

Annexure-1

CSI 2140 Four Channel Machinery Health Analyzer

Technical Specifications			
Sl. No.	Parameters	CMTI Requirement	Supplier to Specify
1.0 Machinery Health Analyzer with Firmware and Analysis Software's			
1.1	Data collection channels	<ul style="list-style-type: none"> • Simultaneous 4 channel dynamic input+ phase • Simultaneous 4 channel data collection with TRIAX sensor in ROUTE mode. • Simultaneous 4 channel DC input • Simultaneous 4 channel ROUTE collection + phase • Simultaneous 4 channel NON-ROUTE + phase • Simultaneous 4 channel display – spectrum & waveform • Simultaneous Dual Orbits Display (accelerometer & displacement probes) • Simultaneous 4 channel Frequency response Function 	Essential (Specify)
1.2	Input sensor types	<ul style="list-style-type: none"> • Accelerometers, velocity probes, RPM/tachometer probes, temperature sensors, flux coil, current clamp, pressure sensors • Any vibration or dynamic sensor with a voltage output; any DC-type signal. • Audio, Stroboscope, aux & manual entry 	Essential (Specify)
1.3	Measurement parameters	Acceleration, velocity, displacement, current, temperature, phase, user defined	Essential (Specify)
1.4	A/D conversion	24 bits	Essential (Specify)
1.5	Dynamic range	Minimum 120dB	Essential (Specify)
1.6	Auto integrator correction	Allows low freq vibrations down to 0.2Hz	Essential (Specify)
1.7	Averaging modes	Normal, exponential, peak hold, order tracking, negative averaging, synchronous time	Essential (Specify)
1.8	Cursor spectrum	Single harmonic, moving harmonic, sideband, time/freq for waveform	Essential (Specify)
1.9	Frequency Range	DC to 80 KHz	Essential (Specify)
1.10	Full scale range	-20 to 20V	Essential (Specify)
1.11	Noise Floor	Typically less than 20µV for a 400 line spectrum at 1KHz maximum frequency	Essential (Specify)
1.12	No of Averages	5000 in ROUTE mode, 10000 in job mode	Essential (Specify)
1.13	Resolution	100, 200, 400, 800, 1600, 3200, 6400, or 12800 lines of resolution for route data collection & effective resolution of up to 300,000 lines for analysis.	Essential (Specify)
1.14	Response	Flat to DC for non-integrated and DC-coupled signals; optional AC coupling -3 dB at 1 Hz	Essential (Specify)
1.15	Scaling	Linear, Log for both X & Y	Essential (Specify)
1.16	Windows	Hanning or uniform	Essential (Specify)
1.17	Data analysis speed	400 line, 1000 Hz spectrum – 9 avg/sec 1600 lines, 1KHZ spectrum – 4 avg/sec	Essential (Specify)
1.18	Bearing condition detection	Digital technology in measuring &	Essential (Specify)

