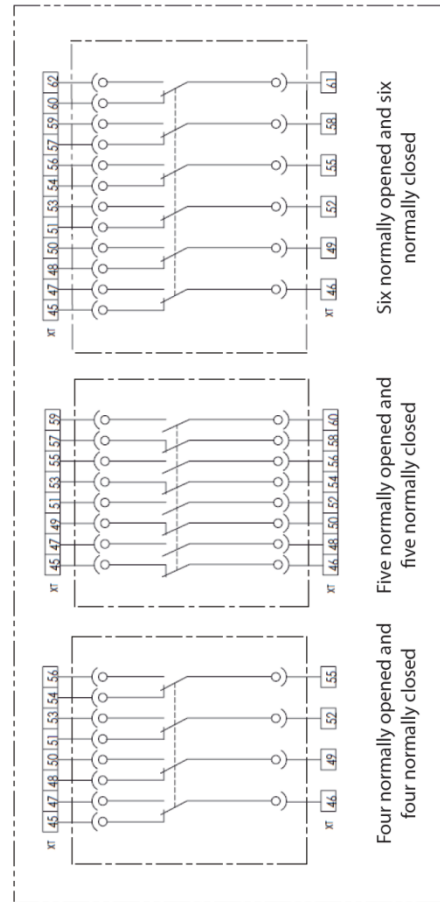
When 12#, 19# output the signal to the signal unit DO/DI, DO contact capacity: 0.5A/DC110V,
5A/AC250V; DI signal input voltage: DC110V ~ DC130V or AC110V ~ AC250V.

20#: Grounding wire of controller
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#: N-phase transformer output end or electric leakage transformer output end
27# - Communication shielding ground wire
28#, 29# - Communication interface, 28# for red (A), and 29# for green (B)
30#, 31#, 32#: Electric energy storage and energy storage indicators
33#, 34#: Under-voltage tripper
35#, 36#: Shunt tripper
37#, 38#: Closed electromagnet
39#, 40# - Remote reset
41#, 42#, 43#, 44# - customized by users
45#-56#: Auxiliary contact (4 groups of switch)
45#-60#: Auxiliary contact (4 always open, 4 always closed)
45#-62#: Auxiliary contact (6 groups of switch)

