# Contents

## 1. Precautions before use

### 1.2 Receiving inspection

Inspection on the goods received. Check the UEW6 air circuit breaker (breaker for short below) model specifications and quantity with the order of goods whether they are consistent. When opening the packaging case for inspection, avoid bruising the breaker and damaging the packaging. It is recommended to keep the wooden case before installation. After receiving inspection, even if it will be installed in a very short time, please put the circuit breaker back into the package and pay attention to waterproof and moisture-proof. If any damage or abnormality is found, please contact us within 5 days after receiving the goods.

### 1.3 Storage and transportation

The storage environment should be dry, dust-free, and free of corrosive and explosive chemicals. Storage temperature: -40℃ ~ +70℃.

Please place the breaker horizontally on fixed base. It is not allowed to be placed directly on the ground.

During storage and transportation, the breaker should be in the OFF state and the spring mechanism should be in the discharged state.

During installation and transportation, pay attention to the breaker and person protection. Tipping, striking, or falling may cause damage to the breaker.

## 2 Normal working environment

■ Ambient air temperature

The ambient air temperature is -5℃～+40℃, and the average value of 24 hours is not more than +35℃.

The operating environment temperature for low temperature type breaker can be as low as -40 ℃.

Note: when the ambient temperature is high (more than + 40 ℃), appropriate cooling measures or derating should be taken to avoid the breaker running in high temperature for a long time and insulation aging.

■Altitude

For normal breakers, the altitude of the site should not exceed 2500m. If the altitude above 2500m, derating should be applied.

■ Atmospheric condition

Atmospheric relative humidity should not exceed 50% at ambient air temperature +40℃. At lower temperatures,

the relative humidity can be higher, for example 90% at 20℃. Special measures should be taken for the occasional condensation caused by temperature changes. There should be no corrosive or explosive chemicals around the circuit breaker.

■ Pollution degree

Breaker pollution degree: 3.

■ Protection degree

Breaker protection degree: IP40.

■ Installation category

Main circuit installation category of the breaker is Ⅳ, and the auxiliary and control circuit installation category is Ⅲ.

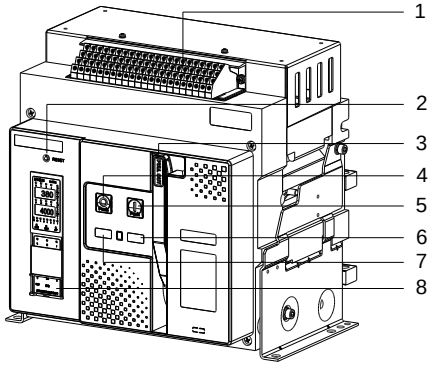
■Installation condition

The breaker should be installed horizontally, and the vertical gradient after installation does not exceed 5° .

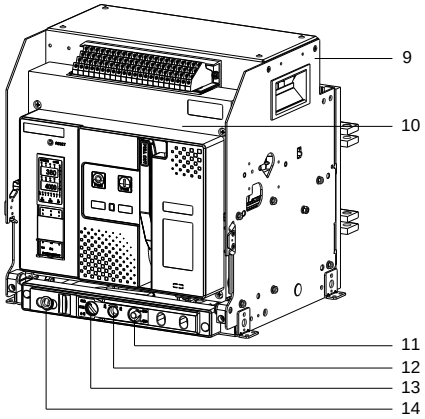
## 3 Operation setting description

### 3.1 Breaker structure introduction

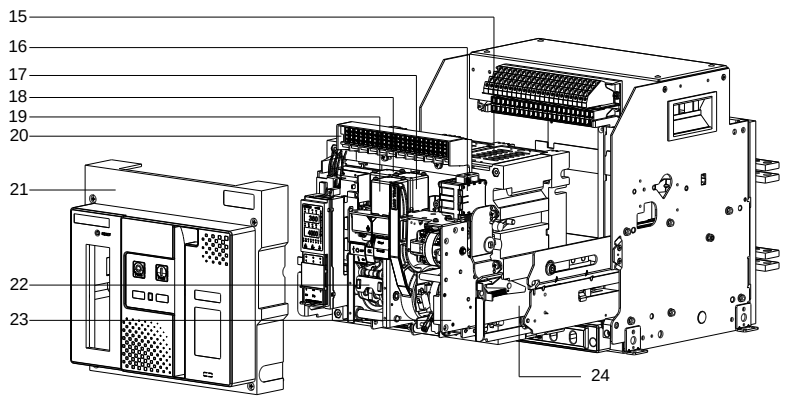
**Fixed type**




**Draw out type**



| | | | |
|---|---|---|---|
| 1. Secondary terminal block | 5. On button | 9. Cradle | 13.Position indicator |
| 2. Trip indicator/ reset button | 6 Charged/ Discharged indicator | 10. Breaker body | 14. Crank storage space |
| 3. Charging handle | 7. Open/close indicator | 11. Stop release button | |
| 4. OFF button | 8. Trip Unit | 12. Crank inserting hole | |




15. Arc chamber

16. Auxiliary contacts (switch)

17. Shunt trip

18. Undervoltage Trip Device

19. Closing electromagnet

20. Secondary terminal block

21. Front cover

22. Operating mechanism

23. Charging motor

24. Cradle

### 3.2 Breaker operation

**Charging operation**

Electric charging: When the breaker is in discharged state, if the motor is energized, it will automatically charge breaker operating mechanism. The motor will automatically stop after the charging is completed, and clicking sound can be heard, and charging state indicator indicates that it is in charged state.

Manual charging: Similarly, when the breaker is in discharged state, it can be charged by pushing down the manual charging handle. Pushing down about 6 or 7 cycles until hear the clicking sound, the reaction force of the handle is significantly reduced. At this time, the charging state indicator indicating “Charged” and the charging is completed.

**Closing operation**

Under charged state, press the ON button, or energize the closing electromagnet until hear the "buzz" sound, at this time, the "I/O" indicator indicates "I", and the breaker is ON. At the same time, the charging status is in “discharged”. At this time, if the motor is energized, the motor will automatically charge the operating mechanism, and the motor will automatically stop after the charging is completed. The charging indicator indicating “charged”.

Note: The circuit breaker can only be closed after the operating mechanism is charged.

If an undervoltage trip device is selected, the undervoltage trip device should be energized before closing the breaker.

**Opening operation**

In the closing state, press the OFF button on the panel, or energize the shunt release, you will hear the "buzz" sound. At this time, the "I/O" indicator window on the panel indicates "O", indicating that the breaker has been interrupted.

Note: The breaker only be opened when the breaker under ON state.

Draw out type breaker operation

In the following operation process, in the "rocked out", "test" and "rocked in" position, the red position lock button will pop up to indicate that the position is locked, and the crank cannot be turned at this time, and forced operation is not allowed. The crank is allowed to turn only when the position lock button is pressed to reset.

**Connect**

First pull out the left and right sliding plate on the cradle, put the circuit breaker body on the left and right sliding plate (pay attention to alignment with the body when placing), push the sliding plate into the draw out cradle, insert the crank handle into the inserting hole, press the position lock button, rotate the crank clockwise, the circuit breaker body part on the skateboard will be pushed inward from the "rocked out" position, and finally reach the "rocked in" position through the "test" position. When the "rocked in" position is reached, the red position lock button pops up, at which point you should stop rotating the handle. The busbar on the body of the breaker has been connected to the contact on the cradle, and the body and the cradle are connected.

**Draw out**

When the circuit breaker in the "rocked in" position, press the position locking button, rotate the crank counterclockwise, and the body of the breaker will gradually separate from the cradle. When the indicator points to the "rocked out" position, remove the crank and pull the sliding plate out (if the crank is not removed, the breaker body part cannot be removed). By holding both sides of the breaker body up, the breaker body can be removed from the cradle.

Note: 1. For the cradle of UEW6-2000, the plastic handle shown in Figure 1 should be grasped to pull out or push the left and right sliding plate. For the cradle of UEW6-3200 and UEW6-4000, the lock shown in Figure 2 needs to be first pushed back to pull or push the left and right sliding plate.

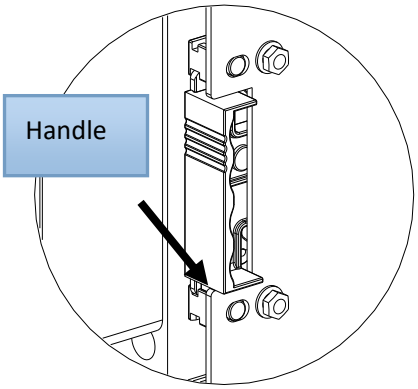



Figure 1

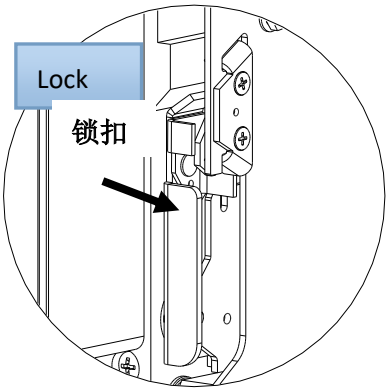



Figure 2

2. When the breaker body is rocked in or rocked out, the breaker must be opened first.

**4 Accessory parameter description**

Shunt release

| Rated voltage（V） | AC220 | AC380 | DC110 | DC220 |
|---|---|---|---|---|
| Instantaneous current（A） | 2.2 | 2.1 | 5.2 | 2.7 |
| Operational voltage（V） | （0.7~1.1）Ue | | | |
| Breaking time（ms） | No more than 30ms | | | |

Closing electromagnet

| Rated voltage（V） | AC220 | AC380 | DC110 | DC220 |
|---|---|---|---|---|
| Instantaneous current（A） | 2.2 | 2.1 | 5.2 | 2.7 |
| Operational voltage（V） | （0.85~1.1）Ue | | | |
| Closing time（ms） | No more than 70ms | | | |

Undervoltage Trip Device

| Rated voltage（V） | AC220 | AC380 |
|---|---|---|

| | | |
|---|---|---|
| Instantaneous current（A） | 0.65 | 0.45 |
| Steady current (mA) | 110 | 75 |
| Operational voltage（V） | （0.35~0.7）Ue | |
| Reliable closing voltage（V） | （0.85~1.1）Ue | |
| Reliable non-closing voltage（V） | ≤0.35Ue | |
| Delay time | Instantaneous, 1s, 3s, 5s | |
| Note: When the voltage is below 0.35Ue, the delay type under voltage release will operate instantaneously. Select a no-voltage release for power off delay | | |

No-voltage release

| | | |
|---|---|---|
| Rated voltage（V） | AC220 | AC380 |
| Instantaneous current（A) | 0.65 | 0.45 |
| Steady current (mA) | 110 | 75 |
| Operational voltage（V） | （0~0.7）Ue | |
| Reliable closing voltage | （0.85~1.1）Ue | |
| Reliable non-closing voltage | ≤0.35Ue | |
| Delay time | 1s, 3s, 5s | |

Motor

| | | | | |
|---|---|---|---|---|
| Rated voltage（V） | AC220 | AC380 | DC110 | DC220 |
| Power consumption（VA/W） | 85（2000A frame）/110（3200A, 4000A frame） | | | |
| Operational voltage（V） | （0.85~1.1）Ue | | | |

Auxiliary switch

| | |
|---|---|
| Conventional thermal current（A） | Ith=16A |
| Rated insulation voltage (V) | Ui=400V |
| Capacity | （2000 frame）<br>AC-12 380V 16A, DC-12 250V 5A<br>AC-15 400V 3A , DC-13 220V 1.2A<br>(3200A and above) |

| | |
|---|---|
| | AC-12 400V 10A, DC-12 250V 1A<br>AC-15 400V 2A, DC-13 220V 0.3A |

Power module

| Input voltage（V） | AC220 | AC380 | DC110 | DC220 |
|---|---|---|---|---|
| Output voltage（V） | DC24 | | | |

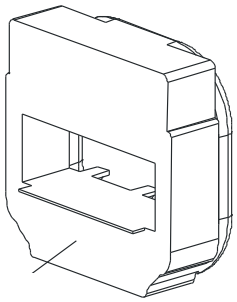
ST201 relay module

| | |
|---|---|
| Operational voltage | DC24V |
| Number of contacts | 3 |
| Contact capacity | AC250V, 10A DC28V, 10A |
| When the trip unit DO output signal is used to control the opening and closing of the breaker or the load capacity is large, it needs to be converted by the ST201 relay module first to control. | |

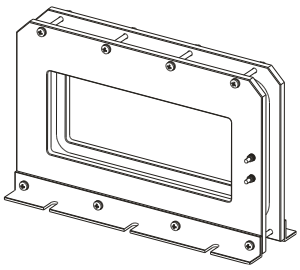
Cradle position electrical indication

| | |
|---|---|
| Number of contacts | Each for rocked out, test, rocked in respectively |
| Contact capacity | AC380V, 2A DC250V, 0.3A |

