Study of the role of the earth & a differential circuit-breaker

ref. SELDIF

The front synoptic shows

- the public network, with its medium voltage/low voltage transformer substation, and the neutral to earth connection, in this substation.
- the transmission line from the transformer substation to the dwelling
- the domestic installation, with the residual current circuit-breaker 30mA, the local earth, and a washing machine. The TT neutral system is the same as that of a domestic installation
- A person in the right-hand part has an LED for a heart. If a dangerous leakage current flows here, the LED comes on
- A two-pole industrial residual current circuit-breaker 30mA is located in the centre of the synoptic.
- Two jumpers enable the washing machine to be fully isolated, and current measurements to be taken.
- An ON pushbutton starts the washing machine, and a green LED comes on, symbolizing rotation of the machine.

Safety terminals 4mm, located on the front, let the student measure the fault currents, and insert different resistive modules. These modules simulate two earth resistance values, and two leakage current values. One module with variable resistance enables the differential's tripping current to be measured.

To prevent any risk of electrocution to the student, the model operates at extra low voltage using an isolating transformer to standard NFC61558.

EDUCATIONAL OBJECTIVES

- ***Educating students about the risks of electrocution in the event of direct contact***
- ***Educating students about the risks concerning the quality of the earth***
- ***Showing the role of a 30mA residual current circuit breaker in a house***

TEACHING RESOURCES STUDENT & TEACHER

Theoretical recalls provided

- Operation of a magneto-thermal circuit-breaker rating, breaking capacity, tripping curve, symbols
- Operation of a residual current circuit-breaker rating, tripping time, symbols
- Physiological effects of the current hazard zones: current function times, dangerous voltages
- Maximum resistance of the earth

Practical work supplied

No earth and no insulation fault

- potential risk

Earth < 100Ω and net insulation fault

- with person in contact with the metal enclosure of the machine
- with no contact

Appearance of a fault current greater than 30mA, tripping of the differential.
Demonstration of the short circuit

Earth < 100Ω and low insulation fault

Appearance of a fault current less than 30mA, no tripping of the differential.
Measurement of the fault current in the person in contact with the machine

Earth > 100Ω and low insulation fault

Appearance of a fault current less than 30mA, no tripping of the differential.
Measurement of the fault current in the person in contact with the machine

Earth > 100Ω and net insulation fault

- with person not in contact with the metal enclosure of the machine measurement of the fault current
- with person in contact with the enclosure: measurement of the fault current greater than 30mA, no tripping of the differential. LED symbolizing the heart, coming on.

Others characteristics

- Power supply : 230VAC 50Hz
- Dimensions : 390 x 270 x 100mm
- Weight : 2.3kg
- Supplied with 5 resistive modules, coupling jumpers & leads