**Tender Notice**

Local Tender (Indian Bidders and OEM manufacturers in located in India)

Tender Notification Ref No.: ICER/ENQ/TNDR/PK/24-25/01  Date: 15th April 2024

The *Interdisciplinary Centre for Energy Research*, Indian Institute of Science Bangalore, invites tenders for supply of “Modular Vibration Analyzer for Supercritical CO2 Power Block”. This Invitation for Bids is open to all domestic (India based) manufacturers, Indian OEM or its authorized Indian distributors only. All the bidders are requested to follow below mentioned **Detailed Technical Requirements**, Terms and Conditions for submission of bids.

1) Technical Requirements:

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
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<tbody>
<tr>
<td><strong>Front end Slots</strong></td>
<td></td>
</tr>
<tr>
<td>1) Dynamic analog inputs</td>
<td>Minimum 2 Slots of 4 Universal inputs</td>
</tr>
<tr>
<td>2) Dynamic analog outputs</td>
<td>Minimum 1 Slot of 2 outputs</td>
</tr>
<tr>
<td>3) Externals sync</td>
<td>Minimum 1 Slot of 2 Tachometer inputs</td>
</tr>
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<table>
<thead>
<tr>
<th><strong>Dynamic Inputs</strong></th>
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<tr>
<td>1) Sampling</td>
<td>Sampling Frequencies: &gt;=3.2kHz, &lt;=102.4 kHz</td>
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<td></td>
<td>Converters: 24bit sigma delta ADC</td>
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<td></td>
<td>Sampling should be simultaneous</td>
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<td>2) Range (peak)</td>
<td>With amplifier: ±100 mV, ±300 mV, ±1 V</td>
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<td>Direct: ±10 V</td>
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<td></td>
<td>With attenuator: ±40 V</td>
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<tr>
<td>3) Absolute accuracy</td>
<td>Resolution: 24 bits (144 dB) minimum</td>
</tr>
<tr>
<td>4) Frequency flatness and</td>
<td>±0.1 V, ±0.3 V, ±1 V ranges, DC - 20 kHz</td>
</tr>
<tr>
<td>phase response</td>
<td>±0.1 V, ±0.3 V, ±1 V ranges, 20 kHz - 40 kHz</td>
</tr>
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</table>

| 5) Signal to noise ratio     | With 50 Ω terminators                                                         |
|                              | ±10 V range, 40 kHz bandwidth: > 100 dB, spurious lines < -115 dB of full scale |
|                              | ±10 V range, 20 kHz bandwidth: > 104 dB, spurious lines < -125 dB of full scale |

| 6) Input noise               | 50 Ω terminators                                                             |
|                              | Thermal input noise: 20mV/ÖHz                                                 |
|                              | ±100 mV and ±300 mV ranges                                                   |
|                              | ±1 V range                                                                   |
|                              | ±10 V range                                                                  |

<p>| 7) Coupling                  | AC: Cut-off frequency 0.35 Hz ±10% (analog filter)                           |
|                              | DC                                                                           |
|                              | ICP: 2 mA or 4 mA power supply with AC coupling (±10%)                       |</p>
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<th><strong>ICP + TEDS</strong></th>
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<td><strong>GND</strong></td>
<td>Shortcut to ground - Automatic current limitation to 50 mA</td>
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**Parametric Inputs**

1) **Range(peak)**
   - Direct: ±10 V
   - with attenuator: ±40 V

**External Sync**

1) **Sampling**
   - Frequencies: (64 Hz upto 6.4 MHz)
   - Converters: High speed voltage comparator and time counter

2) **Ranges**
   - ±300 mV, ±1 V, ±3 V, ±10 V, ±40 V

3) **Resolution**
   - Amplitude accuracy: ±1% of range

4) **Setting**
   - Hysteresis: 1% (of input range) to input range
   - Hold off: 0 s to 500 s
   - Slope: Rise or fall
   - Hardwired pre-divider: 1 to 255

5) **Accuracy**
   - Time resolution: > 160 ns (0.06° at 1 kHz and 1.2° at 20 kHz)

