GLOBAL AUTOMOTIVE RESEARCH CENTRE

ENSURING SAFE DRIVE

TENDER DOCUMENTS FOR

"Supply, Installation, Commissioning, Training & Acceptance of E-Power drive Analyser and its accessories "

TENDER NO. 439/GARC/EV/2022-23/E-Power drive Analyser /27

Annexure IV- Technical Condition of Contract

Supply, Installation, Commissioning, Training & Acceptance E-Power drive Analyser and its accessories

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1.0. Scope of Supply details

Supply
E-Power drive Analyser and its accessories

1.1. Functional requirements

Dimensions and main characteristics.

The characteristics listed below shall be considered minimum requirements apart from any other characteristic required for the compliance with the standards and/or feasibility to perform the tests in the described manner.

This equipment is intended to be used for more than one test.

Sr. No.	Parameter	Requirement
1.1	Description	Modular portable Power Analyzer for Variable frequency loads/sources to be operated with Isolated power supply 11 to 32 VDC as well as external AC adaptor.
1.2	Application of power analyzer	The analyzer is indented to be used in power analysis of Traction motor (BLDC, PMSM, IM, SRM etc.,), Battery, power Electronics of Electric Vehicle
1.3	No. Of Power channels	Minimum 8 Voltage & 8 Current channels with minimum 18 bit resolution.
1.4	Modes of Voltage & current Measurements	1 Ph - 2 wire, 3Phase-3 wire without neutral line, 3Phase-3 wire without neutral line(using current output transducers), 3Phase-3 wire without neutral line(using voltage output transducers), 3Phase-3 wire with neutral line, 6 phase measurements.
1.5	Voltage Range	Minimum 1000V DC and AC(RMS)
1.6	Voltage Probe	8 nos of Crocodile clips with min 10 Mtr or longer cable for all given channels.
1.7	Voltage Accuracy	0.05% of reading or better
1.8	Voltage Resolution	Minimum 3 digit decimal point of displayed Volt value.
1.9	Current Range	Min 0 - 1000A DC and AC(RMS)
2.0	Current Accuracy	0.05% of reading or better
2.1	Current Resolution	Minimum 4 digit decimal point of displayed Amps value.
2.2	Power supply for External CT within Power analyzer	External power supply box for up to eight current transducers Input: 9 .. 36 VDC, ext. 115/230 VAC Power Supply included Current transducer connection: 8 Lemo sockets with ±15 V and +9V power supply for current transducer
2.3	cable terminals	8 no's of cable terminal connection from BNC to CT pin configuration
2.4	Current Accuracy for External current transducer	0.05% of reading or better

