



# TGW45-1000

Air Circuit Breaker

## User Manual

Please carefully read the User Manual before the installation and use of the products, and then keep it properly as backup.

11, faults and elimination method

TGW45-1000 circuit breakers possible faults and elimination method.

| The fault phenomenon  | The cause of the problem   | Troubleshooting methods  |
|---|--|--|
| Circuit breaker can't storage   | <ol style="list-style-type: none"> <li>1. Can't hand machine                             <ol style="list-style-type: none"> <li>1.1 operating latch spring inside the handle off;</li> <li>1.2 energy storage mechanical failure;</li> </ol> </li> <li>2. Can't electric energy storage                             <ol style="list-style-type: none"> <li>2.1 energy storage mechanical failure;</li> <li>2.2 electric operator control power supply voltage is less than 85% of <math>U_s</math></li> <li>2.3 outlet and inlet line of the motor is loose</li> </ol> </li> </ol>   | <ol style="list-style-type: none"> <li>1.1 to spring back, or contact the manufacturer;</li> <li>1.2 energy storage mechanical failure, contact the manufacturer;</li> <li>2.1 check the energy storage mechanism, contact the manufacturer;</li> <li>2.2 check the electric operator control supply voltage;</li> <li>2.3 check the outlet and inlet line of all;</li> </ol>  |
| Circuit breaker cannot be closed  | <ol style="list-style-type: none"> <li>1. The undervoltage tripping device failure                             <ol style="list-style-type: none"> <li>1.1 undervoltage tripping device without electricity or the working voltage in 85% <math>U_e</math>;</li> <li>1.2 the undervoltage tripping device control unit fault;</li> <li>1.3 under-voltage loose connecting rod, causing the closing under-voltage action;</li> </ol> </li> <li>2. Release can electromagnet of failure                             <ol style="list-style-type: none"> <li>2.1 release can electromagnet work voltage not less than 85% of <math>U_s</math>;</li> <li>2.2 release can damage of electromagnet;</li> <li>3 with drawer fit did not reach the designated position.</li> </ol> </li> </ol> | <ol style="list-style-type: none"> <li>1.1 electricity or adjust the voltage;</li> <li>1.2 contact factory, replace the undervoltage tripping device;</li> <li>1.3 adjust the connecting rod and under-voltage armature clearance and securing rod;</li> <li>2.1 adjust voltage;</li> <li>2.2 contact factory, replace the interpretation of the electromagnet;</li> <li>3. Whether in the trial or connection position completely.</li> </ol> |
| The breaker can't disconnect  | <ol style="list-style-type: none"> <li>1. Can't manually disconnect circuit breaker                             <ol style="list-style-type: none"> <li>1.1 operators fault;</li> </ol> </li> <li>2. Can't electric disconnect circuit breaker                             <ol style="list-style-type: none"> <li>2.1 shunt tripping device without electricity or working voltage is less than 70% of <math>U_s</math>;</li> <li>2.2 shunt tripping device damage;</li> <li>2.3 operating mechanism of failure.</li> </ol> </li> </ol>   | <ol style="list-style-type: none"> <li>1.1 check the operating mechanism, of fault, if you have stuck with manufacturing factory contact;</li> <li>2.1 electricity adjustable voltage;</li> <li>2.2 contact with factory, replace the shunt tripping device;</li> <li>2.3 check the operating mechanism, of fault, if you have stuck to contact factory.</li> </ol>  |
| Draw-out type circuit breaker in the separation position cannot be pulled out | <ol style="list-style-type: none"> <li>1. The circuit breaker is not fully reach the "separation" position;</li> <li>2. No press drawer seat on the left and right guide rail two limit;</li> <li>3. There is foreign body into the drawer, cause the wave into the mechanism of fault, skip the breaker ontology hook shaft roof in the drawer.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Shake the circuit breaker fully to "separation" position;</li> <li>2. Shake to "separation" position, press the circuit breaker or so two limit, pull the circuit breaker body section, again by pressing left and right two limit, can take out the circuit breaker ontology.</li> <li>3. Check the operating mechanism, of fault, if you have stuck to contact factory.</li> </ol>                 |
| Draw-out type circuit breaker can't shake to the connection position          | <ol style="list-style-type: none"> <li>1. With foreign bodies in the drawer inside, cause to jump into the wave device failure such as tooth;</li> <li>2. Shell circuit breaker ontology and drawer frame level doesn't match the rated current;</li> <li>3. Circuit breaker ontology not completely inserted into the drawer, will forcibly shake into the ontology.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Check and remove foreign bodies, if still can't shake, contact the manufacturer.</li> <li>2. Equipped with the same shell level rated current of the breaker ontology one drawer.</li> <li>3. Insert the breaker ontology completely drawer after, then rolled into the ontology.</li> </ol>   |
| No display controller   | <ol style="list-style-type: none"> <li>1. The controller could not working voltage;</li> <li>2. The controller internal fault.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check if the controller is powered on, if not, turn on the juice;</li> <li>2. Contact the manufacturer.</li> </ol>   |
| The controller lights flashing  | <ol style="list-style-type: none"> <li>1. The controller could not working voltage;</li> <li>2. The controller internal fault.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check if the controller is powered on, if not, turn on the juice;</li> <li>2. If already connected to the power, control power, sending again, if the fault is still there, contact the manufacturer.</li> </ol>   |

## 10, installation, check the use and maintenance

### 10.1 installation

10.1.1 check before installation of the specifications of the circuit breaker is in line with the requirements.

10.1.2 before installation with 500 v check circuit breaker insulation resistance by megger are, first in the surrounding medium temperature 20 °C + 5 °C and relative humidity was 50% ~ 70% Should not be less than 100 m Ω, otherwise should be dry, insulation resistance to meet the requirements before use. Smooth 10.1.3 circuit breaker, when installation should be installed without additional mechanical stress, its base should be in the vertical position, with four M8 screw fixation.

10.1.4 when installation, the protection of circuit breaker into the line and reliable grounding, is located in has obvious grounding mark, fixed type circuit breaker should strictly abide by the safety zone.

10.1.5 circuit breaker when installation, the above should be have distance and shall not be close to the bus. External bus connected to the circuit breaker, compared the various answered Unloading, stress for circuit breaker.

10.2 after the circuit breaker installed according to the wiring diagram wiring, in front of the main circuit power (draw out circuit breaker drawer seat instructions in the test position) should be the following test and inspection.

A) check, owe voltage shunt tripping device and closed electromagnet, motor operating voltage is matched (under voltage trip should absorb, circuit breaker to closing).

B) pull (up and down the handles on the mask and panel display can "storage" after seven times, and heard a "clicking" sound, at the end of the storage can, press the "I" button or closing electromagnet electricity, reliable circuit breaker closed (in the case of controller reset).

C) electric motor operation to mask shows "storage", and accompanied by a "clicking" sound, storage can end, motor power, press the "I" button or closing electromagnet electricity, reliable circuit breaker closed.

D) the closed circuit breaker, no matter use owe voltage, shunt tripping device or "O" button on the mask, the tripping of the controller test shall make the circuit breakers to disconnect.

### 10.3 the use of intelligent controller

A) in a load current circumstances, the circuit breaker closing before must first click on the "mechanical reset (for mechanical reset options, or clear light reset)" button, can close the circuit breaker, put it into normal operation.

B) after each test or fault tripping, you must first click on the "mechanical reset (for mechanical reset options, or clear light reset)" button, can return to test or in operation.

### 10.4 circuit breaker maintenance

10.4.1 in the process of using various rotational part should be regularly injected lubricating oil;

10.4.2 should be regular maintenance, flush dirt, in order to keep the circuit breaker insulation good;

10.4.3 should regularly check contact system, especially in the final inspection for each short circuit; Check the content:

A) arcing cover: arcing shield wall is broken, smoke is cleared, arcing gate whether loss serious, depending on the situation change in time;

B) contact system: contactor whether good contact, contact thickness less than 1 mm, need to send factory replacement;

C) connection: the connection parts are loose.

10.4.4 to electricity by the maintenance, need to change the arcing cover and contact;


10.4.5 without maintenance to achieve mechanical life, need to change the motor, energy storage mechanism and the main contact.

## CATALOGUE

|  |    |
|--|----|
| 1, purpose and scope of application .....  | 1  |
| 2, product model meaning and its classification.....   | 1  |
| 3, normal working conditions .....   | 2  |
| 4, technical data and performance .....  | 2  |
| 5, structure and attachment .....  | 6  |
| 6, secondary circuit wiring diagram .....  | 9  |
| 7, circuit breaker installation size, shape size and switch cupboard door opening size ..... | 12 |
| 8, TGW45-1000 - M/H type intelligent controller instructions .....                           | 15 |
| 9, TGW45-1000 L type intelligent controller instructions .....                               | 18 |
| 10, installation, check the use and maintenance .....  | 19 |
| 11, faults and elimination method .....  | 20 |
| 12, order specifications .....   | 21 |

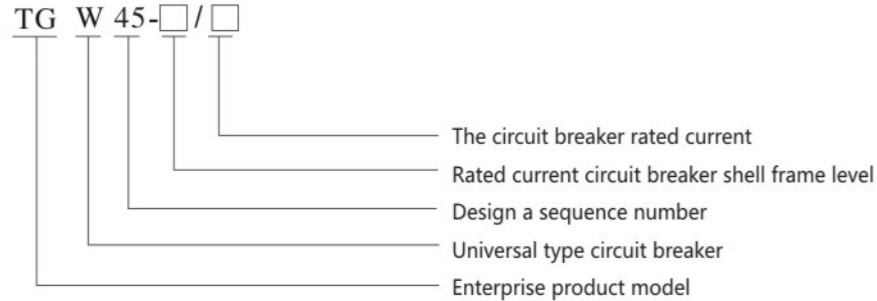
## 1, purpose and scope of application

TGW45-1000 universal intelligent circuit breaker (hereinafter referred to as circuit breaker), applied to ac 50 hz, rated voltage 400 v, 690 v, rated current 200 ~ 1000 a power distribution network, are mainly used for distribution power and protect circuit and power equipment from overload, short circuit, under voltage, the harm of single-phase grounded fault. Under normal conditions can be used for line not frequent transformation, also can be used for infrequent motor starting and protection purposes. The circuit breaker has a variety of intelligent protection function, accurate, selective protection can improve power supply reliability and avoid unnecessary power outages.