6) **Pulse rate**
   - Minimum 375 kpulse/s

**Processor Slots**

1) **PC, Disk, Bus Interfaces**
   - 1 or more Slots

2) **Clock Synchronization**
   - 1 or more Slots

3) **Tachometer monitoring**
   - Minimum 1 Slot of 1 ForceDSP

4) **Real-Time Processing power**
   - Minimum 2 Slots of 1 ForceDSP

**Miscellaneous**

1) **Internal hard drive**
   - 64GB internal SSD

2) **High-speed serial ports**
   - 1 port for CAN bus probe

3) **Remote Control**
   - 1 RS232 cable

**Network**

1) **Connection to PC**
   - Ethernet 1 Gb/s / > 100 m / CAT 5E

2) **Security**
   - Support SSH tunneling connections

3) **IP Management**
   - TCP/IP/DHCP
## Cascade

1) **Configuration**
Switchless daisy-chain/ 30+ cascaded analysers/ Mixed analyser's type

2) **Accuracy**
Phase : > +0.2° @ 20 kHz / > 8 ns @ 51.2 kS/s  
Amplitude: > +0.02 dB

## Power Supply

1) **External AC Power supply**
Voltage: 100 to 240 VAC / 1.7 A max  
Frequency: 50/60 Hz

2) **DC in**
Range: 10 V to 28 V  
Overload protection: Absolute maximum < 40 V / > 31 V

3) **Battery**
Type: Built-in 89 Wh Li-ion 8 modules  
Autonomy: 3 h  
Charge Time: 3 h (typical)  
Charge conditions: DC power supply > 12 V

## Expander Modules

1) **Bridges**
Mounting: Full, Half and quarter  
Excitation Voltages: 0 to 10 V  
Excitation Currents: 0 to 4 V: < 30 mA - 4 V to 10 V: < 12 mA  
Sensing: Negative and positive probes

2) **Amplifiers**
Type: Differential - DC capable  
Gains: 10 or 100  
Error: < 0.01 dB

3) **Protection**
Overvoltage: Device on: max ×30 V - device off: max ×15 V

4) **Connectors**
Type: Mini Thermocouple/RTD type  
Pins: 3 polarized pin - spring-loaded  
Non grounding enclosure

5) **Thermocouples**
Type J: -210 °C to +1100 °C  
Type K: -200 °C to +1300 °C  
Type T: -200 °C to +390 °C  
Type NB: -200 °C to +1200 °C  
Type E: -200 °C to +800 °C  
Cold Compensation with Integrated - 2 sensors - user on/off  
Absolute temperature error: > -150 °C : ±0.9°C / < -150 °C : ±(0.4°C + 0.1% of MT range)

6) **RTDs**
PT 100: -190 °C to +880 °C  
PT 1000: -190 °C to +880 °C  
Absolute temperature error: ±(0.4°C + 0.3% of MT range)  
Current: PT100: 500 μA to 4 mA - PT1000: 500 μA to 1 mA  
Wires: 3/4 wire

## Digital Computation

1) **Narrow band analysis (FFT)**
Real-time FFT analysis  
20 kHz bandwidth (Requested SPU are proportional to bandwidth)
<table>
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<th><strong>2) Synchronous Order Analysis</strong></th>
<th>Real-time order spectrum analysis</th>
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<td>20 kHz bandwidth</td>
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<td>Real-time time domain monitor and statistical analysis with:</td>
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<td>1 channel processing</td>
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### DSP Modules

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<th><strong>1) Type</strong></th>
<th>Sample Size: 32 bit floating</th>
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<td>Internal memory: 16 Msample</td>
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<td><strong>2) Power</strong></td>
<td>Computation capability: Up to 4810 SPU / DSP module</td>
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<tr>
<td><strong>3) Input Sharing</strong></td>
<td>Inputs per DSP: 8 max</td>
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#### 3) Vendors scope of supply for the above Modular Noise and Vibration Analyzer:

a) Pre-dispatch inspection and testing report.

b) Installing commissioning and demonstration of the complete system must be done at IISc, Bengaluru

c) Training on operation and troubleshooting of the product must be provided at IISc, Bengaluru

#### 4) Mandatory non-technical requirements:

a) The bidders must enclose a client list, contact details, relevant brochures and compliance certificate (Annexure I) with the tender.

b) The bidders should be well established firm preferably leaders in the application stated above and must have a proven track record.

c) Authorization from the OEM/ Principals as in Annexure II

d) The order should be completed within 16-24 weeks from the date of release of the Purchase Order.

