



**NATIONAL CENTER FOR COMBUSTION RESEARCH
AND DEVELOPMENT (NCCRD)
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI – 600036, INDIA**

Ref. No. ASE1314124DRDOSRCH

Date: 16 April 2014

Due date: 7 May 2014

Item name: Pressure Transducer - 18 Nos.

1. Quotations are invited in duplicate for the items shown overleaf (in Annexure I). The quotations duly sealed and superscribed on the envelope with reference no. and due date, should be addressed to the undersigned so as to reach on or before the due date mentioned above.
2. The quotations should be valid for sixty days from the due date and the period of delivery required should also be clearly indicated.
3. The total cost of the equipment in terms of CIP Chennai should be clearly mentioned.
4. Terms of warranty and guarantee should be explicitly mentioned.
5. Packing and delivery charges, customs and clearance duty should be clearly stated.
6. Goods shall not be supplied without an official supply order.
7. Local firms : Quotations should be for free delivery to this institute. If quotations for ex-godown delivery charges should be indicated separately.
8. Firms outside Chennai: Quotations should be for F.O.R. Chennai. If F.O.R. consignor station, freight charges by passenger train / lorry transport must be indicated. If ex-godown, packing, forwarding and freight charges must be indicated.
9. The rate of sales / general taxes and the percentage of such other taxes legally leviable and intended to be claimed should be distinctly shown along with the price quoted. Where this is not done, no claim for sales / general taxes will be admitted at any stage and on any ground whatsoever. The taxes leviable should take into consideration that we are entitled to have Concessional Sales Tax (CST) applicable to non-government educational institutions run with no profit motive for which a concession sales tax certificate will be issued at the time of final settlement of the bill.
10. Payment : Specify the mode of payment and if advanced payment has to be made. Every attempt will be made to make payment within 30 days from the date of receipt of bill / acceptance of goods, whichever is later.
11. IIT Madras is exempt from payment of excise duty and is eligible for concessional rate of customs duty. Necessary certificate will be issued on demand.
12. IIT Madras has the right to accept the whole or any part of the tender or portion of the quantity offered or reject it in full without assigning any reason.
13. In case of any queries/clarifications, please contact Mr. Sujith Kumar, IIT Madras, Chennai, Ph. +91-7299461431, +91-8122852926, E-mail: r.p.sujithkumar@gmail.com.
14. The sealed quotation may be sent to

Prof. S. R. Chakravarthy

NCCRD Office

No. 201, Rarefied Gas Dynamics Lab (Behind Aerospace Engineering Dept.)

Chennai – 600036

(P) +91-44-22575025



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Annexure I

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Technical Specifications of Pressure Transducer

These pressure transducers will be used in an experimental combustion chamber for studying combustion instabilities of solid propellant samples.

Brief scope of supply

- This document describes the technical requirements for the pressure transducer of piezoelectric type meant for measuring the fluctuating pressure in hot environment.
- The pressure transducers will be used in combustion environment.
- The pressure transducers shall be capable of measuring absolute, dynamic pressure.
- The specifications of the transducers are tabulated below.

	ENGLISH	SI
Performance		
Measurement Range (for $\pm 5V$ output)	500 psi	3450 kPa
Useful Overrange (for $\pm 10V$ output)	1000 psi	7900 kPa
Sensitivity (± 1 mV/psi)	10 mV/psi	1.45 mV/kPa
Maximum Pressure (static)	5000 psi	34500 kPa
Resolution	0.01 psi	0.07 kPa
Resonant Frequency	≥ 400 kHz	≥ 400 kHz
Rise Time (Reflected)	≤ 1.5 μ sec	≤ 1.5 μ sec
Low Frequency Response (-5 %)	0.01 Hz	0.01 Hz
Non-Linearity	≤ 2.0 % FS	≤ 2.0 % FS
Environmental		
Acceleration Sensitivity	≤ 0.002 psi/g	≤ 0.0014 kPa/(m/s ²)
Temperature Range (Operating)	-100 to +275 °F	-73 to +135 °C
Temperature Coefficient of Sensitivity	≤ 0.03 %/°F	≤ 0.054 %/°C
Maximum Flash Temperature	3000 °F	5400 °C
Maximum Shock	20000 g pk	196000 m/s ² pk
Electrical		
Output Polarity (Positive Pressure)	Positive	Positive
Discharge Time Constant (at room	≥ 50 sec	≥ 50 sec



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	ENGLISH	SI
temp)		
Excitation Voltage	20 to 30 VDC	20 to 30 VDC
Constant Current Excitation	2 to 20 mA	2 to 20 mA
Output Impedance	≤ 100 Ohm	≤ 100 Ohm
Output Bias Voltage	8 to 14 VDC	8 to 14 VDC
Electrical Isolation	100000000 Ohm	100000000 Ohm
Physical		
Sensing Geometry	Compression	Compression
Sensing Element	Quartz	Quartz
Housing Material	Stainless Steel	Stainless Steel
Diaphragm	Invar	Invar
Sealing	Welded Hermetic	Welded Hermetic
Electrical Connector	10-32 Coaxial Jack	10-32 Coaxial Jack
Weight	0.44 oz	12.5 gm

Quantity Required:

Quantity	18 Nos.
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- The required amplifier for each transducer shall be provided meeting the stipulated signal output requirements.
- The required electrical excitation connection shall be in built with the sensor.

Calibration

- All transducers shall be calibrated to the datum of 50 bar and 100 bar and a calibration certificate shall be provided.

Packing

- All transducers shall be packed tightly in a cushion material and the packing shall protect the sensors from moisture and water from the environment.