Circuit breaker, with isolation function symbol for "  ".

Circuit breaker technical performance is in line with GB14048.2 "low-voltage switchgear and control equipment Part 2: circuit breaker ". IEC60947-2 "low-voltage switchgear and control equipment Part 2: circuit breaker "and other standards.

## 2, product model meaning and its classification



### 2.1 classification

2.1.1 by using categories: class A (not wide choices) class B (wide choices)

2.1.2 installation: stationary drawer

2.1.3 mode of transmission: motor drive manually

The number of 2.1.4: three pole quadrupole

2.1.5 trip types: intelligent controller shunt tripping device Under voltage instantaneous trip (or latency)

2.1.6 classification of intelligent controller (standard configuration for M type intelligent controller)

TGW45 series intelligent controller adopts coding switch, toggle switch mode of setting. According to its protective properties can be divided into 2 I2, I3 and I4 2 2 three basic types, also has the button setting mode and digital tube display of M type intelligent controller and liquid crystal display (LCD) H intelligent press system.

2 I2 (basic) :Overload long time delay +Short circuit instantaneous;2 I3 (selective protection) : Overload long time delay +Short circuit the short time delay +Short circuit instantaneous;2 I4 (selective protection and earthing protection) :Overload long time delay +Short circuit the short time delay +Short circuit instantaneous +Grounding protection (current vector and the way).

M type intelligent controller: using adjusted button setting of protection parameters, digital tube display shows a variety of data, protection function diversification.

### 2.1.7 intelligent controller performance

- A) has the overload long time delay (latency), short circuit the short time delay, short-circuit transient dynamic and single-phase grounding protection function, can be set by the user, of the required protective properties;
- B) single-phase grounding protection performance: according to the three phase current and neutral current vector and protection;
- C) display function: load current beam, MCU monitoring operation;
- D) alarm function: overload pre-alarm;
- E) self-check function: overheating protection, computer self-diagnosis, A/D conversion self-inspection self-inspection, E2PROM chips was introduced;
- F) test function: validation of the controller action features;
- G) fault memory function: check the fever of lines or equipment, check the fault current, delay time and the fault status;
- H) MCR and the tripping function limits; The fault current in circuit breaker main circuits, the circuit breaker in the closing moments, as long as the main circuit fault current and greater than the set values for the short time delay, the circuit breaker should be instantaneous action. 2 I2 without this feature;

## 9, TGW45-1000 L type intelligent controller instructions

9. Figure 1 TGW45-1000 L intelligent controller panel (figure 12)

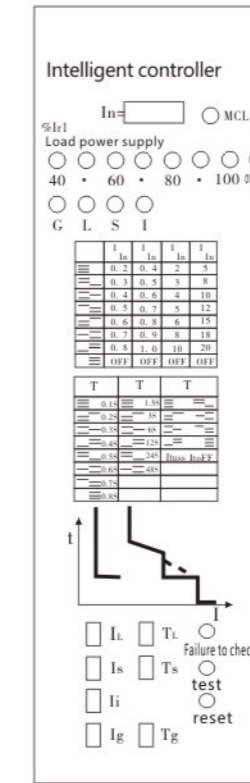


Figure 12 TGW45 figure - 1000 - L intelligent controller panel

9. 2 L instructions on the use of the intelligent controller (see panel component function description table 17)

Table 17 L intelligent controller of panel component function description

| name                            | function  |
|---------------------------------|---|
| "Fault check" button            | Click this button display system before a line fault protection section of memory   |
| "Test"                          | Click this button to instantaneous tripping test, the instantaneous tripping action   |
| "Reset" button                  | Intelligent controller reset after press this key, enter the running state  |
| "MCU" indicator light           | When the green light said controller work; The green light flashing several consecutive said controller since the diagnostic error code   |
| "40~100" Indicator light        | This lamp for light load current instructions, shows that the percentage of the load current and Ir1 number   |
| "Overload" indicator light      | When the red light, said the load current has exceeded Ir1 current protection value, Ir1 start time delay or the police   |
| "Ir1~Ir4" Fault indicator light | In actual operation, a fault normally on a red light indicates that the section has malfunction, make the breaker breaking; If there is a fault the red light flash delay action or fault alarm; A fault in fault check, normally on a red light said before a failure occurs in the section; When the instantaneous tripping test, transient fault red light "Ir3" bright said that section has occurred the transient simulation of tripping. |

8.2.4 test

The controller can test tripping. Continuous press [capabilities], when testing until the light shining "test", according to a [sure] key, the controller tripping password, "test" constant light. According to the [return] key to exit the test status, to return to normal operation.

8.2.5 查询

(1) failure query:

After controller fault protection, "fault" lights, at the same time the failure indicator, displays the fault current and time controller cycle. Press ▲, ▼ recycled to view other data of fault occurs: L1, L2, L3 - N (optional) - If - the delta 1 - the delta 2 - delta 3 - % - x 10. According to the [return] key to exit the query status, to return to normal operation.

(1) failure query:

After controller fault protection, "fault" lights, at the same time the failure indicator, displays the fault current and time controller cycle. Press ▲, ▼ recycled to view other data of fault occurs: L1, L2, L3 - N (optional) - If - the delta 1 - the delta 2 - delta 3 - % - x 10. According to the [return] key to exit the query status, to return to normal operation.

8.2.6 controller factory default Settings are shown in table 16

Table 16 M/H controller factory default Settings

|  |                                    |                    |
|--|------------------------------------|--------------------|
| Set the long time delay                    | Set the current                    | 1In                |
|  | Time setting                       | C3(2 times In, 8S) |
|  | Thermal memory                     | OFF                |
| Short circuit the short time delay setting | The inverse time current setting   | 8In                |
|  | Definite time current setting      | 12In               |
|  | Time setting                       | 0.4 s              |
|  | Thermal memory                     | OFF                |
| Ground fault protection setting            | Set the current                    | OFF                |
|  | Time setting                       | 1s                 |
|  | The shear setting                  | 1.5                |
| Short circuit transient dynamic setting    | Set the current                    | 20In               |
| Load monitoring 1 set                      | Set the current                    | OFF                |
|  | Time setting                       | C3                 |
|  | Thermal memory                     | OFF                |
| Load monitoring 2 set                      | Set the current                    | OFF                |
|  | Time setting                       | C3                 |
|  | Thermal memory                     | OFF                |
| Unbalanced current setting                 | The current imbalance rate setting | OFF                |
|  | Time setting                       | OFF                |
| Curve to choose                            | L - 3                              |                    |

I) setting function: using code switch, toggle switch or button in a way that current and time setting;

J) contact output function: output circuit breaker with four groups of contacts: overload alarm, grounding alarm, self-diagnosis, alarm, OCR fault tripping alarm.

3, normal working conditions

3.1 ambient air temperature

3.1.1 ceiling not more than + 40 °C;

3.1.2 lower limit of not less than 5 °C;

3.1.3 average no more than 24 h + 35 °C;

Note: 1, the lower limit for - 10 °C and 25 °C working conditions and users in order to the factory declaration;

2, the ceiling more than + 40 °C or lower limit value is lower than 25 °C working conditions, users should negotiate with factory.

At an altitude of 3.2

installation location altitude does not exceed 1000 m.

3.3 atmospheric conditions

Air relative humidity in the ambient air temperature is + 40 °C not more than 50%, at a lower temperature can have higher relative humidity, the wettest month average maximum relative humidity is 90%, while the lowest monthly average temperature of the month to + 25 °C, and considering the due to temperature changes happened in any condensation on the product surface.

3.4 pollution levels

3 Level

3.5 installation category

Circuit breaker for the installation of the main circuit category IV classes, in addition to the installation of auxiliary circuit category under voltage trip coils, the main circuit of power transformer primary coil and the circuit breaker is the same, the rest are III class.

3.6 use category

Class B

3.7 installation conditions

Circuit breaker shall be installed according to the operation instruction of requirements for installation. The vertical slope of the circuit breaker is not more than 5 °.

4, technical data and performance

4.1 the circuit breaker rated current are shown in table 1.

Table 1

| Shell frame level rated current Inm (A) | Rated current (A) In | Rated current controller In (A) |
|---|----------------------|---------------------------------|
| 1000                                    | 200、400、630、800、1000 | 200、400、630、800、1000            |

4.2 the circuit breaker rated insulation voltage 690 v. Rated voltage 400 v, 690 v.

4.3 the circuit breaker rated short circuit making capacity shall be not less than 2.1 Icu.

4.3 the circuit breaker rated short circuit breaking capacity and short-term resistance current is shown in table 2.

Table 2.

| Shell frame level rated current Inm (A) | Rated short circuit breaking capacity limit Icu (kA) cos Φ | Running short circuit breaking capacity rating Icu (kA) cos Φ | When rated short-time current Icu (kA) cos Φ | arcing distance | Into the way of line          |
|---|--|---|--|-----------------|-------------------------------|
| 1000                                    | 380(400)V  | 380(400)V   | 380(400)V                                    | Zero flashover  | Aspirant line or next in line |
|   | 42   | 30  | 30/1s  |                 |                               |

note: Ue=690V, Icu=20kA。

4.5 intelligent controller protection features

4.5.1 intelligent controller setting value and error are shown in table 3.

Table 3

| long time delay | Short time delay |       | instant   |       | Ground fault |       |
|-----------------|------------------|-------|-----------|-------|--------------|-------|
| Ir1             | Ir2              | error | Ir3       | error | Ir3          | error |
| (0.4~1)In       | (1.5~15)In       | ±10%  | 1In~30kA  | ±15%  | (0.2~1)In    | ±10%  |
|                 | ☆(2~10)In        |       | ☆(5~20)In |       | ☆(0.2~0.8)In |       |

Note: the set values for the belt for being L controller

4.5.2 of M/H type intelligent controller long delay over current protection inverse time characteristic is  $t = K/(N - 1)$  (type t: in the long time delay action time, K: speed controller curve,  $N = I/Ir1$ , I: actual fault current Ir1 long time delay setting current), K coefficient are shown in table 4, action time are shown in table 5, the time limit of error is plus or minus 10%.

