HZC-3980
Circuit Breaker Analyzer

Contents

Thank you for choosing this tester. Please read the instructions in detail before the instrument is first used.Due to continuous improvement of products, design and specifications are subject to change without notice.

Please call me for specific matters. Thank you very much.

Special security hints

1. First of all, connect the instrument_ with the ground so that you can connect other wires and operate; after testing it, turn off the power supply, disconnect other wires and the wires in the ground.

2. Please check whether the input power is 220V before using the instrument; otherwise, the instrument will be spoiled.

3. There is high pressure in the instrument. Don't take apart the instrument causally in order to be safe.

Tips: in the manual, the menu or options on the software interface will be in the 【】.

【File】→【DataOpen】stands for choosing file and open data in turn.

【ENTEN】stands for the button on the surface.

I.Technical Parameters

1.1 Using Environments

Input Power   220V±10%   50Hz±10%   Air Pressure   86～106kpa

Temperature   －10～40℃   Humidity   ≦80%RH

1.2 Safety Performance

Insulation Resistance＞2MΩ

Dielectric Strength 1.5KV power supply chassis work frequency withstand voltage 1

minute, no flashover and arcing.

1.3 The Basic Parameters

a. Time: range: 25000.0ms   resolution: 0.1ms

word error: ① 250ms   0.1ms ± 1

② 2500ms   0.1% ± 1 word

③ 25000ms   0.1% ± 1 word

b. Speed :   span 20.00m / s   resolution 0.01m / s

word Error ① 0-2m / s within ± 0.1m / s ± 1 word

② 100ms or ± 0.2m / s ± 1 word

c. Tips:

	span	resolution	error
Vacuum breaker	50.0mm	0.1mm	
SF6 circuit breaker	300.0mm	1mm	1%±1 word
Less oil circuit breakers	600.0mm		

d.   Current: 10.00A   resolution range 0.01A

e.   Output power: DC30 ~ 250V digital adjustable / 10A

(instantaneous work)

f.   Dimensions: 360mm (L) × 280mm (W) × 300mm (H)

g.   Weight: 9kg

II.Performance Characteristics

1. Performance

a. Time: 12 inherent in the fracture points, closing time, with the same period, and white the same period.

b. Reclosing: each fracture together - sub, sub - together, sub - Hopewell - sub-process time: one point, a time is the time of the two-in-gold short time, current time value.

c. Speed: just now, just closing speed, maximum speed, time - stroke characteristic curve.

d. Stroke: total trip, open distance, over-travel, the overshoot travel, rebound amplitude.

e. Current: points, closing coil points, closing the current value, the current waveform diagram.

f. Operating Voltage: DC30 ~ 250V/10A digital machine adjustable breaker operation power supply, to automatically complete low voltage operation test of the breaker, measuring the value of the operating voltage of the circuit breaker.

2. Characteristics

a. All models suitable for domestic and foreign production of SF6 switchgear, GIS combination of electrical, vacuum switch, oil switch mechanical properties test

b. Super anti-jamming capability, 500KV substation the bypass bus charged case can easily test to accurately measure.

c. Universal speed sensor, straight line linear sensor, rotary sensor, extremely easy to install and simple.

d. Switching operation once obtained the switch mechanical properties testing of all data and the corresponding waveform Spectrum.

e. The host field test data, the machine can be stored in the real-time clock, easy to the archive save the test date, time.

f. Host big screen, wide temperature, direct perspective, backlight LCD Chinese display all data and maps, LCD contrast electronic adjustment, power and memory.

g. Chinese menu operation, easy to use. Instrument built-in printer, fast print all data and maps at any time.

h. The instrument with data analysis and management software, with PC online operation,

the test results can be output to the various types of dot matrix, laser or ink-jet printer to print the test report, the field trials computerized.
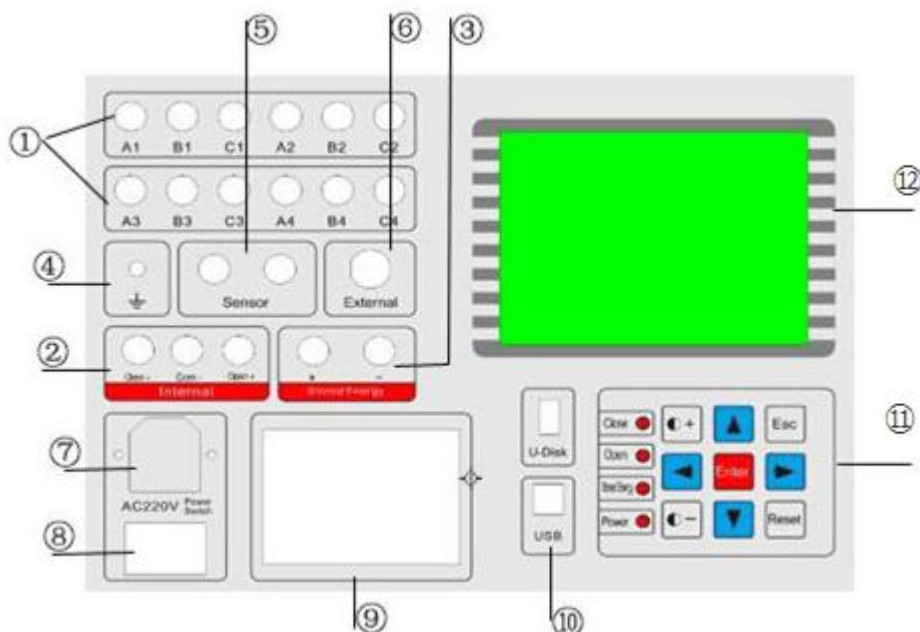
III.Terminology Definition

a. Points (a) Opening time: Tripping coil of the points (a) power as the starting time to move, the static contact just points (a) time.

