PREPARING YOUR LAB

NexION 300 ICP-MS

ICP-Mass Spectrometry

Preparation Checklist

- Environmental conditions
- Electrical requirements
- Space requirements
- Exhaust ventilation
- Coolant requirements
- Argon gas requirements
- Cell gas requirements

Introduction

PerkinElmer® ICP-MS instruments are complete systems with the exception of the following items which must be provided by the customer: electrical power, exhaust vents, argon gas supplies with approved regulator, cell gas supply, and coolant system.

Required Environmental Conditions

The laboratory environment in which the NexION® 300 ICP-MS instrument is installed should meet the following conditions:

- The room temperature should be between 15 and 30 °C (59-86 °F) with a maximum rate of change of 3 °C (5 °F) per hour.
- The relative humidity should be between 20 and 80%, non-condensing. For optimum performance, the room temperature should be controlled at 20 ±2 °C (68 ±3.6 °F), and the relative humidity should be 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
- Free of smoke, dust and corrosive fumes
- Not prone to excessive vibration
- Out of direct sunlight
- Away from heat radiators

In order to minimize contamination problems, a dust-free environment is necessary. For ultra-trace techniques, environmental contamination becomes a limiting factor in the analysis. To quantitate ubiquitous elements such as Fe, Ca, K, Na, etc. below 1 ppb (µg/L), a class 1000 environment is necessary for sample preparation and analysis. This is not an indication of the performance limitations of the instrument, but a recommendation for an ultra-clean environment.

The NexION 300 ICP-MS can be installed into a mobile laboratory if vibration is isolated.

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For the Better

Storage Conditions

- Ambient 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 you remove the instrument from storage and before you put it into operation, allow it to stand for at least a day under the required environmental conditions.

WARNING

EXPLOSIVE ATMOSPHERE. *This instrument is not designed for operation in an explosive atmosphere.*

General Laboratory Requirements

Laboratory Hygiene

- Keep the work area scrupulously clean to avoid contaminating your samples and to maintain a safe working environment. Clean up spilled chemicals immediately and dispose of them properly.
- Do not allow waste to accumulate in the work area. Dispose of waste correctly.
- Do not allow smoking in the work area. Smoking is a source of significant contamination and also a potential route for ingesting harmful chemicals.
- Do not store, handle, or consume food in the work area.
- Ensure that the area around, under and behind the instrument is clear of any dirt and dust to prevent their entry into the instrument's interior, which could cause a negative effect on performance.

Working with Chemicals

Some chemicals used with the instrument may be hazardous or may become hazardous after completion of an analysis.

- Use, store, and dispose of chemicals in accordance with the manufacturer's recommendations and the applicable national, state, and/or local regulations.
- Do NOT put open containers of solvent near the instrument.
- Store solvents in an approved cabinet (with the appropriate ventilation) away from the instrument.
- 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, including gloves if necessary, resistant to the chemicals you are handling.
- 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.
- Clean up spills immediately using the appropriate equipment and supplies, such as spill-cleanup kits.

Location and Space Requirements

Space Requirements

The system should be located near the required electrical and gas supplies as well as the coolant supply. The roughing pump can be located up to a distance of 2 meters (6.5 ft.) from the instrument – up to 3 meters (10 ft.) using optional kit. There can be no more than 2 to 3 bends or couplings in the vacuum hose over its entire length. The diameter of the hose must remain at least 25 mm (1 in.) ID.

The NexION 300 ICP-MS is designed to operate on a bench 66-91 cm high (26-36 in. high). PerkinElmer offers a bench designed for the NexION 300 ICP-MS (Part No. N8141230). This bench is 76 cm wide x 152 cm (198 cm with shelf extended) long x 74 cm high (30 in. wide x 60 in. long [78 in. with shelf extended] x 29 in. high). This bench has storage bins and an acoustic barrier to muffle the sound of the roughing pump.

Allow space on the right and left sides of the instrument for the workstation or any accessories. The main air intake is on the left-hand side of the instrument and a minimum of 45 cm (18 in.) clearance is required. In operation, NexION can be operated with the back up against a wall. Access for most service procedures is through the front of the instrument. However, some infrequent service procedures may require a space of at least 30 cm (12 in.) behind the instrument.

