ACB Series
Universal Circuit Breaker

Instruction manual

Attention!

Ensure the manual is sent together with the circuit breaker to the customer.

Users must read the manual prior to use to guarantee correct operation.

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I. Usage Instructions

1. Appearance Inspection

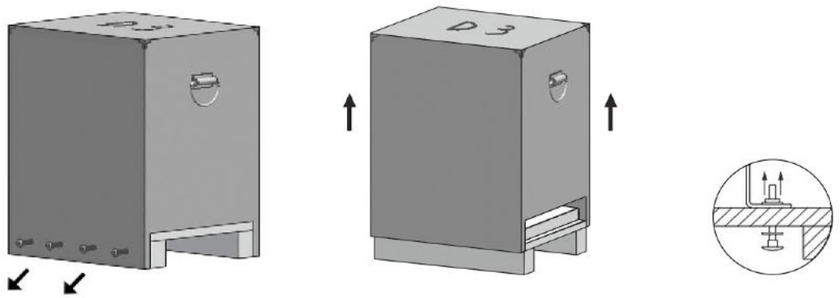
Before opening the package, please carefully inspect the following items:

I. Check for any damage to the outer packaging; if any visible damage is found, please contact our company.

II . Verify that the circuit breaker model and rated values on the side of the outer packaging match your order.

2. Package Opening

Please follow the steps below to open the outer packaging:



A. Remove all packaging screws. B. Lift the upper packaging box upwards. C. Remove all fixing screws on the circuit breaker.

⚠ Note: The fixing screws are M8 screws.

Figure 1: Packaging Opening Diagram

3. Storage Instructions

3.1 . The packaging box must be placed upright and must not be tilted or inverted.

3.2 Storage temperature: -20 ℃ to 85 ℃.

3.3 . The circuit breaker shall be stored in a dry environment, free from corrosive gases.

3.4 . If the circuit breaker is not used for an extended period, it shall be stored in its original packaging box.

3.5 . The maximum number of circuit breakers stacked shall not exceed two.

4. Handling Instructions

4.1 . Cranes may be used to transport circuit breakers; prior to lifting, ensure that the sling or hook securely fastens the circuit breaker. During lifting, proceed with caution and hoist slowly, avoiding any impact to the circuit breaker.

4.2 . Lifting forklifts may be used to transport circuit breakers; however, ensure that the circuit breaker is placed securely and stably.

4.3 . The SDW1-2000 and SDW1-3200 models can be carried by two persons, whereas the SDW1-4000 and SDW1-6300 models require three or more persons for transportation.

⚠ Caution: The equipment is heavy; please handle it carefully to prevent equipment damage and personal injury.

⚠ Warning: Under no circumstances should the panel, instrument board, or terminal blocks be used for handling.

5. Working Conditions

5.1 Ambient Air Temperature

5.1.1 The upper limit shall not exceed +40℃. The lower limit shall not be below -5℃. The 24-hour average temperature shall not exceed +35℃.

⚠ Note: ① For operating conditions with a lower limit of -10 ℃ or -25 ℃, the user must notify the manufacturer when placing the order.

② For operating conditions where the upper limit exceeds +40 ℃ or the lower limit is below -25 ℃, the user shall consult with the manufacturer.

5.1.2 The installation site altitude shall not exceed 2000 m; if exceeded, derating is required.

5.2 Atmospheric Conditions

The atmospheric relative humidity shall not exceed 50% at an ambient air temperature of +40 ℃. At lower temperatures, higher relative humidity is allowable. The average maximum relative hu-midity during the wettest month is 90%, with the average minimum temperature of that month being 25℃. Condensation on the product surface caused by temperature changes is also considered.

5.3 Pollution Degree

Level 3

5.4 Installation Category

The installation category for the circuit breaker main circuit, undervoltage release coil, and primary coil of the power transformer is IV, whereas the installation category for other auxiliary circuits and control electrical devices is III.

6. Installation Requirements

6.1 . Before installation, verify that the circuit breaker specifications comply with the requirements.

6.2 . Prior to installation, use a 500V megohmmeter to measure the insulation resistance of the circuit breaker. At an ambient temperature of 20 ℃ ± 5 ℃ and relative humidity of 50%–70%, the insulation resistance must not be less than 10 MΩ. Otherwise, it must be dried until the insulation resistance reaches the required level before use.

6.3 . When installing the circuit breaker, its base shall be placed in a horizontal position and secured with the appropriate screws.

6.4 . During installation, ensure reliable protective grounding of the circuit breaker. The grounding point shall be clearly marked. Fixed circuit breakers must strictly adhere to the prescribed safety clearance requirements.

6.5 . After completing the installation of the circuit breaker and wiring it according to the relevant wiring diagram, the following inspections and operational tests shall be performed before energizing the main circuit (drawer-type circuit breakers must be in the test position):

a . Verify that the operating voltage of the undervoltage release, shunt trip device, closing electromagnet, and motorized energy storage mecha-nism matches the nameplate specifications (the undervoltage release must be energized and engaged for the circuit breaker to operate);

b. Manual energy storage. Operate the handle on the upper and lower vibrating cover seven times; a 'click' sound should be heard, and the display should indicate 'Energy Stored,' signifying the completion of energy storage. Press the closing button or energize the closing electromagnet; the circuit breaker shall close reliably (the trip unit must be reset), and operating the handle shall enable recharging. .

c . Connect the power supply to the electric energy storage mechanism and energize the motor. The display on the faceplate will show 'Energy Storage,' indicating that energy storage is complete. The motor will then automatically power off. Press the closing button or energize the electromagnet; the circuit breaker should close reliably.

d . Once the circuit breaker is closed, it must open when triggered by any of the following: undervoltage release, shunt release, the trip button on the faceplate, or the trip test of the intelligent release.

Ⅱ. Structure and Operation Instructions

1. Structure Description

1.1 Drawer Base Diagram (Figure 2)

1.2 Fixed Circuit Breaker Diagram (Figure 3)

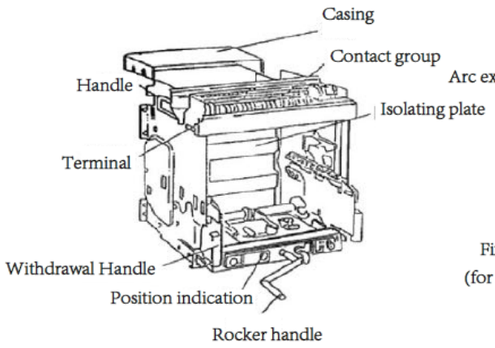


Figure 2 Drawer block construction

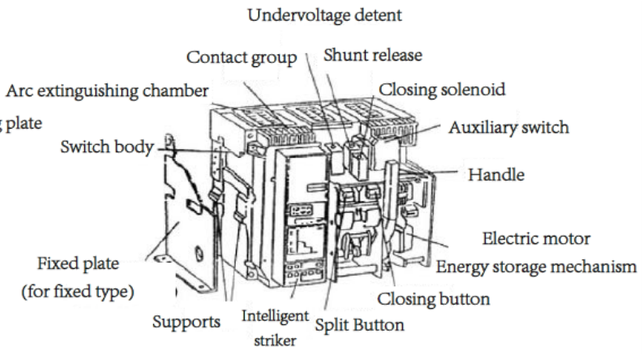
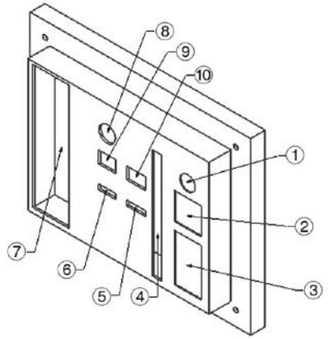


Figure 3 Fixed circuit breaker structure

1.3 Panel Illustration



1. 3C Mark
2. Nameplate 1
3. Nameplate 2
4. Manual Energy Storage Handle
5. Energy Storage / Release Indicator
6. Main Contact Position Indicator (0)
7. Intelligent Trip Unit
8. Key Lock
9. Open Button
10. Close Button

Figure 4 Panel Structure Diagram

2. Operating Instructions

2.1. Circuit Breaker Description

The installation methods for the SDW1 series circuit breaker are classified into fixed type and drawer type, with the operation of the drawer type circuit breaker being more compex.

The drawer type circuit breaker comprises the circuit breaker body and the drawer base. The extraction handles on both sides of the drawer base can be engaged and disengaged. The circuit breaker body is mounted on this guide rail to slide in and out of the drawer base. The main circuit is connected and closed via the insertion connection between the busbar on the circuit breaker and the bridge-shaped contact on the drawer base. The secondary circuit is connected through the contact group installed at the top of the circuit breaker and the drawer base.

The drawer-type circuit breaker has three operating positions: 'ON', 'TEST', and 'OFF'. Position changes are performed by rotating the operating handle. The current position is indicatedby a pointer on the crossbeam of the drawer base. Upon reaching each position, the drawer base automatically locks. To unlock the position, the red unlock button on the side must be pressed; otherwise, the operating handle cannot be rotated.

When in the 'ON' position, both the main circuit and the secondary circuit are connected. When in the 'TEST' position, the main circuit is diconnected and separated by an insulating isolation plate,with only the secondary circuit connected, allowing certain necessary operation tests to be conducted. When in the 'OFF' position, both the main circuit and the secondary circuit are completely

disconnected. The drawer-type circuit breaker is equipped with a mechanical interlock device between the drawer base and the circuit breaker. In the ON or TEST positions, the circuit breaker can be closed; however, in the intermediate position between ON and TEST, the circuit breaker cannot be closed.

Fixed circuit breakers do not have 'Test' or 'Off' operating positions; once installed, only the 'On' position is available.

2.2. Circuit Breaker Withdrawal Operation

When using a drawer-type circuit breaker, please follow the steps below to withdraw the circuit breaker:

2.2.1 Before withdrawing the circuit breaker, ensure that the main spring has been released and the circuit breaker is in the open position (these conditions can be verified by the energy storage/release indicators on the observation panel and the main contact position indicator). The circuit breaker must not be withdrawn while energized.

2.2.2 Remove the operating handle and insert it into the rotation position. Press the drawer base unlock button, then rotate counterclockwise to withdraw and clockwise to insert.

During operation, carefully observe the three-position indicator (pressing the drawer base unlock button causes it to pop out at these three positions, locking the circuit breaker body within the drawer base; pressing the button is necessary to unlock each position). Stop rotating once the circuit breaker reaches the separation position.

2.2.3 Remove the handle and use the side plate to pull the circuit breaker out of the drawer base. Please carefully observe the position of the side plate; the circuit breaker can only be withdrawn when the side plate is fully extended to its limit position.

2.2.4 Grasp the handles on both sides of the circuit breaker and lift upwards to remove it from the drawer base.

⚠ Note: 1. If the red button on the side plate is not pressed downward, the side plate will be locked. Forcibly pulling out the side plate may cause damage to the drawer base.

2. If the circuit breaker is not separated before withdrawal, it will automatically separate during withdrawal; however, this may cause damage to the product.

3. The circuit breaker cannot be withdrawn if the operating handle is not removed.

4. When the drawer base unlocking button is extended, do not use the operating handle to move the drawer base to any of the three positions, as this will damage the drawer base.

⚠ Warning: Excessive force or movement of the handle beyond the separation position may cause product damage!

2.3. Circuit Breaker Insertion Operation

The circuit breaker insertion process requires only following the reverse steps of the extraction procedure; however, it is important to note that when the circuit breaker reaches the 'Connection' position, two distinct 'click' sounds will be heard, indicating that the insertion is complete.

2.4. Closing, Opening, and Energy Storage Operations

The closing, opening, and energy storage operations of this circuit breaker can be performed either manually or electrically. The circuit breaker's operating mechanism employs a cam to compress a set of energy storage springs to achieve energy storage. During the energy release process, the energy stored in the springs is utilized to close the circuit breaker. The closing speed is independent of whether the operation is manual or electric. The circuit breaker can perform pre-energy storage while in the closing state to prepare for the next closing operation. The operating mechanism features a free trip function. The circuit breaker operates in the following three states:

a) Energy storage

The circuit breaker's energy storage methods are classified as electric and manual. When using electric energy storage, simply fully release the energy storage spring; the energy storage motor will automatically rotate to compress the spring until energy storage is complete and the motor stops. For manual energy storage, the energy storage handle must be pulled downward multiple times until no reaction force is felt when pulling the handle, indicating that energy storage is complete. The fully charged energy storage provides sufficient primary energy for the circuit breaker to perform one trip operation and one closing operation each.