4.5.3 M/H intelligent controller short time overcurrent protection for the definite time + inverse time characteristic, the time limit of error is plus or minus 10%.

4.5.4 ground-fault protection action for the definite time + inverse time characteristic, when the fault current ratio (I/If) is less than the shear coefficient of Cr, action for inverse time characteristics. When the fault current ratio greater than or equal to Cr or Cr is set to 0 ff, action delay for the definite time characteristic, the delay time is equal to the set delay time, the time limit of error is plus or minus 10%.

4.5.5 breaker over-current protection, earth fault protection characteristic curve as shown in figure 1.

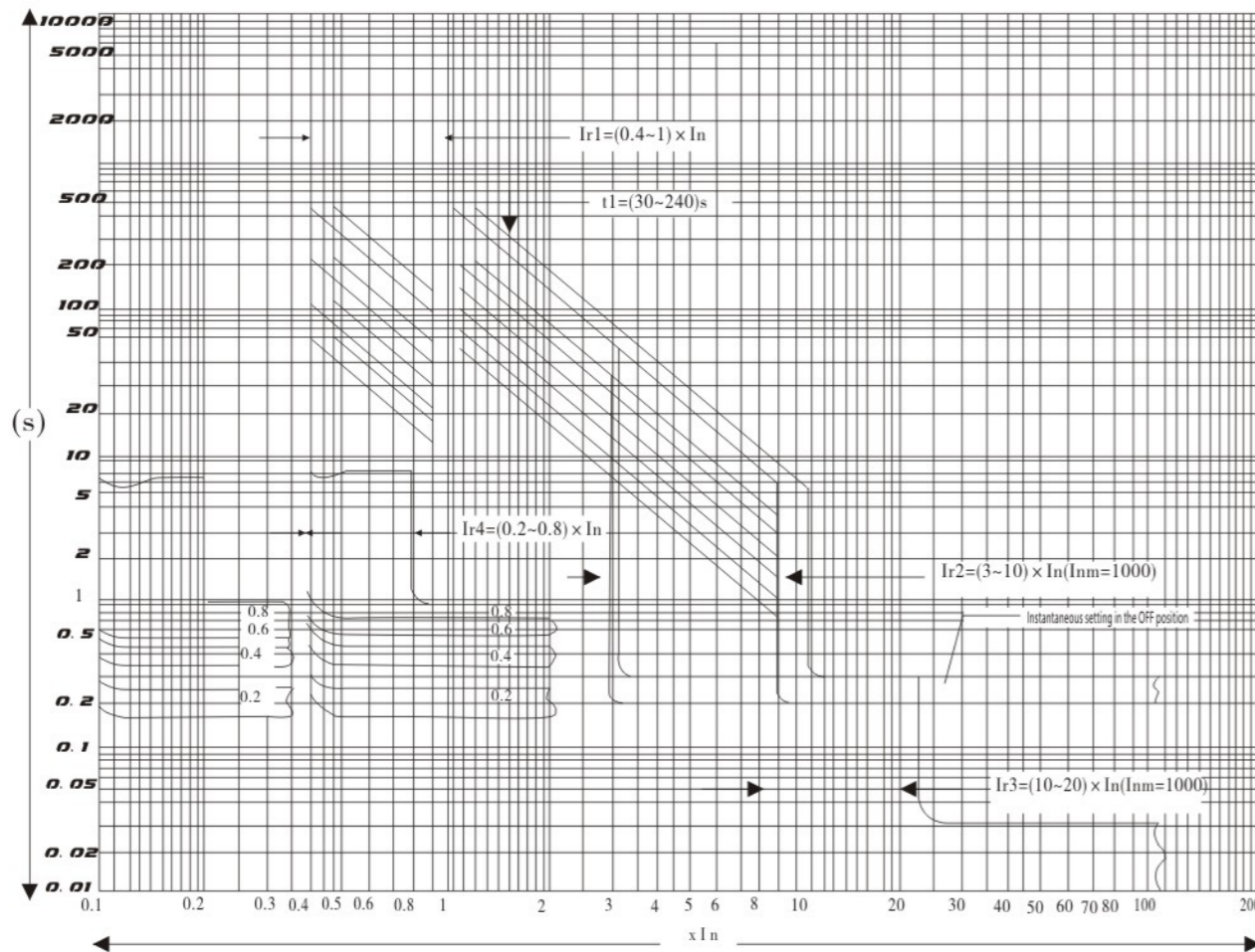


Figure 1 controller overcurrent protection, ground fault protection function curve

Set don't 8.2.2 controller state

As shown in the controller panel, in the operation of the controller in there are all kinds of state:

- (1) set up the state: "Settings", constant light to view or modify the set values for the various protection features.
- (2) the query condition: "query" constant light, can view the history of fault information.
- (3) test condition: "test", constant light trip test can be performed.
- (4) fault state: "failure", constant light indicating the fault category, cyclic display fault current and time.
- (5) state of alarm: "alarm" light constant on, said in a fault in the process of the delay.

6. Storage condition: "storage" lights, said a data changes.

All landowners from diagnostic state: "T" lights, said controller have self-diagnosis failures.

The end state of communication: only H, "lights ablaze, Tx, TR" said data transmission.

8. 2.3 setting value is set

Operation control panel on the function, ▲, ▼, [sure], [return], such as key, which can realize setting, query and test function.

Press [capabilities] can choose three states: loop setting, query, experiment; According to the mind, and key can select the feature or parameter values increase or decrease; Press [sure] into a function or data storage has been changed; According to the [return] button to return to action at the next higher level. The set values for the various protection feature set when shall guarantee the  $Ir3 > Ir2 > Ir1$ , and suggested  $ILC1 > ILC2$ , its operation steps are as follows

The first step: press [capabilities] until the "Settings" lights shining, then [sure] key, once the "Settings" light is still shining, at the same time a protection category lamp lights, said the state of setting value is set.:

Step 2: press ▲, ▼ recycled display various setting worthy of the original set of data. If you want to modify a setting value, determine the key, the "Settings" constant light, press ▲, ▼, adjust until the needed values with the mind, and key, press ok key, "storage" lights, says it has preserved the modified data. Press the return key to exit the setting value changes.

Step 3: repeat step 2 until all finished setting value change. Press the return key to exit the setup function.

Modify the set values for the various protection features, please refer to the following table 15

Table 15 set under state protection category indicator constant on and the corresponding value of the corresponding table

| red light | green light | Press ▲, ▼, [sure], [return] key setting value of the set   |
|-----------|-------------|---|
| IC1       | A/KA        | Load monitoring IC1 current setting value   |
|           | S           | The set values for the load monitoring IC1 inverse time delay time T (K) : TC1  |
| IC2       | A/KA        | The set values for the load current monitoring IC2  |
|           | S           | The set values for the load monitoring IC2 inverse time delay time T (K) : TC2  |
| δ         | %           | The set values for the balance or not   |
|           | S           | The set values for the delay time Tδ  |
| If        | A/KA        | The set values for the earth current Tf   |
|           | S           | Grounding the set values for the inverse time delay time Tf (S green light constant)<br>Grounding inverse time shear coefficient K (S green light constant) |
| L         | A/KA        | Overload the set values for the long time delay current IL  |
|           | S           | The set values for the overload long time delay inverse time delay time T (K) : TL  |
| S         | A/KA        | The set values for the short circuit the short time delay inverse time current IR21 (S green light of constant)   |
|           | A/KA        | Short circuit a short delay the set values for the definite time current IR22 (S green light is shining)  |
|           | S           | Short circuit a short delay the set values for the definite time delay time IS  |
| I         | A/KA        | The set values for the short-circuit transient current II   |

8, TGW45-1000 - M/H type intelligent controller instructions

TGW45 8. 1-1000 - M/H type intelligent controller panel figure (as shown in figure 11)

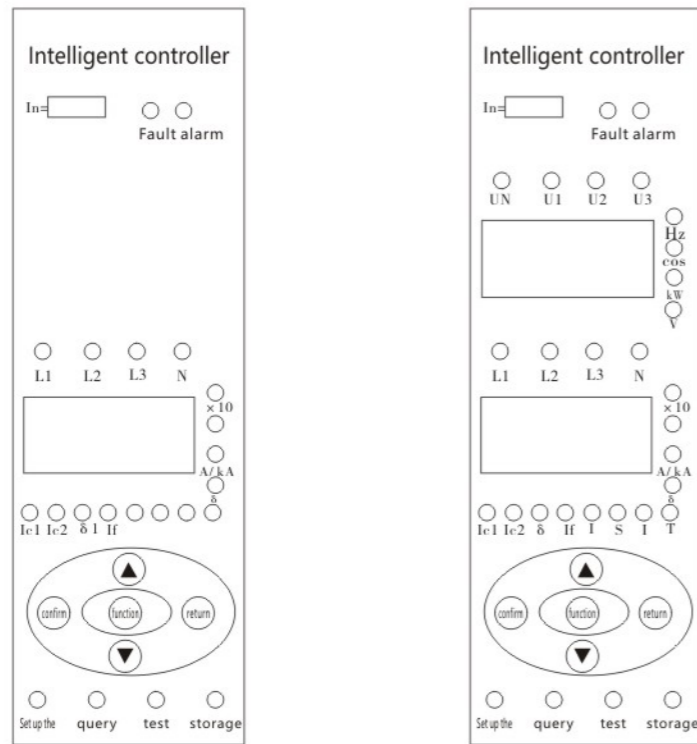


Figure 11 TGW45 figure - 1000 - M/H intelligent controller panel

Query 8.2.1 normal operation parameters

Controller can automatic cycle display three current value when normal operation, when co-opted voltmeter function cycle shows that three-phase voltage value. If you want to see more running parameters, can press ▲ ▼ display parameters:

Current meter window: L1, L2, L3, N (optional) - If - the delta 1 - the delta 2 - delta 3 - % - x 10

Voltmeter window: UAB UBC - UCA - UA UB - UC

1, the current meter window display parameters

"%" when the light is bright, display value to contact wear

"X 10" when the light is bright, display value of circuit breaker has been closing operation

"Delta", "%", "L1 / L2 / L3" lamp light at the same time, the display value of the corresponding phase imbalance rate

"If" and "A/kA" when the light is bright, the display value of phase current N

"L1 / L2 / L3" and "A/kA" lamp light at the same time, the display value of the corresponding phase current

"N" and "A/kA" lights at the same time, according to the phase current value of N

"A/kA kA lights flash," said A constant light

2, voltmeter, window display parameters

"1, 2, 3," in a lamp and "V" lights at the same time, according to three phase line voltage respectively

"1, 2, 3," in a light, "N" and "V" lamp lit at the same time, respectively corresponding to the phase of the phase voltage

When the "T" light on the control panel, said have self-diagnosis fault, press [sure] shows fault code. Such as the fault has been ruled out, according to the [return] key to clear the diagnosis fault "T" lamp, back to normal state; If you have multiple failure diagnosis, press ▲ ▼ loop to check the failure code.