Figure 1. Dimensions of NexION 300 ICP-MS spectrometer.

Table 1. Dimensions of the Instrument and Computer.				
Instrument	**Width cm (in.)**	**Height cm (in.)**	**Depth cm (in.)**	**Weight kg (lb.)**
NexION ICP-MS	122.5* (49)*	76 (30.5)	75 (30)	181 (400)
Computer	Dimensions will vary by model			
Monitor	Dimensions will vary by model			
Printer	Dimensions will vary by model			

**Width including the shipping handles is 141 cm (56.5 in.)*

System Layout

The ICP-MS system consists of the main instrument, roughing pump, the computer controller assembly, and a printer. The dimensions of the instrument are given in Figure 1. Table 1 lists the dimensions of the instrument and the computer. Table 2 lists the dimensions of the peripherals and accessories.

The NexION 300 ICP-MS can be positioned in either a linear or an L-shaped configuration. In the L-shaped configuration, the computer and printer are positioned on one leg of the L. The instrument and an accessory table make up the other leg. A recommended workstation layout is shown in Figure 2.

There should be sufficient space near the spectrometer for the various accessories (autosampler, laser etc.). It is recommended that the accessories be placed on a movable cart or table to allow for easy service access.

The system computer may be placed on the instrument bench or a separate computer table.

Table 2. Dimensions of the Peripherals and Accessories.				
Peripherals	**Width cm (in.)**	**Height cm (in.)**	**Depth cm (in.)**	**Weight kg (lb.)**
Vacuum Roughing Pump	50 (20)	30 (12)	30 (12)	45 (100)
Cooling System				
Heat Exchanger (PolyScience® 3370)	56 (22)	57 (22.5)	38 (15)	37.6 (83)
Refrigerated Chiller (PolyScience® 6106PE)	36.5 (14)	61 (24)	67.3 (26.5)	86 (189)
Accessory				
S10 Autosampler	44 (17)	37 (15)	34 (14)	4 (9)

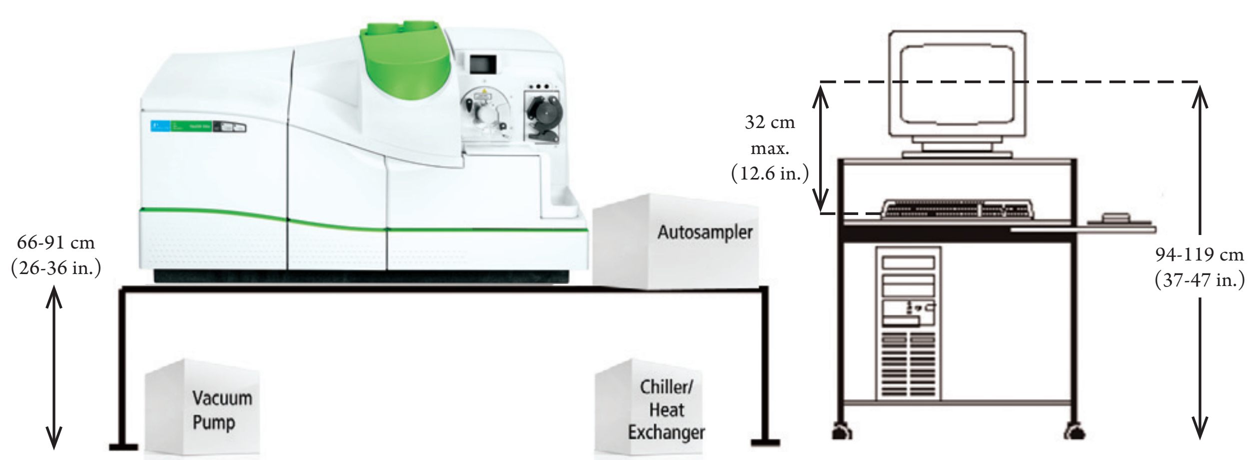


Figure 2. Recommended workstation layout.

Drain Vessels

A drain vessel is supplied with the NexION 300 ICP-MS. The vessel is made of HDPE (high density polyethylene) and is used to collect the effluent from the ICP sample-introduction system. The NexION 300 ICP-MS also has a torch box drain with a drain line and a small waste bottle. Any waste accumulated in either of these bottles should be disposed of in compliance with your local environmental regulations.

