UDEY ®

OPERATING MANUAL

C B A – 8 1 ver 2.0

CIRCUIT BREAKER ANALYZER

UDEYRAJ ELECTRICALS PRIVATE LIMITED,

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Contents

Product overview

UDEY Circuit Breaker Analyzer CBA-81 ver 2.0is designed to test and measure mechanical parameters for many types of power system high voltage switches, including vacuum, sulfur hexafluoride, oil-minimum, bulk-oil types. It is the most convenient tool for maintaining HV switches, can be used to carry out tests in power stations with 500kV grade and below, featured with easy wire connections, simple and user friendly operation.

I. Product Features

1. The apparatus can automatically identify port status (ON or OFF) & operate accordingly with clue.

2. Independent 12 ports, can test and indicate their connection status for user to check wiring.

3. The device can store fifty sets of testing results.

4. Its big screen（320×240）LCD display is an advanced gray screen without light reflection or black screen in sunshine. Besides, its menu interface with clues of pictures and characters menu operation is user friendly and easy to operate.

5. The device has powerful graphical analysis function, which makes it possible to display waveform and measured data simultaneously. Thus testing process is more self-evident.

6. The device contains delay and protection function, which makes it possible to cut off coil voltage automatically after circuit breaker operates. Therefore, the circuit breaker and the testing instrument are well protected.

7. The device can be used to carry out auto and manual opening / closing test.

8. The device can be used in test of low voltage and high voltage, auto seek the minimum opening or closing voltage.

9. It can be used in reclosing test, closing-opening, opening-closing and opening-closing-opening parameter measurements.

10. Parameter measurement of vacuum contactor (single coil).

II. Technical Parameters

1. Time measurement: 12 channels

    Fixed opening (closing) time

    Inner-phase asynchronism

    Opening (closing) phase-to-phase non-synchronism

    Bouncing time of closing (opening) (bouncing times)

2. Measurement range: 0.01ms～10000ms

3. Accuracy: 0.1% ± 2 characters within 1ms～100ms,

    0.5% ± 2 characters over 100ms

4. Instant opening (instant closing) velocity

    Appointed time slot (stroke segment or angle segment) average velocity

5. Measurement range: 1mm sensor: 0.01～25.00m/s,

    0.1mm sensor: 0.001～2.50m/s

    0.5°angle sensor: 0.01～25.00m/s

    Universal sensor：   0.01～10.00m/s

6. Stroke measurement: Moving contact stroke (stroke)

    Contact stroke (opening)

    Overshoot stroke or retrace (over travel)

7. Sensor measurement range:

    linear displacement sensor: 50mm : resolution: 0.1mm: stroke 0.1～50mm

    linear displacement sensor: 300mm: resolution: 0.1mm: stroke 10～300mm(optional)

    linear displacement sensor: 500mm: resolution: 1mm: stroke 10～500mm(optional)

    360 line sensor   : 360 : resolution: 0.5: stroke 1mm～1000mm

8. Current measurement: the maximum value of opening (closing) coil

9. Display screen: 320×240 Liquid Crystal Display, contrast adjustable

10. Data storage: Fifty sets of measuring data

11. Printer: High speed thermal printer

12. Apparatus power supply: AC 220V ± 10%；50Hz ± 2%

13. DC output supply

   1) Output voltage: 25 ～ 265V continuously adjustable

   2) Output current: ≤ 15A (short time)

14. Dimensions: TESTER: 360 × 250 × 140mm; Carrying box: 390 x 300 x 240mm

15. Operation environment: -10° ~ +50° C

16. Relative humidity: ≤ 90%

III. Panel Description
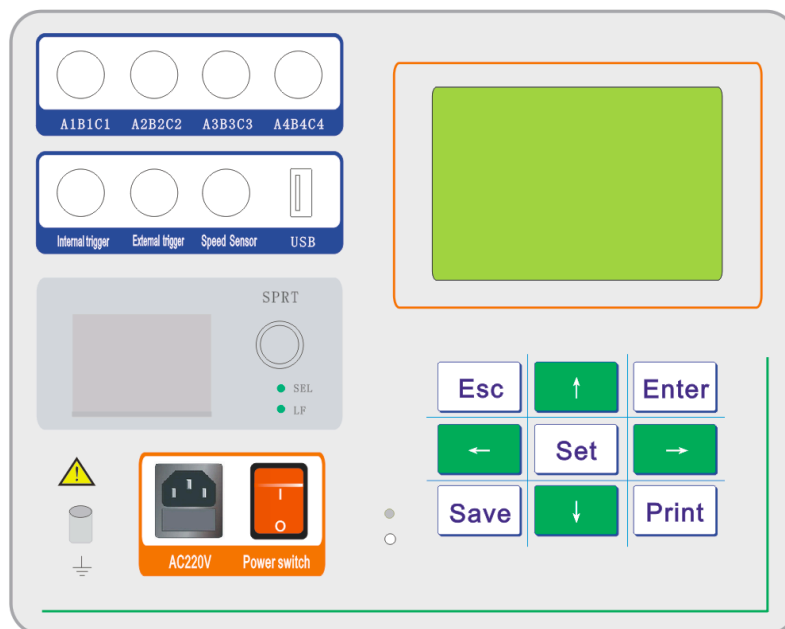
1. Port Signal: Contact to each phase port moving and static contact

2. Speed sensor: Port used for connecting the speed sensor.

3. Internal trigger: ON, OFF, - are controllable DC power supply output; GREEN line (on) connects the opening auxiliary contact; RED line (off) connects the closing auxiliary contact; BLACK line (-) connects the common end of opening and closing control loop.