After the circuit breaker completes full energy storage, the energy storage/release indicator displays 'Energy Stored'; at this point, neither electric nor manual methods can initiate energy storage. If the circuit breaker's initial state is open, upon completion of energy storage, the closing operation's energy storage/release indicator displays 'Energy Released'; electric energy storage will then start automati-cally. If electric energy storage is unavailable, the user may perform manual energy storage as appropriate. If the circuit breaker's initial state is closed, upon completion of energy storage, the trip operation's energy storage/release indicator displays 'Energy Stored'; at this point, neither electric nor manual methods can initiate energy storage. Energy storage can only be performed again after reclosing.

b) Closing

Press the closing button or activate the closing electromagnet to cause the energy-release tripper half-shaft to rotate counterclockwise, thereby closing the circuit breaker.

⚠ Warning: For circuit breakers equipped with an undervoltage tripper, the undervoltage tripper must be energized before closing; otherwise, product damage will occur.

c) Opening

Press the opening button or initiate the trip operation from the undervoltage tripper, shunt tripper, or intelligent tripper; the circuit breaker will open immediately.

Ⅲ. Technical Specifications and Performance

1. Circuit Breaker Technical Parameters

1.1 Rated Current and Breaking Capacity

Table 1

Frame Rating	Rated Current (A)	Rated Ultimate Short-Circuit Breaking Capacity ICU（KA）		Rated Operational Short-Circuit Breaking Capacity ICS（KA）		Rated Short-Time Withstand Current ICW (kA) 1s	
		400V	690V	400V	690V	400V	690V
2000	630，800，1000，1250，1600，2000	80	50	50	50	50	40
3200	2000，2500，2900，3200	100	65	65	50	65	50
4000	3200，3600，4000	100	—	80	—	65	—
6300	4000，5000，6300	120	—	80	—	80	—

1.2 Circuit Breaker Service Life

Table 2

Frame Rating		2000	3200	4000	6300
Mechanical Service Life	With Maintenance	20,000 operations	20,000 operations	5,000 operations	5,000 operations
	Without Maintenance	10,000 operations	10,000 operations	2,500 operations	2,500 operations
Electrical Service Life		1,000 operations	1,000 operations	1,000 operations	1,000 operations

1.3 Operating Voltage and Required Power of the Circuit Breaker's Shunt Trip, Undervoltage Release, Electric Stored Energy Mechanism, and Closing (Energy Release) Electromagnet

Table 3

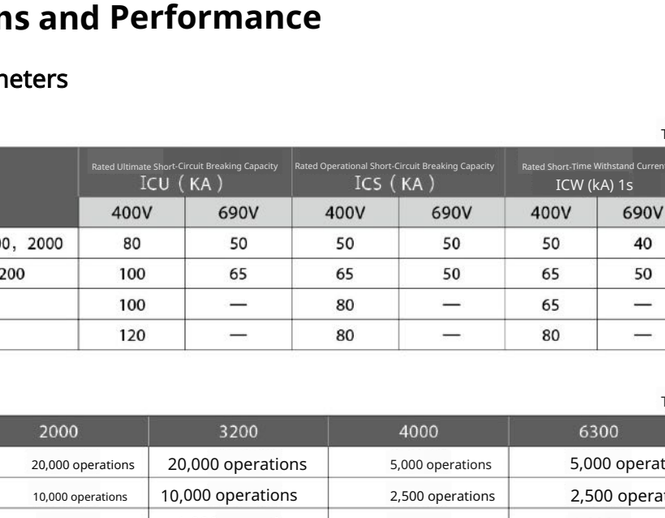
Item \ Rated Voltage (V) / Power	AC (VA)		DC (W)	
	220V	380V	110V	220V
Closing Electromagnet	300	300	130	100
Shunt Trip	300	300	130	100
Undervoltage Release	6	6	—	—
Electric Stored Energy Mechanism (Motor)	For 2000: 85 W; for 3200: 110 W; for 4000 and 6300: 150 W			

2. Intelligent Trip Unit

2.1. Intelligent Trip Unit Model

The Intelligent Trip Unit is available in three main types, namely L type, M type, and H type. The L type trip unit is further subdivided into three models based on functionality: L2, L3, and L4.

L Type Trip Unit:



L2 Type Trip Unit　　L3 Type Trip Unit　　L4 Type Trip Unit

Figure 5-1 L Type Trip Unit Diagram

M-Type and H-Type Trip Units:

Figure 5-2. M-Type Trip Unit Diagram

Figure 5-3. H-Type Trip Unit Diagram

2.2 . Intelligent Trip Unit Performance

2.2.1 Basic Functions of the Trip Unit

Table 4

Circuit Breaker Rating		SDW1-2000 ~ 6300				
Trip Unit Type		L2	L3	L4	M	H
Long-time Delay Protection		●	●	●	●	●
Short-circuit Short-time Delay Protection			●	●	●	●
Ground Fault Protection				●	●	●
Short-circuit Instantaneous Protection		●	●	●	●	●
Load Monitoring					●	●
Data Display Method	Light Column Indicator	●	●	●		
	LED / LCD				LED	LED
Ammeter					●	●
Voltmeter					○	○
Pre-alarm		○	○	○	○	●
Fault Alarm		○	○	○	○	●
Fault Query		●	●	●	●	●
Self-diagnosis		●	●	●	●	●
MCR Function		○	○	○	○	○
Hsisc Function		○	○	○	○	○
Communication Module and Dedicated Power Supply Module						●

⚠ Note: ● indicates configured; ○indicates optionally configurable.

2.2.2 Trip Unit Protection Characteristics

2.2.2.1 Trip Unit Setting Value I/In and Tolerance

Table 5

Model	Application	Long-Time Delay		Short-Time Delay		Instantaneous		Ground Fault	
		I_{r1}	Tolerance	I_{r2}	Tolerance	I_{r3}	Tolerance	I_{r4}	Tolerance
L 型 (ST45-L_2-L_4)	Power distribution	0.4-1	± 15%	L_2, None L_3L_4 is 3–10	—	L_2 3 – 10L_3L_4 10 – 20 / 7 – 14	± 15%	0.2-0.8 (Maximum 1200 A, Minimum 160 A) The trip unit for generator protection does not possess this function	± 15%
	Generator	0.8-1.25							
Type M Type H	Power distribution	0.4-1	± 10%	0.4-15	± 15%	1.0I_n–50kA (When Inm ≥ 3200, it is 75 kA)	± 10%		± 10%
	Generator	0.4-1.25							

⚠ Note: When three-stage protection is applied simultaneously, the setting values must not overlap.

2.2.2.2 Long-time delay overcurrent protection operation characteristic

● The inverse time characteristic of the long-time delay overcurrent protection for power distribution trip units is IT = $(1.5In)^2$tq.

● The inverse time characteristic of the long-time delay overcurrent protection for generator trip units is IT = $(1.2In)^2$t.

⚠ Note: t is the long-time delay setting time (corresponding to the operation time at 1.5 In or 1.2 In), adjustable by the user. In represents the long-time delay setting current, and T denotes the long-time delay operation time.

The inverse time characteristic of long-time delay overcurrent protection is shown in the table below:

Table 6

Model	Application	I	Operation time TL (5)					
ST45-L_2	Power distribution motor	<1.05 I_{r1}	> 2 h no operation					
		>1.2 I_{r1}	< 1 h operation					
ST45-L_3		1.5 I_{r1}	—	30	60	120	240	—
ST45-L_4		2.0 I_{r1}	—	16.9	33.8		135	—
		7.2 I_{r1}	—	1.3	2.6	5.2	10	—
ST45- L_2/F	Generator	<0.95 I_{r1}	> 2 h no operation					
ST45- L_3/F		>1.05 I_{r1}	< 1 h operation					
ST45- L_4/F		1.2 I_{r1}	15	—	30	—	50	60
		6.0 I_{r1}	0.6	—	1.2	—	2.0	2.4
ST45 – M ST45 – H	Power distribution motor	<1.05 I_{r1}	> 2 h no operation					
		>1.2 I_{r1}	< 1 h operation					
		1.5 I_{r1}	15	30	60	120	240	480
		2.0 I_{r1}	8.4	16.9	33.8		135	270
		7.2 I_{r1}	0.65	1.3	2.6	5.2	10	21
ST45 – M/F ST45 – H/F	Generator	<0.95 I_{r1}	> 2 h no operation					
		>1.05 I_{r1}	< 1 h operation					
		1.2 I_{r1}	15	20	30	40	50	60
		6.0 I_{r1}	0.6	0.8	1.2	1.6	2.0	2.4

2.2.2.3 Short-Time Delay Overcurrent Protection Operating Characteristics

● The short-time delay protection characteristics of this trip unit are divided into inverse time and definite time types. When the overload current is less than 8I, the characteristic is inverse time, defined by $I^2T = (8In)^2 t$.

⚠ Note: t_S represents the short-time delay definite time setting, and T_S represents the operating time. The short-time delay inverse time charac-teristic is related to the long-time delay setting value I_{r1}, whereas the short-time delay setting value I_{r2} only determines the starting point of the short-time delay characteristic.

● When the overload current exceeds 8, the device automatically switches to the definite time characteristic. The definite time characteristic is presented in the following table:

Table 7

Trip Unit Type	Type M; Type H				ST45-L_3 ; ST45-L_4	
Short Delay Setting Time (s)	0.1	0.2	0.3	0.4	0.2	0.4
Reset Time (s)	0.06	0.16	0.255	0.34	0.16	0.34

2.2.2.4 Overcurrent Trip Unit Three-Stage Protection Characteristics

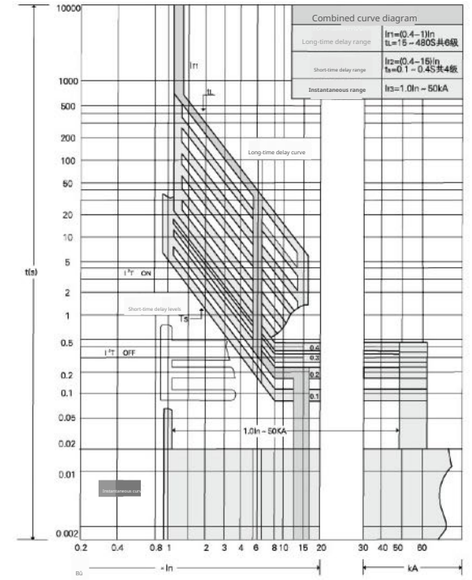


Figure 6-1. SDW1-2000 overcurrent trip unit three-stage protection characteristic curve

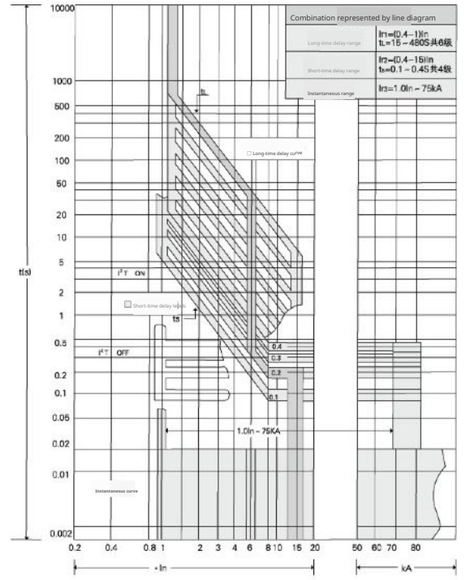


Figure 6-2. SDW1-3200 to 6300 overcurrent trip unit three-stage protection characteristic curve

2.2.2.5 Ground fault protection characteristics

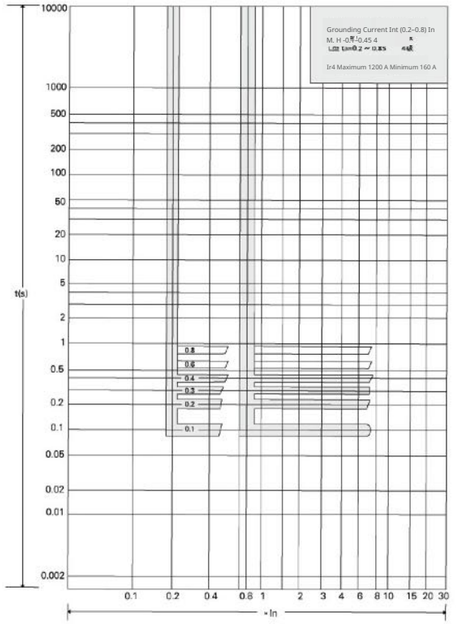


Figure 7. Ground Fault Protection Characteristic Curve

The ground fault protection characteristics of Type M and Type H are definite time. The ST45-L_2 and L_3 models do not have ground fault protection functionality. The ground fault protection delay setting values for the ST45-L_4 model are 0.2 s, 0.4 s, 0.6 s, and 0.8s.