The drain vessel should be placed to the right of the instrument. The drain vessel should NOT be stored in an enclosed storage area. The drain system should be checked regularly and replaced when necessary. Should it become necessary to replace the drain vessel, it should be made from a material not likely to be attacked by samples being analyzed. Glass or other brittle materials must NOT be used.

Liquid waste should always be segregated and clearly labeled. Never mix organic and inorganic liquids in the same drain vessel. Organic and inorganic drain vessels should never be stored in the same area.

Connections

Illustrated below are the connection locations and lengths.

Safe Handling of Gas Cylinders

NOTE: The permanent installation of gas supplies is the responsibility of the user and should conform to local safety and building codes.

- Fasten all gas cylinders securely to an immovable bulkhead or a permanent wall.
- When gas cylinders are stored in confined areas, such as a room, ventilation should be adequate to prevent toxic or explosive accumulations. Move or store gas cylinders only in a vertical position with the valve cap in place.
- Locate gas cylinders away from heat or ignition sources, including heat lamps. Cylinders have a pressure-relief device that will release the contents of the cylinder if the temperature exceeds 52 °C (125 °F).
- When storing cylinders external to a building, the cylinders should be stored so that they are protected against temperature extremes (including the direct rays of the sun) and should be stored above ground on a suitable floor.
- Mark gas cylinders clearly to identify the contents and status (full, empty, etc.).
- Do NOT attempt to refill gas cylinders yourself.