The fault code table 14:

Table 14

| Er01                      | Er02      | Er03                          | Er12                            | Er13                                 |
|---------------------------|-----------|-------------------------------|---------------------------------|--------------------------------------|
| E <sup>2</sup> PROM error | A/D error | Environmental overtemperature | Circuit breaker refusing action | Contact the maintenance instructions |

Table 4

|                    |       |       |       |       |       |       |       |       |       |       |     |     |     |      |      |      |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|-----|-----|------|------|------|
| Set the delay time | 3. 32 | 5. 32 | 8. 00 | 13.32 | 20.00 | 26.66 | 33.30 | 45.00 | 60.00 | 93.32 | 133 | 200 | 266 | 333  | 400  | 433  |
| K coefficient      | 10    | 16    | 24    | 40    | 60    | 80    | 100   | 135   | 180   | 280   | 400 | 600 | 800 | 1000 | 1200 | 1300 |

Table 5

| I                   | The action time    |
|---------------------|--------------------|
| 1.05I <sub>r1</sub> | > 2 h action       |
| 1.3I <sub>r1</sub>  | Don't < 1 h action |

4.5.6 circuit breaker operation times are shown in table 6

Table 6

| Rated current shell frame level I <sub>nm</sub> (A) | Operating cycles per hour | The operating cycles |                |                     |
|---|---------------------------|----------------------|----------------|---------------------|
|   |                           | electricity          | No electricity | The total number of |
| 1000  | 20                        | 500                  | 4500           | 5000                |

4.5.7 circuit breaker control circuit power supply voltage is shown in table 7.

Table 7

| The name of the   | The rated voltage   |            |
|---|---------------------|------------|
|   | AC (V)              | Dc (V)     |
| Undervoltage tripping device (U <sub>e</sub> )            | 220 (230) 380 (400) | —————      |
| The shunt tripping device (U <sub>s</sub> )               |                     | 110 220    |
| Closed electromagnet (U <sub>s</sub> )                    |                     | 110 220 24 |
| Operating motor (U <sub>s</sub> )                         |                     |            |
| Controller for the power supply voltage (U <sub>e</sub> ) |                     |            |

Note: the controller working voltage for DC24V transformer or power module a side can provide for AC380V voltage and 220 v, 50 hz or C220V, 110 v.

Note: the shunt tripping device within the scope of 70% ~ 100% U<sub>s</sub> assure disconnect circuit breaker; Motor operation within the scope of 85% ~ 110% U<sub>s</sub> reliable complete energy storage, closed electromagnet shall be within 85% ~ 100% U<sub>s</sub> ensure reliable circuit breaker closed. Intelligent controller should be within the scope of 85% ~ 115% U<sub>e</sub> guarantee circuit breaker reliable work.

4.5.8 circuit breaker undervoltage tripping characteristics are shown in table 8.

Table 8

| category  | Owe voltage delay tripping device | Owe voltage delay tripping device        |
|---|-----------------------------------|--|
| The action time of the trip   | Delay 1, 3, 5 s                   | The instantaneous                        |
| Trip voltage value  | 35%~70%U <sub>s</sub>             | Can make the circuit breaker disconnects |
|   | ≤35%                              | Circuit breaker cannot be closed         |
| In ½ delay time, when the power supply voltage 85% return to U <sub>e</sub> | ≥85%~110%U <sub>e</sub>           | Reliable circuit breaker closed          |
|   | Circuit breaker is                | —————                                    |

Note: the delay time of error of plus or minus 10%

4.5.9 auxiliary contacts

4.5.9.1 auxiliary contacts the stipulations of the heating current  $I_{th} = 6 \text{ a}$ .

4.5.9.2 auxiliary contact form: the standard configuration for the four groups switch contact (such as users have special requirements shall specify when ordering).

4.5.9.3 auxiliary contacts on the abnormal and breaking capacity are shown in table 9.

Table 9

| Using the categories | Rated control capacity (Pe) | Rated working voltage (Ue) | Connected with the breaker |      |      |           | On-off operation cycle times and operating frequency |  |                  |
|----------------------|-----------------------------|----------------------------|----------------------------|------|------|-----------|--|--|------------------|
|                      |                             |                            | U/Ue                       | I/Ie | cosΦ | T0.95(ms) | Operating cycles                                     | Operating cycles per minute                          | Current time (s) |
| AC-15                | 300VA                       | 400V                       | 1.1                        | 10   | 0.3  | —         | 10   | 6 (the same as the main circuit operating frequency) | 0.5              |
| DC-13                | 60W                         | 230V                       | 1.1                        | 1.1  | —    | 300       |  |  |                  |

4.5.9.4 auxiliary contacts connected under the condition of normal and breaking ability see table 10.

Table 10

| Using the categories | Rated control capacity (Pe) | Rated working voltage (Ue) | Through to |      |      |           | Through to |      |      |           |
|----------------------|-----------------------------|----------------------------|------------|------|------|-----------|------------|------|------|-----------|
|                      |                             |                            | U/Ue       | I/Ie | cosΦ | T0.95(ms) | U/Ue       | I/Ie | cosΦ | T0.95(ms) |
| AC-15                | 300VA                       | 400V                       | 1          | 10   | 0.3  | —         | 1          | 10   | 0.3  | —         |
| DC-13                | 60W                         | 230V                       | 1          | 1    | —    | 300       | 1          | 1    | —    | 300       |

4.5.9.5 auxiliary contacts without power operation cycles were the same as the main loop of the circuit breaker.

4.5.9.6 circuit breaker of the maximum operating force 100 n, draw out feed mechanism operating handle operating power is not more than 125 n.

4.6 users to install with copper platoon recommended are shown in table 11.

Table 11 users to install with copper platoon is recommended

| Rated current (A) In |                | 200 | 400 | 630 | 800 | 1000 |
|----------------------|----------------|-----|-----|-----|-----|------|
| bus                  | Thickness (mm) | 5   | 5   | 5   | 6   | 8    |
|                      | The width (mm) | 30  | 30  | 40  | 50  | 50   |
|                      | The number     | 1   | 2   | 2   | 2   | 2    |

4.7 the breaker maximum loss power are shown in table 12.

Table 12 circuit breaker the biggest loss of power

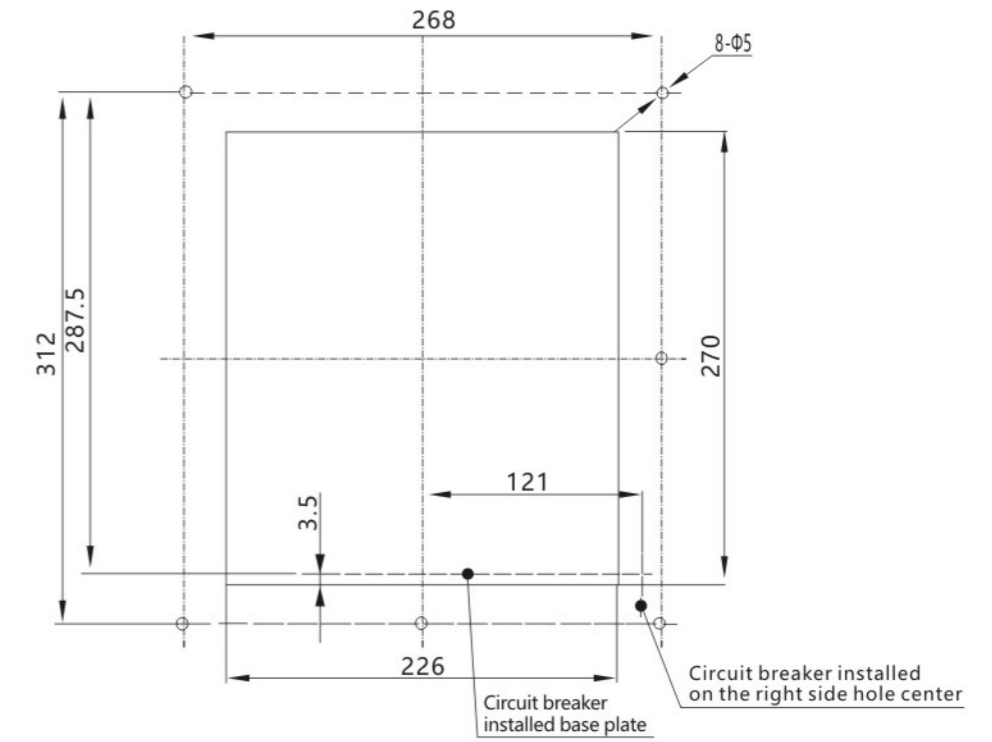
| Rated current (A) In  |               | 200 | 400 | 630 | 800 | 1000 |
|-----------------------|---------------|-----|-----|-----|-----|------|
| Power consumption (W) | Draw-out type | 40  | 101 | 123 | 110 | 171  |
|                       | stationary    | 33  | 85  | 107 | 94  | 146  |

4.8 circuit breaker under different ambient temperature changes are shown in table 12 continuous rated current, the circuit breaker cut capacity coefficient (ambient temperature + 40 °C).

