



Agilent 7700 Series ICP-MS

Site Preparation Guide



Agilent Technologies

Notices

© Agilent Technologies, Inc. 2012

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number

G3280-90010

Edition

Rev. D, June 2012

Agilent Technologies, Inc.
9-1 Takakura-cho, Hachioji-shi,
Tokyo 192-8510 Japan

Warranty

The material contained in this document is provided “as is,” and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

If software is for use in the performance of a U.S. Government prime contract or subcontract, Software is delivered and licensed as “Commercial computer software” as defined in DFAR 252.227-7014 (June 1995), or as a “commercial item” as defined in FAR 2.101(a) or as “Restricted computer software” as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause. Use, duplication or disclosure of Software is subject to Agilent Technologies’ standard commercial license terms, and non-DOD Departments and Agencies of the U.S. Government will receive no greater than Restricted Rights as defined in FAR 52.227-19(c)(1-2) (June 1987). U.S. Government users will receive no greater than Limited Rights as defined in FAR 52.227-14 (June 1987) or DFAR 252.227-7015 (b)(2) (November 1995), as applicable in any technical data.

Safety Notices

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

NOTE

A NOTE contains helpful information on the usage - it does not denote a hazard.

Agilent products must only be used in the manner described in the Agilent product user guides. Any other use may result in damage to the product or personal injury. Agilent is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent product user guides, or use of the products in violation of applicable laws, rules or regulations.

Agilent shall not be liable for errors or damages on products or performance due to using non-Agilent genuine parts.

Contents

General Information	5
Introduction	5
Customer's Site Preparation Responsibilities	5
Receiving the System	6
Installation and Verification	7
Site Requirements	8
Space, Weight and Access Requirements	8
Argon Gas Requirement	11
Cell Gas Requirement	15
Power Requirements	19
Environment Conditioning Requirements	27
Safety information for installation	30
Cooling Water Requirements	31
Laboratory Supply Requirements	33
Communications	34
Holes for Seismic Tie Down	36

General Information

Introduction

This manual will help you prepare your facility for the arrival of your new Agilent 7700 Series ICP-MS. The specifications in this manual ensure consistent, reliable and safe installation of your 7700 ICP-MS system.

Please contact Agilent Technologies to help you coordinate the arrival of your equipment and the preparation of your facility. Your Agilent Technologies engineer will install the instrument and familiarize you with it.

Customer's Site Preparation Responsibilities

The following are NOT included in the Agilent Technologies installation; they are the customer's responsibility unless other arrangements are made with Agilent Technologies.

- Planning, scheduling and preparing all site facilities according to the specifications in this manual is the customer's responsibility.
- The customer is responsible for furnishing power receptacles as required. Site electricians should provide a male plug along with the receptacle if not able to have the receptacle that specified in this document.
- Your electrician is responsible for verifying that the electrical environment is safe and adequate for the 7700 ICP-MS system installation and operation.
- The customer is responsible for compliance with all local laws (codes, ordinances, and regulations) for mechanical, building, and electrical distribution systems. Compliance must exist prior to installation.

NOTE

Sites failing to meet requirements may delay installation of the instrument or may be subject to additional charges. Agilent Technologies provides service during warranty, and under maintenance agreements, only if the specified site requirements are met.

Receiving the System

When your 7700 ICP-MS system is delivered, it is your responsibility to provide for the removal of the shipping containers from the truck and their storage until installation. Contact your Agilent Technologies engineer as soon as your shipment arrives to arrange an installation date.

Unloading

The shipping containers are heavy. They require a loading dock and a fork lift or similar lifting device.

CAUTION

The shipping containers must be kept upright at all times to prevent damage to the instrument.

Storage

It is your responsibility to store the containers until installation. Do not open any shipping containers until an Agilent Technologies representative is present. Warranty claims for missing items will not be honored unless an Agilent Technologies representative is present to verify the contents of each container as it is unpacked.

The 7700 ICP-MS shipping container has the following dimensions.

Table 1 Shipping Container Approximate Dimensions

	Height	Width	Depth	Weight
Agilent 7700 Mainframe	85cm (34in)	100cm (40in)	100cm (40in)	157kg (347 lb)

The environment in the storage area should be between 5°C and 50°C with 20% to 80% relative humidity, and a non-condensing and non-corrosive atmosphere.

Installation and Verification

Once the installation has begun, it should progress in a timely manner to completion. Delays due to inadequate site preparation could cause loss of instrument use during the warranty period. In extreme cases, Agilent Technologies may ask to be reimbursed for the additional time required to complete the installation.

The final step in the installation process is system verification. Your Agilent Technologies engineer tests the system against standards as documented for the product(s) you have purchased.

NOTE

The Agilent Technologies engineer will not test your system against your standards or samples. Further, the Agilent Technologies engineer will not set up your laboratory procedures. Assistance with laboratory procedures can be obtained from your local Agilent Technologies Applications Engineer on a consulting basis at additional cost.

Site Requirements

Space, Weight and Access Requirements

Your site must have enough space for the 7700 ICP-MS and all of its associated equipment. The bench in your laboratory must be able to support the weight of the entire the 7700 ICP-MS system.

In addition, there must be sufficient space around the system for ventilation (especially for water recirculator) and maintenance access. [Table 2](#) lists dimension and weight information for the 7700 ICP-MS and related components. Be sure to allow space for the following:

- 7700 ICP-MS
- 7700 ICP-MS MassHunter Workstation PC, PC monitor and Printer
- Foreline pump
- Autosampler
- Power line conditioner (only required when site power supply is unstable)
- Tables
- Chairs
- Water recirculator
- Other optional hardware

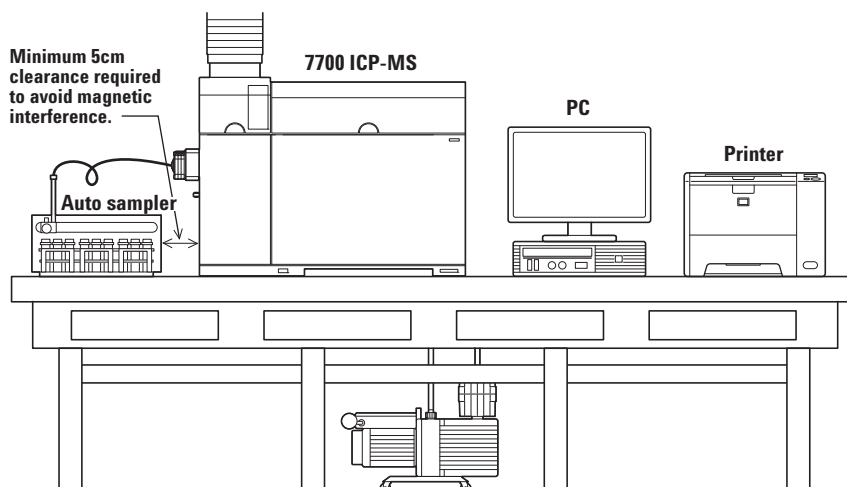
CAUTION

Magnetic Emission

Electrical appliances installed within 5cm of the far left side of the 7700 instrument may not work correctly due to magnetic interference from the cool water inlet valve. Do not install electrical appliances near the left side of the instrument.

NOTE

Space around the system for ventilation and maintenance access: At least 60cm (24in) on all sides of the instrument must be kept clear.
The bench in your laboratory must be able to support the entire 7700 ICP-MS system and other laboratory equipment.