b. The same period: the same phase being, points (a) the maximum and minimum opening time the difference.

c. White year: Three-phase points (a) and the maximum and minimum opening time difference between.

d. Average speed: points (a) gate process, moving contacts total travel before, after removing 10% each, to take the middle 80%, the ratio of the moving contact sport trip time.

e. Maximum Speed : Gateway process in the points (a), the moving contact sport, take the moving contact sport every 10ms for a speedometer unit until the moving contact sport stop certain speed unit value, of which the largest unit The speed value shall be the points (a) the maximum speed of the gate.

f. Just points (a) speed: different switch models depending on the measured switch factory, each manufacturer to define the different just now, just closing speed, the tester included various definitions section for The user's own choice.

○ ABB-HPL550B2: ABB Company 550KVSF6 of switches;

○ together before the sub 10ms: part of the oil switch and part of SF6 switchgear;

○ aggregate points before and after some of the oil switch;

○ LW6 type the: LW6 SF6 switchgear;

○ LW8-35 type: LW8-35 type SF6 switchgear;

○ 10% to the the fracture: the Xi'an Switch Factory production part SF6 switchgear;

○ the same average speed: Shenyang Switch Factory production SF6 switchgear;

○ LW33-126 LW33-126 SF6 switchgear;

○ together before the sub 10mm: part 35KV vacuum switch;

○ together before points 6mm: 10KV vacuum switch.

Several definitions above are not adopted, users can be measured according to the

tester stroke characteristic curve (travel direction), defined on the curve just points, the speed sampling paragraph just an aggregate speed, the instrument automatically calculated user-defined just stars, just close speed (sampling time and stroke within a segment ratio).

IV.The Layout Of Panel

Number	Panel Signs	Function Description
①	A1 B1 C1 A2 B2 C2 A3 B3 C3 A4 B4 C4	12 road fracture time measurement channels, ↓ after 6-way channel virtual ground, not in contact with the earth.
②	Internal	Inside the sub-gate control DC power supply Open and close control socket
③	Energy storage	A set of DC power supply for switching energy.
④	Protect ground terminal	In contact with the earth
⑤	External	External trigger mode, directly and received points, together both ends of the coil, the coil on the electrical signal as a sync signal.
⑥	Speed sensor receptacle	Speed sensor signal input
⑦⑧	Power switch	Through this interface input supply 220V ± 10% 50Hz ± 10% 10A
⑨	Panel printer	to print a test report and map
⑩	USB interface	Test data can be stored via this interface
⑪	Arge-screen LCD	I wide temperature, backlight LCD Chinese display all data

		and maps			
⑫	Key	🔲+ 🔲− LCD contrast function key block increases, reduces			
		▲ ▼ On, move the cursor or increase, reducing the value of the current cursor			
		◄ ► Left, right menu or to move the cursor			
		[ENTER] to select the current menu or confirm the operation			
		[ESC] Go back or cancel the operation			
		[RESET] instrument reset			

V.Instruction Of Menu Operation

Turn on the power supply , press the button 🔲+ 、🔲− until it is the best. Press [ENTER]

and go to the menu interface.

At the top of the screen is the main menu of the instrument operation. From left to right,

there are five main menus: [set], [test], [view], [file] and [about].

**5.1 Main menu 	[Set]：**

Before the test, the various operating conditions of the instrument are set.

5.1.1 [Set Test]

①Type of sensor:

Linear resistance, rotation resistance, acceleration sensor and photoelectric

sensor.According to the sensor used for the corresponding settings. If there is no sensor

selection.

②Sensor installation:

According to the different location of the sensor, choose different. Install a three phase linkage of the sensor, select three phase linkage, install three sensors and select three phase simultaneous measurement.

③Speed test:

If the scene is not a speed test, closing it will shorten the test time and reduce the test intensity.

④Speed definition:

The instrument has solidified several conventional speed definitions (Note: this definition can be redefined and solidified with the PC machine according to needs), and the corresponding definition is selected according to the different switch models. If the corresponding definition can not be found, then the "time travel characteristic curve" is usually measured by "10ms" and then the corresponding velocity value is obtained on the curve.

⑤Stroke test:

When a linear sensor and photoelectric sensor are tested, this item can be opened and tested.When other sensors are used or do not want to test the schedule, this setting is closed.

⑥Switch stroke:

The total line value of the input switch is measured when rotating sensor and acceleration sensor are used to measure speed.When using linear sensor and photoelectric sensor to test, mark the stroke value of sensor.

⑦Trigger type:

Internal power trigger: divide and close operation with internal DC power supply.

External power source external trigger: the internal DC power of the instrument is not working, and the switch is operated by the on-site power supply (AC and DC). When the instrument is closed, the "external trigger" connection of the instrument is directly connected to the closed (sub) thyristor. When the switch is operated, the instrument takes the voltage signal from the coil as the starting point.