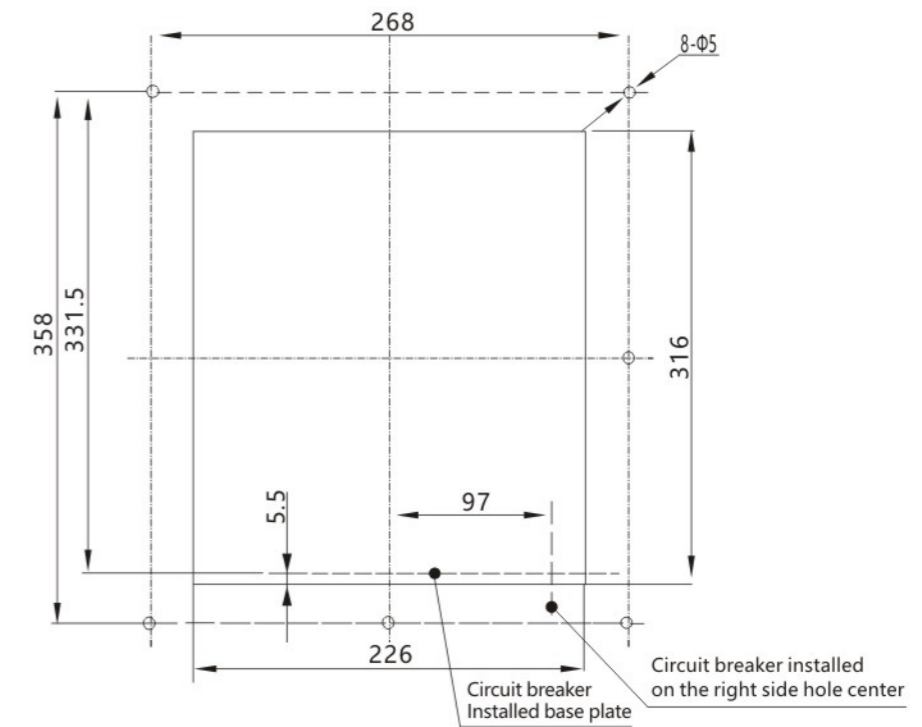
Table 13 circuit breaker capacity coefficient

| Environment temperature   |       | +40°C | +45°C  | +50°C  | +55°C  | +60°C  |
|---|-------|-------|--------|--------|--------|--------|
| Allowed continuous working current  | 1000A | 1.0In | 0.95In | 0.92In | 0.88In | 0.85In |
| Note: ambient air temperature and allowed to continue working current relationship (in various environment temperature conditions, the measured temperature of outlet and inlet line of circuit breaker end + 110 °C as a benchmark.) |       |       |        |        |        |        |

7.3 the installation size and shape dimensions of the circuit breaker in figure 10



Stationary 3 p / 4 p frame cupboard door opening size

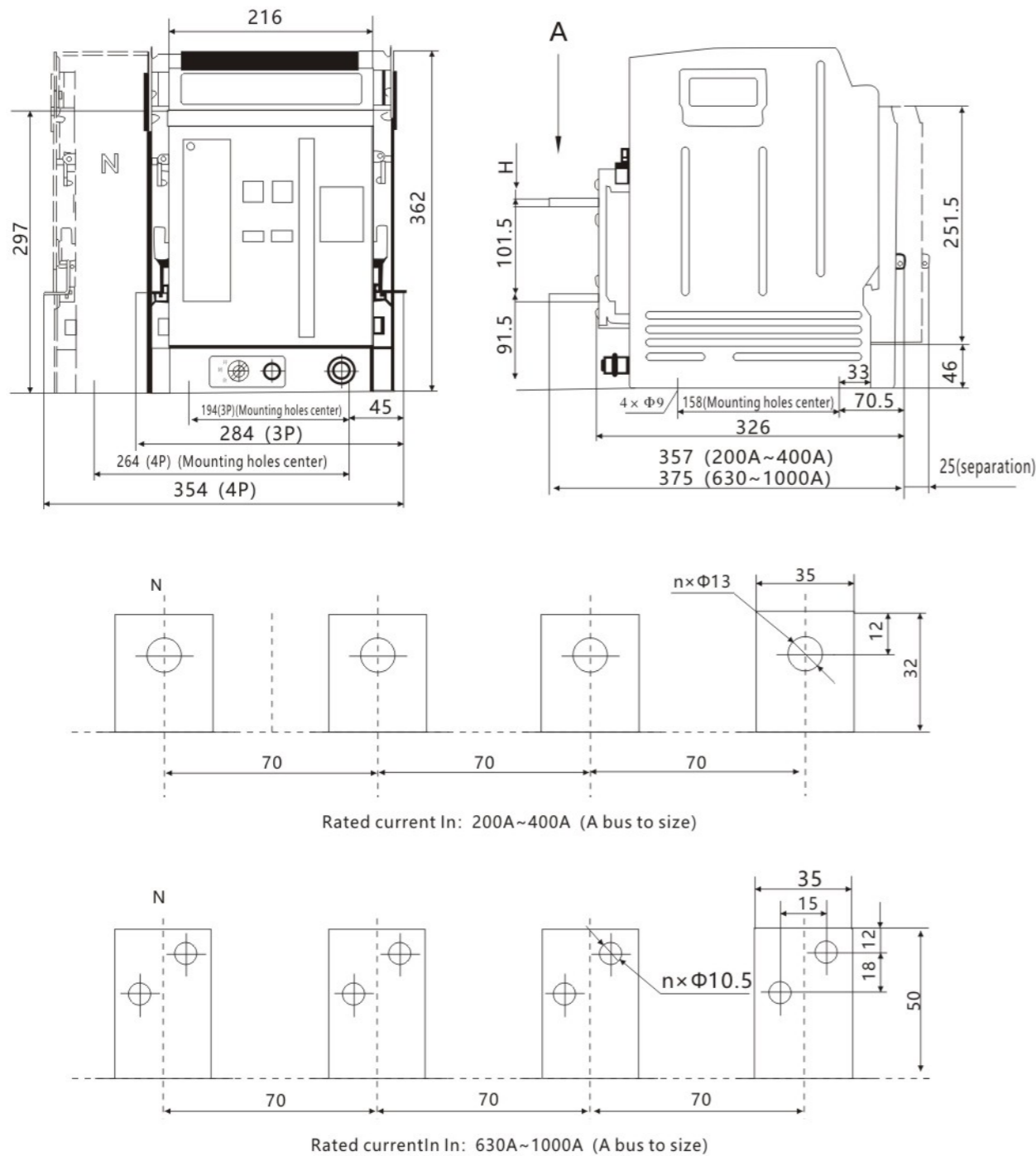


Draw-out type 3 p / 4 p frame cupboard door opening size

Figure 10 TGW45-1000 universal type circuit breaker doors cupboard door hole size and install distributed distance



7.2 draw out circuit breaker installation dimensions and the dimensions as shown in figure 9.



| Rated current (A)       | 200, 400 | 630 | 800, 1000 | note |
|-------------------------|----------|-----|-----------|------|
| Busbar thickness H (mm) | 6        | 8   | 10        | —    |
| n                       | 6        | 12  | 12        | 3P   |
|                         | 8        | 16  | 16        | 4P   |

Figure 9 TGW45-200 - a ~ 200 a draw out circuit breaker

4.9 circuit breaker attachment power consumption are shown in table 13.

Table 13 power consumption of circuit breaker accessories

| category                  | rated voltage | AC230V | AC400V | DC220V | DC110V | note                                    |
|---------------------------|---------------|--------|--------|--------|--------|---|
| Under voltage trip        |               | 400VA  | —      | —      | —      | Maximum instantaneous power consumption |
| The shunt tripping device |               | 200VA  | —      | 200W   | —      | Maximum instantaneous power consumption |
| Closed electromagnet      |               | 400VA  | —      | 400W   | —      | Maximum instantaneous power consumption |
| Operating motor           |               | 80VA   | —      | 80W    | —      | —                                       |

### 5, structure and attachment

Circuit breaker for three-dimensional decorate a form, has the structure features of compact structure, small volume (circuit breaker structure as shown in figure 2).

Circuit breaker as the frame combination structure, drawer, stationary. Fixed by intelligent controller, modular contact system, arc extinguishing system, operating mechanism (electric and manual), closing, shunt, undervoltage, seven units; Draw-out type consists of inserting circuit breaker with drawer, and insert the breaker is composed of intelligent controller, modular contact system, arc extinguishing system, operating mechanism (electric or manual), closing, shunt, under-voltage units.

5.1 draw out circuit breaker drawer guide rail can push pull in, plug-in circuit breaker located on the guide rail in and out of the drawer, by inserting the bus on the circuit breaker with drawers on bridge contact insertion to connect through the primary loop.

Draw-out type circuit breaker has three working location: "connected" location, "test", "separation" location, location change by the handle or spin out implementation of precession. Three position indicator through the drawer base beam of the display. When in the "connection" position, the main loop and the secondary loop are connected, when in the "test" position, the primary loop disconnect, separated and insulating isolation, secondary loop through, only can do some necessary test, when in the "separation" position, all the main loop and the secondary loop disconnect.

### 5.2 the contact system

Main contact choose docking type contact, contact system adopts four branch contact parallel structure, only the main contactor, dynamic contact blade on the smooth arc Angle, static contact overhead with arc. The insulation of the contact system installed in a closed small indoor, contact center of rotation system embedded in the closet wall insulation, circuit breaker action, from the main shaft of the closing of the torque to rotate the dynamic contact around the center of rotation and closed. Each contact for independent parts, in the form of building blocks into the framework.

