

## **Technical Specification for Circuit Breaker Analyzer with DCRM**

### ***Scope:***

This specification covers Design, Manufacture, Testing, Supply and Delivery of Circuit Breaker Analyzer with DCRM and associated accessories suitable for measuring the operation timing of Main, PIR and auxiliary contacts (wet & dry) as well as close and trip coil currents.

### ***Functional Requirement :***

- The instrument should be suitable for measuring the operation timing of Main, PIR and auxiliary contacts (wet & dry) as well as close and trip coil currents.
- It should measure the Dynamic Contact Resistance of Main & Arcing Contacts as well as Travel measurement (with external travel transducer & fixture) of operating mechanism. It should measure parameters like contact gap, contact wipe, Additional Insertion of Arcing Contacts, velocity, over-travel, rebound etc.
- The test results should have repeatability, consistency & immunity to electromagnetic interference in live switchyard up to 765 kV level
- Automated interference suppression circuits should be provided to suppress and cancel interference.
- The instrument should be suitable for testing the CBs up to 400kV as per applicable standards and testing procedure for circuit breaker. It should be operated through laptop. The test data should be automatically saved in laptop after test.

### ***No. of Channels :***

- Main Contact Channels : 24 (4 Main + 4 PIR per pole on 3 poles simultaneously)
- Aux. Contact Channel:06 wet & 06 Dry
- DCRM/Test Current Channels:12 set (6 Channel for resistance + 6 channel for current) Built-in battery based 100 A DC current source for each of 6 channels.
- Travel Channel:06
- Coil Current Channel:06

### ***Sampling Speed :***

1, 5, 10 & 20kC selectable

### ***Accuracy :***

Timing :  $\pm 1$  % of reading

Coil Current:  $\pm 1$  % of reading

R :  $\pm 2$  % of reading

Travel:  $\pm 1$  % of reading

### ***Measurement Range :***

Timing :0-4 secs

R : 0-8m $\Omega$

R:  $\pm 2$  % of reading

Coil Current: 0-25A

Resolution : Timing : 0.1ms

**DCRM Test current :** 100Amps minimum

***Test Lead / Accessories :***

One complete set of cable of sufficient length (Min 20Mtr) of all the input cables with suitable clamps & connectors, compatible with the instruments should be provided for successfully carrying out the test in KPTCL S/S. Additionally all the required accessories should be provided for the smooth functioning of kit. Further hard carrying case (which should be robust/ rugged enough) for ensuring proper safety of the kit during transportation shall have to be provided. All the standard accessories for desired monitoring, operation & control of instrument shall be provided.

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

***Travel Transducers :***

One set of travel transducers along with clamp/fixtures to suit 400/220kV CBs of ABB/AREVA/BHEL/CGL/SIEMENS make (where ever applicable) shall be provided for AIS and GIS stations. The Circuit breaker details shall be provided by KPTCL and the supplier shall have to develop and supply the transducers within delivery schedule.

The details of the 400KV and 220KV Class Circuit breakers available in KPTCL is herewith attached as **Annexure-1**.

***Type Testing :*** Kit should be suitably type tested in NABL accredited lab for Dry heat, Steady state damp heat, Change of temperature, Vibration, Bump, Mechanical shock, Supply voltage variation etc. as per relevant IEC. The test kit shall be type tested for Environmental Tests, EMI-EMC & Safety Tests as per relevant IEC Standard. The type test report from NABL accredited lab should be submitted along with the offer.

***Power Supply :***

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. Kit should have a separate earthing point.

***Protection Control :***

The kit shall have protection against short circuit, over load, improper ground connection, over temperature, over voltage/transient surges, Zero start etc. The instrument should have alarm/cut-off settings to protect the instrument. Also the kit facility of discharging the specimen when test is completed or when current cable is accidentally disconnected or when instrument power supply is lost.

***Operating Temperature :*** 0 to +50 deg C

**Relative Humidity :** Max. 95% non-condensing.

**Cooling Arrangement :**

Built in cooling shall be provided. No external cooling/ accessory shall be required to dissipate the heat.

**Software :**

The software should be suitable for automatic testing & report generation, signature as well as trend analysis of all measured parameters. Comparison of graphs as well as pass/fail limit entry should be possible. The kit should have facility to communicate with windows based computer for control, operation & downloading the test data. The instrument should be operated through Laptop. The test set-up once entered for one type of CB should be saved as CB type and should be usable during subsequent testing to save set-up time. There shall be provision to generate customized report as specified by KPTCL.

**Laptop :**

One compatible IBM/HP/DELL make Laptop shall be provided loaded with user application software for controlling, supervising the test system and displaying all measurement values in addition to error and data management.

**Minimum Specification :**

Processor : Intel core i7

Operating System : Original latest operating System MS windows 7 professional compatible to the kit.

Hard Disk : 320GB or better HDD

Screen:15 inches

RAM : 4 GB

CD Drive : DVD/ CD Read/Write drive

USB Ports : 3 Nos

Antivirus with one year validity

Guarantee : 3 years from the successful demonstration at site.

Kit should have USB or Ethernet communication port.

If kit is being controlled through inbuilt LCD monitor and kit is having data storage facility, supply of laptop shall not be necessary.

**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.

**Applicable Standards :**

The equipment shall comply with the requirements laid down in internationally acceptable standards. The test set should meet the requirements of both the IEC1010 and the CE mark specifications. The kit should also meet the shock and vibration requirements of IEC and ASTM D999.75 standard.

Instrument should meet EMC standards EN 61326:1997/A1:1998/A2:2001/A3:2003 IEC/EN 61000-4-2/3/4/5/6/8/11 IEC /EN 61000-6.600 44.

***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.

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.

***Trolley :*** Kit should be supplied with suitable trolley with large wheels. Kit will be mounted on trolley for easy movement in substation.

***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 KPTCL engineers at different sites of destination.

***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 KPTCL at destination site.

***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. The service support rendered by the bidder for the equipments supplied earlier to KPTCL will be one of the requirements during evaluation of the bid.