7700_0393

Figure 1

Table 2 Product Dimensions (for ICP-MS refer also to [Figure 2](#) on page 10)

Product	Dimensions, cm (in)			Weight
	Height	Width	Depth	kg (lbs)
7700 ICP-MS	59.5 (23.4)	73.0 (28.7)	62.0 (24.4)* ⁴	115 (254)
Edwards E2M18 (or E2M18F) Foreline Pump * ¹	55.0 (21.7)	61.0 (24.0)	17.0 (6.7)	36 (79)
Agilent DS402 Foreline Pump * ²	58.0 (22.9)	54.1 (21.3)	16.4 (6.5)	36 (79)
Data System (PC, Monitor, Printer)	Size and weight of the data system depends on the components included. Reserve at least 100 cm (39 in) of bench space for the data system. A typical data system weight is 30 kg (66 lb).			
Agilent Chiller (G3292A)	57.6 (22.7)	36.8 (14.5)	70.2 (27.6)	85 (188)
Agilent Heat Exchanger (G1879B)	57.2 (22.5)	38.0 (15.0)	51.4 (20.25)	42 (92)
Agilent Chiller for Japan (G3159A)	71.5 (28.2)	52.0 (20.5)	68.5 (27.0)	100 (220)
Integrated Autosampler (I-AS)	22.0 (8.7) 28.0 (11.0)* ³	29.0 (11.4)	36.0 (14.2)	5 (11)
Agilent ASX-500 Series Autosampler	25.0 (9.8) 61 (24)* ²	52 (20.5)	48.2 (19)	11 (24)

*1 : Height includes mist filter and caster, width includes oil drain kit

*2 : Height includes mist filter

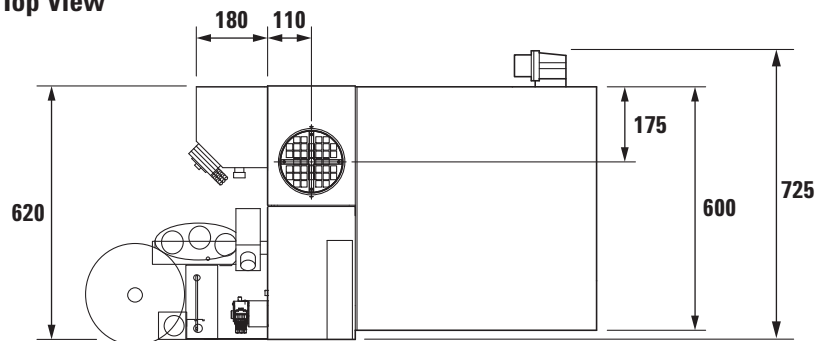
*3 : Height includes probe

*4 : Maximum depth is 72.5 (28.5) including a power connector projecting at rear.

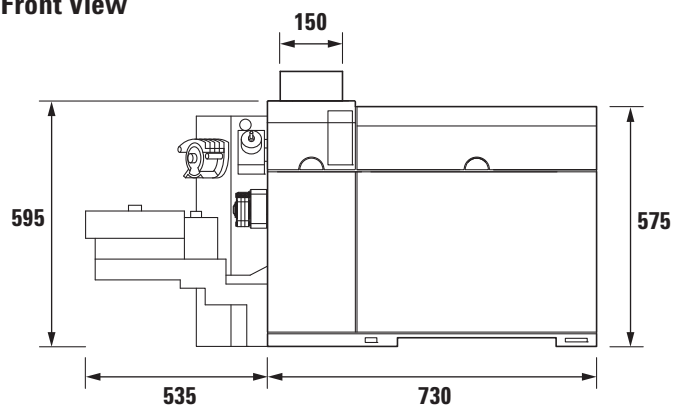
NOTE

Approximate dimensions, refer to specific product documentation.

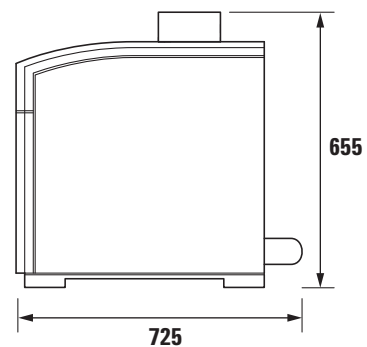
Top View



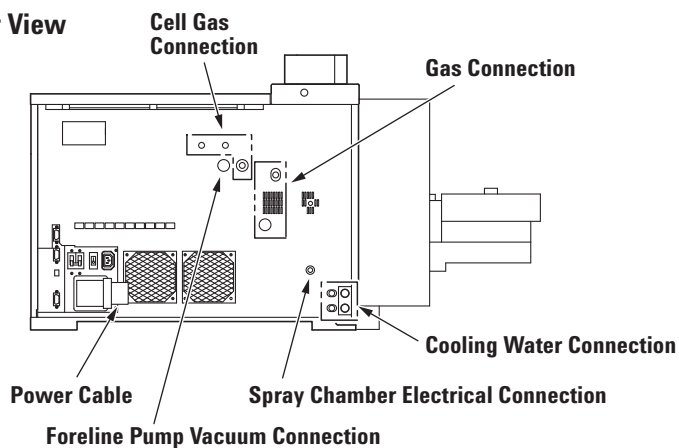
Front View



Side View (Right)



Rear View



7700_0015

Figure 2 Dimensions (unit: mm)

Argon Gas Requirement

WARNING

Strictly adhere to all local and national regulations and guidelines for the proper storage, handling and transport of all gases.

Compressed gas tanks must be handled with care. The contents of the cylinders also may be hazardous, depending on the gases you choose to use. Contact your gas supplier for cylinder handling, storage, transport and safety information for the gases that you will be using.

The Argon gas needed for installation will be supplied by the customer.

It is recommended that there be a shutoff valve and a regulator with a pressure gauge within 5m of the 7700 ICP-MS.

The customer will supply and prepare any gas piping from a remote gas storage area. This must be at least 1/4 inch in diameter and should be made of stainless steel.

Gas cylinders or liquid Argon may be used. Typically a cylinder of Argon lasts 8 hours. A 260L tank of liquid Argon lasts for approximately one month of daily (8 hours) operation.

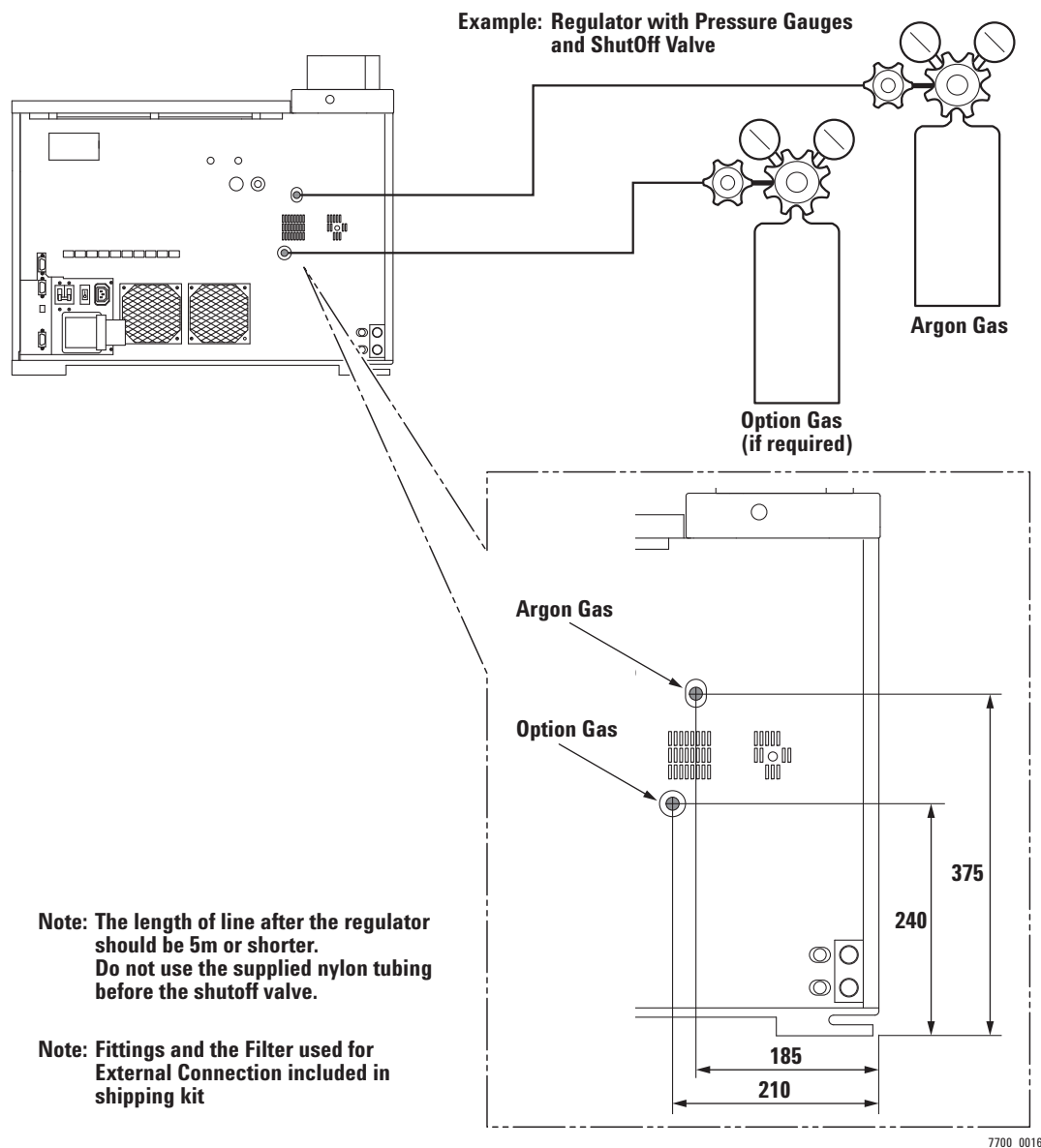


Figure 3 Example Gas Connection and Connection Location (all units in mm)

Argon Gas Purity

The 7700 ICP-MS requires Argon gas of the purity as specified in [Table 3](#).

