This portable DC ground fault locator provides a quick and cost-effective solution for ground fault locating in DC distribution systems.

This portable DC ground fault locator uses advanced computation methods and fuzzy logic to rapidly and accurately display the insulation level of a tested circuit branch providing an insulation index and waveform. It is specially designed for use in power generation, distribution, and industrial applications where lines have high capacitive reactance, electromagnetic, and electrostatic fields.

The cost-effective DC ground fault locator is able to efficiently perform fault testing for indirect grounding, non-metal grounding, loop grounding, positive and negative grounding, positive and negative balance grounding, and multipoint grounding in DC systems. It displays system voltage, voltage to ground, and grounding resistance. The user can set an insulation alarm threshold value.

Key Features

- High resolution (0.1 mA) signal sampling, direct current clamp meter
- Sensitive ground leakage detection
- Displays insulation index and waveform
- Indicates direction of ground point
- Easy to operate, and convenient to use
## Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grounding Resistance Range</td>
<td>220 V: 0 Ω to 500 kΩ</td>
</tr>
<tr>
<td></td>
<td>110 V: 0 Ω to 250 kΩ</td>
</tr>
<tr>
<td></td>
<td>48 V: 0 Ω to 50 kΩ</td>
</tr>
<tr>
<td></td>
<td>24 V: 0 Ω to 10 kΩ</td>
</tr>
<tr>
<td>Detection of Signal Power</td>
<td>≤ 0.2 W (the output power of the signal generator)</td>
</tr>
<tr>
<td>Anti-distributed Capacitance Value</td>
<td>Branch ≤8 uF, total ≤100 uF</td>
</tr>
<tr>
<td>to Ground</td>
<td></td>
</tr>
<tr>
<td>Direct Current System Voltage</td>
<td>220 V± 10%, 110 V± 10%, 48 V± 10%, 24 V± 10%</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-35 °C to 55 °C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>≤ 95%</td>
</tr>
<tr>
<td>Weight</td>
<td>2.8 kg</td>
</tr>
<tr>
<td>Dimensions</td>
<td>460 mm x 240 mm x 120 mm</td>
</tr>
</tbody>
</table>
Portable DC Ground Fault Detector

User Manual
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>Key Features</td>
<td>4</td>
</tr>
<tr>
<td>Operation</td>
<td>4</td>
</tr>
<tr>
<td>Tips for Use</td>
<td>5</td>
</tr>
<tr>
<td>Clamp Meter Saturation</td>
<td>8</td>
</tr>
<tr>
<td>Technical Specifications</td>
<td>8</td>
</tr>
<tr>
<td>Packing List</td>
<td>9</td>
</tr>
</tbody>
</table>
Introduction

DC power system grounding is an abnormal occurrence which may lead to system damage. If the DC system is grounding when the positive electrode/anode system is grounding, the power system protection relay device may falsely trip or switch off the DC power supply. When the negative electrode of the DC system is grounding, the DC system may short circuit and the switch closing function may not trigger which will cause a protection relay failure. This in turn may cause a relay or fuse to burn out and possible other failures.

The portable ground fault detector, model A0E10003, finds grounding faults in DC power systems with various voltage levels. The insulation level of the branch circuit being tested can be displayed as insulating degree or waveform. The grounding position and the direction of the grounding point relative to the detecting point are quickly and accurately located. Insulation alarm threshold values can be customized within the allowed range based on the need of the user.

The portable detector effectively discovers and locates various grounding faults due to indirect grounding, non-metal grounding, loop circuit grounding, positive and negative electrode grounding, positive and negative balance grounding and multipoint grounding. In addition, it displays system voltage, voltage to grounding and the value of grounding resistance.

The detector consists of the following modules: a signal generator, a fault detector and a signal sampler (clamp). The signal generator connects to the positive and negative bus of the DC system as well as ground. When a grounding fault is detected, a low frequency, low power signal is generated by the signal generator. The fault detector is connected to the clamp’s cable and samples and analyzes the electric current leakage of the branch circuit being tested and evaluates the insulation condition of the circuit.

