

Portable Surge Protective Device Tester

SPD T8 tester

User Manual



Index

| | |
|--|-----------|
| Cover ----- | 1 |
| Index ----- | 2 |
| Safety Precaution ----- | 3 |
| Packaging ----- | 3 |
| Introduction ----- | 4 |
| Standards, applications ----- | 4 |
| Specification ----- | 5 |
| Control Function ----- | 6 |
| Operation Procedure ----- | 7 |
| Operation Procedure ----- | 8 |
| Procedure for Batteries Replacement ----- | 9 |
| Maintenance and Repair ----- | 10 |
| Troubleshooting ----- | 11 |
| Measurement Inspection Method ----- | 12 |
| Measurement Inspection Method ----- | 13 |
| Technical Enquiry ----- | 13 |

Safety Precaution

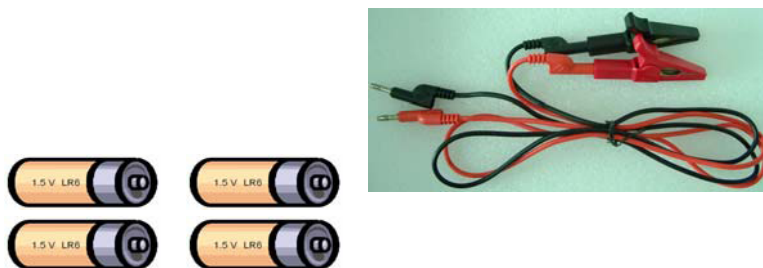


This tester can produce up to 1000V testing voltage. To obtain accurate performance and prevent injury, please follow the safety instructions below :

- 1 · Before the “**TEST**” button is pressed, make sure the tester connection with testing component is complete.
- 2 · During the “**TEST**” button is pressing, do not touch the testing component and the cable of the tester.
- 3 · After the “**TEST**” button is released, wait for about 5 second before touching any component.
- 4 · Short circuit the testing rods before and after each test.
- 5 · DO not press the “**TEST**” button when no testing component connected.
- 6 · Make sure the batteries in the tester are in correct polarity
- 7 · Remove the batteries for long-time storage.
- 8 · When LCD Display shows “LOBAT”, it mean low battery supply, battery replacement is necessary. Otherwise, accuracy of measurement will be affected and the internal circuit of the tester may not fully operate.

Packaging

The SPD Tester Box set includes the following items:



| ITEM | Quantity | |
|------|------------------------------|---|
| 1 | SPD Tester T8 | 1 |
| 2 | Tester Bag | 1 |
| 3 | Testing rods | 2 |
| 4 | 1.5 V LR6 Alkaline Batteries | 4 |
| 5 | User-manual | 1 |



Introduction

Surge Protective Devices Tester, SPD Tester T8 is designed for on-site testing of Surge Protective Devices (SPD). It allow to measures both the **Nominal Voltage** and Leakage Current of different SPDs. Users can determine the status of these components according to the tester readings.



The tester can measure both type of main component inside SPDs, including:

a) Voltage Limiting Type (MOV, TVS, Zener Diode)

The SPD tester injects a constant current into the component and measure the **Let-Through Voltage**. Then, the tester can use this voltage to find out the **leakage current** of the component.

b) Voltage Switching Type (Gas Discharge Tube, Solid Discharge Tube, Spark Gap)

The SPD tester injects a constant current into the component and measure the **Break Down Voltage** of the component. What the tester outputs is slope of 10V/ms voltage not a constant current

Standards, applications

This Tester is made with reference to IEC 61643 part 1 and part 21

IEC 61643 “Surge protective devices connected to low voltage power distribution system”

Part 1: Performance requirements and testing methods. Class I and II tests

IEC 61643 “Surge protective devices connected to telecommunications and signaling networks”

Part 21: Performance requirements and testing methods

Specification

| (i) General | |
|--------------------------------------|---|
| Dimension (Length x Width x Deep) | 252mm × 121mm × 50mm |
| Weight | 0.8kg |
| Case Material | ABS |
| Display | LCD 15mm Height Digit |
| Color | Light Grey Case, Red and Black tester rod |
| Operation Temp. | 0°C ~ 40°C |
| Operation Humidity | ≤ 75% |
| Storage Temp. | -10°C ~ 50°C |
| Power Supply | 4 × 1.5V LR6 Alkaline Battery |
| Battery Life | 500 measurements |

| (ii) Technical Specification* | | | | |
|--------------------------------|-------------------|-------------|------------|----------|
| | Measurement Range | Range | Resolution | Accuracy |
| 1mA DC Reference Voltage | 600V | 50V~600V | 1V | 3% + 5 |
| | 1000V | 500V~1000V | 1V | 3% + 5 |
| Discharge Voltage | 600V | 50V~700V | 1V | 3% + 5 |
| | 1000V | 500V~1200V | 1V | 3% + 5 |
| Leakage Current | 0~199.9μA | 2.0~199.9μA | 0.1 μA | 5% + 10 |