		<p>detecting true indication of impact in bearing & gearing. "Peakvue" technology to detect earlier signs of bearing/gear wear.</p> <p>The bearing parameter measurement to provide on screen indication of bearing fault & lubrication fault.</p> <p>Bearing parameter should also be trend able.</p>	
1.19	Display	6" x 4.5" (151 x 115 mm) color TFT w/ LED backlight. Resolution 640 x 480 pixels. Touchscreen - XY resistive.	Essential (Specify)
1.20	Keypad	Tactile Dome buttons, Electroluminescent panel illumination	Essential (Specify)
1.21	Operating temperature	-20 to 50 deg C	Essential (Specify)
1.22	Environmental rating	Sealed Enclosure, IP-65 rated	Essential (Specify)
1.23	Battery	Rechargeable Lithium Ion battery pack, 10 hours of continuous use	Essential (Specify)
1.24	Internal Memory	1 GB, expandable to 32GB with external memory card	Essential (Specify)
1.25	Certification	PESO certification ATEX and IECEx approval to Ex ic IIC T4 Gc, CSA Class II, Division 2, Groups F G	Essential (Specify).
1.26	Data Transfer	USB 2.0, 100M Ethernet Wi-Fi 802.11 b/g range up to 33m, & Bluetooth 2.0 A2DP	Essential (Specify)
1.27	Analysis Features	<ul style="list-style-type: none"> a. High resolution Analysis b. High frequency analysis c. Slow speed analysis with slow speed technology to monitor assets running at speed as low as 0.5 rpm. d. Rolling element bearing / Gear Box measurement e. Bump test equipment off condition f. Bump test equipment running condition g. Motor Current signature analysis h. Advance transient analysis (continuous unbroken waveform collection for the desired time period, BODE, Nyquist & Cascade plots) i. Order tracking analysis j. Synchronous analysis k. Dual Orbit analysis l. Live continuous monitoring of overall vibration value, spectrum & waveform m. Run up & coast down n. Frequency response function to perform full transfer function, Coherence & adv cross channel analysis o. Advance Dynamic Balancing in 4 plane & 6 axes. p. ODS/Modal analysis q. Technology to differentiate between periodic vibration & random vibrations. 	Essential (Specify)
1.28	Speed Sensor	a. Infrared Tach generator	Essential (Specify)

	Compatibility	<ul style="list-style-type: none"> b. Proxy probe with driver c. Strobe light d. Magnetic pulse pick up 	
1.29	Machinery Health Analyzer- Essential Features	<ul style="list-style-type: none"> • The vibration analyser shall have embedded intelligence capable of providing automatic configuration of additional measurement acquisition when ROUTE data indicates a machinery problem. It shall be compatible with predictive maintenance software which can store & manipulate ROUTE based data collected with machinery analyser as well as other predictive maintenance tools. Embedded intelligence for all above mentioned analyses shall be available as a standard feature. • The Vibration analyser shall have the ability to measure, store & trend process variables associated with asset in addition to vibration data. The process variables such as pressure, temperature, speed, flow etc can be correlated with vibration data to provide info about the health of the asset. • The vibration analyser/data collector shall be user friendly having on screen instructions & shall be intelligent enough to prepare automatic set ups for the complex vibration analyses. The analyser should have ability to perform additional diagnostic tests at the machine sites itself. • The vibration analyser shall have capability to ROUTE management with TRIAXIAL sensor & also provide peak detection measurement for bearing analysis. • The analyser screen must be bright enough & shall have auto light sensor to adjust the sensitivity as per the environment. The screen should be clearly visible in all environments be it complete dark or bright sunlight. Also, a backlight keypad should be provided to operate the analyser in the dark. • The analyser shall be able to simultaneously collect spectra, waveforms & 12 analysis parameters for both a standard vibration & peak detection measurement for bearing analysis from a single sensor & that of TRIAX sensor. • The analyser shall have a colour screen with easy infield analysis colour coded alarm indication for overall & 12 parameters providing immediate indication of machinery health on the screen itself as a part of “conformance 	Essential (Specify)

		<p>check". Also, analyser shall provide trending of these 12 parameters for 2 years & fault frequency overlays to match & identify the specific source of energy peaks in the vibration spectrum.</p> <ul style="list-style-type: none">• Vibration analyser shall also have remote viewing capability. Remote Analyst shall be able to view the screen of the vibration analyser during data collection by data collector.• Vibration analyser shall also have "virtual Tachometer" to detect running speed of the machine without any need of tachometer or stroboscope.• The vibration analyser shall be capable of diagnosing variable speed machinery. It should automatically adapt its diagnostic tools to variable turning speed during data collection.• It should be possible to enhance vibration analyser capability to collect unbroken raw vibration signal over a long period of time. It should be collected as a single continuous block of data & not multiple data blocks pieced together. It shall also can be utilise as temporary online monitoring system for the period of at least a month.• The analyser shall have a tach multiplier function for generating a pseudo tach signal for Time synchronous averaging of enclosed gear box shafts.• The analyser shall be able to calculate full spectrum cross channel phase & coherence measurement.• The analyser shall be capable of detecting machine speed from a laser speed sensor without requiring the use of reflective tape, a key way or any other special marks on the shaft.• The analyser shall be capable of negative linear averaging to remove background vibration signals.• The vibration analyser shall be incorporated with balancing & frequency response function capabilities.• Balancing application shall be minimum 2 plane, 4 sensor & application shall be intelligent enough to analyse vibration data collected during balancing & able to identify structural faults, thereby making the balancing job easy.• The analyser shall be capable of transferring data to & from a host PC	
--	--	--	--