2.2.2.6 Load Monitoring Function

The load monitoring function comprises either a dual load limitation function or a single load limitation with reclosing function; only one option can be selected by the user at the time of ordering. The implementation method of this function is as follows: the trip unit can be configured with two setting values, I_{LC1} and I_{LC2}. The I_{LC1} setting range is (0.2–1) I_n, and the I_{LC2} setting range is (0.2–1) In ($I_{LC2} < I_{LC1}$). The I_{LC1} delay characteristic is an inverse time characteristic, with its delay setting value equal to half of the long-time delay setting value (used for delayed tripping of downstream non-critical loads when the current exceeds the I_{LC1} value). There are two types of delay characteristics for I_{LC2}:

● The first type features an inverse time characteristic, with the time setting value set to one-quarter of the long-time delay setting value. This delay function is employed to trip the least critical downstream loads (load shedding function) when the current approaches the overload setting value (> I_{LC2}).

● The second type features a definite time characteristic with a delay of 60 seconds. It operates when the current exceeds the I_{LC1} value, tripping less critical downstream loads after the delay. When the current decreases, power supply to the main circuit and critical load circuits is maintained. Once the current falls below I_{LC2}, a command is issued after a 60-second delay to reconnect the previously disconnected downstream circuits, thereby restoring power to the entire system.

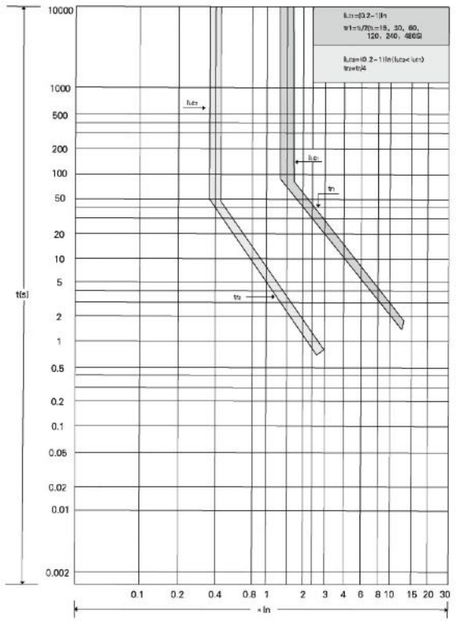


Figure 8-1. Dual Load Limitation Characteristic Curve

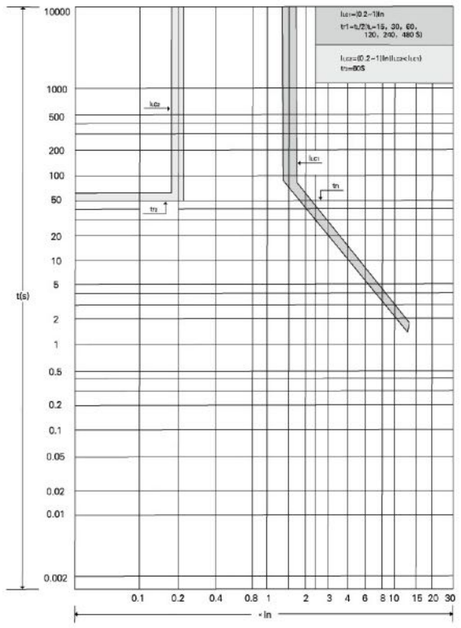


Figure 8-2. Single Load Limitation and Reclosing Characteristic Curve

2.2.2.7 Self-Diagnostic Function

a. Internal Fault Diagnostic Function of the Trip Unit.

When a fault occurs in the trip unit, it can display an error 'E' or trigger an alarm, and simultaneously restart the trip unit's CPU. If required by the user, the circuit breaker can also be tripped. (This must be specified when ordering.)

b . When the local ambient temperature reaches 80℃, or when the internal temperature of the enclosure exceeds 80℃ due to contact heating, an alarm will be triggered. If required by the user, the circuit breaker can also be tripped at lower current levels. (Must be specified when ordering)

2.2.2.8 Test Function

The protection response corresponds to the magnitude of the test current. Select the desired test current value using the dial and keys, then press the test button to perform the trip unit test. There are two types of test buttons: a non-trip test button and a trip test button. The non-trip test function can be used while the circuit breaker is connected to the power grid. When an actual overcurrent occurs in the network, the test function will be interrupted to allow real overcurrent protection to operate.

2.2.2.9 Trip Unit Display Function

The trip unit can display the operating current of the circuit breaker (i.e., ammeter function) and indicate the corresponding phase or the maximum value. During setting, it indicates the category of the set section as well as the set current or time value. When a fault occurs, it indicates the operating section of the protection characteristic and, after circuit interruption, latches the fault current, operating time, and operating section. If it is a delayed operation, the indicator light flashes during the operation process and changes from flashing to steady on after the circuit breaker interrupts. During the trip test, the test current, delay time, and test operation section are displayed. The trip unit with voltage display capability can indicate the operating voltage value

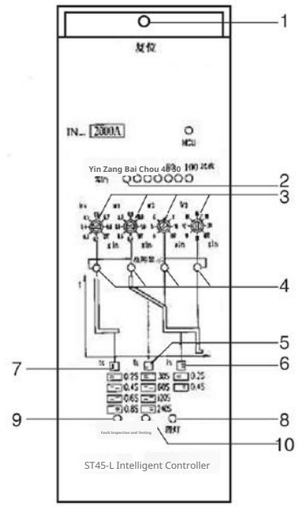
2.2.2.10 Ammeter Function

The intelligent trip unit displays the operating current of the main circuit on the LCD screen. When the selection button is pressed, it displays the current value of the phase indicated by the indicator light. Please note: When the circuit breaker operating current is less than 10% of the rated current, the trip unit's current display may read zero; however, all other protection functions of the trip unit remain operational.

For L-type trip units, the light column indicates a starting point at 40% I_{r1}.

2.3 Usage Method

2.3.1 Usage Method for L-type Trip Units



Setting Method

1. Long-time delay overload setting:

a. Adjust the I switch to set the current from 0.4 to 1In;

b . Toggle the t switch to set the delay time to 30 s, 60 s, 120 s, or 240 s;

c . Rotating the switch to the OFF position indicates exiting this function.

2. Short Delay Overload Setting

a. Rotate the I¿ switch to set the current from 3 to 10 In;

b . Toggle the t key to set the time to 0.2 or 0.4 seconds;

c . Rotating the I switch to the OFF position indicates exiting this function.

3. Instantaneous Overload Setting

a . Rotate the switch to set the current from 3 to 10 Im or 10 to 20 Im;

b . Rotating the Ia key switch to the OFF position indicates exiting this function.

4. Ground Fault Protection

a . Toggle the I.4 switch to set the current from 0.2 to 0.8 In;

b . Toggle the t key to set the time to 0.25, 0.4, 0.6, or 0.8 seconds;

c . Rotating the I4 switch to the OFF position indicates exiting this function.

5. Trip Unit Enters Operating State

After completing all trip parameter adjustments, press the clear light button.

Figure 9. Usage Diagram of L-Type Trip Unit

Button Description:

1. Reset Button: Press this button after the circuit breaker trips to enable reclosing.

2. Load Display: Indicates load current and overload status.

3. Long-time delay, short-time delay, instantaneous, and ground fault protection current adjustment knobs: Set the protection current for each stage according to the scale on the knob.

4. Fault Indicator Light: Displays the type of fault.

5. Long-time delay overload protection time adjustment switch: Adjust the time by toggling the switch position.

6. Short delay overload protection time setting key: Adjust the time by toggling the switch position

7. Ground fault protection time setting key: Adjust the time by toggling the switch position

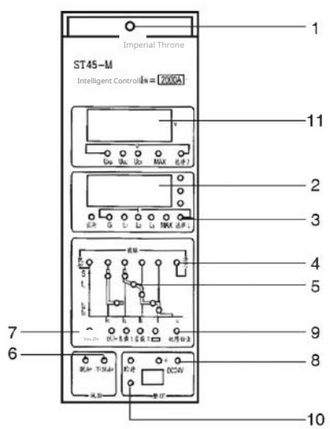
8. Clear indicator key: Must be pressed after trip unit setting, testing, or fault occurrence to restore the trip unit to normal operating status

9. Fault check key: Press after a circuit breaker fault trip to indicate the fault trip type; the fault memory function is retained after power is off

10. Test Button; This button verifies the proper operation of the trip unit and the coordination between the trip unit and the controller.

2.3.2 . M-Type Trip Unit Usage Method

2.3.2.1 Button Description



Button Description:

1. Reset Button
2. Current and Time Display
3. Select Button
4. Clear Light Button
5. LED Indicator
6. Trip Button and Non-Trip Button
7. Set Button
8. “Store” and “+” Button
9. Fault Check Key
10. Store Display
11. Voltage Display (Optional Feature)

Figure 10. Structural Diagram of M-type Trip Unit

2.3.2.2 Operating Instructions

2.3.2.2.1 Long-time Delay Setting

Long-time Delay Current Setting: After pressing the Clear Light key, press the Set key to display the factory-set long-time delay current value, which is In. The current setting range is (0.4–1) In. Each press of the key decreases the current by 2% until the desired setting value is reached. Then press the Store key to complete the long-time delay current setting.

Long-time delay time setting: After completing the long-time delay current setting, press the setting button to display the factory preset time value, which is 15 seconds. The time setting range includes 15, 30, 60, 120, 240, and 480 seconds. Each press of the button doubles the time until the desired value is reached. Then, press the save button to finalize the long-time delay time setting. Finally, press the clear light button; the trip unit will then be in the operational state.

2.3.2.2.2 Short-time delay setting

The adjustment procedure for the short-time delay operation current and time is identical to that of the long-time delay adjustment. The difference is that by pressing the setting key, the short-time delay current is set to the factory preset value (for In ≤ 2000A, Ir2 = 8Ir1; for In > 2000A, Ir2 = 6Ir1). The current adjustment range is from 0.4 to 15 times In, with a min-imum value of 400A. Each press of the decrement key reduces the value by 4%. The factory preset short-time delay time is 0.15 seconds, adjustable within 0.1, 0.2, 0.3, and 0.4 seconds.

2.3.2.2.3 Instantaneous Setting

The setting procedure for instantaneous operation current is identical to that of long-time delay and short-time delay, except that there is no time value to set. The factory default setting for instantaneous operation current is: For In ≤ 2000A, Ir3 = 10Ir1, with a setting range of In to 50kA; For In > 2000A, Ir3 = 8Ir1, with a setting range of In to 75kA. Each press of the return key reduces the value by 8%. OFF indicates that the instantaneous function is disabled.

2.3.2.2.4 Grounding Fault

The adjustment procedures for grounding fault operation current and operation time are identical to those for long-time delay and short-time delay. The factory setting for grounding fault operation current is 0.8Ir1, with an adjustable range of (0.2–0.8) In, a maximum value of 1200 A, and a minimum value of 160 A, decreasing in 2% increments per step. The factory setting for grounding fault operation time is 0.15, with selectable values of 0.1, 0.2, 0.3, and 0.45.

2.3.2.2.5 Overload Test Functional Operation Steps

2.3.2.2.5.1 Grounding Function Test

First, set the grounding current setting value to any value less than 0.8Ir1. Press the field key to display the current exceeding the setting value, then press either the trip or no-trip key. At this point, the test indicator and grounding fault indicator lights will illuminate, and the grounding operation delay time will be displayed. When the trip key is pressed, the circuit breaker will open; when the no-trip key is pressed, the circuit breaker will remain closed.

2.3.2.2.5.2 Long-time Delay Function Test

First, set the grounding current setting value to any value less than 1.0In. Press the button; when the displayed current exceeds 1.05 times the set current, press either the trip orno-trip key. At this point, the test indicator light will illuminate. The long-time delay fault indicator light flashes. After the delay period ends, it remains steadily lit and displays the delay time. The higher the test current, the shorter the delay time. Pressing the trip key causes the circuit breaker to trip; pressing the no-trip key prevents the circuit breaker from tripping

2.3.2.2.5.3 Short-time Delay Function Test

First, adjust the short-time delay current setting to a value greater than the long-time delay current setting. Press the button; when the displayed current exceeds the short-time delay setting value, then press the trip or no-trip button. At this point, the test lamp and the short-time delay fault indicator illuminate, and the delay time is displayed. When the displayed current is less than eight times the long-time delay current setting, the delay time follows an inverse time characteristic. When the displayed current reaches 28 times the long-time delay current setting, the delay time follows the sort-time delay timing characteristic. Pressing the trip button causes the circuit breaker to trip; pressing the no-trip button prevents the circuit breaker from tripping.