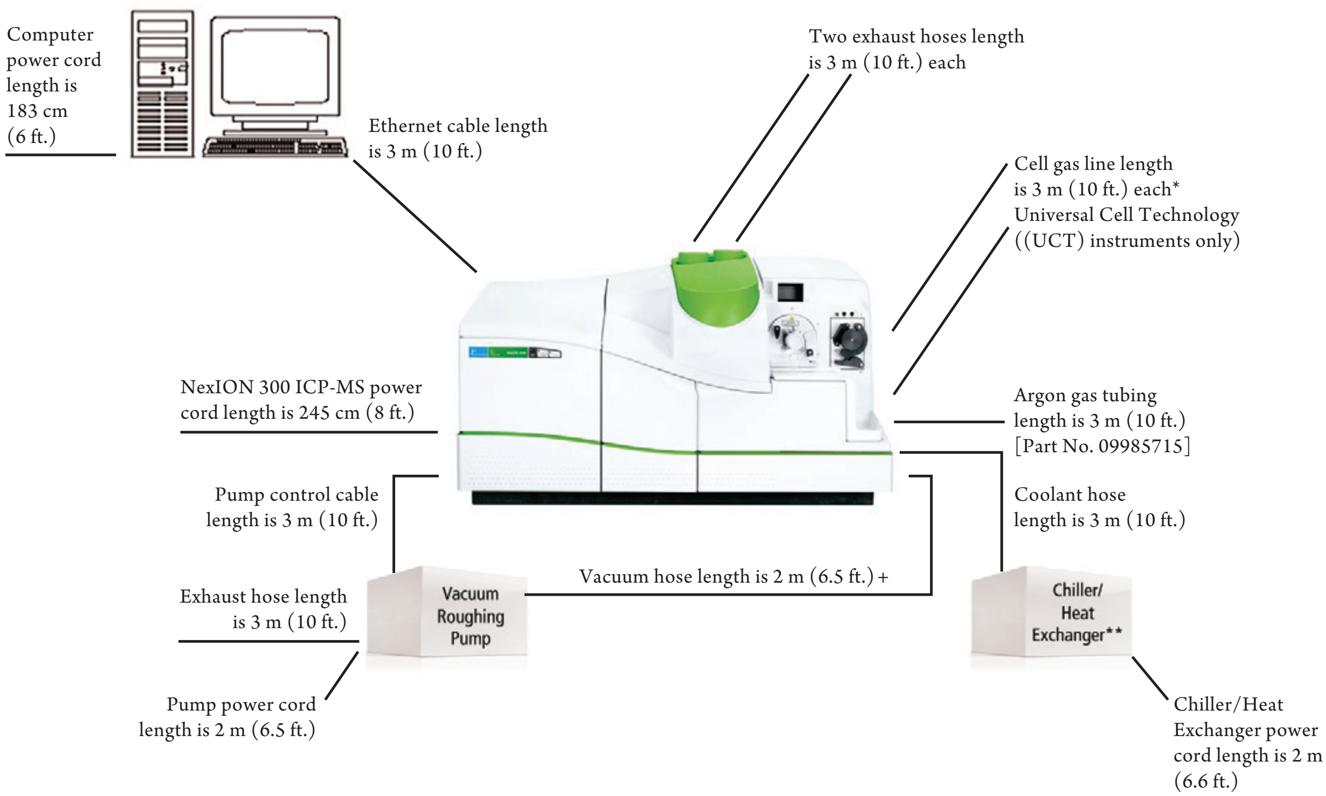


Figure 3. Location and length of connections.

* Cell gas tubing is 3 meters long (10 ft.) stainless steel. Two or three pieces supplied depending upon instrument model. Additional cell gas tubing 3 m (10 ft.) can be ordered using (Part No. N8141269).

** If using the optional remote control kit (Part No. N8140505), the AC power cord (with adapter cable) and the remote control cable are each 213 cm (7 ft.) long.

\+ Optional 3 m vacuum hose (Part No. WE024084) is available if needed.

- Use only approved regulators and hose connectors. Left-hand thread fittings are used for fuel gas tank connections whereas right-hand fittings are used for oxidant and support gas connections.
- Arrange gas hoses where they will not be damaged or stepped on and where things will not be dropped on them.
- Perform periodic gas leak tests by applying a soap solution to all joints and seals.
- It is strongly recommended that Universal Cell Technology™ (UCT) gases be installed in a gas cabinet with adequate ventilation.

Facilities Requirements

Table 3 provides information on the gas and liquid services required for the NexION 300 ICP-MS. Tables 4 and 5 show the electrical supply requirements and approximate power consumption of the NexION 300 ICP-MS and its major accessories.

Table 3. Gas and Liquid Services Required for the NexION 300 ICP-MS.

Gases	Operating pressure	Flow at operating pressure
Argon Purity see page 8	586 - 690 kPa (85 – 100 psig) min-max	14-20 L/min (typical)
Ammonia ≥ 99.999% pure (for UCT instruments only)	48 ±14 kPa (7 ±2 psig) operating	0.6 mL/min (typical)
Helium ≥ 99.9999% pure (for UCT instruments only)	290 ±14 kPa (42 ±2 psig) operating	5 mL/min (typical)
Cooling Liquid	344 ±14 kPa (60 ±2 psig)	3.8 L/min (1.0 gpm) minimum 4.7 L/min (1.25 gpm) typical

Electrical Requirements

Power to the NexION 300 ICP-MS is to be delivered from one 30A/32A single-phase 200-240V dedicated electrical branch circuit, according to the power specifications in Table 4. Table 5 provides the electrical supply requirements and approximate power consumption of the peripherals. If the power line is unstable, fluctuates or is subject to surges, additional control of the incoming power may be required.

The vacuum roughing pump is provided with a mains supply plug suitable for the country of installation (shown in Figure 4) and must be connected to a separate branch circuit/wall outlet. It requires one 15A single-phase 200-240V outlet – see Table 5. See Figure 3 (Page 4) for the location and lengths of hoses, lines, cords and cables.

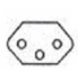
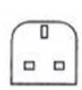
	North America Japan NEMA 6-15P N8145006		Europe CEE 7 “Schuko” N8145007
	Switzerland N8145009		United Kingdom BS 1363 N8145008
	Rest of World No plug N8145010		

Figure 4. Vacuum roughing pump mains supply plugs.

WARNING

MAGNETIC SUSCEPTIBILITY. *Do NOT place NexION 300 ICP-MS close to any other instrumentation or equipment that emits high magnetic fields. External magnetic field strength must not exceed 10 Gauss at NexION 300 ICP-MS.*

Table 4. NexION 300 ICP-MS Power Specifications.