4. External trigger: When external synchronization of AC and DC occurs, there is no need to disconnect secondary circuit control power supply to collect signals. The wiring method is the same as inner trigger method or RED line connects the closing coil, GREEN line connects the opening coil, and BLACK line connects the common end. **While wiring, ensure to switch the power off. Take personnel safety care.**
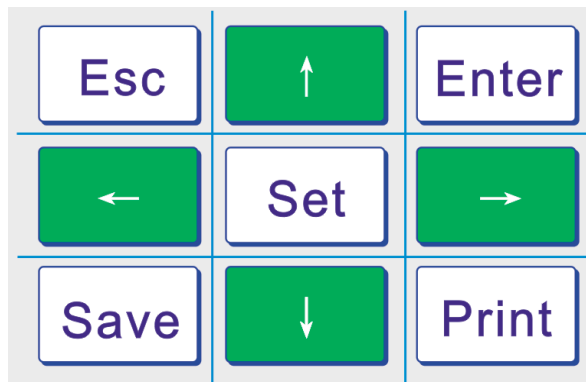
·Please use the 250V, 10A power cord.

· AC power should be suitable to the requirement of 220V±10%, 50Hz.

·10A fuse in the fuse box in socket. (Spare fuse is placed in the box too.)

5. Printer: To print test results. Thermal printer 58mm width. Open the printer cover to change paper.

6. Contrast: To adjust the brightness of LCD

7. Buttons:

Esc	↑	Enter
←	Set	→
Save	↓	Print

Note：

● When setting the trip, press the set key to display "Default travel", which means that the actual measurement with a linear sensor.

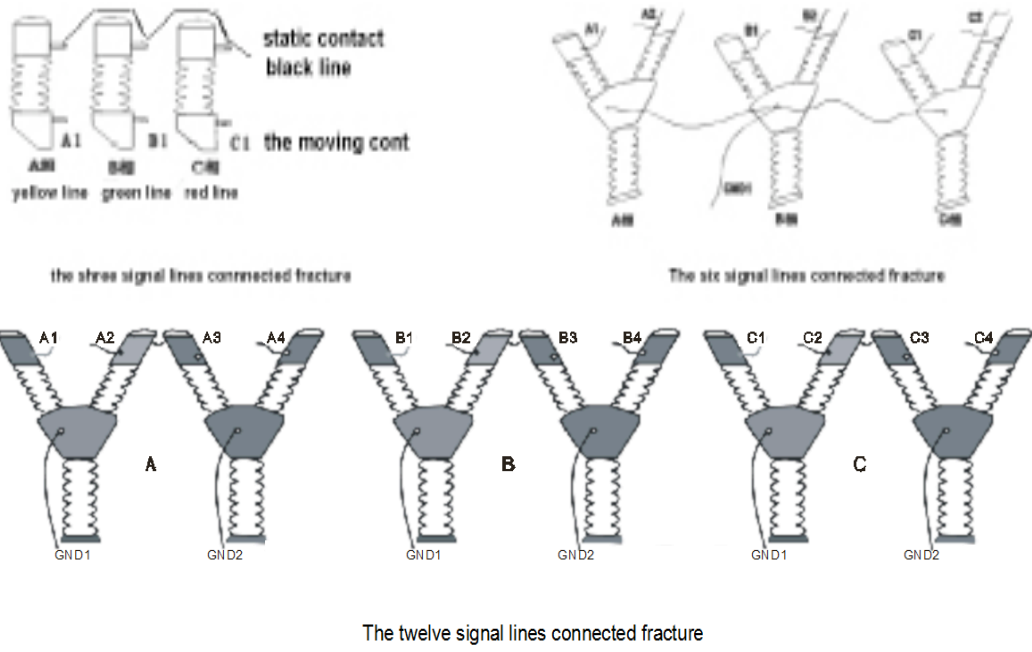● In the view of the saved data, press the set button is to delete.

IV. Installation Method Of Port Lines And Sensors

1. Installation method of port lines

The device has two testing input port, each port total four lines: A1 (yellow line), B1 (green line), C1 (red line) connect three phase moving contact end, and GND (black line) static contact (three phase short circuit). The whole can be for sampling of circuit breaker (switch) with 6 breaks.

Taking circuit breaker with 3 and 6 breaks connection for example, all testing input ports should be used, and the connection method is as follows: A1 and A2 connect the yellow input line, B1 and B2 connect the green input line; C1 and C2 connect red input line.

As for three phase three-break's connection, only need to use the prior port testing signal input interface. 'A1' as the main port. (Note: three breaks and six breaks circuit breaker with place GND in common)

the three signal lines connected fracture

The six signal lines connected fracture

The twelve signal lines connected fracture

## 2. Wiring method of internal trigger opening and closing control

During real testing, if inner power of the device is used, closing control line (red), opening control line (green), and common line (black)are connected to "internal trigger" end of the apparatus panel (Air plug), when it comes the opening+, closing +, and negative output of the instrument, we should generally connect them to in front of auxiliary switch contacts to efficiently protect coil and the instrument. **While wiring, pay attention to power off the operating power supply of high voltage switch apparatus (break the cutter or pull the fuse) to avoid power conflict and apparatus damage.**
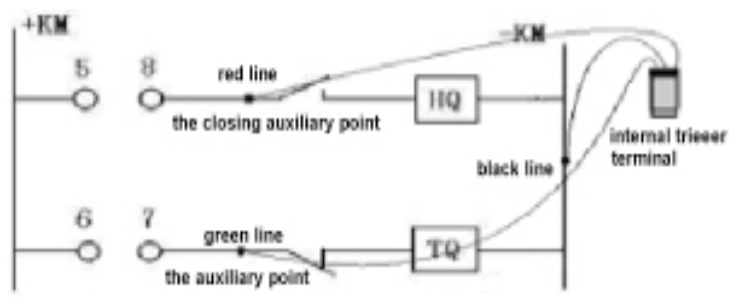
Schematic diagram of internal trigger control wiring for high voltage switch controlling screen

Below is the wiring diagram of opening and closing control for VS1 vacuum switch: closing red line connecting (4), opening green line connecting (31), public point (14) and