2.3.2.2.5.4 Instantaneous Function Test

Adjust the instantaneous current setting value to be higher than the short delay current setting value. Press the trip or no-trip button; at this point, the test indicator light and instantaneous fault indicator light will illuminate. Press the trip button to trip the circuit breaker, or press the no-trip button to prevent the circuit breaker from tripping.

2.3.2.2.6 Procedure for Displaying Various Current Values

Once the main circuit is energized, press the select button to display the phase current or the maximum phase current. Each subsequent press of the select button will cycle through the currents of the other phases.

2.3.2.2.7 Load Monitoring Setting Procedure

The selection of I_{LC1} and I_{LC2} setting values shall be determined based on the user's functional requirements (load shedding or unloading and reclosing of a load) and the actual load condi-tions. The setting procedure is as follows: press the setting button until the load indicator light illuminates; at this point, the current display shows the factory default setting value (I_{rl}). Each press of the button decreases the current by 2% until the desired current value I_{LC1} is reached. Then, press the save button to confirm. Press the setting button again until the load indicator light illuminates, displaying the factory preset load current value (I_{rl}). Continue pressing the button until the required current value is reached. Then press the save button, followed by the clear light button.

2.3.2.2.8 Fault Trip Reset

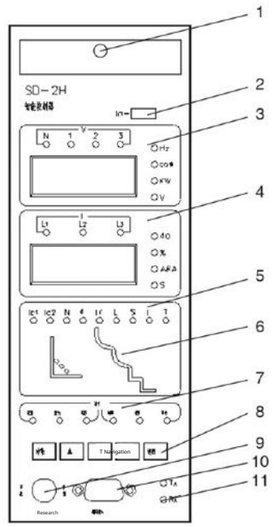
Following a fault trip (circuit breaker interruption), the red reset button located on top of the intelligent trip unit will pop out. The circuit breaker cannot be closed until this button is reset. The trip unit can store and display fault data. Press the clear indicator button once to restore the trip unit to its originally configured protection state.

Note: ① If there is no button on the control unit within the 605 model, it will automatically revert to the ammeter function.

② After the user has configured the current values for all states, if no further adjustments are required, an acrylic plate must be used to cover the adjustment buttons.

2.3.3 Operation Method of H-type Trip Unit

2.3.3.1 Description of H-type Trip Unit Buttons



Button Description:

1. Mechanical Reset Button
2. Rated Current Marking
3. Function Display Window
4. Ammeter Window
5. Protection Category Indicator
6. Characteristic Curve
7. Status Indicator
8. Function Key
9. Key Lock
10. Programming Port
11. Communication Indicator Light

Figure 11. Structural Diagram of the H-type Trip Unit

2.3.3.2 Method of Use

The specific usage method for the H-type trip unit is provided in the ST45-2H electronic trip unit user manual.

3. Accessories Description

The circuit breaker includes various accessories, primarily categorized as standard and non-standard. If customers require non-standard accessories, special ordering can be specified on the order form.

Table 8

Accessories	Standard Accessories	Shunt Trip
		Closing Electromagnet
		Electric Energy Storage Mechanism
		Auxiliary Contact
		Padlock Device
		Phase Barrier
	Non-standard Accessories	Undervoltage Release
		Vertical Interlock
		Horizontal Interlock
		Key Interlock
		Door Interlock
		Trip Lock
		Drawer-type Three-state Indication Signal Device
		External Power Supply Module
		ST201 Relay Module
	Standard Accessory for 3P + N Controller	N-Phase External Current Transformer

3.1. Shunt Trip Unit

A trip unit that enables remote operation to open the circuit breaker.

3.2. Closing Electromagnet

When the circuit breaker is in the open position, energizing the release electromagnet (i.e., the closing electromagnet) will cause the circuit breaker to close.

3.3. Electric Energy Storage Mechanism

The electric energy storage mechanism comprises a motor, limit micro switch, and a gear reduction system with planetary gears, which is used for the energy storage and pre-charging of the operating mechanism.

3.4. Auxiliary Contacts

3.4.1 Auxiliary Contact Configuration: Four normally open and four normally closed contacts, connected as four sets of changeover contacts at the circuit breaker contact group terminals.

3.4.2 Abnormal Closing and Breaking Capacities of Auxiliary Contacts

Table 9

Current Type	Usage Category	Rated Control Capacity (Pe)	Rated Operating Voltage (Ue)	Making and Breaking Capacity				Making and Breaking Operation Cycle Count and Frequency		
				U/Ue	I/Ie	COSΦ	$T_{0.95}$ (ms)	Operation Cycle Count	Operations per Minute Cycle Count	Energized Time (S)
AC	AC-15	300VA	220V 380V	1.1	1.1	0.3	-	10	6 (Or matches the main circuit operating frequency)	0.05
DC	DC-13	60W	220V	1.1	1.1	-	300			

3.4.3 The Designated Thermal Current of Auxiliary Contacts is 6 A.

3.4.4 Making and Breaking Capacity of Auxiliary Contacts under Normal Conditions

Table 10

Current Type	Usage Category	Rated Control Capacity (Pe)	Rated Operating Voltage (Ue)	Make				Break			
				U/Ue	Ie	COSΦ	$T_{0.95}$ (ms)	U/Ue	I/Ie	COSΦ	$T_{0.95}$ (ms)
AC	AC-15	300VA	220V 380V	1	10	0.3	-	1	1	0.3	-
DC	DC-13	60W	220V	1	1	-	300	1	1	-	300

⚠ Note: ① The electrical operation endurance of the auxiliary contacts is 6050 operations.

② The number of operation cycles per minute is 6 or matches that of the main circuit; the minimum contact closing time is 0.05 s or equal to the main circuit closing time.

3.5. Padlock Device

This device is installed at the bottom of the drawer-type circuit breaker drawer seat and is used to lock the three positions: 'Separation', 'Connection', and 'Test'. During use, it should be pulled out and secured with a padlock provided by the user.

3.6. Phase-to-Phase Barrier

Each circuit breaker is supplied with phase-to-phase barriers appropriate to its specifications and model. Specifically, a three-pole circuit breaker is equipped with two phase-to-phase barriers, while a four-pole circuit breaker is equipped with three phase-to-phase barriers.

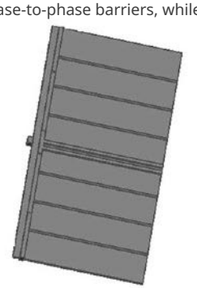


Figure 12. Interphase Barrier Diagram

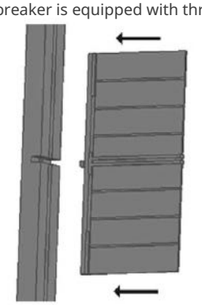


Figure 13. Interphase Barrier Installation Diagram

The interphase barrier is to be installed by the user. Simply insert the protruding portion on the left side of the interphase barrier into the slot adjacent to the circuit breaker terminal block. Ensure it is fully inserted to prevent the interphase barrier from dislodging.

3.7. Undervoltage Release Device

A release device designed to prevent the circuit breaker from operating under prolonged undervoltage conditions. The characteristics of the undervoltage release device are detailed in the table below.

Table 11

Category		Under-voltage Delay Trip Unit	Under-voltage Instantaneous Trip Unit
Trip Unit Operation Time		Delay: 0, 0.3, 0.6, 1, 3, 5 s	Instantaneous
Trip Unit Operation Voltage	35 ~ 70%Ue	Can cause the circuit breaker to trip	
	≤35% Ue	Circuit breaker cannot close	
	≥85% Ue ~ 110% Ue	Circuit breaker can close reliably	
Within half of the delay time, when the power supply voltage recovers to 85% e		Circuit breaker does not trip	—

⚠ Note: Delay time accuracy is ±10%.

3.8. Vertical Interlock

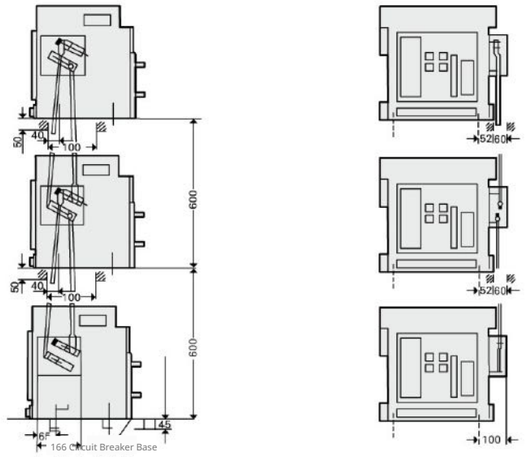


Figure 14. Diagram of the Stacked Circuit Breaker Vertical Interlocking Mechanism (For interlocking two circuit breakers, simply remove one unit)

The vertical interlocking mechanism is installed on the right side panel of the circuit breaker drawer base. Vertical interlocking of stacked circuit breakers is achieved via a connecting rod. When one circuit breaker is in the closing position, the interlocked circuit breaker cannot be closed. The interlocking mechanism is to be installed by the user.

3.9. Horizontal Interlocking

The horizontal interlocking mechanism is also installed on the right side panel of the circuit breaker drawer base. Horizontal interlocking of circuit breakers placed side by side is achieved using steel cable ropes. When one circuit breaker is in the closed state, the interlocked circuit breaker cannot be closed. The interlocking mechanism is to be installed by the user.

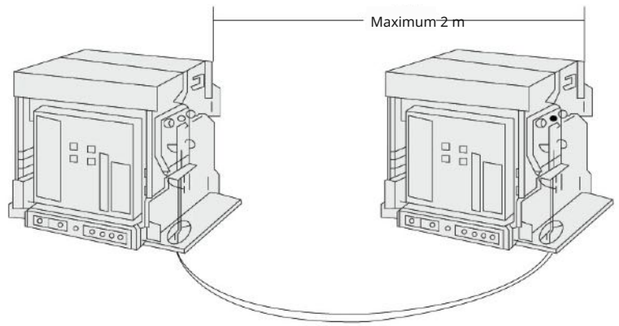
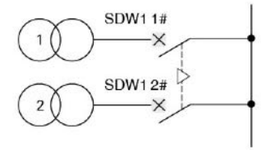


Figure 15. Diagram of horizontal interlocking mechanism for circuit breaker placed flat

Between two circuit breakers (horizontal or vertical)

Power supply 1 SDW11 #	Power supply 2 SDW12 #
0	0
0	1
1	0

0: Circuit breaker open 1: Circuit breaker closed



Between three circuit breakers (horizontal or vertical)

Power supply 1 SDW11 #	Power supply 2 SDW12 #	Power supply 3 SDW13 #
0	0	0
1	0	0
0	1	0
0	0	1
1	0	1

0: Circuit breaker open 1: Circuit breaker closed

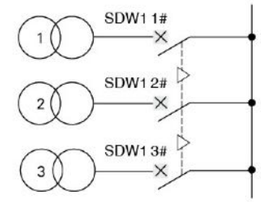


Figure 16. Interlock System Operating Status Diagram

⚠ Note: Vertical interlock and horizontal interlock must not be used simultaneously; each circuit breaker user may select only one type.

3.10. Key Interlock

The key interlock device is intended for applications where circuit breakers are installed separately and is mainly classified into two types: five-lock three-key and three-lock two-key. When the key is inserted into the lock and rotated to the horizontal position, the circuit breaker can be operated for closing and opening. To lock the circuit breaker in the open position, press the circuit breaker open button to its limit, then rotate the key counterclockwise to the vertical position; at this point, the closing operation is disabled, and the key can be removed. If the user requires additional key interlocks, arrangements can be made with the manufacturer.

3.10.1 Five-lock three-key interlock

The five-lock three-key interlock device is applicable to a power supply system with three incoming lines plus two bus tie breakers, particularly when the circuit breakers are installed in a dispersed configuration. Designate the three incoming line circuit breakers as Circuit Breaker A, Circuit Breaker B, and Circuit Breaker C, and designate the two bus tie circuit breakers as Circuit Breaker A' and Circuit Breaker C' respectively.

Refer to the figure below:

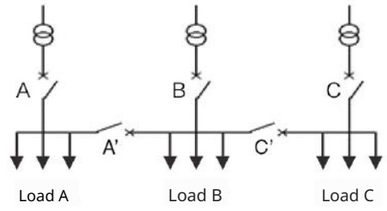


Figure 17. Five-Circuit Breaker Power Supply System Diagram

In the figure: Circuit breakers A and A' share the same lock; circuit breakers C and C' also share the same lock; circuit breaker B uses an independent lock. Three keys are provided:

(1) Key A: can open the locks of circuit breakers A and A', but cannot open any other locks;

(2) Key C: can open the locks of circuit breakers C and C', but cannot open any other locks;

(3) Key ABC: can open all five locks.