Power Consumption:	
Maximum Volt Amperes (total)	3720VA
Maximum Continuous Current	22A
Voltage Amplitude Specification:	
Operating Voltage	200 - 240
Allowable Voltage Variance	±10%
Maximum Allowable Percent Sag	5%
Maximum Allowable Percent Swell	5%
Phase	Single phase only
Frequency Specification:	
Operating Frequency	50/60 Hz
Allowable Frequency Variance	±1 Hz
Waveform Specification:	
Maximum Supply Voltage Total Distortion	5%
Maximum Supply Voltage Distortion by Single Harmonic	3%

Table 5. Electrical Requirements for NexION 300 ICP-MS Peripherals.

Equipment	Voltage(AC)	Power
Computer	100-127V/200-240V, 50/60Hz	800W typical
Printer	100-127V/220-240V, 50/60Hz	800W typical
Roughing Pump	200-240V, 50/60Hz 12A	1500W
Cooling System:		
Heat Exchanger (PolyScience® 3370)	208-240V, 50/60Hz 120V, 60Hz 5.5A	660W
or		
Refrigerated chiller (PolyScience® 6106PE)	208-230V, 60Hz 12.2A 240V, 50Hz 12.2A	2500W

Mains Connection

The instrument is shipped with one 2.4 m (8 ft.) mains cord terminated by an IEC 60309 connector rated 30A by UL (North America) and 32A by VDE (International) for 250V as shown in Figure 5.

Figure 5. IEC 60309 connector.

EXPLOSIVE ATMOSPHERE. *The use of ICP-MS instruments without adequate ventilation to outside air may constitute a health hazard. For example, the combustion of halogenated hydrocarbons produces toxic vapors. When ammonia is used as a Dynamic Reaction Cell gas, it can be present at very trace amounts in the exhaust during purging of the gas lines. Extreme care should be taken that exhaust gases are vented properly.*

Exhaust and Ventilation Requirements

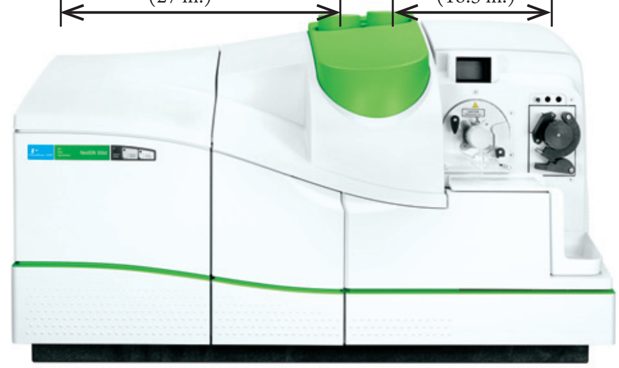


Figure 6. Location of exhaust ports.

The NexION 300 ICP-MS has two separate exhaust ports.

Both of the NexION 300 ICP-MS exhaust ports are located on the top of the instrument (see Figure 6). The torch box exhaust port is located 46.5 cm (18.5 in.) from the right side of the instrument. The RF generator exhaust port is located 67.5 cm (27 in.) from the left side of the instrument.

The torch box exhaust port exhausts the following:

- Plasma heat and fumes
- Vacuum pump exhaust – including cell gases on Universal Cell Technology™ (UCT) instruments
- Cell gas assembly manual vent/purge switch

The torch box exhaust venting system is required to remove combustion fumes and vapors from the torch housing, and to remove reaction cell gas. Exhaust venting is important for four reasons:

- It protects laboratory personnel from toxic vapors that may be produced by some samples.
- It minimizes the effects of room drafts and the laboratory atmosphere on ICP torch stability.
- It helps protect the instrument from corrosive vapors which may originate from the samples.
- It removes dissipated heat which is produced by the ICP torch.

The torch exhaust port always has 0.5 inches of water (125 Pa) static pressure. The RF generator exhaust port has 0.5 inches of water (125 Pa) static pressure when the plasma is off – during operation, the static pressure drops to zero. Both of the exhaust ports should be connected directly to flexible exhaust hoses. Use the vent adapter to attach the roughing pump exhaust hose to the torch box exhaust port.

The torch box exhaust must be installed, but the RF generator exhaust is optional (see note in Table 7*).

The RF generator exhaust vent is used for the blower that cools the system power supplies and ICP generator.