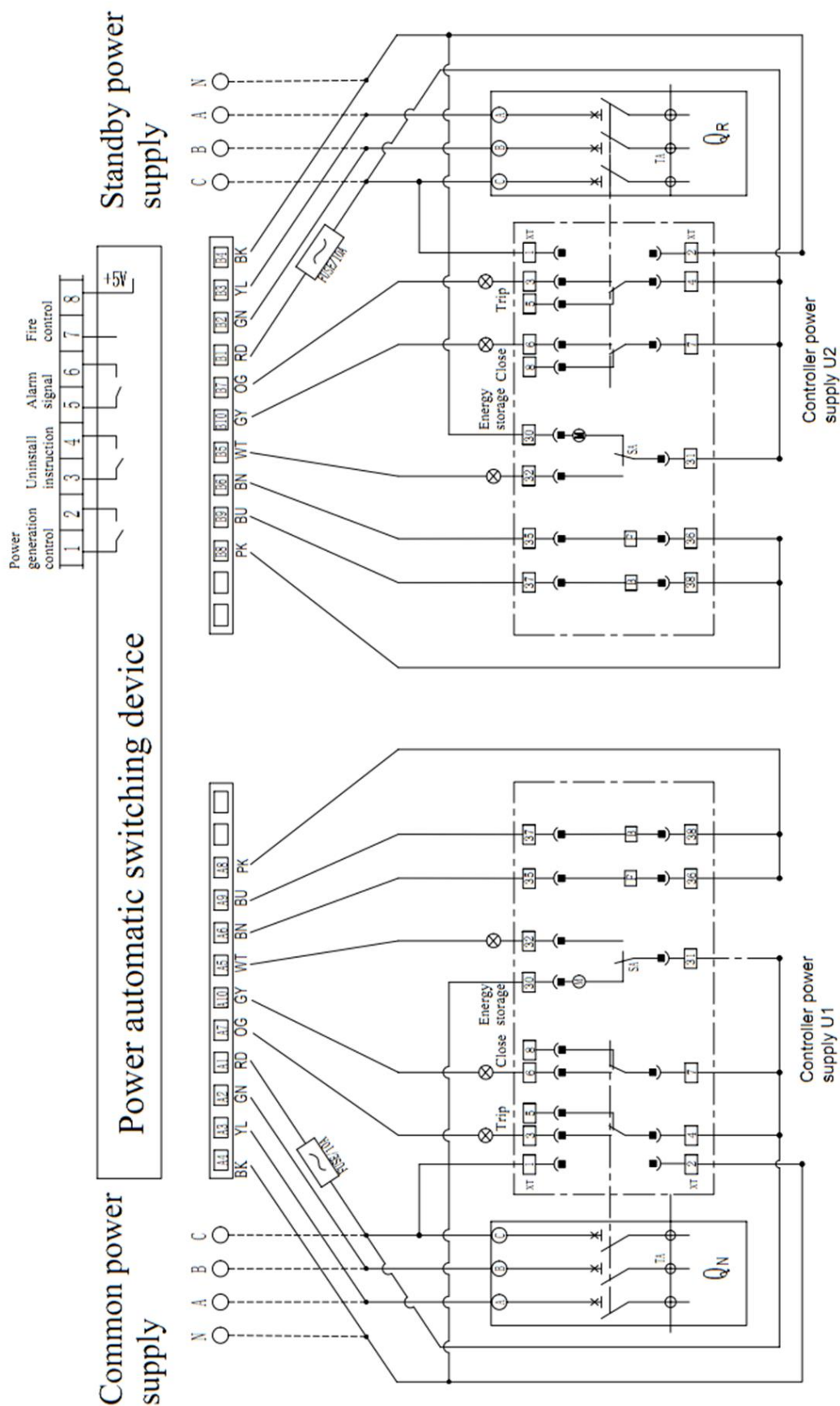
SB1: Shunt button (to be prepared by users)
SB2: Close button (to be prepared by users)
SB3: Undervoltage tripper button (to be prepared by users)
SB4 - Remote reset button (to be prepared by users)
SA1: Motor travel switch
SA2: Closing ready travel switch
SA4: Fault tripping travel switch
SA5: Opening and closing indicating travel switch
XT: Secondary terminal
M: Energy storage motor
F: Shunt release
B: Closed electromagnet
Q: Under-voltage release
YF: Remote reset
Fu: Fuse (to be prepared by users)

Note:

- 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 working voltages of Q, F, B, M and controller are not the same, please connect to the rated voltage of control 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) If earth current type ground protection or leakage protection is additionally selected, but external transformer is not connected, then terminal 25# and 26# should be short connected.
- 6) Secondary terminal may connect to wires of 0.5mm²20AWG - 1.5mm²16AWG.
- 7) There are control circuits within the shunt release and closed electromagnet, which can be energized for more than 200ms. The user cannot connect it with the auxiliary switch point of the circuit breaker in series.



7.4 NDW1A-1600 Wiring Diagram of the Power Automatic Transfer Switches 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.

