

# *MSQ Plus*<sup>TM</sup>

## Facilities Preinstallation Requirements Guide

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The MSQ Plus Mass Spectrometer System is manufactured for Dionex by:

**Thermo Scientific Instruments**  
355 River Oaks Parkway  
San Jose, CA 95134

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#### **TRADEMARKS**

#### **PRINTING HISTORY**

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## Regulatory Compliance

The Original Equipment Manufacturer (OEM) Thermo Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When your system is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards as follows:

**EMC Certification:** EMC - Directive 89/336/EEC as amended by 92/31/EEC and 93/68/EEC

- EN 55011 (1998) EN 61000-4-3 (2002)
- EN 61326-1 (1998) EN 61000-4-4 (2001)
- EN 61000-3-2 1995 EN 61000-4-5 (2001)
- EN 61000-3-3 1995 EN 61000-4-6 (2001)
- EN 61000-4-2 (2001) EN 61000-4-11 (2001)
- CFR 47 Part 15 Subpart B: 2004

Code of Federal Regulations, Part 15, Subpart B, Radio Frequency Devices  
Unintentional Radiators Class A

**EMC issues have been evaluated by UNDERWRITERS LABORATORY, INC (UL)**

## Safety Compliance

Complies with the EU directive 73/23/EEC (equivalent to IEC 1010-1, 1990 plus Amendment 1, 1991 and Amendment 2, 1995) by meeting the following standard: EN 61010-1: 2001 with Corrigendum No. 1 and 2.

Please be aware that any changes that you make to your system may void compliance with one or more of these EMC and/or safety standards. Making changes to your system includes replacing a part. Thus, to ensure continued compliance with EMC and safety standards, replacement parts should be ordered from Thermo Electron or one of its authorized representatives including Dionex Corporation.

## FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference. In this case, the user will be required to correct the interference at his/her own expense.

## **Notice on Lifting and Handling of MSQ Mass Spectrometer System**

For your safety, and in compliance with international regulations, the physical handling of this Dionex instrument *requires a team effort* for lifting and/or moving the instrument. This instrument is too heavy and/or bulky for one person alone to handle safely.

## **Notice on Proper Use**

In compliance with international regulations: If this instrument is used in a manner not specified by Dionex, the protection provided by the safety interlocks and the instrument design could be impaired.

## TABLE OF CONTENTS

<b>Read This First.....</b>	<b>7</b>
Changes to the Manual.....	8
<b>Introduction.....</b>	<b>9</b>
<b>Site Preparation .....</b>	<b>11</b>
2.1 Entrance .....	12
2.2 Space and Load Requirements.....	13
2.3 Telephone .....	16
<b>Operating Environment .....</b>	<b>17</b>
3.1 Temperature.....	18
3.2 Humidity.....	19
3.3 Lighting .....	20
3.4 Particulate Matter.....	21
3.5 Vibration.....	22
3.6 Electrostatic Discharge .....	23
3.7 Electromagnetic Disruption .....	24
<b>Line Power.....</b>	<b>25</b>
4.1 Quality of Power.....	27
4.2 Power Monitoring Devices .....	28
4.3 Power Conditioning Devices .....	29
4.4 Available Outlets .....	30
4.5 Power Cables .....	33
4.6 Connecting the MSQ and other Modules to Wall Outlets .....	34

4.7 Uninterruptible Power Supply ..... 36

**Fittings, Gases, Solvents, Labware..... 37**

5.1 Fittings and Parts ..... 38

5.2 Gases ..... 39

5.3 Solvents ..... 40

5.4 Labware ..... 41

5.5 Solvent Delivery ..... 42

**Waste and Exhaust ..... 43**

6.1 Exhaust System ..... 44

6.2 Solvent Waste ..... 48

**Instrument Arrival ..... 49**

7.1 Domestic Shipments ..... 50

7.2 International Shipments ..... 51

7.3 Receiving your MSQ Plus ..... 52

**Installation..... 53**

8.1 User Maintenance ..... 54

8.2 Preinstallation Checklist – Please go to the last page of this document – page 55.....55

# Read This First

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## Welcome to the Dionex MSQ Plus LC/IC MS system!

This Preinstallation Requirements Guide provides you information that will assist you in planning and preparing your lab site prior to delivery and installation of your system. Please read each section carefully to ensure that your laboratory is ready for the installation of your system.

