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TRANSFORMER ENGINEERING DEPARTMENT**PRODUCT PURCHASING SPECIFICATION****Fibre optic direct hot-spot temperature monitoring system for
Power Transformer/ Reactors**

PURCHASE

SPECIFICATION

NO. TRE 219 REV.00

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A. ESSENTIAL FEATURES

1. Fiber optic temperature monitoring system shall be of proven technology and rugged quality. The system shall use high quality optical fibre sensors for direct and accurate measurement of hot spots temperatures in the windings, top oil and other parts of Power Transformers/ Reactors for condition monitoring purpose.
2. The fibre optic probes shall be able to completely immersed in hot transformer oil. They shall withstand exposure to hot kerosene vapor during the transformer insulation drying process. The probes shall meet the requirement to eliminate the possibility of partial discharge in high electrical stress areas in the transformer/ Reactor.
3. The fiber optic cables are brought out of the main tank through tank wall penetrator feed through plate. The external optic extension cable shall then run to the separate Enclosure OR main transformer control cabinet, routed inside the conduits with large bend radius.
4. The system should provide visual and audio alarm in case of any abnormality.

B. TECHNICAL PARAMETERS

1. **FO Probe (Item no. 1 of BOQ):** The probe shall be all Silica, double Teflon jacketed fiber with perforations/slits in the outer jacket to allow complete oil filling. The fiber with Teflon jacket shall be strong enough to withstand the severe conditions prevailing inside an EHV Transformer.
2. **FO Probe (Item no. 2 of BOQ):** The probe shall be 200µm all silica, double PFA Teflon jacketed, Kevlar cabled fiber with perforated outer jacket to allow complete oil filling and white Teflon protective Helix wrap having improved visibility and mechanical strength. The fiber with Teflon jacket shall be strong enough to withstand the severe conditions prevailing inside an EHV Transformer.
3. Temperature range of the offered system should be -30°C to +200°C.
4. Accuracy of the system should be $\pm 2^\circ\text{C}$ with no recalibration required.
5. System shall have a microprocessor based monitoring and recording unit having 4/8/16 channels, as per BOQ.
6. System should include analog outputs for each measurement channel. Temperature resolution of the analog outputs shall be $\pm 0.1^\circ\text{C}$
7. The system shall offer user programmable temperature alarm outputs with min. 6 relays, alarm lights and controller system status indicators provided. Indicate no. of relays.
8. System meets the requirements of surge test of 4000V when applied to all the inputs and outputs without permanent damage to the instrument as per IEEE C37.90.1-2002

REV	DATE	ALT CKD	REV	DATE	ALT CKD	REV 00	NAME	SIGN	DATE
						PREP	G. LALWANI	<i>G. Lalwani</i>	16.11.18
						CKD	R. K. SINGH	<i>R. K. Singh</i>	18.11.18

DWI/TCB/TRE/016



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9. Data storage capability of the offered system shall be 90 days interval of one (01) reading/minute. Retention capability of maximum temperature for each provided in the offer.
10. The separate enclosure should have degree of protection IP56 enclosure shall be made of minimum 1.6mm thick stainless steel.
11. RS485 / 4-20mA output for remote indication provided.
12. System shall be complied with IEC 61850 protocol to interface with SCADA/ monitoring system. Fiber optic communication port for remote data connection is also required. Additionally, Ethernet port shall also be provided for communication & monitoring system over MODBUS protocol. The signal list and ICD file for communication and register address list for MODBUS communication to be made available along with supply.
~~— Additionally USB port shall also be provided. —~~
13. Operating voltage shall be 230V, 50Hz single phase AC.

C. INSTRUCTIONS TO BIDDERS (ITB)

1. Complete schematic showing the connections of power supply to the control unit, terminal markings and wiring 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/details of installation of FO sensor in winding ducts to be furnished with offer.
3. Bidder should furnish- technical details, schematic drawings, wiring diagram, control circuit scheme along with the offer.
4. Bidder to indicate detector parameters of the system including power, sensor life and performance feedback of field trials in their bid.
5. Outline and fixing arrangement drawing for display/ controller feed through plate, protective cover and enclosure for controller unit to be furnished along with offer.
6. Any other accessories, which is not listed in above clauses but required for the satisfactory operation of fiber optic sensor temperature measurement system to be included in scope of bidder. Bidder to clearly bring out such items in the bid.
7. **One number Portable handheld FO probe healthiness testing kit shall be supplied without any cost along with first order against this Rate contract.**
8. Bidder shall submit the undertaking that they have clearly understood the condition and there is no deviation from their side. Deviation / alteration of any kind in the scope or specification shall not be entertained at later stage once after finalization of technical.
9. If during the tenure of the rate agreement, OEM makes any change in the equipment or the equipment is superseded by some other advanced equipment, Bidder to supply the updated equipment/advanced equipment without any price implication to BHEL for the same shall be furnished by the Bidder in its bid.
10. Bidder to quote the price of individual item as per attached BOQ. Order to be done by selecting the items from the BOQ as per end customer requirement.
11. All the items being supplied with the system shall be compatible with each other and shall work coherently as a complete system.
12. Bidders are required to submit questionnaire attached with this specification. It is expected that answer to all the points of questionnaire shall be "YES". In the case if it is "NO", the same should be substantiated with proper reason etc. for review.

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D. INSPECTION & DESPATCH

1. The Bidder shall furnish a list of all fittings and components in the dispatch details giving description, quantity and weight of each item (Quantity of each item shall be mentioned). All items shall be properly packed in jerk-free packing to international standards to avoid damage during the transit.
2. Each items to be packed set wise. Each and every item to be tagged with BHEL-PO and the same shall be displayed on Box and also on the packing list, to be sent along with the consignment.
3. Hard copy in 3 sets of routine/acceptance/calibration test reports & instruction manual (along with a soft copy shall be sent with the consignment).

E. INSTALLATION, COMMISSIONING & TRAINING

If required by BHEL, bidder may be called for installation & demonstration of system at our works. Also, if required, bidder has to provide training for operation of the equipment and installation & commissioning of system at the site on intimation by BHEL and obtain certificate for successful installation from the customer for the same. **Bidder should quote the charges for the same in the price-bid separately.**

F. GUARANTEE

The system shall be guaranteed for satisfactory operation and against defects in design, materials and workmanship for a period of at least 30 months from the date of supply or 24 months from the date of commissioning, whichever is earlier. The date of commissioning shall be reckoned from submission of certificate as mentioned in clause E above. **Bidder shall also quote separate charges towards incremental guarantee for every six month.**

Annexure-A: BOQ is attached.

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ANNEXURE-I - QUESTIONNAIRE

	Requirement	Yes/ No	Many
1.	A) ESSENTIAL FEATURES: 1) 2) 3) 4)		
2.	B) TECHNICAL PARAMETERS 1) 2) 3) 4) 5) 6) 7) 8) 9) 10) 11) 12) 13)		
3.	C) INSTRUCTIONS TO BIDDERS (ITB) 2) 3) 4) 5) 6) 7) 8) 9) 10) 11) 12)		
4.	D) INSPECTION & DISPATCH 1) 2) 3)		
5	E) INSTALLATION, COMMISSIONING & TRAINING		
6.	F) GUARANTEE		