External neutral transformer

| | |
|---|---|
| Hole size | 60x20 (2000A frame)<br>80x30 (3200A and above)<br>Note: The above is the standard product size. For special size, please contact us to customize. |
|  <br>Front | The distance between the installation point and the circuit breaker should not exceed 2m.<br>When the breaker is upper incoming (that is, the upper terminal busbar of the breaker is connected to the power side, and the lower terminal busbar is connected to the load side), when the external neutral transformer passes through the N line, its front side faces the power side and the reverse side faces the load side. When the circuit breaker is lower incoming (that is, the lower terminal busbar is connected to the power side and the upper terminal busbar is connected to the load side), when the external neutral transformer passes through the N line, the reverse side of the breaker faces the power side and the front side faces the load side. |

Residual current transformers

| Hole size | 115x280 |
|---|---|
|  | When residual current protection is needed, please select residual current transformer. |

Opening lock

| Lock the breaker in the OFF position to ensure that it cannot be closed. When locking, press down the ON button and rotate the key about 90 degrees counterclockwise and pull out the key. When unlocking, insert the key clockwise about 90 degrees to unlock. At this time, the key cannot be pulled out. |
|---|
| One lock and one key: one breaker with one lock and one key<br>Two locks and one key: two breakers with two same locks and one key<br>Three locks and two keys: three breakers with three same locks and two keys<br>Five locks and three keys: Five breakers with five same locks and three keys<br>Five locks and three keys (Three incoming lines and two busbar) : Special five locks and three keys, used in three incoming lines and two busbar system |

## 5 Trip Unit introduction

### 5.1 Overview

To ensure the reliable operation of the trip unit, the trip unit is supplied with power in the following two ways:

a. by power transformer supply

When the rated current is greater than 400A, the trip unit can work normally when the primary single-phase current is not less than 0.8In, and the three-phase current is not less than 0.4In.

b. Auxiliary power supply

Allowable range for DC24V: ±5%;

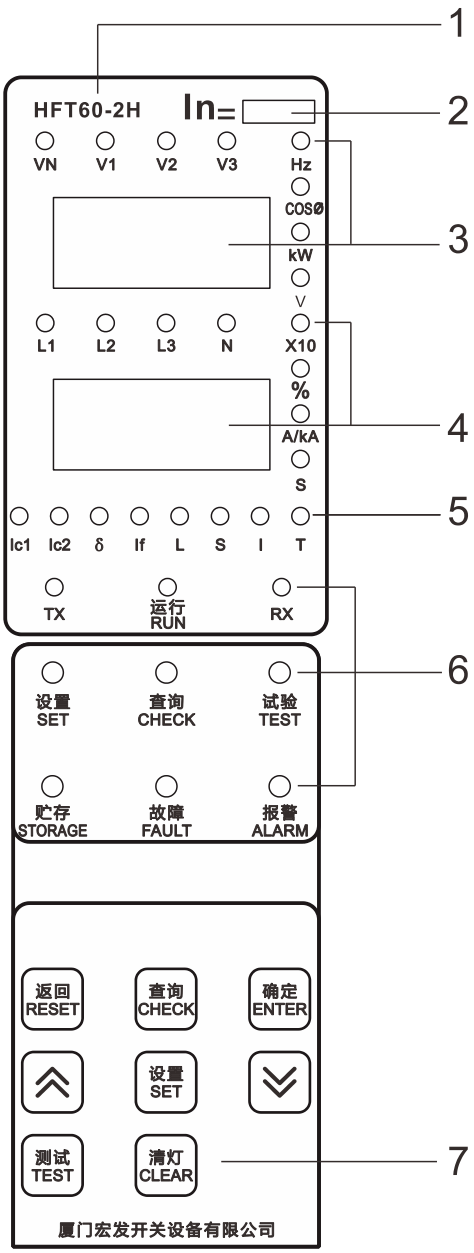
Allowable range for AC220V/AC380V, DC110V/DC220V: 15%.

Rated power consumption: <7W

There is a red reset button on the upper side of the trip unit. When the trip unit trip for protection, the reset button will pop out. The breaker can only close after it is pressed down.

### 5.2 HFT60-2M/2H trip unit

#### 5.2.1 Interface description




1. Model specification

2. Rated current

3. function window and indicator

4. Ammeter window and indicator

5. Protection category indicator

6. Operating status indicator

7 Operation keys

**Display window indicator description**

The display data in the function window and ammeter window are combined with different indicator and their combinations to indicate different power parameters. The details are shown in the following table.

| **Indicator** | **Meaning** |
|---|---|
| V1, V2, V3+VN+V | Voltages of phase A, phase B, and phase C |
| V1, V2, V3 +V | Line voltage of phase AB, BC, and CA |
| Hz | Frequency |
| cos Φ | Power factor |
| kW indicator on | Power |
| kW indicator flash | kWh of power |
| L1, L2, L3, N+ A/kA | Current of phase A, phase B, phase C, and phase N |
| L1, L2, L3 + δ +% | Current imbalance rate of phase A, phase B and phase C |
| % | Contact wear value |
| X10 | Cycles of the breaker opening and closing |
| If+A/kA | Grounding current |
| A/kA indicator flash | The unit of the display value is kA |
| A/kA indicator on | The unit of the display value is A |

Note: If the above indicator is not specifically described, the indicator is on.

**Protection type Indicator description**

When the trip unit is faulty, the Ic1, Ic2, δ, If, L, S, I, and T indicators flash, indicating load monitoring 1, load monitoring 2, current imbalance, grounding or leakage, overload long delay, short current short delay, short current instantaneous, and self-diagnosis fault respectively.

When T indicator is on, a self-check fault occurs and the fault code is displayed. The fault code is as follows:

| | | | | |
|---|---|---|---|---|
| ER01 | ER02 | ER03 | ER04 | ER05 |
| $E^2$ PROM error | A/D error | Environmental overheating | CT1 disconnected | CT2 disconnected |
| ER06 | ER07 | ER11 | ER12 | ER13 |
| CT3 disconnected | CT3 disconnected | Tripping coil | Breaker not tripping. | Contact maintenance |

| | | | | |
|---|---|---|---|---|
| | | disconnected | | indication |

When the trip unit is in the parameter setting state, the indicator combination indicates the current setting items as shown in the following table.

| **Indicator** | **Meaning** |
|---|---|
| Ic1+ A/kA | Load monitoring 1 current setting value |
| Ic1+ S | Load monitoring 1 Time setting value |
| Ic2+ A/kA | Load monitoring 2 current setting value |
| Ic2+ S | Load monitoring 2 time setting value |
| N | N-phase protection current setting value |
| δ +% | Current imbalance protection setting value |
| δ +S | Current imbalance time setting value |
| If+A/kA | Grounding or leakage current setting value |
| If+S (flash) | Inverse time shear factor of grounding |
| If+S (ON) | Grounding or leakage time setting value |
| L+A/kA | Overload long delay current setting value |
| L+S | Overload long delay time setting value |
| S on +A/kA | Short-circuit short delay inverse time current setting |
| S flash +A/kA | Short-circuit short delay fixed time current setting |
| S+S | Short circuit short delay time definite time delay time set value |
| I+A/kA | Short-circuit instantaneous current setting value |
| L1 | Trip unit address number 1-255 |
| L2 | The baud rate of the trip unit, 9.6K or 19.2K |

Note: If the above indicator is not specifically described, the indicator is on except A/kA. A/kA flashing indicates that the unit of display value is kA, and being on indicates that the unit of display value is A

**Description of the working status indicator**

Rx flashing indicates that the trip unit is receiving data. Tx flashing indicates that the trip unit is sending data.

The “Running” indicator flashing indicates the trip unit is energized to work.

The "Setting" indicator flashing indicates that the trip unit is in the setting state. At this time, you can select the item to be set by the "▲" and "▼" keys. If the Settings indicator is on, it indicates that the parameter setting state of a specific item is entered. You can modify the related settings.

If the “Check” indicator is on, the trip unit is in the fault checking state. In this case, you can check the parameters of the last fault.

If the “TEST” indicator is on, it indicates that the trip unit is in the test state. In this case, the trip unit can be

tested for instantaneous trip.

If the “STORAGE” indicator is on for a while, one parameter setting is saved.

If the “FAULT” indicator is on, it indicates that the trip unit is in the fault trip state. The protection indicator is indicating the corresponding fault type.

If the “ALARM” indicator flashes, the trip unit detects a grid fault. The protection indicator indicates the corresponding fault type.

#### 5.2.2 Operation instruction

When the trip unit is in normal operation state, the three-phase line voltage, three-phase phase voltage, frequency, power factor, active energy and active power, three-phase(four-phase) current, etc. are in loop display (if the corresponding function is selected). Press the "▲" and "▼" keys to select and position the above parameters. Press the "▲", "▼" key once, the display changes once, press the "RESET" key to exit.

Through "RESET", "CHECK", "ENTER", "SET", "CLEAR", "TEST", "▲", "▼" key of the operation area, you can set, check, trip test and operate other functions.

**Protection parameter setting**

When setting the setting values of various protection characteristics, it should be guaranteed that $I_i > I_{sd} > I_r$ (if the $I_{sd}$ definite time limit and inverse time limit protection are both turned on, the definite time current setting value should be greater than the inverse time current setting value, otherwise the inverse time limit will automatically fail), and the operation steps are as follows:

Step 1: Confirm that the trip unit is in the normal operating state. If the trip unit is in other states, press the "RESET" key until the current display window is in the loop display state.

Step 2: Press the "Set" key, then the settings indicator flashes.

Step 3: Select the protection type by the "▲" and "▼" keys. Select the setting type and press the "ENTER" key again. When the Setting indicator is on, it indicates that the setting state of the specific protection parameters is entered. You can use “▲” and “▼” keys to set parameters.

Step 4: After the parameter setting is completed, press the "ENTER" key, at this time, the STORAGE indicator is on, indicating that the modified data has been saved (if you do not want to save, you can directly press the "RESET" key to restore the original value, at this time, the SET indicator will resume flashing, and select other items through the "▲" and "▼" keys or "ENTER" keys to reset the parameters).

Step 5: Press the "RESET" key to exit the setting interface of the item, and the "Setting" indicator will flash again. Repeat step 3 until all values have been modified. Press the “RESET” key to exit the setting function.

**Tripping test**

Step 1: Confirm that the trip unit is in the normal operating state. If the trip unit is in other states, press the "RESET" key until the current display window is in the loop display state.

Step 2: Press the "Test" key, at this time the TEST indicator is on, press the "ENTER" key, the breaker is opened, and the ammeter display window displays the operation cycle. (Re-close the circuit breaker and press the "ENTER" key again. The breaker will re-open.)

Step 3: Press "RESET" key, "Test" indicator is off and exits testing.

**Historical fault checking**

The trip unit stores the last fault record. Specific checking operations are as follows:

Step 1: Confirm that the trip unit is in the normal running state. If the trip unit is in other states, press the "RESET" key until the current display window is in the loop display state.

Step 2: Press the “Check” key. At this time, the Checking indicator and FAULT indicator are on, and the corresponding fault type indicator is on. The trip unit repeatedly displays the fault current and time. Press the "▲" and "▼" keys to view other data when the fault occurs. Press the "Reset" key, and the trip unit display the fault current and time again.

Step 3: Press the "Reset" key until the Checking indicator and "FAULT" indicator are off to exit the historical fault checking state.

**Display and operation after fault operation**

1. Trip fault

After the trip unit trips due to a fault, the fault current and time are loop displayed on the trip unit. The “FAULT” indicator and the corresponding protection type indicators are on. Press the "▲" and "▼" keys to view other data when the fault occurs. You can press the “Reset” key to exit the checking state and return to the fault display state. Press the "CLEAR" key, and the trip unit displays resetting and exits the fault display state.

