

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY: BURLA



P.O: Engineering College Burla (Siddhi Vihar), Dist: Sambalpur
Odisha- 768018, India

Website :www.vssut.ac.in, E-mail: registrar@vssut.ac.in, Ph:(0663)2430573, Fax-2430592

Notice No.: VSSUT/EE/1987

Date: 12/10/2026

PUBLIC NOTICE

PRE-NIT CONSULTATION / EXPRESSION OF INTEREST (EOI)

for Review of Technical Specifications of "[ARES L EQUIPMENT]" prior to issue of Tender

1. Background

Veer Surendra Sai University of Technology (VSSUT) (hereinafter "VSSUT") proposes to procure the equipment described in Annexure-A (Equipment like Machine, Magnetics and Converter) for Advanced Renewable Energy Systems Lab(ARESL), Department of Electrical Engineering, VSSUT, Burla. In keeping with the fundamental principles of public buying — transparency, competition, fairness, elimination of arbitrariness and efficiency — as laid down in the General Financial Rules, 2017 (Rules 144 and 173), the Manual for Procurement of Goods issued by the Department of Expenditure, Ministry of Finance, Government of India, and the guidelines of the Central Vigilance Commission (CVC) on transparency in tendering and formulation of specifications, VSSUT intends to place the draft technical specifications in the public domain before the tender is advertised.

This Notice is issued solely to obtain views of interested parties and the public at large on the draft technical specifications. It is not a tender, a pre-qualification invitation or an offer, and it does not commit VSSUT to float a tender or to procure.

2. Objectives of this Consultation

Views, comments and suggestions are invited on the following aspects of the draft specifications:

- (1) Technical viability: whether the specified parameters, ratings, tolerances, standards and test requirements are technically sound, internally consistent and achievable.
- (2) Availability: whether the Equipment, or functionally equivalent equipment, is available from more than one manufacturer / source, including indigenous manufacturers, MSEs and start-ups.
- (3) Customisation: whether any item requires custom design or manufacture, with indicative lead time, and whether a standard catalogue alternative would meet the functional requirement.
- (4) Restrictive or proprietary features: any clause, parameter, make, model, trade name or feature that restricts competition or favours a particular vendor, with a suggested generic or equivalent formulation.
- (5) Standards and compliance: applicable BIS / IS / IEC / IEEE or other standards, safety and EMC requirements, and required type-test or routine-test certificates.

- (6) Commercial and delivery terms: warranty, installation and commissioning, training, spares and after-sales support, and any indicative delivery period, that bidders would consider reasonable.
- (7) Any other suggestion that would improve the quality of the specifications or widen participation.

3. Who May Respond

Manufacturers, authorised distributors and dealers, system integrators, service providers, academic and research institutions, industry associations, domain experts and members of the public may respond. Respondents shall disclose their name, organisation, category (manufacturer / authorised dealer / other) and contact details. Anonymous responses will not be considered.

4. How to Respond

- Responses shall be submitted in the format at **Annexure-B**, by e-mail to [head_elect@vssut.ac.in] with the subject line "Pre-NIT Comments – Notice No. []".
- **Last date and time for receipt of responses: 13/10/2026, 23:59hrs (IST).**
- Technical queries may be addressed to the **The H.O.D, Electrical Engg, VSSUT, Burla.**
- Comments received after the closing date may not be considered.

5. Treatment of Responses

All responses will be examined by a duly constituted Technical Committee. VSSUT may, at its sole discretion, accept, modify or reject any suggestion, and will finalise the specifications keeping in view functional requirements, generic (non-proprietary) formulation and the widest possible competition. A consolidated summary of the changes made, with reasons, will be recorded on file and may be published along with the tender document. Individual replies to respondents are not obligatory.

6. Terms and Conditions of this Notice

- (1) This Notice is for information and consultation only and does not constitute a Notice Inviting Tender (NIT), Request for Proposal or any commitment to procure.
- (2) Response to this Notice is voluntary. Participation, or non-participation, shall neither confer any advantage or preference nor impose any disqualification in the subsequent tender. Interested parties shall be required to bid separately, through the procedure stated in the tender document.
- (3) No cost, expense or liability of any kind incurred by a respondent in responding shall be reimbursed by VSSUT.
- (4) Respondents shall not quote prices in their comments unless specifically sought. Any commercial information shared will be treated as indicative only.
- (5) Respondents shall not indulge in canvassing, or approach any official of VSSUT other than the HOD, Electrical Engineering, VSSUT, Burla, regarding this Notice. Any attempt to influence the

9

process may lead to action under applicable rules, including debarment from the subsequent tender.