		<p>using high speed USB & Ethernet connection & have the ability to directly connect to the internet for data transfer via E-mail for remote use & analysis.</p> <ul style="list-style-type: none"> • The analyser shall be capable of displaying a spectrum & time waveform for each point collected with the ability of activating movable harmonic, sideband & fault frequency cursors. It shall also have definitive cursor accuracy. It shall be capable of spectra zoom / expansion in the X or Y directions. It shall be capable of showing tach pulses with dynamic time waveform display. • The vibration analyser shall also be capable of selecting any measurement point at any time, no matter which route & which machine point is active. • The analyser shall be capable of capturing data when triggered either by an amplitude level exceeding an alarm level (internal trigger) or TTL pulse (external trigger). It shall have the capability of allowing the user to define the percentage of pre-trigger or post-trigger information to be captured. • The analyser shall have the capability for low frequency diagnostics with the appropriate sensor and shall measure and display vibration accurately in velocity or displacement, corrected for integration distortions and signal noise. • The analyser shall be capable of off-route data setup, collection, analysis, and storage. User-defined off-route data measurement points shall enable the analyser to collect overall, spectrum, and waveform data. It shall have the capability of uploading the off-route spectra and waveform data into a specified database within the predictive maintenance software. The user shall have the option of attaching the off-route data to an already loaded route and may utilize analysis parameter sets defined in the route. • The vibration analyser shall also have external battery charger for charging spare battery pack. • The vibration analyser shall have dashboard indicating bearing condition in terms of “% mechanical bearing fault” & “% lubrication fault”, for easy interpretation of lubrication condition of the bearings / gearing. • The vibration analyser shall also be capable of collecting data from already installed online vibration monitoring / 	
--	--	---	--

		<p>protection systems on turbo machinery.</p> <ul style="list-style-type: none"> • The vibration analyser shall also be capable of monitoring reciprocating compressor. • The vibration analyser shall be able to pair with BT enabled wireless headphone to listen the vibration data as well as identify the source. • The vibration analyser shall be provided equipped with 1/3rd Octave analysis. • The vibration analyser shall also be capable of performing Impact analysis simultaneously over all the 4 channels & with TRIAX sensor. 	
1.30	Diagnostic Software Package	<p>Features:</p> <ul style="list-style-type: none"> • Database management, ODBC driver, trend plotting, fault frequencies calculator, advanced plotting & analysis tools, wizard database set up, CMMS interface tools, advanced reporting, machine history viewer, asset history management, basic statistical alarm management, multi window plotting & analysis, dual monitor support, management reporting, multi speed multi plane balancing calculator, manual data entry, route management, advanced statistical alarm management, rule based automatic diagnostics & can be upgraded to any higher version. • The software package shall integrate multiple predictive diagnostic technologies thereby providing a comprehensive view of each monitored machine & more accurate diagnosis of developing problems. Software package shall integrate different predictive technologies like vibration analysis, lubrication analysis, Infrared thermography, laser alignment, AC motor diagnostics & dynamic balancing • The software package should be "Wide Area Network" licensed, having centrally located server for database management & sharing data on plant level. The WAN license shall be able to provide simultaneous usage for minimum 100 users. It should also be possible for the software to upload data from any of the PC's in network. • Software shall have real time dynamic dashboard, which shall provide instantaneous information like assets in critical condition / warning condition & good condition. It shall also provide instantaneous information about 	Essential (Specify)

