INDIAN INSTITUTE OF TECHNOLOGY DELHI
HAUZ KHAS, NEW DELHI-110016

DATE: Feb 1, 2013

NOTICE INVITING QUOTATION

NIQ ref. no.: IITD/PHYS/2013/SjC/CFSM

Due Date: 22 Feb 2013/5:00 PM

Sealed quotations along with complete details (brochure/web-site details) are invited for procuring the **Cryogen Free Superconducting Magnet based DC, AC Magnetometer and Magnetotransport, Measurement System with provision for measurement of thermal properties** *(Quantity – 1 Number)* as per following desired specifications.

Item Description	**CRYOGEN FREE SUPERCONDUCTING MAGNET BASED DC, AC MAGNETOMETER AND MAGNETOTRANSPORT MEASUREMENT SYSTEM WITH PROVISION FOR MEASUREMENT OF THERMAL PROPERTIES** capable of providing magnetic field of ≥ 5Tesla, Temperature range 2.0 – 400 K complete with standard Desktop PC of latest configuration and all required software codes in LABVIEW for instrument/measurement control, data analysis, etc. The detailed system specifications are as follows:
Parameters	***Specifications***
A. Cryogenic & Magnet System	
1. Magnet Type	Superconducting
2. Magnetic Field Range	-5.0 T to +5.0 Tesla or more
3. Field in-homogeneity	≤ 0.1% over 1 cm diameter spherical volume
4. Magnet Cool Down time	≤ 30 hours
5. Maintenance free operation of coldhead/ compressor	≥ 15,000 hours
6. Magnet Mode operation	Both Ramping and Persistent Modes are required
7. Magnet Power Supply	Programmable Four Quadrent Type, Computer controlled (GPIB/488) appropriate to the installed superconducting magnet
8. Cryo cooling method	Pulse Tube/GM type (operating on Helium)
9. Cooling Capacity	≥ 0.5 Watts at 4.2 K
10. Typical base temperature	3K or lower
11. Compatibility with DC/AC Magnetometry Module	The cryogenic magnet system should be supplied INTEGRATED with DC magnetization Module whose specs are detailed in below (i.e., in C.) Further, the system should be compatible so as to quickly interchange at user's site for change to the supplied AC Susceptibility/Magnetotransport (DC/AC) module/probe, whose specs are detailed below (i.e., in D to F.)
12. Provision for adding, in future, the *Specific Heat* Measurement Module	This modular provision is required for future upgrade. (Necessary details of the "*Specific Heat probe*" be provided)
13. Provision for adding, in future, the *Figure of Merit* Measurement Module	This modular provision is required for future upgrade. (Necessary details of the "*Thermal Conductivity and Thermopower probe*" be provided)
14. Input Voltage	Single Phase, 220±40V or Three Phase 400±40V
15. Input frequency	50 ± 3Hz
16. Safety/regulatory Compliance	CE compliance
17. Users in India	The vendor must provide the list of customers to whom such DC/AC Magnetometer/Magnetotransport system have been sold in past. Complete information about date of installation, contact of the users be provided for obtaining their feedback.
B. Variable Temperature Sample Environment	
1. Probe insert dia	25 mm or more
2. Temperature range	Variable in the range 2.0 – 400 K or more by Continuous gas flow
3. Temperature Control mode	PID, Ramp, PID table modes with Auto-tuning feature