#### 5) Optional requirements

a) Extended Warranty: 2 years additional Warranty (Standard: 1 year, Additional: 2 years, Total- 3 years) to be provided from the date of delivery at IISc, Bangalore.

b) AMC for 5 Years
TERMS AND CONDITIONS FOR SUBMISSION OF BIDS

Both the Technical and Commercial bid should be put in separate sealed envelopes and both the envelopes should be put in another cover subscribing “Modular Vibration Analyzer for Supercritical CO2 Power Block” and should reach “The Chairman, Interdisciplinary centre for Energy Research, IISc, Bangalore-560012 on or before Wednesday, 6th May 2024.

Tender Summary

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<tr>
<td>2.</td>
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<td>15th April 2024</td>
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<td>3.</td>
<td>Item Description</td>
<td>Modular Vibration Analyzer for Supercritical CO2 Power Blocks</td>
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</table>
| 4. | Tender Type | Two bid system:  
(a) Technical Bid (Part A)  
(b) Commercial Bid (Part B) |
| 5. | Place of tender submission | Prof. Pramod Kumar  
Interdisciplinary Centre for Energy Research,  
Indian Institute of Sciences,  
Bengaluru 560012 |
| 6. | Last Date & Time for submission of tender | 6th May 2024, 5:00 PM |

To whom it may concern

This is a Request for quote (RFQ) from Indian Agencies for supply and installation of “Modular Vibration Analyzer for Supercritical CO2 Power Block” at the “Interdisciplinary Centre of Energy Research (ICER), Indian Institute of Science, Bangalore.

This Invitation for Bids is open to only domestic (India based) manufacturers, Indian OEM or its authorized Indian distributors. All interested vendors shall submit a response demonstrating their capabilities to produce the requested equipment to the primary point of contact listed below.

With respect to this tender, the rules laid out by the Government of India in order No. P45021/2/2017-pp-BE-II issued by the Public Procurement Section, Department or Promotion of Industry and Internal Trade, Ministry of Commerce and Industry, dated 4th June 2020 will be followed. As per the order the government has defined a ‘Class-I local supplier’ as “a
supplier or service provider whose goods, services or work offered for procurement, has local content equal to or more than 50%”. A ‘Class-II local supplier’ is “a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%”. Only Class-I and Class-II local suppliers are eligible to participate in this open domestic tender. Any “Non-local supplier” i.e. “a supplier or service provider, whose goods, services or works offered for procurement, has local content less than 20%” is ineligible to participate in this tender.

The deadline for submission of proposals is 6th May 2024, 5:00 PM. Proposals should arrive at the office of The Chairman, Interdisciplinary Centre of Energy Research (ICER), Indian Institute of Science, Bangalore, Karnataka 560012, India.

Direct all questions concerning the acquisition to addresses to Prof. Pramod Kumar at: pramod@iisc.ac.in