### This manual contains the following chapters:

[Chapter 1: Introduction](#) describes your responsibilities for installation and maintenance of the system.

[Chapter 2: Site Preparation](#) gives details on the physical, electrical, air conditioning, and other laboratory requirements for the mass spectrometer and data system.

[Chapter 3: Operating Environment](#) provides additional information about how to prepare your laboratory to provide optimum conditions for instrument operation.

[Chapter 4: Line Power](#) gives details on the electrical outlets, power conditioning devices, and power supplies required to properly install your system.

[Chapter 5: Gases, Solvents & Labware](#) provides information on the solvents, gases, and laboratory equipment necessary to install and maintain your system.

[Chapter 6: Waste and Exhaust](#) describes how to properly collect the waste solvent and properly vent the laboratory for safe operation of the instrument.

[Chapter 7: Instrument Arrival](#) provides information on insurance claims and domestic and international shipments.

[Chapter 8: Installation](#) provides details on the final preparations necessary before the arrival of the Dionex Service Engineer for installation of the system.

## Changes to the Manual

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To suggest changes to this manual or the online Help, please send your comments to:

Technical Publications Manager  
Dionex Corporation  
1228 Titan Way  
Sunnyvale, CA 94086

You are encouraged to report errors or omissions in the text or index.

**Thank you!**

# Chapter 1

## Introduction

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The MSQ™ Plus mass spectrometric detector is a member of the Finnigan™ family of MS detectors. The MSQ Plus MS detector operates reliably under carefully controlled environmental conditions.

**The purchaser is responsible for providing a suitable location, a suitable operating environment, a source of power of acceptable quality, correct gas and solvent supplies, and proper waste and exhaust systems.**

Operating a system or maintaining it in a condition outside the power and operating environment specifications described in this guide might cause failures of many types. The repair of such failures is specifically excluded from the standard warranty and service contract coverage.

For additional information, request specific preinstallation support directly through your local Dionex Field Office.





# Chapter 2

## Site Preparation

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**It is your responsibility as the user to provide an acceptable installation site.**

Before your instrument can be installed by the service engineer, the site must be prepared. Refer to Table 2-1 for a summary of site preparation requirements. More information on each of the requirements is available on the page indicated in the table.

**Table 2-1.** Site preparation requirements

Requirement	Page
<b><u>Entrance</u></b> For the system to be delivered to the site, your entrances and hallways must be a minimum of 70 cm (28 in.) wide for passage of the instrument	11
<b><u>Space and Load Requirements</u></b> Your workbench must have minimum dimensions of 0.9 × 1.5 m (3 × 5 ft) to support the MSQ Plus MS detector, the LC/IC system, the optional cone wash pump, and the data system with user-supplied printer. The workbench must be capable of supporting the weight of the MSQ Plus MS detector [60 kg (132 lbs)] and the data system (with printer) [39 kg (86 lbs)] plus the weight of your liquid chromatograph and any options.	12
<b><u>Telephone</u></b> A telephone line must be installed near the workbench	15

**IMPORTANT NOTE:** Please ensure that your laboratory is prepared for the installation of your MSQ. Once the laboratory is ready, **complete and return the Preinstallation Checklist** (at the end of this guide) to your local Dionex representative, who will ensure an engineer is allocated to carry out the installation as soon as possible.

## 2.1 Entrance

Ensure that the entrance to your laboratory is a minimum of 70 cm (28 in) across. Allow additional room for maneuvering the containers around corners, into elevators, or through doorways.



**WARNING.** Risk of injury: The MSQ and rotary pump are heavy items and require at least two fit people for lifting and moving safely.

**AVVERTIMENTO.** Rischio di lesione: l'MSQ e la pompa rotativa sono oggetti pesanti e richiedono almeno due persone robuste per sollevarli e spostarli in sicurezza.

**ATTENTION.** Risque de blessure : le MSQ et la pompe rotative sont des instruments lourds qui nécessitent deux personnes au minimum pour leur manutention.

**VORSICHT!** Verletzungsgefahr: Aufgrund des hohen Gewichts sind mindestens zwei Personen zum Anheben und vorsichtigen Bewegen des MSQ und der Vakuumpumpe erforderlich.



