PS-CB01 Circuit Breaker Analyzer

Baoding Push Electrical Manufacturing Co., Ltd.

Contents

Precautions for using the instrument

1. Before using the instrument, please ground the instrument reliably to ensure personal and instrument safety.

2. Before using the instrument, please check whether the power supply is AC 220V, otherwise the instrument will be damaged.

3. When the instrument is working, there is a 220V DC current output inside, please pay attention to safety.

4. In the case of using the internal DC power supply to control the opening and closing of the switch, please carefully check the control wiring before the test. Short circuit is strictly prohibited to avoid damage to the DC power supply or control contacts in the machine.

5. The connection of each fracture line must be good, so as not to affect the test data due to the vibration of the switch.

6. There is 220V voltage inside the instrument, please do not open the case.

1、Overview:

With the development of society, people have higher and higher requirements for the safety and reliability of electricity use. High-voltage circuit breakers are responsible for the dual tasks of control and protection in the power system, and their performance is directly related to the safe operation of the power system. The mechanical characteristic parameter is one of the important parameters to judge the performance of the circuit breaker. The GKC-HA1 high-voltage switch characteristic comprehensive tester (high-voltage switch mechanical characteristic tester) is based on the latest "High-voltage AC Circuit Breaker" GB1984-2003 as the design blueprint, and refers to the People's Republic of China Electric Power Industry Standard "General Technical Requirements for High Voltage Test Equipment" 》Part 3, DL/T846.3-2017 is the design basis, which provides convenience for the dynamic analysis of various circuit breakers, and can accurately measure various voltage levels of less oil, more oil, vacuum, and sulfur hexafluoride The mechanical dynamic characteristic parameters of high-voltage circuit breakers. High-voltage circuit breakers are responsible for the dual tasks of control and protection in the power system, and their performance is directly related to the safe operation of the power system. The mechanical characteristic parameter is one of the important parameters to judge the performance of the circuit breaker.。

2、Instrument characteristics：

⑴ This instrument is an embedded industrial computer, the main board is based on CortexTM-A8, the main frequency is 1GHZ, the flash memory is 1GB, and the boot speed is only 16 seconds. Large 9-inch color screen, windows operating system, intuitive user-friendly operation interface, touch screen, support Chinese and English input, which is convenient for on-site operators.

⑵, high-speed thermal printer, convenient for on-site printing of test data.

(3) The integrated operating power supply in the machine eliminates the need for on-site secondary power supply, which is convenient and quick to use. It can provide DC6～270V adjustable power supply, current 20A. The operating voltage value of the opening and closing coil can be set arbitrarily, and the low voltage operation test of the circuit breaker can be done.

⑷. Equipped with linear sensor, rotation sensor, universal sensor, laser sensor (optional), bracket, special fixed multifunctional joint, installation is extremely convenient and simple.

⑸ Suitable for all types of SF6 switches, GIS combination electrical appliances, vacuum switches, and oil switches produced at home and abroad.

⑹ The switch action once, get all the data and graphics, the test data and graphics are displayed on the same screen, and the speed can be recalculated without retesting.

⑺ The host can store 30000 groups of current test data (expandable memory card), and the real-time clock in the machine is convenient for archiving.

⑻. Equipped with 2 USB ports, which can be connected to the mouse to operate the instrument, and the data can be directly saved to the U disk, uploaded to the computer for analysis and storage. RS232 interface online operation (optional), WIFI operation optional.

⑼. At the same time, it can measure 12 metal contact fractures, 6 main fractures and 6 auxiliary fractures, and 1 speed (optional for 3 speeds).

⑽ Contains the envelope curve, through the value tested by a switch, the standard envelope curve is generated for analysis and comparison, and the switch vibration frequency analysis can also be carried out.

⑾. The internal anti-interference circuit can satisfy the reliable use in 500KV substation.

3、The main technical parameters：

1. Time measurement:

12 channels inherent opening (closing) time

Different periods in the opening (closing) phase

The difference between opening (closing) phases in different periods

Closing (opening) bounce time (bounce times)

Different period test range: 0.10ms～99ms, resolution: 0.01ms;

Internal trigger test range: 0.10ms～999ms, resolution: 0.01ms, 1000ms～9999ms, resolution: 0.1ms, 10000ms～200000ms resolution: 1ms.

External trigger test range: 0.01ms～200s

Accuracy rate within 1000ms: 0.05%±1 word

2. Speed measurement: just opening (just closing) speed

Average speed in a specified time period (stroke period or angle period)

3. Speed measurement range: 1mm sensor 0.01～25.00m/s,

0.1mm sensor 0.001～2.50m/s

345° angle sensor 0.01～25.00m/s,

Laser sensor 0.01～15.00m/s.

4. Stroke measurement: moving contact stroke (stroke) (optional for 3-way stroke measurement)

Contact stroke (open distance)

Overtravel

Overshoot stroke or rebound stroke

5. Measuring range: linear sensor: 50mm, measuring range: 0-50mm, resolution: 0.1mm.

Rotation sensor: 345º, measuring range: 0-1000mm, resolution: 0.08o. This sensor has an invalid area of 15 degrees, and the effective area of the sensor can be seen on the instrument when it is installed, and the value display is preferably about 160-200 degrees.

Acceleration sensor measuring range: 0-300mm, resolution: 0.1mm.

6. Coil current: maximum current 20A, resolution: 0.01A.

7. Measuring range of coil resistance: 0～2000Ω, resolution: 0.01Ω.

8. Instrument power supply: AC220V ± 10%; 50Hz ± 10%.

9. DC power output: DC6 ～ 270V continuously adjustable, DC24V≤15A (short time), DC220V≤20A (short time).

10. External trigger voltage: AC/DC10-300V, current ≤120A

11. Isolating switch measurement range:

⑴ Voltage output: DC6～270V (adjustable);

⑵ Power output time: 0.01-20 seconds (can be set);

⑶, the maximum collection time of fracture signal is 200 seconds;

⑷, measurable fracture closing time, opening time, three-phase different period, bounce time and frequency

12. Host volume: 440×300×260mm

13. Use environment: -20℃~+50℃

14. Relative humidity: ≤90%

4、Definition of Terms：

① Three-phase different period: refers to the maximum and minimum difference between the three-phase opening (closing) time of the switch.

②Same phase and different period: Refers to the opening (closing) time difference of the same phase fracture for the switch with more than six fractures.

③ Bounce time: refers to the cumulative time value of all contact and separation (bounce) of the switch's dynamic and static contacts during the closing process (ie, the time between the first contact and full contact).

④Opening time: the time interval from the moment of opening and tripping of the circuit breaker in the closing position to the moment when all arc contacts of each pole are separated.

⑤Closing time: The time interval from the moment when the closing circuit is energized to the moment when the contacts of all poles are in contact with the circuit breaker in the opening position.

⑥Reclosing time: during the reclosing cycle, the time interval from the beginning of the opening time to the time when all pole contacts are in contact.

