क्षेत्रीय जैवप्रौद्योगिकी केन्द्र

Regional Centre for Biotechnology

राष्ट्रीय महत्ता की संस्था

An institution of National Importance

(यूनेस्को के तत्वावधान में जैव प्रौद्योगिकी विभाग, भारत सरकार द्वारा स्थापित)

(Established by the Dept of Biotechnology, Govt of India under the auspices of UNESCO)

No. RCB/Misc/22-23 Dated: 30.09.2022

Observations for Purchase of TOF 7600 LC-MS/MS System with Exion UHPLC with accessories on PAC basis

We are in the process of purchase of **TOF 7600 LC-MS/MS System with Exion UHPLC with accessories** from M/s AB Sciex Pte Ltd. through M/s DHR Holding India Pvt Ltd. on Proprietary basis.

Any observations regarding the same may be emailed to purchase@rcb.res.in or submitted by speed post/courier to the under mentioned address on or before **10.10.2022**

Purchase Division
Regional Center for Biotechnology
NCR Biotech Science Cluster
3rd Mile Stone, Gurugram-Faridabad Expressway
Faridabad, Haryana-121001

सुदीप. 30/9/22

Controller of Administration

डॉ. सुदीप भार/Dr. Sudeep Bhar
प्रशासन नियंत्रक / Controller of Administration
क्षेत्रीय जैवप्रौद्योगिकी केंद्र / Regional Centre for Biotechnology
(जैवप्रौद्योगिकी विभाग, भारत सरकार द्वारा स्थापित)
(Estd. by the Dept. of Biotechnology, Govt of India)
यूनेस्को के तत्वावधान में
Under the auspices of UNESCO
एन.सी.आर. बायोटेक साइंस क्लस्टर/ NCR Biotech Science Cluster
फरीदाबाद-गुड़गाव एक्सप्रेसवे/Faridabad-Gurgaon Expressway
फरीदाबाद - 121001 (हरियाणा)/ Faridabad - 121001 (Haryana)

TECHNICAL SPECIFICATIONS OF LIQUID CHROMATOGRAPHY-MASS SPECTROMETRY SYSTEM (LC-MS/MS SYSTEM) FOR MULTI-OMICS WORKFLOW

Qty:1 **Approximate Cost: INR 5.5 Crore**

The mass spectrometry (MS) facility with complete functional hardware and software with subsequent updates ideally suited for both multifunctional qualitative (non-targeted) & quantitative (targeted) analyses for proteins, metabolites and lipids. The proteomics application includes bottom-up approach, top down, PTM analysis, relative quantitation (iTRAQ based), label free quantification using data independent workflow. The system should be capable of characterizing analyzing metabolite known as well as completely unknown in nature, quantify biomarkers using label and label-free techniques and small molecules. System should be equipped with all the necessary upstream device, downstream data analysis platforms for above mention applications. LC-MS/ MS system should be operated with single software with remote access capability.

A. SEPARATION DIVICE

1. Nano and micro-LC System

a. Pump:

1. Binary Pumps/Solvent Manager
2. Vacuum degassing capability Two/more-channel
3. Operating flow rate range 200 nL/min to 100 µL/min without flow splitting
4. Effective System Delay Volume < µL Default configuration
5. Maximum Operating Pressure 15,000 or better
6. Pump compositional precision <0.25 min SD based on six repeat injections
7. pH range pH 2 to 10

b. Auto sampler:

1. Number of sample plates Any two of the following:
   - 96 and 384 microtiter plates
   - 48 position 2.00-mL vial plates
   - 48 position 0.65-mL micro-centrifuge tube plates
   - 24 position 1.50-mL micro-centrifuge tube plates
2. Injection Volume 0.1 µL to 100.0 µL, in 0.1 µL increments.
3. Sample manager precision <1% area RSD 0.2 to 1.9 µL injection
4. The temperature of sampler compartment should be maintained from 4°C to 40 °C or better settable 0.1 °C increment
5. Temperature accuracy and stability of the sampler compartment should be ± 0.5°C and ± 1 °C, respectively

c. Column Compartment

1. Temperature of column compartment should be ambient + 5.0 °C to 90 °C with, 0.1 °C increment
2. The accuracy of Column compartment should be ±0.5 °C at sensor
3. System should accommodate at least one column of 75 µm to 4.6 mm internal diameter (ID); up to 250 mm or more in length

d. TRAP Valve Manager (TVM)