(30), after short circuit black line.
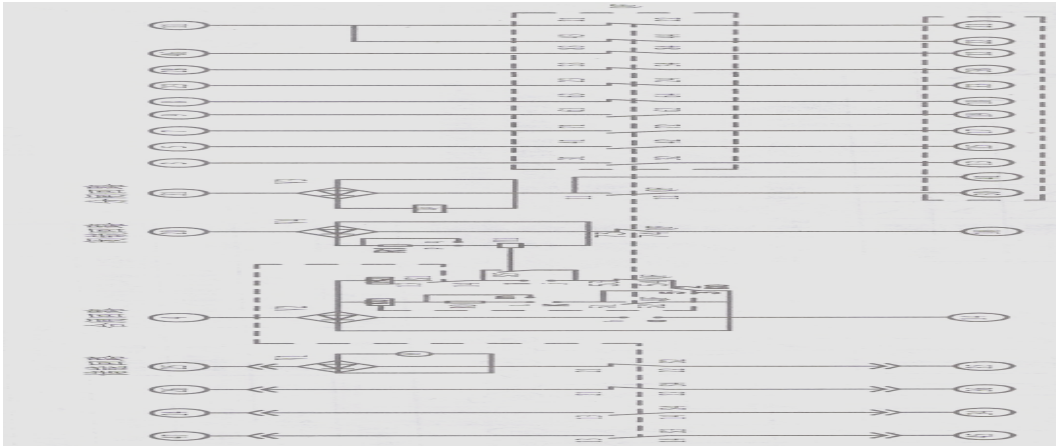
3. Wiring of external trigger

(Can be used for AC switch, without energy storage body or permanent magnet switch)

Before using external power supply, firstly connect controlling line to "external trigger" port of instrument panel, and then start to set parameters and set the trigger mode to external trigger. During measurement, firstly press enter button on characteristics testing menu to test and wait for signal, and then conduct the opening or closing breaker and then you can collect data. Before wiring, the user should analyze the wiring diagram of all kinds of high voltage switch control screen and then start the wiring.
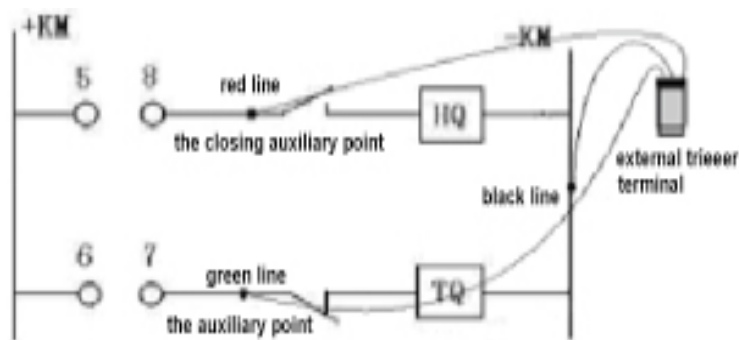
4. Manual trigger mode

There is no need to connect controlling line in manual mode. Firstly delay testing time to 3 second in time setting menu. Then start to measure in characteristics test menu. Then manually start opening and closing quickly. Thus you can collect signal in 3 seconds. If it excesses 3

5. Installation method of speed sensors

While measuring speed of switch, firstly install sensor to moving contact of high-voltage switch. Choose corresponding sensors according to type of switch (oil,

vacuum, SF6)

0.1 mm linear sensor (vacuum switch type)

Linear pull rod of the sensor is tied to vertical conduct electrical pole of the switch (moving contact). Sensor is fixed with universal bracket and will be installed when it is on opening status. During installation, electronic ruler must be vertical to moving contact. Firstly pull out about 15mm to ensure that sensor not be pulled broken as the switch moves up-and-down during closing and opening. This kind of installation method is mainly applied to ZN28 switch or vacuum switch with moving contact bared of ZN63 (VSI) without chassis.
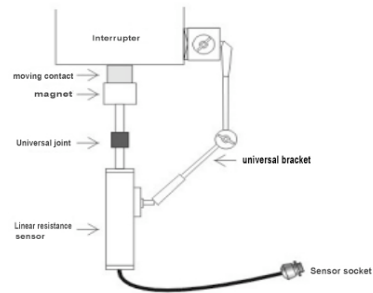
50mm linear sensor   installation diagram

Installation method of 360-line rotating sensor:

1) As for sealed switch VS1, VD4, install the connecting lever (principal axis) on switch sides. Take away the white sealing cover on switch sides and quincunx principal axis will appear. Then put on the specific linkers. Please keep horizontally during installation. Then fix it with universal bracket. Shown as follows:

2) If principal axis is in plum blossom form, we use the following method to install, shown as follows:
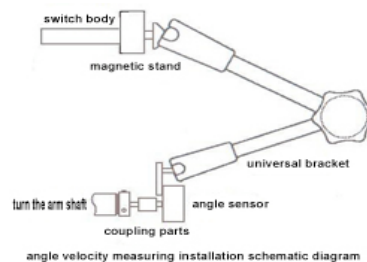
3) Diagram of outdoor vacuum switch and sulfur hexafluoride installation method. This type of installation method is mainly used for out door vacuum switch. Install it to switching pointing needle. You should remove the pointing needle first, and then screw the sensor connector.
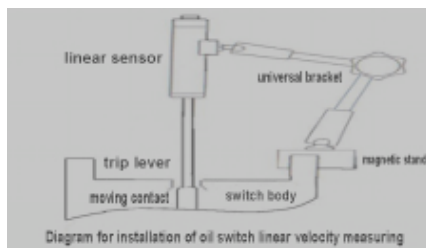

4) If there are location holes on connecting lever axis of the switch, use connecting-piece and angle-interlocked displacement sensor on actuator spindle, then use cardan joint to fix angle shift sensor.

