

## Technical Specification for CT, PT & CVT Analyzer

### **Scope:**

This specification covers Design, Manufacture, Testing, Supply and Delivery of CT, PT and CVT analyzer and associated accessories suitable for carrying out the tests as specified under functional requirement.

### **Functional Requirement :**

This instrument shall be able to measure the following parameters of **CT** automatically :

1. CT turns ratio and phase angle error:
  - Up to 5000 turns at accuracy 0.2% for magnitude.
  - Resolution : 0.001
  - Phase angle : Range : 0 to 180 degree
  - Accuracy: 0.2 degree or better
  - Resolution : 0.1 degree or better
2. CT winding Resistance :
  - Range : 1m  $\Omega$  to 30  $\Omega$
  - Accuracy: 1% of reading or better.
3. Knee point voltage : upto 5 KV.
4. Burden impedance : 0.5  $\Omega$  to 100 $\Omega$ . Accuracy : 0.1% $\pm$ 1m $\Omega$
5. Polarity
6. Accuracy Limiting Factor (ALF) and Instrument Safety Factor (IFS)
7. Composite Error.

The kit shall be able to measure the following optional parameters.

1. Peak instantaneous error
2. Saturated inductance
3. Unsaturated inductance
4. Remanance flux
5. Secondary Time Constant
6. Transient dimensioning factor

This instrument shall be able to measure the following parameters of **PT** automatically.

1. PT turns ratio :
  - upto 8000 at accuracy 0.2% for magnitude
  - Accuracy : 0.2% or better
  - Resolution : 1V or better
  - Phase Angle : Range : 0 to 180 degree
  - Accuracy : 0.2 degree or better
  - Resolution : 0.1 degree or better
2. Excitation Test
3. Primary and secondary winding resistance measurement.
4. Burden

This instrument shall be able to measure the following parameters of **CVT** automatically:

**Capacitive VT test Parameters :**

Outputs : Output voltage : 0 to 2050 V AC

Output current : 0 to 1 Amp

Output Power : 2000VA

**Ratio Measurement :**

**Voltage Ratio** : 300 to 8000, >30KV to 800 KV

±0.07% typical

±0.15%max

**Phase Angle measurement :**

**Voltage Ratio** : 300to 8000 volts

±6min typical ±15 min max

**Winding resistance measurement :**

Resolution : 1mΩ

Range : 1mΩ to 30Ω

Guaranteed Accuracy(at 20deg C) ±0.5% +10m Ω

**Inductive VT test Parameters :**

Outputs : Output voltage : 0 to 300 V AC

Output current : 0 to 1 Amp

Output Power : 300VA

Ratio Measurement :

**Voltage Ratio** : 1 to 350V (6KV to 35 KV) ; Accuracy : ±0.03% typical ±0.1%max

350 to 1100V(35KV to 110KV) ; Accuracy : ±0.05% typical ±0.2%max

1100 to 2450V (110KV to 245KV); Accuracy : ±0.05% typical ±0.5%max

**Phase Angle Measurement** : 1 to 350V ; Accuracy : ±3 min typical ±6 min max

350 to 1100V ; Accuracy : ±3 min typical ±10 min max

1100 to 2450V ;Accuracy : ±3 min typical ±15 min max

**Winding resistance measurement :**

Resolution : 1mΩ

Range : 1mΩ to 30Ω

Guaranteed Accuracy(at 20deg C) ±0.5% +10m Ω

**Features:**

- It should be capable of field testing of protection class CTs, Metering CTs, GIS CTs, Transformer bushing CTs and all other type of CTs up to 765kV voltage level in live switchyard.
- CT/PT shall automatically demagnetize after each test.
- Fuse / MOV / MCB with over voltage, over current and thermal overload etc shall be provided. Zero start and end Interlocks shall also be provided.
- The kit shall be able to plot the excitation curve and locate the Knee point Voltage and Current in real time.
- It should offer repeatability of test results in live switchyard upto 765 KV.
- It shall also help in analyzing the CT behaviour in case of change of primary or secondary currents when the revised data is entered in to test data.