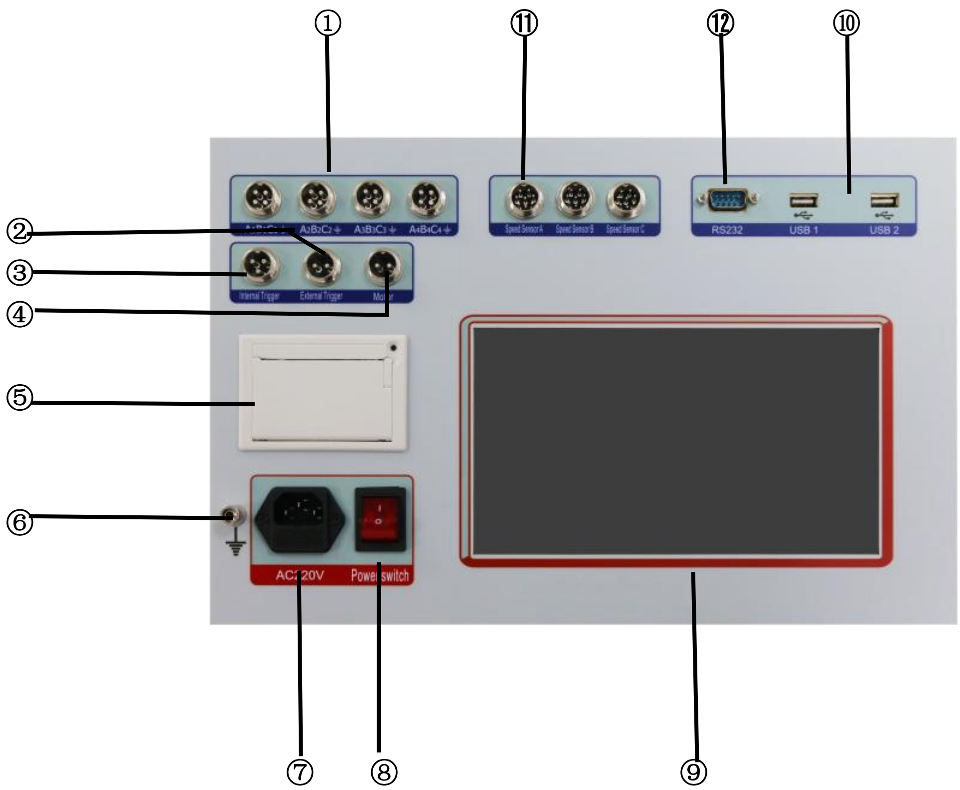
⑦Just opening (closing) speed: refers to the average speed within a specified time or within a specified distance when the moving contact of the switch is in contact with the static contact, taking 10ms as an example, it means opening for opening The average speed in the last 10ms, for closing, is the average speed in the 10ms before closing.

⑧Open distance: refers to the distance from the switch from the sub-state to the first contact between the moving contact and the static contact.

⑨Maximum speed of opening (closing): refers to the maximum value of the instantaneous speed of opening (closing). Generally speaking, this value should appear in the segment just after the switch is opened or closed. This point can be judged from the speed and stroke curve. .

⑩Opening (closing) average speed: refers to the ratio of the stroke of the switch moving contact to the time during the entire movement process.

5、Instrument panel introduction：



①: Fracture signal: Measure parameters such as closing (opening) time, different periods, bounce time, and bounce times of 12 main contacts, 6 main contacts and 6 auxiliary hoes. The A1 fracture is the main fracture by default. Set other fractures as the main fracture.

②: External trigger: instead of using the internal DC power supply of the instrument, it collects the voltage signal of the opening (closing) coil of the circuit breaker (either AC or DC) as a triggering method. It is mainly used for circuit breakers whose closing (opening) coil current is too large to drive, such as old-fashioned oil-less circuit breakers and permanent magnet circuit breakers.
③: Internal trigger: refers to the instrument output DC6～270V adjustable DC power, the default is DC220V, for opening and closing operations.
④: Motor: The output time and voltage can be set, here is the special power supply for the energy storage motor of the circuit breaker, and do not use it for other tests.
⑤: Printer: Print the test data, thermal paper, and keep it in a cool place.
⑥: Grounding pole: When testing, especially for outdoor high-voltage circuit breakers, connect the ground wire first, and then connect other test wires. After completing the test, first remove the fracture test wire, sensor, etc., and finally remove the ground wire.
⑦: Power input: the instrument voltage input interface, the voltage is AC/DC220V, it is strictly prohibited to input AC380V power supply.
⑧: Power switch: AC220 power switch.
⑨: Screen: 9-inch color touch screen, this screen is a resistive screen, do not use sharp devices to click when touching.
⑩: USB: This interface connects the mouse to operate the instrument or connects to the U disk to upload and save data.
⑪: Speed sensor: This interface can be connected to linear sensors, rotation sensors, acceleration sensors, laser sensors, etc.
⑫: RS232 interface: this interface is dedicated for online computer measurement (optional).

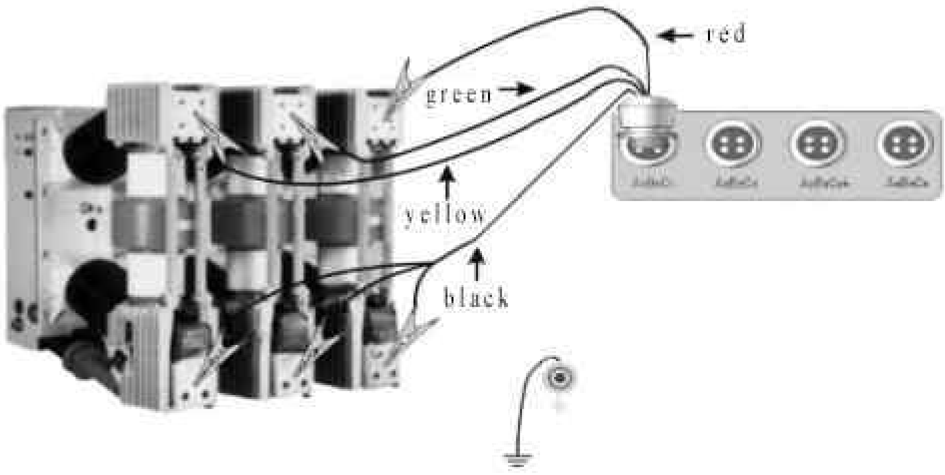
6、Break line, closing and opening control, sensor installation method：