Auxiliary contact trigger: no coil on the signal, auxiliary contact can be used to trigger the test.

Sensor trigger: manual switch, no electronic control mechanism, no starting point. Use of sensor action as a note The starting point is measured.

Manual switch: measurement of manual switch. It only needs to connect the fracture line and do the closing test. The instrument is in the waiting form State. Then the switch can be split manually.

⑧Test duration: the time length of the operation voltage of the internal power supply.

250ms: single and combined tests of general switches, 250ms time.

2500ms: when the general switch is reclosing operation, the test time is chosen. It is divided into two parts.

25000ms: general contact switch with pre action before closing and closing, and it takes a long time to divide and close the brake.

⑨Resistance type:

A, metal contact: conventional metal contact switch, set to close.

B, closing resistance: 500KV circuit breaker with transition resistance shunt.

C, graphite contact: (no function)

⑩ Pre stored energy duration:

there is a switch that needs pre stored energy to set up this item. The general choice is not.

Tip: when all the options are finished, move the cursor to the bottom of the screen, then press the key to complete all settings.

5.1.2 [Set Voltage]

According to the switch need to set up the closing, the gate, the reclosing output voltage value. After setting up, press confirmation.

5.1.3 [Status]

Check whether the sensor is working properly and whether the installation is reasonable. And whether the switch is right or not. Make sure the wiring is correct.

5.1.4 [Datatime]

The time of setting up the instrument is generally adjusted, and there is no need to set it up.

5.1.5 [Option]

According to their own needs, choose whether or not data items need to be displayed.

5.1.6 [Auxiliary]

In case of a special switch, the normal test data and the factory data do not conform to the data, or the data in the normal test are deviated from the normal test data. Generally, it is not recommended.

Tip: after all the settings are completed, the instrument automatically saves the settings. If the next test is not changed, the instrument will still be tested according to this setting.

5.2 Main Menu　[Test]：

After the instrument is set up, the test is carried out.

5.2.1 [Auto] [Close] [Open]

Single and single point test of switch. Automatic test is based on the A1 fracture criterion. If A1 is divided, the closing test will be done automatically. If A1 is combined, the gate test will be done.

5.2.2 [C-O-Low]

The automatic low voltage action test of closing and sluice is carried out, and after entering the interface, the operation is prompted according to the screen operation of the instrument.

5.2.3 [Manual]

Under a set voltage, the switch is repeatedly divided and tested. Such as:

 (1) At 30% rated voltage, the switch is operated continuously for three times. The switch should be reliable and no action.

 (2) before switching tests are done, the switch needs to be divided into several times at rated voltage, and then test is carried out.

According to the hint: adjust the voltage, press the left key to close, press the right button to divide the gate, and press the confirmation key to store energy output. Exit

according to return.

5.2.4 [Reclose]

Do reclosing test on the switch.

① [-C—O-]

The switch "close division" test, setting the "T1 - sub" control time interval test, directly get the switch one time, one minute time, gold short time value.

② [-O—C-]

The "split - in" test of the switch has been tested after adjusting the time interval of "split T2 - in", and the time, time and no current time value of the switch are directly obtained.

③ [-O—C—O-]

The "split - in - division" test of the switch was tested, and the time interval, one time, two minutes, short time, and no current time value of the switch were directly obtained after the time interval of "T2 - -t1 - sub" was adjusted.

> **Tip**：The control time interval T1 is the length of the period from which the switching coil is electrically charged to the closing coil, and the control time interval T2 is the length of the time from the switch on the coil to the switch on the closing coil. The control time interval T1 is set as the inherent time of closing for the operation of "T1 - T2", "sub - T2 -" and "split - T2 - T1 - sub". The time is equal to the switching time of the switch, and the control time interval is set as the inherent time of the sluice, and the time is equal to the switch time.

5.3 Main Menu　[View]：

After completing the test, the instrument will examine, analyze and print the test results.

5.3.1 [Data all]

The test results show that the data table and the graphic display interface are switched by pressing the up and down keys.

The comprehensive curve atlas includes the time wave of each fracture, the jump wave, the time stroke curve, the coil current waveform and so on. These waveforms are the

comprehensive atlas of the time as the horizontal coordinates on a coordinate map.

The results are displayed in the form of a table, including the intrinsic time value of each fracture, the same period of the same phase, the same period, the rigidity of the stiffness, the maximum speed, the current of the coil, the total stroke of the switch, the excess stroke or the amplitude of the rebound.

5.3.2 [Bounce]

The time of jumping and the number of jumping times of each fracture are displayed. On the right, you can see the more detailed bounce process of each fracture, showing the first moment, the first minute, the second closing time and the second minute of the corresponding fracture. A more detailed jumping process. Press up and down, switch to select each fracture. If you want to print the bouncing results, press the return key, then move the cursor to [file] menu [print interface], OK.

5.3.3 [Wave-R.]

