

BIHARAT HEAVY ELECTRICALS LIMITED, JHANSI
TRANSFORMER ENGINEERING DEPARTMENT

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REV.02
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JS22310 SPECIFICATION FOR ON-LINE PARTIAL DISCHARGE (PD) MONITORING SYSTEM for POWER TRANSFORMERS

Rev.02

A) GENERAL

This specification covers the design, manufacturing, testing, supply, installation & commissioning of On Line Partial discharge detection & monitoring system for Power Transformers up to 400kV. It shall be able to continuously monitor the partial discharges in oil filled Power Transformer using acoustic emission method or electromagnetic (UHF) method as per IEC TS 62478:2016.

B) ESSENTIAL FEATURES

1. The system should be suitable for PD detection and monitoring inside while the Transformers are in service.
2. The equipment offered should utilize UHF or acoustic method as applicable as per respective item 1-5 of (C) for PD detection of Power Transformers as per standard IEC TS 62478:2016.
3. PD sensor assembly shall be suitable for connection to any Power Transformer in service upto 400 kV class. The sensor assembly, if in contact with Transformer oil or transformer tank wall, shall be rated for temperature up to 100°C.
4. The system shall be weather proof and of rugged construction suitable for heavy duty outdoor performance.
5. Control unit for the monitoring system shall be provided with the outdoor cabinet with mounting & fixing arrangement. The material used for the cabinet/control unit shall be corrosion proof & shall be suitable for degree of protection IP-56.
6. The system shall also have data input, data output for control and remote monitoring of the PD detection.
7. The system shall give necessary alert messages which should contain historical and detailed information. The alerts from the device should be displayed in control panel of the control room in addition to PC.

REV	DATE	ALT	REV	DATE	ALT	REV DO	NAME	SIGN	DATE
02	22.02.19	CKD	01	08.12.18	CKD	PREP	P Parulkar		03.11.18
Specification Generally changed. Earlier variant 3&4 merged with one type and item 4 & 5 added.					02 more variants added. length of cable 300mtrs. RS-485 cable also added.				
TRE/JS22310/pp					CKD S K Gupta				
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Annexure-B.

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8. The system shall have inherent protection against overvoltage, surges and all other likely abnormal conditions of operation under high voltage.
9. The system shall be self-calibration type and no external calibration shall be required.
10. The system shall have the noise rejection feature to reduce the effect of noise on measurement. The performance of the system should not be influenced by the highly inductive environment of EHV sub station and radio frequency signal.
11. All hardware/Software required for successful operation of the On Line PD monitoring system is shall be supplied along with the system.
12. The system shall be complete with all necessary items i.e. Controller unit, sensors, cables, FO cables (if called), Conduits, fittings, operating and calibration software, PC etc. to complete the equipment in all respect for the purpose described in this specification.
13. Ambient Temperature Range : 0 °C to 55 °C
14. Operating supply voltage : 240 V, 50 Hz, 1-Ph AC
15. Humidity : upto 95% RS
16. Alarm settings : Yes required
17. Communication
Mandatory : RS-232/485 using ASCII protocol, Ethernet over TCP/IP, input/output for SCADA
Optional : USB, IEC-61850, GSM Modem (additional price to be indicated in offer for each type)
18. Frequency bandwidth range for UHF sensors shall be typically between 300MHz to 3000MHz as per IS-62478
19. In line with IEC TS 62478:2016, system shall also employ signal de-noising technique if required.
20. One monitoring system (1 set) shall be used for PD monitoring of one three phase or single phase transformer i.e. required PD sensors for a three phase / single phase Transformer, control/ monitor unit, cables, PC and accessories as per specification to complete the system.
21. PC or laptop Specification (Min. requirement) (to be supplied along with carry bag & charger)
 - i) Screen size: 14 inch (min.)
 - ii) Processor: Intel Core i3, 64bit