2.5	Current Resolution for External current transducer	Minimum 4-digit decimal point of displayed Amperage value.
2.6	Data Storage	Minimum 2TB inbuilt storage
2.7	Sampling Rate	Selectable from 1hz to 10Mhz or higher per channel.
2.8	Measurement of speed and torque	The power analyzer shall have means to connect input of 1. Encoder (Pulse/Frequency 4000Hz or better), 2. Hall effect sensor (DO 4000Hz or better) 3. Torque flange for measurement of speed, angular position, and torque with provision for adding additional inputs. System shall have provision for calibration/scaling of unit value to I/O value.
2.9	Multi input for various Transducer	Minimum 8 channel Multi input provision with 24-bit resolution Bandwidth DC to min 2 MHz, anti-aliasing and freely programmable low- and high-pass filters Measurement modes: bridge (full/half/120 Ohm-, 350 Ohm and 1000 Ohm -quarter bridge, up to 1000 mV/V or mV/mA), voltage (up to ±100 V), IEPE (up to ±10 V), RTD (up to Pt2000), resistance (up to 30 k Ohm), current (±30 mA via internal shunt), thermocouple and charge input with Freely programmable excitation voltage (0 - 24 VDC) and current (100 µA - 60 mA) with monitor/math/constant output, function generator functionalities. 5m open end cables with suitable connectors to be provided for all channels.
3.0	GPS	Minimum 100 Hz GPS; provision should be provided to be used in vehicle for position, speed and displacement measurement , GPS antenna (5 m cable).
3.1	Analog Output	8 min isolated output channels ±5 V and ±10 V @ >2 MS/s
3.2	CAN Interface	Min 4 channel with D-SUB-9 CAN/CANFD interfaces for Highspeed CAN with Sensor power supply +5 V and +12 V, min Isolation 500 VDC
3.3	Temperature	16 channel universal thermocouple measurement module galvanic isolated input channels up to 100 S/s/Ch , simultaneous sampling thermocouple types K, J, T, E, R, S, B, N, C, U sensor disconnection or interruption detection with cable.
3.4	Battery Backup for Autonomous Measurements.(should be less than 3 Kg)	External UPS and multi-battery charger with isolated DC input for Power analyser, with min 3 inbuilt batteries , and min output power 250 W, Input: 11 to 32 VDC, Output: 12 to 16 VDC when running from batteries and 24 VDC when powered from DC, Including external 115 / 230 VAC adaptor for charging batteries.
3.5	Software	The software should include: Hardware setup, simplified data Logging, simplified Data Viewing. Automatic sensor recognition through TEDS. Software to make online digital displays, graphs & calculations.Start-Stop on manual Trigger, repetitive Acquisition, Data Streaming for online monitoring. The following parameters to be visualized and logged: Voltage, Current, PF, Power, Energy, Peak to Peak Values, RMS Values, Torque, Id, Iq, CosΘ, Sin Θ, Θe, Θm, Ld, Lq, Vd, Vq, channel, Efficiency Speed & time for each channel, Efficiencies, Deg, Wh, ah, Clark Park transforms vector diagrams, efficiency mapping, power mapping etc.,
3.6	Data Post Process	a. Easy-to-use software for data analysis. b. Graphical data visualization in time, frequency, domain, position c. Data cleansing and processing: Cut, edit, delete graphical curve operations, FFT of selected section, statistics (min, max, mean rms) d. d. Filters: Running Average, RMS over time, Mean over time, Low Pass, High Pass, Band Pass, Band stop filter of Bessel, Butterworth e. Mathematical functions: Arithmetic, Algebra, trigonometric, Integration, Differentiation & Statistics. f. Analysis: FFT and Video based data analysis (Synchronized Replay of Data and video)

		g. Visualization Objects: Graphs, Tables (CAN, Flexible, statistics), Histograms, 3D Diagrams, Spectrum, Spectrogram & GPS data on Maps. h. Data conversion to ASCII, EXCEL, MDF3/4, MATLAB, RPCIII etc., i. Data export and reporting.
3.7	DC Clamp meter	• AC/DC CAT3 Clamp Meter with backlight • TRMS, Minimum 1000A AC/DC, 1000VAC, Continuity, Frequency, MIN/MAX, mV DC • Up to 2500A AC including flexible current probe
3.8	milli ohm meter	Minimum 10 mΩ to 1000 MΩ range. Testing range: 1 A DC to 1 µA or less 1 mA to 5 µA DC Measurement accuracy: ±0.001 % f.s. Functions: Temperature correction, temperature conversion, offset voltage compensation (OVC), comparator (ABS/ REF%), BIN, key-lock (OFF, menu lock, all lock), display digit count selection function (7- digit/ 6-digit/ 5-digit), automatic power supply frequency settings (AUTO/ 50Hz/ 60Hz), scaling, judgment sound setting, auto hold, averaging, statistical calculations, panel store/panel load, D/A output
3.9	IR gun thermal image processor and recorder	Contact and non-contact thermometer in one Measurement temperatures range: -50°C to 700°C Features rugged, ergonomic design that stands up to tough industrial environments.
4.0	Current Transducer(Quantity:4 no's)	Rated current: 200 A AC/DC Max. allowable input: 400 A rms Output voltage: 0.01 V/A Operating temperature, humidity: -40 °C to +85 °C Power Supply: ±11 V to ±15 V DC (Power suppled via the Sensor Unit, which supports 100 to 240 V AC) with ME15W connector
4.1	CT power supply	Excitation with 4 channel output Output Terminal: BNC Terminal Output voltage: Waveform output/ Total waveform output: 2 V f.s.; Total RMS output: 2 V DC f.s. Power supply: AC Adapter and External power supply (10 to 30 V DC; maximum rated power: 60 VA)
4.2	Extension Cable for CT's (Quantity:10 no's)	• 5 m (16.41 ft) length, ME15W (12 pin) - ME15W (12 pin) connector.
4.3	Voltage probe (Quantity:12nos)	5m CAT 3 voltage probes with Crocodile clips
4.4	Toughbook (Quantity:2nos)	• i5 Processor • 14 inch or higher display. • 16gb ram or higher • Min 512 gb ssd, • 4.4 gHz with turbo booster
4.5	High precision shunt for high-voltage and current measurement for component level measurements(Quantity:5 no's)	• High-voltage input up to 850 VDC • Current measurement up to 100 A DC via shunt • Universal plugs for connection to high-voltage network. • Operating Temperature: -20 … 70 °C (-4 … 158 °F) • Degree of Protection : IP54 • Accuracy: 0.1%
4.6	High precision shunt for high-voltage and current measurement for PDU level measurements(Quantity:6 no's)	• High-voltage input up to 850 VDC • Current measurement up to ±900 A DC via current transformer • Universal plugs for connection to high-voltage network. • Working temperature range: -20 … 70 °C • Degree of Protection : IP54
4.7	HV Thermocouples(Quantity:15 no's)	K type thermocouples to be used in High voltage areas.