QN - Commonly used power supply universal type low-voltage circuit breaker

QR - Standby power supply universal type low-voltage circuit breaker

XT - Secondary terminal

M - Energy-storage motor

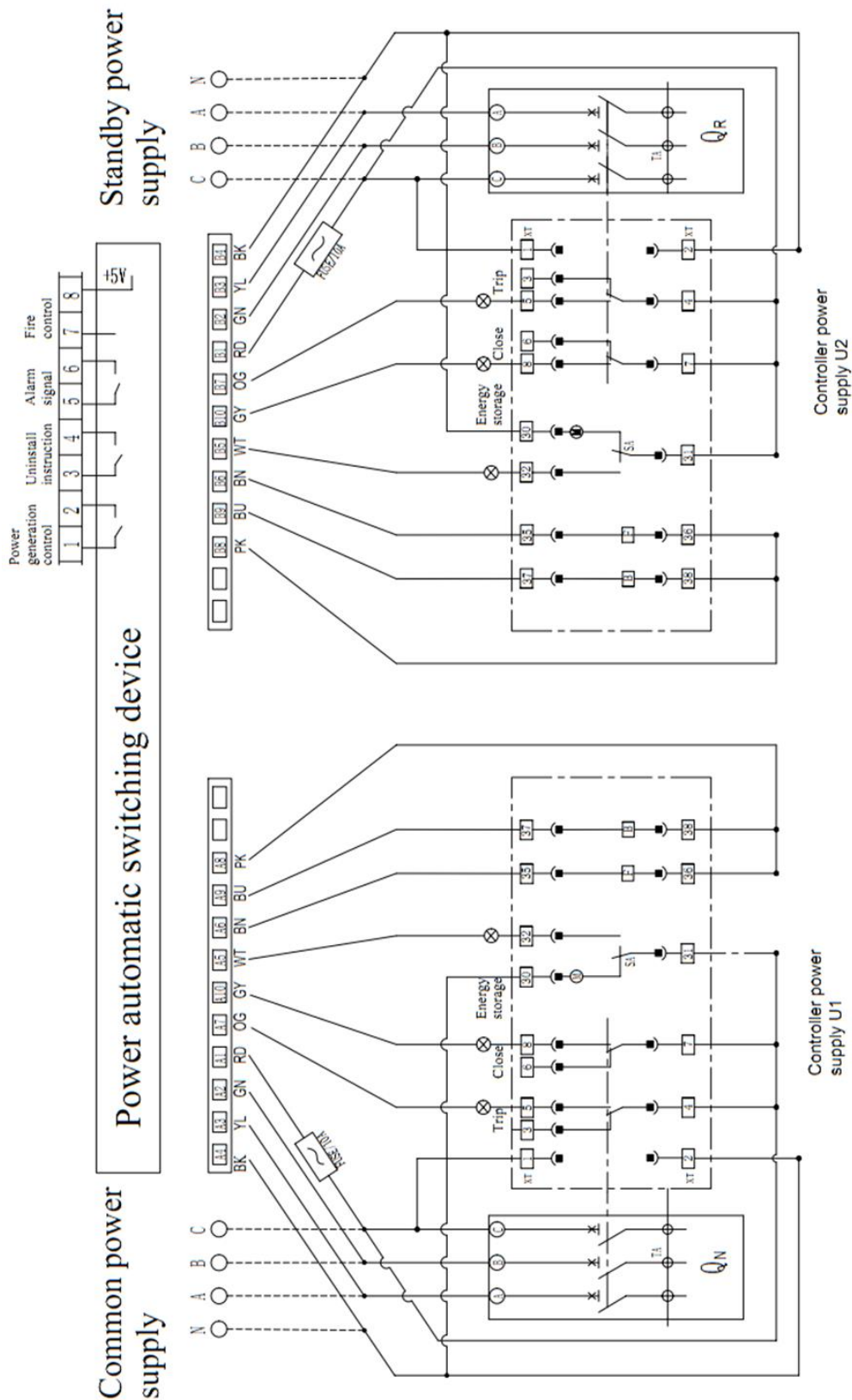
SA - Motor travel switch

F - Shunt tripper

B - Closed electromagnet

Q - Undervoltage tripper.

7.5 Wiring diagram of the NDW1A-2000/3200/4000/6300 power Automatic Transfer Switches 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.

QN - Commonly used power supply universal type low-voltage circuit breaker

QR - 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

Q - Undervoltage tripper.

Chapter 8 Ordering Type Selection Specification

8.1 NDW1A Series of Circuit Breaker Model Explanation and Encoding Rules.....107

8.2 Order Specification (Please fill the number in and check in ☐. Related contents can be found in the Manual)111

Ordering type selection specification

8

8.1 NDW1A Series of Circuit Breaker Model Explanation and Encoding Rules

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

SN	Name	Specification, type code	Description
1	Enterprise code	Nader 牌低压电器	
2	Product code	W: air circuit breaker	
3	Design SN	1: design code; A: improved	
4	Frame size level current	16-1600, 20-2000, 32-3200, 40-4000, 63-6300	
5	Installation mode	Non-marked - fixed type, C - drawout type	
6	Rated current	02-200A, 04-400A, 06-630A, 08-800A, 10-1000A, 12-1250A, 16-1600A, 20-2000A, 25-2500A, 29-2900A, 32-3200A, 36-3600, 40-4000A, 50-5000A, 63-6300A	
7	Number of poles	3-3 poles, 4-4 poles, 5-3P+N	3P+N: 3P products are added with N-phase external transformers,
8	Controller	KM1-NWK31 (AC380V/AC400V), KM2-NWK31 (AC220V/AC230V), KM3-NWK31 (DC220V), KM4-NWK31 (DC110V), KM5-NWK31 (AC24V/DC24V)	Applicable to 1600 Frame size
		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 Frame size
		KY1-NWK22 (AC380V/AC400V), KY2-NWK22 (AC220V/AC230V), KY3-NWK22 (DC220V), KY4-NWK22 (DC110V), KY5-NWK22 (AC24V/DC24V)	
		KE2-NWK22E (AC220V/AC230V)	Applicable for the physically connected product of 2000 Frame size
9	Optional functions of controller	Protection type: Not-marked - conventional type, V - voltage measurement and protection, P - harmonic measurement and protection	1. This shall be omitted if the controller has no optional function 2. V and P are only applicable to the main circuit with the rated voltage of 500V and below, and P has
		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 (A380A/AC400V), Z2 (AC220V/AC230V), Z3 (DC220V), Z4(DC110V), Z5 (DC24V)	
		3P+N grounding mode (optional for the external N-pole transformer): T -	