The typical Argon purity needed for the 7700 ICP-MS is 99.99%, high purity Argon is classed as 99.999%. The purity is usually a measure of the main source of liquid Argon, there is always a possibility of contamination when the source Argon is transferred into the vessel that is delivered to your laboratory.

Table 3 Compressed Gas

Compressed Gas	Purity	Compressed Gas Assoc. Standard	Typical Working Pressure kPa (psi)	Consumption L/min
Argon	≥99.99%	CGA 580	500-700 (73-102)	20
Option Gas (If required for application)	Oxygen 20% Argon 80% ≥99.999%	CGA 540	10-100(1.5-14)	1.0

Contamination of instrumentation and poor ignition of plasma can be caused by low grade Argon, an acceptable specification for Argon purity is listed in [Table 4](#).

Table 4 Argon Purity

Contamination		Level
O ₂	Oxygen	<2ppm
N ₂	Nitrogen	<10ppm
CO	Carbon Oxide	<0.5ppm
CO ₂	Carbon Dioxide	<0.5ppm
CH ₄	Methane	<0.5ppm
H ₂ O	Water	<5ppm

Requirements for Argon Gas Supply Installation

Agilent Technologies will provide nylon tubing, 1/4 inch (6.4mm) O.D., 5m long. This is used for supplying gases to the 7700 ICP-MS from the laboratory shutoff valve.

NOTE

The length of line after the regulator should be within 5m.
Do not use the supplied nylon tubing before the shutoff valve.

NOTE

Fittings and the filter used for external connection included in shipping kit.

Customers will provide connection from the gas supply to a shutoff valve. This tubing should be 1/4 inch (6.4mm) Electro Polished stainless steel or stainless steel that has been cleaned.

The customer should provide the pressure regulator for the Argon gas cylinder. All pressure regulators should be stainless steel two-stage for ultra high purity;

Input: 0-24×10⁶Pa (0-3500psig)

Output: 0-9.8×10⁵Pa (0-150psig)

When ordering, consider the size of the output tubing, 1/4 inch (6.4mm), and also the Compressed Gas Association (CGA) number.

Your gas supplier can advise, supply and install all items for a successful installation.

NOTE

Please ensure that the type of connector used at the outlet side of the gas-pressure regulator conforms to applicable national requirements.

WARNING

Compressed gas tanks must be handled with care. The contents of the cylinders also may be hazardous depending on the gases you choose to use. Please contact your gas supplier for cylinder handling and safety information for the gases that you will be using.

Cell Gas Requirement

It is strongly recommended that the cell gas cylinder, regulator with pressure gauge and shutoff valve are within 3m of the 7700 ICP-MS.

The 7700s ICP-MS will be shipped with 1/8 inch Swagelok® fittings for Helium and Hydrogen cell gas connections (the 7700x and 7700e ICP-MS will be shipped with 1/8 inch Swagelok® fitting for Helium) on the rear of the instrument.

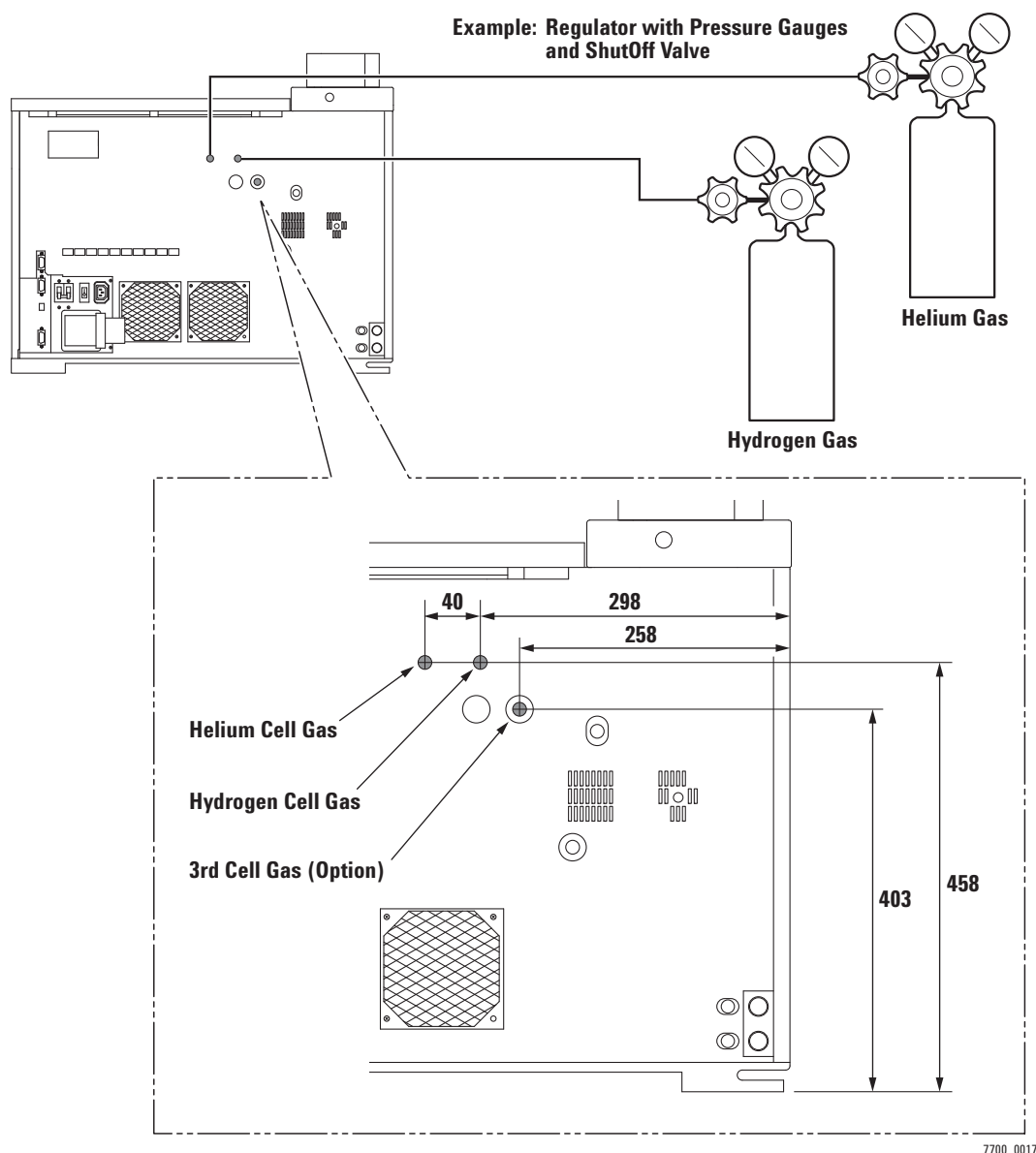


Figure 4 Example of Cell Gas Connection and Connection Location (all units in mm)

Cell Gas Purity

The 7700 ICP-MS requires Helium and Hydrogen* gas of the purity as specified in Table 5.

Table 5 Compressed Gas (Cell Gas)

Compressed Gas	Purity	Compressed Gas Assoc. Standard	Typical Working Pressure kPa (psi)	Max Consumption mL/min
Helium	≥99.999%	CGA580	90-130(13-18.8)	12
Hydrogen*	≥99.999%	CGA350	20-60(2.9-8.7)	10
Xenon**	≥99.999%	CGA580	20-60(2.9-8.7)	1
NH ₃ /He** 10%/90%	≥99.999%***	CGA705	20-60(2.9-8.7)	10

* Hydrogen gas is an option (G3289A) with the 7700x and 7700e ICP-MS.

** 3rd Cell Gas Line is an option.

*** Both the NH₃ and He gases used to prepare the gas mix must be ≥99.999% pure.
For NH₃/He Gas Agilent recommends use of CONCOA Regulators and Protocol Station:
To find a Concoa representative in your area please visit Concoa on the web at www.concoa.com.

Gas Purity Problem

Atmospheric Oxygen, moisture and volatile organics entering the cell gas lines will result in poor/unpredictable ORS interference removal, and severe signal drift or changes in sensitivity due to contamination of the octopole (which will then have to be replaced).