- (6) Any person who has participated in framing the specifications for, or advised, the VSSUT on this procurement shall disclose any actual or potential conflict of interest while responding.
- (7) Intellectual property or proprietary information included in a response shall be clearly marked. The VSSUT may use technical inputs, without attribution, for the sole purpose of finalising specifications.
- (8) The subsequent tender, if floated, shall be published on VSSUT's website, in some leading state and/or all-India News Paper as advertisement / the Government e-Marketplace (GeM), as applicable, and shall be governed by the extant GFR provisions, the Public Procurement Order, the MSE procurement policy.
- (9) VSSUT reserves the right to amend, extend or withdraw this Notice, or to proceed without any further consultation, without assigning any reason.
- (10) Submission of comments or queries in response to this Notice does not entitle any person to a reply, clarification, meeting or consideration. The Institute is under no obligation to respond individually to, or to address, all or any of the comments received, and its decision on them shall be final.
- (11) Only comments received in writing in the prescribed format (Annexure-B) by the closing date will be placed before the Technical Committee. Comments received after the closing date shall not be considered.
- (12) Any clarification of general interest that the Institute chooses to issue will be uploaded on its website for all interested parties.
- (13) The Institute may issue the Notice Inviting Tender at any time after the closing date of this Notice, with or without incorporating any suggestion received, and without waiting for or answering any pending query. The tender document shall be the sole binding document, and queries on it shall be addressed after tender advertisement, as per its terms and conditions.

7. Draft Technical Specifications

The draft technical specifications of the Equipment are given at **Annexure-A** to this Notice, available for download at www.vssut.ac.in.

REGISTERED

VSSUT, Burla

Copy to: (1) Web Administrator – for uploading on the VSSUT's official website under "Tenders / Notices"; (2) Notice Board; (3) Purchase Committee / Technical Committee members; (4) File.

ANNEXURE-A

DRAFT TECHNICAL SPECIFICATIONS OF "ARES EQUIPMENT: MACHINES, MAGNETICS AND CONVERTER"

Sl. No	Item & Description	Quantity	Specifications
1	3.7kW, 240V BLDC Generator coupled with 7.5hp, 415V 3-Phase IM.	1	3.7 kW Brushless DC (BLDC) Generator directly coupled to a 5.5 kW (7.5 hp) Three-Phase Induction Motor(IM). The assembly must be fully integrated on a common structural steel bedplate with vibration isolation, safety guarding, and high-resolution feedback instrumentation. Technical Specifications 1. Component A: Research-Grade Three-Phase BLDC Generator of 3.7 kW (5 hp mechanical input equivalent), Rated Voltage: 240 V AC (Line-to-Line, RMS) at rated speed. Magnetic Profile & Waveform: 4-Pole, permanent magnet rotor optimized to generate a highly stable trapezoidal back-EMF / terminal voltage waveform from no-load to full-load conditions. Phase Balance: Must deliver a strictly balanced three-phase output voltage profile across all operating ranges. Stator Connection: Star (Y) connected with the Neutral point brought out explicitly to an external 40 A terminal box. Electrical Frequency: Designed for a nominal fundamental frequency of 50 Hz at a rated synchronous speed of 1500 RPM. Voltage Regulation: Tight armature/field design to restrict the total voltage drop from absolute no-load to full rated load within research tolerances. 2. Component B: Three-Phase Prime Mover (Induction Motor): Rated Output Power: 5.5 kW (7.5 hp), Rated Input Voltage & Frequency: 415 V (Line-to-Line), 3-Phase, 50 Hz, Squirrel Cage type, Delta (Δ) connected stator winding, 4-Pole design (nominal operational speed ~1440-1470 RPM under load), Thermal Documentation: A 24-hour temperature-rise test report conducted at full rated load prior to dispatch. Mechanical Coupling, Thermal Management, & Auxiliaries: Shaft Coupling: Torsionally flexible Tyre-type or Jaw-type coupling precisely aligned, Duty Cycle Rating: Continuous Duty Thermal Insulation: Class F insulation system utilized and temperature rises limited to Class B limits, With Cooling System, Speed & Position Feedback Encoder: High-accuracy, optical or magnetic incremental rotary encoder providing a resolution of 1024 Pulses Per Revolution (PPR). Rigid Foundation Base: Heavy-gauge fabricated structural steel base plate for precise motor-to-generator alignment with appropriate anti-vibration pads/mounts Safety Guarding of coupling.
2	3.7kW, 240V Three Phase Induction Machine coupled with 7.5hp Three Phase, 415V IM and Three Phase 415V, 10 HP VFD	1	3.7kW, 240V Three Phase Induction Machine coupled with 7.5hp Three Phase, 415V Induction Motor(IM) and Three Phase 415V, 10 HP Variable Frequency Drive(VFD). The assembly must be fully integrated on a common structural steel bedplate with vibration isolation, safety guarding, and high-resolution feedback instrumentation. Technical Specifications 1. Component A: 3.7 kW (5 hp). Induction Machine (Operating as Generator), 240 V AC (Line-to-Line), 3-Phase, Star (Y) connected with the Neutral point brought out explicitly to a heavy-duty, 40 A external terminal box with oversized neutral terminal rated for 100% phase current to safely withstand triplen harmonic heating, Squirrel Cage rotor, 4-Pole, Rotor core built with high-retentivity silicon steel laminations. Self-Excited Mode: Must maintain a stable, balanced, sinusoidal three-phase voltage and current profile from no-load up to full rated load, Total Harmonic Distortion (THD): less than 5%, fully compliant with IEEE 519 standards, • Voltage Regulation: Maximum terminal voltage drop limited to 10% to 15% from no-load to full-load using external passive/active compensation. Excitation Characteristics: Must exhibit rapid, stable voltage build-up/boosting, saturating cleanly at the rated voltage without wave distortion or voltage hunting. Rotor core steel processed to ensure reliable residual magnetism sufficient to initiate passive capacitor self-excitation. The machine must be mechanically and electrically capable of sustained over-