### 5.3 operating mechanism

Operator adopts closed CAM and spring energy storage, closure speed has nothing to do with manual or electric operating speed. Operators have free trip function, the operating points "energy storage to buckle", "closed" and "disconnect" three rules.

5.3.1 when applying force electric or manual operation, saving axis rotation, spring energy storage after CAM high jump into gap by spring drive the sector plate rotate clockwise around the fulcrum, make the switch lever and closing half shaft clasp, roller is roof to resist, energy storage.

5.3.2 press "I" button or release can electromagnet action, make the roof rotate counterclockwise, energy storage spring release energy, square shaft driven CAM rotate counterclockwise, make the lever on the roller CAM rolling along, lever up, drive spindle and make the contact closure.

5.3.3 push "O" button or from the action of over current, under voltage, shunt signal tripping half shaft rotation, and trip lever trip, in contact reaction under the action of the spring, make the circuit breaker quick disconnect.

### 5.4 electric operating mechanism

Motor through the gear reducer drive the eccentric shaft rotation, transmitted to the connecting rod, rocker arm, under the impetus of the ratchet pawl, ratchet, ratchet for energy storage. When at the end of the storage, CAM ratchet up, make the ratchet stop running, travel switch to cut off the motor power supply at the same time, the motor stop running, "energy storage", according to the energy storage.

### 5.5 undervoltage tripping device

Under voltage trip to work for a long time, can be divided into owe voltage instantaneous trip and owe voltage delay tripping device, undervoltage delay trip through owe calender toggle switch on the device, adjustable delay time, the number "1" on delay time of 1 s, the number "2" on delay time of 3 s, number "3" on delay time of 5 s, accuracy is  $\pm 10\%$ .

5.6 shunt tripping device

Shunt tripping device can make the circuit breaker operation over a long distance off, for short work repeatedly, turn on time is not more than 3 s.

5.7 closed electromagnet

Closing electromagnet can remote operation make the circuit breaker closing for short work repeatedly, turn on time is not more than 3 s.

5.8 mechanical reset button (standard configuration does not provide mechanical reset knob)

To prevent the breaker caused by over current or ground fault after disconnecting closed again. When a circuit or device fails, the mechanical reset button pops up, press the button, the circuit breaker can be closed again. This button to install selected by the user.

5.9 intelligent controller

The intelligent controller for circuit breaker control center, composed of transformer components, electronic parts, flux and other components of the converter, can provide a variety of protection function.

5.9.1 various protection setting of parameters

Users need to reset controller of protection parameters, should be a professional operation, use special tools (small table with a screwdriver) rotating code switch or move the toggle switch, make it point to the corresponding protection parameters corresponding location, may not stay in the middle of the two calibration when rotating position, set various parameters shall not cross at the same time, should satisfy  $I_{r1} < I_{r2} < I_{r3}$ .

5.9.2 fault check

Circuit breaker failure points, the controller can light indicates the cause of the problem, and have the function of fault memory. Click on the "fault check" button on the control panel, can indicate the cause of the fault trip last time. Such as the failure occurs again, while the last fault memory, keep the fault memory. Test status simulation breaking is not memory. After the inspection need to press the "reset/clear light" button, make the controller into the normal state.

5.9.3 thermal memory function

Severe fever caused by repeated overload a conductor, in order to avoid the happening of this kind of situation, the controller in theory accumulation of the thermal effect and shortens the time of protection operation and the last memory power can be removed, the long time delay thermal memory time for 30 minutes.

5.9.4 test function

Test function of the controller adopts the simulation fault signal to check the controller with the circuit breaker to match the performance of the action. In the first place, should be closed circuit breaker and press the "test" button on the panel, the controller signal instantaneous dynamic breaking circuit breaker, panel snap the failure at the same time. After the test need to click the "reset" button, can make the controller into normal operation condition, can be closed circuit breaker operation again.

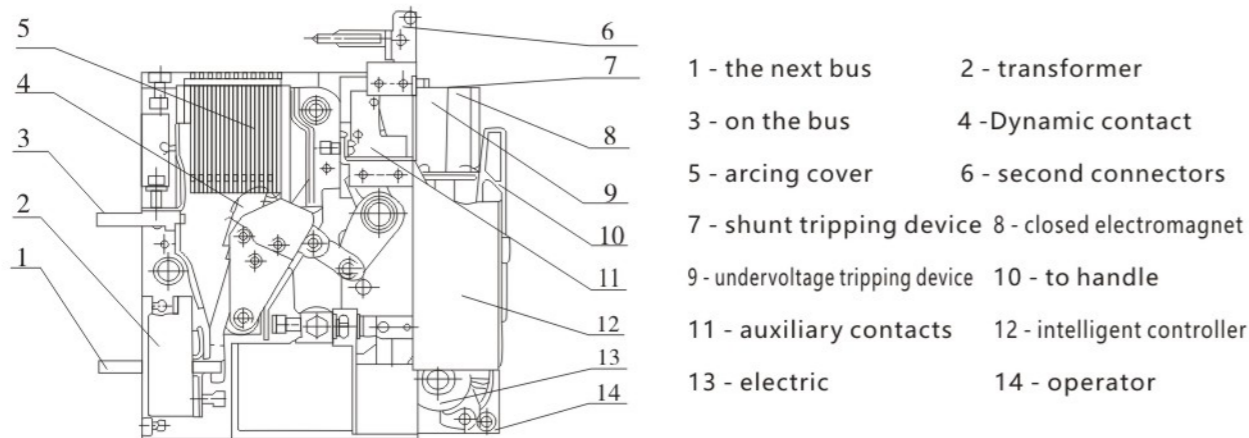
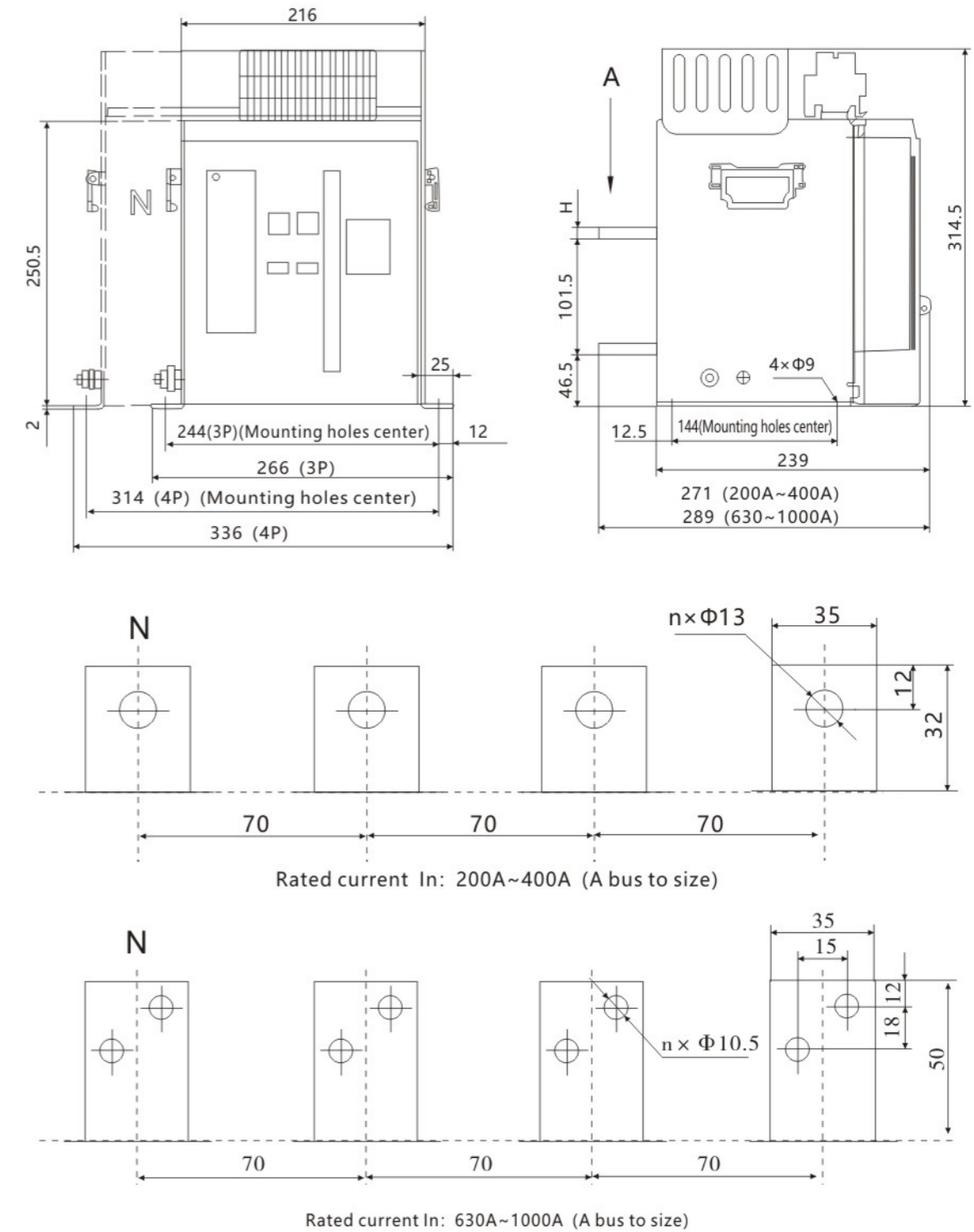


Figure 2 structure of circuit breaker

5.10 wire interlock only see draw-out type circuit breaker as shown in figure 3 (horizontal, vertical, all can bring, applicable to or between adjacent cabinet put oneself in another's position in the same cabinet put oneself in another's position).