The detector functions as follows: when a grounding fault occurs in the DC system or the insulation resistance value of the DC system falls below the threshold value an alarm is generated. The signal generator will automatically evaluate the voltage level of the DC system, the pole of the grounding fault and the grounding degree and then automatically analyze the connection mode of the balanced bridge circuit for monitoring insulating degree and the resistance value. The system voltage, the voltage between the positive electrode and ground, the voltage between negative electrode and ground and the insulation degree between the system and ground will be displayed.

The detector will detect current leakage and insulating status of the circuit to assess which loop/branch circuit has the grounding fault, the type of grounding fault and the location of the grounding fault.
Key Features

High-resolution Sampling Clamp
The high resolution (0.1mA) DC clamp is used for signal sampling to accurately locate multi-point grounding and high resistance grounding points.

Grounding Point Direction Display
The grounding point and direction is displayed.

Insulation Index Display
The insulation index (range: 0 to 100) rather than the absolute insulation value indicates the insulation degree of the DC circuit. The larger the insulation index, the poorer the insulating performance. The insulation index facilitates the detection of multi-point grounding and high resistance grounding faults.

Waveform Display
The detector collects the signals generated by the signal generator and displays their waveforms enhancing grounding fault detection range and precision.

Easy to Use
Connect the clamp meter to the target circuit as directed and press the test button. Circuit analysis is typically completed in 3 to 6 seconds.

No Distance Limit
The distance between the access point of signal generator and the grounding point is practically unlimited.

Safe and Reliable
The signal generator generates signals with an electric current from 1.0 to 5.0mA at a maximum power of less than 0.2W allowing for safe and reliable operation.

Operation

1. Connect the Signal Generator to the DC System
   With the power off, connect the red clip of the signal generator to the positive bus, the black clip to the negative bus and the yellow clip to the ground wire. Power on the signal generator.

2. Self-adaptation to Various Voltages
   The signal generator self-adapts to DC systems with various voltages. If the “Normal” indicator light is on, no grounding fault is detected. The DC system voltage, the voltage of positive electrode to ground and the voltage of negative electrode to ground will be displayed. When a grounding fault occurs, the signal generator will automatically check which electrode (positive or negative) is grounding and either the “Positive Grounding” or
“Negative Grounding” indicator will flash. The voltage of positive electrode to ground, the voltage of negative electrode to ground and the total insulation resistance of system to ground will be displayed.

3. Detector Preparation

Insert the clamp cable into the socket marked “Detector” and connect the device as described above and power on the detector. If the DC system is equipped with an online monitoring device, the device should be turned off during fault detection.

4. Start Detecting

If the “Communication” indicator light is on, the detected signal and the output signal are synchronous. If the “Communication” light is off, communication between signal generator and detector is not possible.

If the “Measuring Range” indicator light is on and if “Measuring Range #1” is indicated, measuring range #1 of the clamp is used; if “Measuring Range #2” is indicated, measuring range #2 (default) of the clamp is used.

5. When the positive and negative wires cannot be clamped at the same time

In this case “Single Wire Clamping” may be applied for fault detection. If the positive electrode is grounding, connect the clamp meter to the positive cable; if the negative electrode is grounding, connect the clamp meter to the negative cable.

6. When multi loop wires are bundled together

In this case, the clamp should be clamped to the bundled wires (note: the clamp opening must be completely closed). If “Non Grounding” is displayed no grounding fault has been detected. If “Grounding” is displayed then each circuit in the bundle must be individually tested to locate the fault.

Tips for Use

1. Signal Generator Connection

The signal generator should be connected to the positive and negative bus and the ground wire. The connection positions should be close to the output of the battery. When a grounding fault is detected in a distant branch circuit, the signal generator should be connected to the output location of the DC fuse of the branch circuit closer to the fault area or the DC mini-bus of the circuit to enhance the detection accuracy. During the detecting process, the signal generator should be always connected to the power supply end of the branch DC circuit. The fault detector and the clamp should always be located at the load end of the DC system.