6.1.Fracture connection method：

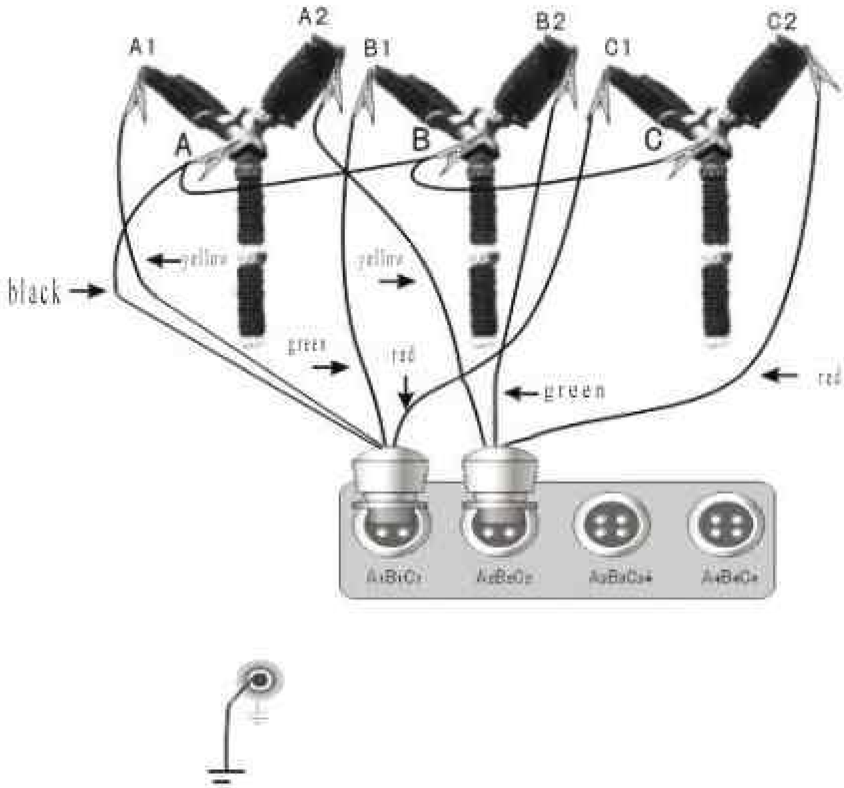
The instrument has a total of two fracture test input interfaces, each of which has four wires, which are A1 (yellow wire), B1 (green wire), and C1 (red wire) connected to the three-phase moving contact terminal. GND (black wire) is static. Contact (three-phase short circuit), a total of six-break circuit breaker (switch) test samples.

The following figure takes the connection of three-fault and six-fault circuit breakers as an example. Both the fracture test input interfaces are used. The connection method is: A1, A2, connect the yellow wire of the fracture input, B1 and B2 connect the green wire of the fracture input, C1, C2 Connect the break input red wire. For the three-phase three circuit breaker connection, only the previous break test signal input interface is needed, and the A1 break is the main break. (Note: Three-break, six-break, and twelve-break circuit breakers share a common ground GND)

Fracture connection diagram (three fractures)

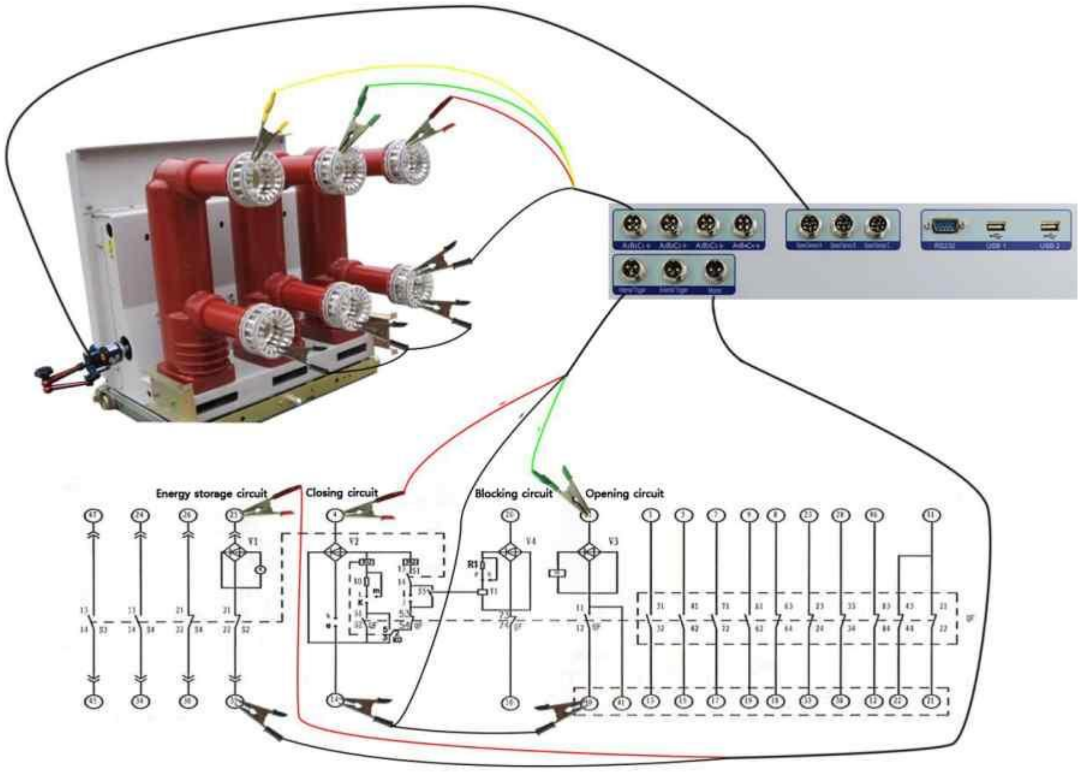


Fracture connection diagram (six fractures)



6.2Internal trigger opening and closing control wiring method：

During the field test, if the internal power supply of the instrument is used, the closing control line (red), opening control line (green), and common line (black) are connected to the "internal trigger" port (aviation plug) on the instrument panel, and the instrument is divided into + When, closing + and negative output, generally must be connected in front of the auxiliary switch contact (which can effectively protect the coil and the instrument). When wiring, pay attention to cut off the operating power of the high-voltage switchgear (disconnect the knife guillotine or unplug the fuse) to avoid conflict between the two power sources and damage the instrument.



Complete wiring diagram of switch tester

6.3 External trigger wiring (used for AC circuit breakers, permanent magnet circuit breakers or circuit breakers that cannot be driven by a large coil current)

Use an external power supply for closing or opening test, the instrument only collects voltage and current signals, the steps are as follows:

⑴. First connect the control line to the "external trigger" port on the instrument panel

⑵. Set the parameters of the instrument, set the trigger mode to external trigger, and set the acquisition time to about 5 seconds. The set acquisition time is the length of waiting for the signal. If the time is exceeded, the data will not be collected.

⑶. Use an external trigger wire (same as the energy storage wire) to connect the two ends of the brake or opening coil (the control loop point can also be connected).

⑷. Select closing or opening test in the characteristic test menu, and then start the external voltage, and the instrument can collect the closing and opening data.

⑸ Before wiring, users should carefully analyze the wiring according to the wiring diagrams of various high-voltage switch control panels.