*Internal Buzzer beeps for each successful measurement.

| (iii) Safety Parameter | |
|--------------------------|---------------------------------|
| Maximum Overload Current | 2mA |
| Maximum Output Voltage | ≤ 1500V (No Load) |
| Case Protection Level | IP65 |
| Calibration cycle | Once a year (recommendation) |

Control Function

1. Output Terminal:

RED : Positive

Black : Negative

2. LCD Display

3. Test-Voltage Range Selector “(VS)”

Range:

(i) 600V

(ii) 1000V

4. Voltage Adjustment Switch “(VA)”

5. Operation Mode Selector “(OM)”

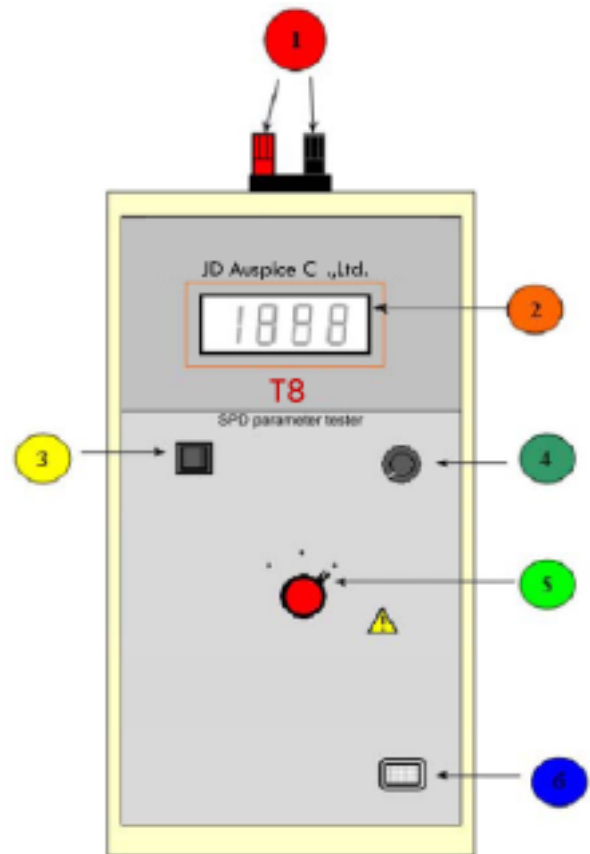
Mode:

(i) U_N : Nominal Voltage Measurement

(ii) V_A : Test-Voltage Adjustment

(iii) I_{leak} : Leakage Current Measurement

6. “TEST” button.



Operation Procedure

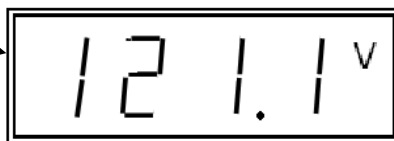
1. Connection

- 1.1 Connect the red and black tester rods to the output terminal. Then, short circuit the tester rods to release the charge inside the tester.
- 1.2 Open the battery cover and insert four 1.5V LR 6 Alkaline Batteries into the tester. Make sure the batteries are in correct polarity.

2. Conducting Voltage Measurement

2.1 For the conducting voltage measurement of an unknown SPD (including Voltage Switching Type and Voltage Limiting Type component) :

- ▲ Turn the **Operation Mode Selector**, “(OM)” to “(UN)” position.
- ▲ Press the **Test-Voltage Range Selector**, “(VS)” switch to “600V”.
- ▲ Connect the terminal of the component to T8 tester by the two tester rods.
- ▲ Press the “**TEST**” button for 2 second until the LCD display a numeric reading with Unit “V”. A “Beep” sound from the tester buzzer indicates the reading is valid.



Attention:

- ▲ ① If the LCD reading exceeds 600V, it means that the **Nominal Voltage** is larger than 600V. It is required to turn the “(VS)” to the “1000V” side and repeat the test again.
- ② If the LCD reading is inside the range of test voltage of “(VS)”, it means “(VS)” selection is correct and the reading is valid.
- ③ If no “**Beep**” sounds after the “**TEST**” button is pressed, it means the current across the MOV is less than 1mA or the Gas Discharge Tube does not reach the **Break Down Voltage**. So the reading is invalid. Please check “(VS)” if it is set to “1000V” or the output terminal is open-circuit.