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- iii) OS: Window 8.1 professional (single language)
iv) RAM: 4 GB
v) HDD: 500GB

C. BILL OF QUANTITIES:-

SL.NO.	Description	Item-1	Item-2	Item-3	Item-4	Item-5
1	Type	UHF based PD monitoring system		Acoustic based PD monitoring system	UHF based transformer PD cum bushing monitoring system	UHF based transformer PD cum bushing monitoring
2	No. of PD sensors	03	01	02	01	01
3	Bushing test -tap sensors For bushing PD/tandelta	--	--	--	03	06
4	Main controller unit with other associated items and fittings as may be required (as per B.19)	01 per transformer	01 per transformer	01 per transformer Imp- Controller unit should have min. 04 channels	01 per transformer	01 per transformer Imp- Controller unit should have min. 08 channels
5	Length of PD sensor cable with S/s conduit	20 mtr	20 mtr	20 mtr	20 mtr	20 mtr
6	Enclosure for controller unit	01 nos. (drawing to be furnished along with offer)	01 nos. (drawing to be furnished along with offer)	01 nos. (drawing to be furnished along with offer)	01 nos. (drawing to be furnished along with offer)	01 nos. (drawing to be furnished along with offer)
7	Power Cable-AC	10 mtrs	10 mtrs	10 mtrs	10 mtrs	10 mtrs
8	FO / RS-485 cable along with conduits, connectors	300 mtrs	300 mtrs	300 mtrs	300 mtrs	300 mtrs
9	Adapter for DC input	01	01	01	01	01

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	(only if equipment doesn't operate on AC)					
10	PC / laptop(as per B.20)	01 set complete with software	01 set complete with software	01 set complete with software	01 set complete with software	01 set complete with software
11	Instruction Manual	01 compact disc containing all relevant details	01 compact disc containing all relevant details	01 compact disc containing all relevant details	01 compact disc containing all relevant details	01 compact disc containing all relevant details

D. INSTRUCTIONS TO BIDDERS (ITB):-

1. Complete schematic showing the connections of power supply to the display/ control unit, terminal marking and wiring termination of alarm & trip contacts shall be furnished along with offer. Type and size of terminals used in display/controller unit shall also be furnished.
2. Drawing of mounting of PD sensors onto transformer to be furnished along with offer.
3. Bidder should furnish 2 sets of literature, schematic drawings, technical brochure, connection scheme, along with the offer.
4. Outline and fixing detail drawings for monitoring unit to be furnished along with offer.
5. Any other accessories, which is not listed in all above clauses but may be required for satisfactory operation of online partial discharge monitoring system is deemed in scope of supplier and also such item shall be clearly bring out in the bid.
6. Bidders may submit the techno-commercial offer for all variants and any of them. In the event of non-quitting for any variant, bidder to specifically mention "Not quoted" against that item.
7. Bidders are required to submit questionnaire attached with this specification.
8. Bidder shall be given 1-week time to reply in case of any query from BHEL. Bidder shall note that reply to technical queries must reach us within stipulated time else their offer will be rejected.
9. Bidder shall be fully responsible for any problem arising in PD sensor / monitoring unit at site. In case any problem is faced at site, Bidder shall immediately attend the problem and if need be, system/sensor shall be replaced by him for which item wise break-up cost shall be indicated separately in the bid.