7, circuit breaker installation size, shape size and switch cupboard door opening size

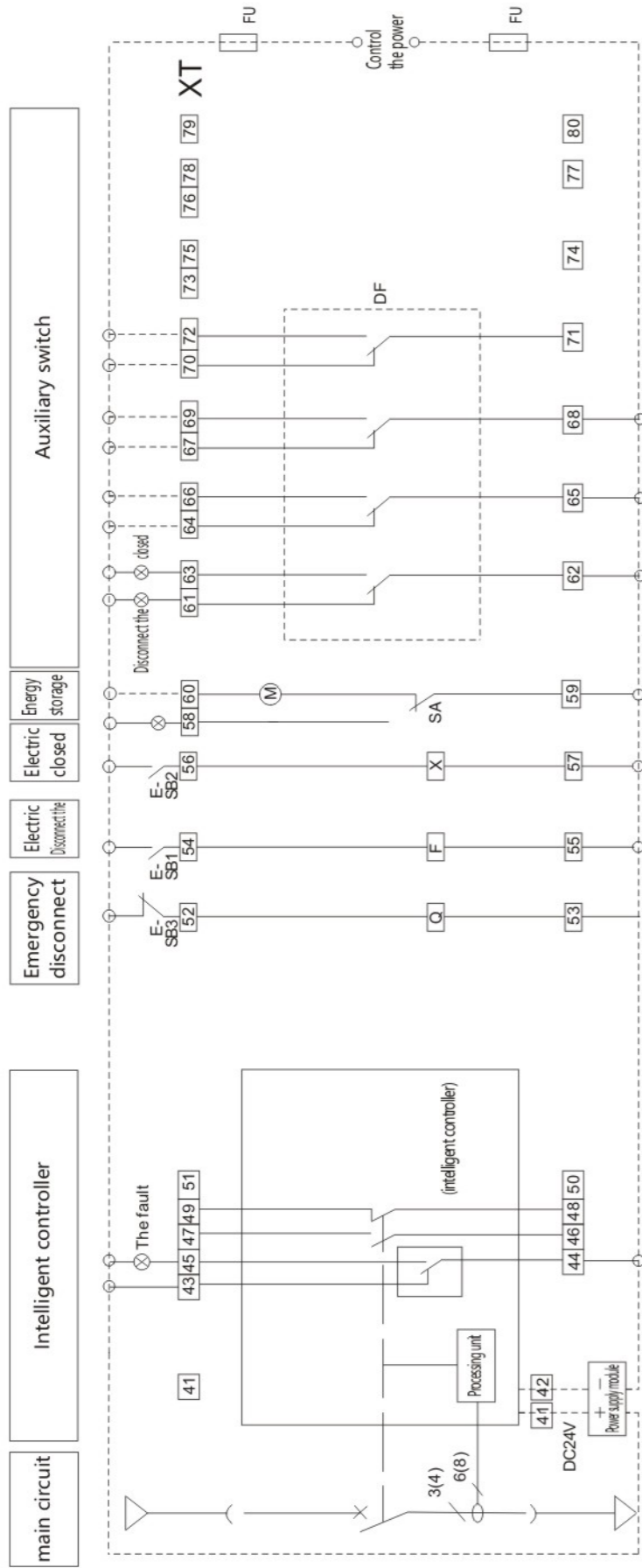
7.1 the installation of fixed type circuit breaker size size and shape as shown in figure 8;



| Rated current (A)       | 200, 400 | 630 | 800, 1000 | note |
|-------------------------|----------|-----|-----------|------|
| Busbar thickness H (mm) | 6        | 8   | 10        | —    |
| n                       | 6        | 12  | 12        | 3P   |
|                         | 8        | 16  | 16        | 4P   |

Figure 8 TGW45-200 - a ~ 200 a type circuit breaker

The secondary circuit wiring diagram (H) intelligent controller



DF - breaker auxiliary switch 6 groups (dosed)  
 SB1 - shunt button (the user should bring along their own)  
 SB3 - under-voltage button (the user should bring along their own)  
 SB2 - closing button (the user should bring along their own)  
 Q - under-voltage voltage (instantaneous or latency) trip  
 F - shunt tripping device  
 X - i-interpretation of the electromagnet  
 M - energy-storage motor  
 SA - motor travel switch  
 XT - terminal  
 O - light  
 (the user should bring along their own)  
 FU - fuse

58 - can directly connect the power supply (to be automatic storage), can also be concatenated normally open button followed by the power energy storage) (manual).  
 Note: if the power of Q, F and X rated voltage should be different by different power supply (the dashed part from connect) by the user.

# 41, 42 - auxiliary power input.  
 # 43, 44, 45 - fault tripping contact output, 44 of the public.  
 # 46, 47 - remote break-brake contact output.  
 # 47, 48 - remote switch contact output.  
 # 50, 51 - RS485 communication interface and output.  
 # 73, 74 - overload forecasting warning.  
 # 75, 76 - fault tripping.  
 # 77, 78, 79, 78 - measuring voltage signal input: corresponding UA, UB, UC, the UN.  
 Note the order is wrong, otherwise the controller will not work properly.

Figure 7 TGW45-1000 - h intelligent universal type circuit breaker secondary wiring diagram

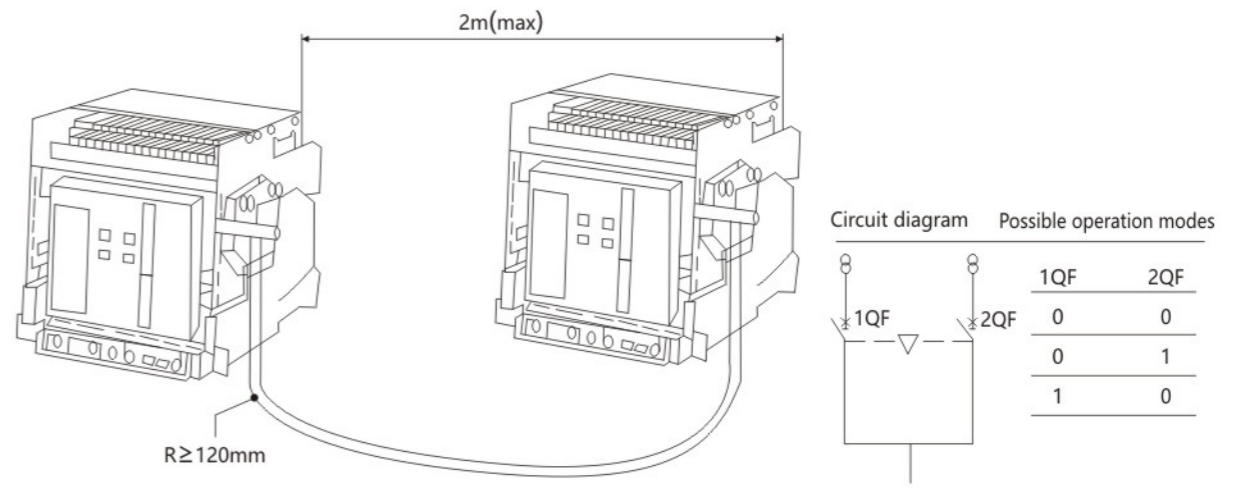


Figure 3 steel rope chain

5.11 circuit breaker ground-fault protection mode as shown in figure 4 (four)

Controller is divided into two kinds of different protection mode, a kind of type for the difference (T), the controller according to the three phase current and the neutral line current vector and protection, and according to the number of circuit breaker is divided into 3 pt, 4 pt3 (3 p + N) T three forms, respectively, see below (a, b, c). Another way for current mode (W), the controller directly between main power supply of neutral point and to an additional current transformer output current signal protection, transformer between N line and PE line, as shown in figure d.