2. Self-diagnosis fault

The self-diagnosis function of the trip unit is used to detect the working state and operating environment of the controller itself. When a self-diagnosis fault occurs on the trip unit, the T indicator will be on. Press "ENTER" to display the fault code. If the fault has been cleared, press the "CLEAR" key to clear the self-diagnosis fault "T" indicator and restore to normal state. If there are several diagnostic faults, press the "▲", "▼" keys to view the fault codes. The fault codes are as follows:

| | | | | |
|---|---|---|---|---|
| $E_R01$ | $E_R02$ | $E_R03$ | $E_R12$ | $E_R13$ |

| $E^2$PROM error | A/D error | Environmental overheating | Breaker not tripping | Contact maintenance indication |
|---|---|---|---|---|

### 5.2.3 2M/2H protection parameter setting table

| Overload long delay | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Setting current $I_{r1}$ (tolerance ±10%) | | (0.4～1.0)×$I_n$+OFF (step size: 1A) | | | | | | | |
| $Tr=\frac{K}{(N^2-1)}$ Operation time (tolerance ±15%) | Current | Operating time | | | | | | | |
| | ≤1.05 $I_r$ | No operating in two hours | | | | | | | |
| | > 1.2$I_r$ | Operate in one hour | | | | | | | |
| | Setting time $t_L$ (Factor K in parentheses) | | | | | | | | |
| | 1.5 $I_r$ | 8(10) | 12.8(16) | 19.2(24) | 32(40) | 48(60) | 64(80) | 80(100) | 108(135) |
| | | 144(180) | 224(280) | 320(400) | 480(600) | 640(800) | 800(1000) | 960(1200) | 1040(1300) |
| | 2.0$I_r$ | 3.32(10) | 5.32(16) | 8.00(24) | 13.32(40) | 20(60) | 26.66(80) | 33.30(100) | 45(135) |
| | | 60(180) | 93.32(280) | 133(400) | 200(600) | 266(800) | 333(1000) | 400(1200) | 433(1300) |
| | 7.2$I_r$ | 0.19(10) | 0.32(16) | 10.47(24) | 10.79(40) | 1.7(60) | 1.57(80) | 1.97(100) | 2.66(135) |
| | | 3.54(180) | 5.51(280) | 7.87(400) | 11.8(600) | 15.7(800) | 19.7(1000) | 23.6(1200) | 25.6(1300) |
| Note: N=I/$I_r$ (I is the actual fault current and $I_r$ is the overload current setting value). The setting time displayed by the trip unit is the actual operating time when I=2$I_r$. With the increase of current I, the operating time will shorten accordingly, which can be calculated according to the formula | | | | | | | | | |
| Thermal memory | | 30min+OFF(can be eliminated by deenergized) | | | | | | | |
| Short-circuit short delay | | | | | | | | | |
| Setting current Ir2 (tolerance ±10%) | | (1.5～15)×$I_r$+OFF (step size: 1A) | | | | | | | |
| Setting time ts (s) (tolerance ±15%) | | 0.1～1s (step size: 0.1s) | | | | | | | |
| Inverse time limit operating time | | The curve is the same as the overload long delay curve, and the curve speed is 10 times faster than that of the overload long delay. | | | | | | | |

| | |
|---|---|
| | The time calculated by the delay curve formula divided by 10 is the short delay inverse time delay time |
| Thermal memory | 30min+OFF (can be eliminated by deenergized) |

Note: When the inverse time limit and definite time limit protection are on, the inverse time limit current setting value must be less than the definite time limit current setting value, otherwise the inverse time limit function automatically fails, and the actual delay time is not less than the set time of the definite time limit

Short circuit instantaneous

| | |
|---|---|
| Setting current Ir3 (tolerance ±10%) | $I_n$～50kA+OFF（$I_n$＜3200A） $I_n$～70kA+OFF（$I_n$=3200A） $I_n$～100kA+OFF（$I_n$＞3200A） |
| Tripping time | within 30ms |

Ground protection

| | |
|---|---|
| ) Setting current If (tolerance ±10%) | (0.2 ~ 1) ×In+OFF(min. 100A) |
| Definite time limit setting time tg (s) (tolerance ±15%) | 00.1 ~ 1s+OFF(step size 0.1s OFF indicates only alarm not tripping) |
| Inverse time shear factor Cr | 1.5 ~ 6+OFF (step size 0.1s OFF indicates inverse time off) |
| Inverse time limit operating time | 。 Formula t=tg×Cr×Ig/I t - Delay time Tg - set delay time Cr - shear factor Ig - setting operating current I - Grounding current. When the multiple of fault current (I/If) is less than Cr, the operating characteristic is inverse time limit; when the multiple of fault current is greater than or equal to Cr, the operating characteristic is definite time limit. |

Residual current protection

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Setting current Ig (tolerance 10%) | 0.5A~30A+OFF (Step size 0.1A) | | | | | | | | | | | |
| Setting time tg (tolerance 10%) | instantaneous | 0.06 | 0.08 | 0.17 | 0.25 | 0.33 | 0.42 | 0.5 | 0.58 | 0.67 | 0.75 | 0.83 |
| Multiple of fault current | Maximum tripping time | | | | | | | | | | | |
| If | 0.04 | 0.36 | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 | 5 |
| 2If | 0.04 | 0.18 | 0.25 | 0.5 | 0.75 | 1 | 1.25 | 1.5 | 1.75 | 2 | 2.25 | 2.5 |
| 5If~10If | 0.04 | 0.072 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |

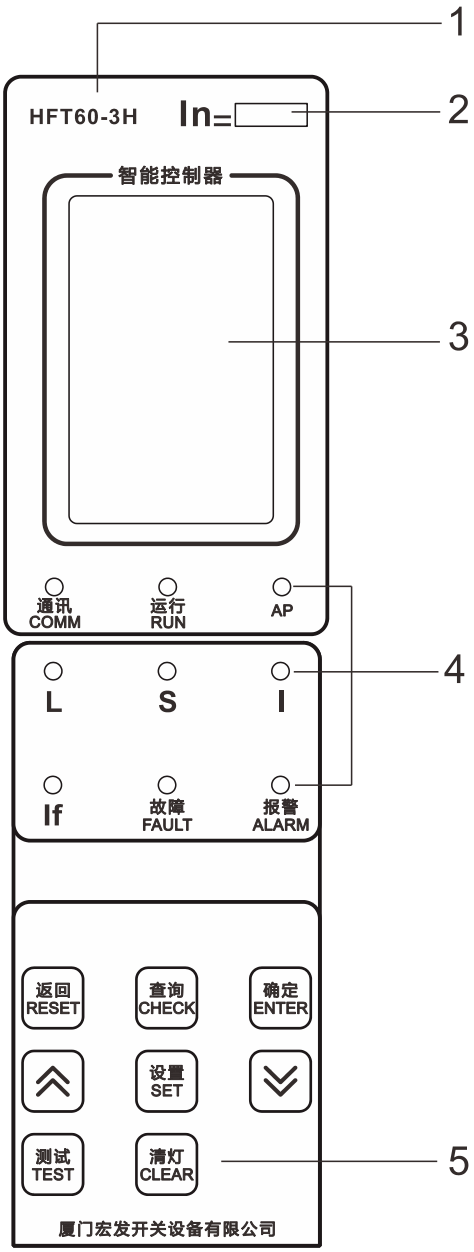
Neutral pole protection

| | |
|---|---|
| Setting current Ig (tolerance ±10% | (0.5, 1) ×$I_n$+OFF |

| | |
|---|---|
| Operating time | Same as overload Long delay |
| Current imbalance protection | |
| Imbalance rate δ setting range | （40%～100%）+OFF |
| Delay time | 0.1～1s+OFF（step size 0.1s OFF indicates alarm not tripping） |
| Load monitoring | Mode 1, Mode 2 |
| Mode 1 | |
| Load 1 Unload current | （0.2~1）In+OFF （OFF indicates exit, minimum 100A） |
| Setting time (inverse time limit, the operating characteristics are the same as the overload long delay) | Same as the time setting table for overload long delay |
| Load 2 Unload current | （0.2~1）In+OFF （OFF indicates exit, minimum 100A） |
| Setting time (inverse time limit, the operating characteristics are the same as the overload long delay) | Same as the time setting table for overload long delay |
| Mode 2 | |
| Load 1 Unload current | (0.2~1）In+OFF （OFF indicates exit, minimum 100A） |
| Setting time (inverse time limit, the operating characteristics are the same as the overload long delay) | Same as the time setting table for overload long delay |
| Load 1 Return current | （0.2~1）In+OFF （OFF indicates exit, minimum 100A） |
| Return time | Fixed 60s |

## 5.3 HFT60-3M/3H trip unit

### 5.3.1 Interface Description




1. Model

2. Rated current

3. Display

4. Indicator of protection category and operation status

5. Operation keys

**Indicator**

●Communication Indicator: When there is data interaction between the trip unit and the host computer, the indicator flashes.

●Operation Indicator: The green LED always flashes as long as the trip unit is energized and the working status is normal.

●AP Indicator: The indicator flashes when the advanced protection fault trips. (e.g. phase loss, over voltage, voltage imbalance, under frequency, over frequency, phase sequence, inverse power and other faults trip. If the protection is set to only alarm and do not trip, when a fault occurs, the "ALARM" indicator will be on).

●L, S, I and If protection type indicator: The corresponding LED flashes to indicate the type of fault: when there’s fault trip. When the protection parameter is set, the LED indicator indicates the currently set items (L: overload long time delay protection; S: short circuit short time delay protection; I: short circuit instantaneous protection; $I_f$: grounding or residual current protection).

●Fault indicator: The indicator flashes when there’s a fault trip.

● ALARM indicator on: The indicator is on when there’s an fault alarm.

**Operation Keys**

● “Reset” key: Exit the current menu and enter the previous menu, or cancel the setting of the current parameter.

●” Check” key: Pressing the “Check” key will cycle between the "System Parameter Setting" theme menu and the "History and Maintenance" theme menu (in the password input interface, it is the "right" key).

●ENTER key: Enter the next menu pointed by the current item, or select the current parameter and store the modification.

● (Up) ▲ key: Move upward in the menu, or select upward parameter.

●Set key: Press the set key to loop between the "Measure" menu and the "Protection Parameter Setting" menu (in the password input interface, it is the "left" key).

● (Down) ▼ key: Move downward in the menu, or select downward parameter.

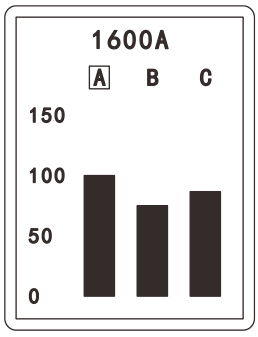
●TEST key: Press it for one trip, used to test whether the mechanical is normal or not.

●Clean key: Fault reset key. The fault is displayed if there’ s a fault trip. After troubleshooting, this key need to be pressed to reset the display.

**5.3.2 Operating Instructions**

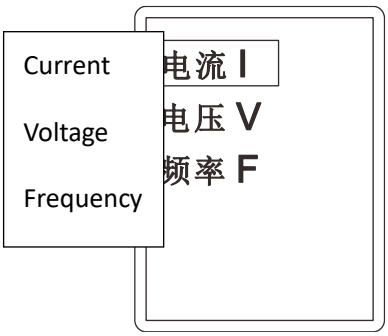
Providing 4 theme menu and a default interface

●Default interface



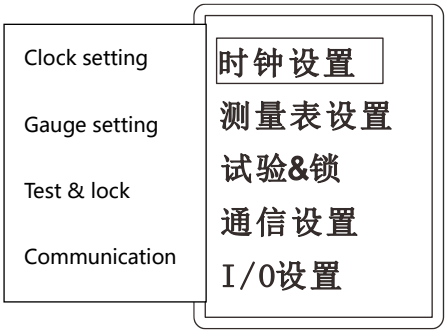

Displaying a bar graph of the current of each phase when no other function is active

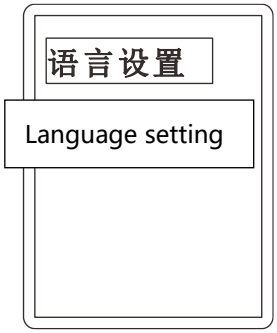
●Measurement menu




Press the "Set" key to enter the measurement menu. if there is no other operation, the system will return to the default interface in a few minutes. Press the "Reset" key to return to the default interface

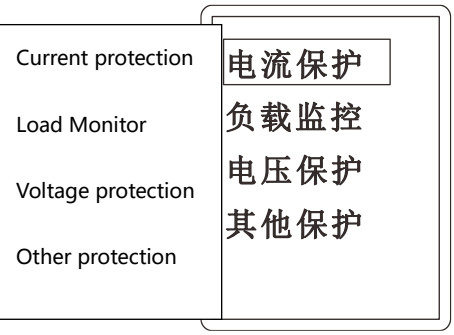
●System parameter setting menu



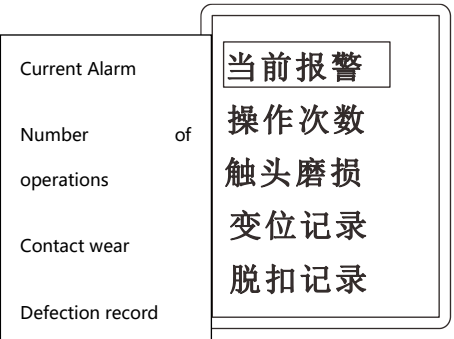

Press the "Check" key to enter the system parameter setting menu. If there is no other operation, the system will return to the default interface in a few minutes, press the "Reset" key to return to the default interface

●Protection parameter setting menu




Press the "Set" key (twice) to enter the protection parameter setting menu. If there is no other operation, the system will return to the default interface in a few minutes. Press the "Reset" key to return to the default interface.

