



CORRIGENDUM

Reference Tender Notice No. 121/2018 for “**600 MHz NMR spectrometer**”. The Annexure “A” i.e. Technical Specifications has been revised as follows:

a) Magnet Specifications:

1. Latest version of 600 MHz NMR spectrometer with 3-broad band RF channels for homo and heteronuclear multi-dimensional solid state and solution NMR experiments.
2. Latest version of shielded superconducting magnetic (standard/narrow bore) with 150 days or more liquid helium hold time, with radial 5-gauss line should be less than 0.7 meter from the center of the magnet, to be accommodated in between the already existing shielded superconducting magnets in the room. The entire superconducting magnet assembly (including Vibration-damping system, legs and auto-sampler assembly) should be accommodated in the room with roof height about 3.8 meters at the site. The operational height of the superconducting magnet for easy transferring of liquid helium and handling automatic sample changer should be less than 3.8 meters from the floor. The part number, detailed specifications of superconducting magnet and its installation site requirements, such as complete dimensions of the magnet and minimum operational height (for liquid helium transfer and other servicing), liquid helium refill volume, liquid nitrogen refill volume, should be given WITHOUT fail.
3. Vibration-damping system to damp the vibration of frequencies $>3\text{Hz}$
4. Room temperature shims as well as cryo shims for best line shape and linewidth.
5. The number of room-temperature shim coils should be 44 (lowest acceptable 36) or larger to achieve high-resolution solution NMR spectra.
6. Field drift $\leq 6\text{Hz/hr}$, Radial stray field (0.5 mT line $<0.7\text{ m}$), Axial stray field (0.5 mT line $<1.4\text{ m}$)

b) Console, electronics and other accessories

1. Advanced electronic console ($\sim 220\text{ V}$) with full-band 3-RF CHANNELS. Rapid switching time for all the parameters, without hidden delays. Capability of programming recent pulse shaping, amplitude and composite pulse decoupling sequences.
2. Independent waveform generators on each of the three channels to simultaneously generate shaped pulses on all the channels.
3. High performance power transmitters.
4. ^2H -Gradient shimming facility.
5. Capabilities of $^1\text{H}/^{19}\text{F}$ observe and decoupling and full-band X-channels.
6. VT-control (in the range -100 to 200°C) unit suitable for all the probes sought under the basic and optional items.
7. Amplifiers: High frequency (HF): 200W or higher, Low frequency (LF1): 500 W, Low frequency (LF2): 500 W or higher



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8. The console should be upgradable for additional RF channels.
9. The console should be ready for CP/MAS based experiments on powdered samples and MQMAS of solids. Necessary amplifiers, RF trans-receiver peripherals, circuitry and filters, should be quoted along with the part numbers. All the necessary accessories, including CP/MAS probes, rotors and pneumatic accessories, should be quoted.
10. Suitable preamplifiers, band-pass filters and ADC ≥ 100 MHz.
11. Single Z-axis pulse field gradient supply 90 Gauss/cm or more. Efficient gradient shimming, water suppression, phase cycling, and DOSY experiments. Field gradient power supply: 30A
12. MAS controller compatible for all the probes.
13. Auto-tune system for solution NMR adequate for the HFX solution state probe.
14. Solution sample changer - **~ 24 units** [OPTIONAL]: preferably mounted on the top of the spectrometer.
15. Two state-of-the-art air compressors with auto drain feature.
16. Two membrane air dryers (moisture-free air-dryer with dewpoint -60°C or better) to avoid any humidity in the air and so to avoid any spike formation in the FID due to electric discharge caused by the sample spinning.
17. Suitable air-filters for dust and moisture-free pneumatic operations.
18. Automatic shimming by gradient shimming method should be implemented for MAS probes even without field gradient coil inside the probes. This is important for high-resolution solid-state NMR measurements.
19. The frequency step: **~ 0.001 Hz (optional 0.005 Hz) [smaller the better]**.
20. The phase step: **~ 0.002 degrees (optional: 0.006 degrees) [smaller the better]**.
21. The frequency, amplitude, or phase switching should be shorter or equal to **~ 5 ns or all combined ~ 12.5 ns**.
22. The maximum spectral width: **~ 10 MHz (optional: ~ 7 MHz) [higher the better]**.
23. Fully automated solution NMR measurements without using deuterated solvent (NoD NMR) should be implemented to achieve cost effective solution NMR measurements, reducing the consumption of expensive deuterated solvent [OPTIONAL].
24. Electric sample cooler (to achieve temperature upto -40°C)
25. Liq- N_2 dewar to achieve very low temperature (-100°C)
26. Heater for MAS probes to increase the sample temperature up to $+200^{\circ}\text{C}$.
27. Sample packing tool should also contain all the necessary accessories to efficiently pack the biological samples.