The common causes are:

- Use of existing He and H₂ lab supplies, instead of using dedicated cylinders for the 7700 ICP-MS
- Dirty, or previously used piping to connect the cylinder to the 7700 ICP-MS (or use of Cu instead of stainless steel)
- Use of gas cylinder regulators with plastic diaphragms (use only stainless steel diaphragm regulators designed for use with high purity gas supplies)
- Use of a Hydrogen generator (we don't recommend the use of these as the moisture content of the H₂ is too high)
- Use of cell gas of less than 99.999% quality
- Sharing of cell gas lines with other instrumentation

The fitting of a gas purifier offers further protection for the ORS - for example if a cylinder of contaminated gas is connected, the gas purifier assures peak performance (spectral interference removal) of the ORS cell.

Follow the instructions below to ensure your system is operating at peak performance.

Essential Requirements for Cell Gas Supply Installation

- The cell gas pathway from the source to the mass spectrometer must be as short and as clean as possible to ensure correct operation of the ORS.
- Only dedicated cylinders of 99.999% pure gas are to be used.
- House gas supplies are not allowed, and sharing of gas supplies with other instruments (except another Agilent ORS (single quad or triple quad) ICP-MS) is not allowed.
- The Agilent ancillary parts described in [Table 6](#) should be used to ensure the highest quality supply of He and H₂ cell gas.
- Only the Agilent stainless steel tubing (Part# G3270-65035) should be used to connect the He, H₂, (or other cell gases) cell gas cylinders to the Agilent 7700 ICP-MS, and the length of the tubing must be less than 3m.
- No other valves, fittings or connections are to be inserted along the length of the cell gas supply lines.

Table 6 Supplies for Gas Lines

Agilent Part Number	Description
CP17976*	Filter x 2, single position base plate (for He and/or H ₂)
CP7988	Single-position base plate
CP7981	Wall mount bracket
8710-1709	Tube cutter
G3270-65035	1/8" Stainless steel tubing, 6m

* Do not use for NH₃/He

- Consult your local supplier for regulators described in [Table 7](#).

Table 7 Regulators

Description	Quantity	Note
Two stage regulator, must be fitted with stainless steel diaphragms, maximum pressure range between 100-200kPa (14-28psi) For use with: He	1	These regulators must be ordered in the country of use. Gas cylinder-regulator connections vary throughout the world and are not compatible.
Two stage regulator, must be fitted with stainless steel diaphragms, maximum pressure range between 100-200kPa (14-28psi) For use with: H ₂	1	

NOTE

The following regulators are available for North America.

0101-1398 Regulator for Helium Cell Gas
0101-1399 Regulator for Hydrogen Cell Gas
5188-5374 Regulator for Ammonia Cell Gas
0101-1400 Regulator for Argon Gas

Customers will supply all gases that are needed for installation.

Customers will provide connection from the gas supply to the instrument. This tubing should be 1/8 inch (3.2mm) Electro Polished stainless steel or Bright Anneal stainless steel or stainless steel that has been cleaned.

The 7700 ICP-MS requires high purity cell gases for best performance. Stainless Steel Tubing (Part# G3270-65035) must be used for the cell gas lines; other materials (such as copper) are not satisfactory. Agilent does not guarantee the 7700 ICP-MS performance when using alternative materials for the cell gas line tubing.

The customer must supply pressure regulators for the cell gas cylinders. Stainless steel two stage regulators are recommended for ultra high purity, corrosive or toxic gas applications;

Input: 0-14×10⁶Pa (0-2000psig)

Output: 0-1.0×10⁵Pa (0-15psig), or 0-2.0×10⁵Pa (0-30psig)

When ordering, consider the size of the output tubing, 1/8 inch (3.2mm), and also the Compressed Gas Association (CGA) number.

NOTE

Please ensure that the type of connector used at the outlet side of the gas-pressure regulator conforms to applicable national requirements.

Power Requirements

You are responsible for providing appropriate electrical power and power outlets for all of the components in your 7700 ICP-MS system. Power considerations include voltage ranges of major components, power configurations, power plugs and cords, water circulator requirements, and general power requirements.

Voltage Ranges of Major Components

The 7700 ICP-MS mainframe requires a single-phase 30A circuit. [Table 9](#) lists the voltage ranges and power requirements for the 7700 ICP-MS and related equipment. Extra power capacity for future additions is strongly recommended.

NOTE

Each product listed requires a dedicated circuit. The 7700 ICP-MS and data system should each have a separate circuit breaker.

The 7700 ICP-MS system includes a wide-range power supply that can operate without reconfiguration, however the foreline pump must be configured for either of two voltage ranges of single-phase alternating current (ac):

200-219Vac, 50/60Hz (typical for the U.S. and Japan)
220-240Vac, 50/60Hz (typical for Europe)

The foreline pump will be configured according to the standard voltage in the country where the instrument is ordered.

CAUTION

If an instrument is being ordered from one location, but is to be installed in another location with different electrical power characteristics, a special note must be made on the order that the electrical power at the site is different from the standard electrical power in that country.

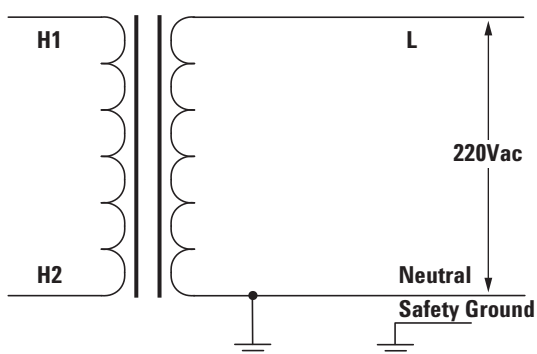
General Power Configuration

Power for the 7700 ICP-MS is supplied in single-phase, Split phase, 3 phase star 4 wired, High-leg delta or 208 Wye configuration (see [Table 8](#)).

Correct grounding for the 208 Wye configuration must be verified by an electrician. The neutral wire cannot be used for safety grounding. The ground wire (green or green/yellow) should carry zero current except for ground-fault current or static electric discharge. The entire system should share an isolated, noise-free electrical ground.

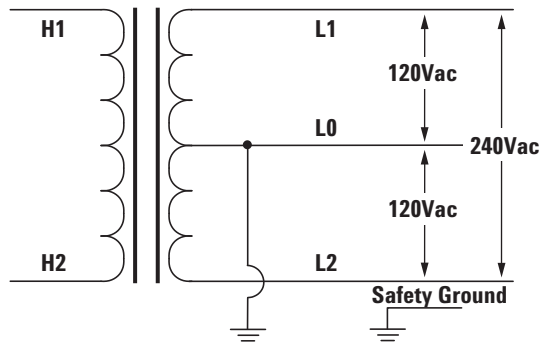
Table 8 Electrical Configurations

Configuration	Measurement	Nominal voltage
Single phase	Line(L) to Neutral	220Vac
	Line(L) to Ground	220Vac
	Ground to Neutral	<0.5Vrms
Split phase	Line(L1) to Line(L2)	240Vac
	Line(L1) to Ground	120Vac
	Line(L2) to Ground	120Vac
3 phase star 4 wired	Line to Neutral (Phase A to Neutral)	240Vac
	Line to Ground (Phase A to Ground)	240Vac
	Ground to Neutral	<0.5Vrms
High-leg Delta (3 phase delta)	Line to Neutral (Phase B to Neutral)	207Vac
	Line to Ground	207Vac
	Ground to Neutral (Phase B to Ground)	<0.5Vrms
208 Wye	Line to Line (Phase A to Phase B)	208Vac
	Line to Ground (Phase A to Ground)	120Vac



