

PREPARING YOUR LAB

HPLC-ICP-MS



NexSAR Speciation Analysis Ready HPLC System

Introduction

PerkinElmer's NexSAR™ HPLC-ICP-MS Speciation Solution is a powerful analytical solution for determining metal and metalloid species in environmental, food, and other samples. It is an integrated system that comprises a NexSAR Inert HPLC – engineered to provide low backgrounds and therefore excellent detection limits, critical for HPLC-ICP-MS speciation applications – coupled to a NexION® ICP-MS.

This Preparing Your Laboratory document is focused on the NexSAR speciation analysis ready HPLC system (separate documents are available for the NexION ICP-MS instruments).

To ensure the proper installation and optimum performance of your NexSAR HPLC system, it is essential that the user follow the laboratory requirements outlined in this document.

PREPARATION CONSIDERATIONS

- General Laboratory Requirements
- Space Requirements
- System Layout
- Facilities Requirements
- Electrical Requirements
- Drain Vessels
- Exhaust
- Solutions Required for Installation
- Software Requirements

JCANO INGENIERIA DE MÉXICO:

Priv. Brunel Mz. 1 Lt. 5 Cs 4-B Fracc. Quinta Versailles C.P. 55767 Tecámac, Edo. De México

Correo: mcano@jcanoingenieria.com

Página Web: <https://jcanoingenieria.com>

Tel: 55 3996 2586

Facebook: <https://www.facebook.com/JCanoIngenieria>

WhatsApp: 55 7129 9832

JCANO
INGENIERÍA DE MÉXICO
Equipo de Laboratorio. Mantenimiento. Capacitación y CRM personalizado


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General Laboratory Requirements

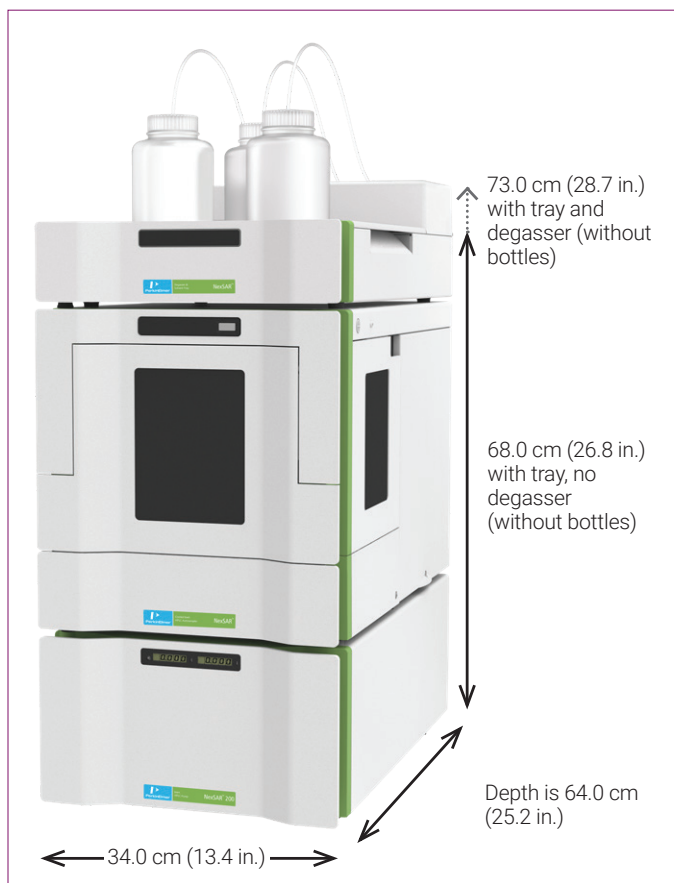


Figure 1. Dimensions of NexSAR HPLC system, excluding optional accessories.

Operating Conditions

The laboratory environment where the instrument is going to be installed should meet the following conditions:

- The room temperature should be between 15 °C and 30 °C (59 °F and 86 °F) with a maximum rate of change of 3 °C (5 °F) per hour, and the optimum being at 20 ± 2 °C (68 ± 4 °F)
- The relative humidity should be between 20% and 80% and non-condensing, with the optimum conditions being between 35% and 50%
- The instrument is certified for operation at elevations up to 2000 meters (6562 ft.) above sea level

In addition, the instrument should be located in an area that is:

- Indoors and out of direct sunlight
- Away from heat radiators and HVAC supply registers by at least three meters
- Free of smoke, dust and corrosive fumes
- Apart from, and not sharing a bench with, potential sources of vibration, such as mechanical rotors and shakers

As mentioned, the instrument should be in an environment which is free of smoke and dust in order to minimize contamination problems. This is because environmental contamination becomes a limiting factor in trace metal analysis. To quantitate metals and metalloids which are naturally present in high concentrations in the environment, such as Fe, Ca, K, Na, etc., at concentrations below 1 ppb ($\mu\text{g/L}$), a Class 1000 Cleanroom environment is necessary for sample preparation and analysis. Please note that this is not an indication of the performance limitations of the instrument, but rather a recommendation to achieve ultra-low baselines.