**CAUTION.** Risk of instrument damage: Do not lift the MSQ by its two front doors. When lifting, support the instrument underneath by the four metal corners.

**Attenzione.** Rischio di danneggiamento della strumentazione: non sollevare l'MSQ usando i due sportelli frontali. Sollevalo prendendo lo strumento sotto i quattro angoli.

**Attention.** Risque de détérioration de l'instrument : ne jamais soulever le MSQ par ses deux portes frontales. Soulevez l'instrument uniquement par en dessous, au niveau des quatre coins métalliques.

**Vorsicht!** Beschädigungsgefahr: Das MSQ nicht an der Tür anheben. Das Gerät bitte nur an der Unterseite an den vier Gehäuseecken anheben.

The MSQ and its accessories are shipped in a container with the dimensions shown in Table 2-2. The MSQ container and its contents weigh approximately 60 kg. (132 lb)

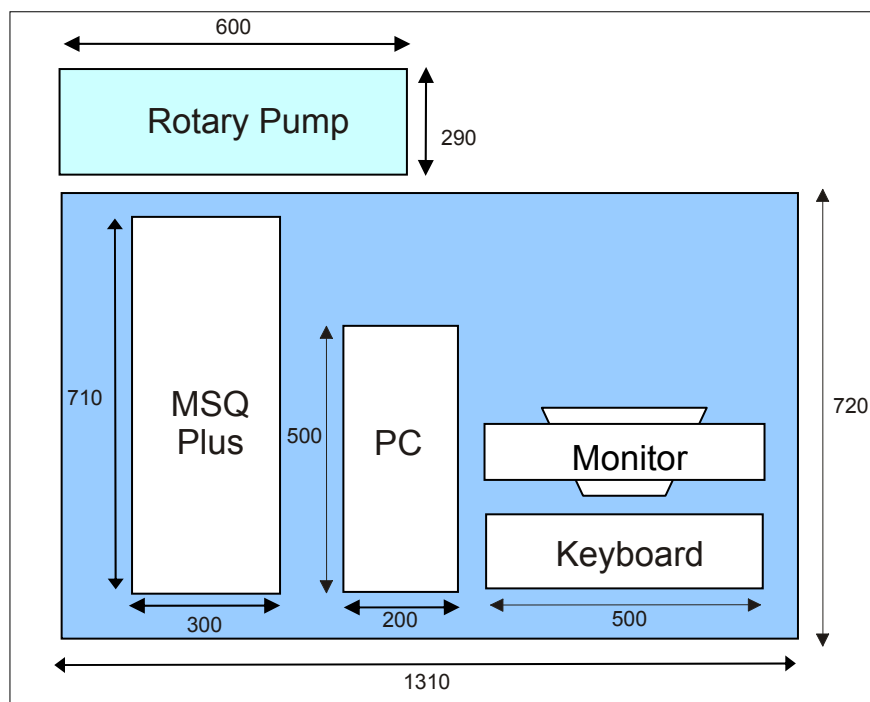
**Table 2-2.** Approximate dimensions for the MSQ container

Dimension	Length
Length	1120 mm (44 in)
Width	700 mm (28 in)
Height	780 mm ((31 in)

Other modules, such as the PC, monitor, and rotary pump are shipped in their own containers. Their dimensions and weights are less than that of the container for the MSQ.

## 2.2 Space and Load Requirements

The recommended layout for the MSQ Plus system is shown in Figure 2-1. The actual size of the instruments and the minimum bench space required is detailed in Table 2-3.



**Figure 2-1.** MSQ Plus system footprint (all dimensions in mm)

**Table 2-3** Weights and dimensions for the standard components of the MSQ Plus system

	Height		Width		Depth		Weight		
	mm	in	mm	in	mm	in	kg	lbs	
MSQ Plus	550	22	300	12	700	28	60	132	
Rotary pump	300	12	600	24	290	11	34	75	
Monitor	410	17	41	17	20	8	10	22	
Keyboard	30	2	480	19	20	8	1	2	
PC	480	19	180	7	430	17	23	50	
					<b>TOTAL</b>		<b>128</b>	<b>281</b>	