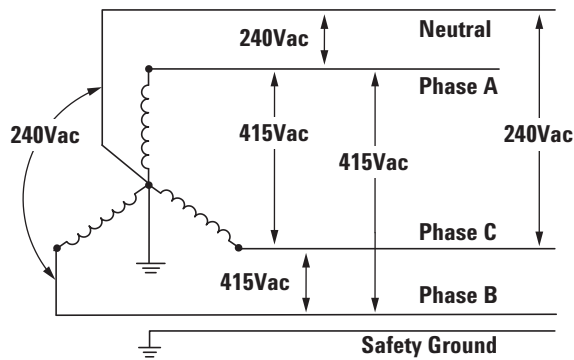
7700_0001

Figure 5 Single Phase Configuration



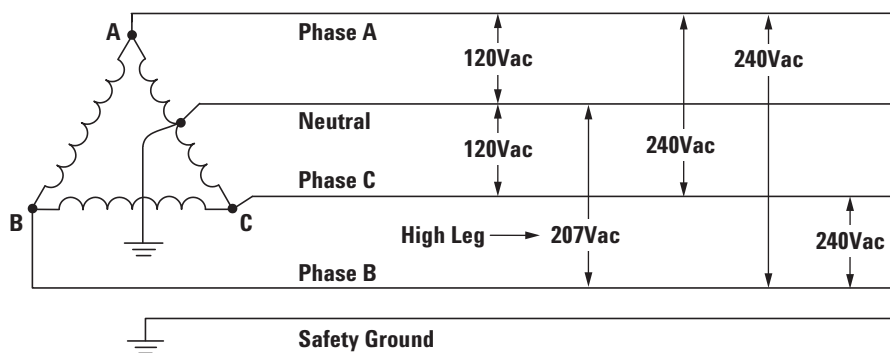
7700_0002

Figure 6 Split Phase Configuration



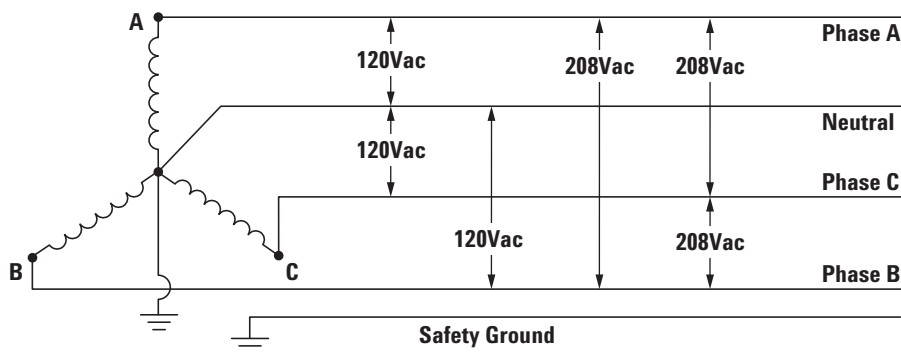
7700_0003

Figure 7 3 Phase Star 4 Wired Configuration



7700_0004

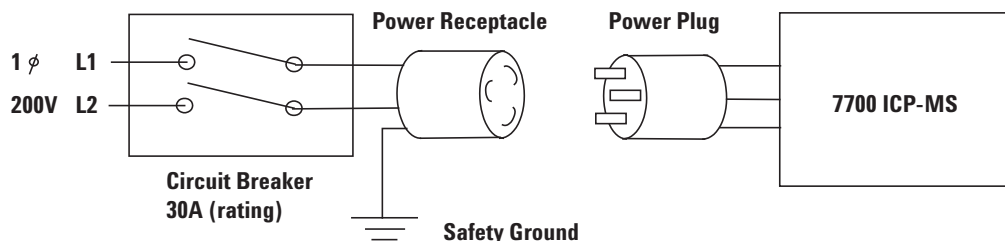
Figure 8 High-Leg Delta Configuration



7700_0005

Figure 9 208 Wye Configuration

Power Plugs and Cords



7700_0019

Figure 10 Main Supply - Instruments Connection without Neutral

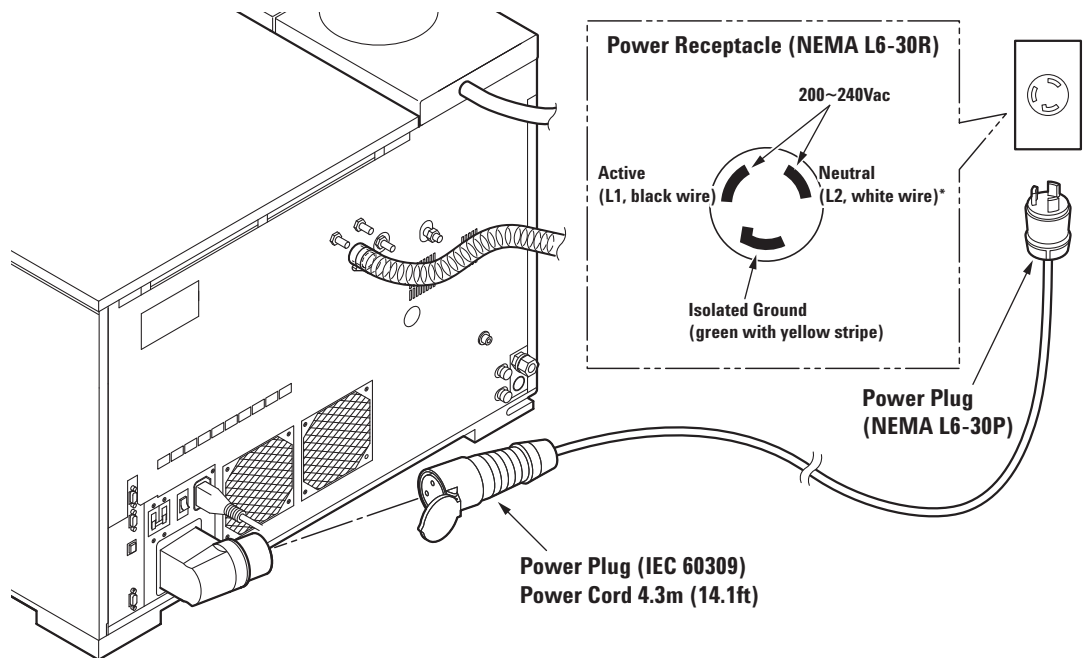
For U.S., all Americas (North, Central and South American countries), Japan, Korea and Taiwan.

The 7700 ICP-MS is supplied with a **NEMA L6-30P** twist lock power plug (the length of the power cord is **4.3m**). Customers should provide the power to a **NEMA L6-30R** outlet.

For other countries

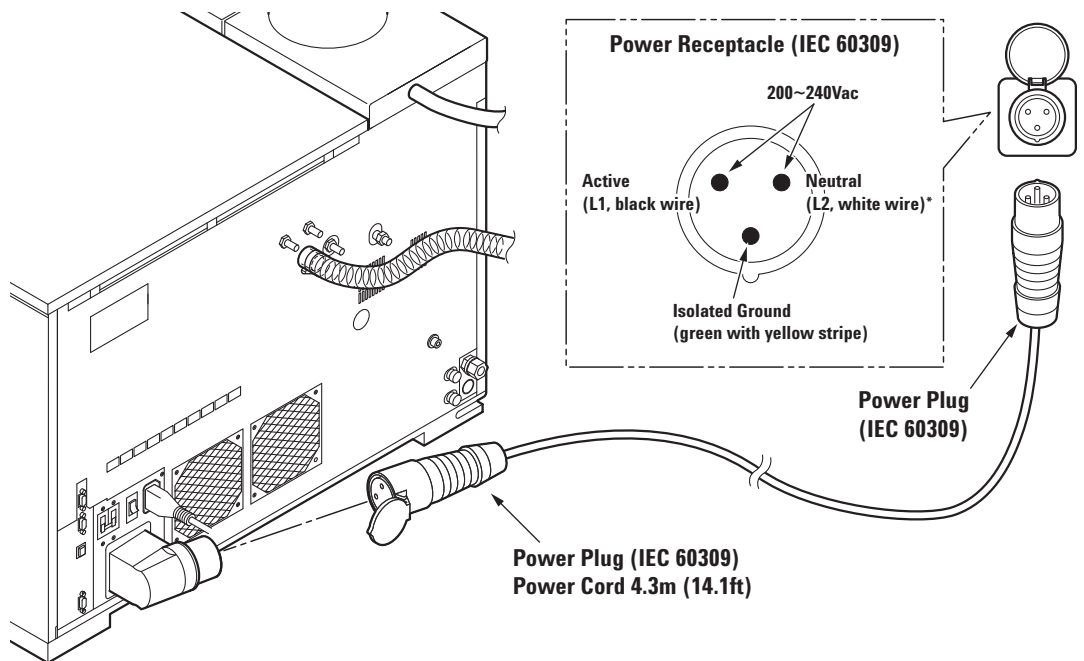
The 7700 ICP-MS is supplied with an **IEC 60309** power plug (the length of the power cord is **4.3m**). Customers should provide the power to an IEC 60309 outlet.

If this is not compatible with your power receptacle, it is your responsibility to connect the 7700 ICP-MS power cord safely. This can be done via an industrial standard locking plug and socket, or directly into a switched distribution panel.