- All relevant parameters shall be measured in one test cycle without the need for rewiring.
- There shall be provision to feed the details of the CT/PT under test and kit shall be able to confirm the name plate parameters after test whether the results are within limits.
- The accessories required for utilization of additional facilities/features if any, apart from above shall be quoted separately.
- The Kit shall be able to perform test on PT by providing the rated or specified burden at the time of testing upto 200VA and provision shall be made to provide the burden internally .
- The kit shall have a provision to select the applied primary voltage upto 5KV in steps/automatically controlled with an accuracy of 1% of reading or better.

***Test Leads and accessories :***

All testing and measurement cables shall be 25 mtrs long . PC interface cables, Licensed software of the testing kit, combination plugs, power-supply cables, inter connecting cables, original hard carrying case (which should be robust/ rugged enough for proper safety of the kit during transportation), operating and application manual (both in soft copy & hard copies) etc., are required for carrying out all types of testing.

***Design & Engineering :*** The complete equipment along with accessories must be designed/engineered by Original Equipment Manufacturer.

***Input Power :***

It shall work on single phase 230 Volts  $\pm 10\%$ , 50 Hz  $\pm 5\%$  supply with standard socket.

The kit shall have inbuilt security and safety circuits for variations in input supply and shall perform satisfactorily without the use of any external stabilizers.

***Software :***

The test record shall be able to download via USB port to a PC in windows Excel/equivalent format. All tests can also run on windows version 7 or higher software . Software of the kit should be Windows based, Menu driven and user friendly. It should have all the templates/features required for complete testing of and facility for comparison of past template of the tested unit. The test report forms shall be user configurable.

***Display :***

If operated through inbuilt LCD screen, it must be visible in bright sunlight and must have backlight display. The size of the font shall be of sufficient size to make the same clearly legible.

***Storage/Memory :***

It should store/record minimum 150 test results in kit or Laptop. Each test record must contain up-to 10 saturation curves, turns ratio reading, polarity and DC resistance reading etc

**Printer :** Built in printer.

**Environment :**

The test kit shall be compatible for EMI/EMC environment required for EHV switchyard as per IEC61000.

**Operating Conditions :**

Shall operate at Temperature 0 to 50 deg C, Humidity not condensing up to 90%.

**Applicable Standards :**

IEC600 44- and ANSI C57.13 or 10/50, international and IS 2705

The test set must meet the international safety standard for a CE Mark being IEC 61010-1 safety and IEC 61326-1 for EMC

**Warranty/Guarantee :**

Kit shall be guaranteed for any defects for minimum 36 months from date of successful demonstration at site. If the kit needs to be shifted to supplier's works for repairs, supplier will have to bear the cost of spares, software and transportation etc., of kit for repair at test lab/works. The commencement of warranty period will start after the successful and final demonstration, inclusive of repetitive if any, of kit at site. All the materials, including accessories, cables, laptops (wherever supplied) etc. are to be covered under warranty/ guarantee period. All the materials, including accessories, cables, laptops (wherever supplied) etc. are to be covered under warranty/ guarantee period.

1. If any problem in the kit is reported in the guarantee period, then the kit shall be collected by the firm within ten days of the report of problem for free repairs and the transportation/transit insurance cost shall also be borne by the supplier .
2. Repair period shall be maximum of one month from the date of kit collected by the firm.

Any period over and above (as 1 & 2 above), stipulated time shall be liable to extend the guarantee period for the delay period for which firm shall arrange to extend the Bank Guarantee.

**Portability:**

It should be easily portable. Carrying case with wheels & pulling handle should be provided.

**Training :**

Supplier shall have to ensure that the kit is made user friendly. Apart from detailed demonstration at site, the supplier shall also have to arrange necessary training to end user engineers.

**Calibration Certificate :**

Unit shall be duly calibrated before supply and the date of calibration shall not be older than two months from the date of supply of Kit.

**Commissioning, Handing over the Instrument:**

Successful bidder will have to commission the instrument to the satisfaction of end user.

***Service :***

Bidder will have to submit the documentary evidences of having established mechanism for prompt services in India as required as per the specifications. The service support including supply of spares shall be ensured for a period of minimum 10 years.