		Differential type (not to write in default) W - Ground current type		only NWK22 and 32 for choice 3. NWK21/31 only has S1- 4DO	
		N1 - External N-phase transformer (62*21)	Applicable to 1600 Frame size		
		N2 - External N-phase transformer (102*32.5)	Applicable to 1600, 2000 Frame size		
		N3 - External N-phase transformer (122*52)	Applicable to 2000, 3200, 4000, 6300 Frame size		
		N4 - External N-phase transformer (262*102)	Applicable to 3200, 4000, 6300 Frame size		
		NR1 - External flexible transformer (280mm)	Applicable to 200A-800A		
		NR2 - External flexible transformer (370mm)	Applicable to 1000A-2000A		
		NR3 - External flexible transformer (450mm)	Applicable to 1000A-6300A		
		Protection form of current leakage: E-type (including the external current leakage transformer)			
		Contact wear equivalent, operation times query (NWK21/NWK31 optional): J			
10	Electric energy storage mechanism	D1-AC380V/AC400V, D2-AC220V/AC230V, D3-DC220V, D4-DC110V, D5-DC24V			
11	Shunt release	F1-AC380V/AC400V, F2-AC220V/AC230V, F3-DC220V, F4-DC110V, F5-DC24V			
12	Closed electromagne t	B1-AC380V/AC400V, B2-AC220V/AC230V, B3-DC220V, B4-DC110V, B5-DC24V			
13	Internal Accessories	Undervoltage/loss of voltage release	Q1-AC380V/AC400V, Q2-AC220V/AC230V, Q3-DC220V, Q4-DC110V, Q5-DC24V	1. Under-voltage release or alternative loss of voltage release 2. This shall be omitted if without this accessory	
S1-AC380V/AC400V, S2-AC220V/AC230V					
Undervoltage/loss of voltage release delay time		Conventional undervoltage: 0-Instantaneous, 1-1s delay, 3-3s delay, 5-5s delay			
		Loss of voltage: 1-1s delay, 3-3s delay, 5-5s delay		Applicable to 2000, 3200, 4000 Frame size	
		Voltage loss: 1s-10s delay, step length 1s		Applicable to 1600, 6300 Frame size	
15		Auxiliary contact	Not-marked - four groups conversion, A6 - six groups conversion		Applicable to 1600 Frame size
			Not-marked - four-group conversion, A6 - six-group conversion, A44 - four normally opened and four normally closed		Applicable to 4000 Frame size
			Not-marked - Four normally opened and four normally		Applicable to 2000,

			closed, A55 - Five normally opened and five normally closed, A66 - Six normally opened and six normally closed	3200, 6300 Frame size
16		BX - Closing ready signal output unit		This shall be omitted if without the accessory
		JS - Counter functional unit		
		CM1 - Drawout type (with the right side of the door interlock), CM2 - Drawout type (with the left side of the door interlock)		
		CX - Drawer seat three-position signal output		
17	External accessories	M - Doorframe		ST-IV power supply module and ST201 relay module should be used with the controller
		G - Phase partition		
		F - Dustproof cover		
		R - ST201 relay module		
		NWDF1(ST-IV) Power supply module (in line with the voltage of controller in default)		
		P1-DC24V		
		P3-AC380V/AC400V、AC220V/AC230V		
		P5-DC220V、DC110V		
		S - Button lock		
		P2-voltage conversion module		
18	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)		NDW1A-6300 with the rated current of 6300A only has two wiring modes: Vertical wiring and vertical extended wiring.
19	Product usage type	Not-marked-Conventional; GD-plateau, low temperature; TH- thermal humidity;		
20	Special notes	Customer's special requirements		