7700_0008

Figure 11 Power Receptacle for 200-219Vac, 50/60Hz (NEMA L6-30R)



7700_0009

Figure 12 Power Receptacle for 220-240Vac, 50/60Hz (IEC 60309)

Agilent Chiller (G3292A) Power requirements

The chiller requires a 12.2A single-phase electrical outlet. The chiller will ship with the power cable for the country of installation.

Agilent Chiller for Japan (G3159A) Power requirements

The chiller requires a 20A single-phase electrical outlet. The chiller will ship with the power cable for Japan.

Agilent Heat Exchanger (G1879B) Power requirements

The heat exchanger requires a 5.5A (400VA) single-phase power receptacle. The power cable of the heat exchanger will ship with the power cable for the country of installation.

Power Conditioner/Uninterruptible Power Supply (UPS)

If the power supplied is outside the limits specified, a power conditioner may be required. Power conditioners aid in filtering impulses caused by lightning strikes, line spikes, oscillatory transients and electrical noise impulses.

It is the customer's responsibility to install the power conditioner and supply any additional equipment, circuit breakers, switches, etc., before the Agilent Technologies engineer arrives on site.

It is your responsibility to comply with all local and national electrical and safety codes. Check with your electrical department!

Data system components and accessories have power cords with plugs depending on the voltage and power cord option ordered. Power cord lengths for the data system components and accessories are 2.5m.

WARNING

Do not use extension cords with Agilent Technologies equipment. They cannot provide enough power to the system and can be a safety hazard. If the desired location of equipment does not permit its standard power cord to reach an power receptacle, your electrician should install additional outlets. Otherwise, you should relocate the equipment closer to existing power receptacles.

NOTE

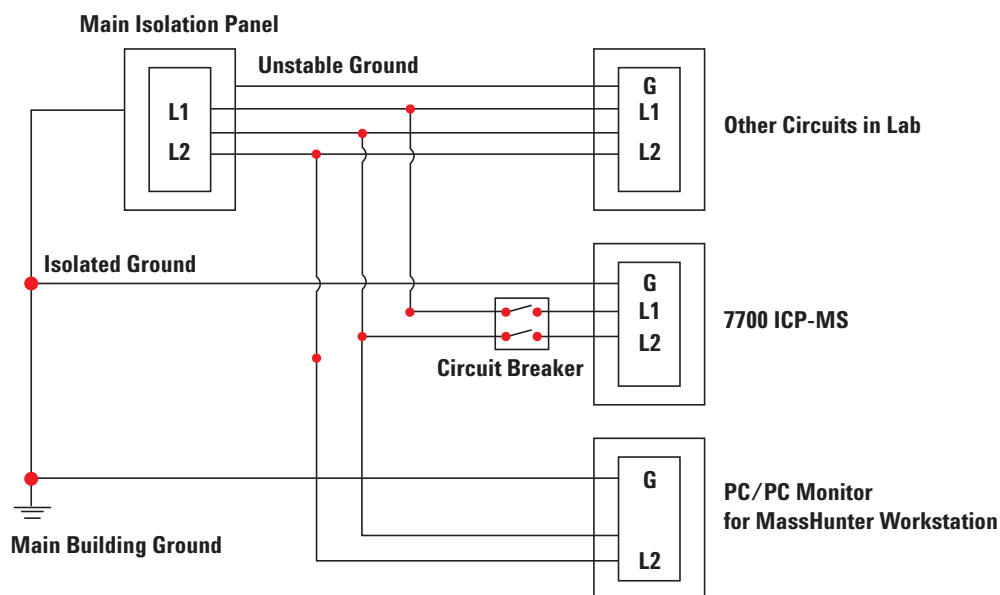
The 7700 ICP-MS has a start up rush current of 150A for 15 milliseconds.

General Power Requirements

Table 9 lists the power requirements for the 7700 ICP-MS and associated equipment. Extra power capacity for the future growth of your laboratory should be considered now. Power requirements and considerations include the following.

Each product listed in Table 9 requires a dedicated circuit. The 7700 ICP-MS mainframe, PC/PC monitor, water recirculator, etc. should each have a separate circuit breaker.

The entire 7700 ICP-MS system should share an isolated, noise-free electrical ground. This system ground should be electrically separate from the ground for the rest of the building, i.e. back to the main ground of the facility. (See Figure 13)



7700_0011

Figure 13 Isolated Ground

Power must meet the stability and transient specifications listed in Table 9. We recommend your site power specialist use a line monitor to check power stability. If your line power is unstable, you may need to install a line conditioner.

Separate convenience outlets should be provided for building maintenance and other appliances. Convenience outlets must be on circuits separate from the 7700 ICP-MS system and must share the normal building distribution ground, not the 7700 ICP-MS system ground.

In some geographical areas it may be advisable to install lightning protection for personnel and equipment.

Electromagnetic interference (EMI) generated by NMRs, radio transmitters, and microwave links, may interfere with system performance. Protect the system from static electricity by observing humidity and temperature requirements. Minimize the presence of non-conductive products such as carpets and vinyl floor tiles.

Emergency-off push buttons that will disconnect power to the ventilation system and all electric equipment in the room except overhead lighting are recommended.

A minimum of 4 power receptacles are required for data system installation; 6 power receptacles are recommended. Surge protection on the data system circuit is also recommended.

CAUTION

There is a power receptacle on the rear of the 7700 ICP-MS, it is dedicated for the Foreline Pump. **DO NOT USE FOR ANY OTHER AUXILIARY EQUIPMENT.**

Table 9 Power Requirements

Product	Voltage, Frequency & Cooling Capacity	Current Rating (amps)
7700 ICP-MS	200-219Vac (50/60Hz)	24
	220-240Vac (50/60Hz)	24
PC/Monitor/Printer	100-127Vac	15
	220-240Vac	8
Agilent Heat Exchanger (G1879B)	200-240Vac (50Hz)	2.75
	100-120Vac (50/60Hz)	5.5
Agilent Chiller (G3292A)	208-230Vac (60Hz=2900W)	12.2
	240Vac (50Hz=2900W)	12.2
Agilent Chiller (G3159A)	200Vac (50/60Hz)	20
Integrated Autosampler (I-AS)	100-120Vac (50/60Hz)	1
	200-240Vac (50/60Hz)	0.5
Agilent ASX-500 Series Autosampler	85-264Vac (40W)	<1

NOTE

- 1 Verify that the voltage available on site is adequate for all the equipment ordered.
- 2 Approximate values. Refer to the specific product specification. Data systems typically require at least 4 outlets and a 15A circuit with surge suppression.

Environment Conditioning Requirements

Environment conditioning considerations include temperature, humidity, altitude, atmosphere, airborne dust and exhaust venting.

Temperature and Humidity

The 7700 ICP-MS is specified for operation under the conditions outlined in [Table 10](#).

Table 10 Temperature and Humidity Specifications

Parameter	Specification
Temperature	15-30°C (59-86°F) < 2°C/h change and total change should be < 5°C
Humidity	20-80%
Altitude	Up to 2,000m
Atmosphere	Non Condensing; Non Corrosive

[Table 11](#) lists the heat output of the 7700 ICP-MS and other components.

Table 11 Heat Output

Item	Product	Heat Dissipated (W)
1	7700 ICP-MS	2,900
2	Foreline Pump	500
3	PC/Monitor	430
4	Heat Exchanger (50/60Hz)	2,000 (Maximum)
5	Agilent Chiller (G3292A)	50/60Hz 3,200 (Maximum)

Item	Product	Heat Absorbed (W)
6	Heat Exchanger (50/60Hz)	1,600 (2,000 maximum)
7	Agilent Chiller (G3292A)	50/60Hz 1,600 (2,000 maximum)
8	Extraction Vent	1,600 (2,500 maximum)

NOTE

A maximum of 4,500W is removed from the 7700 ICP-MS mainframe via the cooling water and extraction duct. Approximate values. Refer to the specific product information for details.

The ambient temperature around the heat exchanger must not exceed 30°C for normal ICP-MS operation.

Be sure to add the additional heat output of other optional equipment and system peripherals installed in the lab.

Agilent Technologies recommends you set up the water recirculator outside the laboratory; if possible in a well ventilated room. Additional allowances should be made for other heat sources, such as heat from adjacent rooms.

Example: Air Conditioning Requirements:

Case 1: Heat Exchanger in Lab.

Heat Dissipated to the room is

$$1 - 6 - 8 + 2 + 3 + 4$$

$$2,900 - 1,600 - 1,600 + 500 + 430 + 2,000 = \underline{2,630 \text{ Watts}}$$

Case 2: Heat Exchanger external to Lab.