There are switching resistors, graphite contacts and other transitional fracture data waveforms, which can check its resistance data waveform.
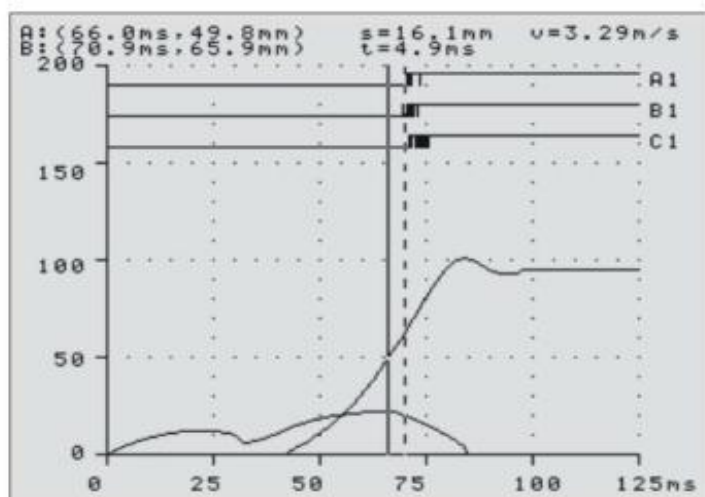
5.3.4 [Data-R.]

There are switching resistors, graphite contacts and other transitional fracture data waveforms, which can check its resistance data waveform.

5.3.5 [Analysis]

Analysis of the measured "time travel" curve can get the relevant data, of course, the most important thing is to get rigid rigid speed data. (as shown below)

Operation hints:

Entering the "velocity analysis" interface, there are two coordinate vertical lines on the "time travel" curve, and the dotted line is on the stiffness and coincidence point of the A channel. The solid line is the definition point of the stiffness and stiffness. The top left corner of the screen is the coordinate values of the two coordinate lines and the travel curves. The ordinate is time, the ordinate is the position of the switch touch head at the moment, the solid line can move, the coordinate point will change in real time and the dotted line can not be moved. Press or key can switch the solid line and the dotted line.

"S = XX.Xmm" is the difference between the ordinate coordinates of the two coordinate points on the stroke curve.

"T = XX.Xms" is the difference of the abscissa of the two coordinate points on the stroke curve.

"V = XX.XXm/s" is the ratio of the difference between the vertical coordinates and the abscissa of the two points, that is, the average velocity between the two points of the moving contact. If we define the two points according to the definition of the rigid speed of the switch factory, Then V is the stiffness of the rigid partition.

Of course, move the two coordinate lines to the corresponding position to see the difference between the ordinates of the two coordinates, and we can see the data such as the open distance, the overstroke, the overshoot process, the rebound amplitude and so on. On the curve, you can also see the starting point of the moving contact point and a series of data that are not displayed in the "comprehensive data table" for analysis.

5.3.5 [Infotest]

You can see the information about the test.

5.4 Main menu   [File]：

After completing the test, the instrument performs related operations on data files.

5.4.1 [DataOpen]

Open the test results that have been saved in the instrument.

5.4.2 [DataSave]

Save the test data.Save the file with the date as the name of the file, and save the result as long as it is not refreshed. This instrument can store thousands of groups of data. After saving, the file name is added automatically. If there is no data, it is empty.

5.4.3 [Print]

Print the current data interface on the screen.

5.4.4 [PrintAll]

Print a fixed test list, including the header, data interface and graphical interface.

5.5 Main menu　[About]

The intellectual property rights of the instrument, the version number of the software, the serial number of the factory, the company's website, mailbox, address, after sales contact telephone and other related information.

VI.Field Wiring

Special security hints: after the instrument comes to the scene, please first connect the instrument protection ground to the site of the site, and other wiring and operation can be carried out; after the test, the instrument power is turned off, then the other lines are removed, and the ground wire is dismantled.

6.1 Ground Line And Fracture Line

See Appendix three: "connection diagram of fracture"

6.2 Dividing Line Control Line

(1) when the switch control power supply is provided inside the instrument, the control power in the control box is disconnected (usually the insurance that connects the control power supply with the control bus), but it can not cut off the energy storage power of the switch mechanism, and then the connection diagram of the appendix two "internal electric source control".

Note: the instrument can only provide DC current, and use the internal trigger of the instrument's internal power. If the field switch is an AC operation mechanism, please use the external trigger mode.

(2) when the external field power is used for dividing and closing control, the output of the

control power is not connected.

When the switch is used for a single test, two lines are triggered externally and the ends of the brake coil are engaged.

When the switch is used for single point test, two lines are triggered externally and the two ends of the split coil are connected.

Tip: use external trigger when using external power. The external trigger mode can be tested regardless of whether the switch mechanism is AC or DC. When external triggering is used, the switching power is not connected.

VII.The Installation Of The Sensor

This instrument is equipped with three kinds of speed sensors, which are used in different situations. The three sensors are connected to the "speed sensor" socket of the instrument through a sensor signal line.

7.1 Acceleration Sensor (Model No Such Sensor)

Traditional speed sensor usually with a slide wire resistor or photoelectric sensor (sub-grating and photoelectric encoder two), these types by moving and stationary parts. Velocimetry, are respectively mounted on the movement of the switch member (movable contact or enhance the lever) and the stationary member (the cap seat or switch base) on, and with the better. In this way, for different switches need to produce many different mounting bracket, on-site installation and removal is very difficult.

My company after years of research, the acceleration technology applied to switch tachometer solve the switching field speed sensor installation difficult, with hard, testing the difficult technical problems, the universal sensor site is easy to install, simple and easy to operate.

