

PROCUREMENT PROCEDURE OF CPRI (NON WORKS)

Revision : 04  
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 Section : Formats  
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Issue No : 2  
 Issue Dt : 30.06.2003  
 Issued by : P A  
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 FORMAT NO.:CPRI/PUR/eTBID/GTP

**Section IV T -Technical Specification**

CENTRAL POWER RESEARCH INSTITUTE, BENGALURU/BHOPAL Web: [www.cpri.in](http://www.cpri.in)

Tender Enquiry No : CPRI/BLR22UHVRL11C990

Description of the Equipment/Goods/Services : Partial Discharge Measuring System

Note : 1) The technical bid submitted in other than this format is liable to be rejected.

2) All blue fields are mandatorily to be filled in.

Name and address of the bidder	
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Quotation Number and Date	
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Sl.No.	Technical Specifications/Parameters	Qty	To be completed by the Bidder		
			Details of guaranteed technical parameters offered by the bidder	Guaranteed Technical Particulars (GTP) Mention Complied/Not Complied	Deviations from GTP
<b>Partial Discharge Measuring System</b>					
1	<b>Equipment: Partial Discharge measuring system</b>				
2	<b>Scope:</b> Design, development manufacturing, supply, transportation, commissioning and training to CPRI personnel for Partial discharge measuring system as per IEC 60270 standard	01 Number			
3	<b>APPLICATION:</b> The equipment shall be designed to measure the partial discharges on transformers (IEC 60076-3), instruments transformers (IEC 61869-1), bushings (IEC 60137), switch gear equipment (IEC 62271-1) etc.				
4	<b>DESCRIPTIONS OF EQUIPMENT:</b> The Digital Partial discharge measuring system consist of the complete test circuit with measuring impedance, transmission cable, hardware for PD measurement and conditioning, software for recording , displaying and analysis of PD pulses. The PD calibrator to be provide along with system to calibrate the system as per IEC 60270 standard.				
5	<b>Operating Conditions at site:</b> Ambient temperature: 10°C to 45°C Relative humidity: 45 % to 85% RH (Non-condensing) Mean height of site above sea level: 542 meters				

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6	<b>Relevant Standards:</b> The Partial discharge measuring system shall comply with requirements of the IEC 60270 for Partial discharge measurement.				
7	The Partial discharge measuring system shall be able to measure the following parameters 1. Apparent charge, <b>Derived quantities:</b> 2.Average discharge current , 3. Discharge power, 4.Pulse repetition rate, , 5. phase angle $\phi_i$ and time $t_i$ of occurrence of a PD pulse, 6. quadratic rate etc. The time between successive updates of the digital display shall not exceed 1 s.				
8	Number of Channels: Three channels and able to measure simultaneous PD events and voltage				
9	<b>PD Channel</b>				
9.1	PD Measurement range of measuring system: fC to 1 $\mu$ C				
9.2	PD Input impedance : 50 $\Omega$				
9.3	Dynamic range : $\geq 120$ dB overall, $\geq 50$ dB for each range				
9.4	Accuracy: PD input: $\leq 2$ %				
9.5	PD Sampling rate: $\geq 100$ MS/sec				
9.6	PD Integration time range : 100 nsec to 5 $\mu$ sec				
9.7	PD event time resolution : $\leq 2$ nses				
9.8	PD resolution : $\geq 14$ bit				
9.9	The measuring system shall be designed with wide band processing system with following technical specifications Lower cutoff frequency : $30 \text{ kHz} \leq f_1 \leq 100 \text{ kHz}$ Upper cutoff frequency : $f_2 \leq 1 \text{ MHz}$				

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9.10	RIV Bandwidth range: 9 kHz				
9.11	System noise level: $\leq 0.02$ pC				
9.12	Maximum double pulse resolution : $\leq 100$ nsec				
9.13	Superposition error of PD pulses: $\leq 3\%$				
9.14	Input connectors: BNC / Fiber Optic / Any other suitable connector				
9.15	Input voltage of PD channel: $\geq 10$ V				
9.16	Minimum detectable PD level: $\leq 0.1$ pC				
9.17	<b>Noise suppression System:</b> The Measuring system shall include the noise suppression system with gating filter and windowing feature for eliminating the repetitive occurring disturbances especially drive operation etc. The noise				
10.0	<b>Voltage Channel</b>				
10.1	Input voltage: $\geq 50$ Vp				
10.2	Impedance: $\geq 100$ k $\Omega$				
10.3	Dynamic range : $\geq 100$ dB (overall) and $\geq 80$ dB for each range				
10.4	Voltage frequency range: 40 Hz to 200 Hz				
10.5	Input connectors: BNC / Fiber Optic / Any other suitable connector				
11.0	<b>PD Calibrator</b>				
11.1	PD Calibrator: The PD calibrator shall be meet the requirements of the IEC 60270 (latest) with respect to following parameters: Pulse rise time: $\leq 10$ nsec				
11.2	Pulse repetition frequency : in the range of 150 Hz to 300 Hz				
11.3	Step response parameters of pulse calibrator: Rise time: $t_r \leq 60$ ns				
11.4	Time to steady state: $t_s \leq 200$ ns				