		<p>ROUTE collected & pending as per the schedule.</p> <ul style="list-style-type: none"> • Software shall also be able to interface with APM Meridium V4.3X. • The same software package shall be able to installed in Cloud & support remote diagnostics. • The software package shall be knowledge based. It shall have database wizard which automates the entire process with a graphical drag & drop interface. • The software package shall have extensive library of motors, bearings of all manufacturers, gearboxes, couplings, belts & other mechanical components. It shall also allow user database creation of mechanical components. A knowledge engine compiled from years of field analyst experience automatically creates multi-technology measurement points, analysis parameter sets, and alarm limit settings along with configurations for the automated diagnostic system. • The software package shall allow flexible analysis interface inclusive of x,y,z plots in a single screen, connecting 3 monitors at the same time, parameter band trends & all measurement points for the machine on a single screen, viewing & comparing similar machines from more than one database. • The software package shall also allow waveform audio replay. Replay the audio from a periodic or online waveform, a transient detailed waveform, non route measurement waveform. Also the software shall help compare the different waveform audios. The software shall allow the audio to be saved & also can be attached to the report. • The software package shall have extensive analysis tools to enable accurate diagnosis of machinery health. The software shall provide coloured waterfall plots, cascade plots, waveform autocorrelation, circular waveform plot, waveform audio reply, orbits / filtered orbits, Bode plot, Nyquist plot, full spectrum & cascade full spectrum etc • The software package shall have case history module, to be well informed about the status of the asset. • The software package shall also have machine history viewer, which shall be launched from Internet explorer. • The software shall provide Automated & custom report generation, trend report, Exception report in pdf, excel 	
--	--	---	--

		<p>(.xls as well as .csv formats), words etc</p> <ul style="list-style-type: none"> • Software shall also be able to upload photographs & create case histories. • The software package shall incorporate “decision support system” (Advanced Auto Diagnostics). It shall enhance maintenance decision making process by taking into account data from all the predictive technologies & automatically identifying probable faults with an asset. It shall also prescribe appropriate action. • The decision support system (Advanced Auto Diagnostics) shall work in the same computer as software package & shall have at least 20 asset types. • Software shall also be able to store corrective technology i.e. Balancing data. • Software package with capacity of minimum 100 simultaneous users. The software package shall have capabilities as mentioned above. • The decision support system (advanced auto diagnostic system) to enhance maintenance decision making by automatically identifying probable faults with an asset. 	
1.31	Hardware & Software's	AMS 2140 Four Channel Machinery Health Analyzer (Quantity: 1 No)	Essential (Specify)
		Hard Carrying Case (Quantity: 1 No)	Essential (Specify)
		A0760GP Accelerometer (Quantity: 4 Nos)	Essential (Specify)
		Mounting Magnet 2 Pole (Quantity: 4 Nos)	Essential (Specify)
		Accelerometer Coiled Cable (Quantity: 1 No)	Essential (Specify)
		A2140S4 Advanced Transient Analysis Module	Essential (Specify)
		A2140S5 ODS/Modal Analysis Capability Module	Essential (Specify)
		A2140S6 Advanced Cross Channel Analysis & FRF Module	Essential (Specify)
		CSI 2140 Neck Strap Assembly (Quantity: 1 No)	Essential (Specify)
		USB 2.0 A Male to Micro B Male 5P W/Ferrite Core, Black, 6FT (Quantity: 1 No)	Essential (Specify)
		CSI 2140 Overlay Protector (3-Pack) (Quantity: 1 No)	Essential (Specify)
		CSI 2140 AC Power Cord Adaptor (Quantity: 1 No)	Essential (Specify)
		CSI 2140 Battery Pack (Quantity: 1 No)	Essential (Specify)
		Cable ASM 3 Cond W/Plug (Quantity: 1 No)	Essential (Specify)
		AMS 2140 Firmware DVD W/user Manual (Quantity: 1 No)	Essential (Specify)