Interlocking Piece Model Explanation and Encoding Rules

<p>SF11 - key lock device (one lock and one key), SF21 - key lock device (two locks and one key),</p> <p>SF31 - key lock device (three locks and one key), SF32 - key lock device (three locks and two keys),</p> <p>SF53 - key lock device (five locks and three keys)</p>	<p>1. Select one from five key locks</p> <p>2. Select one from five mechanical interlocks</p>
<p>SR11 - Mechanical interlocking device (two sets of steel cables, one for close and one for open)</p> <p>SR12 - Mechanical interlocking device (three sets of steel cables, one for close and two for open)</p> <p>SR21 - Mechanical interlocking device (three sets of steel cables, two for close and one for open)</p> <p>SY11 - Mechanical interlocking device (two sets of hard rods, one for close and one for open)</p> <p>SY12 - Mechanical interlocking device (three sets of hard rods, one for close and two for open)</p>	<p>3. 1600 Frame size does not support the interlocking mode with two for closing and one for opening</p> <p>4. 1600 Frame size cannot be interlocked with other Frame sizes</p> <p>5. There is no interlock for the fixed type product of the shell 1600</p>
<p>ATS-R/S/F automatic power switch device (R: Auto switch and auto recover; S: Auto switch and non-auto recover; F: Mains - Generator)</p>	<p>It is standard with a mechanical interlock with the type selected by customers,</p> <p>This accessory is not available in the shell 1600 fixed type product</p>

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	Frame size level	<input type="checkbox"/> NDW1A-1600 <input type="checkbox"/> NDW1A-2000 <input type="checkbox"/> NDW1A-3200 <input type="checkbox"/> NDW1A-4000 <input type="checkbox"/> NDW1A-6300			
	Installation mode	<input type="checkbox"/> Fixed type <input type="checkbox"/> C Drawout type			
	Rated current (A)	<input type="checkbox"/> 200 <input type="checkbox"/> 400 <input type="checkbox"/> 630 <input type="checkbox"/> 800 <input type="checkbox"/> 1000 <input type="checkbox"/> 1250 <input type="checkbox"/> 1600 <input type="checkbox"/> 2000 <input type="checkbox"/> 2500 <input type="checkbox"/> 2900 <input type="checkbox"/> 3200 <input type="checkbox"/> 3600 <input type="checkbox"/> 4000 <input type="checkbox"/> 5000 <input type="checkbox"/> 6300			
	Number of poles	<input type="checkbox"/> 3 (3 poles) <input type="checkbox"/> 4 (4 poles) <input type="checkbox"/> 5 (3P+N)			
	Wiring mode	1600 Frame size	<input type="checkbox"/> Horizontal wiring (standard configuration) <input type="checkbox"/> J1 Horizontal extended wiring <input type="checkbox"/> J3 Vertical wiring <input type="checkbox"/> J5 - Mixed wiring (upper horizontal, lower vertical), <input type="checkbox"/> J6 - Mixed wiring (upper vertical, lower horizontal)		
		2000 Frame size	<input type="checkbox"/> Horizontal wiring (standard) <input type="checkbox"/> J1 Horizontal extended wiring <input type="checkbox"/> J2 L-type wiring <input type="checkbox"/> J3 vertical wiring		
		3200 Frame size	<input type="checkbox"/> Horizontal wiring (standard configuration) <input type="checkbox"/> J1 Horizontal extended wiring <input type="checkbox"/> J3 vertical wiring		
		4000 Frame size	<input type="checkbox"/> Horizontal wiring <input type="checkbox"/> J1 Horizontal extended wiring <input type="checkbox"/> J3 vertical wiring <input type="checkbox"/> J4 vertical extended wiring		
6300 Frame size		<input type="checkbox"/> Horizontal wiring (In≤5000A standard) <input type="checkbox"/> J1-Horizontal extended wiring <input type="checkbox"/> J3- Vertical wiring (In=6300A standard) <input type="checkbox"/> J4-Vertical extended wiring <input type="checkbox"/> J5 - Mixed wiring (upper horizontal, lower vertical), J6 - Mixed wiring (upper vertical, lower horizontal) <input type="checkbox"/> J7-mixed extended wiring (upper horizontal, lower vertical) <input type="checkbox"/> J8-Mixed extended wiring (upper vertical, lower horizontal) Note: In=6300A Horizontal wiring, horizontal extended wiring.			
Product type	<input type="checkbox"/> Not-marked- conventional (standard configuraiton) <input type="checkbox"/> GD- Plateau, low temperature <input type="checkbox"/> TH- thermal humidity				
Controller parameters	Controller model	1600 Frame size	<input type="checkbox"/> KM-NWK31 (digital screen) <input type="checkbox"/> KY-NWK32 (LCD)		
		2000/3200/ 4000/6300 Frame size	<input type="checkbox"/> KM-NWK21 (digital screen) <input type="checkbox"/> KY-NWK22 (LCD)		
	Controller voltage	<input type="checkbox"/> 1(AC380V/400V) <input type="checkbox"/> 2(AC220V/AC230V) <input type="checkbox"/> 3(DC220V) <input type="checkbox"/> 4(DC110V) <input type="checkbox"/> 5(DC24V)			
	Protection type	<input type="checkbox"/> Conventional type (standard configuration) <input type="checkbox"/> V-voltage measuring and protection type (NWK21/NWK31 only have the measuring function) <input type="checkbox"/> P-harmonic measuring and protection type (NWK22/NWK32 are only optional)			
	Communication function	<input type="checkbox"/> Modbus <input type="checkbox"/> Profibus <input type="checkbox"/> DeviceNet			