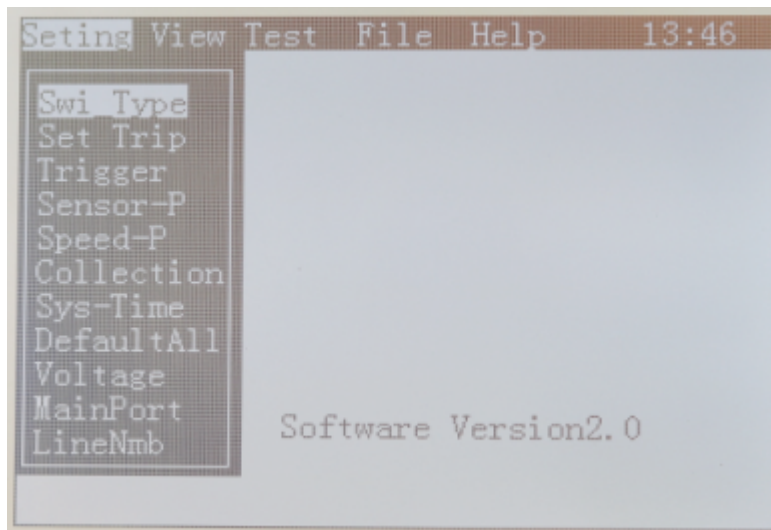Diagram for installation of 1mm linear sensor (oil switch)

V. Instrument Menu Settings

After wiring and installation, turn on the power supply of the apparatus. At this time, the main menu on LCD is shown as follows:
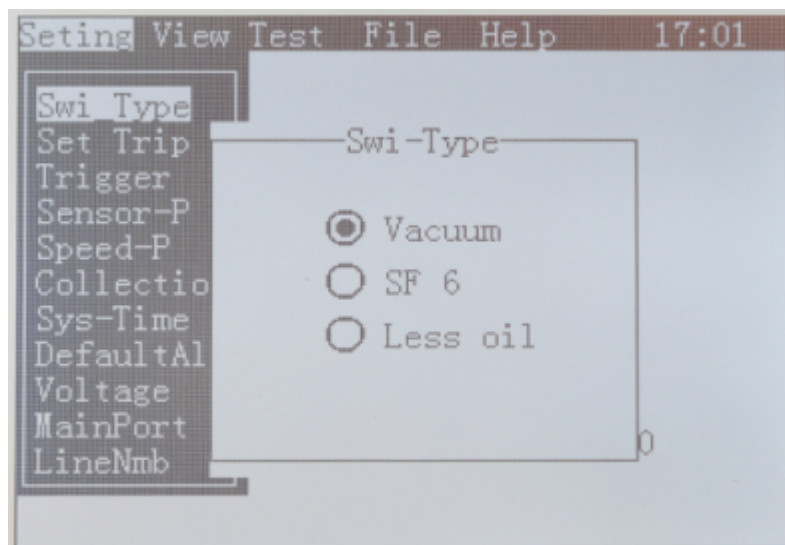
Software Version2.0

1. Setting Menu

Press "←"or "→" to setting menu, and Press enter button to enter, shown as follows:

Software Version2.0

1) Switch type setting: press enter button to enter. Press "↑"or "↓"to move icon. Then press enter button to confirm, shown as follows:

2) Set trip: trip refers to the total travel of the switch, which means the overall length of opening trip and excess of stroke. Press enter button to set parameters, for example, we must set trip for 360-line sensor. "↑"and "↓" are used to adjust numerical value(fine adjustment) and "←" or "→"are used to adjust roughly. When it is adjusted to the needed value, press enter button to save the value. If you choose the 50mm sensor, you can set the trip or press setting button again, then default strip will appear, then you can start to measure. Shown as follows:
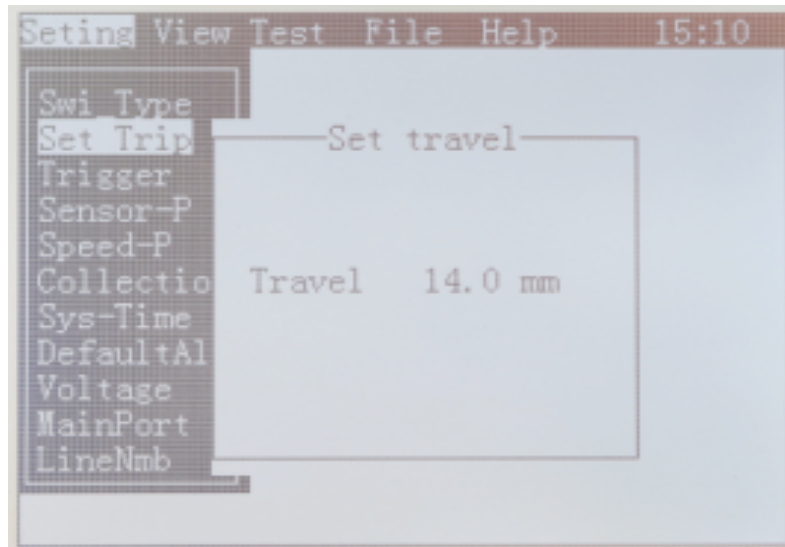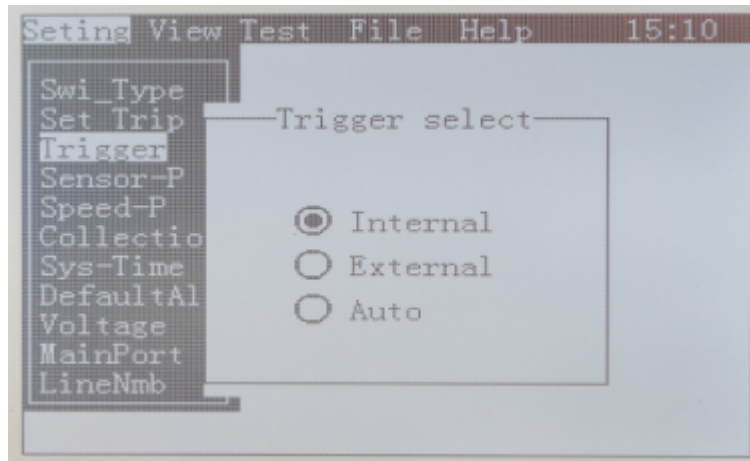

3) Trigger setting: press enter button to enter, choose the trigger mode accordingly and press enter button to save.