Heat Dissipated to the room is

$$1 - 6 - 8 + 2 + 3$$

$$2,900 - 1,600 - 1,600 + 500 + 430 = \underline{630 \text{ Watts}}$$

Case 3: Chiller in Lab.

Heat Dissipated to the room is

$$1 - 7 - 8 + 2 + 3 + 5$$

$$2,900 - 1,600 - 1,600 + 500 + 430 + 3,200 = \underline{3,830 \text{ Watts}}$$

Case 4: Chiller external to Lab.

Heat Dissipated to the room is

$$1 - 7 - 8 + 2 + 3$$

$$2,900 - 1,600 - 1,600 + 500 + 430 = \underline{630 \text{ Watts}}$$

Exhaust Venting

The 7700 can produce ozone and high temperatures. A ventilation duct must be connected to the exhaust port of the instrument during operation for removal of waste products.

WARNING

User safety requires that the exhaust gases from the plasma and vacuum systems be vented externally to the building and not recirculated by the environmental control system. Health hazards include chemical toxicity of solvents, samples, and foreline pump fluid vapor.

NOTE

Exhaust gas venting must comply with all local environmental codes.

NOTE

Agilent Technologies engineer will not install your 7700 ICP-MS system until an adequate exhaust system is present and functioning.

Your exhaust system must have the capacity to maintain negative pressure with 6m³/min = 5.7m/sec of gas flow. Inadequate exhaust capacity can degrade the performance of your 7700 ICP-MS or cause system failures.

Refer to the following example for calculating the exhaust flow in m³/min from the flow meter reading (m/min).

<Example>

$$\begin{aligned} & \text{meter reading} \times 3.142r^2 \\ &= \text{meter reading} \times 3.142 \times (75 \times 10^{-3})^2 \\ &= 1.76 \times 10^{-2} \times \text{meter reading} \end{aligned}$$

Note: r = Duct radius

πr^2 = Area of Duct

π = 3.142

Table 12 Exhaust Venting Requirements

Product	Port Diameter (mm)	Exhaust Flow	
		m ³ /min	m/s
7700 ICP-MS *	150	>5	>4.7
		<7	<6.6

* Exhaust flow must be continuous as long as the plasma is ON.
Exhaust flow must be stable: maximum fluctuation of $\pm 5\%$ of target flow.

NOTE

Flexible ducting must be used for easy removal during instrument maintenance.
The back pressure of the 7700 ICP-MS is approximately 40Pa.

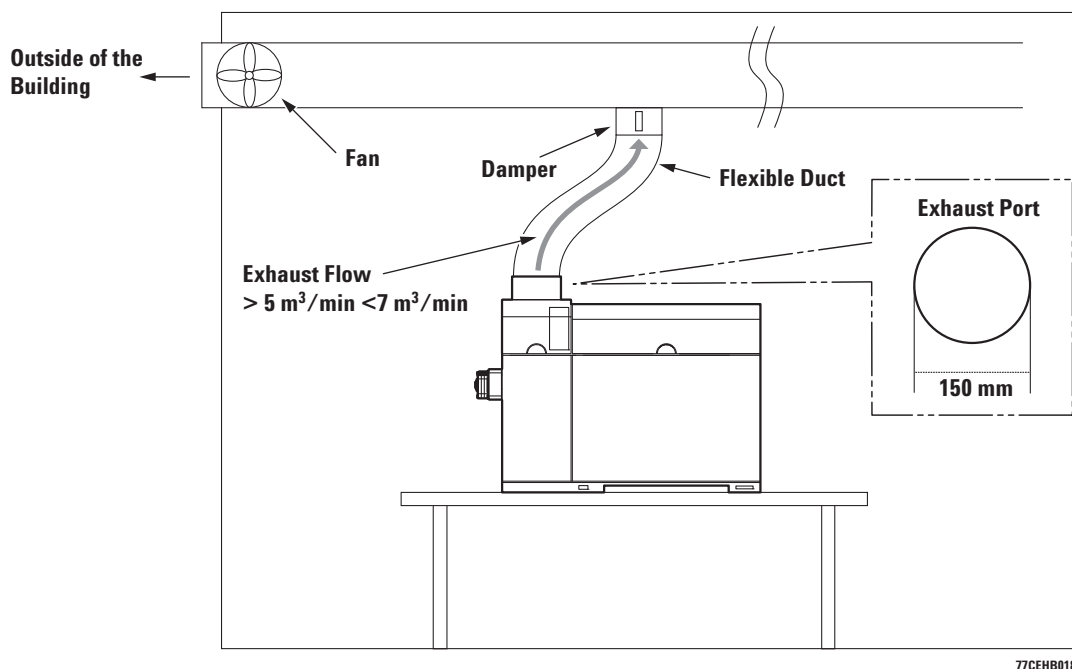


Figure 14 Exhaust Duct Connection

Safety information for installation

Installation category based on IEC61010:II

The “Installation category” implies the regulation for impulse withstand voltage. It is also called the “Over voltage category”. “II” applies to electrical equipment.

Pollution level based on IEC61010:2

“Pollution level” describes the degree to which a solid, liquid or gas which deteriorates dielectric strength is adhering. “2” applies to a normal indoor atmosphere.

Cooling Water Requirements

The 7700 ICP-MS requires a controlled supply of cooling water for the RF generator, turbo molecular pump, load coil, spray chamber and interface. The water supply is specified by its cooling capacity and its cleanliness. [Table 13](#) lists Cooling Water Requirements for the 7700 ICP-MS.

The preferred cooling system is the Agilent Chiller (G3292A) or heat exchanger (G1879B) filled with Poly-Clear Fluid (G3292-80010).

Table 13 Cooling Water Requirements

Cooling Water Parameter	Specification
Heat to be absorbed	1,600W approximately
Flow Rate	> 5L/min (1.32 us gallons/min) Inlet pressure 230-400kPa (33-58psi)
Temperature	15-40°C at water inlet of ICP-MS
Conductivity *	50-150µS at the chiller reservoir
Connections	Hose 1 × 10m long, ID=12mm (7/16inch) Male PT 1/2inch fittings on the 7700 ICP-MS end
Water Filter	<100 microns particle size

* When not using the Chiller or Heat Exchanger in conjunction with Poly-Clear Fluid.

CAUTION

Continued operation with inadequate cooling can cause automatic shutdown of the 7700 ICP-MS and risk potential degradation in the performance of your instrument.

Using tap water can cause contamination to the drinking water line from ICP-MS.

The temperature of water exiting the system should be maintained at less than 40°C.

The outlet water line must be open to atmosphere to minimize flow variations.

Water Quality

In the event that the chiller or heat exchanger with Poly-Clear Fluid is not used, and another type of water re-circulator is used, the reservoir should be filled with distilled water having a conductance in the range of 50-150 µs. Distilled water will keep the system clean. When the Chiller or heat exchanger in combination with Poly-Clear Fluid is not being used, refer to [Table 14](#) for the water quality standards and recommendations.

Table 14 Water Quality Standards and Recommendations

	Permissible (ppm)	Desirable (ppm)
Inorganic Chemicals		
Calcium	<40	0.6
Chloride	250	<25
Copper	1.3	1.0
Iron	0.3	<0.1
Lead	0.015	0
Magnesium	<12	0.1
Manganese	0.05	<0.03
Nitrates/Nitrites	10 as N	0
Potassium	<20	0.3
Silicate	25	<0.1
Sodium	<20	0.3
Sulfate	250	<50
Hardness	17	<0.05
Total Dissolved Solid	50	10
Other Parameters		
pH	6.5-8.5	7-8
Conductivity	50-150 *	50 *

* μS (Compensated at 25°C)

Unfavorably high total ionized solids (TIS) can accelerate the rate of galvanic corrosion. These contaminants can function as electrolytes which increase the potential for galvanic cell corrosion and lead to localized corrosion such as pitting which can be observed at the studs and on the outside surface of cooling coils of the chiller. Eventually, the pitting will become so extensive that the coil will leak refrigerant into the water reservoir.

As an example, raw water in the United States averages 171ppm (of NaCl). The recommended level for use in a water system is between 0.5 to 5.0ppm (of NaCl).

NOTE

Initially fill the tank with distilled water. Do not use tap water as the total ionized solids level may be too high.

Do not use deionized water as it will corrode the system.

Laboratory Supply Requirements

The following items are commonly used with the 7700 ICP-MS system. Refer to [Table 15](#) and you must order necessary supplies.