	Signal unit	<input type="checkbox"/> S1-4DO <input type="checkbox"/> S2-3DO, 1DI <input type="checkbox"/> S3-2DO, 2DI		
	Remote reset	<input type="checkbox"/> Z1 (AC380V/AC400V) <input type="checkbox"/> Z2 (AC220V/AC230V) <input type="checkbox"/> Z3 (DC220V) <input type="checkbox"/> Z4 (DC110V) <input type="checkbox"/> Z5 (DC24V)		
	External transformer	3P+N required: <input type="checkbox"/> N1 <input type="checkbox"/> N2 <input type="checkbox"/> N3 <input type="checkbox"/> N4 <input type="checkbox"/> NR1 <input type="checkbox"/> NR2 <input type="checkbox"/> NR3		<input type="checkbox"/> E type (Standard configuration with electric leakage transformer)
	Grounding mode	<input type="checkbox"/> T type (default) <input type="checkbox"/> W type (3P+N needs to be added with an external transformer)		
	Contact wear equivalent	<input type="checkbox"/> J-Contact wear equivalent (NWK21/NWK31 optional)		
Required accessories	Electric operating mechanism	<input type="checkbox"/> D1 (AC380V/AC400V) <input type="checkbox"/> D2 (AC220V/AC230V) <input type="checkbox"/> D3 (DC220V) <input type="checkbox"/> D4 (DC110V) <input type="checkbox"/> D5 (DC24V)		
	Shunt release	<input type="checkbox"/> F1 (AC380V/AC400V) <input type="checkbox"/> F2 (AC220V/AC230V) <input type="checkbox"/> F3 (DC220V) <input type="checkbox"/> F4 (DC110V) <input type="checkbox"/> F5 (DC24V)		
	Closed electromagnet	<input type="checkbox"/> B1 (AC380V/AC400V) <input type="checkbox"/> B2 (AC220V/AC230V) <input type="checkbox"/> B3 (DC220V) <input type="checkbox"/> B4 (DC110V) <input type="checkbox"/> B5 (DC24V)		
Optional accessories	Undervoltage release	<input type="checkbox"/> Q1 (AC380V/AC400V) <input type="checkbox"/> Q2 (AC220V/AC230V) <input type="checkbox"/> Q3 (DC220V) <input type="checkbox"/> Q4 (DC110V) <input type="checkbox"/> Q5 (DC24V)		
		<input type="checkbox"/> 0-Instantaneous (0s) Delay: <input type="checkbox"/> 1 (1s delay) <input type="checkbox"/> 3 (3s delay) <input type="checkbox"/> 5 (5s delay)		
	Loss of voltage release	<input type="checkbox"/> S1 (AC380V/AC400V) <input type="checkbox"/> S2 (AC220V/AC230V)		
		2000/3200/4000 Frame size	<input type="checkbox"/> 1 (1s delay) <input type="checkbox"/> 3 (3s delay) <input type="checkbox"/> 5 (5s delay)	
		1600/6300 Frame size	Delay: <input type="checkbox"/> 1 (1s delay) <input type="checkbox"/> 2 (2s delay) <input type="checkbox"/> 3 (3s delay) <input type="checkbox"/> 4 (4s delay) <input type="checkbox"/> 5 (5s delay) <input type="checkbox"/> 6 (6s delay) <input type="checkbox"/> 7 (7s delay) <input type="checkbox"/> 8 (8s delay) <input type="checkbox"/> 9 (9s delay) <input type="checkbox"/> 10 (10s delay)	
	Auxiliary contact	1600 Frame size	<input type="checkbox"/> Four-group switching (standard configuration) <input type="checkbox"/> A6-Six-group switching	
		4000 Frame size	<input type="checkbox"/> Four-group switching (standard configuration) <input type="checkbox"/> A6-six-group switching <input type="checkbox"/> A44-four normally opened and four normally closed	
		2000/3200 6300 Frame size	<input type="checkbox"/> Four normally opened and four normally closed (standard configuration) <input type="checkbox"/> A55-Five normally opened and five normally closed <input type="checkbox"/> A66-Six normally opened and six normally closed	
	Closing ready	<input type="checkbox"/> BX - Closing ready signal output unit		
	Counter	<input type="checkbox"/> JS - Counter		
	Drawer seat door interlock	<input type="checkbox"/> CM1 - Right side of the door interlock <input type="checkbox"/> CM2 - Left side of the door interlock		
	Position indication	<input type="checkbox"/> CX - Drawer seat three-position signal output		
	Door frame	<input type="checkbox"/> M Doorframe		
	Phase partition	<input type="checkbox"/> G Phase partition		
	Dustproof cover	<input type="checkbox"/> F Dustproof cover		
	Relay module	<input type="checkbox"/> R-ST201 relay module		