① If you choose internal trigger mode, internal DC current will be outputted to control the opening (closing) status of the breaker.

② If you choose external trigger mode, external power supply operation will be employed. Then the apparatus will enter testing mode and automatically wait for closing or opening signal. Then electrically operate it manually.

③ If you choose manual trigger mode, you only need to connect contact line, and there is no need to connect closing and opening controlling line. Set time in Collection time menu to 3 second, setup will firstly enter testing mode and wait for signal, with manual operation or opening status. And this motion shall be completed in 3 seconds, otherwise, the apparatus will go back automatically and there will be no testing data. Shown as follows:

4) Sensors setting: press enter button to enter. Press "↑" or "↓"to choose sensor. Choose 50mm sensor if vacuum can be installed with linear sensor. Choose 360-line rotating sensor or universal sensor if you cannot install linear sensor. Press enter button to save, shown as follows:
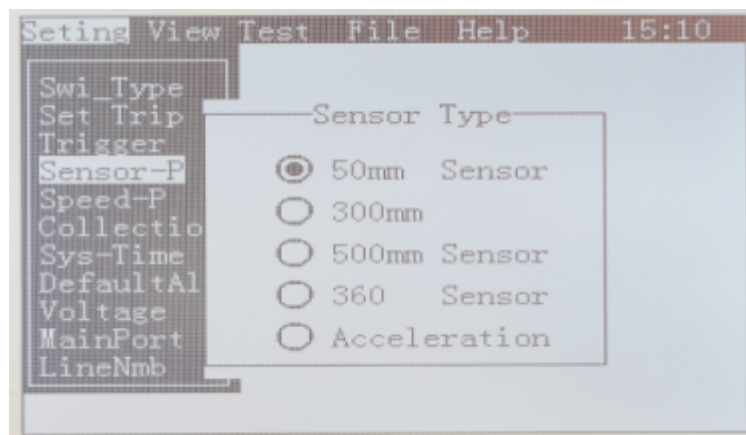

5) Speed parameters setting: press enter button to enter, then press "↑" or "↓"to select the needed speed. Press setting button to enter value before opening after closing of definition. After shadow of cursor appears, press "→" or "←" to adjust the size to the needed size and then press save button to save the value. If you do not know the definition of vacuum switch speed, select the first item. If it is sulfur hexafluoride switch, select the last definition of speed. Shown as follows:
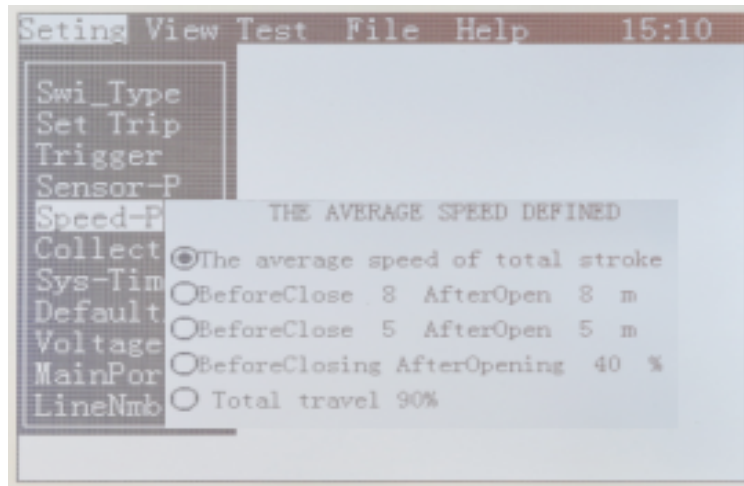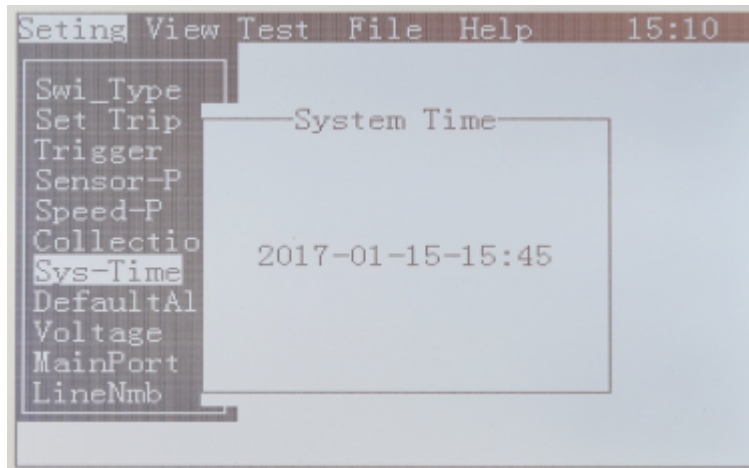
6) Collection time setting: press enter button to enter, and the default time is 0.5 second. If the internal trigger mode is chosen, there is no need to change this item. The acquisition time refers to the time period of voltage input. If the setting time is too long, the switch coil will be easily damaged. If the manual trigger mode is chosen, the acquisition time refers to the acquisition length of fracture signal, which is normally 3 seconds. Press "↑" or "↓" to set the length of time.