Installation tips:

Universal sensor fastening installation even enhance pole switch or level Xuan on, or other transmission poles.
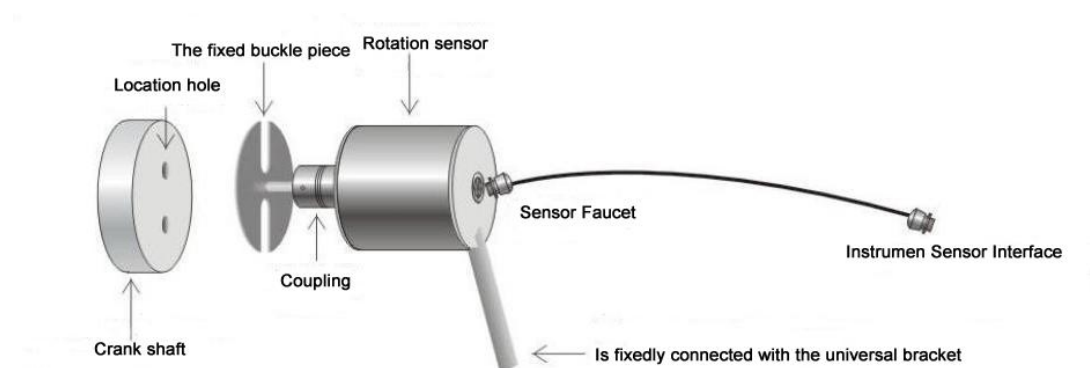
Installation Note 1: the universal sensor socket direction and the direction of movement of the moving Xuan, keep moving Xuan parallel, if you pretend skew may cause inaccurate measurement data.

Installation Note 2: Universal sensor installation should be based on the lever of different thickness optional, the corresponding radius of cards very firmly stuck in the moving rod, can not shake the sensor. Switching action, the sensor should bear bear lever movement together, can not be used in conjunction with the lever relative shaking, or can cause inaccurate test data.
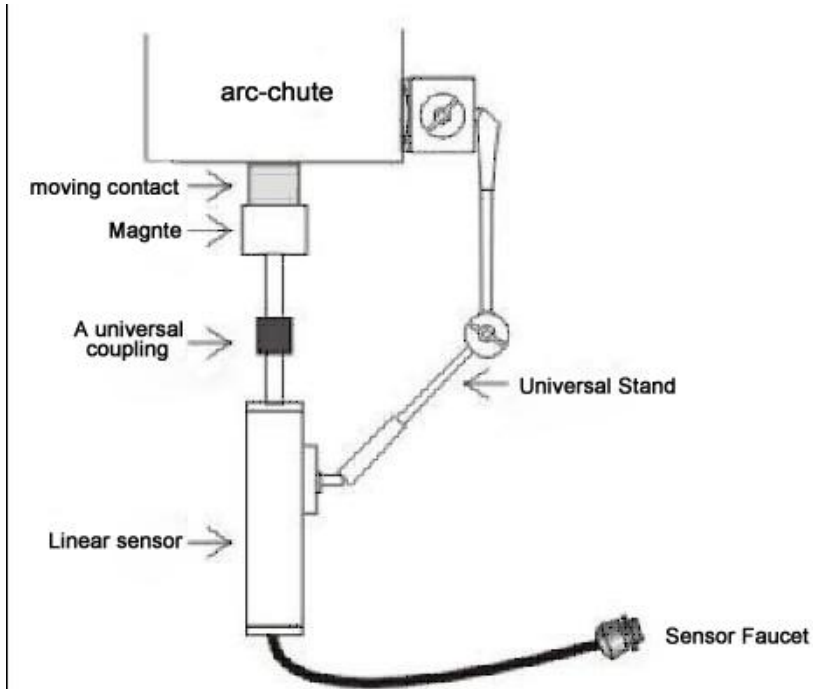
Installation Note 3: the universal sensor installed in the switch automatically rod certain location space should be left around the sensor up and down when the switching action, does not cause the sensor to collide with the surrounding switch parts in the course of the campaign, causing damage.

7.2 Reel Sensor

Universal sensor suitable for sensors for linear motion of the gun, some switches, especially imports and joint venture switch, linear transmission parts are enclosed inside the switch body, versatile sensor can not find the installation site. Switch manufacturers factory do speed test, a test switch the division and indicator or rotating shaft, such choose the rotation sensor.

Installation note: rotation sensor axis should as far as possible and switch axis keep concentric, otherwise sensor rotating obstacles, measure curve of burr will be very heavy, impact test data is correct.

7.3 Linear Sensor

If you need very accurately measure, switch action stroke, need to use linear sensor.

Linear sensor has three specifications, respectively is 50 mm, 200 mm and 300 mm.

50 mm linear sensor used for vacuum switch stroke velocity measurement;

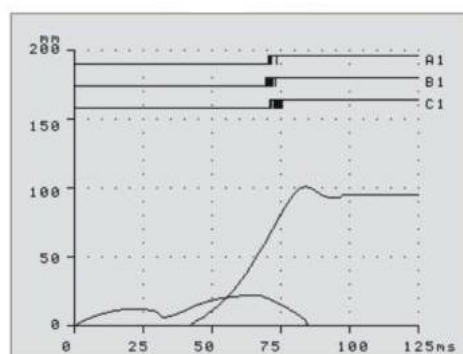200 mm and 300 mm for SF6 switch stroke, speed measurement, the two kinds of sensors is a standard configuration.