We recommend using two 100-mm (4 in.) exhaust hoses (for both the torch box exhaust vent and RF generator exhaust vent). The NexION 300 ICP-MS is supplied with 6 m (22 ft.) of 100-mm (4 in.) flexible tubing. This tubing permits the movement of the instrument without disconnecting the vents from the laboratory system. See Tables 6 and 7 for vent specifications.

In operation, the roughing pump produces 1200-1500W (4100-5100 BTU/hr) of heat. The heat from the roughing pump is released into the laboratory. Proper ventilation is required to remove this heat from the room or any enclosure in which the pump is situated. There must be a minimum of 15 cm (6 in.) clearance between the rear of the pump and any vertical surface as well as a minimum of 35 cm (14 in.) clearance in the front. It should be located away from other heat generating sources such as the liquid cooling system. The ambient air temperature must NOT exceed 40 °C at the roughing pump control electronics.

The heat from the liquid cooling system (heat exchanger or refrigerated chiller) is also released into the laboratory during operation. The heat exchanger will produce a maximum of 2000W (6825 BTU/hr) of heat. The refrigerated chiller will produce a maximum of 3000W (10,000 BTU/hr) of heat. Proper ventilation is required to remove this heat from the room or any enclosure in which the liquid cooling system is situated. Adequate clearance should be allowed on the front, sides, and rear of the unit for access to connections and components. The front and rear vents of the unit must be a minimum of 61 cm (2 ft.) away from walls or vertical surfaces so air flow is not restricted. It should be installed at least 1.4 meters (4 ft.) away from any heat-generating sources such as the roughing pump or other instruments. *Proper ventilation is critical for the heat exchanger – its ambient air temperature must never exceed 30 ˚C.*

Venting System Recommendations

The exhaust flow rate at the instrument (the ability to vent the system) is dependent on customer-provided blower, the duct length, material and the number of elbows or bends used. If an excessively long duct system or a system with many bends is used, a stronger blower may be necessary to provide sufficient exhaust volume at the instrument. Smooth stainless steel tubing should be used instead of flexible stainless steel tubing, where flexibility is not required, to reduce system friction loss or "drag." A length of smooth stainless steel ducting has 20-30% less friction loss than a comparable length of flexible ducting. When smooth stainless steel tubing is used, elbows must be used to turn corners. These elbows should turn at no more than 45 degrees between straight sections to reduce friction losses, and the number of elbows should be minimized.

Additional recommendations on the venting system include:

- The duct casing and venting system should be made of materials suitable for temperatures as high as 70 ˚C and be installed to meet local building code requirements.
- Locate the blower as close to the discharge outlet as possible. All joints on the discharge side should be airtight, especially if toxic vapors are being carried.
- Equip the outlet end of the system with a backdraft damper and take the necessary precautions to keep the exhaust outlet away from open windows or inlet vents and to extend it above the roof of the building for proper dispersal of the exhaust.
- Equip the exhaust end of the system with an exhaust stack to improve the overall efficiency of the system.

***Table 6.* Instrument Exhaust Ventilation Requirements.**

	Required airflow measured with hose connected to NexION	Required air velocity measured with hose connected to NexION	Reference airflow measured with hose disconnected from NexION	Reference air velocity measured with hose disconnected from NexION
Torch Box Exhaust Port	73 – 100 ft^3/min @ 0.5" H_2O (35 – 47 L/sec @ 125 Pa)	836 – 1145 ft/min @ 0.5" H_2O (4.3 – 5.8 m/sec @ 125 Pa)	110 – 150 cfm @ 0" H_2O (52 – 71 L/sec @ 0 Pa)	1260 – 1719 ft/min @ 0" H_2O (6.4 – 8.7 m/sec @ 0 Pa)
RF Generator Exhaust Port	150 – 160 ft^3/min @ 0" H_2O (71 – 76 L/sec @ 0 Pa)	1719 – 1833 ft/min @ 0" H_2O (8.7 – 9.3 m/sec @ 0 Pa)	150 – 160 ft^3/min @ 0" H_2O (71 – 76 L/sec @ 0 Pa)	1719 – 1833 ft/min @ 0" H_2O (8.7 – 9.3 m/sec @ 0 Pa)

Table 7. Hose Diameter and Venting Capabilities.*

Hose	Hose Diameter	Heat Vented Outside Lab Watts (BTU/hr)
Torch Box Exhaust	100 mm (4 in.)	800 (2720)
RF Generator Exhaust	100 mm (4 in.)	1500 (5100)

*If only the Torch Box exhaust hose is used, approximately 1500W (5100 BTU/hr) of heat from the RF generator exhaust is vented into the lab. An independent room air conditioner [3000W (10000 BTU/hr)] is recommended to remove this additional heat.