● History and maintenance menu





Press the "Check" key (twice) to enter the history and maintenance menu. If there is no other operation, the system will return to the default interface in a few minutes. Press the "Reset" key to return to the default interface.

▲, ▼

**Example of sub-menu operation (taking overload long time delay protection current setting as an example)**

Press "Set" key twice to enter the protection parameter setting menu. Select "Current Protection" by ▲, ▼ keys and press "ENTER" key to enter. Select "Long time Delay" by ▲, ▼ keys and press "ENTER" to enter. Select "Current Setting Value" ▲, ▼ keys and press "ENTER" to enter. Adjust the current level by ▲, ▼ and press "ENTER" to save. Similarly, the curve type and time of delay can be selected by ▲, ▼ keys and "ENTER" key.

#### 5.3.3 Menu structure

The menu consists of five main parts: the measurement menu, the parameter setting menu, the protection parameter setting menu, history and maintenance menu, and advanced menu.

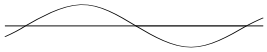
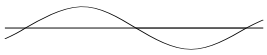
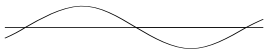
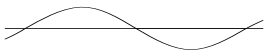
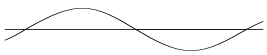
Note: The actual menu changes accordingly depending on the function selected by the user.

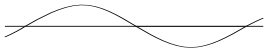
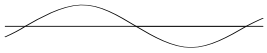
**1 Measurement menu structure:**

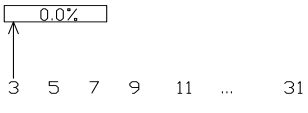
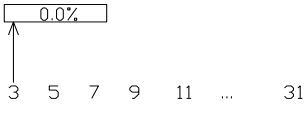
| Level-1 menu | Level-2 menu | Level-3 menu | Level-4 menu | Level-4 menu |
|---|---|---|---|---|
| Current I | Instantaneous value | $I_a$,$I_b$,$I_c$,$I_n$ | $I_a$= 0A | |
| | | | $I_b$= 0A | |
| | | | $I_c$= 0A | |
| | | | $I_n$= 0A | |
| | | | $I_g$= 0A or $I_{\Delta n}$= 0.00A | |
| | | Maximum value | $I_a$= 0A | |
| | | | $I_b$= 0A | |
| | | | $I_c$= 0A | |

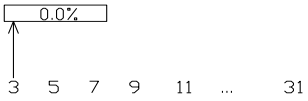
| | | | | |
|---|---|---|---|---|
| | | | $I_n$= 0A | |
| | | | $I_g$= 0A or $I_{\Delta n}$= 0.00A | |
| | | | Reset (+/-) | |
| | | Imbalance rate | $I_a$= 0% | |
| | | | $I_b$= 0% | |
| | | | $I_c$= 0% | |
| | Current thermal capacity | 100% | | |
| | Required value | $\overline{I_a}$, $\overline{I_b}$, $\overline{I_c}$, $\overline{I_n}$ | 60min | |
| | | | $\overline{I_a}$= 0A | |
| | | | $\overline{I_b}$= 0A | |
| | | | $I_c$= 0A | |
| | | | $I_n$= 0A | |
| | | Maximum value | 5min | |
| | | | $\overline{I_a}$= 0A | |
| | | | $\overline{I_b}$= 0A | |
| | | | $I_c$= 0A | |
| | | | $I_n$= 0A | |
| | | | Reset (+/-) | |
| Voltage U | Instantaneous value | $U_{ab}$= 0V | | |
| | | $U_{bc}$= 0V | | |
| | | $U_{ca}$= 0V | | |
| | | $U_{an}$= 0V | | |
| | | $U_{bn}$= 0V | | |
| | | $U_{cn}$= 0V | | |

| | | | | |
|---|---|---|---|---|
| | Average value | $U_{av}$=380V | | |
| | Imbalance rate | 0% | | |
| | Phase sequence | A，B，C | | |
| Frequency F | 50Hz | | | |
| Electricity E | Total electricity | $E_P$ = 0kWh | | |
| | | $E_Q$ = 0kvarh | | |
| | | $E_S$ = 0kVAh | | |
| | Input electricity | $E_P$ = 0kWh | | |
| | | $E_Q$ = 0kvarh | | |
| | Output electricity | $E_P$ = 0kWh | | |
| | | $E_Q$ = 0kvarh | | |
| | Electricity reset | Reset/Cancel | | |
| Power P | Instantaneous value | P，Q，S | P = 0kW | |
| | | | Q = 0kvar | |
| | | | S = 0kVA | |
| | | Power factor | 1.00<br>Compatibility | |
| | | | $P_{Fa}$ = 1.00 | |
| | | | $P_{Fb}$ = 1.00 | |
| | | | $P_{Fc}$ = 1.00 | |
| | | $P_a$,$Q_a$,$S_a$ | $P_a$= 0kW | |
| | | | $Q_a$= 0kvar | |
| | | | $S_a$= 0kVA | |
| | | $P_b$,$Q_b$,$S_b$ | $P_b$= 0kW | |
| | | | $Q_b$= 0kvar | |
| | | | $S_b$= 0kVA | |

| | | | | |
|---|---|---|---|---|
| | | $P_c$,$Q_c$,$S_c$ | $P_c$= 0kW | |
| | | | $Q_c$= 0kvar | |
| | | | $S_c$= 0kVA | |
| | Required value | $\overline{P}$, $\overline{Q}$, $\overline{S}$ | $\overline{P}$= 0kW | |
| | | | $\overline{Q}$= 0kvar | |
| | | | S= 0kVA | |
| | | Maximum value | $\overline{P}$= 0kW | |
| | | | $\overline{Q}$= 0kvar | |
| | | | S= 0kVA | |
| | | | Reset (+/-) | |
| Harmonic wave H | Wave form | $I_a$,$I_b$,$I_c$,$I_n$ | $I_a$  | |
| | | | $I_b$  | |
| | | | $I_c$  | |
| | | | $I_n$  | |
| | | $U_{ab}$,$U_{bc}$,$U_{ca}$ | $U_{ab}$  | |

| | | | | |
|---|---|---|---|---|
| | | | $U_{bc}$  | |
| | | | $U_{ca}$  | |
| | Fundamental wave | I(A) | $I_a$= 9999A | |
| | | | $I_b$= 9999A | |
| | | | $I_c$= 9999A | |
| | | | $I_n$= 9999A | |
| | | U(V) | $U_{ab}$= 9999V | |
| | | | $U_{bc}$= 9999V | |
| | | | $U_{ca}$= 9999V | |
| | | | $U_{an}$= 9999V | |
| | | | $U_{bn}$= 9999V | |
| | | | $U_{cn}$= 9999V | |
| | THD | I(%) | $I_a$ = 20.0% | |
| | | | $I_b$ = 20.0% | |
| | | | $I_c$ = 20.0% | |
| | | | $I_n$ = 20.0% | |
| | | U(%) | $U_{ab}$ = 20.0% | |
| | | | $U_{bc}$ = 20.0% | |
| | | | $U_{ca}$ = 20.0% | |
| | | | $U_{an}$ = 20.0% | |
| | | | $U_{bn}$ = 20.0% | |
| | | | $U_{cn}$ = 20.0% | |

| | | | | |
|---|---|---|---|---|
| | thd | I(%) | $I_a$ = 20.0% | |
| | | | $I_b$ = 20.0% | |
| | | | $I_c$ = 20.0% | |
| | | | $I_n$ = 20.0% | |
| | | U(%) | $U_{ab}$ = 20.0% | |
| | | | $U_{bc}$ = 20.0% | |
| | | | $U_{ca}$ = 20.0% | |
| | | | $U_{an}$ = 20.0% | |
| | | | $U_{bn}$ = 20.0% | |
| | | | $U_{cn}$ = 20.0% | |
| | FFT | I(3,5,7…31) | $I_a$(3,5,7…31) | $I_a$ FFT THD= 0.0%<br>  |
| | | | $I_b$(3,5,7…31) | $I_b$ FFT THD= 0.0%<br>  |
| | | | $I_c$(3,5,7…31) | $I_c$ FFT THD= 0.0%<br>  |
| | | | $I_n$(3,5,7…31) | $I_n$ FFT THD= 0.0%<br>  |

| | | | | |
|---|---|---|---|---|
| | | U(3,5,7…31) | $U_{ab}$(3,5,7…31) | $U_{ab}$ FFT THD= 0.0%<br>  |
| | | | $U_{bc}$(3,5,7…31) | $U_{bc}$ FFT THD= 0.0%<br>  |
| | | | $U_{ca}$(3,5,7…31) | $U_{ca}$ FFT THD= 0.0%<br>  |

**2 System parameter setting menu structure:**

| Level-1 menu | Level-2 menu | Level-3 menu | Level-4 menu | Level-4 menu |
|---|---|---|---|---|
| Clock setting | Date | ＝2004/11/15 | | |
| | Time | ＝19：50：35 | | |
| Gauge setting | System type | ＝34W 4CT | | |
| | Connection mode | =Upper incoming connection | | |
| | Power direction | ＝P＋ | | |
| | Current required | Calculation mode | =Algorithm | |
| | | Time window type | =Sliding | |
| | | Selection time | ＝60min | |
| | Power required | Calculation mode | =Algorithm | |
| | | Time window type | =Sliding | |

| | | | | |
|---|---|---|---|---|
| | | Selection time | ＝60min | |
| Test & lock | Test trip | Test type | =Three-stage protection | |
| | | Test parameter | ＝I：9999A | |
| | | Test control | =Start | |
| | Remote lock | Remote lock | =Unlock | |
| | Parameter lock | Parameters are locke d | Parameter lock<br>=Lock | |
| | | (Input) User password<br>=0000 | User password (Change)<br>=0000 | |
| Communication setting | Address | ＝3 | | |
| | Baud rate | ＝9.6K | | |
| I/0 setting | Function setting | =Regional interlock<br>＝ZSI | | |
| | Operation mode | ＝DO1<br>=Normally open Pulse<br>＝N/O Pulse<br>＝360S | | |
| | I/O Status | I/O Status<br>DO1 DO2 DO3 DI1<br>1 1 1 1 | | |

**3 Protection parameter setting menu structure:**

| Level-1 menu | Level-2 menu | Level-3 menu | Level-4 menu | Level-4 menu |
|---|---|---|---|---|
| Current protection | Long time delay | $I_r$ | Example: =2500A=100%In | |
| | | Curve Type | Example: =SI | |
| | | Time of delay | Example: =C16, 86.0S@1.5$I_r$ | |

| | | | | |
|---|---|---|---|---|
| | | Cooling time | Example: =3h | |
| | Short time delay | Definite time limit | Operating current | Example: =5000A=2.0$I_r$ |
| | | | Time of delay | Example: =0.1S |
| | | Inverse time limit | Operating current | Example: =5000A=2.0$I_r$ |
| | | | Time of delay | Example: C16,1.92s@6$I_r$ |
| | Instantaneous | Operating current | Example: =25000A=100%$I_n$ | |
| | I Imbalance | Operation mode | Example: =Alarm | |
| | | Start value | Example: =30% | |
| | | Start time | Example: =1.0s | |
| | | Return value | Example: =10% | |
| | | Return time | Example: =10.0s | |
| | Neutral-phase protection | Neutral-phase protection | Example: =200% | |
| | Current required | $\overline{I_a}$ max<br>$\overline{I_b}$ max<br>$\overline{I_c}$ max<br>$\overline{I_n}$ max | Operation mode | Example: =Alarm |
| | | | Start value | Example: =2000A |
| | | | Start time | Example: =15s |
| | | | Return value | Example: =1800A |
| | | | Return time | Example: =15s |
| | Grounding protection | Operating current | Example: =2500A | |
| | | Time of delay | Example: =0.4s | |
| | | Grounding factor | Example: =6.0 | |
| | Grounding Alarm | Start current | Example: =2000A | |
| | | Start time | Example: =0.1s | |
| | | Return current | Example: =1000A | |
| | | Return time | Example: =0.1s | |
| | Residual current protection | Operating current | Example: =8.0A | |
| | | Time of delay | Example: =0.75s | |