		AMS 2140 DVD Case (Quantity: 1 No)	Essential (Specify)
		AMS 2140 Analyze Module (Quantity: 1 No)	Essential (Specify)
		AMS 2140 Route Module (Quantity: 1 No)	Essential (Specify)
		Run up coast down module for AMS 2140 (Quantity: 1 No)	Essential (Specify)
		Conformance Check Module for AMS 2140 (Quantity: 1 No)	Essential (Specify)
		AMS Module for Bump Test when equipment is running (Quantity: 1 No)	Essential (Specify)
		A034701: Sensor Modal Hammer 1 lb (Quantity: 1 No)	Essential (Specify)
		AMS Module for Bump Test when equipment is off (Quantity: 1 No)	Essential (Specify)
		A034703: Sensor Modal Hammer 3 lb (Quantity: 1 No)	Essential (Specify)
		AMS Module for MCSA (Quantity: 1 No)	Essential (Specify)
		A341D: Clamp on Current Probe. 1-1000 AMP (Quantity: 1 No)	Essential (Specify)
		AMS Module for High Resolution & High Frequency Analysis (Quantity: 1 No)	Essential (Specify)
		AMS Module for Orbit Analysis (Quantity: 1 No)	Essential (Specify)
		AMS Module for Slow Speed Machine Analysis (Quantity: 1 No)	Essential (Specify)
		AMS Module for Bearing/Gear Impact Peak Detection Analysis (Quantity: 1 No)	Essential (Specify)
		AMS Module for PeakVue Plus Feature (Quantity: 1 No)	Essential (Specify)
		AMS Module for Laser Speed Detection (Quantity: 1 No)	Essential (Specify)
		AMS Machinery Health Manager Software installation DVD (Quantity: 1 No)	Essential (Specify)
		AMS 2140 Balancing Module (Quantity: 1 No)	Essential (Specify)
		AMS 2140 Balancing Kit (laser tachometer, magnetic stand and reflective tape (Quantity: 1 set)	Essential (Specify)
		AMS Autocorrelation Analysis Module	Essential (Specify)
		AMS inbuilt virtual tachometer module	Essential (Specify)
		CSI 2140 Channel A,B,C,D Acceleration cable, 4ft length (Quantity: 4 Nos)	Essential (Specify)
		CSI 2140 Acceleration Extension Cable BNC to BNC 4 ft length (Quantity: 4 Nos)	Essential (Specify)
		CSI 2140 Accl channels A & B Splitter 5P M12 to Dual BNC 0.2M Red & Blue (Quantity: 1 No)	Essential (Specify)
		CSI 2140 Accl channels C & D Splitter 5P M12 to Dual BNC 0.2M Grey & Black (Quantity: 1 No)	Essential (Specify)
		CSI 2140 volts/Tach extension cable 8P M12 to 8P M12 0.2M Black (Quantity: 2 No)	Essential (Specify)
		CSI 2140 Accel Extension Cable 5P M12 to 5P M12 0.2M (Quantity: 1 No)	Essential (Specify)