4.8	Fuse (Quantity:4nos)	• Operating current measurement via automotive fuse carrier to measure from 20A to 100A • Mounting at automotive fuse carrier • Overload protected up to factor 1.5 of rated current • Voltage supply: 6 … 15 VDC • Working temperature range: -40 … 85 °C
4.9	Displacement sensor Draw wire sensor(Quantity:1no)	Measurement range of atleast 100mm - min 1 m length with analog output option.
5.0	Automatic Insulation Withstanding Hitester	All-in-one instrument that Combines Withstand Voltage and Insulation Resistance (AC/DC). Programmable insulation (50 V to 1200 V DC) and dielectric strength (AC/DC) testing Withstanding Test: 0.2 kV to 5.00 kV AC, 500 VA (max. 30 minutes), 0.2 kV to 5.00 kV DC, 50 VA (continuance)
5.1	Pin connector (Quantity:10 no's)	12 pin female ME15W Connector to free ends 5m cable
5.2	General Equipment Compliances	CE or equivalent markings for both Electrical and EMC Compliances
5.3	Calibration System	Calibration certificates of all the hardwares components in test system like sensors, IO cards, power source, timers, display meters etc. Calibration certificate should be valid for 1 years from the date of acceptance of equipment.
5.4	Power Failure	In case of Power failure , test should resume from the same test point after the power is resumed
5.5	Warranty	Warranty for 24 months should be available standard.
5.5	Documentation:	One set of Operation Manual complete with drawings, parts list (with part codes), diagrams with list ratings of components and list of do's and don'ts for the main equipment as well as the sub-systems. These manuals should be in the form of hard (printed) copy in English Language as well as in electronic storage form (disc, pen drive etc).
5.6	General	Installation, training and trails to demonstrate proper functioning of the system will be the responsibility of the supplier. Preference shall be given to the supplier who have their local service agents in India

INSTALLATION & COMMISSIONING

The supplier shall install equipment at site. Also the supplier(s) shall demonstrate the working of equipment as per Final Acceptance Protocol (mutually agreed between buyer and supplier) with Trials in order to complete the Commissioning Process. Hands on training to be provided at site by company engineer on complete system and accessories.

The supplier to provide required support to GARC while working on atleast two initial customer project execution.

Calibration of Devices and Certificates.

Calibration devices traceable to international standards for E-power drive analyser and its accessories shall be supplied. These devices have to include the needed calibration certificates.