| | | | |
|---|---|---|---|
| | Residual current alarm | Start current | Example: =5.0A |
| | | Start time | Example: =0.1s |
| | | Return current | Example: =4.0A |
| | | Return time | Example: =0.1s |
| Load monitor | Operation mode | Example: =I Mode 1 | |
| | Unloading value 1 | Example: =800 | |
| | Unloading time 1 | Example: =50%$t_r$ | |
| | Unloading value 2 | Example: =700A | |
| | Unloading time 2 | Example: =25%tr | |
| | Operation mode | Example: =P Mode 2 | |
| | Unloading value 1 | Example: =299kW | |
| | Unloading time 1 | Example: =10s | |
| | Restore value | Example: =300kW | |
| | Restore time | Example: =3600s | |
| Voltage protection | Under voltage | Operation mode | Example: =Alarm |
| | | Start value | Example: =100V |
| | | Start time | Example: =0.2s |
| | | Return value | Example: =90V |
| | | Return time | Example: =60.0s |
| | Over voltage | Operation mode | Example: =Alarm |
| | | Start value | Example: =600V |
| | | Start time | Example: =0.2s |
| | | Return value | Example: =100V |
| | | Return time | Example: =60.0s |
| | U imbalance | Operation mode | Example: =Alarm |
| | | Start value | Example: =60% |

| | | | |
|---|---|---|---|
| | | Start time | Example: =0.2s |
| | | Return value | Example: =30% |
| | | Return time | Example: =60.0s |
| Other protection | Under frequency | Operation mode | Example: =Alarm |
| | | Start value | Example: =45.0Hz |
| | | Start time | Example: =0.2s |
| | | Return value | Example: =50.0Hz |
| | | Return time | Example: =36.0s |
| | Over frequency | Operation mode | Example: =Alarm |
| | | Start value | Example: =65.0Hz |
| | | Start time | Example: =0.2s |
| | | Return value | Example: =50.0Hz |
| | | Return time | Example: =36.0s |
| | Phase sequence | Operation mode | Example: =Trip |
| | | Start value | Example: =A, B, C |
| | Inverse power | Operation | Example: =Alarm |
| | | Start value | Example: =500kW |
| | | Start time | Example: =0.2s |
| | | Return value | Example: =50kW |
| | | Return time | Example: =360s |
| | Communication failure | Operation | Example: =Alarm |
| | | Link time-out | Example: =200s |

**4 History and maintenance menu structure:**

| Level-1 menu | Level-2 menu | Level-3 menu | Level-4 menu | Level-4 menu |
|---|---|---|---|---|
| Current Alarm | Example: Phase sequence alarm, inverse power alarm, over frequency alarm..... | | | |

| | | | | |
|---|---|---|---|---|
| Number of operation cycles | Total number cycles | Example: 300 | | |
| | Number of operation cycles | Example: 219 (ENTER key reset) | | |
| Contact wear | Total wear | Example: 120 | | |
| | Contact wear | Example: 20 (ENTER key reset) | | |
| Product Information | | | | |
| Trip record | Example:<br>1 Under voltage tripping<br>2004/06/17 | Under voltage tripping<br>T= 0.20S<br>$U_{max}$= 0V<br>11:24:59 6/17 | | |
| | | F = 0.00Hz<br>$U_{ab}$= 0V<br>$U_{bc}$= 0V<br>$U_{ca}$= 0V | | |
| | …… | …… | | |
| | Example:<br>8 Short circuit definite time limit<br>2004/05/30 | A phase short circuit definite time limit<br>T= 0.4S<br>I= 4300A<br>15:28:25 5/30 | | |
| | | $I_a$= 4300A<br>$I_b$= 4200A<br>$I_c$= 4000A<br>$I_n$= 4150A | | |

| | | | | |
|---|---|---|---|---|
| Alarm record | Example:<br>1 Communication failure alarm<br>2004/07/16 | Communication failure alarm<br>2004/07/16<br>20:38:45 | | |
| | …… | …… | | |
| | Example:<br>8 Under voltage alarm<br>2004/06/20 | Under voltage alarm<br>Umax＝ 0V<br>2004/06/20<br>22:29:40 | | |
| Deflection record | Example:<br>1 Local closing<br>2002/06/18 | Local closing<br>2002/06/18<br>9:30:56 | | |
| | …… | …… | | |
| | Example:<br>8 Fault trip<br>2002/06/12 | Fault trip<br>2002/06/12<br>10:15:52 | | |

### 5.3.4 Protective parameter setting table for 3M/3H type controllers

| Overload long time delay | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Setting current $I_{r1}$ (tolerance ±10%) | | (0.4~1.0)x$I_n$+OFF (step size: 1A) | | | | | | | |
| Operating time (tolerance ± 15%) | Current | Operating time | | | | | | | |
| | ≤1.05$I_r$ | No trip within 2 hours | | | | | | | |
| | > 1.2$I_r$ | Trip within 1 hour | | | | | | | |
| | Curve type | Setting time $t_r$ (Factor K in parentheses) | | | | | | | |
| | Standard inverse time limit | 0.61(0. | 0.98(1 | 1.47(0.0 | 2.46(0. | 3.68(0 | 4.91(0. | 6.14(0.0 | 8.29(0.007 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| The factory default curve for trip unit is curve 3 | $T=K/(N^{0.02}-1)$ | 005) | .0) | 12) | 02) | .03) | 04) | 5) | 5) |
| | | 11.1(0.09) | 17.2(0.14) | 24.6(0.2) | 36.8(0.3) | 49.1(0.4) | 61.4(0.5) | 73.7(0.6) | 86(0.7) |
| | Fast inverse time limit<br>$T=K/(N-1)$ | 2(1) | 3.2(1.6) | 4.8(2.4) | 8(4) | 12(6) | 16(8) | 20(10) | 27(13.5) |
| | | 36(18) | 56(28) | 80(40) | 120(60) | 160(80) | 200(100) | 240(120) | 280(140) |
| | Super fast inverse time limit (general purpose)<br>$t=K(N^2-1)$ | 8(10) | 12.8(16) | 19.2(24) | 32(40) | 48(60) | 64(80) | 80(100) | 108(135) |
| | | 144(180) | 224(280) | 320(400) | 480(600) | 640(800) | 800(1000) | 960(1200) | 1040(1300) |
| | Super fast inverse time limit (motor protection)<br>$T=(K/1.15)\times\log_e[N^2(N^2-1.15)]$ | 6.22(10) | 9.96(16) | 14.9(24) | 24.9(40) | 37.3(60) | 49.8(80) | 62.2(100) | 84(135) |
| | | 112(180) | 174(280) | 249(400) | 373(600) | 498(800) | 622(1000) | 747(1200) | 871(1300) |
| | Compatible with high voltage fuse<br>$T=K/(N^4-1)$ | 2.46(10) | 3.94(16) | 5.9(24) | 9.85(40) | 14.8(60) | 19.7(80) | 24.6(100) | 33.2(1300) |
| | | 44.3(180) | 69.8(280) | 98.5(400) | 147(600) | 197(800) | 246(1000) | 295(1200) | 344(1300) |
| | Normal inverse time limit ($I^2T$)<br>$T=(1.5/N)^2\times K$ | 15(15) | 30(30) | 60(60) | 120(120) | 240(240) | 360(360) | 480(480) | 600(600) |
| | | 720(720) | 840(840) | 960(960) | | | | | |

Note: N=I/Ir (I is the actual fault current, Ir is the set value of overload current). The set time displayed by in the trip unit is the actual operation time when I=1.5Ir, with the increase of current I, the operation time is shortened accordingly, which can be calculated according to the formula

| | |
|---|---|
| Thermal memory | 30min+OFF (can be cleared after power off) |
| Short circuit short time delay | |
| Setting current $I_s$ (tolerance ±10%) | （1.5～15）×Ir+OFF（step size 1A）<br>(1.5~15) ×Ir+OFF (step: 1A) |
| Definite time limit fixing time $t_s$ (s) (tolerance ±15%) | 0.1～0.4s（step size 0.1s）<br>0.1~0.4s (step: 0.1s) |
| Inverse time limit operation time | The curve is the same as the overload long-delay curve, the curve speed is 10 times faster than the overload long time delay. The time calculated according to the delay curve formula is divided by 10, which is the short time delay inverse time limit time |

| | |
|---|---|
| | of delay. |
| Thermal memory | 30min+OFF (can be cleared after power off) |

Note: When both inverse time limit and definite time limit protection are on, the setting value of inverse time limit current must be less than the setting value of definite time limit current, otherwise the function of inverse time limit will be failed automatically, in addition, the actual time of delay is not less than the setting time of definite time limit

| | |
|---|---|
| Short circuit instantaneous | |
| Setting current $I_{r3}$ (tolerance ±10%) | (1~20) ×$I_n$+OFF (step size: 1A) |
| Trip time | Within 30ms |
| Grounding protection | |
| Setting current If (tolerance ± 10%) | (0.2～1) ×In+OFF (Min 100A) |
| Definite time limit setting time tg (s) (tolerance ± 15%) | 0.1～1s (Step size.0.1s) |
| Inverse time shear factor Cr | 1.5～6+OFF (Step size.0.1s OFF means inverse time off) |
| Inverse time action time | Formula t=tg × Cr × Ig/I t - Delay time Tg - Set delay time Cr - Shear factor Ig - Set action current I - Ground current. When the multiple of fault current (I/If) is less than Cr, the action characteristic is inverse time characteristic. When the multiple of fault current is greater than or equal to Cr, the action characteristic is definite time characteristic. |

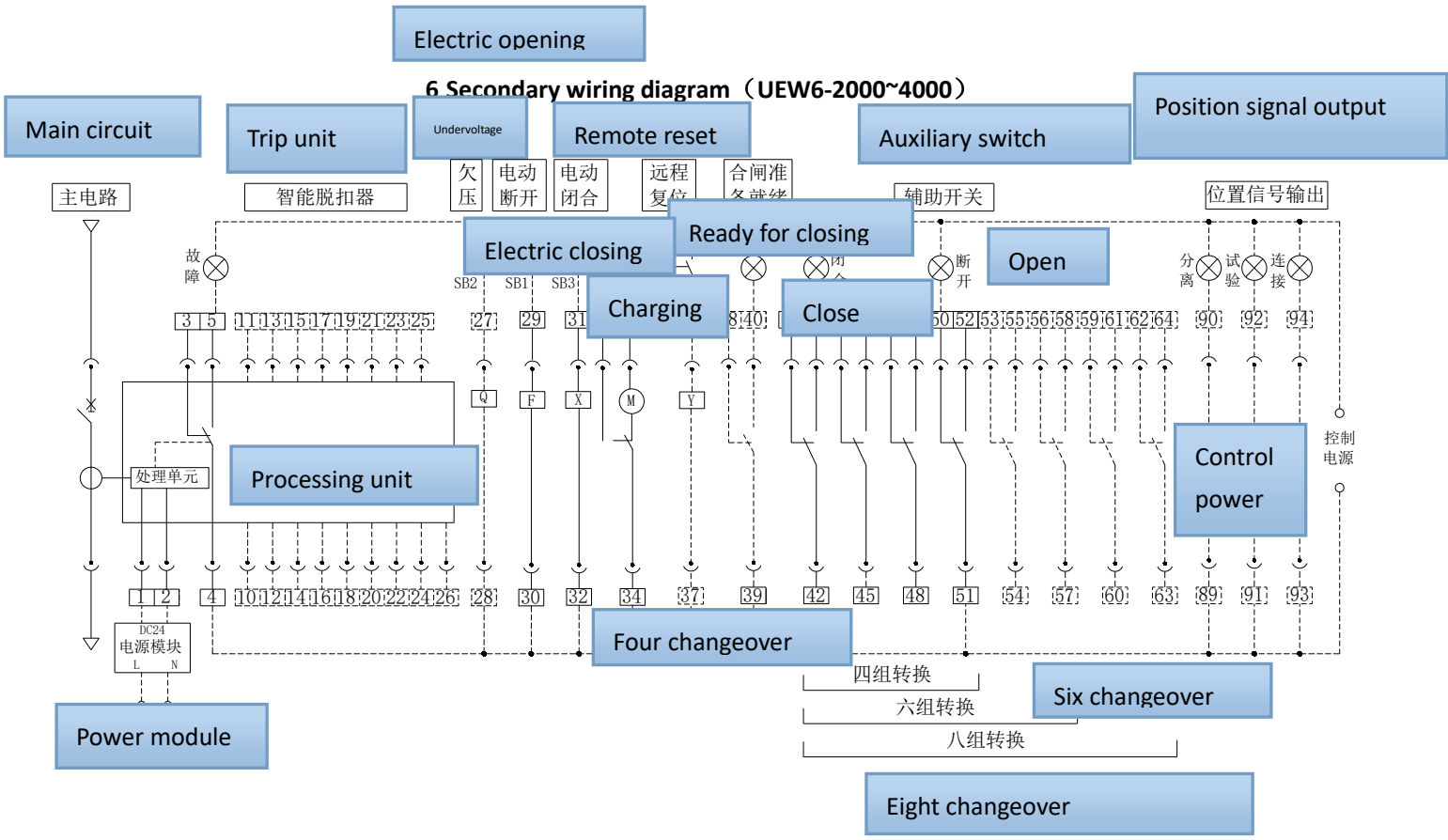
Grounding alarm (grounding alarm and grounding protection are independent of each other, with independent parameter settings, and can exist simultaneously)