NOTE: PerkinElmer instruments are intended for indoor use only.

Long-Term Storage Conditions

- Room temperature: -20 °C to +60 °C (-4 °F to +140 °F)
- Relative humidity: 20% to 80%, without condensation
- Altitude: in the range 0 m to 12,000 m (sea level to 39,370 ft.)

NOTE: When the instrument is removed from storage, and prior to operating, it should be allowed to sit for at least a day under the required environmental conditions.

Laboratory Hygiene

- Keep the work area clean to avoid contaminating your samples and to maintain a safe working environment.
- Ensure that the area around, under, and behind the instrument is clear of any dirt and dust to prevent their entry into the instruments' interior, which could adversely affect performance.
- Do not allow waste to accumulate in the work area. Dispose of wastes correctly, and in accordance with laboratory protocol and the prevailing local, state or national laws.
- Clean up spilled chemicals immediately and dispose of them in accordance with laboratory protocol and the prevailing local, state or national laws.
- Do not allow smoking in the work area. Smoking is a significant source of contamination, can be a potential route for ingesting harmful chemicals if brought into contact with chemicals, and can also pose as a fire hazard for organic solvents.
- Do not store, handle, or consume food in the work area.

Working with Chemicals

Some chemicals used with the instrument may be hazardous or may become hazardous after the completion of an analysis. Consequently, the following recommendations are made for working with chemicals:

- Wear appropriate eye protection at all times while handling chemicals. Depending on the types of chemicals you are handling, wear safety glasses with side shields, or goggles, or a full-face shield.

- Wear suitable protective clothing (laboratory coat, long pants, closed shoes) and gloves at all times. All protective clothing and materials should be resistant to the chemicals you are handling.
- Clean up spills immediately using the appropriate equipment and supplies, such as spill-cleanup kits.
- Use, store, and dispose of chemicals in accordance with the supplier's recommendations and the applicable local, state or national regulations.
- Do NOT put open containers of solvent near the instrument. Store solvents in an approved cabinet (with suitable ventilation) away from the instrument.
- When preparing chemical solutions, always work in a fume hood that is suitable for the chemicals you are using.
- Perform sample preparation away from the instrument to minimize corrosion and contamination.

Space Requirements

The NexSAR HPLC system should be located on the right-hand side of the NexION ICP-MS – see Figure 2 (page 4). It is recommended that a minimum buffer zone of 30 cm (12 in.) be left all around the HPLC instrument for the routine maintenance of the system components.

System Layout

The NexSAR HPLC system offers a variety of configurations depending upon your individual needs. Systems may be composed of the following parts:

- NexSAR 200 Inert HPLC Pump (dual-piston, binary)
- NexSAR Inert/Cooled Inert HPLC Autosampler
- NexSAR Solvent Tray with/out Degasser
- NexSAR Switching Valve
- NexSAR Column Oven
- Computers, printers and computer monitors

The physical dimensions and weights of these items (with the exception of the computers, printers and computer monitors) are given in Table 1.

There should be sufficient space near the NexION ICP-MS for the NexSAR HPLC system. The components can be placed on a NexION bench (Part No. N8141230) or a movable cart or table (Part No. N0777900) to allow for easy service access. The recommended system layout is shown in Figure 2.

Facilities Requirements

Table 1 provides the weights and physical dimensions for the NexSAR HPLC components.

Electrical Requirements

Table 2 shows the electrical supply requirements and the approximate power consumption of the NexSAR HPLC components. It is strongly recommended that the system be allocated a dedicated circuit breaker in order to avoid power overload on the circuit. It is also highly advisable to use a power conditioner with the system, as fluctuations in power supply may adversely affect instrument-computer communication. Users can purchase either a 1.44 kVA Power Conditioner 60 Hz, (Part No. N9307502) or 2.0 kVA Power Conditioner 50 Hz (Part No. N9306752) to support their system. The full NexSAR HPLC system will require a seven-port power bar for system setup.

NOTE: It will be the responsibility of the user to provide this power bar.

Drain Vessels

The NexSAR speciation solution may require its own drain vessel for the mobile phase waste. This will be determined by the chemical compatibility of the mobile phase liquid with the acid waste from the NexION ICP-MS. Consult the chemical safety information to determine whether or not the segregation of waste is required. It is safest to have a separate drain vessel for the HPLC liquids (Part Nos. 09200486 and N0690271 can be purchased to support waste segregation.).