c) Probes

[Solution state NMR probes]

1. 5mm HFX solution NMR probe [X nuclei ranges from ^{31}P to ^{15}N]: Capability of giving ^{19}F spectra with ^1H decoupling and ^2H lock. The ^1H observe sensitivity should be ~900 or above and ^{13}C sensitivity should be ~300 or above. The ^{19}F sensitivity should be ~850 or above.
2. 5mm inverse triple resonance H/C/N solution probe [OPTIONAL]: ^1H detection with ^{13}C and ^{15}N decoupling with ^2H lock. The ^1H observe sensitivity should be ~1050 or above.

[Solid-state NMR probes]

3. Double resonance H/X probe with the proton detection capabilities (Max MAS rate 35-42 kHz) [OPTIONAL]: Wide tuning range of X nuclei (^{31}P to ^{35}Cl). Probe should also tune to ^2H , ^{19}F , ^{14}N fundamental and overtone frequencies. Lowest tunable frequency ~19 MHz.
4. Triple resonance probe with the proton detection capabilities (Max MAS rate 35-42 kHz): Should be able to tune to $^1\text{H}/^{13}\text{C}/^{15}\text{N}$, $^1\text{H}/^{31}\text{P}/^{13}\text{C}$, $^1\text{H}/^{13}\text{C}/^{29}\text{Si}$, $^1\text{H}/^{29}\text{Si}/^{17}\text{O}$, $^1\text{H}/^{13}\text{C}/^{14}\text{N}$, $^1\text{H}/^{31}\text{P}/^{27}\text{Al}$, $^1\text{H}/^{27}\text{Al}/^{29}\text{Si}$, $^1\text{H}/^{31}\text{P}/^{15}\text{N}$, $^1\text{H}/^{31}\text{P}/^{29}\text{Si}$, etc. Appropriate rf filters should be provided.



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5. Double resonance H/X probe with the proton detection capabilities (Max MAS rate 65-75 kHz) [OPTIONAL]: Wide tuning range of X nuclei (^{31}P to ^{35}Cl). Probe should also tune to ^2H , ^{19}F , ^{14}N fundamental and overtone frequencies. Lowest tunable frequency ~19 MHz.
6. Triple resonance probe with the proton detection capabilities (Max MAS rate 65-75 kHz): Should be able to tune to $^1\text{H}/^{13}\text{C}/^{15}\text{N}$, $^1\text{H}/^{31}\text{P}/^{13}\text{C}$, $^1\text{H}/^{13}\text{C}/^{29}\text{Si}$, $^1\text{H}/^{29}\text{Si}/^{17}\text{O}$, $^1\text{H}/^{13}\text{C}/^{14}\text{N}$, $^1\text{H}/^{31}\text{P}/^{27}\text{Al}$, $^1\text{H}/^{27}\text{Al}/^{29}\text{Si}$, $^1\text{H}/^{31}\text{P}/^{15}\text{N}$, $^1\text{H}/^{31}\text{P}/^{29}\text{Si}$, etc. Appropriate rf filters should be provided.
7. Double resonance H/X probe with the proton detection capabilities (Max MAS rate 95-111 kHz) [OPTIONAL]: Wide tuning range of X nuclei (^{31}P to ^{35}Cl). Probe should also tune to ^2H , ^{19}F , ^{14}N fundamental and overtone frequencies.
8. Double resonance H/X probe (Max MAS rate: 20-24 kHz): wide variable temperature (VT) (-100°C - 200°C) capability, wide tuning range of X nuclei (^{31}P to ^{35}Cl). Probe should also tune to ^2H , ^{19}F , ^{14}N fundamental and overtone frequencies. Lowest tunable frequency ~19 MHz.