6.4 Manual trigger mode does not need to connect the control line

Extend the signal acquisition time in the parameter setting menu for 5 seconds, and then quickly manually open or close the switch to acquire the signal. This action must be completed within 5 seconds. If it exceeds, no data will be displayed. The test data is mainly for reference The bounce time, the number of bounces, the synchronization, the speed, the closing and the minute time are the evaluation values。

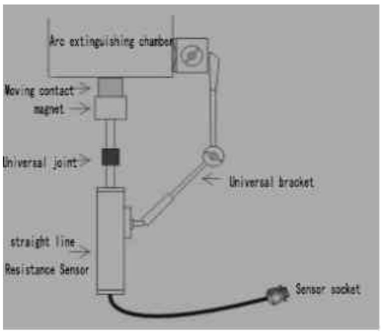
6.5Speed sensor installation method

When testing the switching speed, the sensor is installed on the moving contact or the arm of the high-voltage switch, and the corresponding sensor installation is selected according to the motion mechanism of the circuit breaker.

50mm linear sensor (vacuum switch)

The linear pull rod of the sensor is attached to the vertical conductive rod (moving contact) of the switch with a magnet, and the sensor is fixed with a universal bracket and installed in the open state. When installing, the electronic ruler must be perpendicular to the moving contact. First, pull out a buffer length of about 15mm to ensure that the sensor does not damage the sensor by switching up and down during closing and opening. This type of installation method is mainly a vacuum switch with exposed moving contacts such as ZN28 switch or ZN63 (VSI) without mounting chassis.

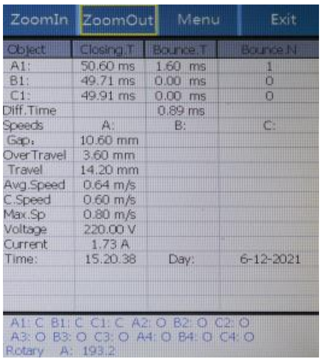
0.1mm Electronic ruler and universal joint



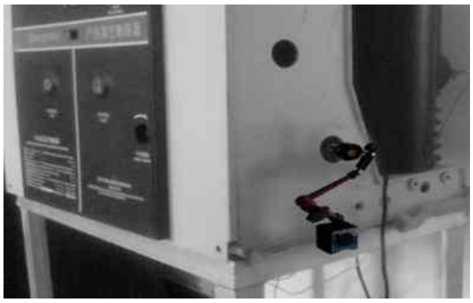
Installation diagram

Rotation sensor installation method：

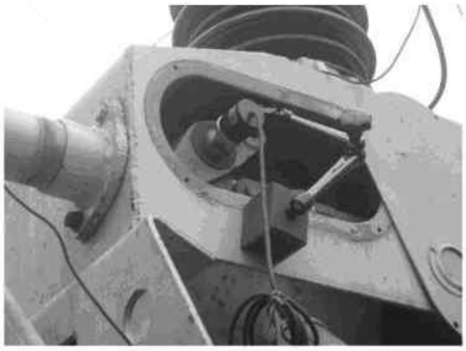
The effective stroke of the rotating sensor is 3450, the tail of the sensor pointer points to the red area, or the sensor status can be seen in the status bar of the instrument test interface, as shown in the figure below, try to keep the sensor reading between 160 and 200.



For example, sealed VS1 and VD4 switches are installed on the arms (spindles) on both sides of the switch. Remove the white sealing covers on both sides. You can see the plum blossom-shaped spindle. The magnet is attracted to the center of the spindle. Keep it horizontal during installation. The universal bracket is fixed.



Outdoor SF6 circuit breakers whose speed is below 3.5m/S can be attracted to the main shaft with a magnet. If the speed exceeds this speed, it must be installed on the main shaft with a hard connection. Use the following method to install it, as shown in the figure below:



110KVSF6 Switch sensor installation

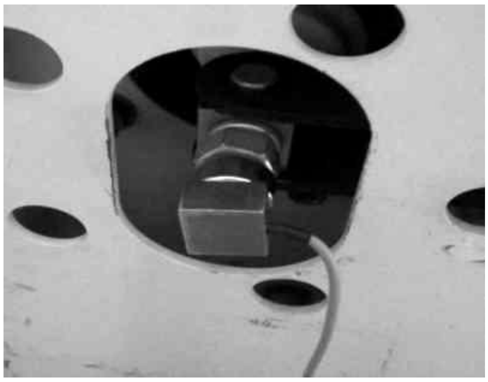
If you can't find the arm, install it at the split finger pin, first remove the split finger pin, and then screw on the sensor connector.

Installation diagram of outdoor vacuum switch and sulfur hexafluoride:

The arm of the SF6 circuit breaker has an angular displacement sensor connection port. Fix the U-shaped port in the screw hole correspondingly, and then fix the sensor with a universal joint. As shown below:

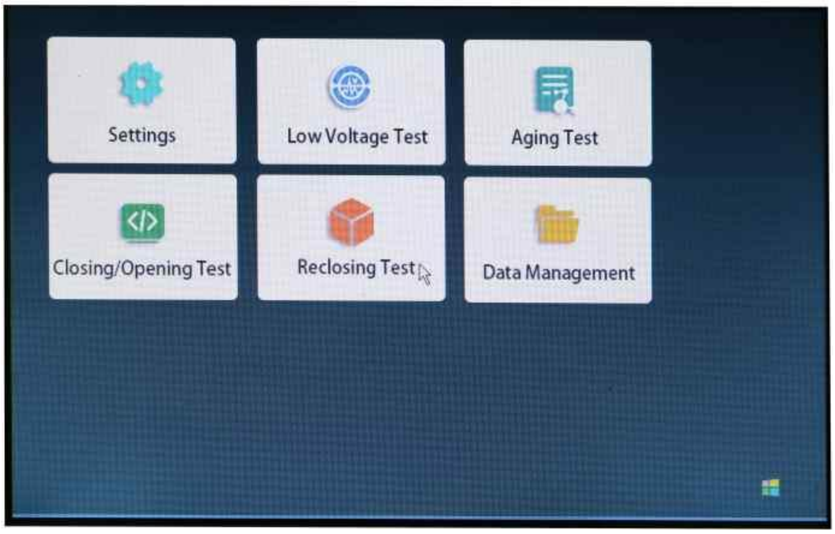
Universal sensor installation method:

The universal sensor is also known as the acceleration sensor. When installing the measuring stroke, please attach it to the moving contact stroke rod of the circuit breaker. It must move in a straight line. For example, it is wrong to measure the stroke when it is installed on the crank arm for rotating operation. If it is moving laterally, fix the sensor on the crossbar, but the front of the sensor should face the forward direction.



