

ANNEXURE-1 TO 140902183 Rev 00

ITEM	QTY	DESCRIPTION	COMPLIAN CE	REMARKS
1	1 No.	Disturbance/ Fault Recorder (DFR) {Generator} having minimum 16 analog and 32 digital inputs to capture short transient events, longer term disturbances and trend input quantities such as RMS analog values, frequency, harmonics, power and power factor.	Yes/No	
		The DFR shall have the facility of fast scan as well as slow scan recording of transient as well as dynamic performance of the system. The slow scan feature shall have scan rate suitable to capture dynamic MW/MVAR power oscillations and shall also be suitable to record the frequency excursions and response of generator field and governor control on system fluctuations.	Yes/No	
		The Disturbance/ Fault Recorder (DFR) shall meet the following minimum requirements:	Yes/No	
		i) Record the graphic form of instantaneous values of voltage and current in all three phases and neutral, open or closed position of relay contacts of various control and protection functions and breakers during the system disturbances and faults.	Yes/No	
		ii) If another disturbance/ fault occurs during one post-fault run time, the recorder shall be able to record the same with different identity.	Yes/No	
		iii) Accuracy of measurement of analog signals shall be 0.2% of full scale or better. Amplitude Resolution of analogue channels shall be 16 bit or better.	Yes/No	
		iv) The frequency response for the analog channels shall be 25 HZ or better. Any interposing devices provided with the DFR system shall not compromise this frequency response.	Yes/No	
		v) Shall be switchboard flush mounting case with rear access terminals. Terminals shall be suitable for ring type lugs, mandatory for CT/PT and preferable for other terminals as well.	Yes/No	
		vi) Sampling rate for fast scan shall be of the order of 256 samples/cycle and for the slow scan it shall be of the order of 2 samples per cycle for a fundamental frequency of 50 Hz. Lower/higher sampling rate if available shall be selectable but default configuration shall be as above.	Yes/No	
		vii) The non volatile memory in the DFR shall be suitable for recording for a minimum of 15 minutes (considering all channels are configured) at scan rate corresponding to 2.0 Hz with possibility to dedicate 10% of the memory space in pre-fault zone of recording. For the fast scan mode, the system shall have non-volatile memory of last three records of at least 5 seconds duration each.	Yes/No	
		viii) The DFR shall also have on board flash memory for storing the firmware.	Yes/No	
		ix) The DFR shall have internal storage of atleast 16 GB for storing the records in a cyclic buffer manner. This memory sizing is minimum but incase to meet the specification requirement higher memory is required, same shall be suitably considered by the vendor.	Yes/No	
		x) Atleast 2 potential free output contacts to be used to signal DFR triggered & DFR fail to other equipments.	Yes/No	

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		xi) Shall be provided with triggering sensors based on threshold values of voltage, current, zero/negative sequence component, harmonics, frequency and rate of change of system frequency. External signals as digital inputs, if required, can also be used for triggering the DFR. The starting sensors of the DFR, and pick-up, shall preserve the disturbance/ fault data in the non-volatile solid state memory of the acquisition unit. The setting of the starting sensors shall be flexible, and shall have reasonable range/steps. The settings of these starting sensors shall be field programmable.	Yes/No	
		xii) Shall have atleast following communication ports - 1 No. front RS232/USB for configuration and 1 No. rear Ethernet port for TCP/IP and/or IEC61850 communication to SCADA/DCS.	Yes/No	
		xiii) CTR, PTR and transducer input variables shall be field programmable.	Yes/No	
		xiv) Data of the recorder can be accessed for further analysis on owner's computers and / or testing equipment like numerical relay test kit for on line testing / diagnosis. The output shall be in IEEE COMTRADE formats. Necessary interfacing equipment, software for transfer of data and software for analysis of fault data shall also be provided.	Yes/No	
		xv) A facility to edit the fault data shall also be provided for analysing the faults under various probable conditions.	Yes/No	
		xvi) The pre-fault recording time shall be at least 200 ms and the post-fault recording time shall be at least 5.0 secs. However both pre-fault and post fault shall be user programable.	Yes/No	
		xvii) The sequence of event recording for digital channels shall: (a) have a time resolution of 1 millisecond or better. (b) be able to cope with up to 40 changes in any one 10 millisecond interval. (c) date and time should be printed to the nearest 1 millisecond followed by a tag describing the point which has operated. (d) events that occur while another event is in the process of being printed are to be stored for subsequent printing. Over 100 such events must be stored. (e) event printouts shall contain at least the station identification, date and time (in hour, minutes, seconds and milliseconds), event number and event description (at least 32 characters). (f) minimum of 500 such events shall be stored in a cyclic buffer before being exhausted.	Yes/No	
		xviii) Shall have facility to transfer the fault records to the Evaluation Unit automatically and also on request for further detailed analysis. The software for analyzing the fault data shall be available at the substation Level.	Yes/No	
		xix) The DFR shall have its own time generator, which shall be synchronized on SNTP protocol when connected on LAN.	Yes/No	
		xx) The Fault/disturbance logs shall be clearly identified by following: a) Unique identity. b) Date & time (in hour, minute, seconds and miliseconds). c) Identity of trigger source. d) Graphic form of analogue and digital signals of all the channels.	Yes/No	