**Note.** The information shown in Table 2-3 may vary with different equipment.

**Ensure that your laboratory meets the following space and load requirements:**

- Place the MSQ Plus MS detector on a workbench that has minimum dimensions of 1 x 1.5 m (3 x 5 ft). The workbench must be capable of supporting the weight of the MSQ Plus MS detector [60 kg (132 lbs)] and the data system (with printer) [48 kg (105 lbs)] plus the weight of your liquid chromatograph and any options.
- Allow a minimum of 8 cm (3 in.) of clear space behind the system for clearance of the gas lines and electrical connections. In addition, allow at least 92 cm (36 in.) of vertical clearance between the top of the MSQ Plus MS detector and any shelves above it. This will permit sufficient space to remove the housing of the system, allowing access to the internal components of the mass spectrometer.
- Install the forepump on the floor close to the MSQ Plus MS detector. The length of the vacuum hose connecting the MSQ Plus MS detector to the forepump should not exceed 2.5 m (8 ft). Consider the following factors for locating the forepump and for connecting the vacuum hose from the MSQ Plus MS detector to the pump:
  1. Allow a minimum of 8 cm (3 in.) clear space at the rear of the MSQ for proper air circulation, clearance of vacuum hoses, and maintenance purposes.
  2. Provide enough space around the system for operators to work beside it and in front of it. Also ensure that there is a suitable location for sample preparation nearby.
  3. Either run the vacuum hose behind the workbench or make a 3.8 cm (1.5 in.) diameter hole through the bench for the vacuum hose. Allow for room to run the power cords. If there is no space under or at the end of the workbench, the pump can be placed on the floor in front of the MSQ Plus MS detector.



**CAUTION.** Whenever possible, provide space under the workbench for the forepump. If the pump is placed in front of the MSQ Plus MS detector, it can block access to drawers and cabinets, and can represent a trip hazard.

**Note.** Do not route exhaust tubing from the pumps vertically toward the ceiling. To maintain pump integrity, route the tubing from the exhaust ports down to the floor.

- If you are using the MSQ18LA nitrogen generator, install it on the floor close to the MSQ Plus MS detector. Because the gas pressure decreases as the length of the tubing increases, the 6 mm OD tubing that runs from the back of the nitrogen generator to the GAS In port on the rear panel of the MS detector should be no longer than 6 m (20 ft). Allow sufficient slack in the gas line so that the generator can be pulled forward for maintenance.
- The controlling PC can be positioned either alongside the MSQ or on a separate PC table. If on a separate PC table, this should be within 3 m of the rear of the MSQ Plus. (The MSQ is supplied with a 3 m USB2 cable to connect it to the PC.)

**Note.** If your system configuration includes optional extras such as an LC, syringe pump, or AXP-MS pump, extra bench space and/or vertical clearance will be required. Consult your local Dionex Customer Support Engineer for assistance.

## 2.3 Telephone

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Install a telephone in your laboratory near the instrument so that, if necessary, you can conveniently operate the system while you are working by telephone with Technical Support. Place the voice telephone outlet within 2 m (6 ft) of your system.

## Chapter 3

# Operating Environment

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**It is your responsibility as the user to provide an acceptable operating environment.**

Attention to the operating environment will insure continued high performance of your MSQ Plus MS detector. Any expenditure for air conditioning is more than offset by good sample throughput and reduced repair costs. Refer to Table 3-1 for more information on operating environment requirements.

**Table 3-1** Summary of operating environment preinstallation requirements

Requirement	Page
<p><b>Temperature:</b> The laboratory room temperature must be maintained between 15 and 27 °C (59 and 81 °F). Also, ensure that the temperature does not fluctuate by more than <math>\pm 5</math> °C to ensure good performance.</p>	17
<p><b>Humidity:</b> The relative humidity of the operating environment must be between 40% and 80%, with no condensation.</p>	18
<p><b>Lighting:</b> Adequate lighting for instrument operation is required. A high intensity lamp for instrument maintenance is also recommended.</p>	19
<p><b>Particulate matter:</b> Air should contain fewer than 100000 particles per cubic foot (3500000 particles per cubic meter) in excess of 5 <math>\mu</math>m.</p>	20
<p><b>Vibration:</b> Workbench must be free from vibration.</p>	21
<p><b>Electrostatic discharge:</b> Precautions are recommended, especially when you are operating the system at the lower end of the relative humidity specification listed above.</p>	22
<p><b>Electromagnetic Disruption:</b> The MSQ Plus can be susceptible to strong magnetic fields and should be positioned away from such interferences.</p>	23

### 3.1 Temperature

For precision instrumentation such as the MSQ Plus MS detector, the temperature stability of the installation environment can affect performance.