⚠ Note: The ABC key is actually composed of three keys—A, B, and C—linked together and must never be separated. When this set of keys is inserted into a specific circuit breaker among the three circuit breakers A', B, and C, the other two circuit breakers will be unable to close.

Based on the above combination, the possible operating states of the system are presented in the following table:

Table 12

A	A'	B	C'	C
0	0	0	0	0
1	0	0	0	0
0	1	0	0	0
0	0	1	0	0
0	0	0	1	0
0	0	0	0	1
1	1	0	0	0
1	0	1	0	0
1	0	0	1	0
1	0	0	0	1
0	1	1	0	0

A	A'	B	C'	C
0	1	0	1	0
0	1	0	0	1
0	0	1	1	0
0	0	1	0	1
0	0	0	1	1
1	1	0	1	0
1	1	0	0	1
1	0	1	0	1
1	0	0	1	1
0	1	1	1	0
0	1	0	1	1

⚠ Note: When the complete set manufacturer installs the circuit breaker, the incoming line circuit breaker and its bus tie for a given circuit must use circuit breakers with the same key.

3.10.2 Three-Lock Two-Key Interlock

The three-lock two-key interlock device is applicable to power supply systems with two incoming feeders plus one bus tie, particularly where the circuit breakers are installed sep-arately. This key interlock system employs three identical locks but only two keys, thereby ensuring that no more than two of the three circuit breakers can be closed simultaneously.

Interlock system among three circuit breakers (three locks and two keys)

Power supply 1 SDW11 #	Bus tie switch SDW12 #	Power supply 2 SDW13 #
0	0	0
1	0	0
0	1	0
0	0	1
1	1	0
0	1	1
1	0	1

0: Circuit breaker open 1: Circuit breaker closed

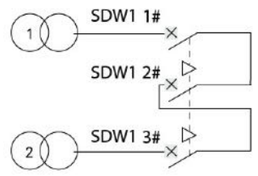


Figure 18. Operating status diagram of the three-lock and key interlock system

3.11. Door interlock

Drawer-type circuit breakers can be equipped with door interlocks. The door interlock prevents the switchgear door, when in operation or test mode, from being opened arbitrarily, thereby ensuring personnel safety. The door interlock is installed at the lower right corner of the drawer base. Its functions are as follows:

a . When the circuit breaker is in the 'Separation' position (relative to the drawer base), the switchgear door can be freely opened and closed.

b . When the switchgear door is open, the circuit breaker can be moved to any position between 'Connection' and 'Separation' by pushing in or pulling out. c . When the circuit breaker leaves the 'Separation' position, the door is locked immediately upon closing.

3.12. Trip Lock

The trip lock has the same structure as the key interlock. However, it includes only one lock and one key, which are used to lock the circuit breaker's trip button; during this state, the circuit breaker's closing button is disabled.

3.13. Drawer-type Three-position Indication Signal Device

This signal device is used to indicate the output signals corresponding to the circuit breaker's Connection, Test, and Separation positions. Each position—Connection, Test, and Separation—features a set of changeover contacts with normally open and normally closed contacts.

The voltage, current, and usage category of the three-state indicator signal device are detailed in the table below.

Table 13

Item	Ue(AC)	Ue(DC)	I	Usage Category
Value	380V	200V	6A	AC15/DC13

SDW1-2000~6300	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Status	Separation			Test			Connection		
	Q1		Q3	Q4		Q6	Q7		Q9
Wiring Diagram									
		Q2			Q5			Q8	

Figure 19. Wiring Diagram of Three-State Indication Signal Device

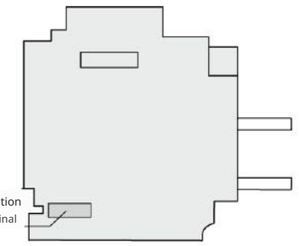


Figure 20. Location Diagram of Secondary Wiring Terminals

3.14. External Power Supply Module

When the power supply for the intelligent trip unit is selected as a DC power supply, an external DC power supply module must be installed, and the connection must be made from the output terminal of the DC power supply module.

Table 14

Circuit breaker enclosure	Type of input voltage	Output voltage	Module power rating	Type of supply
SDW1-2000～6300	DC110V/220V	DC24V	17.6W	Special order

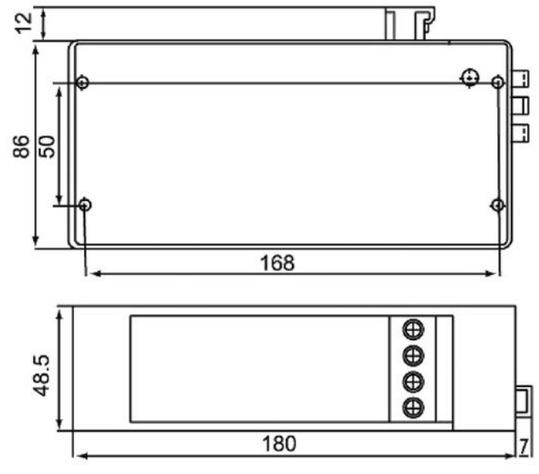


Figure 21. External Power Supply Module Dimensions

⚠ Warning: Terminals 1# and 2# must not be connected to an AC power supply under any circumstances.

3.15 ST201 Relay Module

The signal output unit of the intelligent trip device is typically used for fault alarms or indications. When employed to control the circuit breaker's opening and closing operations or when the associated load capacity is substantial, control must be routed through the ST201 relay module. The ST201 contact ratings are: AC 250 V, 10 A; DC 28 V, 10 A. The module's appearance and installation dimensions are illustrated in the figure below:

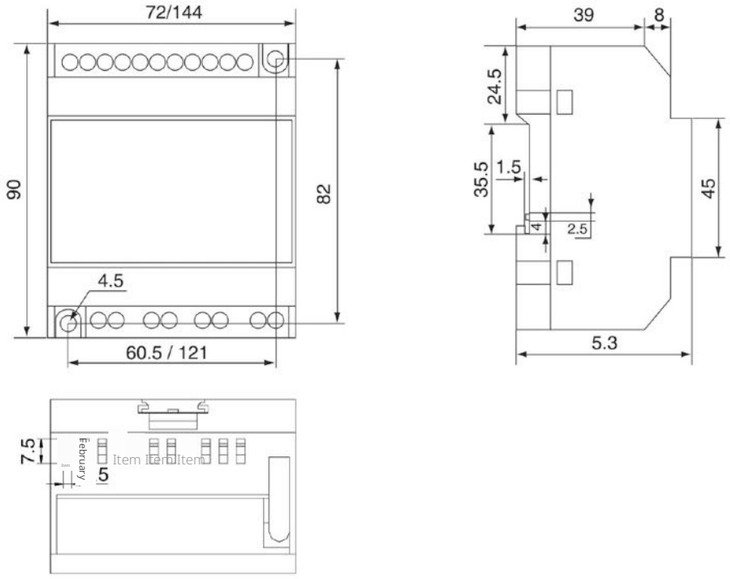
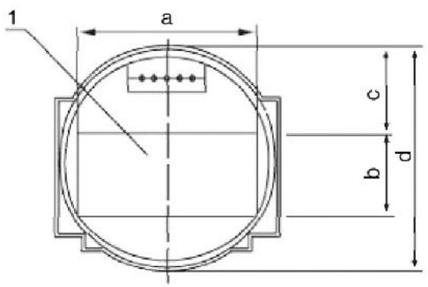


Figure 22. ST201 Relay Module Dimensional Drawing

3.16. N-phase external current transformer

When the controller is 3P + N, it is necessary to additionally equip a neutral pole current transformer, i.e., an N-phase external current transformer.



1- Busbar

Fig. 23. N-Phase External Current Transformer Dimension Diagram

Circuit breaker enclosure	a	b	c	d
SDW1-2000 SDW1-4000 Four-Pole	60 mm	20 mm	34 mm	Φ89 mm
SDW1-3200 ~ 6300	86 mm	30 mm	35 mm	Φ109.5 mm

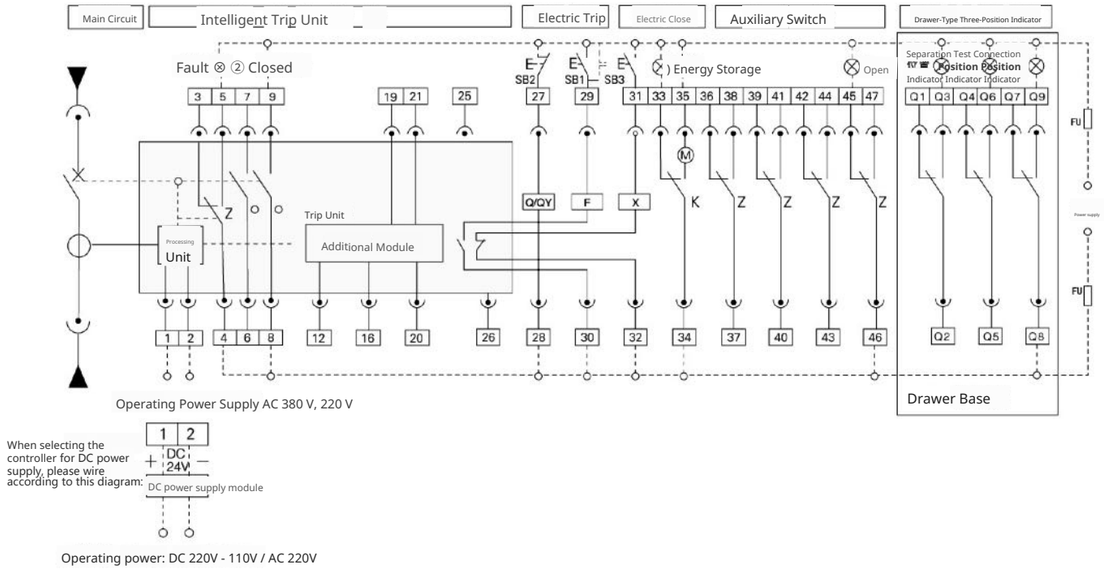
IV. Secondary Wiring

1. Secondary Wiring Contact Group

The contact group consists of two parts: the contact base and the plug-in. On the drawer-type circuit breaker, the contact base is mounted on the drawer base and can be freely displaced approximately 5mm laterally, while the plug-in is fixed to the circuit breaker body. A guide component is provided on the plug-in to ensure its correct insertion into the contact base. During the insertion of the drawer-type circuit breaker, the contact group connects the secondary circuit wiring on the circuit breaker to the contact base via the conductive springs on both the plug-in and the contact base. The contact seat serves as the sec-ondary circuit wiring terminal of the circuit breaker. The contact assembly on the fixed circuit breaker is integrally mounted on the circuit breaker and is used solely as the secondary circuit wiring terminal.
The contact assembly includes a total of 56 wiring terminals, facilitating simple and convenient wiring for users.

2. Secondary Wiring Diagram

2.1 L-Type Trip Unit Secondary Wiring Diagram



Note: SB1 Shunt release button (user-supplied) SB2 Un-dervoltage button (user-supplied)

F Shunt release trip unit

O Normally open contact (3A / AC 380V)

Z Changeover contact

12 Overload Pre-alarm Signal Output

16 Ground Fault Trip Signal Output

19 Signal Output Common Line

DC Power Supply Module (Special Order Required)

Q/QY Undervoltage instantaneous trip unit or undervoltage delay trip unit

M Energy storage motor

SB3 Closing button (user-supplied)

X Closing electromagnet

K Limit switch (in the diagram, corresponds to the energy storage end position)

20 Self-diagnosis Signal Output

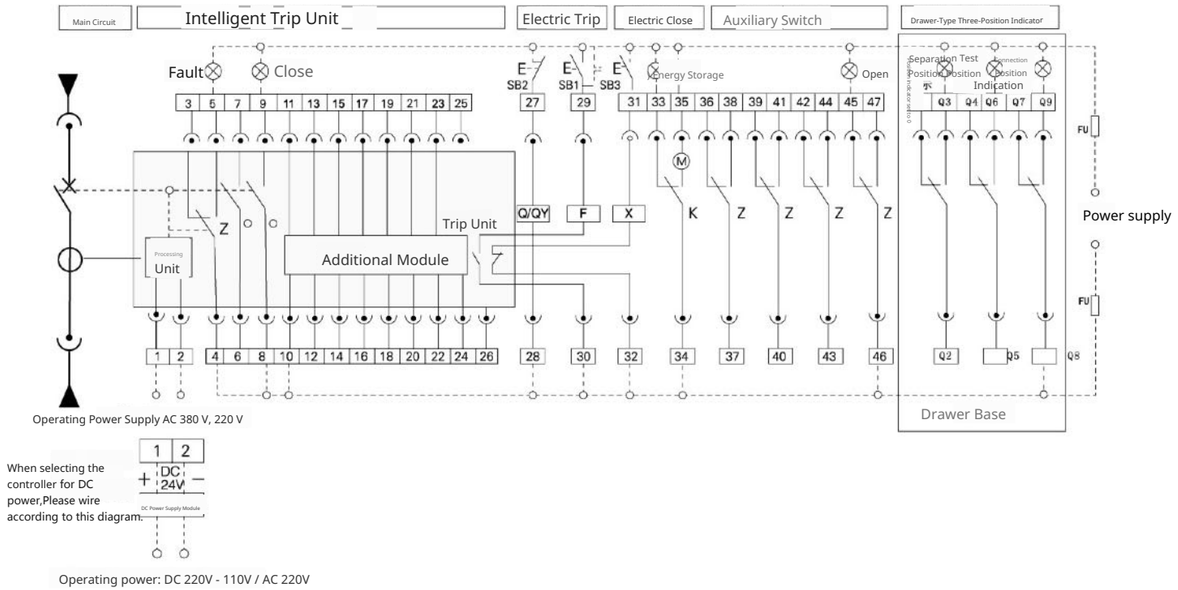
21 OCR Fault Trip Signal Output

25, 26 External Neutral or Ground Current Transformer Input Terminals (Special Order Required) Q1 to Q9 Drawer-type Three-position Indicators (Special Order Required)

*When the operating power supply of the intelligent trip unit is selected as DC power, a power supply module must be added (Terminals 1# and 2# must not be connected to AC power).