To a certain type of vacuum switch as an example, in the following figure. Linear resistance sensor in the installation, to ensure the sensor motion shaft to linear motion, with magnetic universal support fixed good sensor. For SF6 switch, oil switch, similar to the way.

Tip: linear sensor for its field installation of loaded down with trivial details sex, is not the product of conventional accessories, users can according to need, in view of the different switch, oneself design mounting bracket, keep sensor rod and switch dynamic contact sport parallel and synchronization, can be precisely detect switch movement stroke and the corresponding speed.
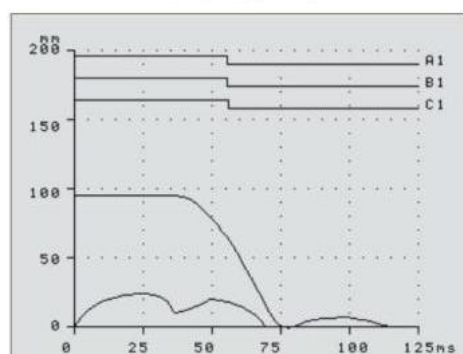
VIII.The Compatibility Of The Instrument And After-Sales Service

The company's products are sold and invoiced for three years, and life-long maintenance. Welcome to feedback valuable opinions and information on our products. We will realize your vision and request wholeheartedly. Thank you for your cooperation.
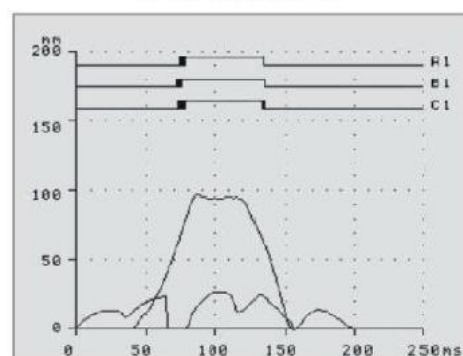
Appendix 1. Use Instrument Some Measured Graphics And Text Results

Close	Pole A	Pole B	Pole C	
1	69.9	70.9	71.0	
2				
3				
4				Inter.
Inter.	0.0	0.0	0.0	1.1ms
V.				
S.	106.2mm			
V.Max	4.15m/s	V.Ave.	3.75m/s	
I.coil	2.27 A	R.coil	100	

Open	Pole A	Pole B	Pole C	
1	55.6	55.8	56.4	
2				
3				
4				Inter.
Inter.	0.0	0.0	0.0	0.8ms
V.				
S.	106.5mm			
V.Max	5.23m/s	V.Ave.	4.74m/s	
I.coil	2.41 A	R.coil	98	

Reclose	o	c	Gold short	
A1:	74.2	54.4	60.3	
B1:	72.0	54.9	63.0	
C1:	73.9	55.6	61.8	
A2:				
B2:				
C2:				
A3:				
B3:				
C3:				
A4:				
B4:				
C4:				

Appendix 2. Internal Control Power Wiring Diagram

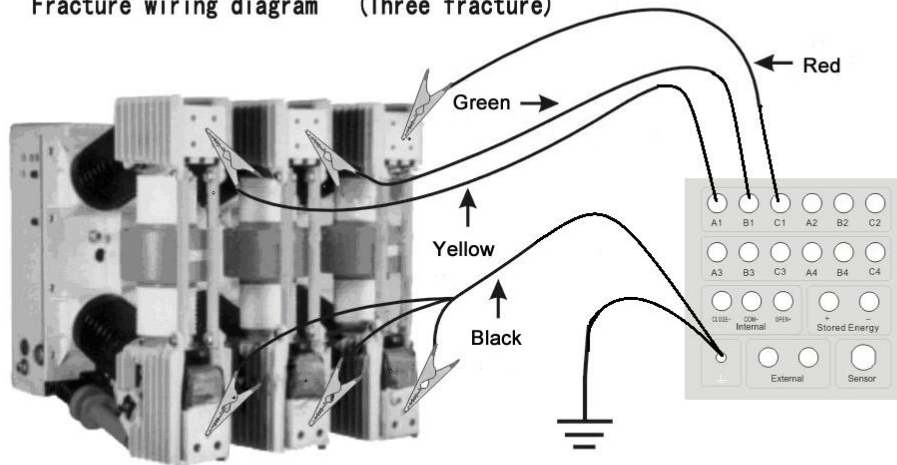Note: must disconnect measured switch control box control power (usually will control the control power supply and control bus linked insurance dial the off), but can't cut off switch mechanism of stored energy power supply.
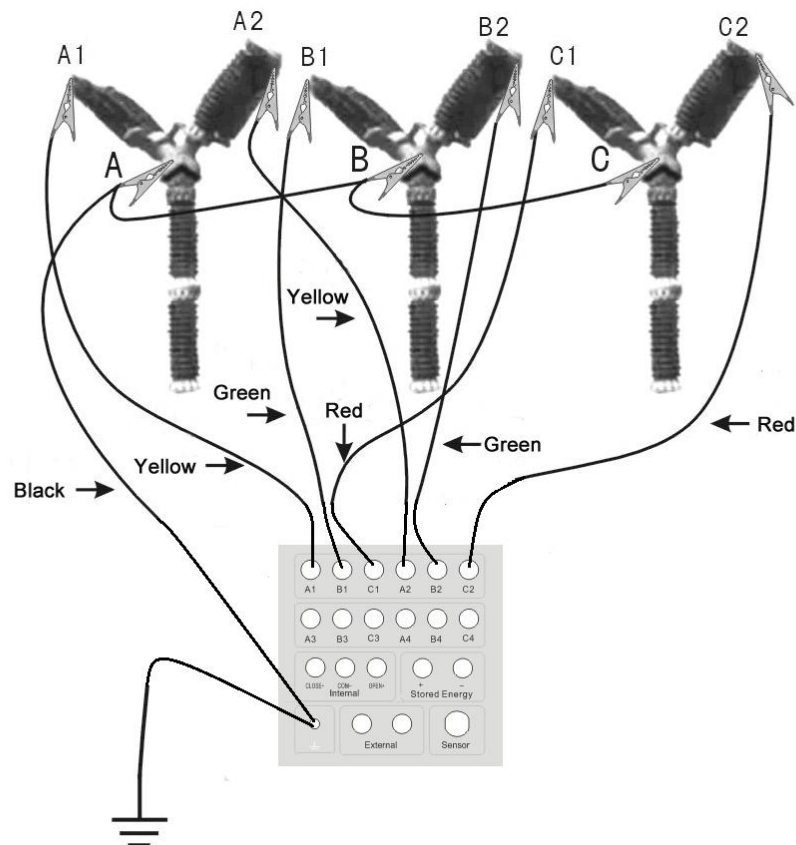
Appendix 3 Fracture Line Diagram