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alarm operation setting value | Current (0.2～1) ×$I_n$+OFF | | | | | | | | | | | |
| | Time 0.1～1s (Step size0.1s) | | | | | | | | | | | |
| Alarm end set value | Current (0.2～1) ×$I_n$ | | | | | | | | | | | |
| | Time 0.1～1s (Step size0.1s) | | | | | | | | | | | |
| Residual current protection | | | | | | | | | | | | |
| Setting current Ig (with a tolerance of 10%) | 0.5A~30A+OFF (Step size 为 0.1A) | | | | | | | | | | | |
| Setting time tg (with a tolerance of 10%) | Instantaneous | 0.06 | 0.08 | 0.17 | 0.25 | 0.33 | 0.42 | 0.5 | 0.58 | 0.67 | 0.75 | 0.83 |

| Fault current multiple | Maximum tripping time（s） | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| If | 0.04 | 0.36 | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 | 5 |
| 2If | 0.04 | 0.18 | 0.25 | 0.5 | 0.75 | 1 | 1.25 | 1.5 | 1.75 | 2 | 2.25 | 2.5 |
| 5If~10If | 0.04 | 0.072 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |

| | | |
|---|---|---|
| Neutral pole protection | | |
| Setting current In (tolerance ± 10%) | (0.5， 1) ×$I_n$+OFF | |
| Operating time | Same as overload long delay | |
| Current imbalance protection | | |
| Protection setting value | 5%～60% | |
| Delay Time | 0.1～40s（Step size.0.1s） | |
| Protection return set value | 5%～start value% | This setting is only available when the operation mode is alarm |
| Time | 10～200s（Step size0.1s） | |
| Operation mode | Trip, alarm, Shut down | |
| Load monitor | 1. Current mode 1 2. Current mode 2 3. Power mode 1 4. Power mode 2 5. Shutdown | |
| Setting value of unloading I action | 0.2~1.0Ir (current mode 1/2) | |
| | 200~10000kW (power mode 1/2) | |
| Unloading I action delay | 20%~80%tr (Current mode 1/2) | |
| | 10~3600s (Power mode 1/2) | |
| Setting value of unloading II action | 0.2~1.0Ir (current mode 1), 0.2Ir~unloading value (current mode 2) | |
| | 200~10000kW (power mode 1), 100~unloading value (power mode 2) | |
| Unloading II action delay | 20%~80% tr (current mode 1), 10~600s (current mode 2) | |
| | 10~3600s (power mode 1/2) | |
| Voltage imbalance protection | | |
| Protection setting value | 2%~30% | |
| setting time | 0.2~60s | |
| Protection return set value | 2%~Start value | This setting value is only available when the |

| | | |
|---|---|---|
| setting time | 0.2~60s | operating mode is "alarm" |
| Operating mode | Alarm/Trip/Shutdown | |
| Undervoltage protection | | |
| Protection setting value | 100V~return value | |
| setting time | 0.2~60s | |
| Protection return set value | Starting value~1200V | This setting value is only available when the operating mode is "alarm" |
| setting time | 0.2~60s | |
| Operating mode | Alarm/Trip/Shutdown | |
| Overvoltage protection | | |
| Protection setting value | Return valute~1200V | |
| setting time | 0.2~60s | |
| Protection return set value | 100V~return value | |
| setting time | 0.2~60s | |
| Operating mode | Alarm/Trip/Shutdown | |
| Low frequency protection | | |
| Protection setting value | 45Hz~returen value | |
| setting time | 0.2~5s | |
| Protection return set value | Start value~65Hz | This setting value is only available when the operating mode is "alarm" |
| setting time | 0.2~36s | |
| Operating method during protection | Alarm/Trip/Shutdown | |
| High frequency protection | | |
| Protection return set value | Return value~65Hz | |
| setting time | 0.2~5s | |
| Protection return set value | 45Hz~Return value | This setting value is only available when the operating mode is "alarm" |
| setting time | 0.2~36s | |
| Operating method during protection | Alarm/Trip/Shutdown | |




SB1 Shunt release button（prepared by the user） SB4 Reset button（prepared by the user） F Shunt release

SB2 Undervoltage button（prepared by the user） M Motor Q Undervoltage release or undervoltage time delay release SB3 Closing button（prepared by the user） X Closing electromagnetic Y Remote reset electromagnetic

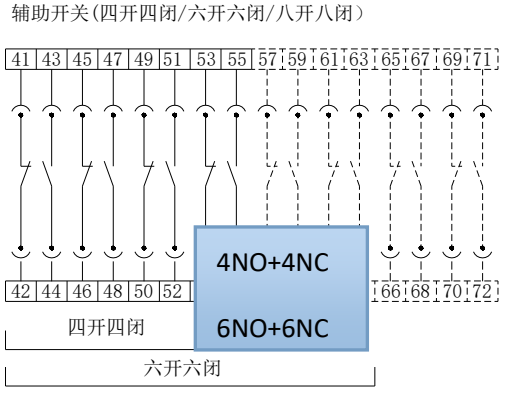
**Terminal description：**

1# 2#：Release working power supply (must be connected to the power module)

3# 4# 5#：Fault tripping signal output

10# 11# ：Communication interface

Auxiliary switch (4NO+4NC/6NO+6NC/8NO+8NC)



12#13#, 14#15#, 16#17#, 18#19# respectively:

DO1， DO2， DO3， DO4 Signal contact output

20#：trip unit protective grounding

21#～24#：Voltage sampling, in sequence: N， A， B， C

25# 26#：External neutral transformer

27# 28#：Undervoltage release

29# 30#：Shunt release

31# 32#：Closing electromagnetic

33# 34# 35#：Charging motor

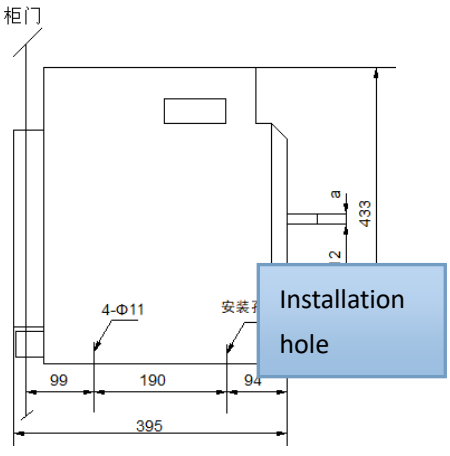
Note: 1. Terminal 1 # and 2 # cannot be directly connected to a DC220V/380V or DC110V/220V power supply. The voltage needs to be converted to DC24V through the power module to supply power to the trip unit.

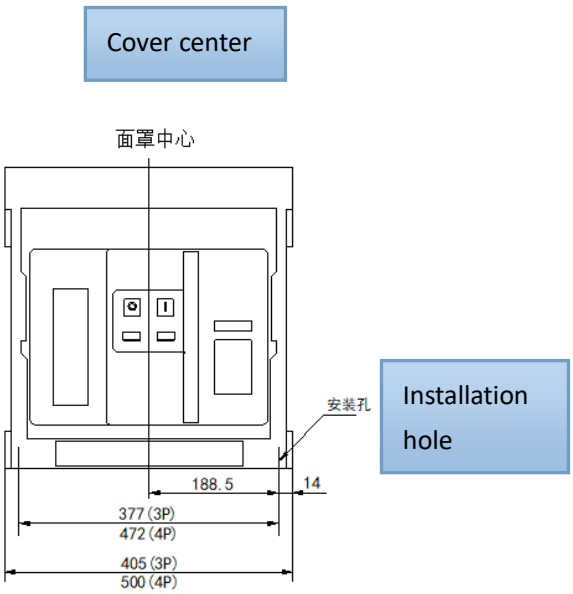
2. The UEW6-2000 can only provide up to six changeover and six NO/NC.

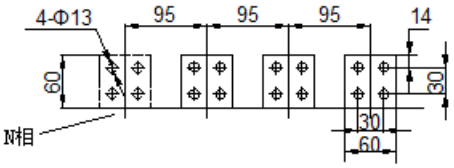
## 7 Installation dimension

### 7.1 Installation dimensions of breakers

**UEW6-2000 draw out**

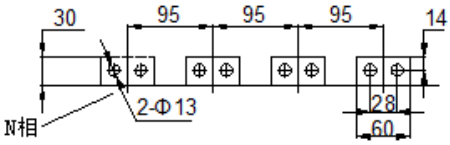





UEW6-2000抽屉式加长母线尺寸

UEW6-2000 draw out type extended busbar



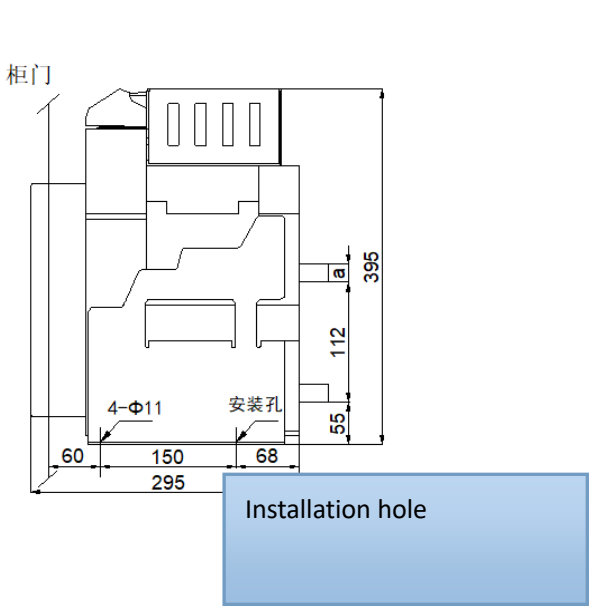

UEW6-2000抽屉式短母线尺寸

UEW6-2000 draw out type short busbar

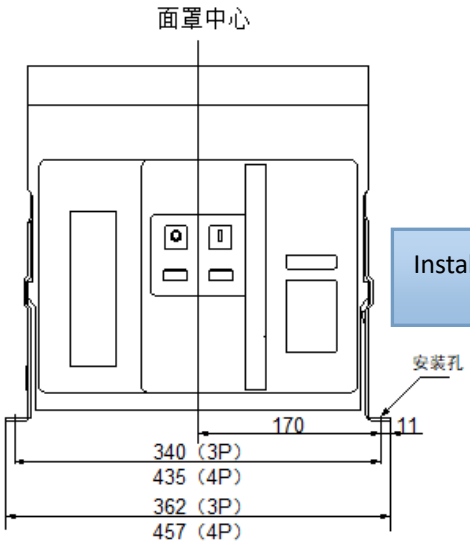
| In(A) | a(mm) |
|---|---|
| 630~800 | 10 |
| 1000~1600 | 15 |
| 2000 | 20 |