- For best efficiency, make sure the length of the duct that enters into the blower is a straight length at least ten times the duct diameter. An elbow entrance into the blower inlet causes a loss in efficiency.
- Provide make-up air in the same quantity as is exhausted by the system. An airtight lab causes an efficiency loss in the exhaust system.
- Ensure that the system is drawing properly by placing a piece of cardboard over the mouth of the vent.
- Equip the blower with an indicator light located near the instrument to indicate to the operator when the blower is on.

Cleaning the Instrument

Before using any cleaning or decontamination methods, except those specified by the manufacturer, users should check with the manufacturer that the proposed method will not damage the equipment.

Cleaning procedures can be found in the NexION 300 ICP-MS Maintenance Guide.

Coolant Requirements

The NexION 300 ICP-MS system requires a regulated source of filtered coolant. PerkinElmer coolant (Part No. WE016558) must be used on the NexION 300 ICP-MS instrument. The recirculator operating pressure should be 413 ±13 kPa (60 ±2 psi). A coolant flow of at least 3.8 L/min (1.0 gpm) is required.

A cooling fluid containing a corrosion inhibitor is specified to protect the aluminum components of the cooling system and the interface. Ten liters of pre-mixed coolant (Part No. WE016558) is supplied for the heat exchanger or refrigerated chiller. If the air temperature at the liquid cooling system is always below 30 ˚C (86 ˚F), the heat exchanger can be used in place of a refrigerated chiller. The heat exchanger must be located in a well-ventilated area where the air temperature will not exceed 30 ˚C (86 ˚F). See “Exhaust and Ventilation” section for details. For laboratories where the air temperature can exceed 30 ˚C (86 ˚F) at the cooling system, a heat exchanger cannot be used and a refrigerated chiller is required.

For 60 Hz installations, the M3370 heat exchangers come with either NEMA L6-15P (230V) or NEMA L5-15P (120V) connectors. The refrigerated chiller comes with a NEMA L6-15P connector.

For 50 Hz installations, the refrigerated chiller comes with a CEE 7 connector. The M3370 heat exchanger comes with a NEMA L6-15P connector.

Gas Requirements

Argon Gas Requirements

Argon is used as the ICP torch gas with the NexION 300 ICP-MS. The argon-purity criteria are listed below.

Purity	≥ 99.996%
Oxygen	< 5 ppm
Hydrogen	< 1 ppm
Nitrogen	< 20 ppm
Water	< 4 ppm

It is also important to note that the amount of krypton impurity in the argon gas will negatively affect the ability of the instrument to quantitate selenium. The best selenium detection limits are achieved when krypton < 0.1 ppb (0.0001 ppm).

Either liquid or gaseous argon can be used with an ICP-MS system. The choice of liquid argon or gaseous argon tanks is determined primarily by the availability of each and the usage rate. Liquid argon is usually less expensive per unit volume to purchase, but cannot be stored for extended periods. If liquid argon is used, the tank should be fitted with an over-pressure regulator which will vent the tank as necessary in order to prevent the tank from becoming a safety hazard.

Gaseous argon tanks do not require venting and consequently can be stored for extended periods without loss. A tank of liquid argon, which will produce 4300 ft^3 of argon gas, will last for approximately 100 hours of continuous ICP running time. A tank of gaseous argon will last 5 to 6 hours of ICP running time. The normal argon gas usage is 14-20 L/min.

A cylinder regulator (Part No. 03030284) which can be used with argon is available from PerkinElmer. The regulator can be used with CGA 580 or CGA 590 fittings and includes a color-coded hose with 1/4-inch Swagelok® fittings to permit direct connection to the regulator and to the instrument gas controls. Liquid argon may be purchased from your gas supplier.

