

MEIDEN Received the 61st Electrical Technology Encouragement Award Development of a new “Artificial Ground Fault Testing System” by adding testing impedance, to realize compact, light mass, and safe setup as well as the testing time-saving

[Power system protection against ground fault and artificial ground fault testing in Japan]

The neutral ungrounded system is generally adopted for medium voltage power systems (6.6kV and 3.3kV) in Japan. For such a ground fault protection system, Directional Ground Relays (DGRs) are used so that only the line with a ground fault is selected and tripped for protection. In order to see in advance if this selective and protective tripping will correctly work, the artificial ground fault test is carried out to check the DGR, the Earthed Voltage Transformer (EVT), the Zero-phase-sequence Current Transformer (ZCT), and mutual cabling among these devices.

[Problems in conventional artificial ground fault testing systems]

Several testing systems are available. In any case, however, large-scale equipment and materials are needed, such as a testing transformer (TF) with a capacity of tens of kVA and a water rheostat (Rt) with abundance of heat capacity. Since a medium voltage is subject to being applied for testing, it is necessary to secure ample separation space from panel housing and such earthed sections. In addition, particular consideration is needed for safety zones and loca-

tion of watchmen to avoid danger against persons and electrical systems. (see Fig. 1 and Fig. 2)

[Features of a new “Artificial Ground Fault Testing System”]

A zero-phase-sequence testing voltage is applied to the main circuit with three phases joined together and testing impedance (Z_t) is inserted between the main circuit and the ground. For easy recognition of DGR operation, a new testing system was invented so that we can apply a reasonable amount of zero-phase-sequence voltage and zero-phase-sequence current. (see Fig. 3 and Fig. 4)

This system can realize the features shown below and it is expected that it will offer a technical advantage as a Meiden’s unique offering in the future.

- (1) Artificial ground fault testing can be performed easily by using compact and light testing equipment and materials. It is possible to reduce testing time and man-hours.
- (2) Since testing is possible only with a low applied voltage, we can secure sufficient insulation only by using 600V vinyl-sheathed wires. Even in the case a wire of an applied testing voltage should touch a part at a grounded potential, we can still conduct safe testing.

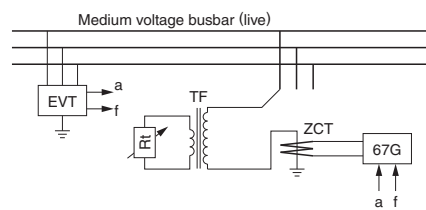


Fig. 1 Example of Artificial Ground Fault Test Circuit by Conventional Method (Real ground fault simulation on load side)



Fig. 2 Example of Artificial Ground Fault Testing Executed by a Conventional Method (Real ground fault simulation on load side)

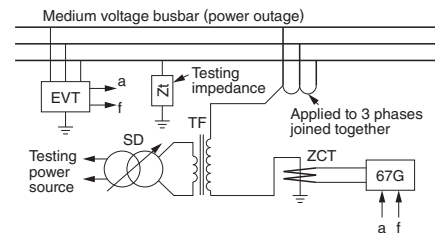


Fig. 3 Example of Test Circuit by a New “Artificial Ground Fault Testing System”



Fig. 4 Example of Testing Executed by a New “Artificial Ground Fault Testing System”