4. Temperature Sensor	*Cernox* type or any other sensor compatible to work in magnetic field environment of 5 Tesla or more.
5. Temperature controller & Monitor	Appropriate make, with temperature resolution of ±0.001 K capable of controlling temperature @ ±5 mK or better at 10K
6. Typical cool down time (from 300K to ~4.0K)	1 hour or lower
7. Stabilization time	≤ 15 minutes to reach within ±10 mK of set temperature
8. Upgradability to lower temperature	The Variable Temperature Insert be upgradable to Helium-3 temperature of 300 mK
C. DC Magnetization Measurement Probe & Necessary Measurement Instruments	
1. Measurement Method	Vibration Sample Magnetometry (VSM)
2. Vibration frequency	< 100 Hz
3. Vibration amplitude	1-2 mm or wider
4. Moment Accuracy & reproducibility	≤ 1%
5. Detection Sensitivity of measured moment	$\leq 5\times10^{-6}$ emu with a typical noise floor of $\leq 1\times10^{-6}$ emu
6. Sample size	Typically ≤ 1mm (t)×5mm(w) ×10 mm (l) rectangular shape and/or ≤5 mm dia spherical sample
7. Electronic Measuring Instrument	Appropriate to the Sensitivity specified in above C.5
D. AC Magnetic Susceptibility (ACMS) Measurement Probe & Necessary Measurement Instruments	
1. Measurement Method	**Phase Sensitive Detection** from a **2-coil-pick-up set up** (to remove parasitic signals) as the sample is moved within a primary coil (excited at an ac-magnetic field of ~1- 15 Oe, frequency range 10 Hz to 10 kHz or wider.
2. Minimum Sensitivity	$\leq 1\times10^{-6}$ emu (ac) near 4 K
3. Sample size	Typically ≤ 1mm (t)×5mm(w) ×10 mm (l) rectangular shape and/or ≤5 mm *dia* spherical sample
4. Electronic Measuring Instrument	Appropriate to the Sensitivity specified in above D.2
E. DC Magnetoresistivity/Hall Effect PROBE	
(i) Sample size option (ii) Multipin-connector	Typically ≤ 1mm (t)×5mm(w) ×10 mm (l) rectangular shape Suitable multi-pin connector at top for electrical access to contacts to sample, sensor, and heater mounted on probe
F. AC Magnetoresistivity/Hall Effect PROBE	
(i) Sample size option (ii) Multipin-connector	Typically ≤ 1mm (t)×5mm(w) ×10 mm (l) rectangular shape Suitable multi-pin connector at top for electrical access to contacts to sample, sensor, and heater mounted on probe
G. Computer:	
The offer must include a Desktop PC with minimum 4 GB RAM, 350 GB(or more) HDD, RW-DVD with 21 inches or higher flat LCD color monitor, latest version of windows operation system, all required LABVIEW software for instrument/measurement control, data analysis, etc.	
H. Measurement Software Codes:	
Necessary measurement software codes developed in Labview platform compatible with latest Windows operating environment be provided, in respect of all above measurements e.g., Magnetization-Temperature, Magnetization-field, Magnetization-time, Susceptibility-temperature, Susceptibility-DC field, DC/AC resistivity-field, DC/AC-Hall Effect, DC/AC-Current-Voltage, DC/AC-Resistance-Temperature measurements, etc.	
I. Commissioning & Installation and Training at IIT Delhi / works:	
(i) The offer must include the Installation and Commissioning of the Equipment at IIT Delhi, including the Initial Helium Gas Charge. All the mentioned specifications like field, temperature, measurement capabilities of dc-magnetization, ac-susceptibility and magnetoresistance, etc. must be demonstrated at the time of commissioning by doing analysis of users samples. This is essential for satisfactory commissioning certification. **(ii)** The offer must also include the operational training of the equipment to our scholar(s)	
J. Accessories, Manuals, Standard calibration samples, etc.: Following must be included in the offer,	
(i) Appropriate quantity of consumable accessories for various measurements, etc. for 5 year trouble-free operation **(ii)** All essential tools for regular in-house maintenance and required maintenance kit. **(iii)** Hard copies of **operating and service manuals**, and	

