BHARAT HEAVY ELECTRICALS LIMITED, JHANSI
TRANSFORMER TESTING LABORATORY

TECHNICAL SPECIFICATION OF DIGITAL PARTIAL DISCHARGE DETECTOR & ANALYSIS TEST KIT FOR POWER TRANSFORMERS

REF. NO. : DEBOTTLENECKING-CAPITAL/SPECS/2018-19/09 REV. 00 DATE: 02.02.19

Note : 1) Vendor must submit complete information against clause no. 12 (Qualifying condition). The offer meeting this clause would only be processed.
2) The offered column and Deviation & Remarks column (where ever applicable) of this format shall be filled by the vendor and to be submitted along with the offer. Inadequate

Sl. No.	DESCRIPITION FOR BHEL REQUIRMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATION & REMARK
1.1	Purpose : Digital Partial Discharge Detector Test kit is required for measurement/ monitoring the electrical discharge in Power Transformer (Upto 315 MVA, 400 kV, 3 phase), Shunt Reactors and Instrument Transformers in line with IS 2026 & IEC 60076 Part-III.	Vendor to Confirm.		
1.2	Quantity : 01 No.	Vendor to Confirm.		
2	**GENERAL SPECIFICATION :**			
2.1	The partial discharge detection and analysis system shall include a portable Digital partial discharge detector and a laptop with the analysis software, along with necessary accessories, measurement impedances, cables, and connectors to perform the tests. The System shall be suitable for factory use.	Vendor to Confirm.		
2.2	The offered system should be capable of performing partial discharge measurement and its analysis on power transformers. The required accessories for PD measurement on these assets shall be supplied.	Vendor to Confirm.		
2.3	The partial discharge system should be equipped with at least Six measurement channels with digital filtering, sampling and processing for high repeatability and accuracy. The six channels should be capable of synchronous measurement of partial discharges on all the three phases of a Transformer. It should be possible to conduct measurement from bushing tap. It is expected to conduct measurement simultaneously on HV as well as LV side. All the necessary connection cables between channels should be fiber optical cable with minimum length of 20 meters to be used up to 400 KV class power transformers.	Vendor to Confirm.		
2.4	It should be possible to use an additional external channel apart from the six channels to be used as antenna to eliminate effect of disturbances to measurement results.	Vendor to Confirm.		
2.5	The PD detector shall have fully digital and free adjustable filters. The center frequency and bandwidth shall be user selectable. The input filter shall be adjustable so that the measurement can achieve an optimum signal-to-noise ratio. PD detectors with analog filters are not acceptable.	Vendor to Confirm.		
2.6	All the channels should be battery powered so that additional induced noise from power supply can be avoided.	Vendor to Confirm.		

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2.7	The system should be able to withstand high electromagnetic environment. Necessary software tools shall be supplied to make a meaningful PD measurement even under noisy conditions.	Vendor to Confirm.		
2.8	Offered system shall have following technical specification : -			
	PD Measuring System			
2.8.1	No. of measuring channels : 6 Nos. minimum and 01 additional channel (spare)	Vendor to Confirm.		
2.8.2	Input Impedance : 50 Ω (Approx.)	Vendor to specify		
2.8.3	Input Frequency Range : 0 to 20 MHz or higher (adjustable)	Vendor to specify		
2.8.4	PD System Bandwidth : 10 kHz to 2.0 MHz (in pre-set steps)	Vendor to specify		
2.8.5	Filter Type : Digital Type	Vendor to Confirm.		
2.8.6	Min. Charge as per IEC at 50 Ω : < 1 pC	Vendor to Confirm.		
2.8.7	PD Measurement Range : 1 pC to 10,000 pC or higher	Vendor to Confirm.		
2.8.8	PD event time resolution : <2 ns	Vendor to Confirm.		
2.8.9	Power Source for PD Detector : Mains (Single phase) or battery powered	Vendor to specify		
2.8.10	Operating Temperature : 0° to + 50 °C	Vendor to specify		
2.8.11	Storage Temperature : 0° to + 50 °C	Vendor to specify		
2.8.12	Humidity : 5% ~ 85% non-condensing	Vendor to Confirm.		
2.9	The Instrument shall have the ability to continuously collect and display partial discharge events in terms of apparent charge (as described under IEC60270) and corresponding test voltage and frequency of the applied test voltage.	Vendor to Confirm.		
2.10	The instrument shall have digital sampling and processing to achieve high repeatability and shall be fully compliant with IEC60270 with the latest revision.	Vendor to Confirm.		
2.11	The partial discharge system shall be capable of operating multi channel measurement as well as single channel measurement. For real-time synchronous multi-channel measurement with digital filtering, sampling and processing for high repeatability and accuracy	Vendor to Confirm.		
2.12	It should also be capable of hardware and software gating facilities to enable the isolation of stray noise and for easy identification of real partial discharge activities	Vendor to Confirm.		
2.13	The System and the software shall be "user friendly" so that the end-user can perform their own partial discharge testing and interpretation of results	Vendor to Confirm.		
2.14	External Calibrator :A charge calibrator shall be included with the system for calibration, in-line with the apllicable standards. The calibrator should inject PD pulses with known values. It shall be able to inject charges of 10pC, 20pC, 50pC, 100pC, 200pC, 500pC and 1000pC.	Vendor to Confirm.		

