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ANNEXURE-A

MPR No.-20170078

TECHNICAL SPECIFICATIONS FOR PORTABLE VIBRATION ANALYZER CUM BALANCING UNIT FOR HIGH SPEED MOTOR SPINDLES

Sl. No	Description	Quantity	Accepted (Yes/No)	Vendor's comments/ specs
1	**Portable vibration analyzer cum Balancing Unit consisting of data acquisition , data processing, and display unit in a single set with all the required items, accessories & features as per details below: (Vendor to specify model):**			
	Vendor to note that Balancing unit is for detection of unbalance and suggesting corrective weights and phase angles and not for automatic balancing.			
1.1	Operating range (Low limit): 120 RPM or lower			
1.2	Operating range (High limit): 15000 RPM or higher			
1.3	Unit must be capable of checking imbalance of the spindles and automatically determining & calculating residual weight and phase angle.			
1.4	Data acquisition, data processing, display and Balancing in a single unit			
1.5	In addition to analyzer data collection facility should be available			
1.6	Programmable four channel vibration input.			
1.7	The system should accept displacement, velocity & acceleration input signals from various vibration transducers like proximity probe, velocity probe, accelerometer etc.			
1.8	The system should also have a provision to accept input signals & record data from permanently installed client sensors through configuration of sensor type, sensitivity, frequency etc.			
1.9	Data collection and transfer facility to connect to PC via USB / Ethernet. In-built capability to function as a standalone analyzer.			
1.10	The instrument should include all standard items as required for the system & specified in the technical specification.			
1.11	The instrument should have single plane and dual plane balancing feature.			
1.12	Should be able to evaluate vibration as per ISO 10816-3 standards.			
1.13	Color TFT/ LCD type Display on the unit should have large screen size of 3" x 3"/ minimum with resolution of 320x240pixels or better along with back light and contrast adjustment facility suitable for clear view at bright day light and night conditions.			
1.14	Real time display: Display of transient and steady state data in familiar plot formats viz. BODE plot, time waveform, amplitude-frequency spectrum, shaft Orbit, Cascade plots, shaft center-line, polar etc. as they are captured and also for historical data.			
1.15	Real time display of overall displacement velocity for all the channels simultaneously. Display of frequency, FFT and time domain data simultaneously on one screen.			
1.16	Portable and hand-held unit with weight less than 3.0 kg			

1.17	Two nos. of suitable accelerometers to be supplied for the vibration analysis			
1.18	Frequency range 0- 40KHZ or more			
1.19	Vibration measurement in terms of acceleration, velocity and displacement. Units for Acceleration (RMS- mm/sec2); Velocity (RMS-mm/sec); Displacement (microns)			
1.20	Detection of vibration in RMS/Peak/Peak-Peak/True Peak			
1.21	Frequency analysis over the entire frequency range with constant percentage bandwidth filter in 1% steps over 1 Hz-1kHz and 2% steps over 1kHz-10kHz.			
1.22	Facility to Pause scanning at any frequency.			
1.23	Automatic Peak finding and display routine			
1.24	Measurement features			
1.24.1	Vibration displacement range: 1 to 2500 microns or more			
1.24.2	Vibration displacement resolution/ least count: 1 micron or better			
1.24.3	Vibration displacement repeatability: 4 microns or better			
1.24.4	Vibration velocity range: 0.1 to 1000 mm/sec or more			
1.24.5	Vibration velocity resolution/ least count: 0.1 mm/sec			
1.24.6	Vibration velocity repeatability: 0.3 mm/sec or better			
1.24.7	Vibration acceleration range: 0.1 to 250 mm/sec2 or more			
1.24.8	Vibration acceleration resolution/ least count: 0.1 mm/sec2			
1.24.9	Vibration acceleration repeatability: 0.3 mm/sec2 or better			
1.25	Detection and analysis of rolling element bearing faults with envelope detection or spike energy or equivalent technology.			
1.26	2 nos. of additional accelerometers for routine measurement of accelerometer cum bearing condition measurement with strong magnetic base along with standard connecting cable including connectors with each transducer			
1.27	Alarms as per ISO 10816-3 standards.			
1.28	Facility of Cross channel phase analysis, coast up & coast down analysis (to establish resonant speeds of a machine).			

1.29	In-built FFT Analysis with data display in Hz or CPM			
1.29.1	Programmable Spectral resolution in steps up to 6400 lines			
1.29.2	Selectable FFT windowing			
1.29.3	FFT frequency domain in single, water fall & cascade format to be displayed/ recorded			
1.29.4	FFT spectral trend in water fall format to be displayed/ recorded			
1.30	Balancing function			
1.30.1	One input channel for measuring phase/speed. The phase/speed input channel must support proximity probe or optical/laser pickups.			
1.30.2	Integral static balancing facility			
1.30.3	Dynamic balancing facility with 2 plane balancing and programmable selection of 1 or 2 plane balancing..			
1.31	Capability to measure speed as per Clause 1.1 & 1.2 with resolution of 1 rpm or better.			
1.32	Hardware for balancing facility inclusive of Laser Trigger Sensor, Trigger stand, Reflective Tape (Enough quantity for 50 spindles), Connecting Adapter to interface Unbalance detection Hardware with Vibration Analyzer.			
1.33	Instrument shall have recharging power adapter with 110-220V single phase AC input			
1.34	Supplied system shall have replaceable rechargeable battery for uninterrupted data capturing/analysis, for 6 hours or more			
1.35	Equipment shall have Backup power source (on-Board) to preserve data & memory during battery change.			
1.36	Should have Inbuilt Memory of at least 120MB which should be extendable up to 8 GB or more. Last ten readings should be stored in memory as history. Vendor to supply external memory card of 4GB or more along with the equipment.			
1.37	The vibration analyzer operating software shall support full functionality with access to all historic and real time signals and database.			
1.38	Generation of reports in different formats (Word, Excel etc.) should be possible.			
1.39	The software should have in-built data base of antifriction bearings of major Global manufacturers along with bearing frequencies (natural and fault).			
1.40	The software should be able to correlate all the characteristic frequencies of machine from the collected spectral analysis.			
1.41	The software should have additional feature of post processing			
1.42	Operating software should be able to analyze the vibration data & should include vibration data storage, data management and analysis, supported by various data display formats and report generation features			
1.43	Analysis software shall also be installed on Laptop along with own database and analysis software for all features of the unit.			
1.44	System should be supplied with all the Software Licenses & CDs/ DVDs for software installed on the analyzer/equipment/ Laptop			

1.45	Free updates of software during Warranty period of two years			
1.46	Expert diagnostic support should be available through centralized services for analysis of the recorded data. This service should be free of cost for two years and instrument should be capable of reorganizing recorded data in small file sizes for transmission through e-mail.			
1.47	Laptop with Intel i5 Processor or better, 500GB HDD or higher, 4GB RAM or higher along with Preloaded OS WINDOWS 8 or higher and should have all the software for data base management system, analysis of data, offline study of recorded data, parameterization of basic unit etc. for vibration analyzer & balancing unit.			
1.48	Any other items required for prove-out of vibration analysis and balancing of high speed motor spindles (4 nos.) including any additional sensors, cables, fixtures etc. in addition to the above shall be supplied by the vendor free of cost.			
1.49	Training to be provided for 3 days after initial commissioning and three visits of balancing and vibration analysis expert for 3 days each will be provided during the warranty period. The visit of the engineer will be need based on BHEL request.			
1.50	Warranty for a period of two years from the commissioning of the equipment at BHEL Haridwar. Vendor to provide on-site service support during warranty period and all expenses of the Engineer to be borne by the vendor			