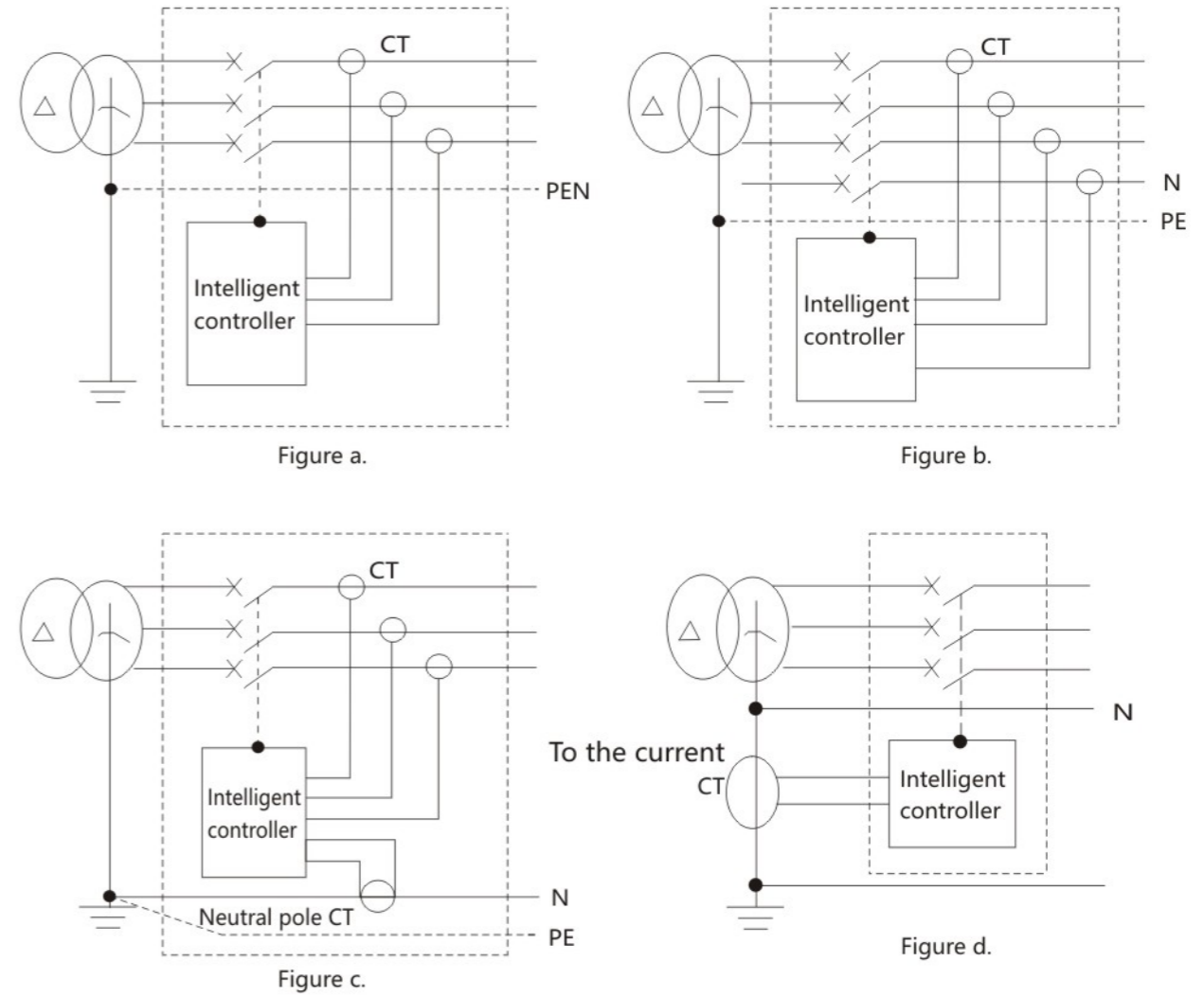
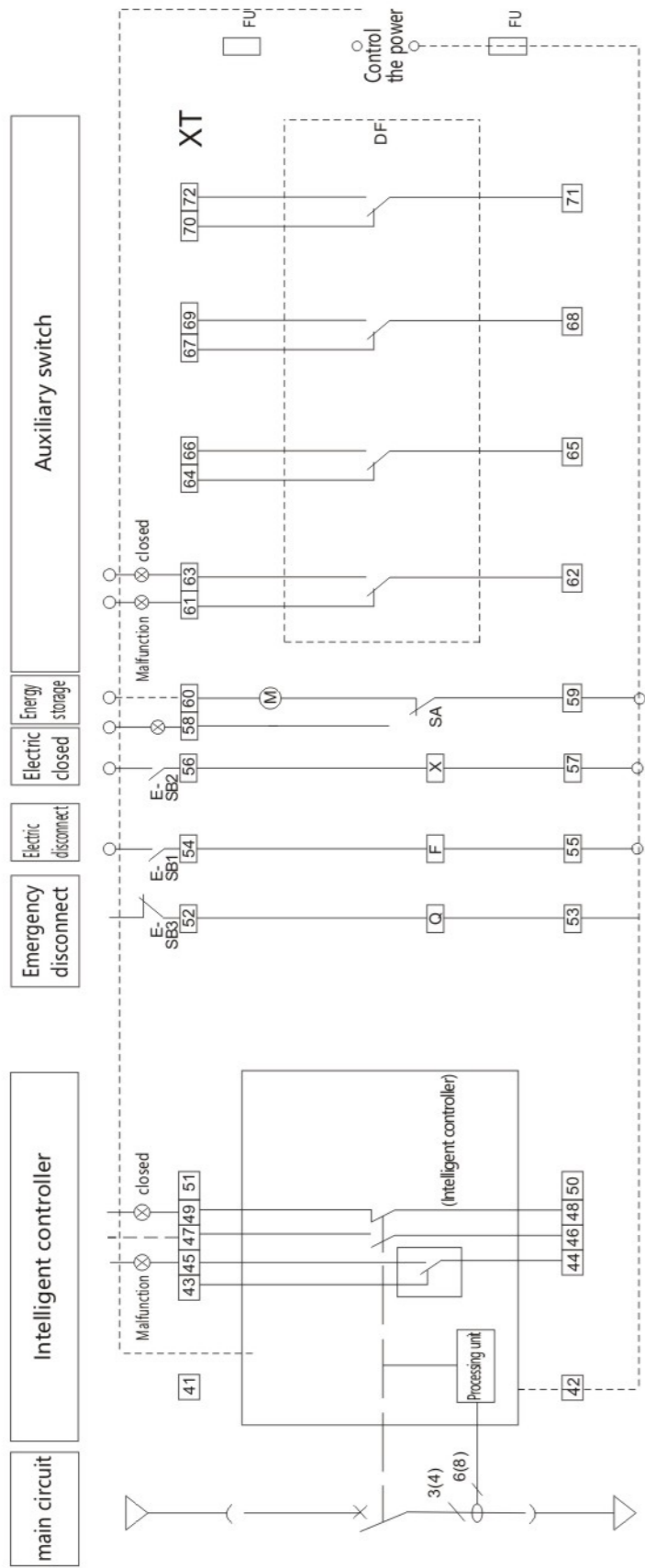


Figure 4 ground fault protection

6, secondary circuit wiring diagram

Circuit breaker 40 terminal blocks, wiring diagram as shown in figure 5, figure 6, shown in figure 7.

Auxiliary contact four groups convert secondary circuit wiring diagram (standard)

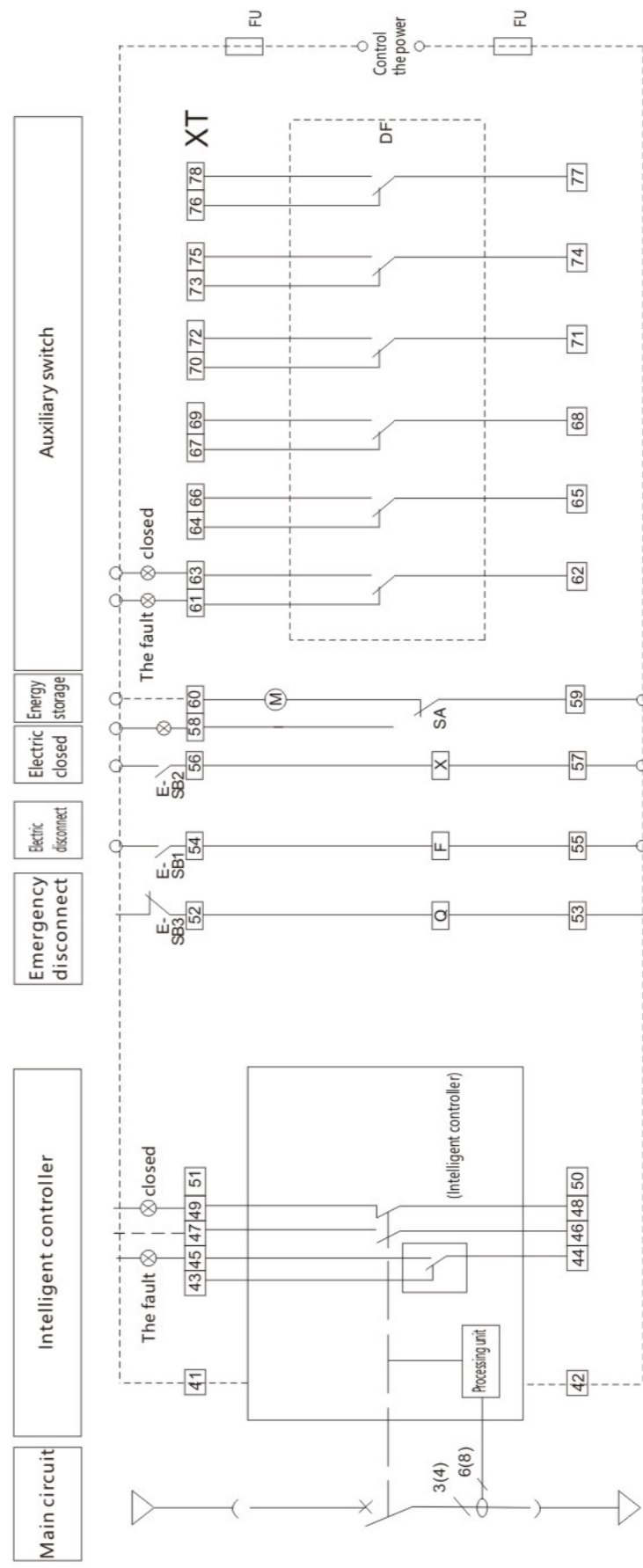


- DF - breaker auxiliary switch (4 set of closed)
- SB1 - shunt button (the user should bring along their own)
- SB3 - under-voltage button (the user should bring along their own)
- SB2 - closing button (the user should bring along their own)
- Q - under-voltage voltage (instantaneous or latency) trip
- F - shunt tripping device
- X - interpretation of the electromagnet
- M - energy-storage motor
- 5 a - motor travel switch
- XT - terminal
- O - light (the user should bring along their own)
- FU - fuse
- # 41, 42 - auxiliary power input (ac/dc general)
- # 43, 44, 45 - fault tripping contact output, 44 of the public.
- # 46, 47, 48, 49 - auxiliary contact output circuit breaker status.
- # 50, 51 - communication interface
- # 79, 80 - external sensor input terminals

58 - can directly connect the power supply (to be automatic storage), can also be concatenated normally open button followed by the power energy storage) (manual).  
 Note: if the power Q and FX rated voltage should be different by different power supply (the dashed part from connect by the user).

Figure 5 TGW45-1000 - m intelligent universal type circuit breaker secondary wiring diagram

Auxiliary contact six transformation secondary circuit wiring diagram (special configuration)



- DF - breaker auxiliary switch 6 groups (closed)
- SB1 - shunt button (the user should bring along their own)
- SB3 - under-voltage button (the user should bring along their own)
- SB2 - closing button (the user should bring along their own)
- Q - under-voltage voltage (instantaneous or latency) trip
- F - shunt tripping device
- X - interpretation of the electromagnet
- M - energy-storage motor
- 5 a - motor travel switch
- XT - terminal
- O - light (the user should bring along their own)
- FU - fuse
- # 41, 42 - auxiliary power input (ac/dc general)
- # 43, 44, 45 - fault tripping contact output, 44 of the public.
- # 46, 47, 48, 49 - auxiliary contact output circuit breaker status.
- # 50, 51 - communication interface
- # 79, 80 - external sensor input terminals

58 - can directly connect the power supply (to be automatic storage), can also be concatenated normally open button followed by the power energy storage) (manual).  
 Note: if the power of Q, F and X rated voltage should be different by different power supply (the dashed part from connect) by the user.

Figure 6 TGW45-1000 - m intelligent universal type circuit breaker secondary wiring diagram