PerkinElmer ICP-MS instruments include 3 meters (10 ft.) of the tubing necessary for connecting argon to the instrument (Part No. 09985715).

Cell Gas Requirements

For NexION 300 ICP-MS systems equipped with Universal Cell Technology (300X, 300D, 300S), the customer is required to supply the reaction and/or collision gas (also referred to as cell gas) for introduction into the universal cell. The type of gas used varies with the customer application, but the most common cell gases used with the NexION 300 ICP-MS are ultra pure helium and anhydrous ammonia.

Depending upon the NexION 300 ICP-MS model, PerkinElmer provides the pressure regulator(s), gas delivery tubing, and purifier for use with UHP helium and/or UHP anhydrous ammonia. The pressure regulators are capable of supplying the cell gases at the working pressures listed in Table 8.

The NexION 300 ICP-MS is shipped with the regulator-to-cylinder fittings shown in Table 8. The cell gas cylinders should use this type of fitting when ordered from your local gas supplier. The cleanliness of the cell gas lines is critical for analytical performance. There should be no additional fittings between the regulator, purifier, and the instrument. The NexION 300 ICP-MS requires specially cleaned stainless steel cell gas lines (included). Additional 3 m lengths of specially cleaned cell gas tubing are available from PerkinElmer (Part No. N8141269).

The cell gases used by the universal cell must meet the specifications as shown in Table 9. The purity of helium entering the instrument must be ≥ 99.9999% pure. This can be accomplished by using a gas cylinder with a built-in purifier, or by using ≥ 99.999% pure helium cylinder together with the special gas purifier provided with each instrument. A dedicated UHP helium cylinder is required; house helium supplies must not be used. The purity of any other cell gas, must be ≥ 99.999% pure.

The ammonia gas is consumed at a typical rate of 0.6 mL/min; therefore, only a very small cylinder (60 L, 2 ft^3) of gas is required. Cylinders should be secured upright in a ventilated enclosure such as a cabinet or fume hood. For additional types of cell gases not listed in Table 8, the customer must purchase a UHP double-stage regulator capable of supplying up to 7 mL/min at 48 kPa (7 psig). A suitable double-stage regulator with the correct cylinder fittings can be purchased from your local gas supplier

Table 8. Cell Gas Requirements for Instruments Equipped with Universal Cell Technology.

NexION 300 ICP-MS Model	Cell Gas Regulator Supplied	Regulator-to-Cylinder Connection	Cell Gases Used at Installation	Operating Flow Rate and Pressure
300Q	N/A	N/A	N/A	N/A
300X	UHP dual stage for He (N8145021)	CGA 580	UHP Helium ≥99.9999% pure	5 mL/min @ 275 kPa (40 psig)
300D	UHP dual stage for He (N8145021)	CGA 580	UHP Helium ≥99.9999% pure	5 mL/min @ 275 kPa (40 psig)
	UHP dual stage for NH_3 (N8122255)	CGA 660	UHP NH_3 ≥99.999% pure	0.6 mL/min @ 48 kPa (7 psig)
300S	UHP dual stage for He (N8145021)	CGA 580	UHP Helium ≥99.9999% pure	5 mL/min @ 275 kPa (40 psig)
	UHP dual stage for NH_3 (N8122255)	CGA 660	UHP NH_3 ≥99.999% pure	0.6 mL/min @ 48 kPa (7 psig)

Table 9. Cell Gas Purity Requirements.

Gas	Purity Grade	Impurity	Specification	Notes
Helium	≥ 99.9999%	O_2 H_2O THC N_2	< 0.01 ppm < 0.02 ppm < 0.1 ppm < 5 ppm	This grade of gas can be input directly into the NexION ICP-MS. External purifier not required.
Helium	≥ 99.999%	O_2 H_2O THC N_2	< 4 ppm < 5 ppm < 0.5 ppm < 8 ppm	This grade of gas requires the use of an external gas purifier (supplied).
Ammonia	≥ 99.999%	O_2 H_2O THC N_2	< 4 ppm < 2 ppm < 3 ppm < 6 ppm	This grade of gas can be input directly into the NexION ICP-MS.

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