2. To Test a Bundle of Circuit Wires

If the result of testing a bundled circuit is “Non Grounding”, then there is no grounding fault in any of the circuits. If the result is “Grounding”, then each circuit should be inspected separately.
3. Fault Positioning

When a grounding fault is detected, to locate the grounding position use the bi-section method as follows: If a grounding fault is detected at position A and there is no grounding fault at position B, then the fault point is between A and B; next choose the mid-point of A and B for the next detection point, and so on.

4. Detecting Multi-point Grounding Faults by Using the “Insulation Quantitative Index”

If there are more grounding faults in the system or both the positive and the negative DC bus are indicated, the instrument will automatically detect the branch circuit and will locate the grounding fault position during the detection process of each circuit. The grounding fault points should be tested one by one for each circuit by analyzing the detection results based on the quantitative index of insulation and the reference insulation degree percentage.

5. The Direction of the Grounding Point

The direction of the grounding point can be determined by using the arrow direction of the clamp as a reference direction. If the direction of the clamp meter does not change and the arrow direction displayed on the detector is downward, the direction of the grounding point is opposite to the direction of the clamp; if the arrow direction is upward, the direction of the grounding point is the same as the direction of the clamp meter.

6. Detecting Loop Circuit Grounding Using the “Direction of the Grounding Point”

If one or two ends of two circuits are connected together in the system a closed-loop system is formed (also known as a loop circuit). Generally, loop circuits occur in the following cases:

- The positive and negative poles of two circuits are connected to form a loop circuit;
- The positive poles or the negative poles of two circuits are connected to form a loop circuit;
- The positive pole of one circuit is connected to the negative pole of another circuit via load to form a loop circuit.

If possible, disconnect the loop circuit to enhance detection efficiency and decrease the detection time. If not, the signal generated by the signal generator is bypassed by the loop circuit causing a grounding signal to be detected. In this case, the direction of the grounding point cannot be determined.

7. Detecting Grounding Fault Using the Waveform

The grounding fault can be determined by the status (on/off) of the grounding indicator of the fault detector or by the waveform displayed on the LCD screen. The waveforms and their representations are explained as follows:

- Non-grounding waveform
- Grounding waveform (68 k grounding measurement range #1)

![Grounding waveform #1](image)

- Grounding result (68 k grounding measurement range #1)

![Grounding result #1](image)

- Grounding waveform (68 k grounding measurement range #2)

![Grounding waveform #2](image)

- Grounding result (68 k grounding measurement range #2)

![Grounding result #2](image)

The grounding degree of the detected circuit can be determined based on the waveform as follows: The larger the amplitude of the waveform the smaller the impedance of the circuit. A smoother waveform indicates better insulation status of the circuit.

Note: “Range #1” automatically displays grounding and insulation status. “Range #2” determines grounding based on the waveform and the value of electric current leakage.

8. **Inspecting the battery**

Attention should be paid to the battery indicator. If the battery power is low, it should be immediately recharged to ensure the normal instrument operation.
Clamp Meter Saturation

The alert message “Clamp Meter Saturation” may occasionally appear. This alert may be caused by either of two situations:

- The clamp meter is not well connected with the detector. Check the connection.
- The circuit has a large electric current value and only one wire is clamped. Clamp both positive and negative wires and restart the detector.

Technical Specifications

<table>
<thead>
<tr>
<th>Detectable Range of Grounding Resistance</th>
<th>System Voltage (V)</th>
<th>Ground Resistance Range (kΩ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>220</td>
<td>0 to 500</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>0 to 250</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>0 to 50</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>0 to 10</td>
<td></td>
</tr>
</tbody>
</table>

Detecting Signal Power ≤ 0.2W

Resistance/ Capacitance to Ground

- Capacitance to ground of single circuits ≤ 8 µF
- Total capacitance to ground of systems ≤ 100 µF

Applicable DC System Voltages

- 220V±10%
- 110V±10%
- 48V±10%
- 24V±10%

Ambient Operating Temperature -35°C to 55°C

Relative Humidity ≤ 95%

Gross Weight 2.8kg

Packet Size 460x240x120(mm)
Packing List

1 Signal Generator
1 Signal Detector
1 Battery
1 Recharger
1 Clamp Meter
1 Three-Pin Cable
1 User Manual
1 Quality Certificate/Warranty Card
Carrying Case