(iv) Appropriate standard sample for calibration purpose.	
K. OPTIONAL ITEMS:	
1. Spare VSM Probe (1 No.)	Identical to that offered with C.1 above
2. Spare ACMS Probe (1 No.)	Identical to that offered with D.1 above
3. Probe having sample rotation feature	(i) The provision for rotating the sample to more than 300 degrees around the horizontal axis by manual/motorized operation be provided. (ii) The above be provided mounted on a probe together with temperature sensor, 4 wires, and multi-pin fixture/connector accessible from outside, etc.
4. High temperature option in DC magnetization measurement:	
High temperature : 700K or higher	
5. Electronic Measuring Instruments for DC Magnetoresistivity/Hall Effect	
(i) Voltage Sensitivity	≤20 nV
(ii) Bias current range	Programmable; Minimum: ≤10 nA, and Maximum:≥1 Amp
(iii) Resistance range (DC)	Minimum: ≤ 10 μΩ, and Maximum ≥ 100 MΩ
(iv) Contact Switching Card and Scanner for Hall effect	Hardware (scanner/switching system) should be able to allow precise measurement of dc-signals ≥ 1μV and supply of constant current of ≥ 1 μA
6. Electronic Measuring Instruments for AC Magnetoresistivity/Hall Effect	
(i) Voltage Sensitivity	≤1 nV @ ~1kHz
(ii) Bias current range	Programmable; Minimum: ≤10 nA, and Maximum:≥100 mA
(iii) Frequency range	1 Hz to 1 kHz or wider
(iv) Contact Switching Card and Scanner for Hall effect	Hardware (scanner/switching system) should be able to allow precise measurement of ac-signals ≥ 1μV and supply of current of ≥ 10 μA
7. **Specific Heat and Thermal Transport Measurement Probe** with all necessary **electronic measuring instruments**	Temp-range : 10-300K Measurable Sample mass : At least 1 mg or lower Measurement Sensitivity : 10 nJ/K or lower at ~4K
8. UPS with batteries	Make and Rating of 20 kVA or Higher (whichever is applicable) appropriate to operate the offered cryogen free system's compressor, refrigerator at **maximum magnetic field rating** & **controlled thermal environment** while doing VSM and/or ACMS measurement, and water chiller; back-up time of 2 hrs or more is required
9. Water Chiller	Rating and Make appropriate to the cooling requirements of the offered Cryogen free Magnet system

TERMS & CONDITIONS COVERING SUBMISSION OF QUOTATIONS

1. **Delivery** — The rates quoted must be for **FOB**
2. **Payment Terms** — Acceptable payment term is through Letter of Credit. The vender must provide complete details regarding the offered mode of payment. **Quotations offering the Advanced Payment terms will not be entertained**.
3. **Validity of quotations** — Quotations will be considered **valid for 3 months** from the date of receipt unless otherwise stated.
4. **Correspondence** — No correspondence regarding acceptance/rejection of a quotation will be entertained.
5. **Submission of quotations** — Separate technical and commercial quotations, in sealed covers mentioning our **N.I.Q. REFERENCE AND DUE DATE FOR OPENING** on the envelope itself**,** should be submitted to the undersigned as otherwise it will not be considered.
6. **Discount/ rebates** — Special discount/rebate wherever admissible may please be indicated, keeping in view that the supplies are being made for Educational purpose in respect of Public Institution of National importance.

7.	**Warranty & delivery period**	**Necessary information must be provided in respect of** (a) Warranty (**preferably 3 years**) and (b) Delivery period
8.	**Agency-ship Certificate**	The vendor must attach with the offer a **latest sole selling and servicing agency-ship certificate from OEM** for sales/services in India.
9.	**Printed brochures/web-site links**	The printed brochures and website link detailing the technical specifications of the items quoted MUST be provided in the offer, failing which the offer *shall not be considered*.
10.	**Proprietary item**	In case the offered equipment is **proprietary in nature**, the same be mentioned on the envelope containing the bids. In addition, the necessary **proprietary certificate** stating clearly the proprietary details should be furnished together with Technical quotation.
11.	**Rejection**	Quotations not conforming to above terms and conditions will be rejected.
12.	**Institute's rights**	Institute reserves the rights of acceptance or rejection of any or all quotations without assigning any reason(s). The discretion for increasing or decreasing of the quantities demanded also vests with the Institute.

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