Fracture wiring diagram   (Three fracture)

Fracture wiring diagram   (Six fracture)

Appendix 4. Testing Field Common Technical Problems And Treatment Measures

A. Field use instrument control together, break-brake operations, switch not action

1. Field close, points brake control wiring is not correct or control circuit problems

Processing method: find the control cabinet control wiring diagram, ask relevant protection professionals, respectively to find close, points brake coil and switch auxiliary contact, see appendix 2 this manual control wiring diagram and instructions rewiring. Check control circuit, ensure smooth loop.

2. Instrument hint "output short circuit or load is too big, please shut down check control wiring"

(1) The control wiring error, cause instrument output short circuit, the short circuit protection function start, instrument "close, points brake control power" no output.

Processing method: shutdown after see the above first, 1 to test connection.

(2) The field coil load is too large, the instrument can't normal drive

Processing method: (1) for electromagnetic mechanism of switch, due to the switch closing coil requirements of the drive current very large (up to 100 a or hundreds of Ann), and the instrument operation power the maximum loading capacity of 20 a. The load is too large, the instrument can't normal drive.

Site is usually the switching control line up in closing coil former level switching contactor coil, use instrument control switch contactor close, with the contactor drive switch closing coil, make the switch action. Or use "external trigger" mode of operation switch switching.

(2) For hydraulic and spring mechanism of the switch, due to the instrument to output current is greater than 6 when a default "load excessive". Please have a look at or using a multimeter to measured the closing coil resistance tolerance of the elements and confirm closing coil current is heavy. Then please carefully check the wiring, confirm closing output no short circuit, then cancel instrument short circuit protection function test. (note: instrument short circuit protection function was cancelled, "close, points brake control power" output will not have protection function, if the control power output is really short circuit state, it may cause instrument control power damage! Please careful operation)

The specific method is: shutdown - hold button and hold it down to boot, until you reach the "release button" screen prompt to loosen the key, short circuit protection function to cancel.

Note: instrument as long as to shutdown or reset, short circuit protection function and restart.

3. Inspection equipment operating power if there is a dc output

Using a multimeter to instrument internal provide operating power for voltage check check (see this manual article 5.1.1 the first 9 items). Such as voltage output normal, the other inspection; If no voltage output, then

(1) Operation line of insurance tube burned or line damage.

Processing method: replace new insurance tube or to meet good line.

(2) Instrument internal power damage

Processing method: use the switch cabinet operating supply, adopting the "external trigger" way operation. (see this manual 6.2. (2) introduced the operation) and notify the company return factory maintenance or provide spare machine.

4. Switching mechanism exist to protect atresia (such as Siemens, ABB switch)

Processing method: (1) the use of instruments to provide inner power operation switch close, points brake test, to dissolve atresia, please on-site technical personnel or switch factory personnel according to the control cabinet control wiring diagram, help remove atresia.

(2) Use site operation power, with "external trigger" means test.

Second, the instrument do single joint, single points test, switch action, but countless according to display

1. Ground not completely meet good

Processing method: carefully check the ground, retighten ground.

2. Closing coil or points brake of coil resistance is too big, so that the load is too small (general coil current less than 1 a, is easy to appear this kind of circumstance), makes the instrument to trigger the, not the collected data.

Processing method: cancel the short circuit protection function to test. (see first, 2 (2) how

to cancel the short-circuit protection function)

3. Closing out data, the switching control loop damage, points brake out data, then points brake control loop damage.

Processing method: field with the good all the way power control channel temporary test. Such as closing out data, then use points brake channel test closing, the method is, the points brake line (green, black line) joint in the closing coil, with points brake control to operate switch closing test process. The field test after completion of the return factory maintenance or notify the company provide the backup machine.