Op

			speed testing up to 1650 RPM or more. With factory test certificates containing complete No-Load and Blocked-Rotor test data. 2.Component B:Prime Mover (Three-Phase Induction Motor of 5.5 kW (7.5 hp), 415 V AC (Line-to-Line), Delta connected, Squirrel Cage, 4-Pole configuration operating with rated Input voltage: 3-Phase, 50 Hz,Inverter-Duty rated to withstand high dv/dt voltage spikes from the VFD, designed with a low-inertia rotor to optimize dynamic turbine emulation.capable of handling a breakdown torque of 200% to 250% of rated torque. Housed in a standard indoor IP20 terminal framework box to support proper Delta integration, and embedded with three PTC thermistors or PT100 RTD sensors (one per phase) for winding thermal protection interlocking. 3.Component C: High-Performance Variable Frequency Drive (VFD) 7.5 kW (10 hp), 415 V AC, 3-Phase input with $\pm 10\%$ tolerance, optimized with a heavy-duty overload rating of a minimum 150% current for 60 seconds to seamlessly handle transient step-loading in motor-generator testing. Must support stable, continuous operation across an output frequency range from 0.5 Hz up to 60 Hz. Control Modes: Selectable open-loop Sensorless Vector Control (SVC) and programmable multi-point V/f curves, optimized for high-performance Constant Torque operating regions. Integrated Hardware: Equipped with an integrated internal dynamic braking chopper unit matched to an external dynamic braking resistor housed in a ventilated cage, rated for a minimum of 10% continuous braking duty cycle to safely dissipate regenerative energy during deceleration testing. Interface & Control: Integrated or removable alphanumeric digital keypad display for local programming and monitoring of basic parameters (Current, Voltage, Frequency). Dual speed reference capability: Local manual control (Keypad/Potentiometer) and an External isolated 0 to 10 V DC Analog input channel dedicated to receiving real-time remote speed/frequency tracking commands from external High-Performance Real-Time Processor System for Rapid Control Prototyping (RCP) and Hardware-in-the-Loop (HIL) Applications. Includes programmable digital inputs for remote operational commands (Start, Stop, Fault Reset) and digital/relay outputs for drive status indication back to the processor. Enclosure & Physical Layout: Wall-mountable industrial enclosure panel providing a standard IP20 protection rating with pre-wired, clearly labeled terminal blocks cleanly segregating power inputs, motor lines, braking loops, and low-voltage control/sensor signaling. Quality Assurance & Documentation: Vendor must supply standard Factory Test Reports validating basic rated performance parameters prior to dispatch.
3	3.7kW, 240V three phase PMSG coupled with 7.5hp, 415V IM, 10hp 415 V VFD with display and control in drives.	1	3.7kW, 240V three phase Permanent Magnet Synchronous Generator(PMSG) coupled with 7.5hp, 415V Induction Motor(IM), 10hp 415 V Variable Frequency Drive(VFD) with parameter observation display and control in drives. The assembly must be fully integrated on a common structural steel bedplate with vibration isolation, safety guarding, and high-resolution feedback instrumentation. Technical Specifications 1.Component A: Research-Grade Three-Phase PMSG 3.7 kW continuous electrical output, Rated 3-phase 240 V AC (Line-to-Line) at rated speed, of 1500 RPM synchronous speed at 50 Hz. Stator Winding Configuration: All six (6) stator winding terminals must be brought out and clearly labeled in the terminal box(IP20) to allow external user-configurable Star (Y) or Delta connections, Full load current of approximately 11 A RMS at 0.8 power factor or greater at full rated load for Star winding connection. Terminal block hardware and internal wiring lugs must be rated for a minimum continuous line current of 20 A. Optimized rotor magnet arrangement utilizing high-energy NdFeB permanent magnets to deliver a strictly balanced, highly symmetrical, sinusoidal output voltage and current profile. THD: The voltage waveform must remain stable and virtually distortion-free up to full rated load, fully compliant with IEEE 519 limits for research accuracy. Voltage Regulation from No-load to full rated load must be