1. Two 2-position, 6-port switching valve or one 2-position, 10-port switching valve

2. UHPLC system

a. Pump:

1. The system should be equipped with Quaternary/Binary Pumps.
2. The system should have vacuum degassing capability two/more-channel
3. The system should have operating flow rate range 0.01 to 2.00 mL/min,
4. The system should have maximum operating pressure 15000 psi or better.
5. The system should have flow precision 0.1% RSD or ±0. 0.05 min SD or better
6. The system should have gradient concentration accuracy ±0.35 % or better.

b. Auto sampler:

1. Autosampler should have capacity to accommodate 1.5ml/2ml vial of 96 or more and the microplates with of capacity of 96 and 384 well.
2. Injection volume 0.1 µL to 50 µL or better
3. Injection volume precision <1% area RSD with> 5µL injection or better
4. Sample compartment 4.0 to 40.0 °C or better.

c. Column Compartment

1. Temperature of column compartment should be 5°C to 85°C with or better
2. Temperature stability of the sampler compartment should be± 0.1 °C,
3. System should accommodate at least one column of 4.6 mm internal diameter (ID); up to 300 mm in length or 2 columns of 150 mm length each

B. MASS SPECTROMETER (HRMS)

1. Quadrupole-time-of-flight-mass spectrometer with Linear Ion Trap (for discovery and quantitative analysis)
2. System should include source for Electro Spray Ionization (ESI), including nano ESI and atmospheric pressure chemical ionization (APCI). ESI and APCI sources should be capable of handling 5 µL/min to 3 mL/min or better and 200 µL /min to 3 mL/min or better, respectively. Separate dedicated ion source should be included for handling wide range of flow rates from 100nL to 200 µL/min range. Source should have 2 spray probes for micro & nano flow rate probe along with column heater support or better. Desolvation temperature should be equal to or greater than 700 °C or better
3. Quadrupole and TOF mass range should be m/z 5 to 2200 or better and m/z upto 40000 or better, respectively
4. Mass resolution should be 40000 or better at m/z 956
5. The system should have MS/MS scan rates 130 Hz or better
6. Mass accuracy should be $\leq$ 2 ppm or better using external calibration and < 1.0 ppm or better with internal calibration
7. Sensitivity of the system using 1 pg reserpine injection on column with S/N ratio should be $\geq$ 2500:1 or better in MS scan mode and sensitivity in MS/MS mode should be S/N $\geq$400:1 or better using 50 fg reserpine on column injection
8. The dynamic range of the system should be $\geq$ 5 order of linear dynamic range or better
9. The system should operate both MS 1 and MS 2 modes
10. System should perform MS/MS scan, full scan TOF MS/MS, data independent analysis with variable window acquisition, high resolution MRM, DIA and DDA scan mode with reagent-free electron-based alternative fragmentation
11. The system should be equipped with collision induced disassociation (CID) and electron based alternative fragmentation technique without need of reagent. Both fragmentations should be user tunable for allowing free electron energies for both small and large molecule-based applications
12. The MS system should have capacity to separate, identify and characterize iso-baric biomolecules using MS device which are identical in mass. Future upgrade for the same using gas phase separation device should be provided free of cost during warranty period

C. SOFTWARES

1. Original and universal perpetual licensed software and all interfacing hardware and software for instrument control, data acquisition and data processing must be supplied compatible to the LC-MS/MS
2. Independent software for Metabolomics, Lipidomics, Proteomics, Glycomics/Glycan applications like - label free quantitation, top-down sequencing, PTM analysis that can perform both qualitative and quantitative analyses with statistical tests should be provided. Software should be able to perform DIA & DDA workflow
3. Software should be able to perform the statistical analysis like PGA plot, PCVG etc
4. Software should have visual tools to help us to understand trends within dataset and allow us to exclude outliers in data, for example xenobiotic metabolites or contaminants, before further analysis
5. Software with formula finder, automatic online database search, and fragmentation prediction tool to identify unknowns should be provided
6. Protein identification & data base searching capability software for Proteomics application and library for metabolomics along with XCMS software shall be quoted
7. Software update including newer version should be provided free of cost during the warranty period