**UEW6-2000 fixed type breaker**

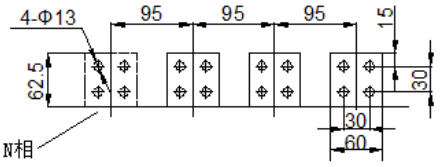
Cover center




Installation hole

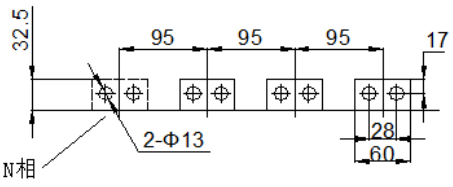



Installation hole




UEW6-2000固定式加长母线尺寸

UEW6-2000 fixed type extended busbar



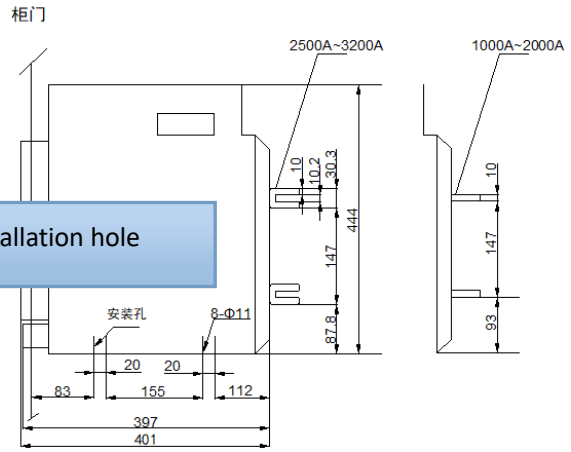

UEW6-2000固定式短母线尺寸

UEW6-2000 fixed type short busbar

| In(A) | a(mm) |
|---|---|
| 630~800 | 10 |
| 1000~1600 | 15 |
| 2000 | 20 |

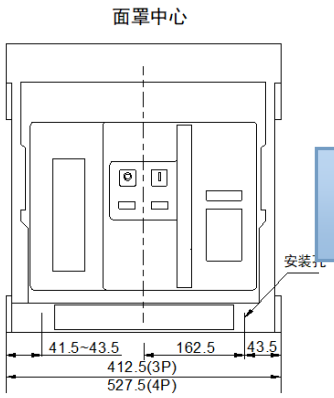
**UEW6-3200 draw out type breaker**

Door

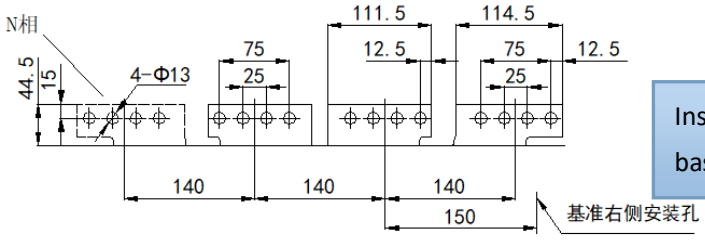



Installation hole

Cover center



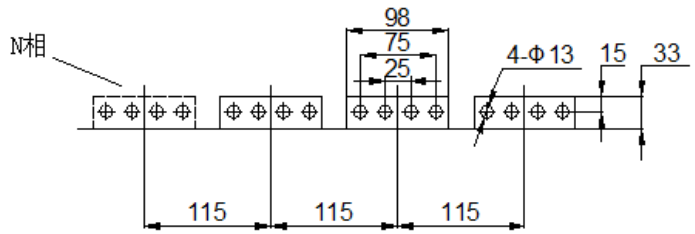

Installation hole




Installation hole on the right side of the base line

UEW6-3200/2500A～3200A抽屉式母排尺寸

UEW6-3200/2500A 3200A draw out type busbar



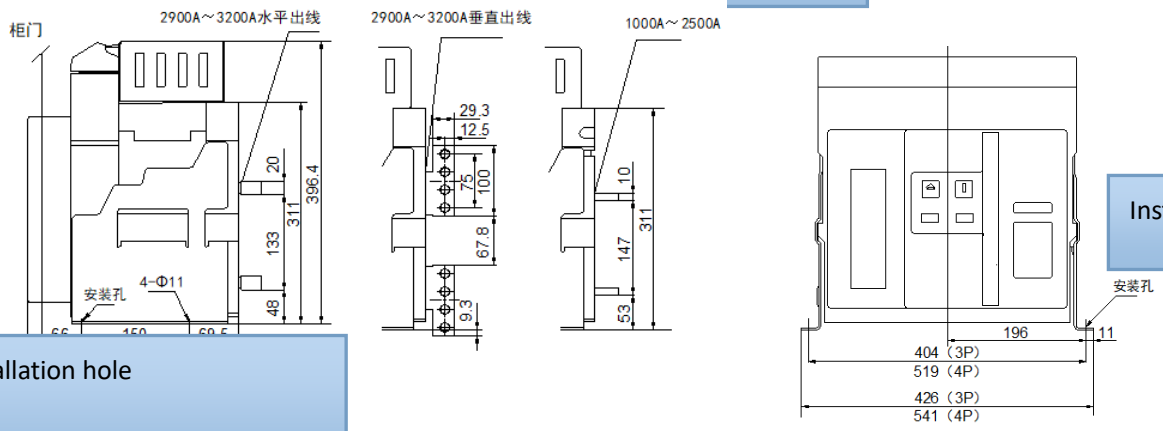

UEW6-3200/1000A～2000A抽屉式母排尺寸

UEW6-3200/1000A~2000A draw out type busbar

**UEW6-3200 fixed type breaker**

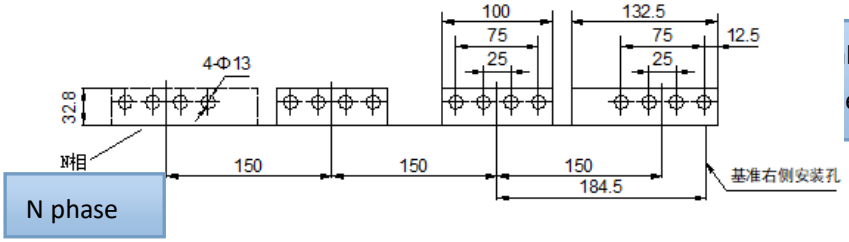
Horizontal outgoing

Vertical outgoing




Installation hole

Installation hole



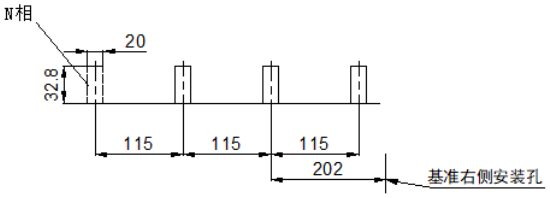

llation hole on the right e base

N phase

UEW6-3200/2900A～3200A固定式水平母排尺寸



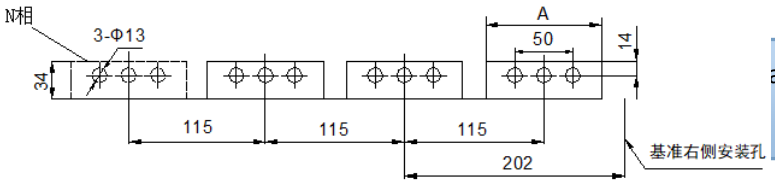
UEW6-3200/2900A~3200A fixed type horizontal busbar




le on the right of the base

UEW6-3200/2900A～3200A固定式垂直母排尺寸

UEW6-3200/2900A~3200A fixed type vertical busbar




ation hole on the right base

（注：上母排尺寸A为90mm，下母排尺寸A为86mm）

(Note: The size A of the upper busbar is 90mm, and the size A of the lower busbar is 86mm)

UEW6-3200/1000A～2500A固定式母排尺寸

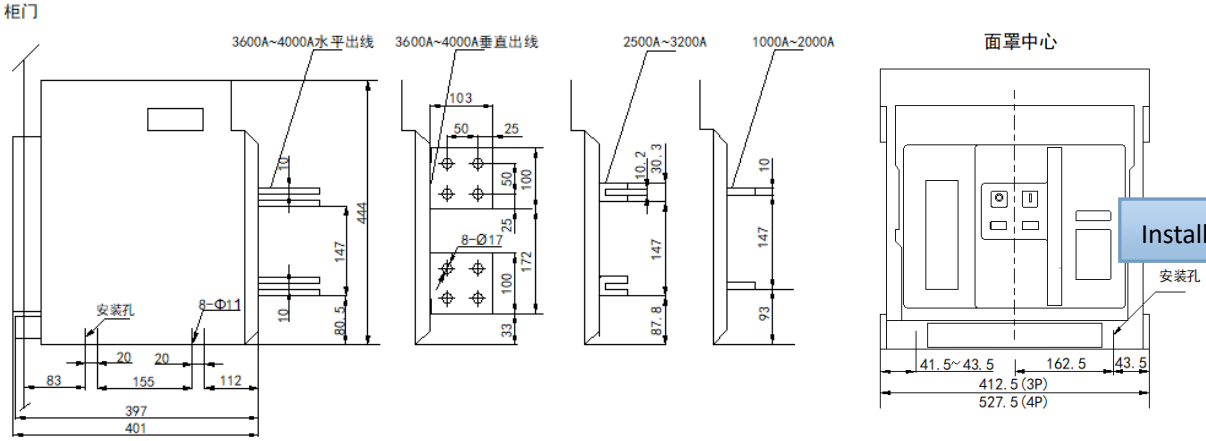
UEW6-3200/1000A~2500A fixed type busbar

**UEW6-4000 draw out breaker**

Horizontal outgoing

Cover center

Door

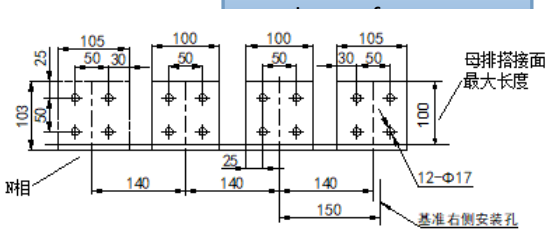



Installation hole

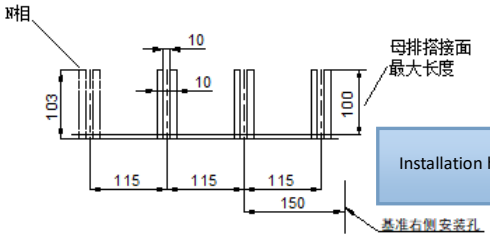
Max. length of busbar

N phase

Max. length of busbar overlap surface



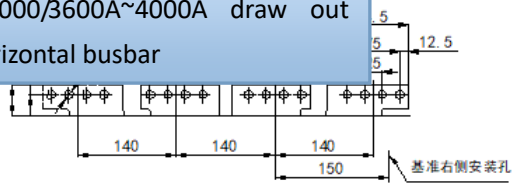

UEW6-4000/3600A～4000A抽屉式
水平母排尺寸




Installation hole on the right of the base

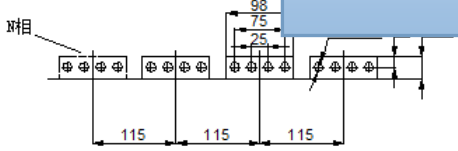
UEW6-4000/3600A～4000A抽屉式
垂直母排尺寸

UEW6-4000/3600A~4000A draw out type horizontal busbar




UEW6-4000/2500A～3200A抽屉式
母排尺寸

UEW6-4000/3600A~4000A draw out type vertical busbar




UEW6-4000/1000A～2000A抽屉式
母排尺寸

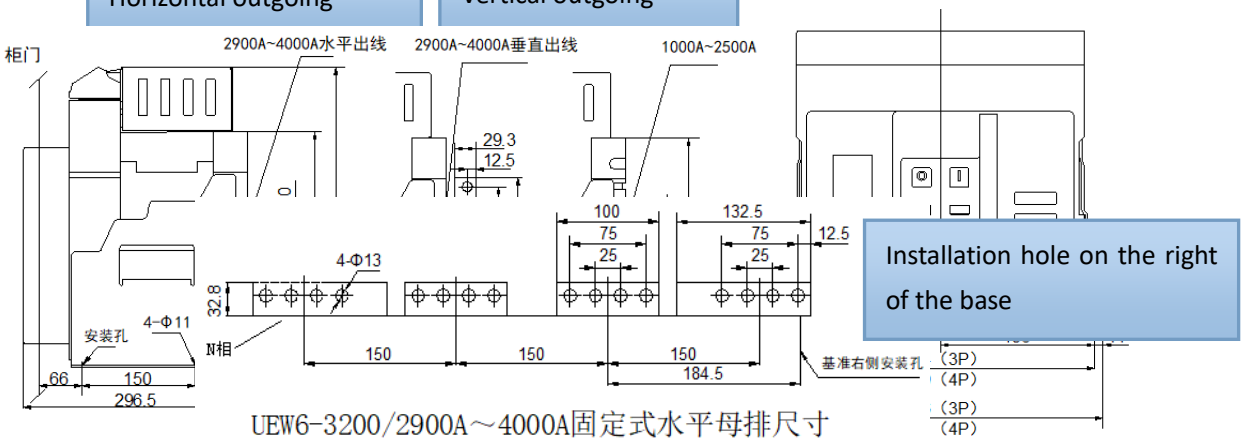
UEW6-4000/2500A~3200A draw out type busbar

UEW6-4000/1000A2000A draw out type busbar

**UEW6-4000 fixed type breaker**

Horizontal outgoing

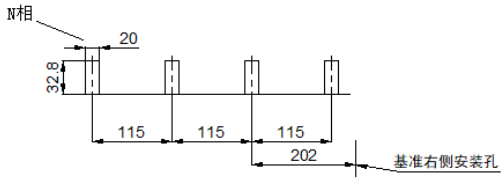
Vertical outgoing




Installation hole on the right of the base

UEW6-3200/2900A～4000A固定式水平母排尺寸

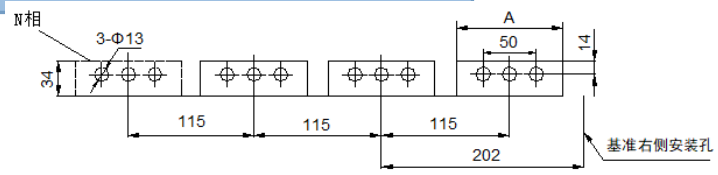
UEW6-3200/2900A-4000A fixed type horizontal busbar