Op

			within 10% to 15%. Mechanical & Enclosure Construction: Rugged Cast Iron frame, Single shaft extension on the drive end (DE) Low acoustic noise emission 2.Component B: Prime Mover (Three-Phase Induction Motor) Three-Phase Induction Motor of 5.5 kW (7.5 hp) continuous output, 415 V AC (Line-to-Line), 3-Phase, 50 Hz. Rotor & Pole Configuration: Squirrel Cage rotor, 4-Pole (nominal full-load operating speed 1440–1470 RPM). Delta connected stator winding (with a 6-terminal block architecture brought out to an IP20 terminal box to support proper Delta integration), rated as an Inverter-Duty motor fully compliant to withstand high dv/dt voltage spikes from the VFD, designed with a low-inertia rotor. 3.Component C: Mechanical Coupling, Thermal Management, & Instrumentation Shaft Coupling: Torsionally resilient, high-alignment Tyre-type or Elastomeric Jaw-type coupling. Rated for Continuous Duty 24-hour operation under full-load conditions without thermal runaway. Class H insulation system with Class F temperature rise limits required for both machines. Cooling System: Integrated bi-directional internal shaft-mounted cooling fans on both machines, optimized alongside external frame cooling fins. Speed & Position Feedback Sensor: High-accuracy, industrial-grade incremental rotary Speed Encoder providing 1024 Pulses Per Revolution (PPR) , rigidly fixed at the Non-Drive End (NDE) of Induction Motor to feed closed-loop turbine emulation signals back to the VFD. Encoders must utilize differential line-driver signaling for EMI noise protection. Rigid Foundation & Safety Auxiliaries: Heavy-gauge fabricated structural steel common bedplate, anti-vibration mount pads, coupling guard/cover. 4.Component D: 10 HP Variable Frequency Drive(VFD) 7.5 kW (10 hp), 415 V AC, 3-Phase input with $\pm 10\%$ tolerance, optimized with a heavy-duty overload rating of a minimum 150% current for 60 seconds to seamlessly handle transient step-loading in motor-generator testing. Must support stable, continuous operation across an output frequency range from 0.5 Hz up to 60 Hz. Control Modes: Selectable open-loop Sensorless Vector Control (SVC) and programmable multi-point V/f curves, optimized for high-performance Constant Torque operating regions. Integrated Hardware: Equipped with an integrated internal dynamic braking chopper unit matched to an external dynamic braking resistor housed in a ventilated cage, rated for a minimum of 10% continuous braking duty cycle to safely dissipate regenerative energy during deceleration testing. Interface & Control: Integrated or removable alphanumeric digital keypad display for local programming and monitoring of basic parameters (Current, Voltage, Frequency). Dual speed reference capability: Local manual control (Keypad/Potentiometer) and an External isolated 0 to 10 V DC Analog input channel dedicated to receiving real-time remote speed/frequency tracking commands from external High-Performance Real-Time Processor System for Rapid Control Prototyping (RCP) and Hardware-in-the-Loop (HIL) Applications. Includes programmable digital inputs for remote operational commands (Start, Stop, Fault Reset) and digital/relay outputs for drive status indication back to the processor. Enclosure & Physical Layout: Wall-mountable industrial enclosure panel providing a standard IP20 protection rating with pre-wired, clearly labeled terminal blocks cleanly segregating power inputs, motor lines, braking loops, and low-voltage control/sensor signaling. Quality Assurance & Documentation: Vendor must supply standard Factory Test Reports validating basic rated performance parameters prior to dispatch.
4	3.7kW, 240V three phase Micro Generator with Automatic Control system	1	3.7kW, 240V three phase Micro Generator with Automatic Control system The assembly must be fully integrated on a common structural steel bedplate with vibration isolation, safety guarding, and high-resolution feedback instrumentation. Technical Specifications 1.Component A: Prime Mover & Generator Coupling: Direct, inline mechanical coupling of a 6 kW minimum rated Diesel Engine to a 3.7 kW Brushless Synchronous Generator. Operating Duty: Rated for