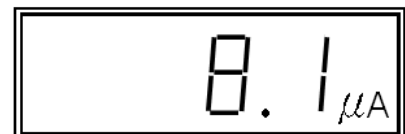
Note: The reading is the **Nominal Voltage**---for Voltage Limiting Type (e.g. MOV). If it is Voltage Switching Type (e.g. Gas Discharge Tube), the reading is **Break Through Voltage**.

2.2 For the measurement of known SPD Nominal Voltage

- ★ Switch “(OM)” to “(UN)” position.
- ★ According to component **Nominal Voltage**, if it is less than 600V, then press the “(VS)” to “600V” position; if it is larger than 600V then press the “(VS)” to “1000V” position.
- ★ Connect the tester to the testing component by the tester rods.
Press the “TEST” button, until the buzzer produces “Beep” sound, LCD shows the stable value with the unit “V”, then release the “TEST” button.
Compare the reading with the specification of the component.
- ★ **Attention** : For **Nominal Voltage** measurement, the reading is valid only after the “TEST” button is pressed for more than 2 second with the “BEEP” sound as indication from the tester buzzer. Otherwise, the reading is invalid.

2.3 Leakage Current Measurement

- ◆ Connect the testing component to the tester by the two testing rods.
- ◆ Turn “(OM)” to “(VA)” Position.
- ◆ According to the preset testing voltage, turn the adjust “(VS)” to a suitable position : If the testing voltage is smaller than 600V, turn “(VS)” to “600V” position. For more than 600V, turn “(VS)” to “1000V” position.
- ◆ Press the “TEST” button, adjust the “(VA)” button (Clockwise: Increase,
- ◆ Aclockwise: decrease) until the display value equal to the preset value, then release the button.
- ◆ Switch “(OM)” to “I_{Leak}” position and press the “TEST” button, The LCD display the leakage current (μA) of the testing component.

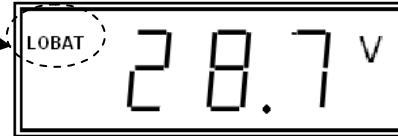


- Attention** :
- ① The maximum reading for leakage current is 199.9 μA . For reading larger than 199.9 μA will only display a “1” on tester LCD.
 - ② “There are no beep sound indication on operation mode “(OM)” on “(VA)” and “I_{Leak}” position.

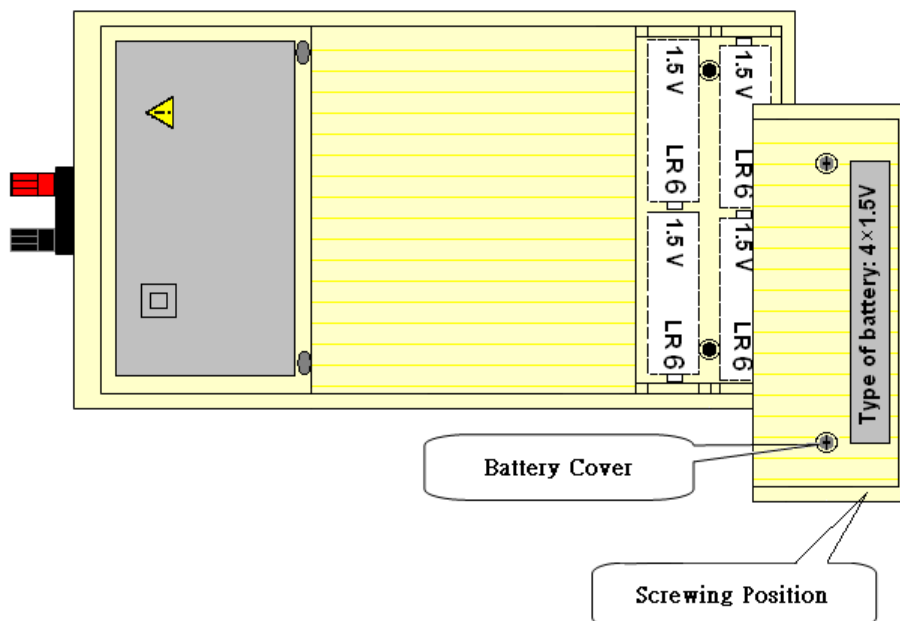
Procedure for Battery Placement

The tester uses four 1.5V LR 6 ALKALINE batteries as power supply. When the LCD shown the “LOBAT”, it is necessary to replace the batteries..