Figure 24. SDW1-2000 to 6300L Type Trip Unit Secondary Wiring Diagram (Including Additional Configurations)

2.2 M / H Type Trip Unit Secondary Wiring Diagram



Note: SB1 Shunt Button (User-Supplied)

SB2 Undervoltage Button (User-Supplied)

F	Shunt Trip
O	Normally Open Contact (3A / AC 380V)
Z	Changeover Contact
10	RS485 Communication Terminal (H Type Only, Single-wire)
11	RS485 Communication Terminal (H Type Only, Single-wire)
12	Overload Warning Signal Output
14	Instantaneous Short-time Delay Trip Signal Output
15	Long-time Delay Trip Signal Output
16	Ground Fault Trip Signal Output
17	Load Shedding 1 Signal Output (Special Order Required)
18	Load Shedding 2 Signal Output (Special Order Required)

DC Power Supply Module (Special Order Required)

Q / QY Undervoltage Instantaneous Trip Unit or Undervoltage Delay Trip Unit

M Energy Storage Motor

SB3 Closing button (user-supplied)

X Closing Electromagnet

K Limit switch (in the diagram, corresponds to the energy storage end position)

19	Signal Output Common Line
20	Protective Grounding Conductor
21	N-Phase Voltage Signal
22	A-Phase Voltage Signal
23	B-Phase Voltage Signal

24 C-phase voltage signal

25, 26 External terminals for neutral or ground current transformer input (special ordering required).
Length of external transformer wiring: MM.

Q1 - Q9 Drawer-type three-position indicator (special ordering required).

* When the operating power supply of the intelligent trip unit is selected as DC power, a power supply module must be added (Terminals 1# and 2# must not be connected to AC power).

Figure 25. SDW1-2000 to 6300M/H type trip unit secondary wiring diagram (including additional configurations).

3. Secondary Wiring Diagram with Communication Function

The communication function comprises four remote capabilities: remote control, remote adjustment, remote measurement, and remote signaling. It constitutes a critical part of the intelligent remote operation of the circuit breaker.

This circuit breaker supports communication functionality only when equipped with the H-type intelligent trip unit. Supported communication protocols include Modbus , Profibus-DP, and DeviceNet. Users are required to provide the communication protocols and associated software, as these are not supplied by our company.

Circuit breakers equipped with communication functionality require the addition of the STIV power supply module, ST201 relay module, communication cable, and hub. The first two modules are standard equipment for circuit breakers with communication capabilities and are factory-installed by our company. The latter two are optional and may be ordered separately by the user if required.

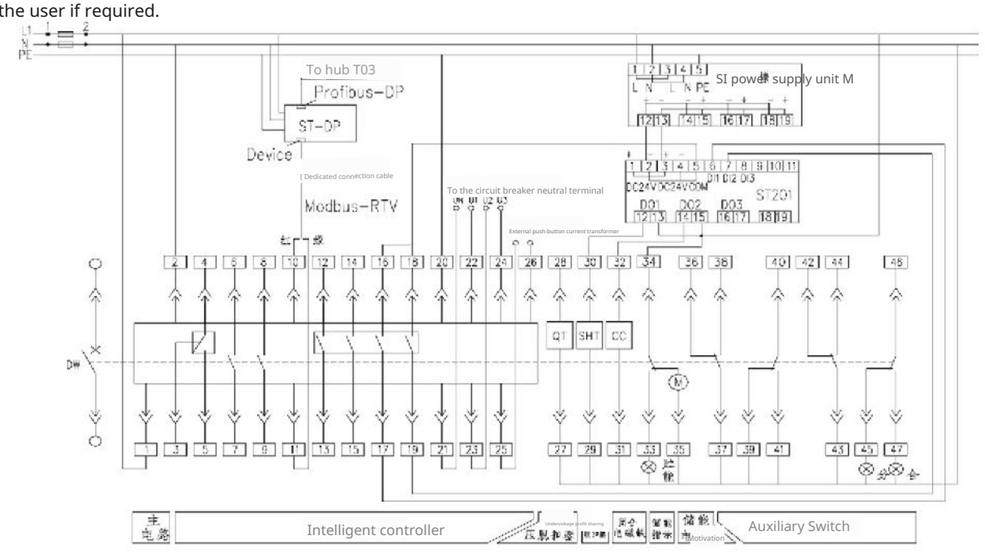


Figure 26. Secondary wiring diagram of circuit breaker with communication function.

Terminal description:

1, 2: Auxiliary power supply input terminals; terminal 1 is positive in DC mode.

3, 4, 5: Fault trip contact outputs (terminal 4 is the common contact);

6, 7 and 8, 9: Two sets of auxiliary contacts indicating circuit breaker status;

10, 11: RS485A and RS485B communication leads;

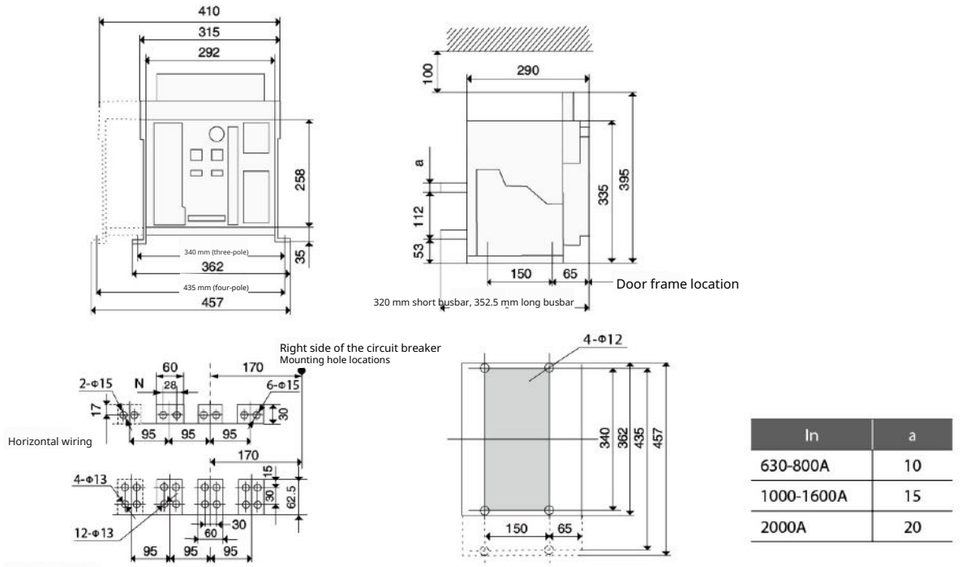
12, 13 (Contact 1), 14, 15 (Contact 2), 16, 17 (Contact 3), and 18, 19 (Contact 4): Four sets of DO signal outputs for the controller; 20: Protective grounding terminal (connected to metal parts bonded to earth);

21, 22, 23, 24: Voltage signal input terminals (for voltage sampling). Ensure correct connection sequence; if the system is three-phase three-wire, terminals 21 and 23 must be shorted;

25, 26: External current transformer input terminals (for (3P + N) T or leakage protection).

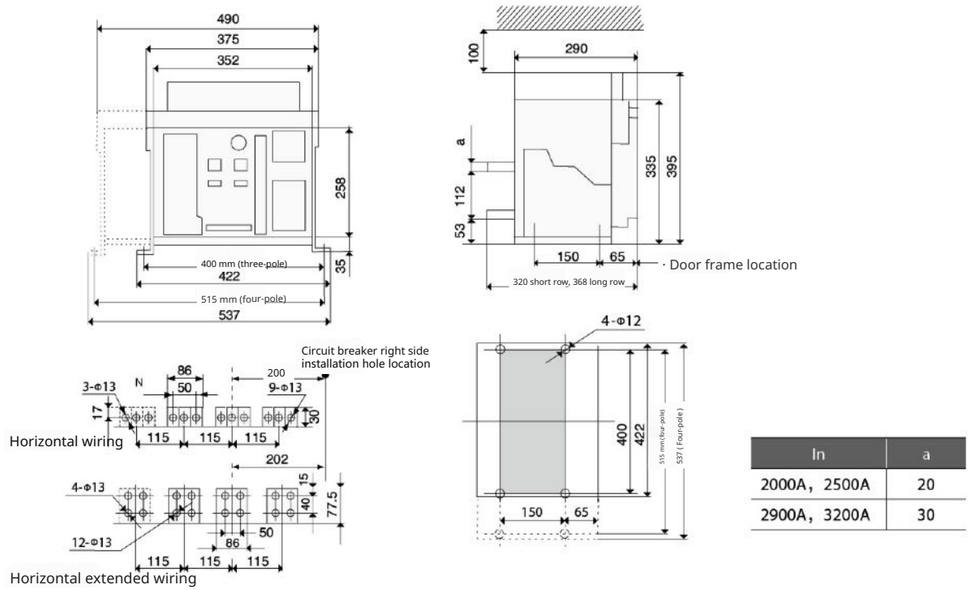
V. Outline and Installation Dimensions

1.Outline and Installation Dimensions



In	a
630-800A	10
1000-1600A	15
2000A	20

Figure 27-1. Fixed-type SDW1-2000 Circuit Breaker (Inm = 2000A, three-pole and four-pole) dimensional drawing



In	a
2000A，2500A	20
2900A，3200A	30

Figure 27-2. Fixed SDW1-3200 circuit breaker (Inm = 3200A, three-pole and four-pole) dimensional drawing

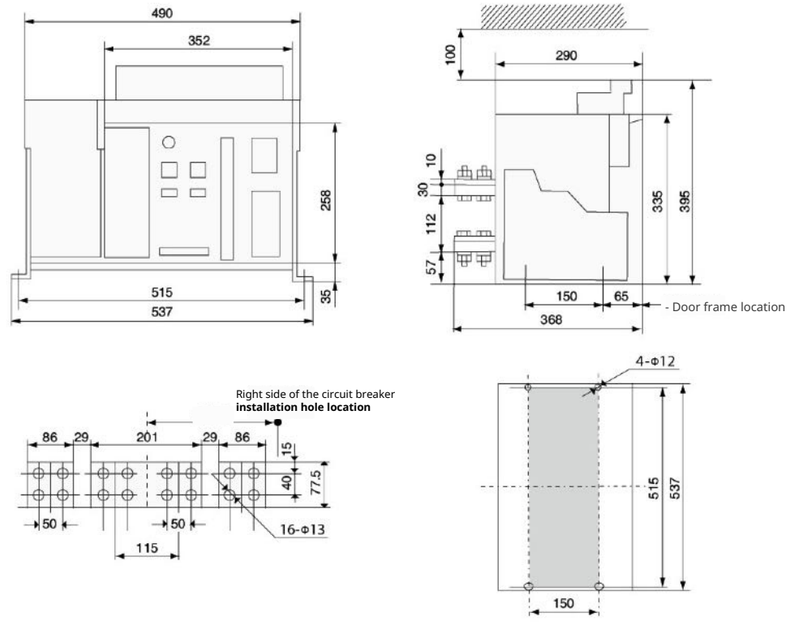


Figure 27-3. Fixed SDW1-4000 circuit breaker (Inm = 4000A, three-pole) dimensional drawing

