

Tender for a “*SQUID based Magnetometer*” at the Indian Institute for Science Education and Research Mohali

IISER Mohali invites sealed bids from reputed manufacturers for a state of the art “*SQUID based Magnetometer*” capable of performing routine magnetic measurements including magnetic field and temperature dependent DC magnetization measurements, and magnetic field, temperature, and frequency dependent ac susceptibility measurements of various bulk, single crystal, thin film, and powder materials. IISER will provide the installation space of suitable size and necessary electrical connections. Vendor should provide other infrastructure facilities, including UPS (but not restricted to), for smooth installation and uninterrupted operation of the equipment.

The Bidders are requested to give two part bids. The first part being a *sealed Technical Bid* and the second part being a *sealed Commercial Bid*.

Technical specifications required for the system are detailed below.

TECHNICAL SPECIFICATIONS

Fully automated **wet (liquid cryogen) SQUID based magnetometer** for measuring the magnetic properties of various materials. .

Details of the required specifications for the system are as follows:

1. TEMPERATURE CONTROL

- a. Lowest temperature: less than 2K; Maximum temperature: more than or equal to 400 K
- b. Continuous temperature control through 4.2 K
- c. Temperature calibration accuracy: better than $\pm 1\%$
- d. Continuous Low Temperature Control and Temperature Sweep modes with a slew rate of at least 2 K/min from 2 K to 10 K, and a rate of at least 10 K/min above 10K
- e. Temperature stability in the sample space: $\pm 0.5\%$ or better.
- f. Temperature variation in the sample chamber: ± 0.2 K or better over a scan length of 6 cm

2. SUPERCONDUCTING MAGNET

- a. Longitudinal field configuration ± 7 Tesla or higher.
- b. Magnetic field uniformity of $\pm 0.01\%$ over ± 2 cm from centre of detection coil.
- c. Field setting resolution of at least 0.2 G in the low field range, and at least 2 G in the high field range.
- d. Highly stable, low-noise bi-polar power supply with over voltage protection.
- e. Control modes: Persistent and Driven (Oscillating, No Overshoot and fast settle).
- f. Magnet reset option to quench the field coil. The time required to re-cool the magnet should be less than 5 minutes

3. DC MAGNETIC MEASUREMENT OPTION

- a. Measurement range of minimum ± 5 emu
- b. Continuous raw data capture
- c. Sensitivity of the order of 10^{-8} emu at low fields.

4. AC SUSCEPTIBILITY

- a. Temperature Range: at least 2 K – 300 K.
- b. AC Frequency Range: at least 0.1 Hz – 1 kHz.
- c. AC Field Amplitude Range: 1 mOe to 3 Oe
- d. 5×10^{-8} emu in the absence of DC field and about 1×10^{-7} emu with DC fields up to 7 T
- e. Accurate resolution of real and imaginary parts of the susceptibility

QUOTE FOR THE FOLLOWING ADDITIONAL OPTIONS

5. Extended dynamic range

- a. Extended range of upto ± 300 emu for measurements of high moment specimens

6. High Temperature Attachment

- a. Temperature range from room temperature to at least 800 K.
- b. Sample tube inner diameter > 3 mm
- c. Temperature accuracy better than ± 1 K
- d. Temperature uniformity better than ± 1 K over a 4 cm scan length

7. Low Temperature Attachment

- e. To extend temperature range of magnetic measurements (DC and/or AC) to below 2 K and at least down to 0.35 K.
- f. Sample tube inner diameter > 2 -3mm
- g. Temperature accuracy better than ± 5 mK
- h. Temperature uniformity better than ± 1 -2 mK over a 4 cm scan length

8. Horizontal and Vertical Sample Rotators

- a. Rotation along the horizontal and vertical axes from 0 to 360 degrees
- b. Positional resolution better than 0.5 degree

9. Environmental Magnetic Shield

- a. Environmental magnetic shielding to cancel out external magnetic fields.

10. Ultra Low field Measurement option

- a. Additional coil based system to enable residual fields less than 0.05 G over a scan length of 4 cm
- b. Magnet reset option to quench the field coil. The time required to re-cool the magnet should be less than 5 minutes

11. Low field measurement/profiling option

- a. A low field sensor with a sensitivity of about ± 0.03 G
- b. A shielded chamber for accurate zero-setting of the field sensor

12. Multipurpose probe

- a. At least 5 twisted pairs of cryogen compatible wires for performing user defined measurements.
- b. Connectors on both ends of the probe for ease of wiring, coupled with a sliding seal assembly.
- c. Accessories and software necessary to set up a fully automated transport (resistivity and Hall effect) measurement system. The software should be flexible enough to incorporate additional external devices, and provide access to the MPMS temperature and magnetic field controls.

13. Fiber Optic Sample Probe

- a. A sample holder which permits the sample to be illuminated during the course of magnetic measurements
- b. Compatibility with the DC magnetization mode, and operable in the temperature range from 2K to 300K, and magnetic fields up to 7 T
- c. Accessories required for routine operation.

14. Compatible Uniaxial and Hydrostatic Pressure cells

- a. Uniaxial pressure cell, with a maximum pressure of not less than 500 MPa, and a sample space of not less than 3 mm
- b. Hydrostatic pressure cell, with a maximum operating pressure of not less than 1.5 GPa, and a sample space of not less than 2.5 mm.
- c. Compatibility with routine DC and AC magnetization measurements.
- d. Hydraulic press and all other relevant accessories.

15. COMPUTER AND SOFTWARE

Licensed windows based operating software and State-of-the-art computer control system compatible with and optimized for the application software to run the various measurement options automatically. Also, a heavy duty printer.

16. VACUUM PUMP AND VACUUM FITTINGS

The supplier should provide vacuum pumps and associated fittings and accessories essential for uninterrupted functioning of the instrument and its various measurements options.

NOTE: Vendors should quote separately for individual items. Vendors can quote for all or some of the items.

GENERAL

- Operation and service manual in English (electronic and hard copy) should be provided with the equipment.
- In the technical details specify the periodic maintenance time (i.e., the no. of operational hours after which maintenance of the instrument is required).

- The price quoted for the equipment should cover the cost of first full maintenance/servicing of the instrument..
- Installation site: at Indian Institute of Science Education and Research Mohali.
- Free on-site training of all measurement options at IISER Mohali.
- Warranty: Apart from the normal warranty, the vendor must quote for a 5 year CMC (Comprehensive maintenance contract).
- Specify your service response time. What is the closest service point you have from Mohali (Chandigarh) area. Specify the number of factory trained engineers based in India (preference shall be given to those having a factory trained staff based in India for subsequent services).
- Enclose full list of users in India and a few international references.
- Provide a point by point compliance chart.
- Enclose pre-installation guide for site preparation including details on electrical power and space required.
- The representatives of the vendors are requested to be present when technical bids are opened on the specified date. They should come prepared to give a short 15 minutes presentation on their product at the time if required in by indenter.