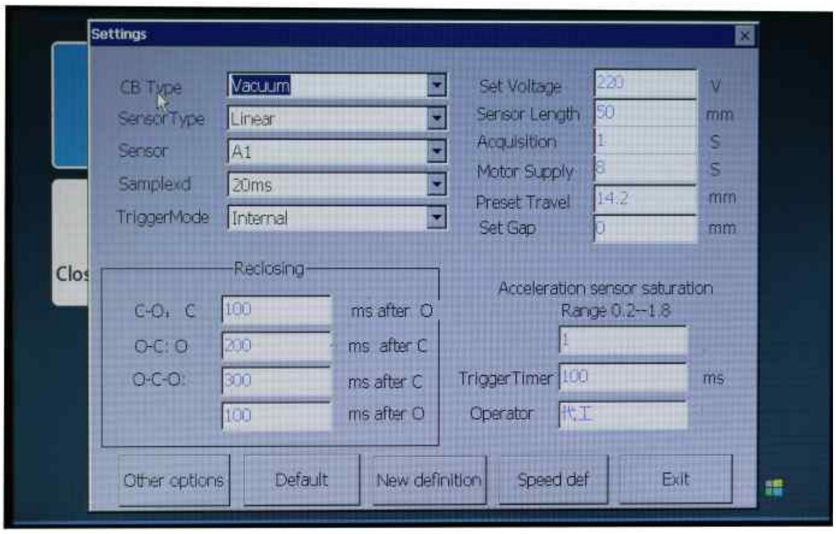
7、Menu description：

Enter the main interface of the instrument operation after booting ：



A、setting menu：

1.Click the setup menu to set the CB Type, Sensor Type, Set Voltage and other parameters, as shown in the figure below:



2.Circuit Breaker Type(CB Type)： Vacuum, Less Oil, SF6 and other switches。

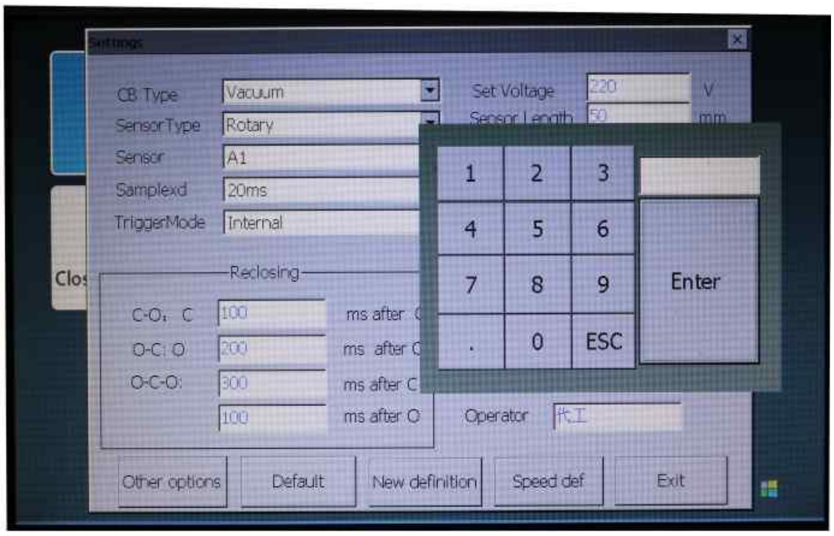
3.Sensor Type: Linear, Rotary, universal and other sensors.。

4. Sensor : The default is A1 as the main fracture, you can also set other fractures as the main fracture according to your needs (if the main fracture is damaged or the sensor is installed on other phases for use)

5. Samplexd: only for the collection cycle of the grounding switch.

6. Trigger Mode: including internal , external, manual.

7. Set voltage: input the current circuit breaker coil operating voltage, input it through the numeric keyboard, as shown in the figure below:



8. Sensor Length: The actual length of the linear sensor currently in use is a 50mm linear sensor as standard. If the length is 100mm or other lengths, it can be automatically matched and measured only by inputting through the numeric keyboard. If the length of the sensor is not changed, the measurement result will be inaccurate.

9.Acquisition : refers to the length of time for the fracture signal acquisition, usually set to 1 second, if the measurement data is greater than 1 second, the acquisition time needs to be extended. It can be set as required, and the maximum can be set to 200 seconds. It is best to set the acquisition time to 5 seconds or more when external triggering or manual triggering is used.

10.Preset Travel: refers to setting the total stroke of the circuit breaker (opening distance plus overtravel value)

11.Recloser settings::

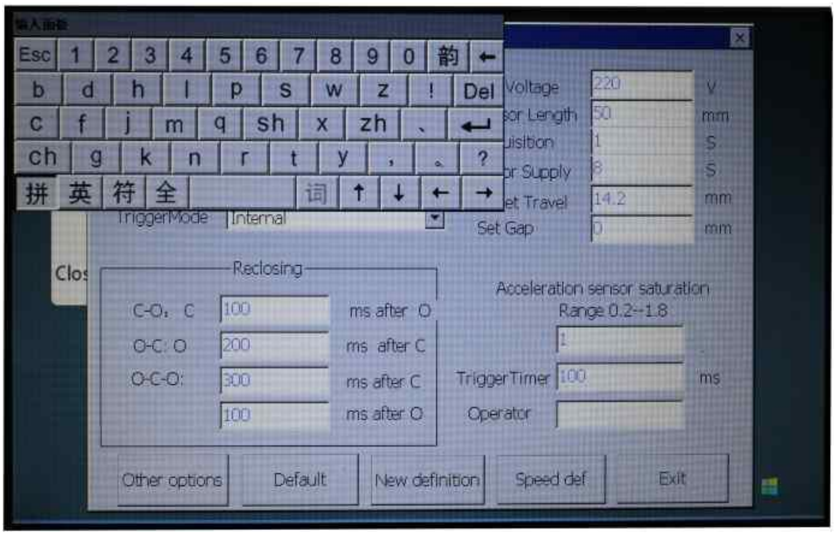
C-O: When doing a closing and opening test, the measured data is the golden short time, and the time from closing to opening setting is usually greater than the closing time.

O-C: When doing opening and closing test, the measured data is the no-current interval time. The time from opening to closing setting is usually less than 300ms.

O-C-O: When doing opening, closing, and opening tests, two parameters must be set.

12.Trigger timer: refers to the duration of the internal triggering of the DC voltage output. The maximum can be set to 2000ms. At this time, the length cannot be set too long. If a short-circuit fault occurs, the control coil will be closed or opened after a long time. Generally 100ms is fine, and the time is up , The power is automatically cut off.

13.Operator: The operator's name can be entered in Chinese, English or numbers. When the input word has multiple homophones, select  it by pressing the key, and then use the "space" key to confirm. As shown below:



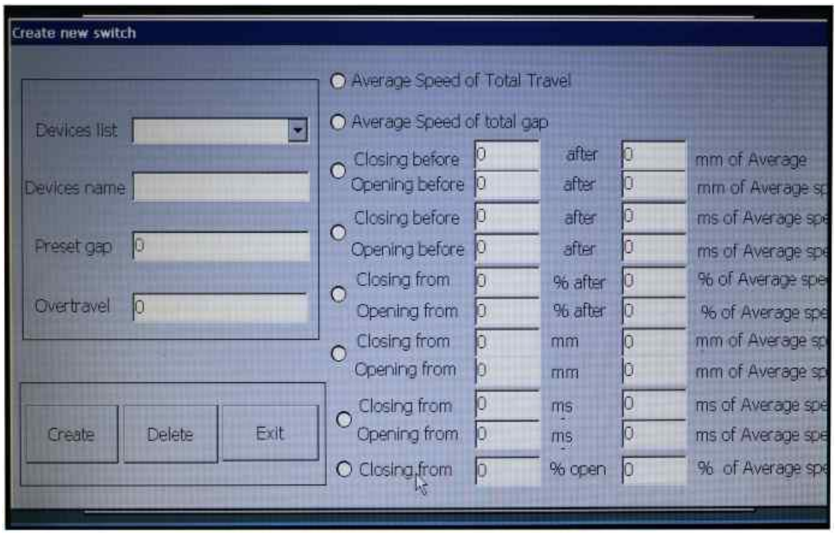
14.Other options setting interface:

Start preset travel: To select a rotary sensor, you must tick before the start preset travel, and parameters such as speed and travel will be displayed. If you use a linear sensor, you don't need to tick.