Note: Though we prefer single probes with specifications listed above however, in case single probes cannot satisfy the required specifications, two or more independent and/or customized probes satisfying all the requirements may be provided. Any request for a longer delivery time (not exceeding 9 months) for the customized probes may be considered.

d) Consumables

1. Spinners for low and high temperature applications-5 each
2. Spinners for room temperature operations: 10.
3. Supply of liquid Helium and liquid Nitrogen for the installation of the magnet and till its stabilization. In case of magnet-quench during the installation or at subsequent times due to any technical reason or failure, the supply (including transport) of the liquid Helium and Nitrogen, till the magnet is restored to normalcy, is the vendors responsibility and the entire costs for cryogenics, recharging or replacing the magnet, should be borne by the vendor at no additional cost to IIT Ropar.
4. 5 mm high quality NMR tubes: 200.
5. MAS rotors including caps [20 MAS rotors each for 20-24, 35-42, 65-75 and 95-111 [optional] kHz spinning and 20 sets of spare bottom-turbine caps for each specific MAS rotors.
7. Liquid nitrogen transfer tubes (standard diameter Silicon rubber tube 10 meters) and Liquid-Helium transfer lines.

e) Computers and softwares

1. High performance workstation with suitable RAM for multiple window-display /NMR-data processing, additional TCP/IP Ethernet port and DVD+R/W drive and high-resolution 27" Wide-screen LCD monitor and high-speed/memory graphics adapter.
2. Workstation with latest operating system should be highly efficient for 1D, 2D, 3D and 4D data processing and plotting.
3. Latest NMR software package should include all the standard and latest pulse sequences for carrying out multidimensional solid state and solution NMR experiments. A full list of pulse sequences should be provided. Software should be ready to perform non-uniform data sampling and should allow 10% or less data acquisition for linear prediction.
4. Licenced software module should include acquisition, processing, plotting, multiplet analysis, deconvolution, automation, projection reconstruction spectroscopy.
5. Any software upgrade including latest pulse sequences and processing methods or new software released during the warranty period should be provided free of cost during the warranty period.
6. Atleast 10 additional software license for offline data processing from remote workstation.



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7. High quality duplex color laser printer
 8. One additional laptop should be provided for NMR data processing
- f)UPS system**

1. Standard make UPS with more than 2 hour backup for smooth functioning of the entire spectrometer in view of power failure.

g)Important Notes:

1. Complete technical brochures, detailed specifications, including part numbers of the quoted items for all the items, should be enclosed without fail. Technical brochure of each item is a part of the bid and absence of which may lead to disqualification of the bid.
2. Price for each item should be quoted separately.
3. The comprehensive warranty of the optional items should be at least for five years.
4. Software upgrades should be made by the vendor as and when the new versions are released by the manufacturer / vendor at no additional cost.
5. Vendor has to enter in to rate-contract to supply Liquid Helium for keeping the super-conducting magnet active.
6. The spectrometer has to be optimized for the standard test/reference samples and to be successfully demonstrated at our site
7. Supply of standard reference and calibrating samples along with the spectrometer.

h) Optional items

(Price of all or selected optional items, that are going to be procured, will be taken into account for comparison of the commercial bid)

1. Comprehensive on-site warranty covering free replacement of parts, maintenance and service for all the units /accessories of the spectrometer including the magnet, for each additional year (4th and 5th year), after the initial 3-year warranty.
2. Closed-cycle refrigeration type low-temperature unit with all its accessories to cover the temperature range -40°C (or better) to RT, to work without the need of liquid nitrogen or any external coolant. This low-temperature unit should support CP/MAS experiments also.

i)Scope of Supply

Supply, successful installation, training and conducting final acceptance test at IIT, Ropar.

j) Inspection & Tests

1) General

- 1.The Supplier shall at its own expense and at no cost to the Purchaser carry out all such tests and/or inspections of the Goods and Related Services as are specified here.



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2.The inspections and tests may be conducted on the premises of the Supplier or its subcontractor(s), at the point of delivery and/or at the Goods final destination(if applicable). Proper documentation indicating the test results should be provided at the time of delivery.

3.Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.

4.Should any inspected or tested goods fail to conform to the specifications, the Purchaser may reject the goods and the Supplier shall either replace the rejected Goods or make alterations necessary to meet specification requirements free of cost to the Purchaser.