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10. Bidder shall submit the undertaking that they have clearly understood the specification and there is no deviation from their side. NO deviation, alteration of any kind in scope or equipment or specification shall be entertained at later stage once after finalization of technical bid/contract.
11. Quantity of Item-1,3 & 5 is 10 nos each and that of Item-2 & 4 is 30 nos. each. The quantity indicated in enquiry is tentative only and there is a possible increase/decrease up to 30% for all items.
12. Bidder is deemed to supply the quoted model/s till expiry of the rate agreement. In case during the tenure of the rate agreement, OEM makes any changes in the equipment or the equipment is superseded by some other advanced equipment, bidder shall supply updated equipment/advanced equipment without any price implication to BHEL in case of not able to supply the quoted model. An undertaking for the same shall be furnished by the Bidder in its bid.
13. All the items being supplied with the system shall be compatible with each other and shall work coherently as a complete system.
14. It is found that Bidders offers main equipment from OEM and some part from India because of which delays have been observed in final installation and commissioning of the system. Bidder shall ensure that all necessary arrangements are made in advance so that such delays are not observed.
15. The above specification is issued without any prejudice to BHEL's standard terms & Conditions. The specification doesn't absolve the Bidder from his basic responsibility of supplying a quality material to BHEL.
16. Item 1-5 shall be purchased from customer approved vendors only. It is responsibility of bidders to get their make/model approved by end-customer as and when required.
17. Bidders to note that bids will be evaluated independently for item (1-5) and the placement of PO will only be considered for make which are approved by the end-customer.
18. 300 meters per transformer optical fibre type / RS-485 cable along with conduits, connectors, converter etc. for monitoring from control room to be considered in scope. Offers will be evaluated considering 300mtr length FO cable. Supplier to quote per mtr price for both RS-485 & FO cable. However, at the time of PO, supplier to supply type of cable & its length as mentioned in PO.
19. Any other fittings deemed necessary to complete the system (must be clarified by bidder in their offer)

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20. The bidder should submit the following along with the technical offer:

- i) Compliance checklist as per enclosed Annexure-I duly filled up and signed.
- ii) 1 set of descriptive leaflet, catalogue and scheme of the offered model.
- iii) List of the total items offered and the scope of supply.

E) INSPECTION & DESPATCH

1. Three sets of inspection, routine, acceptance and calibration test certificate, operation and maintenance manual, descriptive catalogue/ leaflets shall be sent along with dispatch document. One set shall be supplied along with the equipment.

2. The supplier shall furnish a list of all fittings and components in the dispatch details giving description and quantity of each item (Quantity of each item shall be mentioned). All items shall be properly packed in suitable boxes so as to avoid scratches/damage in transit.

F) INSTALLATION, COMMISSIONING & TRAINING

Installation & commissioning of the system is also in the scope of supplier/bidder. The supplier shall install & commission the system and provide training for operation and maintenance to our ultimate customer at site on intimation of BHEL and obtain certificate from the customer for the same.

Schedule of requirement of system for various transformers is mentioned at (C). Supplier to quote separate charges based on their own assessment of visits required to complete installation and commissioning of system.

G) GUARANTEE

The quoted PD monitoring system shall be guaranteed for satisfactory operation and against any defect / mal-operation / non-functioning / failure etc for a period of 24 months from dispatch or 18 months from commission, whichever is earlier.

The date of commissioning shall be reckoned from submission of certificate as mentioned in clause F above. **Bidder shall also quote separate charges in price bid towards incremental guarantee for every six month.**

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Annexure - I
Compliance Check List

	Requirement	Yes/No	Deviation, if any
A)	GENERAL		
B)	ESSENTIAL FEATURES		
	1.		
	2.		
	3.		
	4.		
	5.		
	6.		
	7.		
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	9.		
	10.		
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	14.		
	15.		
	16.		
	17.		
	18.		
	19.		
	20.		
	21.		
C)	BILL OF QUANTITIES		
	1		
	2		
	3		
	4		
	5		
	6		
	7		

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	10			
	11			
D)	INSTRUCTIONS TO BIDDERS			
	1.			
	2.			
	3.			
	4.			
	5.			
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	7.			
	8.			
	9.			
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	16.			
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	18.			
	19.			
	20.			
	i.			
	ii.			
	iii.			
E)	INSPECTION & DESPATCH			
	1.			
	2.			
F)	INSTALLATION, COMMISSIONING & TRAINING			
G)	GUARANTEE			