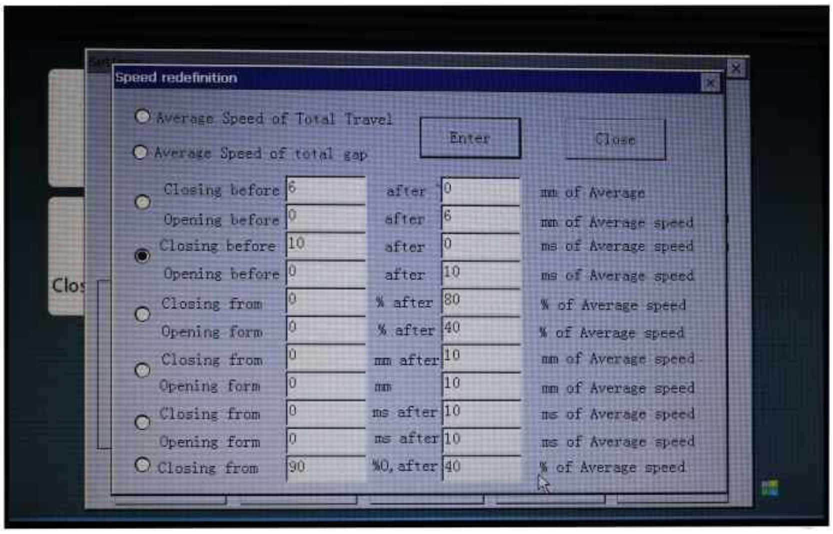
Start A phase sensor: If you only check the front of the A phase sensor, only the speed of 1 sensor will be displayed. If you check both the B phase and C phase sensors below, and also check the virtual front of the three-phase sensor, it means Calculate the stroke and speed of the other two phases by a sensor.

The other options below will be displayed after ticking and confirming according to your needs. After you have selected it, click the OK button to save.

15.Create a new switch: When testing the speed of some special circuit breakers, the speed sensor can only be installed on the non-moving contact.On the running arm, only the open distance and overtravel settings can be used to accurately measure the speed. As shown below:

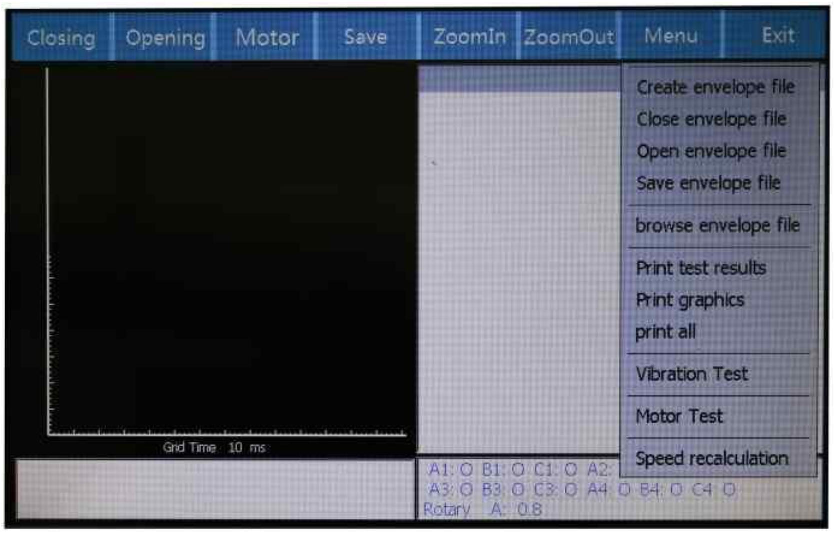


16.Speed definition: Only when the speed definition of the circuit breaker is input correctly, the measured speed will be accurate, as shown in the figure below:

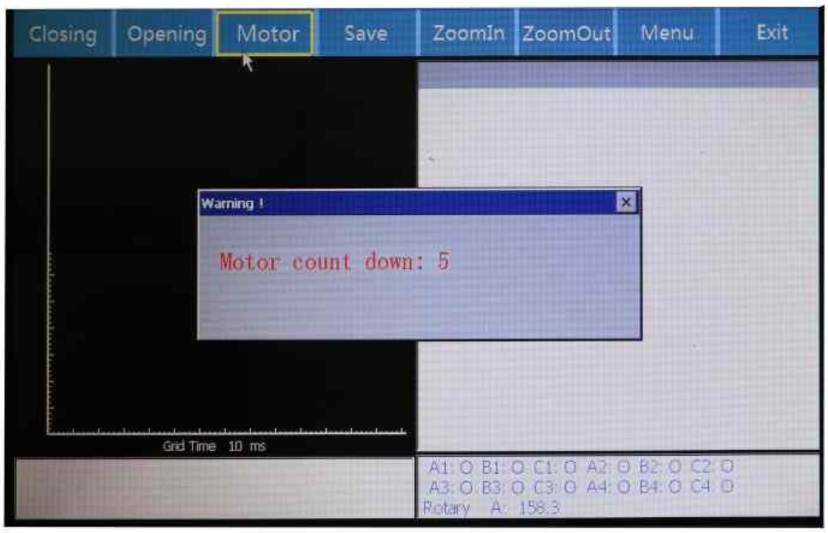


17.If only time test is performed, the above parameters only need to set the circuit breaker coil operating voltage, and the other parameters can be tested directly without setting.

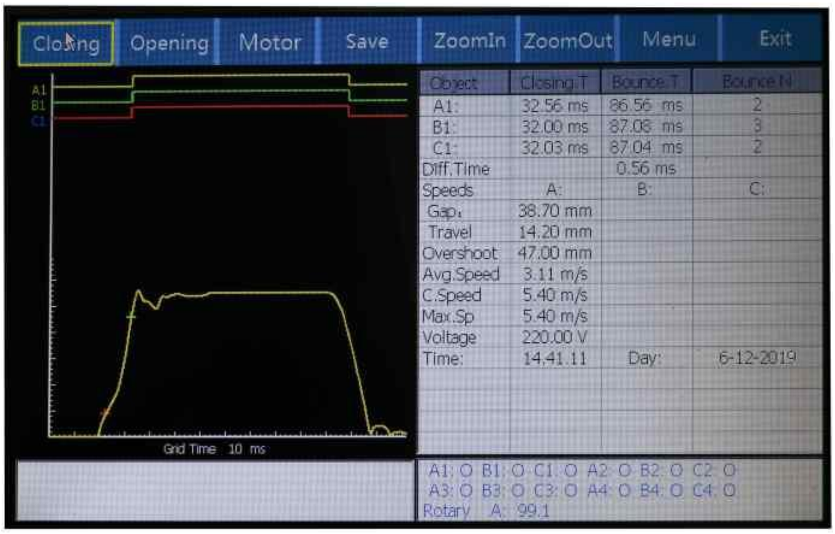
B. Comprehensive test: To test the conventional circuit breaker, enter this interface to perform closing, opening, energy storage operations, data saving, graphics zooming in, zooming out, printing, etc., as shown in the following figure:



1) When the circuit breaker is closed or opened, the energy must be stored first, and the energy storage voltage output time is generally about 10 seconds, as shown in the following figure:



2) The closing test can only be performed after the circuit breaker is stored. The closing test data of 1 sensor is shown in the figure below:

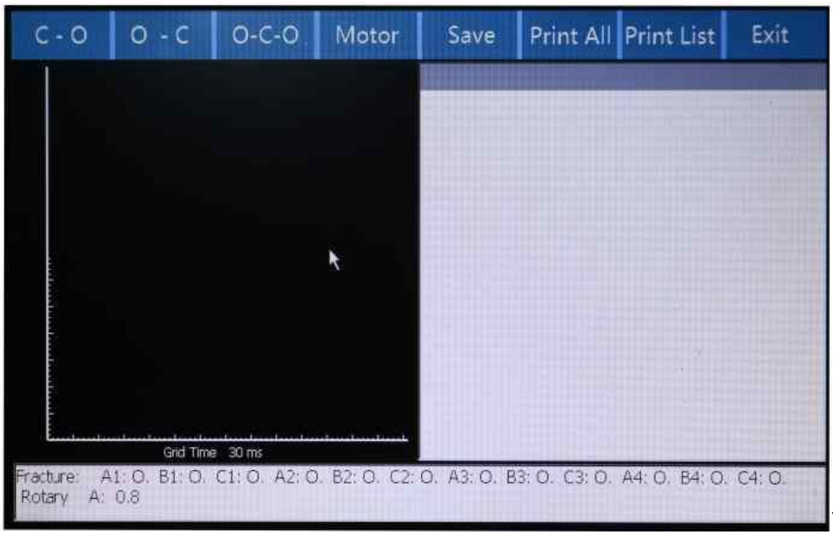


3) The opening test data of 1 sensor is shown in the figure below:

4) The test data of 3-way sensor closing is as follows:

5) The opening test data of the 3-way sensor is shown in the figure below:

C. Reclosing test: First, set the time of C-O、O-C、O-C-O, and then enter the test interface, as shown in the figure below:



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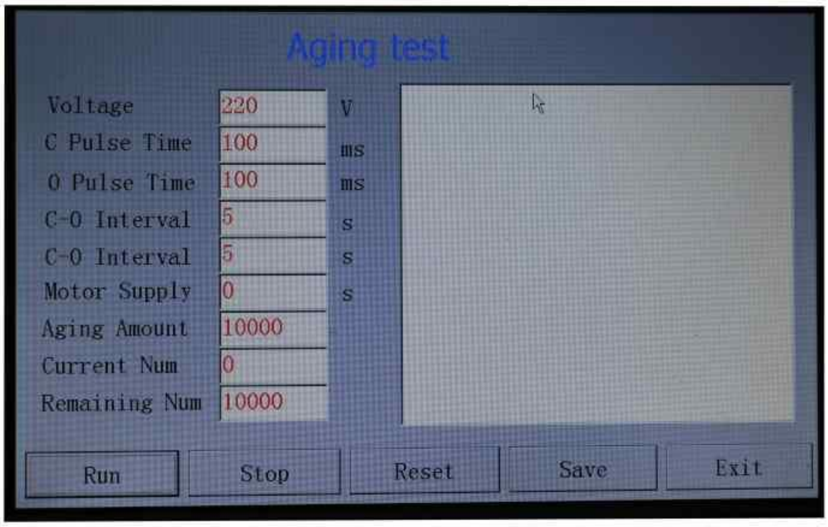
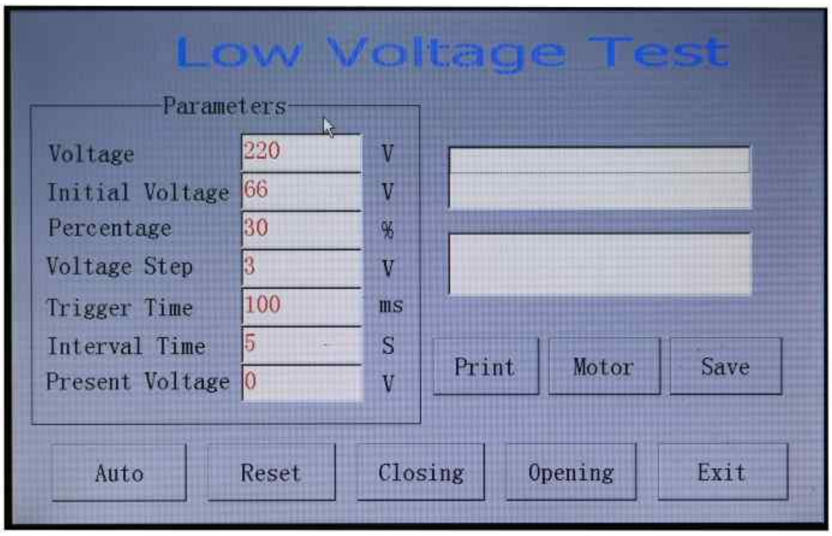
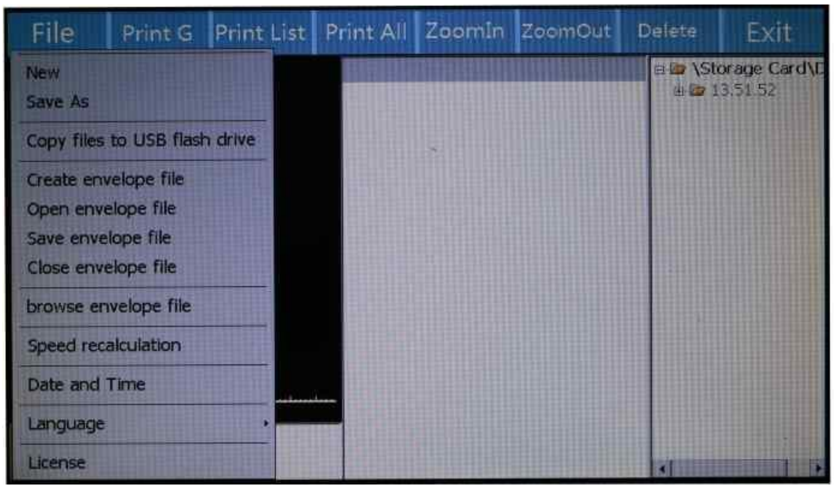
D.Aging test: The aging test can only work for a short time. The energy storage voltage is provided externally. The number of aging is within a hundred times. If a long-term aging test is to be performed, a fan must be added and other hardware must be changed. The cost is extra, as shown in the figure below:



E. Low Voltage Test: In the low voltage test, set the voltage first, select automatic low jump, and connect the break wire to the top to be able to do the low voltage test. If you choose manual closing and manual low jump test, you only need to connect the internal trigger line. As shown below.



