FCZ-V AC/DC Discharge Counter Calibrator

I. General information

FCZ-V series AC/DC Discharge Counter Calibrator for Lightning Arrester is used to verify the reliability of various arrester counter action. The reliability of counter action is very important for power system. It is an important parameter to record the number of lightning strikes of arrester in normal operation. It can provide an important basis for the personnel of power system to test the arrester. This instrument is mainly used for high voltage arrester above 35kV.

II. Features

- Small size, light weight;
- Easy to carry;
- Good reliability;
- Simple operation.

III. Technical Specifications

- Output voltage: DC1600V±3%
- Time interval: ≥30s
- Power supply: DC12V / AC220V±10%, 50Hz±2%
- Impulse current: ≥100A(8/20μs)
- Dimension: 380×250×180mm
- Weight:3kg

V. Principles

1. Wiring

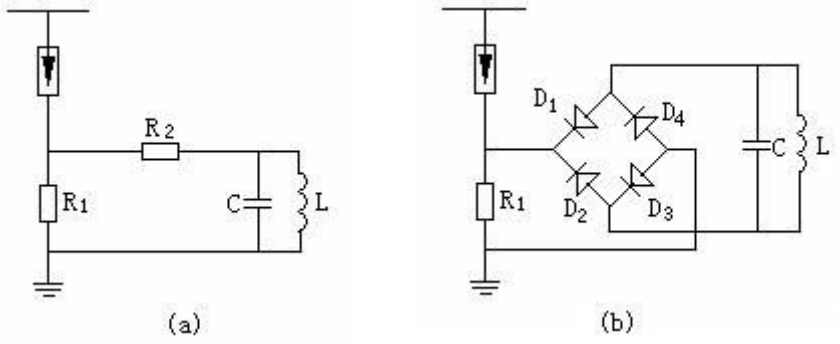

Figure 1 Principle wiring diagram for JS type action counter

(a) JS type; (b)JS-8 type

R1 & R2 - non-linear resistor; C - energy-storage capacitor;

L - coil of counter; D1~4 - silicon diode)

Principle wiring diagram of JS type action counter is shown as Figure 1. Figure 1 (a) shows the basic structure of JS type action counter, which is called double valve plate structure. When the arrester acts, discharge current flows through valve plate R1, the voltage drop on R1 is charged to capacitor C by valve plate R2, then C discharges the inductance coil L of the electromagnetic counter to make it rotate by 1 grid and record 1 time. Changing the resistance of R1 and R2 allows the counter to have different sensitivities. The minimum action current is100A(8/20μs). Because there is a certain voltage drop on R1 and residual voltage of the arrester will increase, so it is mainly used for high voltage arrester above 35kV.

Figure 1 (b) shows the structure of JS-8 type action counter, which is a rectified structure. When the arrester acts, the voltage drop on the high temperature valve plate R1 is charged to capacitor C by full wave rectification, then C discharges the inductance coil L of the electromagnetic counter to make it count. Resistance value of valve plate R1 is small (at 10kA, voltage drop is 1.1kV), flow capacity is large (1200Asquare wave), and minimum action current is100A(8/20s) impulse current. JS-8 type counter can be used for lightning arrester in 6.0～330kV system, JS-8Atype counter can be used for lightning arrester in 500kV system.

2. Detection method and working principle

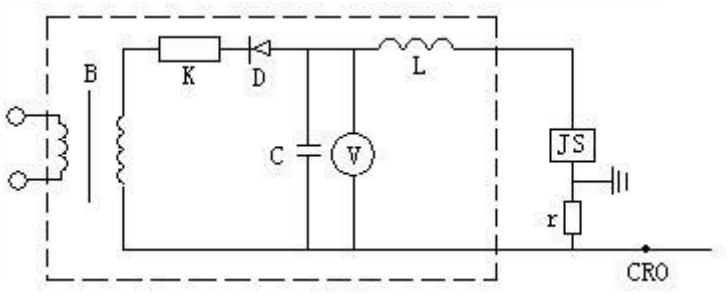

Figure 2 Principle wiring diagram of standard impulse current method
(parts within dotted box is impulse current generator)

(C - charging capacitor; R - charging resistor; L - damped inductance
D - rectified silicon diode; r - rectifier; B - testing transformer
V - electrostatic voltmeter; CRO - high-voltage oscilloscope)

Due to poor sealing, the action counter may enter moisture during operation, causing internal components to rust, resulting in the counter not functioning properly. Therefore, the Regulations stipulate that it should be inspected once a year. On-site detection methods of counter action include capacitor discharge current method, AC current method and standard impulse current method. The research shows that the standard impulse current method is the most reliable one. Its principle wiring diagram is shown in Figure 2. Impulse current wave (8/20μs,100A) generated by impulse current generator is applied to the counter. If the counter operates normally, it indicates that the instrument is good, otherwise it should be disassembled and repaired.

The Regulations stipulate that continuous test should be conducted for 3-5 times, each time with normal operation and every time interval not less than 30s. The recorder should be set to 0 after the test.

V. Operation Procedure

Figure 3 Front panel of the instrument

1. Connect the output end of the instrument to both ends of lightning arrester counter (the connecting wire should be as short as possible), red end to the upper end, and black end to the ground end.

2.After the power cord is connected, check whether the instrument and wiring are correct. After confirmation, start to test.

3. Turn on power switch, the voltage starts boosting. Generally, counter can be calibrated as soon as voltage reach about 600V.

4. Press “Calibration” key and voltage begins to output. At this point, counter actions can be observable.

5.If more than one test is needed, wait until output voltage reaches desired value, then press “Calibration” key again to observe counter actions.

6.Turn off the power supply immediately after testing, then remove the wiring only when output voltage completely returns to zero.

7.If the output voltage does not drop by pressing the "Check" button, power should be turned off. After voltage tuns to zero, check whether there is a break point in the circuit or the discharge counter is not suitable for the model specified in the technical index.

VI. Attentions

- During removal of wiring, if output voltage does not return to zero, operators cannot touch the non-insulated part of the test cables in case of accidents.
- Test objects are not allowed to carry electricity.
- When DC power is no longer in use after testing, the built-in battery should be timely charged.
- In the process of DC testing, if boot voltage cannot reach 1600V, DC power should be replaced by AC power.
- When the instrument is not in use for a long time, the built-in battery pack should be charged on a regular basis (two months) and about 10 hours for each charging until charging light turns into green