A set of clean hand tools dedicated for maintenance of ultra-clean parts such as the ion lens, interface, etc.

Reagent-grade acetone, methanol, or isopropanol for cleaning. Proper storage, handling, and disposal of these chemicals is required for personal and environmental safety.

Laboratory glassware detergent and deionized water for general cleaning of system components.

WARNING

Chemical solvents should be considered hazardous and must be handled with care. Contact your chemical supplier for additional solvent handling and safety information.

An auxiliary work space and fume hood are needed for maintenance procedures such as interface, ion lens, etc. cleaning.

Table 15 Recommended Tools, Equipment and Supplies

Item	Description
Ball Driver	Metric, Hex set
Beakers	50mL, 250mL, 600mL
Sample Bottles	Polypropylene
Cloths	Clean Lint Free
Cotton Applicators	
Gloves	Lint Free
Gloves	Chemical Resistant
Magnifier	for Inspection of Interface Cones
Ultrasonic Bath	at least 1 Quart Capacity
Pliers	Needle Nose
Screwdrivers	Torx, Phillips & Flat head
Wrenches	Various Metric
Volt/Ohm Meter	High Impedance > 10M ohm

Communications

Network Connection to Company LAN (not needed for instrument operation)

If you need to connect the 7700 ICP-MS computer to your company LAN, we only recommend connection via a switching HUB. A small 10/100 6 port switch can be obtained from many sources at a low cost.

NOTE

When connecting via a switching hub your IT department must reserve two fixed (static) IP addresses that share the same subnet mask and are dedicated to the 7700 ICP-MS.

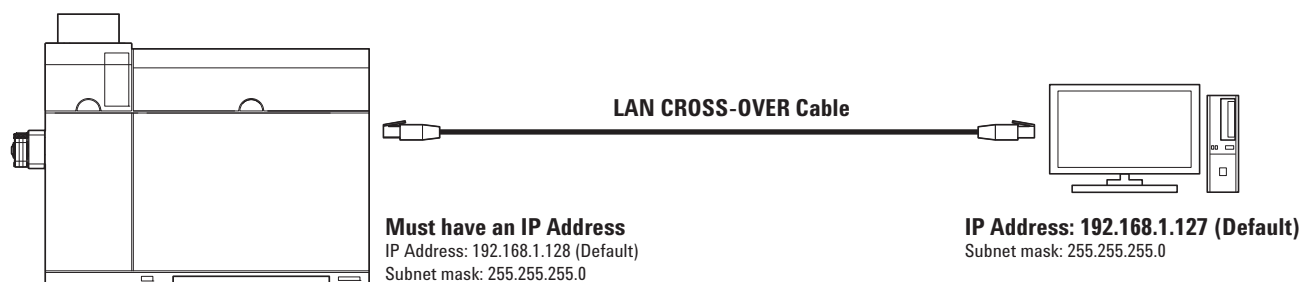
How a Switching Hub Works

Suppose you want to send a packet of data from the PC to the 7700 ICP-MS. The first time the packet is sent, it will go to the Server and the Server determines where the 7700 ICP-MS is located. The packet is sent to the Switch and the Switch sends it on to the 7700 ICP-MS. But the Switch memorizes the location of the original message. Since the location of the original sender is on the same Switch, the Switch builds a memory table within the Switch's internal memory. Now the Switch can respond directly to the PC.

Once the 7700 ICP-MS sends a packet to the PC, it will have its location memorized and again any traffic between the PC and the 7700 ICP-MS will not have to go through the Server. Traffic is reduced on the LAN. The only time that the corporate LAN is affected is on the initial packet.

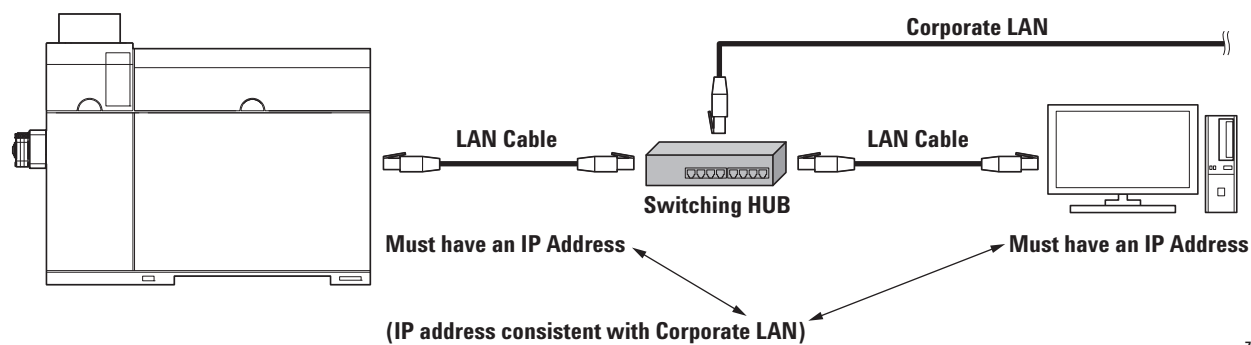
CAUTION

The 7700 ICP-MS system does not support the use of a computer with two network interface cards. It has been observed that the use of two network cards frequently results in crosstalk between the cards. This crosstalk can cause communication failures.



77CEHB0182

Figure 15 Basic Connection



77CEHB0183

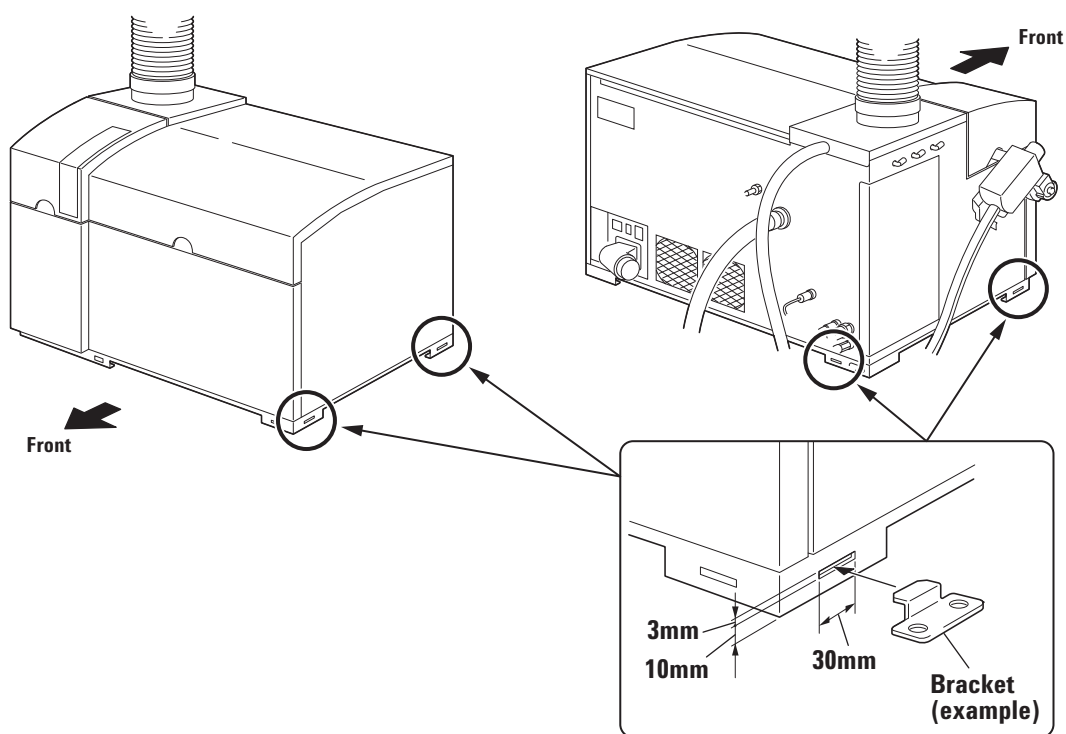
Figure 16 Connection via a Switching HUB

Holes for Seismic Tie Down

(If necessary) Insert the tie down brackets into mounting holes, open corresponding holes in the table, and secure the brackets with bolts.

NOTE

Seismic brackets are not supplied by Agilent. Prepare these items separately.



7700_0394

Figure 17

www.agilent.com

In this Book

This manual will help you prepare your facility for the arrival of your new Agilent 7700 Series Inductively Coupled Plasma Mass Spectrometer (ICP-MS). The specifications in this manual ensure consistent, reliable and safe installation of your ICP-MS system.

© Agilent Technologies, Inc. 2012

Rev. D, June 2012



G3280-90010



Agilent Technologies