The laboratory room temperature must be maintained between 15 and 27 °C (59 and 81 °F). Also, make sure that the temperature does not fluctuate by more than 10 °C to ensure good mass accuracy.

**Note.** As the laboratory temperature increases, system reliability decreases. All electronic components generate heat while operating. This heat must be dissipated to the surrounding air for the components to continue to operate reliably.

The maximum overall heat dissipation to the room is 3 kW. There must be good flow of air around the MSQ Plus system, and the air conditioning system must be capable of maintaining a constant temperature in the immediate vicinity of the system.



**CAUTION.** Do not directly expose the MSQ Plus system under an air duct, near windows, or near heating and cooling sources. Temperature fluctuations of 5° C or more over a 5 min period of time can affect performance.

The air conditioning load for a MSQ Plus MS detector with an LC or IC, and data system is approximately 5000 W (17000 Btu/h). Refer to your LC/IC manual for the heat output of your chromatography equipment. Table 3-2 shows the approximate heat output of each module.

**Table 3-2.** Heat output for the MSQ Plus MS detector and the data system (with printer)

Module	Heat Output (in Watts)	Heat Output (in Btu/h)
MSQ Plus	3,000	10,200
Monitor	240	820
PC	470	1,600
TOTAL	3,710	12,620

## 3.2 Humidity

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The relative humidity of the operating environment must be between 40% and 80%, with no condensation. Relative humidity must not exceed 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 35°C.

Operating a MSQ Plus MS detector in an environment with very low humidity can cause the accumulation and discharge of static electricity, which can shorten the life of the electronic components. Operating the system in an environment with high humidity can cause condensation, oxidation, and short circuits. It can also cause the accumulation of dust that can block filters on cooling fans.

It is recommended that your laboratory be equipped with a temperature /humidity monitor to insure that your laboratory is always within the required temperature and humidity specifications.

## **3.3 Lighting**

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Good lighting makes any work area more enjoyable. A small, high-intensity lamp is recommended for use when cleaning the mass spectrometer components.

## 3.4 Particulate Matter

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The air in your laboratory must not have excessive dust, smoke, or other particulate matter. For reference, the air should contain fewer than 100,000 particles per cubic foot (3,500,000 particles per cubic meter) in excess of 5  $\mu\text{m}$ .

Dust can clog the air filters, causing a reduction in air flow around electronic components. Dust can also form a layer on electronic components that acts as an insulating blanket and thus reduces the transfer of heat from the components to the surrounding air. This environment may cause components and equipment to overheat.

## 3.5 Vibration

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The MSQ is a sensitive instrument. Make sure that your system workbench is free from vibration. Also, be aware of floor vibrations caused by equipment in adjoining locations.

Do not install the rotary pump on the same workbench as your MSQ. The rotary pump gives off vibrations while it operates. Therefore, we recommend installing the pump on the floor underneath or to the rear of the MSQ.

## 3.6 Electrostatic Discharge

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Electrostatic discharge (ESD) can damage the electronic components of your MSQ Plus MS detector. The MSQ Plus can withstand electrostatic discharges (ESD) up to 8 kV (air discharge) and 4 kV (contact discharge) with all panels in place. However, if the panels are removed and the PCBs are exposed or handled without proper precautions, the electronic components might be damaged or fail prematurely.

Static electricity can develop in a variety of ways. A few examples of how electrostatic charge can develop are as follows:

- When walking across a carpet in a room that is at 20% relative humidity, as much as 35,000 V of electrostatic potential can be generated on the surface of your body. A similar trip in a room at 80% relative humidity generates about 1,500 V of electrostatic potential.
- Sitting and working in a chair padded with polyurethane foam in a room at 20% relative humidity can cause as much as 18,000 V of electrostatic potential to develop on your skin or 1,500 V at 80% relative humidity.
- Working in laboratory coats and clothing made of synthetic fibers can cause the accumulation of static electricity on your skin.
- Styrofoam® cups and packing materials typically have a considerable electrostatic charge on them.