		A40ADPTR: CSI 2140 Input Adapter, 4 Channel (Quantity: 1 No.)	Essential (Specify)
		A0643-TX: Accel, Triaxial with integrated magnetic mount for Route Measurement (Quantity: 1 No)	Essential (Specify)
		D25477: CSI 2140 Triaxial Accel Cable, Straight, 5 Pin M12 to 5 Pin Brad Harrison	Essential (Specify)
		Mounting Pad, Triax A0643Tx (Quantity: 3 Nos)	Essential (Specify)
		A2140Case: Hard Carrying Case (Quantity: 1 No)	Essential (Specify)
		Upgradation of Existing Software Licenses (License No.16911) to V5.61 or higher version and upgraded software should be compatible with the existing CSI 2130 and CSI 2140 Machiner Health Analyser	Essential (Specify)
1.32	Manuals and CD	Operating Manuals, Quick Start Guide, Application Manuals, & other essential documents all in English, 1 set each	Essential (Specify)
1.33	Acceptance Criteria	The equipment shall be tested for its functionality and performance at CMTI as per our technical specifications (for all the parameters) and also detailed specifications given in the supplier data sheets.	Essential (Specify)
1.34	Performance Warranty	For 12 months from the date of acceptance at CMTI.	Essential (Specify)
1.35	Training	<ul style="list-style-type: none"> Supplier to provide comprehensive initial training for 3 days from the respective subject domain experts on hands on usage and operation at CMTI at free of cost within 10 days of installation. ISO CAT II Training Program for 2 persons of CMTI at free of Cost. 	Essential (Specify)
2.0 Laptop. Preferred Make: Dell/HP. Quantity: 1 No.			
2.1	Processor	Intel Core™ i7 11 th Gen (2.6 GHz or better, 12MB Cache or more, 6 cores or more)	Essential (Specify)
2.2	Operating System	Windows 10 or 11 Pro 64 with MS Office 2021 standard edition with media recovery	Essential (Specify)
2.3	Processor Family	11 th Generation Intel Core™ i7 Processor	Essential (Specify)
2.4	Processor chipset	Intel	Essential (Specify)
2.5	Memory	8GB DDR4-2666 SDRAM	Essential (Specify)
2.6	Hard Drive Description	1TB PCIeNVMe™ M.2 SSD	Essential (Specify)
2.7	Display	39.62 cm (15.6") diagonal FHD 144Hz IPS anti-glare micro edge WLED-backlit (1920 x 1080) or better	Essential (Specify)
2.8	Graphics	NVIDIA GeForce 4 GB DDR5	Essential (Specify)

2.9	Ports	1 USB 3.1 Gen 2 Type-C™, 3 USB 3.1 Gen 1 Type-A, 1 HDMI, 1 RJ-45, 1 headphone/microphone combo; 1 microphone; 1 AC smart pin; 1 Mini DisplayPort™	Essential (Specify)
2.10	Expansion Slots	1 multi format SD media card reader	Essential (Specify)
2.11	Webcam	Wide Vision Full HD Camera with integrated dual array digital microphone	Essential (Specify)
2.12	Pointing Device	Touchpad with multi-touch gesture support and 26 key Rollover Anti-Ghosting Key Technology	Essential (Specify)
2.13	Keyboard	Full-Size island style white legend 4-zone lighting RGB backlit keyboard with numeric keypad	Essential (Specify)
2.14	Network interface	Integrated 10/100/1000 GbE LAN	Essential (Specify)
2.15	Wireless	Intel Wireless-AC 9560 (2x2) Wi-Fi and Bluetooth 5 Combo	Essential (Specify)
2.16	Wireless Note	MU-MIMO supported; Miracast compatible	Essential (Specify)
2.17	Power Supply Type	Compatible AC power adopter	Essential (Specify)
2.18	Battery Type	6-cell, 60 Wh Li-ion polymer	Essential (Specify)
2.19	Energy Efficiency Compliance	Energy Star Certified	Essential (Specify)
2.20	Power Adopter	Suitable same brand shall be included	Essential (Specify)
2.21	Carry Case	Same brand shall be included	Essential (Specify)
2.22	Warranty	3 years unconditional onsite warranty.	Essential (Specify)

Other Terms and Conditions:

1. All the listed software and hardware items in tender, that vendor/supplier quotes should be preferably be a catalogue product and proven.
2. The single vendor has to supply all the items. The vendor has to quote for all the items and if any vendor quotes for partial items will be rejected.
3. If the vendor is not OEM, the OEM authorization certificate and local content percentage in the order value are also submitted along with bidding documents.
4. The vendor should meet all the technical specifications to qualify the bid.
5. The bidder has to submit all necessary technical information documents/data sheets & compliance sheet as per the technical specifications.
6. The vendor/supplier has to sign and stamp (company seal) on all the pages of technical compliance sheet.