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2.3.11	Partial discharge detector and Measurement impedance shall be housed in a suitable Protection enclosure.	Vendor to Confirm.		
2.3.12	There should be possibilty for increasing more nos. of measuring channels in Test kit.	Vendor to specify.		
2.4	**Control System :**			
2.4.1	The offered system shall be configured and controlled by the System Software from remote location. All functions of PD Measuring system shall be fully controlled by Laptop.	Vendor to Confirm.		
2.4.2	The Instrument should have either internal controller or supplied with external Laptop (supplied by vendor) having following minimum specification: processor equivalent to intel i5 or better, 15 inch or more TFT/ LCD screen, 4GB RAM or more, 1 TB or more HDD, WINDOWS 10 or higher OS, Optical mouse, Anti virus, MS Office with set of interconnecting cables etc.	Vendor to Confirm.		
2.4.3	The Instrument shall be supplied with a MS-Windows based software package (installable on a standard PC) for controlling and analysis purpose.	Vendor to Confirm.		
2.4.4	Communication between measuring unit and Laptop unit should be made with generally availbale communication ports (Ethernet / USB) in present day laptop. Communication cable shall be supplied along with instrument.	Vendor to Confirm.		
2.4.5	Offered system should record the test data and replay (playback) the data afterwards for analysis. The data file shall be stored in the PC.	Vendor to Confirm.		
2.4.6	Instrument software should be user friendly with data storage and data analysis & report generation are to be supplied along with supply.	Vendor to Confirm.		
2.4.7	The design should be such that the measurement device can be located near the unit under test and coupled to the control unit near laptop only by means of fiber-optic cables / shielded cables.	Vendor to Confirm.		
2.4.8	The fiber-optic cable / shielded cable should eliminate external noise that can influence the measurement.	Vendor to Confirm.		
2.4.9	Fiber-optic cable or shielded cable shall be supplied atleast 20 meter length. Supplier to submit specification of Fiber-optic cable / shielded cable.	Vendor to Confirm & submit cable specification.		
2.4.10	The PD detector shall be supplied with advanced analysis software tools for cluster separations, differentiate multiple sources of discharges i.e. software of offered system should be capable for in-depth analysis of partial discharges.	Vendor to Confirm.		

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2.4.11	The software should be capable of segregating different over-lapped PD patterns and analyse them separately to identify various PD patterns like Surface Discharges, Corona Discharges or Internal PDs etc.	Vendor to Confirm.		
2.4.12	Software gating function should be available in offered system. Software should also display gated percentage in order to comply with IEC60270. Software gating should allow for rejection of PD events within a selectable window on the displayed sine wave of the test voltage. All PD events rejected in this window will not be used for calculation in the apparent charge.	Vendor to Confirm.		
2.4.13	The acquisition unit should have six PD measuring channels with simultaneous acquisition of data. Systems with multiplexing is not acceptable.	Vendor to Confirm.		
2.4.14	Six numbers of suitable quadripoles (Impedance boxes) for PD measurement on oil-filled Power transformers shall be supplied along with necessary cables/connectors.	Vendor to Confirm.		
3	**ACCESSORIES:** Vendor to furnish list and details of all accessories to be supplied along with offered instrument.	Vendor to specify list of all accessories.		
4	**SPARES:**			
4.1	Vendor to include one set of the all spares (including all type of cables with connector and battery (in case battery are used for supplying detector) to be supplied alonwith the system.	Vendor to specify list of all spares and cables in one set.		
4.2	All necessary spares for two years trouble-free operation are to be included in offer separately. Cost of all spare items are to be indicated separetly in offer.	Vendor to furnish the spare list.		
4.3	Vendor to ensure availability of all spares item with OEM for at least 5 years of operation.	Vendor to confirm.		
5	**DOCUMENTATION:**			
5.1	Vendor to submit the reference list of customers (where offered systems had been supplied within last 3 years) mentioning the customer, Machine Model, major specifications of the supplied system, Year of Supply etc. along with offer.	Vendor to submit along with offer		
5.2	Vendor to submit drawing/catalogues of all modules, Electrical scheme, photographs of instrument & its accessories along with the offer.	Vendor to submit along with offer		
5.3	Vendor to submit soft copy of Operation and Instruction manual along with offer and subsequently two hard copies of manual along with the supply.	Vendor to confirm and submit as per requirement		
5.4	Vendor to submit soft copy of Maintenance manual along with circuit diagrams and schematics for trouble shooting along with offer and subsequently two hard copies of manual along with the supply.	Vendor to confirm and submit as per requirement		