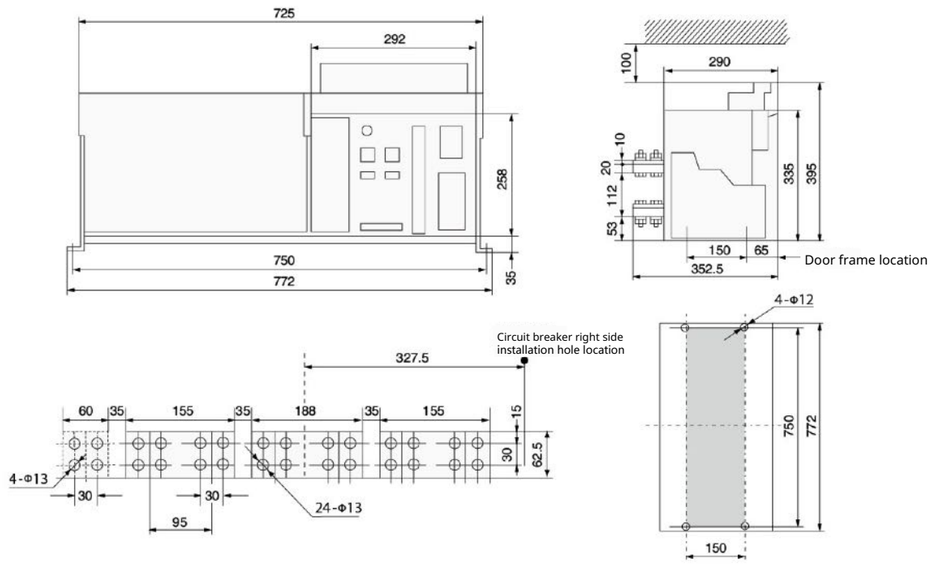
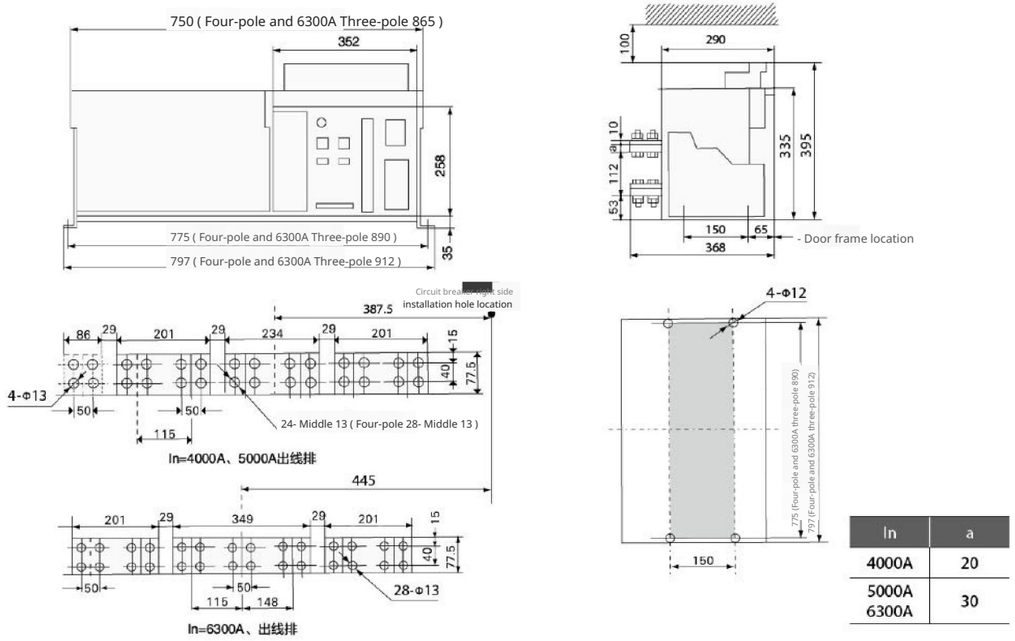
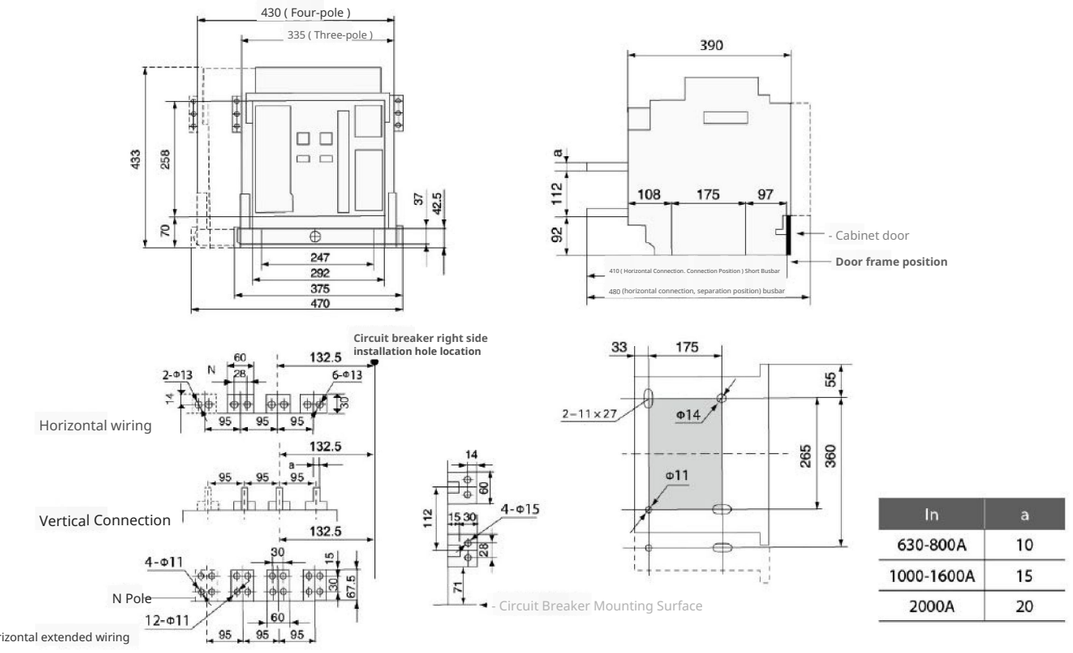


Figure 27-4. Fixed SDW1-4000 circuit breaker (Inm = 4000A, four-pole) dimensional drawing



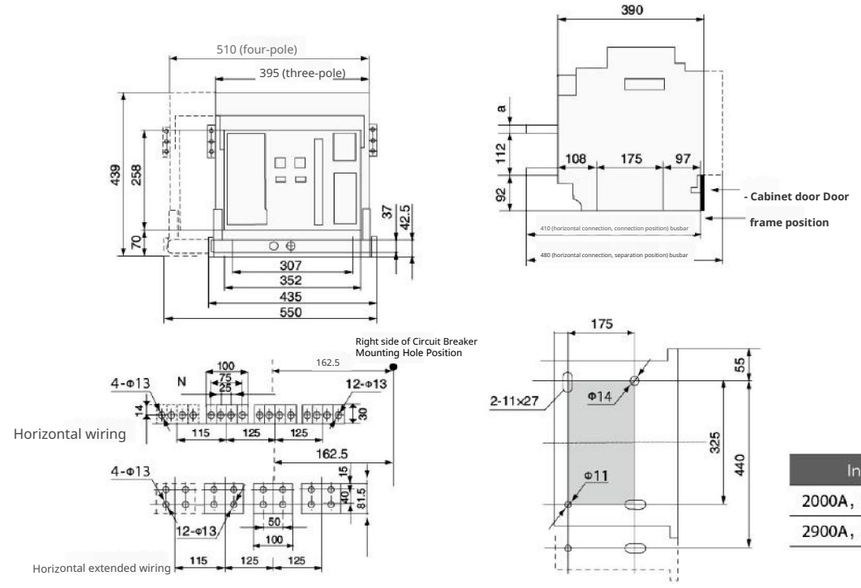
In	a
4000A	20
5000A 6300A	30

Figure 27-5. Fixed SDW1-6300 Circuit Breaker (Inm = 6300A) Dimension Drawing
(4000A, 5000A Three-pole, Four-pole and 6300A Three-pole)



In	a
630-800A	10
1000-1600A	15
2000A	20

Figure 27-6. Drawer-type SDW1-2000 Circuit Breaker (Inm = 2000A, three-pole and four-pole) Dimension Diagram



In	a
2000A，2500A	20
2900A，3200A	30

Figure 27-7. Drawer-type SDW1-3200 Circuit Breaker (Inm = 3200A, three-pole and four-pole) Dimension Diagram

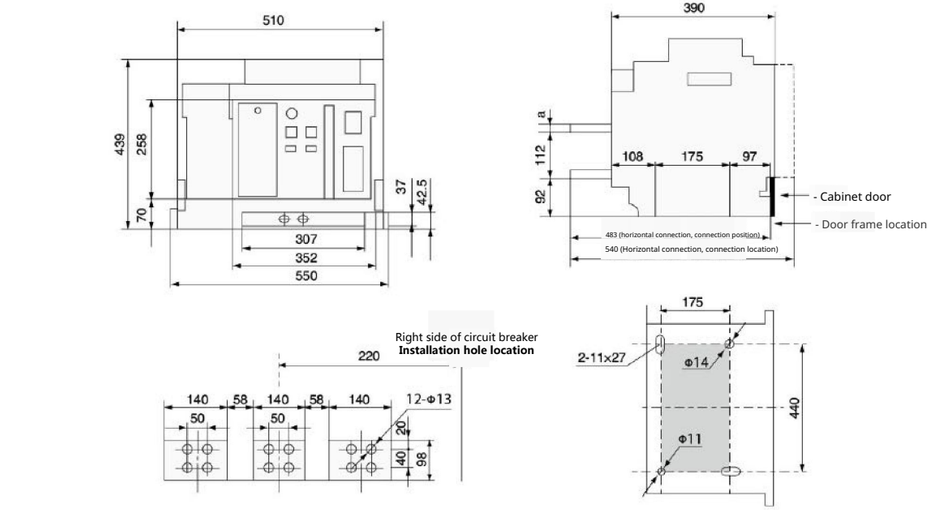


Figure 27-8. Drawer-type SDW1-4000 Circuit Breaker (Inm = 4000A, three-pole) Dimension Diagram

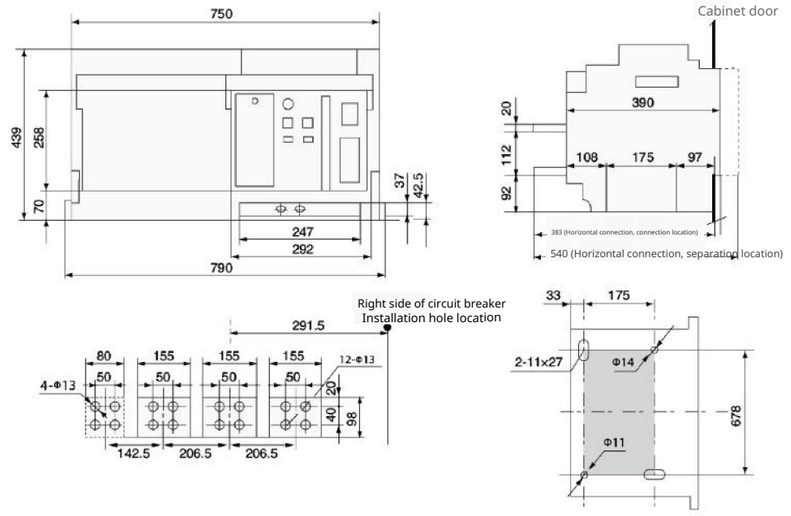
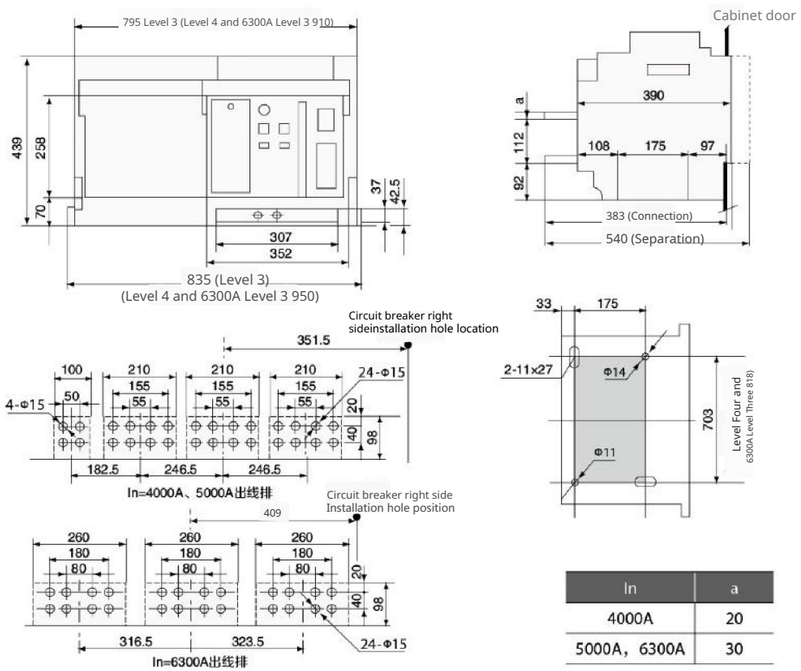