General Terms and Conditions

1. The bid should be submitted in the two-cover system, i.e. technical bid and commercial bid separately in sealed covers. The technical bid should contain all commercial terms and conditions, except the price.
2. The technical bid must contain a point-by-point technical compliance document. The technical proposal should contain a compliance table that should describe your compliance in a "yes" or "no" response against each of the items in the table listed in this RFQ. If "no" the second column should state, the extent of deviation. The third column should state the reason for the deviation, if any. The fourth column can be used to compare your tool with that of your competitors or provide details as requested in the technical requirement table below.
3. In the commercial bid, the price should be inclusive of all discounts.
4. The quotations should be on FOR-IISc Bangalore basis in INR only. Since IISc is DSIR registered organization, hence it is eligible for GST rate @5% as the equipment is required for research purposes only.
5. The vendor should have qualified technical service personnel for the equipment based in India (preferably in Bangalore).
6. The covering letter should clearly state that whether the vendor is a Class-I or Class-II local supplier. Failing this the bid will be automatically rejected.
7. The vendor to state the percentage of the local content and provide self-certification that the item offered meets the minimum local content requirement. They should also give details of the location(s) at which the local value addition is made.
8. The lead time for the delivery of the equipment should not be more than 3 months from the date of receipt of our purchase order. It should be clearly mentioned in the technical and commercial bids.
9. All the quotations must be valid for at least 90 days at the time of submission.
10. List of customers and references: The Bidder should have supplied similar equipment in Central Universities, preferably in centrally Funded Technical Institutes (IITs, IISC, IISER, NIT). Please provide the details and contact information.
11. The Bidder must not be blacklisted/banned/suspended or have a record of any service-related dispute with any organization in India or elsewhere. A declaration to this effect should be provided.
12. Items in addition to that listed in the technical table that you would like to bring to the attention of the committee, such as data sheets, technical plots etc. can be listed at the end of the compliance table.

13. The Bidder should belong to either Class-1 or Class-2 suppliers distinguished by their “local content” as defined by recent edits to GFR. They should mention clearly which class they belong to in the cover letter. a) Class-1 supplier: Goods and services should have local content of equal to or more than 50%. b) Class-2 supplier: Goods and services should have local content of equal to or more than 20 % and less than 50%.

14. Bidders offering imported products will fall under the category of non-local suppliers. They cannot claim themselves as Class-1 local suppliers/Class-2 local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training, and other sales service support like AMC/CMC, etc., as local value addition.

15. Purchase preference as defined by the recent edits to GFR (within the “margin of purchase preference”) will be given to the Class-1 supplier.

16. MSMEs can seek an exemption to some qualification criteria. IISc follows GFR2017 for such details.

17. Vendors are encouraged to highlight the advantage of their Vibration Analysers systems over comparable Vibration Analysers from the competitors.

18. If needed, a meeting for any technical clarifications can be scheduled with the undersigned by sending an email.

19. The Institute reserves the right to accept or reject any bid, or to annul the bidding process and reject all bids, at any time prior to the award of contract without thereby incurring any liability of the affected bidder or bidders.

20. Warranty terms and additional warranty options is a must for all the components. Please specify the service plan like whether the local distributor will address the issue or the parent company.

21. Terms and conditions for the annual maintenance contract beyond the warranty period should be mentioned.

22. After the award of purchase order, the vendor must provide an Order Acknowledgement within 30 days from the receipt of the Purchase Order.

23. Please quote the price of each optional line item, separately.

**Technical requirements:** Please note that the requirements listed below are only guidelines. It does not disbar bids that do not meet the criteria listed. Vendors are requested to quote for equipment that meet the criteria to the best extent possible and list deviations. Deviations are NOT an automatic reason for disqualification. They will be discussed by the technical committee prior to making an informed decision.
### Annexure-I

Note: Compliance Certificate to be enclosed with the Technical Bid

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
<th>Comply</th>
<th>Non-Comply</th>
<th>Deviation</th>
<th>Remarks</th>
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### Parametric Inputs

1) **Range(peak)**
   - Direct: ±10 V
   - with attenuator: ±40 V

### External Sync

1) **Sampling**
   - Frequencies: 64 times over-sampling of the current input sampling (up to 6.4 MHz)
   - Converters: High speed voltage comparator and time counter
2) **Ranges**
   - ±300 mV, ±1 V, ±3 V, ±10 V, ±40 V
3) **Resolution**
   - Amplitude accuracy: ±1% of range
4) **Setting**
   - Hysteresis: 1% (of input range) to input range
   - Hold off: 0 s to 500 s
   - Slope: Rise or fall
   - Hardwired pre-divider: 1 to 255
5) **Accuracy**
   - Time resolution: > 160 ns (0.06° at 1 kHz and 1.2° at 20 kHz)
6) **Pulse rate**
   - 375 kpulse/s

### Processor Slots

1) **PC, Disk, Bus Interfaces**
   - 1 Slot
2) **Clock Synchronization**
   - 1 Slot
3) **Tachometer monitoring**
   - 1 Slot of 1 ForceDSP
4) **Real-Time Processing power**
   - 2 Slots of 1 ForceDSP