			Continuous Duty capable of sustained full-load operation, delivering a stable, sinusoidal output under all loading states. Voltage THD not more than 5.0% up to full balanced load, verified by factory test reports. Housed entirely in a standard indoor IP20 framework layout. 2.Component B: Electrical Specifications (Generator & AVR) 3.7 kW output capacity at 0.8 lagging power factor, 240 V AC Line-to-Line (L-L), 3-Phase, 4-Wire configuration, delivering 11 A continuous output at rated power factor. Excitation System: Brushless, self-excited utilizing a standard industrial Automatic Voltage Regulator (AVR) maintaining voltage regulation within $\pm 1.0\%$ from no-load to full-load. Stator Winding Pitch: Standard 2/3 (two-thirds) pitch design required to naturally suppress the 3rd harmonic and triplen harmonic currents. Insulation System: Class F minimum insulation with a Class B temperature rise limit. Terminal box layout must be IP20 rated with heavy-duty terminal blocks. 3.Component C: Mechanical Specifications (Diesel Engine & Governor) Minimum 6.0 kW continuous shaft power output. Governor Type: Electronic Governor supporting Class A1 governing speed control standard (ISO 8528-5) to maintain tight frequency limits during load steps. Starting System: Standard 12V/24V DC electric key-start or push-button start mechanism, complete with a basic manual engine control module, integrated charging alternator, and a matched maintenance-free starter battery. Cooling System: Natural/forced-air cooling via high-efficiency internal cooling fans mounted directly onto the rotor shafts of both machines, complemented by frame cooling fins. 4.Component D: Instrumentation & Digital Interface Rotary Speed 1024 Pulses Per Revolution (PPR) Encoder: High-accuracy, industrial-grade incremental rotary encoder mounted on the non-drive end of the shaft. Signal Output: Differential Line Driver outputs (RS-422 standard) to ensure high Electro-Magnetic Interference (EMI) noise immunity, pre-wired for direct external integration into the dSPACE Micro Lab Box II processor system. 5.Component E: Structural, Foundation, & Safety Auxiliary Systems Common Foundation Bedplate: Precision-machined, heavy-gauge fabricated structural steel common bedplate accommodating both the engine and the generator to prevent structural deflection. Vibration Isolation: High-damping elastomeric anti-vibration pads (AVMs), Coupling Assembly: Torsionally flexible, high-alignment Tyre-type or Jaw-type, Safety Guard with Interlock: High-visibility, removable steel safety coupling guard enclosing all rotating components. With safety interlock sensor.
5	Three phase, 10kVA Multi tapping transformer	1	10 kVA Custom Neutral-Compensation Multi-Tapping Transformer 1. Nominal Electrical Parameters Specifications: Custom designed, Dry-Type, Multi-Tapping, Natural Air-Cooled (AN) Three-Phase Neutral Current Compensation Isolation Transformer. Nominal Rating: 10 kVA continuous duty, with a standard indoor IP20 protection configuration. 2.Winding & Vector Configuration: Total of six (6) independent 200 V windings (exactly two matched windings per phase) providing a physical turns ratio of 1:1. Terminal connections must support external link strapping to execute a Delta-Star topology engineered specifically for zero-sequence neutral-current compensation on a 240 V Line-to-Line (L-L) system. Design must yield a low zero-sequence impedance of less than 5.0% to guarantee effective neutral current stabilization. 3. Magnetic Core & Core Materials: Three-limb core topology with High-permeability, low-loss CRGO Silicon Steel, minimum grade M3 or better, lamination less than 0.27 mm, featuring high-integrity carlite or multi-layer inorganic surface insulation to suppress Eddy current losses. Core designed with high linearity to maintain working flux density under 1.35 Tesla (T) at nominal voltage, and below 1.50 Tesla (T) during 110% over-voltage transient profiles without core saturation. 4.Windings, Tappings, & Electrical Performance: Conductor Material: High-conductivity, electrolytic-grade 99.9% pure Copper winding wire/strip. Insulation System: Class F minimum, Voltage Tapping Provisions: Each of the 6 independent windings must feature precise intermediate taps outputting:

			140 V, 160 V, 180 V, 200 V, and 220 V. Waveform Integrity & Regulation to an ideal sinusoidal supply source, the induced voltage and current distortion factor to be less than 2%. 5. Physical Layout & Terminals: Finished with heavy-duty, continuously rated 40 A to 63 A IP20-shielded terminal blocks explicitly featuring permanent RYB (Red-Yellow-Blue) color coding. Enclosure must be a floor-mounted, robust sheet-metal open-ventilated panel with a standard indoor IP20 rating, mounted on heavy-duty swivel castor wheels with independent foot brakes. Vendor must deliver a certified factory test sheet validating No-Load Core Losses (W), Full-Load Copper Losses (W) referenced at 75°C, and standard temperature-rise profiles showing compliance with Class F limits under continuous full load.
6	Multi-tapping inductors	1	Multi-tapping inductors 1. Nominal Electrical Parameters Specifications: Custom-engineered, Dry-Type, Multi-Tapping, High-Linearity Three Phase Power Inductor or Single-Phase Power Inductor (3 numbers of Reactors). Nominal Electrical Parameters: 250 V AC working voltage, 40 A continuous RMS current rating at a fundamental frequency of 50 Hz. Winding Configuration: Single continuous multi-tap winding per phase execution, with taps at 0.125 mH, 0.25 mH, 0.5 mH, 1.0 mH, 2.0 mH, 2.5mH, 4.0 mH, 5.0 mH, 8.0 mH, 10.0 mH Inductance Tolerance: Operational inductance variance within $\pm 5.0\%$ for all specified range. 2. Magnetic Core Material & Gapping Specifications Core Material Construction: High-permeability, low-loss CRGO Silicon Steel, Lamination Parameters: 0.27 mm and 0.30 mm thickness with insulation coating. Core Topology: Air-Gapped Core Design, Magnetic Flux Density Limits: 1.2 Tesla (T) at maximum voltage and current, Linearity Profile: Linear B-H curve with Zero magnetic saturation up to a 70 A peak current impulse. 3. Windings, Terminals, & Electrical Performance Conductor Material: High-conductivity, electrolytic-grade 99.9% pure Copper winding, Insulation System: Class F minimum, Harmonic Waveform Integrity: voltage and current THD below 2.0% when supplied from sinusoidal source, Terminal block & Connectors: Heavy-duty, high-conductivity continuous rating IP20 terminal blocks of at least 63 A to reliably handle 70 A peak transients without heating. 4. Thermal, Enclosure, & Physical Auxiliary Systems • Cooling Mechanism: Natural Air-Cooled (AN), Enclosure Panel: Floor-standing, heavy-gauge sheet steel ventilated industrial enclosure panel rated for standard indoor IP20 service, Mobility System: The base structural frame integrated with heavy-duty swivel castor wheels with foot brakes. 5. Mandatory Post-Test Data Submission No-Load Core Losses & Full-Load Copper Losses: Explicitly measured and tabulated in Watts (W) at fundamental 50 Hz conditions. Temperature Rise Profile: Validated heat-run test data proving compliance with Class F limits under continuous full-rated load.
7	Three phase 415V, 20Amp, 50Hz Inductors (Special Design)	1	Three phase 415V, 20Amp, 50Hz Inductors (Special Design) Technical Specifications: 1. Nominal Electrical Parameters Specifications : Custom-engineered, Dry-Type, Moving-Core (Rotating/Plunger Type) Variable Three-Phase Linear Inductor / Power Reactor housed in a standard indoor. Voltage & Supply: Rated for 415 V AC Line-to-Line (L-L), 3-Phase, 50 Hz utility or experimental source networks. Inductance Tuning Mechanism: Mechanical Rotating Type utilizing a heavy-duty external handwheel or rotating wheel assembly equipped with a positive physical locking lever to firmly secure the air gap position. Inductance Tuning Range: Continuously variable inductance spanning from a minimum value of 30 mH up to 300 mH. Impedance-Limited Current Profile: Optimised for a voltage-limited operational envelope under a fixed 415 V excitation. Current ratings are scaled to the impedance curve as follows:

Op

		30 mH to 38 mH Range: Handles a full 20 A continuous AC RMS current. 38 mH to 300 mH Range: Current linearly scales down due to impedance to approximately 2.5 A AC RMS at the maximum 300 mH configuration. Calibration & Symmetry: Delivered with an operational calibration table mapping exact current capacity against inductance across the mechanical adjustment track. Phase mismatch must remain under 5.0% between any two phases to preserve system symmetry. 2. Magnetic Core Material & Linearity Specifications: Core Construction: High-permeability, low-loss Cold Rolled Grain Oriented (CRGO) Silicon Steel utilizing standard laminations of 0.27 mm to 0.30 mm thickness with surface insulation coating. Energy Storage Capability: Designed to support a peak magnetic energy capability greater than 6 Joules per phase at the minimum inductance maximum current configuration. Linearity Profile: High-linearity performance featuring a linear B-H curve up to 1.5 times the rated current tracking envelope across all mechanical tuning configurations. Mechanical Integrity: Moving core guide tracks must be precision-machined to eliminate structural magnetic chatter, air-gap drift, humming, or mechanical binding during positioning. 3. Windings, Terminals, & Electrical Performance: Conductor Material: High-conductivity, electrolytic-grade 99.9% pure Copper winding elements configured with a Class F minimum insulation system. Independent Coil Access: Stator and rotor coil links for each phase must be brought out to independent, isolated connection nodes inside the terminal block area. Windings must safely handle a secondary DC current excitation of at least 15 A at the 100 mH tuning mark for hybrid loading research. Waveform Integrity: Total Harmonic Distortion (THD) of the induced voltage and current waveforms must remain below 2.0% when supplied from a clean sinusoidal source. Terminal Specifications: High-current carrying capacity, heavy-duty continuous rating IP20 terminal blocks rated for at least 40 A to support transient loads without heating. 4. Thermal, Enclosure, & Physical Auxiliary Systems: Cooling Mechanism: Natural Air-Cooled (AN) passive convection framework. Enclosure Panel: Floor-standing, heavy-gauge sheet steel ventilated industrial enclosure panel rated for standard indoor IP20 service. Mobility & Markings: Base structural frame must be integrated with heavy-duty swivel castor wheels equipped with independent foot brakes to facilitate easy lab repositioning. The external terminal array must feature highly visible, permanent RYB (Red-Yellow-Blue) color-coded nodes. 5. Mandatory Post-Test Data Submission: Loss Reports: Certified factory test reports measuring and tabulating No-Load Core Losses and Full-Load Copper Losses in Watts (W) at fundamental 50 Hz conditions prior to dispatch. Thermal Validation: Validated heat-run test profile data proving strict compliance with Class F temperature rise limits under continuous, full-rated load profiles.
8	IGBT based 3-phase 4 leg Voltage Source Converter with 3-phase diode bridge rectifier (3 Phase, 415 V, 25kVA)	1 System Topology: 3-Phase, 415 V, 25 kVA Converter System featuring a Three-Phase Diode Input Rectifier integrated with a Three-Phase, Four-Leg (Neutral leg included) IGBT-based Voltage Source Converter/Inverter (VSC) housed in a standard indoor IP20 layout configuration. Technical Specifications: 1. System Performance Ratings: • Input AC Voltage: 3-Phase, 415 V, 50 Hz fundamental frequency. • Continuous Output Capacity: 25 kVA nominal, 35 A output AC current. • DC Bus Operating Range: Baseline DC link pre-charged to 560 V DC, with an active VSC boost capacity up to 750 V DC maximum. • Switching Frequency: Optimized for 20 kHz carrier control. • Application Suitability: Designed for variable frequency drive (VFD) systems and active power filter applications.