5.The Purchaser's right to inspect, test and, where necessary, reject the Goods after the Goods' arrival at final destination shall in no way be limited or waived by reason of the Goods having previously been inspected, tested and passed by the Purchaser or its representative prior to the Goods shipment.

6.The Supplier shall provide the Purchaser with a report of the results of any such test and/or inspection.

7.With a view to ensure that claims on insurance companies, if any, are lodged in time, the bidders and /or the Indian agent, if any, shall be responsible for follow up with their principals for ascertaining the dispatch details and informing the same to the Purchaser and he shall also liaise with the Purchaser to ascertain the arrival of the consignment after customs clearance so that immediately thereafter in his presence the consignment could be opened and the insurance claim be lodged, if required, without any loss of time. Any delay on the part of the bidder/ Indian Agent would be viewed seriously and he shall be directly responsible for any loss sustained by the purchaser on the event of the delay.

8.Before the goods and equipment are taken over by the Purchaser, the Supplier shall supply operation, maintenance and service Manuals together with Circuit diagrams of the goods and equipment built. These shall be in such details as will enable the Purchase to operate, maintain, adjust and repair all parts of the works as stated in the specifications.

9.The Manuals and Drawings shall be in the ruling language (English) and in such form and numbers as stated in the Contract.

10.Unless and otherwise agreed, the goods and equipment shall not be considered to be completed for the purposes of taking over until such Manuals and Drawing have been supplied to the Purchaser.

11.On successful completion of acceptability test, receipt of deliverables, etc. and after the Purchaser is satisfied with the working of the equipment, the acceptance certificate signed by the Supplier and the representative of the Purchaser will be issued. The date on which such certificate is signed shall be deemed to be the date of successful commissioning of the equipment.

k) Acceptance Test

The acceptance test will be conducted by the Purchaser, their consultant or other such person nominated by the Purchaser at its option after the equipment is installed at Purchaser's site in the presence of



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supplier's representatives. The acceptance will involve trouble free operation. There shall not be any additional charges for carrying out acceptance test. No malfunction, partial or complete failure of any part of the equipment is expected to occur. The Supplier shall maintain necessary log in respect of the result of the test to establish to the entire satisfaction of the Purchaser, the successful completion of the test specified.

In the event of the ordered item failing to pass the acceptance test, a period not exceeding two weeks will be given to rectify the defects and clear the acceptance test, failing which, the Purchaser reserve the right to get the equipment replaced by the Supplier at no extra cost to the Purchaser.

Successful conduct and conclusion of the acceptance test for the installed goods and equipment shall also be the responsibility and at the cost of the Supplier.

The acceptance test includes the following:

1. Detailed demonstration of the instrument
2. Analysis of standard reference samples

l) Training

Onsite training for five working days each, for solid state and solution NMR, after the successful installation. The training should include demonstration, operation and maintenance of the intended equipment supplied on both solution and solid-state NMR. subsequently, onsite training for five working days in each case every year, for five years. The training includes demonstration of routine and new experimental procedures/features introduced by the vendor.

m) Service

Service problems should be addressed within 72 working hours. In case of breakdown during the warranty period, a competent service engineer of the supplier should make adequate number of visits until the problem is rectified and the faulty parts are replaced.

n) Technical requirements:

- 1) Policy against magnet quench
- 2) Provide documentary evidence of 600 MHz NMR spectrometer installed at other places in India. Also provide evidence of satisfactory working and after sale support.
- 3) All manuals should be given as hard copies and/or soft copies on CDs or DVDs
- 4) Application/service engineer should be available to handle any problem related to NMR spectrometer if happens.
- 5) In case of magnet quench during the installation or at subsequent times due to faulty design, vendor should bear all the cost for recharging or replacing of magnet.

o) Warranty

Comprehensive on-site warranty for **five years** from the date of acceptance. The Warranty including, free replacements of parts, maintenance and service for 5 years, covering all the units/accessories of the spectrometer, including the magnet, from the date of acceptance, and also time-to-time supply and filling of the required liquid helium for keeping the superconducting magnets active.



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Bidders are requested to submit their bids as per revised specifications and terms & conditions. **The last date of receipt and opening of Bids is hereby also extended upto 23.08.2018.** Those who have already sent/submitted their bids can revise the same clearly indicating "Revised Bid" on sealed cover. Rest remains the same.

Registrar