Note: After the test in manual trigger mode, please recover the time to 0.5 second, so that the voltage output time will not be too long to cause damage to the switch while conducting the internal trigger mode. Shown as follows:
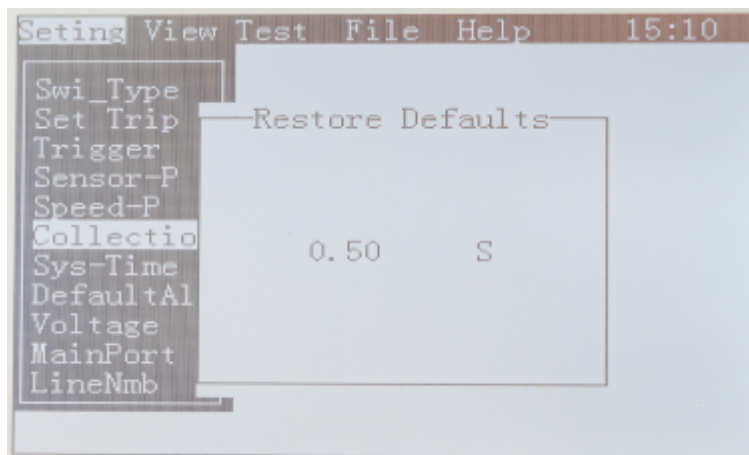

7) System time setting: press the enter button to enter, press "→" to enter the setting, then press "↑" or "↓" to set the current year, month, day and time. Press enter button to finish setting. Shown as follows:
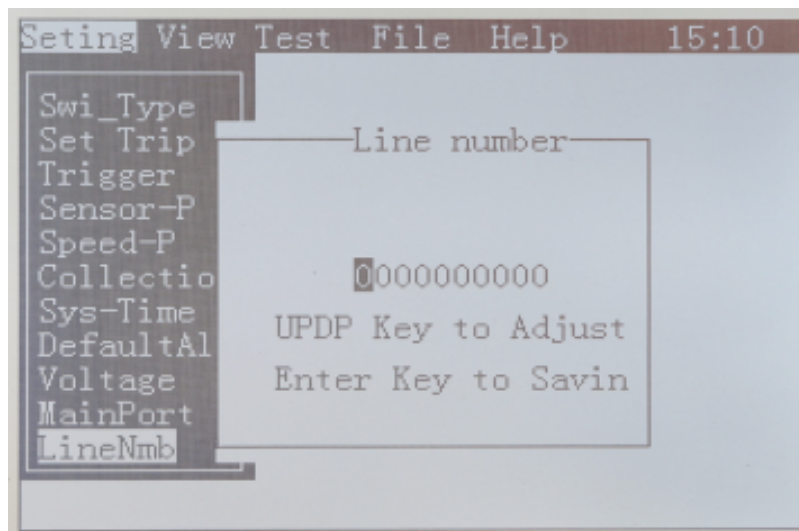
8) Voltage setting: Press enter button to enter, set the voltage required for the test through the "↑" or "↓", shown as follows:
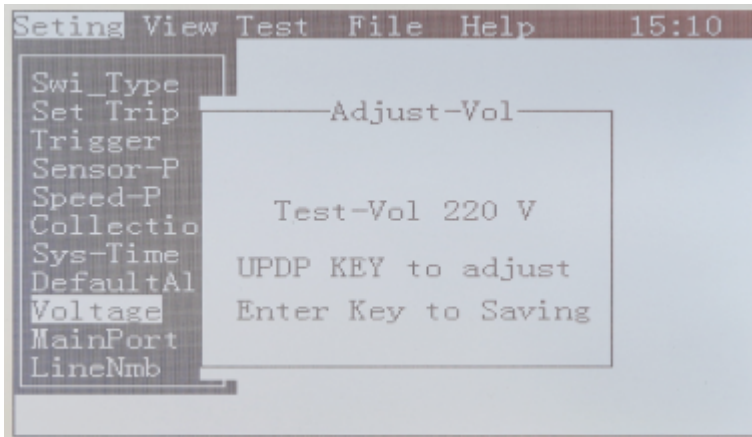
9) Main port setting: press enter button to enter, and the default main port is A1. Each port is independent to each other. Set the current testing port through the "↑" or "↓", and press enter button to save. Shown as follows:
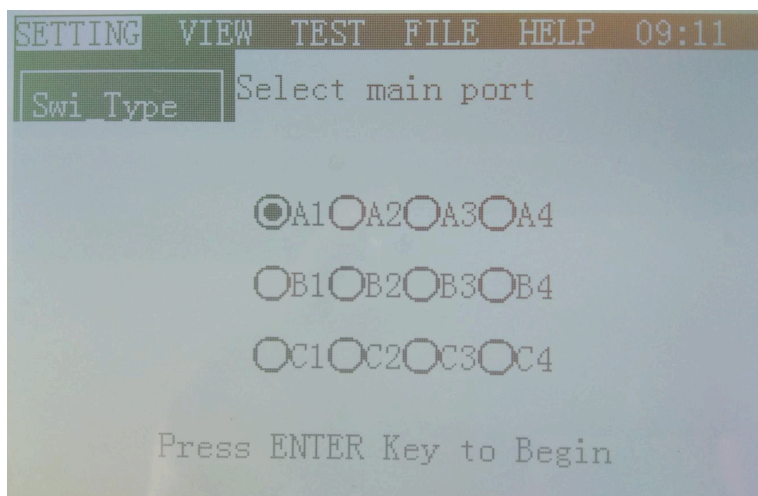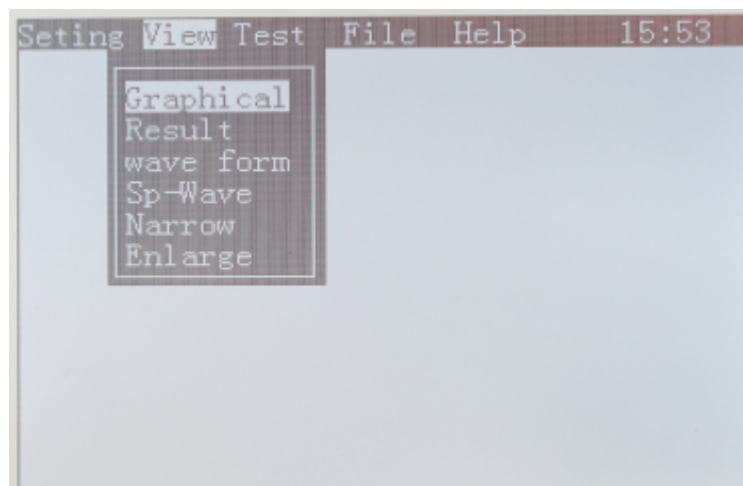