Here is the procedure:



1. Remove the tester rods;
2. Screw up the screws at the back of the tester;
3. Open the battery cover;
4. Remove the old batteries;
5. Install the new batteries; screw the battery cover back to the tester.



Maintenance and Repair

To make sure each measurement is accurate, keep the tester away from : shock 、 corrosive gases, salt and high temperature, etc.

- ★ After testing, remove the tester rods and bring all things back to the tester box. For long time not using the tester, please remove the batteries.
- ★ If the LCD display “LOBAT” after pressing the “**TEST**” button, it mean low battery supply, please replace the battery.

If the tester requires maintenance, please contact the supplier, they will bring the tester back to the technical service centre for further inspection.

Troubleshooting

| Problem | Cause | Suggestion |
|---|---|--|
| NO LCD display after “TEST” button is pressed | No batteries or batteries in wrong polarity | Check the batteries |
| No “Beep” sound from the Buzzer after the “TEST” button is pressed. | Voltage Range “(VS)” setting is too low. (i.e. “600V”) | Turn the switch, “(VS)” to “1000V” Position |
| | Tester Rods Open Circuit | Check if the Tester Rod are connected to the tester and the testing component |
| | Testing Component is Open Circuit | Check the component or replace another one |
| | Low Batteries power | Replace the batteries |
| | Position of the “(OM)” is not on “(UN)” | Turn “(OM)” to the “(UN)” Position |
| | The Nominal Voltage of the testing component exceeds the testing range of the tester | -For Voltage limiting Component, Max. Testing Voltage is 1000V -For Voltage Switching Type Component, Max. Break through voltage is 1200V |
| After “(OM)” Turn to “(VA)” Position and press “TEST” button, Output voltage remains constant no matter adjusting the “(VA)”. | The testing component is conducted but the output voltage is limited. | Check the Nominal Voltage of the testing component |
| During the leakage current test, the LCD displays “ 1 ” | The leakage current of the testing component is larger than 199.9μA | Turn “(OM)” to “(VA)” and set the voltage for leakage current measurement again |

Measurement Inspection Method

The following method suitable for the tester after periodic check or maintenance

1. Check for Output Voltage Accuracy

- (1) Turn “(OM)” to “(VA)” position, connect the output terminal to a standard voltmeter.

(Red Terminal: positive pole; Black Terminal: Negative Pole)

- (2) Press the “TEST” button and adjust the “(VA)” button, compare the LCD reading with the reading on the voltmeter. Check if the different in reading is inside an acceptable range of error percentage.

2. Check for the error of Constant Current

- (1) Turn “(OM)” to “(UN)” position, connect the output terminal with a standard resistor (error $\pm 0.5\%$).
- (2) Press the “TEST” button, read the reading on the LCD until “BEEP” sound from the buzzer. Obtain the current value (Reading Voltage/Standard Resistance) if it is equal to the constant current value(1mA) from the tester, error should be smaller than $\pm 5\%$.

3. Check for the measurement error of the Leakage Current

- (1) Connect with standard resistor $10M\Omega \pm 0.5\%$ to the output terminal.
- (2) Turn “(OM)” to “(VA)” position. Press the “TEST” button. Adjust the “(VA)” knob to a suitable voltage display.
- (3) Keep pressing the “TEST” button and turn “(OM)” to “ILeak” position simultaneously.
- (4) Obtain the leakage current value (Voltage on voltmeter/Standard Resistance).
- (5) The different between the LCD reading and the value obtained on previous step should be smaller than $\pm 3\% + 10$ digit.

4. Check for Conducting Voltage Measurement Accuracy

- (1) Turn the Operation Mode Selector, “(OM)” to “(UN)” position.

- (2) Set the Test-Voltage Range Selector, “(VS)” to “600V”.
- (3) Screw up the screws at the back of the tester. Oper the battery cover.
- (4) Connect the output terminal with a gas tube. Simultaneously, connect the red terminal with the signal lead of oscilloscope probe, connect the negative pole of the battery with the reference lead of oscilloscope probe. Press the “TEST” button, read the reading on the LCD until “BEEP” sound from the buzzer. Obtain the breakdown voltage to check if the different in reading and the oscilloscope measurement is inside an acceptable range of error percentage.
- (5) Set the Test-Voltage Range Selector, “(VS)” to “1000V” and repeat the above steps.