F. File management: In this interface, you can export, view, print, etc., and you can also calibrate the LCD screen and set the system time. As shown below:



8、Common technical problems and solutions at the test site

(1) When the on-site instrument is used to control the closing and opening operations, the circuit breaker does not operate:

1. Incorrect wiring of on-site closing and opening control

Solution: Find the control wiring diagram of the on-site control cabinet, and ask the relevant protection professionals to find out the closing and opening coils and the auxiliary contacts of the switch respectively. Refer to the control wiring diagram in this manual to re-wire.

2. The on-site coil load is too large or the control circuit is short-circuited, the instrument cannot be driven normally, and the power supply emits an overload buzzer warning (the power is automatically restored after four beeps). The treatment methods are as follows:

① For the switch of the electromagnetic mechanism, the driving current required by the switch closing coil is very large (up to 100A or dozens of
A), and the maximum load capacity of the operating power supply of the instrument is 20A. As a result, the load is too large and the instrument cannot be driven normally. At this time, please use the external trigger method, connect the closing control line to the closing connection coil, and the opening control line to the opening coil, and collect the opening and closing voltage signal (trigger timing), either DC or AC.

② Check the control circuit to ensure that the circuit is unblocked.

3. Check whether the instrument has DC output for energy storage, opening and closing, and the treatment methods are as follows:

① Check the energy storage DC voltage: please set the multimeter in the DC 1000V position, and set the energy storage control wire red and black
Connect to the red and black wires of the multimeter respectively. Test on the energy storage interface, the time is extended to 3 seconds, and output according to the energy storage test voltage. If there is no voltage output, please return to the factory for repair if the power fails.

② Check the closing DC voltage: check when the instrument is in the open state (if the test line of the break is not connected, it is the open state, the test interface will also display the word "open", if one of A1 or B1, C1 is displayed as " "Close", it means that this fracture is faulty, please switch to A2 fracture). Connect the opening and closing control line to the internal trigger plug, set the multimeter to the DC 1000V position, and connect the red and black lines of the control line to the red and black lines of the multimeter respectively. First, in the setting menu, extend the acquisition time by 3 seconds, and extend the trigger voltage by more than 2 seconds, and click Close to output the voltage.

③ Check the opening DC voltage: check when the instrument is in the closed state, clamp the yellow wire and black wire of the fracture line together, and then connect the control wire to the internal trigger. The other steps are the same as the closing voltage check.

④. If there is no voltage output in the above three methods, please return the instrument to the factory for inspection and repair. Please do not open the instrument by yourself, because there is a danger of high voltage output inside.

⑤ Countermeasures: If there is no DC output and you are in a hurry to test, please use the external contact method for measurement, and then return to the factory for repair after completion.

4. There is a protection lock for the switch mechanism (such as Siemens, ABB switch), the treatment method is as follows:

① The closing and opening test of the internal power supply operation switch provided by the instrument must be unlocked. On-site technicians or switch manufacturer personnel should assist in unlocking the lock according to the control wiring diagram of the on-site control cabinet.

② Use the on-site operation power supply and use the "external trigger" method to test.

(2) When the instrument is doing single-on and single-point tests, the switch is activated, and it shows a prompt that the fracture is not in action.

1. The fracture is not connected properly:

①. When making an indoor 10KV switch, the yellow (A), green (B), and red (C) contacts should be connected to the movable contact, and the static contact should be short-circuited and then connected to the black wire.

②. When making outdoor switches, connect yellow (A), green (B), and red (C) to the upper end, and ground the black wire (the other end of the outdoor switch in the substation is grounded).

③ There is a problem with the switch control circuit, because it is separated immediately after being closed, please check the switch circuit before doing the experiment.

(3) The printer can feed paper but cannot print text and graphics

1. The printing paper is installed upside down. Solution: Reinstall the thermal printing paper correctly.

2. The heating head of the thermal printer is broken, the solution: return to the factory to repair the thermal printer.

(4) There is no speed data display during the speed test of the instrument.

1. The sensor selection is wrong (for example, linear sensor is installed, rotary sensor is selected), please reset the sensor Make new settings.

2. The sensor is installed in the wrong position. For example, the rotary sensor can only collect signals through the rotation of the spindle.

No data will be displayed if it is installed in a place where it is linearly displaced or where it does not move.

3. If the sensor options and installation positions are correct, there is no speed display, and the sensor is damaged, please return it to the factory for repair.

(5) When the instrument is grounded on site, why do we need to ground the wire first, and then connect the broken wire?

Because in the field test, there is often a high induced voltage between the fracture of the high-voltage switch (especially above 220Kv) and the ground, the induced voltage reaches several thousand volts, and the energy is small, but it is enough to threaten the safety of the instrument itself. Inside the instrument, fracture A bleeder circuit is connected between the signal input terminal and the ground. Therefore, the ground wire is connected first, and the bleed circuit is connected first. At this time, the connection is broken.

When the signal line is connected, even if a high voltage is induced by the fracture, it can be discharged to the ground through the discharge circuit to ensure that the instrument

The fracture channel of the device is safe.

(6) How to judge whether the instrument port is normal?

The instrument has twelve fractures, and each phase fracture can be used independently.

①. When the test line is not connected, it is in the open state, and the test interface will also display the word "open". If the word “close” appears in one phase of a certain break, it means that the break is faulty, and you need to switch to another break for testing.

②. Connect the fracture test line, short-circuit the yellow, green, red and black (common) of the fracture line, and the fracture status is indicated by the word "open".Change to "close", which means normal.

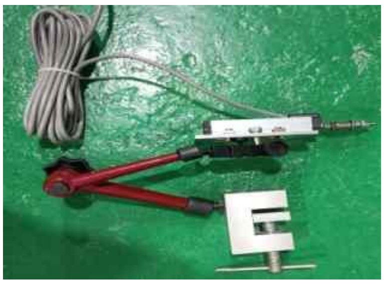
9、Daily maintenance

1. This instrument is a precision and valuable device. Please keep it in a safe place when using it to prevent heavy falls and impacts. When used outdoors, operate under shade as much as possible to avoid direct exposure of the LCD screen to the sun for a long time.

2. When the instrument is not in use, it should be stored at a temperature of -10 to 40. C. The relative humidity does not exceed 80%, and the room is ventilated and non-corrosive. In humid seasons, if it is not used for a long period of time, it is best to power on once a month for about 1 hour each time.

10、configuration list

Linear sensor: 50mm (standard), 100mm, 200mm, 300mm, 500mm, 600mm (optional)



KPF linear sensor: 200mm, 300mm (optional)

KTF linear sensor: 200mm, 300mm (optional)

345° rotation sensor (standard configuration):

Acceleration sensor (standard):

Rotation sensor adapter:

Magnetic table base (standard) and fixed bracket (optional):