	Outline and Installation Dimension Diagram of Power Supply Module	<input type="checkbox"/> P1-DC24V <input type="checkbox"/> P3-AC380V/AC400V、AC220V/AC230V <input type="checkbox"/> P5-DC220V、DC110V		
	Button lock	<input type="checkbox"/> S Button lock		
	voltage conversion module	<input type="checkbox"/> P2-voltage conversion module		
Interlocking accessories	Off-position lock	<input type="checkbox"/> SF11-One lock one key <input type="checkbox"/> SF21-Two locks one key <input type="checkbox"/> SF31-Three locks one key <input type="checkbox"/> SF32-Three locks two keys <input type="checkbox"/> SF53-Five locks three keys		
	Mechanical interlocking	Cable type	<input type="checkbox"/> SR11 - Two groups, one for closing and one for opening <input type="checkbox"/> SR12 - Three groups, one for closing and two for opening <input type="checkbox"/> SR21 - Three groups, two for closing and one for opening (SR21 is not available for 1600 Frame size)	
			Cable rope length <input type="checkbox"/> 2m (standard configuration) <input type="checkbox"/> 3m	
		Hard rod type	<input type="checkbox"/> SY11- Two groups, one for closing and one for opening <input type="checkbox"/> SY12-Three groups, one for closing and two for opening	
	Power supply automatic switching device	Remarks: The mechanical interlock is not available in the fixed type 1600.		
		<input type="checkbox"/> ATS-R type <input type="checkbox"/> ATS-S type <input type="checkbox"/> ATS-F type Controller conductor length <input type="checkbox"/> 2m (standard configuration) <input type="checkbox"/> 3m <input type="checkbox"/> 2m in normal use, 5m for standby		
		Note: 1. Please select a type if mechanical interlocking is included; 2. There's no need to select undervoltage release if undervoltage protection is included; 3. AC220V operating voltage must be selected for electrical accessories. 4. This accessory is not available in the 1600 fixed type product.		
Special requirements		As special requirements, NWK21/NWK31 must be set before the factory delivery: Overload and long-time delay current____ A time____s Short-circuit short-time delay current____A time____s Short circuit instantaneous current____A Grounding fault current____A time____s	As special requirements, NWK22/NWK32 must be set before the factory delivery: Overload and long-time delay current____A time____s Short-circuit short-time delay and reverse time-lag current____A Short-circuit short-time delay and constant time-lag current ____A time ____s Short circuit instantaneous current____A Grounding fault current____A 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.				