# Centre for Energy Studies
# Indian Institute of Technology
### Hauz Khas, New Delhi-110 016

## NOTICE INVITING QUOTATIONS (EXTENDED)

Date: 24.12.2014
Due date: 31.12.2014

Sealed quotations are invited for the item "Spark Plug Integrated In-cylinder Pressure Sensor and Crank Angle Encoder for IC Engines" and technical specifications of the item are given below. The quotations shall be submitted in a sealed cover (separate bids: technical and commercial) to Dr. K. A. Subramanian, Associate Professor, Room No.414, Block V, Centre for Energy Studies, Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016 on or before 31.12.2014 (Wednesday). The late submission will not be entrained.

**TECHNICAL SPECIFICATION:**

The item "Spark Plug Integrated In-cylinder Pressure Sensor and Crank Angle Encoder for IC Engines" comprises of major components such as (i) Spark plug integrated in-cylinder pressure sensor, (ii) Crank angle encoder. The detailed specifications of each individual component of the item are given below.

| **Item Name** | **Spark Plug Integrated In-cylinder Pressure Sensor and Crank Angle Encoder for IC Engines** | |
|---|---|---|
| **Component (i): Spark plug integrated in-cylinder pressure sensor** | | |
| **S.No.** | **Parameter** | **Description** |
| 1. | Sensor Type | Spark Plug Integrated Piezoelectric Pressure Sensor |
| 2. | Pressure Measuring Range | 0 … 200 bar |
| 3. | Overload | ≥ 250 bar |
| 4. | Cooling Type | Un cooled |
| 5. | Sensitivity (nominal) | ≥ 10 pC/bar |
| 6. | Linearity | ≤ ± 0.5% FSO |
| 7. | Natural Frequency | ≤ 150 kHz |
| 8. | Insulation resistance | $\geq 10^{13}\ \Omega$ |
| 9. | Load change drift | ≤ 6 mbar/ms |
| 10. | Eccentricity of insulator | 0.0 mm |
| 11. | Temperature of plug-seat | ≤ 230 °C permanent |
| 12. | Operating Temperature Range | – 40 ... 350 $^{0}$C |
| 13. | Mounting thread diameter | M12×1.25 |
| 14. | Accessories | Piezo-input cable with integrated SIC, BNC- |

| | | |
|---|---|---|
| | | coupling, elongation, Cable-mounting tool, Sockets, Spark plug gauge, Sealing gasket for spark-plug sensor, Ignition cable extension, T-handle, Mounting paste. O-rings (washers), Sealing material, Couplings, Protection caps. |
| 15. | The pressure sensor should be compatible with the existing spark plug (Make : Champion, Model : RA7YC, M12×1.25) for which the specifications are given below | |
| | 1. Sealing | Flat |
| | 2. Type | Resistor |
| | 3. Thread length/Reach | 19 mm/(3/4) inch |
| | 4. Thread Size | 12 mm |
| | 5. Hex | 16 mm |
| | 6. Heat Value | ≤ 7 |
| | 7. Spark Protrusion | 3 mm |
| | 8. Electrode Gap | 0.5 – 0.8 mm |
| | 9. Electrode | Projected copper core central electrode |
| | | |
| **Component (ii): Crank angle encoder** | | |
| 1. | Speed | Up to 15 000 rpm |
| 2. | Permissible load | 500g (overload 1000g) |
| 3. | Sensing Type | Optical pickups for angle measurements |
| 4. | Mounting Type | On flywheel shaft of the engine |
| 5. | Resolution | ≤ 0.5 degree Crank Angle |
| 6. | Mass load on crank shaft | ≤ 500g |
| 7. | Humidity | 10 – 90 % RH |
| 8. | Permissible ambient temperature | – 40°C to +120°C |
| 9. | Operating voltage | 100…. 300 V AC, 50-60 Hz (or) 11…12 V DC |
| 10. | Output Interface | RS 232 or RS422, TTL Up to 0.025 deg CA |
| 11. | Necessary mounting items should be provided. | |
| | | |
| **Other Details** | | |
| 1. | Compatibility | The item must be compatible with the existing data acquisition system |
| 2. | Warranty | 1 Year standard warranty and 2 Years extended warranty. |
| 3. | Certification | Spark Plug Integrated In-cylinder Pressure Sensor and Crank Angle Encoder for IC Engines should be certified by the National/International agency. |
| 4. | Calibration | Calibration charts, Operating instructions and supporting documents should be supplied. |