### Miscellaneous

1) **Internal hard drive**
   - 64GB internal SSD
2) **High-speed serial ports**
   - 1 port for CAN bus probe
3) **Remote Control**
   - 1 RS232/485

### Network

1) **Connection to PC**
   - Ethernet 1 Gb/s /> 100 m / CAT 5E
2) **Security**
   - Support SSH tunneling connections
3) **IP Management**
   - TCP/IP/DHCP server(non-authoritative)

### Cascade

1) **Configuration**
   - Switchless daisy-chain/ 30+ cascaded analyzers/ Mixed analyzer’s type
2) **Accuracy**
   - Phase : > ±0.2° @ 20 kHz / > 8 ns @ 51.2 kS/s / Amplitude: > ±0.02 dB
### Power Supply

1) **External AC Power supply**
   - Voltage: 100 to 240 VAC / 1.7 A max
   - Frequency: 50/60 Hz

2) **DC in**
   - Range: 10 V to 28 V
   - Overload protection: Absolute maximum < 40 V / > 31 V

3) **Battery**
   - Type: Built-in 89 Wh Li-ion 8 modules
   - Autonomy: 3 h
   - Charge Time: 3 h (typical)
   - Charge conditions: DC power supply > 12 V

### Expander Modules

- **Excitation Voltages**: 0 to 10 V
- **Excitation Currents**: 0 to 4 V: < 30 mA - 4 V to 10 V: < 12 mA
- **Sensing**: Negative and positive probes

2) **Amplifiers**
   - Type: Differential - DC capable
   - Gains: 10 or 100
   - Error: < 0.01 dB

3) **Protection**
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   - Pins: 3 polarized pin - spring-loaded

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   - Type K: -200 °C to +1 300 °C
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   - Type NB: -200 °C to +1 200 °C
   - Type E: -200 °C to +800 °C
   - Cold Compensation: Integrated
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   - PT 1000: -190 °C to +880 °C
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   - Current: PT100: 500 μA to 4 mA - PT1000: 500 μA to 1 mA
   - Wires: 3 wires

### Digital Computation

1) **Narrow band analysis (FFT)**
   - Real-time FFT analysis
   - 20 kHz bandwidth
   - 0% overlap
   - 1 channel processing
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<th>Real-time time domain monitor and statistical analysis with:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Simultaneous time view and statistical extraction</td>
</tr>
<tr>
<td></td>
<td>20 kHz bandwidth</td>
</tr>
<tr>
<td></td>
<td>1 channel processing requires 3 SPU</td>
</tr>
</tbody>
</table>

### DSP Modules

<table>
<thead>
<tr>
<th>1) Type</th>
<th>Sample Size: 32 bit floating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Computation words: 32/40 bit</td>
</tr>
<tr>
<td></td>
<td>Internal memory: 16 M samples</td>
</tr>
</tbody>
</table>

| 2) Power | Computation capability: Up to 4810 SPU / DSP module |

| 3) Input Sharing | Inputs per DSP: 8 max |
Annexure-II

MANUFACTURERS’ AUTHORIZATION FORM

[The bidder shall require the manufacturer to fill in this form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by the person with the proper authority to sign documents that are binding on the Manufacturer.]

Date: [insert date (as day, month and year) of Bid Submission]

Tender No.: [insert number from Invitation for Bids]

To: The Chairman, Interdisciplinary Centre for Energy Research, IISc, Bangalore-560012.

WHEREAS

We [insert complete name of Manufacturer], who are official manufacturers of [insert full address of Manufacture’s factories], do hereby authorize [insert complete name of Bidder] to submit a bid the purpose of which is to provide the following Goods, manufactured by us [insert name and or brief description of the Goods], and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty with respect to the Goods offered by the above firm.

Signed: [insert signature(s) of authorized representative(s) of the Manufacturer]

Name: [insert complete name(s) of authorized representative(s) of the Manufacturer]

Title: [insert title]

Duly authorized to sign this authorization on behalf of: [insert complete name of Bidder]