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		xxi) All external and internal faults in the DFR equipment such as power supply fail, processor failure, memory failure, etc. are to be indicated by means of light emitting diodes or on the front display and also in the events.	Yes/No	
		Analog Channel for the DFR shall come default factory programmed as follows -	Yes/No	
		Voltage (R-N) 0-63.5V, 50Hz		
		Voltage (Y-N) 0-63.5V, 50Hz		
		Voltage (B-N) 0-63.5V, 50Hz		
		Field Current, 4-20mA DC		
		Field Voltage, 4-20mA DC		
		Current (R Ph) 0-5A, 50Hz		
		Current (Y Ph) 0-5A, 50Hz		
		Current (B Ph) 0-5A, 50Hz		
		Neutral Current 0-5A, 50Hz		
		Other than above following computed analog channels shall also come default configured -	Yes/No	
		Active Power in Mega Watts		
		Reactive Power in Mega VARs		
		Frequency		
		Power Factor (Lag/Lead)		
		3rd / 5th Harmonic Current		
		3rd / 5th Harmonic Voltage		
		Open Delta Voltage		
		Auxiliary supply: 220V DC with +10% and -20% variation.	Yes/No	
		DFR covered here will be hooked up to substation LAN of protection relays for communication over IEC61850 LAN. Vendor to install configuration software at remote location with the station and shall demonstrate access to DFR for configuration and retrieval of records.	Yes/No	
		All necessary pre-fabricated interconnecting cables for connection of inputs, outputs, inter triggering & inter time synchronisation of disturbance recorders and any other hardware and software necessary for completion of the system including cables and connectors from time synchroniser to disturbance recorders shall be supplied as per site requirement whether specifically mentioned or not.	Yes/No	
		Original authenticated licensed software for analysis of disturbances, software for setting the various parameters & any other software necessary for system integration shall be supplied.	Yes/No	
		The software shall be capable of the complete analysis of fault data, including the display of RMS/Peak envelop of any voltage/current, fundamental power frequency deviation, display of instantaneous values of Real Power (computed value), Reactive Power (computed value), power factor angle etc.	Yes/No	

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		Vendor to note that Engineering workstation of Industrial grade is being procured separately. It will be vendors responsibility to ensure software pertaining to DR configuration will be uploaded into the workstation during commissioning and demonstrated to end user.	Yes/No	
		Engineering workstation will have ethernet/USB port for hooking the DR covered in this enquiry. Necessary interconnecting cable of length 100M (cable length is tentative and shall be confirmed during detail engineering) shall be supplied by the vendor.	Yes/No	
		System architecture showing all interfacing items and interconnections between Disturbance recorders etc shall be furnished with the offer.	Yes/No	
NOTE		1) Compliance to each clause of the specification without deviation shall be given in the offer, failing which, the offer may not be considered.	Yes/No	
NOTE		2) It will be the responsibility of the supplier to ensure total system integration as well as the functioning of the whole system.	Yes/No	
		Any cable, interconnector, port, driver, modem, hardware etc. required for the complete establishment & functioning of the disturbance recorder and its evaluation system.	Yes/No	
NOTE		3) Recommended settings for disturbance recorders shall be furnished by the supplier at the time of order execution.	Yes/No	
NOTE		4) The supplier shall demonstrate the system integration of all the above equipments as well as functioning & time synchronisation of the system at BHEL Bhopal works during customer's inspection.	Yes/No	
NOTE		5) The supplier shall do commissioning at site and establish communication with engineering work station without any price implication. The programming, testing, time synchronisation and all function of the DFR shall be demonstrated at site to the satisfaction of customer without any limitation of no. of days and no. of visits. The site in this case is 1*660 MW Bhusawal TPS, unit-6 STPP of M/s MSPGCL.	Yes/No	
NOTE		6) The supplier shall meet the requirement of having type tested, supplied similar type of equipments, offered against these enquiry, for EHV Transmission and Large generator system and these must have been in successful operation for a period of two years & at two different installations as on date of bid opening.	Yes/No	
NOTE		7) Type test Reports shall be furnished for each type of equipment. Type test reports shall not be more than 5 years old. Any discrepancy or inadequacy found in any of the type test reports shall be resolved by supplier with BIFPCL by way of re-test without any binding on BHEL and free of cost. Minimum type test required - a) High Voltage Impulse Test, class III as per IEC 60255-3 b) High Frequency Disturbance as per IEC 60255-22-1, class III c) Fast Transient Disturbance as per IEC 60255-22-4, class IV	Yes/No	

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NOTE		8) One hard copy and one soft copy of the following documents shall be furnished with the offer for each equipment: a) Guaranteed technical particulars. b) Descriptive leaflets. c) Dimension drawings. d) Wiring Diagrams e) System architecture f) Compliance to Annexure.	Yes/No	
NOTE		9) Ten copies each of bound manuals comprising commissioning manuals, descriptive leaflets, wiring diagram and guaranteed technical particulars of each Item shall be furnished before dispatch of equipment for submission to customer.	Yes/No	
NOTE		10) Two copies of test certificates shall be furnished before dispatch of equipment for submission to customer.	Yes/No	