Three. instrument do single joint test, switch is closed, and separate immediately.

1. Switch control circuit has a problem

Processing method: carefully check the switch control circuit and remove the faults.

2. Switching control channel damage

Processing method: take the points brake line, use switching control channel do test (see the second, three processing way), when the experiment is complete return plant maintenance.

Four. printer can walk paper but can't print text, graphics

1. Printing paper installed backwards

Processing method: to properly installed thermal printing paper.

2. Thermal printer heating head is broken

Processing method: return factory maintenance thermal printer heating head.

Five. the instrument speed test, test results appear full screen vertical stripe

The sensor options wrong (such as general sensor with linear or rotary, linear or rotary with general options).

Processing method: the sensor choose to set up.

Technology Answer

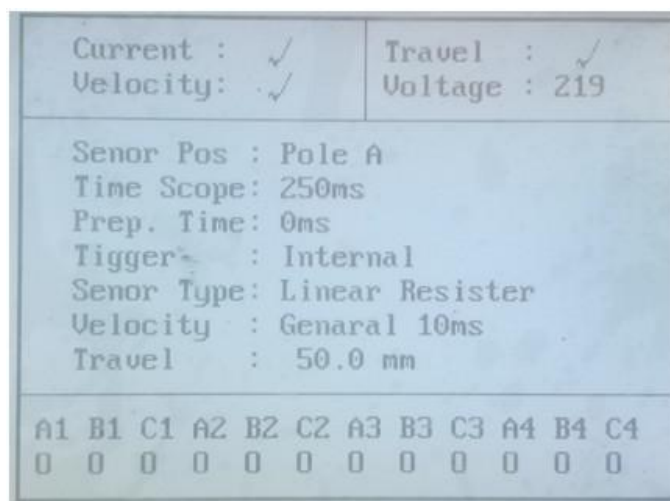1. Instrument field ground, why must first ground line, and then pick fracture line?

Answer: the field test, due to high voltage switch (especially 220 kv above) to the fracture between often have high induction voltage, the voltage value is very big, energy is lesser, but enough to threaten the safety of the instrument itself. Internally, fracture signal input to

the indirect have bleeder circuit. First ground line, the actual priority on the discharge circuit, the connection fracture signal line, even fracture induced a high voltage, also can through the discharge circuit drain on the earth, so as to ensure the safety of the instrument fracture channel.

2. How to judge the instrument port is normal or not?

Answer: choose the test 】 - the closing test 】, instrument of liquid crystal display the bottom there are 12 fracture real-time status display. Screen are shown in the following graph:

In this interface can detection instrument fracture channel is in good condition, fracture input if it is impending, should display "points", if on short circuit, it should display "close". So the respectively each fracture on short answer it, to observe the change of state display, to determine the instrument fracture time channel is normal or not.


```
Current :   √        Travel   :   √
Velocity:  .√        Voltage : 219

Senor Pos : Pole A
Time Scope: 250ms
Prep. Time: 0ms
Tigger    : Internal
Senor Type: Linear Resister
Velocity  : Genaral 10ms
Travel    : 50.0 mm

A1 B1 C1 A2 B2 C2 A3 B3 C3 A4 B4 C4
0  0  0  0  0  0  0  0  0  0  0  0
```

3. What is just points ($) speed? With time and distance section definition switch just points ($) speed have why to distinguish?

Answer: the so-called just points ($) speed is refers to the high voltage switch just minutes (just before points) for a period of time (or a distance) average speed. If the time is defined standards, IEC standards and China's national standards generally defined as $10 minutes before the average speed of ms. For some countries or some switch manufacturers definition is different, my company instrument can through the computer and matching speed definition add degree redefined. Both can be defined as time, also may be defined as distance section, but is flexible and convenient for high voltage switch

provides speed test. In vacuum switch for example, 10 kv switch open distance is commonly S = 11 mm or so, its just $(points) speed is defined as just before the close (just minutes) 6 mm average speed. Also some manufacturer defined as the following kinds:

(1) Switching take the average, points brake take just points 6 mm average speed;

(2) Switching take the average, points brake take the average speed;

Given the speed definition add program function, also can convenient according to specific vacuum switch on speed test. In addition, the influence of vacuum switch on speed test, because points brake process buffering mechanism of action, the whole points brake process average speed is very low. General definition vacuum switch points brake process buffering mechanism of action before the average speed for the whole process of the average velocity, namely switching take the average, points brake take just points 6 mm average speed is relatively close to the true value. Because of 35 kv vacuum switch open distance is commonly S = 22 mm or so, so all for the 10 kv vacuum switch speed in the definition numerical 6 to 10 or 11 can.

Appendix 5. Packing List

No.	Item	Qty
1	Main engine	1
2	Three core test line	1
3	Two core test line	1
4	Four core test line	1
5	Test line (3 black 1 red 1green 1 yellow)	6
6	The universal bracket	1
7	Rotating sensor	1
8	Line sensor	1
9	Sensor wiring	1
10	Double test line	2
11	Power line	1
12	Ground lead	1
13	Alligator clips (4 black 2 red 2green 2 yellow)	10
14	Fuse pipe	4
15	Print paper	2
16	Small clip(3 black 1green 1red)	5
17	Needle joint(1 black 1green 1red)	3
18	Allen wrench	1