Table 1. Dimensions of the NexSAR HPLC system components.

Component	Width cm (in.)	Height cm (in.)	Depth cm (in.)	Weight kg (lb.)
NexSAR 200 Inert Pump	34.0 (13.4)	20.0 (7.9)	58.0 (22.8)	27.0 (59.5)
NexSAR Inert Autosampler	34.0 (13.4)	36.5 (14.4)	58.0 (22.8)	22.0 (48.5)
NexSAR Cooled Inert Autosampler	34.0 (13.4)	36.5 (14.4)	64.0 (25.2)	25.5 (56.2)
NexSAR Column Oven	17.0 (6.7)	60.0 (23.6)	34.5 (13.6)	16.0 (35.3)
NexSAR Solvent Tray With Degasser	34.0 (13.4)	16.5 (6.5)	64.0 (25.2)	7.1 (15.7)
NexSAR Solvent Tray Without Degasser	34.0 (13.4)	11.5 (4.5)	23.0 (9.0)	4.9 (10.8)
NexSAR Switching Valve	6.4 (2.5)	7.6 (3.0)	17.3 (6.8)	1.0 (2.3)
Star Tech 7-Port USB Hub	20.9 (8.2)	3.5 (1.4)	10.5 (4.1)	0.14 (0.3)

Table 2. Electrical Requirements for the NexSAR HPLC system components.

Component	Voltage (AC)	Power	Outlets
NexSAR 200 Inert Pump	100-240 V (±10%), 50/60 Hz	120 W	1
NexSAR Inert Autosampler	95-240 V, 50/60 Hz	200 W	1
NexSAR Cooled Inert Autosampler	95-240 V, 50/60 Hz	200 W	1
NexSAR Column Oven	100-240 V (±10%), 50/60 Hz	454 W	1
NexSAR Solvent Tray and Degasser	100-240 V, 50/60 Hz	15 W	1
NexSAR Switching Valve*	100-240 V, 50/60 Hz	48 W	1
Star Tech 7-Port USB Hub	100-240 V, 50/60 Hz	36 W	1

*An extra switching valve may be purchased for specific applications. An extra outlet will be required in this scenario.



Figure 2. Recommended layout of NexSAR HPLC-ICP-MS Speciation Solution.

Exhaust

Most speciation analyses use buffers or methanol in the mobile phase. However, if a very volatile mobile phase will be used for speciation, the exhaust from the solvent degasser must be connected to the building's exhaust. The extraction rate at the back of the degasser should be greater than the liquid flow rate.

Solutions Required for Installation

The NexSAR 200 Inert HPLC Pump will be supplied with a post-seal wash bottle (0.5 liter Part No. N8152898) and two mobile phase bottles (Part No. N8152899).

The recommended solution for post-seal wash is 20% isopropanol (IPA, 80% deionized water, 18 MΩ.cm⁻¹), where the solution should be changed weekly and is regarded as a laboratory consumable.

NOTE: IPA (HPLC grade) should be supplied by the user at the time of installation.

A solution of 5% methanol (MeOH, 95% deionized water) may also be used in the event that IPA is not available and is also regarded as a laboratory consumable.

Software Requirements

Clarity™ analytical and data processing software is an integral component of the NexSAR HPLC-ICP-MS Speciation Solution. It can control the NexION ICP-MS and all of the NexSAR HPLC components. In order to couple the NexSAR HPLC system to the NexION ICP-MS range of instruments, Syngistix™ for ICP-MS software (NexION 1000/2000: version 2.5 or higher; NexION 5000: version 3.1 or higher) and Clarity™ software (NexION 1000/2000: version 8.1 or higher [version 8.4 or higher preferred]; NexION 5000: version 8.5 or higher) are needed.

NOTE: Installation of both of the aforementioned softwares requires that the user profile being used for the installation has administrative privileges on the host computer.

For information on preparing your laboratory for the NexION ICP-MS, refer to the NexION 1000/2000 or 5000 Preparing Your Laboratory documents.

PerkinElmer, Inc.
940 Winter Street
Waltham, MA 02451 USA
P: (800) 762-4000 or
(+1) 203-925-4602
www.perkinelmer.com

JCANO INGENIERIA DE MÉXICO:
Priv. Brunel Mz. 1 Lt. 5 Cs 4-B Fracc. Quinta Versalles C.P. 55767 Tecámac, Edo. De México
Correo: mcano@jcanoingenieria.com
Página Web: <https://jcanoingenieria.com>
Tel: 55 3996 2586

Facebook: <https://www.facebook.com/JCanoIngenieria>
WhatsApp: 55 7129 9832



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