10) Line number setting: press enter button to enter. Set the required number in English through the "↑" or "↓", and press "→" and "←" to move the phase. Shown as follows:

After all the settings are completed, press ESC key to return to the main interface.
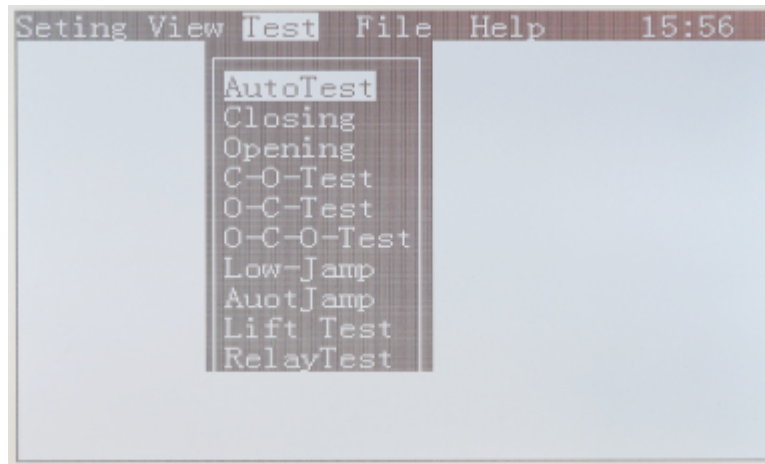
2. View menu

When the test is completed, view and analyze the current test data through this menu. Press enter button to view the data, and then press enter again to exit. Only in the view of speed analysis, press ESC key to exit the analysis state.

3. Test menu

After the parameters have been set, perform the test in this menu. Shown as follows:

a. Auto Test menu: automatically determines the opening (closing) status, and make the corresponding action.

b. Closing menu: "closing" controls the voltage output (red line positive and black line negative in internal trigger), to make the switch act. If the power supply controlled by opening is damaged, the opening motion can be performed by this function.

c. Opening menu: "opening" controls the voltage output (green line positive and black line negative in internal trigger), to make the switch act. If the power supply controlled by closing is damaged, the closing motion can be performed by this function.

d. C-O-Test menu (Closing and opening testing menu): the "closing-opening" test of the switch can be performed after the control time period is set "closing-t1-opening", and the time value of one closing, one opening and one golden short of the switch can be obtained directly.

e. O-C-Test (Opening and closing testing) menu: the "opening-closing" test of the switch can be performed after the control time period is set "opening-t2-closing", and the time value of one opening, one closing and no current of the switch can be obtained directly.

f. O-C-O-Test (Opening-closing and opening testing) menu: the "opening-closing-opening" test of the switch can be performed after the control time period is set "opening-t2-closing-t1-opening", and the time value of one opening, one closing, two opening, one golden short and no current of the switch can be obtained directly.

g. Low-jump (Manual) menu: no connecting the port signal line, just power supply to the opening (closing) break coil to perform the test, while the voltage step pace can be set.

h. Auto jump menu: connect the port signal line, set the voltage step space, then auto step

up the voltage to find the minimum voltage for opening (closing).

i. Life test menu: the opening and closing test of the switch is automatically performed after the parameters setting.

j. Relay test menu: This is for testing (keep closing when powered on, immediate opening when power-off) for the special switches or contacts with the same control point of opening and closing. Please connect the internal trigger red line (positive) and black line (negative) to the relay coil.

4. File menu
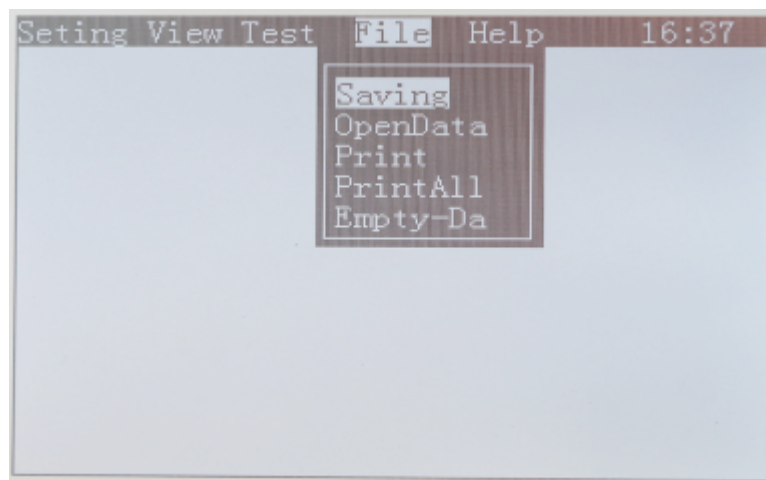
a. Saving menu: save the current testing data.

b. Open Data menu: open the saved data.

c. Print menu: print the current testing data.

d. Print All menu: print all the data (graphics and data) for this test.

e. Empty Data menu: clear the current testing data (not the storage data), which equals to a screen clearance.