UEW6-3200/2900A～4000A固定式垂直母排尺寸

UEW6-3200/2900A~4000A fixed type vertical busbar

(Note: The size A of the upper busbar is 90mm, and the size A of the lower busbar is 86mm)




llation hole on the right of ase

（注：上母排尺寸A为90mm，下母排尺寸A为86mm）

UEW6-4000/1000A～2500A固定式母排尺寸

Frame opening dimension

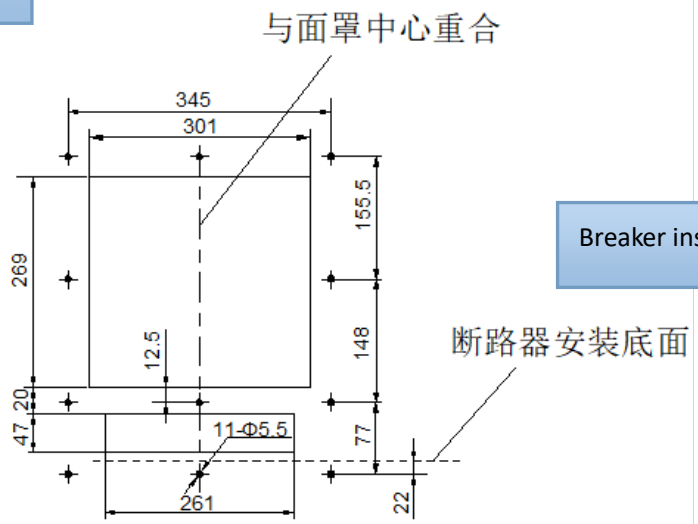
UEW6-4000/1000A~2500A fixed type busbar

**7.1 门框开孔尺寸**

**UEW6-2000 抽屉式**

UEW6-2000 fixed type

Coincident with the center of the cover

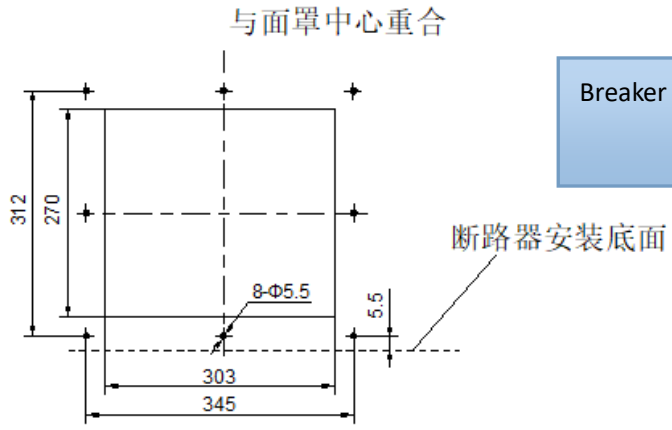



Breaker installation surface

**UEW6-2000 固定式**

UEW6-2000 fixed type

Coincident with the center of the cover

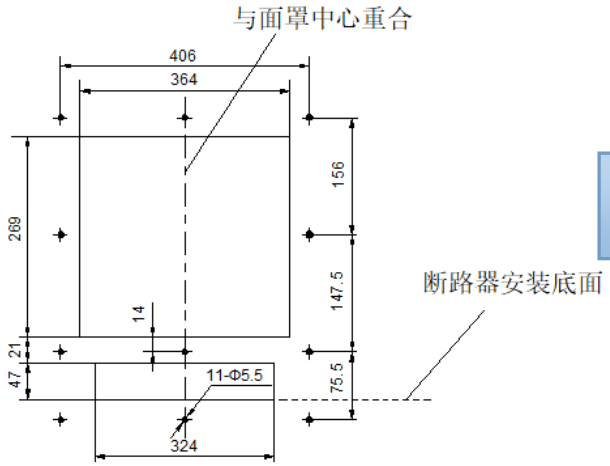



Breaker installation surface

**UEW5-3200/4000 抽屉式**

UEW5-3200/4000 draw out type

Coincident with the center of the cover

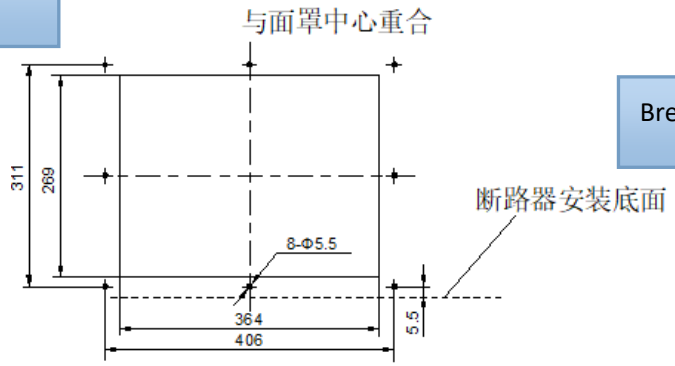



Breaker installation surface

**UEW5-3200/4000 固定式**

UEW5-3200/4000 fixed type

Coincident with the center of the cover

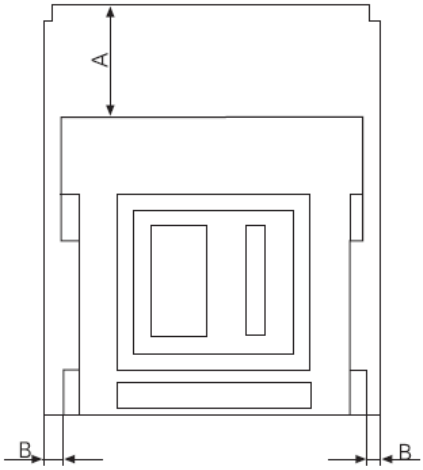



Breaker installation surface

## 8 Safety distance

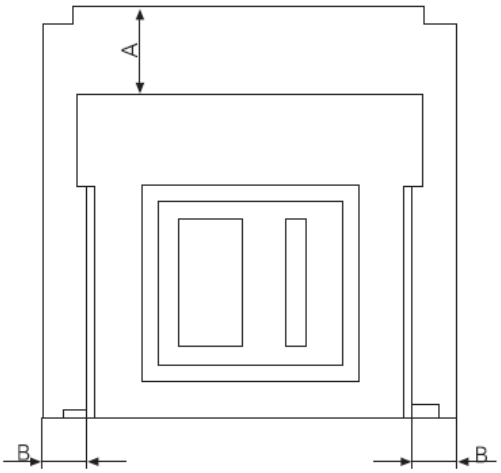
Draw out type

抽屉式




Fixed type

固定式




**Minimum distance between breaker and cabinet wall or live parts**

| | To insulator mm | | To metal body mm | |
|---|---|---|---|---|
| | A | B | A | B |
| **Draw out type** | 0 | 0 | 60 | 60 |
| **Fixed type** | 0 | 0 | 60 | 60 |

## 9 Installation and Maintenance

■Installation (refer to the previous chapter for the required dimensions for installation)

Before installation, check whether the working environment of the breaker meets the requirements

Before installation, check the insulation resistance of the breaker with a 500V megohmmeter. When the surrounding medium temperature is 20 ℃± 5 ℃ and the relative humidity is 50%~70%, it should not be less than 10M Ω. Otherwise, it should be dried and used only when the insulation resistance meets the requirements.

When installing the breaker, its base should be in a horizontal position.

During installation, reliable grounding protection should be provided for the breaker. The grounding of the breaker should be clearly marked, and the breaker should strictly comply with the safety distance regulations.

After the circuit breaker is installed according to the relevant wiring diagram and confirmed to be correct, the following inspections and operational tests should be carried out before the main circuit is powered on (the drawer type circuit breaker places the circuit breaker body in the test position):

After the circuit breaker is installed according to the relevant wiring diagram and confirmed to be correct, the following inspections and operational tests should be carried out before the main circuit is powered on (the drawer out type breaker places the circuit breaker body in the test position):

Check if the operating voltage of the undervoltage, shunt release, closing electromagnetic, and charging motor is within the required range (if equipped with an undervoltage release, the undervoltage release should be energized first before the circuit breaker can be closed).

Firstly, manually charge and open, close the circuit breaker, and the circuit breaker should operate normally;

Then electrically charge and electrically open and close the breaker, which should operate normally; If equipped with an undervoltage release, it can make the undervoltage release to lose voltage or undervoltage, and the undervoltage release should be able to trip the breaker.

Note: When rock the body of the draw out type breaker to the "rocked in" position, the breaker must be opened first.

■Inspection and maintenance

1. Regular inspection and maintenance. The time interval is once a year when installed in a normal environment, and generally once every six months when installed in a polluting environment; After a short circuit trip, immediate inspection and maintenance should be carried out to confirm that there are no faults before continuing operation.

2. Regularly clean the dust to maintain good insulation of the circuit breaker; At the same time, check if the electrical connection screws are loose;

3. Regularly inspect the contact system, mechanism, and accessories

Check the burning condition of the arc extinguishing cover and contact, and if the burning is severe, replace it. It is recommended to polish the surface of the dynamic and static contact points with fine sandpaper once a year to remove the surface oxide layer.

Check whether all fasteners are loose, and whether the limiting components have fallen or failed.

Check whether the voltage of each accessory is within the required range, and the operating performance of the accessory should meet its corresponding characteristic requirements.

When the breaker is operated for very few times or for a long time in the open or closed position, it is recommended to operate it once or twice a quarter

4. Inspection after short-circuit breaking

The inspection content is the same as the regular inspection of the contact system and mechanism, and the addition of flexible connections and welding parts, as well as the inspection of the arc extinguishing chamber, should be free of obvious damage, otherwise the damaged components need to be replaced. When the breaker reaches its electrical lifespan, it should be replaced or repaired in a timely manner.

■ Common faults and troubleshooting methods

| No. | Fault | Reasons | Trouble shooting |
|---|---|---|---|
| 1 | The circuit breaker cannot be manually closed or opened | a. An undervoltage release is selected, and it is not powered on (or the power supply voltage is too low)<br>b. After the trip unit trips, the red button on the upper part of the release panel does not reset<br>c. Operating mechanism not charged<br>d. Interlocking device in locked position. | a. Check if the wiring terminals of the circuit and secondary circuit are loose. Is the undervoltage release powered on.<br>b. Press the reset button<br>c. Manually (using the operating handle) or electrically to charge the mechanism<br>d. Open the other breaker with which it is interlocking |
| 2 | The breaker cannot be charged electrically | The power supply of the electric motor is not connected (or the power voltage is too low) | Check if the wiring terminals of the circuit and secondary circuit are loose, and connect the power supply (the voltage of the charging motor should be greater than 85% Ue). |

| | | | |
|---|---|---|---|
| 3 | The circuit breaker cannot be electrically closed or opened | a. The closing electromagnet and shunt release are not powered on (or the power supply voltage is too low)<br>b. The reason same as above item 1: The circuit breaker cannot be manually closed or opened | a. Check if the wiring terminals of the circuit and secondary circuit are loose, and connect the power supply (the voltage of the closed electromagnet and the shunt release should be greater than 85% Ue and 70% Ue respectively)<br>b. Trouble shoot the same as above item 1: The circuit breaker cannot be manually closed or opened |
| 4 | Frequent tripping | a. Overload operation on site caused overload protection tripping, and the overload thermal memory function failed to power off and clear in time.<br>b. Parameter settings do not match load current<br>c. Poor contact due to loose wiring of terminals in the secondary circuit of the undervoltage release | a. Power off once, or close the circuit breaker after 30 minutes<br>b. Reset the protection parameters according to the load situation by professional personnel<br>c. Check the circuit and tighten the secondary circuit wiring screws of the undervoltage release |
| 5 | The crank of the draw out type breaker cannot be inserted into the working hole | Position locking are not unlocked on the cradle | Unlock the position locking on the cradle |
| 6 | The breaker cannot be moved inside the cradle, and the crank is stuck | a. The unlock button on the cradle is not pressed down<br>b. Foreign particle is stuck in the mechanism of the cradle | a. Press down the unlock button on the cradle<br>b. Contact Hongfa aftersales |
| 7 | The breaker body cannot be extracted from the cradle | a. The breaker does not fully retract to the rocked out position<br>b. Sliding plate is not unlocked | a. Rock the breaker in rocked out position<br>b. Unlock the sliding plate |

Note: If the fault cannot be handled after checking according to the above table, please record the fault condition of the breaker in detail (or take pictures), product factory number, and other information in a timely manner to contact and negotiate for resolution.