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11.5	Step voltage duration: $t_d \geq 5 \mu s$				
11.6	PD pulse ranges : 1 pC to 5000 pC				
11.7	Deviation of the step voltage magnitude $U_0$ between $t_s$ and $t_d$ : $\Delta U \leq 0.03 U_0$				
11.8	The calibrator shall comply the requirements of clause 6.0 of IEC 60270 with respect to type, routine and performance test on calibrators. The calibrator shall be designed with battery operated and hand held equipment. The necessary arrangement for connecting calibrator to terminals of test object to be provided				
12.0	<b>Measuring Impedance</b>				
12.1	Measuring Impedance: The measuring impedance shall be designed as the requirements of CISPR 18-2 and NEMA 107 standards and IEC 60270 standard for Partial discharge measurement				
12.2	Numbers: Three numbers				
12.3	Equivalent impedance of the Measuring impedance shall be designed as per IEC 60270 standard and the value of the coupling capacitor will be provided during tender stage.				
12.4	Frequency range of measurement for PD: 30 kHz to 2 MHz range				

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13.0	<b>PC based Partial Discharge Analysing system</b>				
13.1	<b>PC based Analysing System:</b> The PC based Partial Discharge shall be user friendly Human Interface Machine (HMI). The system shall have the provision for the following options:				
13.1.1	Selection of Test (PD or RIV)				
13.1.2	Measured apparent charge indication in pC				
13.1.3	Test voltage , Test frequency				
13.1.4	Selection for bandwidth of processing unit				
13.1.5	Noise windowing function feature				
13.1.6	Calibration window				
13.1.7	Noise suppression controller ON/OFF indication (Manual gating, Antenna Gating, external hardware gating )				
13.1.8	Displaying the PD level and one cycle duration test voltage waveform / elliptical display, XY recorder etc				
13.1.9	Offline PD analysis				
13.1.10	Display of Measured PD quantities as per IEC 60270				
13.1.11	Q(U) and H(Q) diagram				
13.1.12	Display of PD Inception and Extinction test voltage				
13.1.13	Pulse count for DC applications				

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14.0	<b>Interconnecting Cables:</b> The fiber optical cable/ BNC cable/any other suitable cable ( length more than 50 meters) integration between the measuring impedances and Control unit to avoid the unnecessary electromagnetic interferences				
15.0	<b>Calibration:</b> The Partial discharge measuring system shall be calibrated for type, routine and performance tests as per the clause no 5, 6 and 7 of IEC 60270 and 6.1 of IEC 60270:2000 Amd 1:2015 standards for Calibrators and Measuring system at any ILAC/ NABL accredited calibration laboratory.				
16.0	<b>Pre Dispatch Inspection:</b>  The supplier shall submit the calibration test reports of the individual components as detailed in Sl. No. 15 above for review before Pre Dispatch Inspection (PDI) to be carried out at the works of the supplier. Further, PDI shall be carried out subject to the satisfactory compliance of all the test and calibration reports in accordance with the relevant standards. The supplier shall conduct the following tests in the presence of CPRI representatives at the manufacturer's works as a part of PDI:				
16.1	Demonstration of Partial discharge functionalities				
16.2	Performance check on PD measuring system and PD calibrator as per IEC 60270 standard				
16.3	Demonstration of Partial discharge test on three phase transformers as per conventional method				
16.4	The Pre dispatch inspection will be done by two officials from CPRI for duration of three days to complete the inspection. The expenditure is required for PDI program will be borne by CPRI.				

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17.0	<p><b>Commissioning test and Acceptance tests:</b> The Partial discharge measuring system shall be demonstrated for following test at laboratory with other testing and measuring equipment.</p> <p>1. Measurement of Partial discharge test by conventional method</p> <p>Note: The test sample and other testing equipment shall be provided by the CPRI</p>				
18.0	<p><b>Training:</b> One day training programme on the functionalities, PD online &amp; offline analysis tools, operation and maintenance of the total complete test system shall be provided to CPRI testing staff.</p>				
19.0	<p><b>Technical Information to be supplied:</b></p> <p>The following documents shall be provided along with the supply:</p> <ul style="list-style-type: none"> <li>• General drawings, electrical schemes, installation drawings.</li> <li>• Operational manual and Maintenance manual: these manuals shall include specific instruction relevant to the handling, installation, troubles shooting and servicing.</li> <li>• Calibration reports</li> </ul> <p>All documents shall be issued in English language and provided both on paper and software copy.</p>				
20.0	<p><b>Warranty :</b> All equipment/components shall be guaranteed for minimum 12 months from the date of successful commissioning at CPRI site</p>				

- PN: 1) Mere statement of "Complied" do not suffice the requirement. The details of technical parameters in proof of CPRI requirements shall be furnished along with technical write-up, catalogues, brochures, literatures, phamplates, or any other documents shall be submitted in hard copy along with technical bid.
- 2) Calibration reports/certificates, factory test reports/certificates from an laboratory accredited as per ISO/IEC 17025:2017 /facilites shall be submitted wherever applicable.
- 3) CPRI reserves the rights to conduct "predispatch inspection" prior to dispatch at the works of the supplier and the expenditure towards PDI shall be borne by CPRI. However information