VI. Method Of Operation

After setting all parameters, enter from test menu and chose auto test menu, then press enter button to get to port status, then press enter button to perform the testing. Shown as follows:
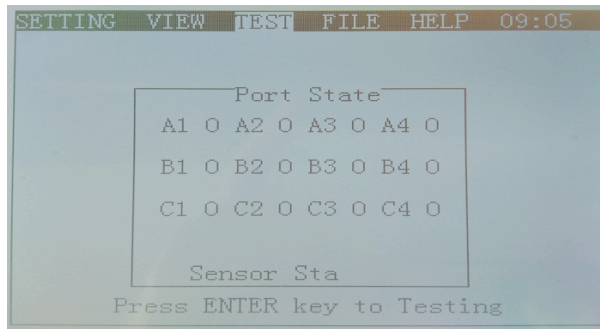
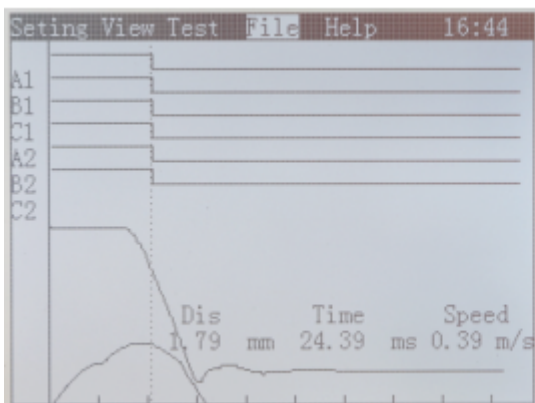After the testing, if you want to view the testing data, press enter button to view the curve graph, and press print button to print the data; you can also select the Graphical or the results in the view menu for a view. Testing data of closing shown as follows:

After the view or printing of closing data, press ESC button, and then press ENTER button to perform the opening testing. Testing data of opening shown as follows:

Press the PRINT button to print the current data. To print all the data, select the print All from the file menu.

Software using method

1. First install the special upload software on the computer.

2. Please do not connect the instrument power supply, in a shutdown state, directly through the USB data line to connect the computer.

3. Open the upload software, upload data to save.

VII. Term Definition

➢ Three-phase non-synchronous switching: difference of three phase maximum and the minimum opening (closing) time.

➢ In-phase non-synchronization: time difference of in-phase contact opening (closing) time for switches with above 6 breaks.

➢ Bouncing time: accumulated time of all connecting, separation (bouncing) in the closing process of moving and static contact for switch.

➢ Opening time: interval from the moment tripping electrified moment to separating moment of all arc contacts of different levels, for breaker at closing position.

➢ Closing time: when breaker at opening position, the time interval from the moment closing circuit is electrified to the moment all pole contacts are connected.

➢ Re-closing time: in re-closing cycling, it means the interval from the moment opening time starts to the moment all pole contacts connect.

➢ Transient opening/closing speed: average speed when moving contact of switch connects with static contact, in appointed time or distance. Take 10ms for example, it means the average speed in 10ms after opening, or average speed in 10ms before closing.

➢ Separation: the distance from opening of switch to where moving contact starts to connect static contact.

➢ The maximum opening (closing) speed: the maximum value of opening (closing) instantaneous speed. Generally speaking, the value appears in the moment that switch just open or close, which can be judged from speed and travel curve.

➢ The average opening (closing) speed: the trip-time ratio during the whole operation of switch moving contact.

VIII. Tester Troubleshooting

1. When the device is powered on, if the LCD screen keeps blind, please replace the power supply fuse, and if the screen is still blind after the replacement, please turn off the power supply immediately and return it to the factory for maintenance. Please do

not open the apparatus panel for checking as there is high voltage inside, and please pay attention to safety.

2. When no displaying in printing after paper replacement, put the paper in other side as the paper is thermal paper.

3. After plugging in the port line, the breaker shows opening status, while closing status is shown on one phase or three phases of the apparatus, there are two following cases:

1) If the port line is pulled out and the apparatus turns to opening status, turn on the universal meter buzzer gear to check whether there is short circuit or line connection error.

2) If the port line is pulled out and the apparatus still in closing status, use the universal meter AC gear to check the breaker whether there is electricity leakage. If there is leakage, please do no connect other ports to perform testing again, and only after the leakage problem is solved, connect the other port for testing.

4. No motion of breaker: after connecting the line for testing, if the internal trigger control line is connected correctly, the apparatus issues orders to the breaker where there is no motion. First, check whether the voltage setting of the apparatus is accurate, then use the multi meter DC 1000V, check whether the output supply is normal. Performing the testing in the energy storage control of the test menu to check whether there is voltage output.   Press "→" button for closing energy storing, connect the red line and black line to the multi-meter for testing. Press "←" button for closing energy storage, connect the green line and black line to the multi-meter for testing. If the voltage output is normal, please check the control circuit of the break and whether the system is jammed. If there is no voltage output, please return it to the factory for maintenance.

IX. Daily maintenance

1. The apparatus is a delicate device, so please keep it properly and avoid banging or striking and hitting. While being operated at outdoor, it should be placed in shadow to prevent the liquid crystal screen from exposure to sunshine.

2. If not used, it should be kept in the temperature from -10 ～ 40°C and in ventilating and non-corrosive air with its relative humidity no more than 80% non condensing. In

wet seasons, if not used for a long time, it should be powered on for half an hour once per month.

X. Standard Accessories and Attachments: In accessory box

NO.	Name	Quantity
1	Port signal wire	2
2	Closing and opening control wire	1
3	10A power cord	1
4	10 A fuses	2
5	Printing paper roll	2
6	50mm linear sensor	1
7	360°rotating sensor	1
8	Universal Bracket	1
9	Speed sensor adapter	1
10	Short circuit wire	1
11	Screw driver	1
12	Manual	1
13	Works Test Report	1
14	Earth wire	1
15	Software CD	1
16	USB computer cable	1

OPTIONAL ACCESSORIES: SENSOR: 300mm or 500mm or 1000mm sensor