| | |
|---|---|
| 5. | Any proof (PO/Invoice) of past selling of the similar Spark Plug Integrated In-cylinder Pressure Sensor and Crank Angle Encoder for IC Engines to at least two OEMs should be provided. |
| 6. | Spark Plug Integrated In-cylinder Pressure Sensor and Crank Angle Encoder for IC Engines comprising of all components must be supplied by one supplier only. |
| 7. | Spark Plug Integrated In-cylinder Pressure Sensor and Crank Angle Encoder for IC Engines should be compatible with any indicating system. |
| 8. | The item should be quoted as single item of "Spark Plug Integrated In-cylinder Pressure Sensor and Crank Angle Encoder for IC Engines**"**. It is desirable that each component shouldn't be quoted separately. |

**Terms and conditions covering submission of quotations**

1. Please submit the TECHNICAL and FINANCIAL bids in two separate sealed envelopes. Mark clearly as "Technical Bid" and "Financial Bid" on the respective envelops. Both the sealed envelopes should be sent in a single sealed envelope, with clearly marked as Quotation for "Spark Plug Integrated In-cylinder Pressure Sensor and Crank Angle Encoder for IC Engines". The quote should reach the following address on or before **31.12.2014 (5:30 PM).**

   Name: Dr. K. A. Subramanian
   Address: Room No. 414, Block V, Centre for Energy Studies,
   Indian Institute of Technology Delhi, Hauz Khas, New Delhi-110016

2. Please quote prices of imported items preferably at FOB (Freight on Board) IIT Delhi/CIP Delhi Airport inclusive of all taxes, freight, delivery, installation and onsite training charges. The quotation should provide the total price of the system including all taxes and transportation charges.

3. Quote should be in Indian Rupees/Euro/US Dollars and to be valid for at least three months.

4. Attach all the technical literature and a list of similar installations done in India.

5. If the quote is being submitted by the representative of the principals/manufactures themselves, a valid Agency ship/Dealership Certificate authorizing the agent to quote to IIT Delhi on behalf of the Principals should be enclosed.

6. Complete set of manuals for the operation and servicing of equipment should be given. All circuit diagrams, other mechanical and electrical schematics must be provided to main unit, sub systems and accessories.

7. Spare set: A complete set of necessary spares and consumables should be supplied for at least three years of trouble free operation.
8. Clearly specify the installation requirement such as space, power, frequency, environment (Temperature and humidity), etc.

9. If the items quoted are proprietary in nature, please enclose proprietary certificate from the principals stating "certified that _____ is a proprietary item of M/s. _____ and no other manufacture make these items".

10. If the bidder is Indian agent, the agency certificate should be enclosed.

11. Please produce compliance certificate for the specification.

12. Delivery period: Within 1 month from the issue of supply order.

13. Authority of IIT Delhi reserves the right to reject any or all quotations without assigning any reasons.

14. Validity of quotations: Quotations will be considered valid for 3 months from the date of receipt unless otherwise stated.

15. Correspondence: No correspondence regarding acceptance or rejection of a quotation will be entertained.
16. Samples: Samples when asked for will invariably be made available and sent along with the quotations.

17. Method of submission: Quotations should be sent in a sealed cover, indicating of OUR N.I.Q. REFERENCE NUMBER AND DUE DATE FOR OPENING as otherwise these will not be considered.

    The envelope must contain two SEPARATE bids:
    (i) Commercial bid
    (ii) Technical bid

18. Rejection: The quotation not conforming to the set procedures mentioned above will be rejected.

19. Discount/Rebates: Special discount/rebate wherever admissible keeping in view that the items are being supplied to an Educational Institution of National importance may be indicated.

20. Excise duty (ED) exemption certificate will be provided by IIT Delhi.

| Prof. P. M. V. Subbarao | Prof. T. S. Bhatti | Prof. M. G. Dastidar | Dr. K. A. Subramanian |
|---|---|---|---|
| Chairman | Member | Member | Member |