D. DATA ACQUISITION WORKSTATION

Intel Xeon W-2245 8 Core Processor (3.9GHz 4.7GHz Turbo HT 16.5MB, I 55W DDR42933), 32GB RAM memory (2X16GB DDR4 3200MHZ RDIMM ECC), 2x2 TB Solid State Hard Drive in RAID 1 configuration, Hardened installation of Windows 10 IoT Enterprise 2019 LTSC 64-bit, Optical mouse and multimedia keyboard or higher configuration. Any upgradation of data acquisition computer should be provided free of cost during warranty period

E. DATA ANALYSIS WORKSTATIONS

Two independent high configuration off-line workstations should be quoted for off-line data processing dedicated for Metabolomics, Proteomics and Targeted Analysis Platform with the following specifications

Intel Xeon Platinum 8268 2.9GHz Twenty-Four Core Processor, 24C/48T, 10.4GT/s, 37.5M Cache, Turbo, HT (205W) DDR4-2933, RAM: Memory 512GB upgradable to 1536; Hard Drive: 2TB or higher Solid-State drive; Storage capacity: 16 TB or higher SATA storage drive; Graphics Card: NVIDIA Quadro RTX 5000 16GB; Monitor: 27 inches; Latest available compatible OS; Microsoft Office: compatible version with the operating system

F. ACCESSORIES

1. LC-MS/MS start-up kit should be included
2. All required traceable standards for Mass calibration and tuning, HPLC calibration reagents should be provided
3. Standard Tool kit should be provided for Instrument maintenance
4. Columns for C18- microflow application (Five packs)-0.30 ID 3 µm 120Å, 15 cm and nano-flow application (Five packs)-0.075 ID 3 µm 120Å, 15 cm. Trap columns for microflow (Five packs) and Trap column for nano-flow (5 pkt) should be quoted

5. C18 Reverse phase column (Qty2) 2.1 ID *150 mm sub 3 micron, 2, HILIC column (Qty 2) 2.1 ID *150 mm sub 3 micron for UPLC applications
6. Tool kit for UPLC and nano-Micro LC should be provided

7. Tubing's, fittings for both nano-microLC and UHPLC should be provided
8. System should include Nitrogen generator with latest gas panels with noise free compressor
9. Any other gas cylinder for performing the required applications must be included in the offer along with the gas regulators, gas purification panels, tubing's, connectors and moisture traps etc. Required gases should be covered for whole warranty period without any additional cost
10. The system should have online UPS (minimum 20 KVA) of suitable rating with voltage regulation, spike protection and minimum 30 minutes back up for the supplied equipment
11. The vendor must provide one suitable AC (two ton or more capacity) in maintaining the temperature of the room

G. WARRANTY, CMC AND GENERAL TERMS & CONDITIONS

1. The system should come with a 5 years (Five years) comprehensive warranty for the complete system (liquid chromatography systems, Mass spectrometer, third party items and workstations) with part number from original OEM. Additional 5 years post warranty Comprehensive Annual Maintenance Contract (CAMC) with year wise should be quoted as an optional item
2. Any upgradation compatible with all instruments (hardware and software) during the warranty period must be given free of charges
3. Instruments must be attended within 48 hr in case of any breakdown or problems. The uptime for the facility should be 95% per year or more. Vendor should assure the availability of the spares for next 10 years from the date of installation
4. One preventive and one routine maintenance for the complete platform should be performed every year during the warranty period
5. Vendor must have good service and application support in India to support the Institute as and when required
6. The quoted model should have at least one or more installations in India out of which at least one installation at government laboratory and should have fifty installations or more globally

The above-mentioned LC-MS/MS system with necessary accessories will be purchased on PAC basis.