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5.5	Vendor to submit soft copy and two hard copies of Test Certificate & Guarantee Certificate along with the supply.	Vendor to confirm and submit along with supply.		
5.6	Calibration certificate to be submitted from laboratory having tracebility with NABL : Vendor to submit Valid Calibration certificate from NABL accredited lab of offered instrument along with the supply.	Vendor to confirm and submit along with supply.		
6	**SYSTEM INSPECTION:**			
6.1	Inspection at BHEL works.	Vendor to confirm		
6.2	All routine & operational tests to verify this specification and demonstartion of all fetures of system (including accessories) as per PO specification shall be carried out at BHEL work in presence of BHEL representative .	Vendor to confirm		
6.3	Demonstration of all controls, operation & measurement performance at BHEL works in presence of BHEL representative.	Vendor to confirm		
7	**TRAINING AT BHEL WORKS :**			
	Training to BHEL testing engineer & maintenance person shall be provided at BHEL Jhansi for following :			
	(a) Use of all system Features, programming of Measuring Systems & supplied accessories etc.	Vendor to confirm		
	(b) Electrical, Electronic & maintenace for system & other supplied equipments	Vendor to confirm		
8	**INSTALLATION & COMMOSSIONONG AT BHEL WORKS :**			
8.1	Supplier to take full resposibility for carrying out the start up and commissioning. Commissioning to be done in presence of technical expert from OEM.	Vendor to confirm		
8.2	Successful proving by demonstration on BHEL Transformer by the supplier shall be considered as part of commissionig. All operational tests deemed necessary for system acceptance and demonstration of all features shall form part the commissioning activity.	Vendor to confirm		
8.3	Demostration by actual use of all supplied components and accessories to their full capicity. Successful proving of supplied system by the supplier on BHEL make transformers shall be part of commissioning. Tests as per IS 2026/IEC60076 are to be necessarily performed on Minimum TWO Nos. BHEL make Power Transformers of different rating.	Vendor to confirm		
8.4	Commissioning tools, required for commissioning of the system within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to confirm		
8.5	Schedule of delivery, installation & commissioning shall be submitted with the offer.	Vendor to submit along with offer		

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8.6	Vendor may note that the E & C charges in this case have been mandatorily fixed at 5% of the total cost. This apportioned price has to be cumpolsorily agreed by all vendors & no deviation shall be acceptable for this.	Vendor to confirm		
9	**SAFETY ARRANGEMENTS:**			
9.1	System should have adequate and reliable safety interlocks / devices.	Vendor to confirm		
9.2	All electronics parts shall be housed in shielded enclosures.	Vendor to confirm		
9.3	Instrument meets the requirement of relevant IEC 60270	Vendor to confirm & specify IEC		
10	**PACKING:** Air worthy/Sea worthy & rigid packing for all items of complete system, all accessories and other supplied items to avoid any damage/loss in trasit. When system is despatched in containers, all small loose items shall be suitably packed in boxes.	Vendor to confirm		
11	**GUARANTEE/WARANTY :** 24 Months after commissioning at our works from the date of acceptance by BHEL irrespective of date of supply.	Vendor to confirm		
12	**QUALIFYING REQUIREMENTS:**			
12.1	Only those vendors who have supplied at least 5 Nos. of the offered model of the equipment within last 10 years from the date of tender opening shall be eligible for participating in the tender.	Vendor to confirm		
12.2	Following documents are required to be submitted along with offer : -			
12.2.1	Reference list of customers mentioning the customer name, contact details and year of supply. Copy of Purchase Order (with details-contact name, address, contact number & e-mail ID of the users etc.) of 5 Nos. of offered model of equipment as referred in clause 12.1.	Vendor to submit		
12.2.2	Performance certificates of at least 2 Nos. of the offered model of the equipment certifying 1 year or more of satisfactory performance. Performance certificate and purchase order issued by the user in the name of OEM or Authorised dealer of OEM are acceptable.	Vendor to submit		
13	BHEL reserves the right to varify information submmited by vendor. In case, information is found false / Incorrect, the offer shall be rejected	Vendor to confirm		

Note: Supplier shall submit the technical compliance/comments against each point in above format. Technical bid without complete technical compliance sheet will not be considered for technical evaluation.

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