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1.0 SCOPE

This Specification covers the general requirements of the design, manufacture, testing, supply, installation and commissioning of Instrument (Current as well as Voltage) Transformer Test Set. The Test equipment shall have Current & Voltage Comparator, Testing Software and Connecting Cables

2.0 APPLICABLE STANDARD

The instrument Transformer Test set supplied shall be in accordance with the latest editions of the Standard specified below and amendments thereof.

IS: 2705 for current transformer.

IS: 3156 for potential transformer.

IEC-61869 Part 1 to 5

IS: 16227 Part 1 to 5

The Test equipment conforming to any other international standards which are equal to or higher but not less rigid than the Standards and Specifications stipulated may be offered. When such alternative Standards are used reference to such Standards shall be quoted and English Language copies of such standards shall be furnished with the offer. Failure to do so will result in the offer being rejected.

3.0 GENERAL REQUIREMENTS

General Requirement are as under.

1. *Display* : 800 X 480 TFT color display.
2. *VGA Port* : Suitable for any monitor/display.
3. *Keyboard* : Alpha numeric metal dome membrane Keypad
4. *Power Input* : 90 to 270 volts, 50 / 60 Hz, <40 VA.
5. *Current Input and Power Consumption* :
Range : 0.05 to 20 amperes, Consumption <0.5 VA @ 5A
Range : 0.01 to 4.0 amperes, Consumption <0.1 VA @ 1A
Readout : In amperes or % of rating.
Accuracy : $\pm 0.5\%$ of reading $\pm 0.1\%$ FS

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6. Voltage Input and Power Consumption :

Range : 1.2 to 400 volts, Consumption 0.02VA @ 120V
Readout : in volts or % of rating
Accuracy : $\pm 0.5\%$ of reading $\pm 0.1\%$ FS.

7. Measuring Ranges :

Ratio Error : 0 to $\pm 20\%$
Phase Error : 0 to ± 0.2 radians
0 to ± 680 minutes

8. Frequency Range : Operating 45 to 65 Hz

9. Resolution : Ratio Error - 0.0001% / 0.1 ppm
Phase Error - 0.0001 crad / 0.1 μ rad

10. Accuracy :

Normal Operating Range (5 to 200%) :
Ratio Error : $\pm 0.4\%$ of reading ± 10 ppm
Phase Error : $\pm 0.5\%$ of reading ± 10 μ rad

Extended Operating
Range (1 to 400%) :
Ratio Error : $\pm 0.8\%$ of reading ± 20 ppm
Phase Error : $\pm 1.0\%$ of reading ± 20 μ rad

11. Accuracy Class : Instrument recognizes IEC, ANSI, IS AS & BS accuracy classes.

12. Burden Measurement Accuracy :

$\pm 1\%$ for Voltage Burden Range : 0 - 999.9 mVA - 9,999 VA.
Burden is expressed in VA and power factor at rated input voltage.
The rated secondary voltages entered on the keyboard.
Burden of current circuit $\leq 0.01\Omega$
Voltage Impedance : Infinity to 99.99K Ω to 99.99 Ω
OR 0 - 999.9 mVA - 9,999VA
Current Burden Range : 0 - 999.9mVA - 9,999VA
Burden is expressed in VA and power factor at rated input current.
Burden of voltage circuit $\geq 3M \Omega$
The rated secondary currents are 5 and 1 amperes, but others may be selected and entered.
Current Impedance : 0 - 9.999 Ω / K Ω
OR 0 - 999.9 mVA - 9,999VA at specified current.

13. Power Factor : 0 - 1.000

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14. *Computer Interface* : RS-232 USB computer interface is provided on the instrument. This port can be used for remotely controlling the instrument or for downloading test results.
15. *Printer Output* : A USB printer port is provided on the instrument. This port will directly drive a USB or centronix compatible Dot matrix printer with proper adaptor cable.
16. *Error Plotting* : Error plotting facility is provided with interface software.
17. *PC Operation* : Can be controlled from a PC using PC key board.
Results are shown on the PC display and test results can be transferred to the PC for the data storage.
18. *Mechanical Data* : Dimensions - 19-inch rack mount
19. *External Storage* : USB 2.0 port is provided in front panel to store results in pen drive.
20. *Temperature* : -10 to 50° C
21. *Humidity* : Ambient to 90% RH.

4.0 BASIC FEATURES

THE INSTRUMENT TRANSFORMER TEST SET SHOULD HAVE FOLLOWING FEATURES

- Microprocessor controlled measurement.
- It should measures total burden connected to test sample.
- Ratio and phase error can be plotted using interface software.
- Internal Results storage facility more than 20,000.
- Alpha numeric metal dome membrane Keypad for parameters entry.
- Digital display of test results on 800 X 480 TFT color display.
- Computer interface using RS-232 or USB.
- USB printer interface.
- Automatic ranging.
- Voltage or current transformer can be test with one test set.

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- 5 & 1 Ampere current transformer testing should be possible using either a 5 or 1 Ampere standard current transformer.
- Auto print and storage facility.
- It should be identify ANSI, IEC, IEC-S, IS-P, IS-PR, AS-M, AS-ME, BS and BS-S standards for CT and VT.
- Latest IEC-61869/ ANSI C57.13-2008/ IS-2705 standards should be incorporated.
- Ratio & Phase Error Tests can be performed as per IEC 61869 for TP-X, TP-Y, TP-Z Class CTs.
- Fast measurements.
- External storage facility using pen drive.
- VGA port to interface with bigger display/ monitor.
- Audible alarm for error message.

5.0 SOFTWARE

- Software for testing of CT and PT shall be provided and installed in PGVCL PC by the supplier with the equipment in free of cost.
- Software shall be suitable for Windows base desktop/Laptop.
- Software should user-friendly and details of CT/PT under test shall be enter in the software.
- Test results of Ratio Error and Phase Error shall be exported in Excel format.

6.0 GUARANTEE

The equipment shall be Guaranteed for any manufacturing defects for period of 18 months from date of supply OR 12 months from date of installation and commission, whichever complete early. Equipment found defective during guarantee period shall repaired/replace by the supplier free of the cost. After repairing/ replacement in guarantee period, the equipment shall be got calibrated by the supplier on their own cost.

7.0 ADDITIONAL REQUIREMENT

Connecting Cables: Connecting cables for power supply and interphase shall be provided by the supplier

Rating Plates and Labeling : The equipment shall carry a Rating Plate indicating the following particulars.

- Manufacturer's name and sr. no.
- Model or type and year of manufacture

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- Operating Voltage and Frequency
- Burden, operating ranges, Accuracy
- “Property of PGVCL”
- PO NO.
- Date of dispatch.
- Guaranteed up to date

8.0 PACKING

The Instrument. Transformer Test equipment shall be suitable packed to prevent damaged during transport and handling.

9.0 INSPECTION, TESTING, INSTALLATION AND TRAINING.

Equipments to be supplied shall be inspected for acceptance test at supplier’s works which shall be witnessed by purchaser. After inspection, the equipment shall got tested at NABL accredited testing laboratory and certificate for the same shall be supplied along with the dispatch. Cost of calibration at NABL accredited laboratory shall be borne by the supplier.

Supplier has to install and commission the equipment at PGVCL Hi-tech Laboratory, Rajkot without any additional charges. Also, training for operation and maintenance shall be provided to minimum five person of PGVCL and issue the training certificate with free of cost.

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