Sp

			• Diagnostics: Must include multiple physical safe waveform observation test points accessible via Oscilloscope (CRO). 2. Internal Hardware Requirements (Per Unit Complete): (a) Power Switching Modules: 4 × Dual-Switch IGBT Half-Bridge modules (Total 8 switches) rated for greater than 1200V and greater than 150A continuous conduction in an industry-standard low-inductance housing (62mm footprint or equivalent standard package). Must feature a low-inductance case design, voltage-controlled MOS input, and fast/soft inverse CAL diodes rated for a minimum of 150 A and more with a maximum junction temperature Tj of 175°C. (b) Gate Drive Units: 4 × Dual-channel plug-and-play gate drivers directly driving two switches per IGBT module, compatible with the supplied IGBT modules. Drivers must feature a standard 15 V logic input signal level, integrated interlocking dead-time protection (minimum 2 µs), error reset functionality, active short-circuit protection, and dynamic IGBT switching behavior control. (c) Input Rectifier Module: 1 × Discrete 3-phase diode bridge rectifier module rated for a minimum of 1600 V peak reverse blocking voltage and a minimum of 160 A nominal continuous DC load current. Must handle a continuous DC bus input current of at least 38 A. (d) DC Link Capacitors: Total bank capacitance configured using 2 × 4700 µF, 500 V capacitors connected in series (yielding a net 2350 µF / 1000 V capacity), complete with parallel static voltage-balancing resistors. (e) Surge & Thermal Protection: 4 × Snubber Capacitors rated for 0.47 µF / 1500 V DC connected directly across the DC link for voltage overshoot mitigation. Includes a thermal trip sensor calibrated to shut down the system at 90°C. (f) Thermal Management Enclosure: Enclosure cooling provided by a 400 mm aluminum heatsink coupled with an internal forced-air cooling fan (powered via single-phase 230 V AC supply) establishing a linear air velocity of 8–10 m/s at a 40°C design ambient rating. (g) Electrical Safety Shielding: All active internal power modules, capacitors, and busbars must be fully housed underneath a transparent polycarbonate protective shield equipped with external safety insulating knobs to prevent accidental shock.
9	Three phase 440 V Excitation capacitor in kVAR-different rating	1	Three phase 440 V Excitation capacitor in kVAR-different ratings Technical Specification: Three phase Excitation capacitor (kVAR): Power Capacitor bank, 3-phase, 440V, ac, 50Hz, with different kVAR rating: (i) 0.25kVAR (3 units), (ii) 0.5kVAR (3 units), (iii) 1.0kVAR (3 units), (iv) 2.0kVAR (3 units), (v) 5.0kVAR (3 units), (vi) 7.5kVAR (3 units). Note: Equivalency Clause: If exact kVAR configurations are unavailable in standard manufacturing catalogues, the vendor may supply the nearest standard industrial equivalent rating, subject to structural review. 1. Dielectric Material & Safety Architecture: • Technology: Heavy-duty, gas-insulated or dry resin-filled Metallised Polypropylene (MPP) film layout featuring robust self-healing characteristics to survive high transient inrush currents during passive generator self-excitation. • Protection Integration: Every individual 3-phase unit must incorporate an integrated internal overpressure disconnecter mechanism to isolate the capacitor safely at the end of its operational life. • Discharge Safety: Built-in premium discharge resistors required across all terminals to automatically bleed residual voltages down to a touch-safe level below 50 V within 60 seconds of network isolation. 2. Windings, Enclosure, & Interfacing: • Terminals & Switching: Heavy-duty, finger-safe IP20 terminal connectors rated for up to 32 A continuous current. The front panel must feature heavy-duty rotary selection switches or industrial contactors to allow independent switching of each individual capacitor block.

		• Physical Layout: Floor-standing or benchtop-ready rigid sheet-steel enclosure finished with anti-corrosive powder coating under an IP20 ventilation class footprint. • Mobility & Wiring: Fitted with swivel castor wheels featuring independent foot locks. The interface panel must display permanent, highly visible RYB (Red-Yellow-Blue) color-coded connectors for every capacitor tier.
--	--	---

ANNEXURE-B

FORMAT FOR SUBMISSION OF COMMENTS / EXPRESSION OF INTEREST

Notice No.: Item / Package:

A. Respondent details	
Name of organisation / individual	
Category (manufacturer / authorised dealer / other)	
Address, e-mail, phone	
Contact person and designation	
MSE / Start-up status (Yes / No; Udyam No. if applicable)	
Indigenous content, if known (Class-I / Class-II local supplier)	

Sl.	Annexure-A Item / Clause No.	Issue (viability / availability / customisation / restrictive / standard / other)	Comment / observation with justification	Suggested modification or alternative
1				
2				
3				
4				
5				

B. Declaration: I / We confirm that the above comments are offered in good faith, that I / we have no conflict of interest in this matter other than as disclosed, and that I / we understand that submission of this response confers no right or advantage in the subsequent tender.

Signature: _____ Name: _____ Date: _____ Seal: _____

