Application Note 0002

Title : Testing on an isolated (IT) supply.

Incorrect readings could occur when testing on either an IT, Missing, Centre Tab or Split Rail Supply.

When considering the test environment according to IEC 60601-1-1, the test setup is based on a TN (terre neutral) supply, provided on the secondairy side of an isolation transformer, to reduce the risk of electrical shock when testing on mains powered equipment.

Such isolation transformers ensure that the output voltage is not referenced to earth hence reducing the impact of leakage currents.

Due to the portability of most electrical safety analyser, the products are not supplied with internal isolation transformers. For instance, the Rigel 266/277 and 288 electrical safety analysers are rated to power-up and measure on instruments upto 4KVA. Incorporating a 4KVA rated Isolation transformer into our products would add approximately 15 – 25 Kilo's to the unit's weight.

For obvious reasons we would no longer class such size and weight as portable hence defeating our objective to produce Portable and Innovative Test Equipment.

In case measurements are done on an IT system we would recommend using a sufficiently rated External Isolation Transformer or using an extension cable powered from a TN supply, to ensure the safety analyser is able to measure the maximum leakage.

If this is not possible, the measurements done on an IT system will be considerably lower and considerations must be given to the test results.

The leakage current measurements in the IEC 60601-1 are described and referred to, using the full mains potential between L and E. Any voltage between N and E would result in a difference between the full mains potential (L-N) and the L – E potential thus resulting in incorrect readings.

All Rigel electrical safety analysers do however; warn the user in case of a missing Earth or when the voltage between Neutral and Earth exceeds 4Volts. The latter would indicate that the L – E voltage is no longer equal to the L-N voltage.

<u>Note 1:</u> Any leakage measurements taken with the tester powered from an IT mains system will only be valid for that condition and will vary when powered from a TN system.

Note 2: **As leakage currents by definition are not considered linear, we do not recommend the use of a correction formula such as below:**

$$I = \frac{\text{measured current x 230V}}{\text{L-E voltage}}$$

When Medical equipment is moved outside the Isolated Supply (ie from Op. theatre to Ward) further testing should be allowed for to determine the true leakage at a TN system. This could be done by making sure all tests are performed from a TN system to avoid confusion.

Note 3: If an Automatic test sequence is run using the Rigel 277 or Rigel 288 whist the tester is powered from an IT mains system a comment is automatically added into the SAVE TEST RESULTS screen. This comment states "**IT Supply – Confirm Correct Measurements"**. This comment may be deleted if required.

End.