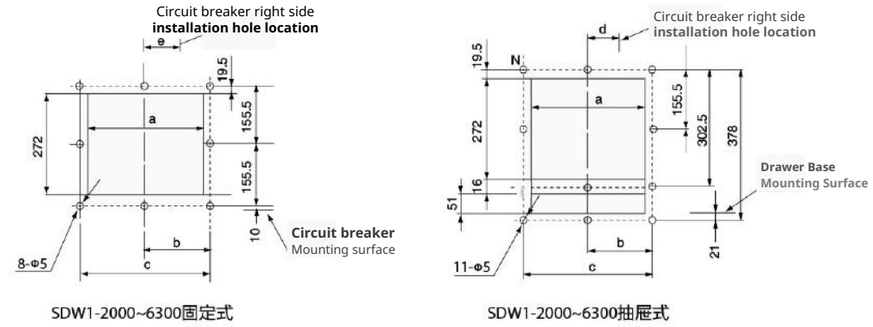
Figure 27-9. Drawer-type SDW1-4000 Circuit Breaker (Inm = 4000A, four-pole) Dimension Diagram



In	a
4000A	20
5000A，6300A	30

Figure 27-10. Drawer-type SDW1-6300 Circuit Breaker (Inm = 6300A) Dimension Drawing
(4000A, 5000A three-pole, four-pole, and 6300A three-pole)

2. Panel Mounting Dimensions

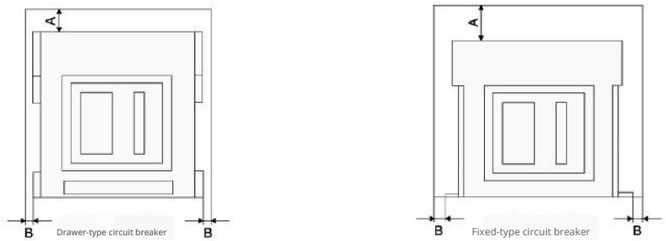


(mm)

In	a	b	c	d	e
2000、4000/4P	306	172.5	345	132.5	170
3200、4000/3P、6300	366	202.5	405	162.5	200

Figure 28. SDW1-2000 to 6300 Panel Mount Dimensions

3. Safety Clearance



Unit (mm)		To insulator		To metal body	
		A	B	A	B
2000～6300	Drawer-type	0	0	0	0
	Fixed-type	100	30	100	70

Figure 29. SDW1-2000 to 6300 Safety Clearance Dimensions

4. Busbar Connection

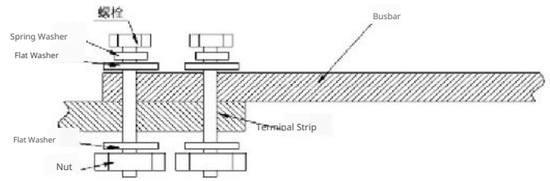


Figure 30. Busbar Connection Diagram

4.1 Horizontal Wiring Busbar and Connection Bolt Specifications

Table 15

Circuit Breaker Frame	Rated Current (A)	Copper Bar Specifications		Connection Bolt Specifications (minimum)			
		Quantity	Dimensions (mm × mm)	Fixed-type short busbar	Fixed-type long busbar	drawer-type short busbar	Drawer-type long busbar
SDW1-2000	630	2	50 × 5	M14 × 35	M12 × 35	M12 × 35	M10 × 35
	800	2	60 × 5	M14 × 35	M12 × 35	M12 × 35	M10 × 35
	1000	2	60 × 5	M14 × 40	M12 × 40	M12 × 40	M10 × 40
	1250	3	60 × 5	M14 × 45	M12 × 45	M12 × 45	M10 × 45
	1600	2	60 × 10	M14 × 50	M12 × 50	M12 × 50	M10 × 50
	2000	3	60 × 10	M14 × 65	M12 × 65	M12 × 65	M10 × 65
SDW1-3200	2000	3	100 × 5	M12 × 50	M12 × 50	M12 × 50	M12 × 50
	2500	4	100 × 5	M12 × 55	M12 × 55	M12 × 55	M12 × 55
	2900	3	100 × 10	M12 × 80	M12 × 80	M12 × 80	M12 × 80
	3200	4	100 × 10	M142 × 90	M12 × 90	M12 × 90	M12 × 90
SDW1-4000 Three poles	3200	4	100 × 10	None	M12 × 90	None	M16 × 90
	3600	4	100 × 10	None	M12 × 90	None	M16 × 90
	4000	5	100 × 10	None	M12 × 100	None	M16 × 100
SDW1-4000 Four poles (Fixed type)	3200	7	60 × 10	None	M12 × 80	None	None
	3600	7	60 × 10	None	M12 × 80	None	None
	4000	8	60 × 10	None	M12 × 80	None	None
SDW1-4000 Four poles (Drawer type)	3200	4	100 × 10	None	None	None	M12 × 80
	3600	5	100 × 10	None	None	None	M12 × 90
	4000	5	100 × 10	None	None	None	M12 × 90
SDW1-6300	4000	5	100 × 10	None	M12 × 70	None	M14 × 60
	5000	6	100 × 10	None	M12 × 80	None	M14 × 80
	6300	8	100 × 10	None	M12 × 90	None	M14 × 90

⚠ Note: It is recommended to use connection bolts with a strength grade of 8.8. The mounting holes on the copper busbar must correspond exactly to those on the circuit breaker terminal block. Oversized, undersized, or significantly misaligned holes will adversely affect the circuit breaker's operation.

4.2 Specifications for vertical busbar wiring and connection bolts

Table 16

Circuit breaker enclosure	Rated Current (A)	Copper Bar Specifications		Connection Bolt Specifications (minimum)
		Quantity	Dimensions (mm × mm)	Drawer-type
SDW1-2000	630	2	50 × 5	M14 × 35
	800	2	60 × 5	M14 × 35
	1000	2	60 × 5	M14 × 40
	1250	3	60 × 5	M14 × 45
	1600	2	60 × 10	M14 × 50
	2000	3	60 × 10	M14 × 65
SDW1-3200	2000	2	80 × 10	M14 × 55
	2500	3	80 × 10	M14 × 65

⚠ Note: It is recommended to use connection bolts with a strength grade of 8.8. The mounting holes on the copper busbar must correspond exactly to those on the circuit breaker terminal block. Oversized, undersized, or significantly misaligned holes will adversely affect the circuit breaker's operation.

VI. Maintenance Instructions

1. Regularly clean dust to ensure the circuit breaker maintains proper insulation.
2. Regularly apply lubricating oil to all moving parts (bearing areas) and lubricating grease to gears and all sliding components.
3. Regularly inspect the contact system and mechanism.

3.1 Inspect the arc chute and contacts for any signs of burning damage. If necessary, measure the contact opening distance and overtravel. For overtravel measurement, detect the displacement of the moving contact arc tip relative to the contact support. When the circuit breaker is closed, mark the contact support at the moving contact arc tip, then open the circuit breaker and measure the displacement of the moving contact on the contact support. Multiply the measured displacement by 28/53 to determine the contact overtravel. This value should exceed 4 mm.

3.2 Inspect all fasteners for looseness and verify that limiters are neither dislodged nor malfunctioning.

3.3 Verify that the operation travel of the undervoltage release, shunt release, and closing electromagnet has adequate clearance. The excess travel for the closing electromagnet should be approximately 1 mm, while for the others, it should exceed 1 mm.

3.4 Ensure that the operational performance of all accessories meets their respective specified characteristic requirements.

3.5 Place a 1 mm thick piece of manure paper or an equivalent material between the moving and fixed contacts; the circuit breaker must be capable of reliable closing. Exercise caution to ensure safety when inserting the paper.

4. Inspection After Short-Circuit Interruption

The inspection content is the same as the previous item, with the addition of checking the flexible connections and their welded joints. There should be no visible damage; otherwise, the damaged components must be replaced.

When the circuit breaker reaches the end of its electrical service life, the arc extinguishing cover and contact system must be replaced promptly.

5. Common Faults and Troubleshooting Methods of the SDW1 Series Circuit Breaker

Table 17

Serial Number	Fault Phenomenon	Cause of occurrence	Troubleshooting Methods
1	Circuit Breaker Cannot Close	a. Undervoltage release without power supply voltage b. After the intelligent release operates, the red button on the upper section of the release panel does not reset c. Operating Mechanism Not Charged	a . Inspect the circuit and connect the undervoltage release power supply. b. Press the reset button. c . Manually (using the operating handle) or electrically charge the energy storage mechanism.
2	The circuit breaker cannot be electrically charged	a. Power supply to the electric operating mechanism is not connected b. Insufficient power supply capacity	a. Inspect the circuit and connect the power supply. b. Verify that the operating voltage is greater than 85% of Ue.
3	The closing electromagnet cannot close the circuit breaker	a. No power supply voltage b. Insufficient power supply capacity	a. Inspect the circuit and connect the power supply. b. Verify that the operating voltage is greater than 85% of Ue.
4	The separation trip unit cannot trip the circuit breaker	a. No power supply voltage b. Insufficient power supply capacity	a. Inspect the circuit and connect the power supply. b. Verify that the operating voltage is greater than 85% of Ue.
5	If the fault current exceeds the short-time delay and overload long-time delay setting values, only instantaneous operation will occur	The short-time delay and instantaneous setting values are configured within the same current range	If the settings are incorrect, readjust according to the principle Ir3 > Ir2 > Ir1.
6	Frequent tripping of the circuit breaker.	On-site overload operation causes overload protection tripping due to the overload thermal memory function failing to clear the power interruption promptly.	After the controller power supply is interrupted once, or after 30 minutes, close the circuit breaker again.
7	The protector displays 'E' after operating for a certain period.	Overload operation of the circuit breaker causes the internal temperature of the protector to rise;	unload non-essential loads to reduce the protector temperature if it becomes excessively high. Alternatively, shut down for an appropriate duration, allow cooling, and then resume operation.
8	After the circuit breaker is energized, the protector ei-ther shows no data or indicates loss of control.	The protector is either not supplied with auxiliary power or the auxiliary power has malfunctioned. When the auxiliary power supply is not connected, the three-phase operating current is low (< 40% of the protector's rated value).	Connect the rated auxiliary power supply to terminals #1 and #2 of the protector.
9	The toggle handle of the drawer-type circuit breaker cannot be inserted into the circuit breaker	The drawer-type rail or the circuit breaker body is not fully engaged	Push the guide rail or circuit breaker body fully into place.
10	The circuit breaker is in the off position and can-not be withdrawn from the drawer base.	a. The toggle handle has not been removed. b. The circuit breaker has not fully reached the off position.	a. Pull out the toggle handle. b . Use the toggle handle to switch the circuit breaker to the 'OFF' position.

Ⅶ. Capacity Reduction Factor and Power Loss

1. Circuit Breaker Temperature Derating Coefficient

Table 18

Ambient Temperature		+40℃	+45℃	+50℃	+55℃	+60℃
Permissible Continuous Operating Current	2000A	In	0.95In	0.90In	0.85In	0.80In
	3200A	In	0.92In	0.86In	0.80In	0.74In
	4000 A (Three-pole)	In	0.90In	0.81In	0.73In	0.65In
	4000 A (Four-pole)	In	0.95In	0.90In	0.85In	0.80In
	6300A	In	0.92In	0.86In	0.80In	0.74In

2. Circuit Breaker Altitude Derating Coefficient

Table 19

Altitude (m)	2000	3000	4000	5000
Operating Current Correction Coefficient	1	0.91	0.86	0.80
Short-circuit Breaking Capacity Correction Coefficient	1	0.81	0.69	0.63

3. Circuit Breaker Power Loss

Table 20

Frame Rating		SDW1-2000						SDW1-3200				SDW1-4000			SDW1-6300		
In(A)		630	800	1000	1250	1600	2000	2000	2500	2900	3200	3200	3600	4000	4000	5000	6300
Power Loss (W)	Drawer Type	24	39	61	87	128	160	150	180	230	250	210	275	330	310	490	770
	Fixed-type	15	25	40	54	64	80	80	100	120	150	125	165	195	160	255	400