



INDEPENDENT POWER TRANSMISSION OPERATOR S.A.

MEASUREMENTS AND INSTRUMENTS SECTION

NOVEMBER 2015

TANGENT DELTA MEASUREMENT PORTABLE SYSTEM

1. OBJECTIVE

The tangent delta measurement portable system is intended for use in 400/150/30 kV Ultra-high voltage and 150/20 kV transmission substations for on-site commissioning check as well as for insulation and measurement windings periodic check of voltage and current Transformers, for insulation and ratio check of power Transformers e.t.c.

2. Measurement possibility of capacitance and dielectric dissipation factor for solid and liquid insulation materials (capacitors, transformers e.t.c.) with the method of grounded and ungrounded test specimen.
3. Possibility of full automatic bridge balancing via a microprocessor without the operator's intervention.
4. The portable system will include appropriate software and a modern, independent, portable PC. The PC will be of robust construction, suitable for works in 400/150/30 kV Ultra-high voltage and 150/20 kV transmission substations and it will be connected via a USB port or Ethernet to the rest of the system. The software will also be suitable and handy and for the following:
 - Insertion and processing of the technical data of the test specimens.
 - Processing of some or all test specimens via handy tables and graphics.
 - Running, manually or fully automatically, of some or all measurements.
 - Detailed indications of measurements and results e.g. capacity of the test specimen, tangent delta (measured value and opened value at 20° C), test voltage, frequency, leakage current of the test specimen e.t.c.
 - Analysis of the results with instructions provided by the software.
 - Save of the measurements in a file as well as transfer of measurements in a different PC for processing via a software of MS-Office.
 - Printing of test sheets and protocol.
 - The software can be installed and fully operate in a different portable PC from the PC of the system.

5. MEASURING RANGES

5.1. Capacitance (with internal standard element):

From 0 to 5 μF with resolution at least 0.01 pF and accuracy at least $\pm 0.5\%$.

5.2. Tangent delta & Power Factor:

From 0 to 100% with resolution at least 0.01% and accuracy at least $\pm 0.01\%$.

5.3. Measuring voltage:

From 0 to 12 kV in multiple ranges and accuracy at least $\pm 1\%$.

5.4. Measuring frequency:

47-53 Hz independently of the frequency of the power supply.

6. POWER SUPPLY

230 V $\pm 10\%$ /50 Hz

7. PROTECTION

7.1. Protection of the bridge's operator and the electronic circuits against high voltage, parasitic discharges and magnetic fields of the test specimen.

7.2. Protection of bridge in case of short-circuit of the test specimen.

8. OPERATION ENVIRONMENT TEMPERATURE

Operation environment temperature: - 15° \div 50° C.

9. Built-in standard capacitor 100 pF, 12 kV or similar built-in standard element.

10. High-voltage supply 0 \div 12 kV + 20% or of higher range for the supply of the test specimen with the selected measuring voltage, with maximum step of ascent – descent 500V, minimum power 3 kVA.

11. Special shielded cables to connect the bridge with the test specimen and the earth, with the respective terminals. Cable of high voltage for power supply connection with the test specimen, with the corresponding terminals. The length of the cables must be equal to or more than 10 metres. The cables will be of high quality, suitable for continuous use in adverse ambient and operation conditions.

12. The maximum weight of the system will be 50 kg and its overall dimensions will not exceed the values of 1m in height, 55cm in width and 65cm in depth.

13. Simple connection of the units and all necessary accessories to provide a system ready for measurement. The accessories will be of high quality, suitable for continuous use in adverse ambient and operation conditions. The accessories will include a safety lamp, the necessary controls and a suitable device for measuring the temperature and humidity, which will cooperate with the system.

14. Durable cases made of synthetic material, for carrying the system components, suitable for the safe transport of the device and its accessories.

15. Full technical brochure of operation, maintenance, parts and accessories list and software in Greek or English.

16. Guaranty of at least two (2) years.

17. Possibility of personnel's training as far as the use of the system is concerned and reference of the price separately in the financial offer.
18. Sales list of the offered system that proves that the devices have been sold in sufficient quantities in European Union countries, USA, Canada, Australia, Japan and S. Korea (apart from the country that products it) and they operate satisfactorily for at least two years.
19. TYPE TESTS
For the evaluation of Technical Specification, the certificates of type tests for shock, vibration as well as for electromagnetic compatibility are required.
20. The device will be accompanied by a calibration certificate, in accordance with the requirements of ISO, certified by an accredited laboratory according to EN ISO / IEC 17025. For the evaluation of the offer it will be given a corresponding sample.
21. Attachment of conformity in accordance with the above paragraphs of the specification. Any deviation from these specifications will have to be explicitly mentioned.