The discharge of static electricity is not perceptible to a human being until the potential is at least 4,000 V. Many electronic components can be damaged by a discharge of electrostatic potential of as little as 50 V. ESD damage can be catastrophic, causing your system to cease functioning. More commonly, however, ESD damage might cause latent problems that are detrimental to sensitive electrical components, causing premature failures.

Therefore, the following precautions are recommended, especially when you are operating your system at the lower end of the relative humidity specification listed in section 3.2.

- Use a static-dissipating floor covering (such as tile or conductive linoleum) in the room that houses your instrument.
- Use laboratory chairs covered with natural fiber or other static-dissipating material.
- When you are operating the instrument, wear a laboratory coat and clothing made of natural fiber or other static-dissipating material.
- Do not place Styrofoam cups or packing materials on the instrument.

## 3.7 Electromagnetic Disruption

The MSQ Plus MS detector must be positioned at least 3 m away from strong magnetic fields such as may emanate from NMR systems, magnetic sector mass spectrometers, power lines, transformers, and so on.

**Note.** Magnetic fields can penetrate through walls and similar barriers



**CAUTION.** The MSQ system must not be used in a high RF environment.

# Chapter 4

## Line Power

**It is your responsibility as the user to provide a source of power of acceptable quality for the operation of your system.**

The performance and longevity of your system can be affected by the quality of line power delivered to the system. To ensure that your instrument performs optimally and is not damaged by line power fluctuations, verify that you comply with all power quality requirements. Refer to Table 4-1 for a summary of line power requirements. More information on each of the requirements is available on the page indicated in the table.

**Table 4-1.** Summary of line power preinstallation requirements

Requirement	Page
<p><b><u>Quality of Power:</u></b></p> <p><b>Line power must be free from:</b></p> <ul style="list-style-type: none"> <li>• Long-term changes in average root mean square (RMS) voltage level, with durations greater than 2 s</li> <li>• Sudden changes in average RMS voltage level, with durations between 50 ms and 2 s.</li> <li>• Brief voltage excursions of up to several thousand volts with durations of up to 50 <math>\mu</math>s.</li> </ul>	<b>26</b>
<p><b><u>Power Monitoring Devices:</u></b></p> <p>Before connecting your MSQ Plus MS detector to line power, it is strongly recommended that the power line be monitored 24 hours a day for seven consecutive days.</p>	<b>27</b>
<p><b><u>Power Conditioning Devices:</u></b></p> <p><b>To free line power from voltage changes, sags, surges and transients, the following devices are available:</b></p> <ul style="list-style-type: none"> <li>• Noise suppression transformer</li> <li>• Buck/boost transformer</li> <li>• Power Conditioning</li> </ul>	<b>28</b>

**Table 4-1.** Summary of line power preinstallation requirements - *continued*

Requirement	Page
<p><b><u>Available Outlets</u></b></p> <p><b>For systems installed where there is 110 and 230 V</b> (i.e. North America):</p> <ul style="list-style-type: none"> <li>• Nominal voltage of 120 V ac, +6% to -10% and 230 V ac, ±10% and free from voltage variations above or below this operating range (<b>Note:</b> For systems installed in areas with 208 V ac nominal line power, it will be required to use a buck/boost transformer to keep your line power within operating parameters.). In the U.S., only 15 and 20 A power rating options are available, therefore you <b>must</b> choose the 20 A option.</li> <li>• Frequency of 50/60 Hz.</li> <li>• Two fourplex outlets (single-phase power) with a minimum power rating of 20 A (120 V ac).</li> <li>• One outlet (single-phase power) with a minimum power rating of 20 A (230 V ac) – MSQ Plus and Forepump only. A separate (230 V ac) outlet will be required for the optional MSQ18LA nitrogen generator.</li> <li>• Earth ground hard-wired to the main panel.</li> </ul> <p><b>For systems with only 230 V line power</b> (i.e. Europe):</p> <ul style="list-style-type: none"> <li>• Nominal voltage of 230 V ac, ±10%</li> <li>• Frequency of 50/60 Hz.</li> <li>• Three fourplex outlets, with a minimum power rating of 16 A at each fourplex outlet.</li> <li>• Earth ground hard-wired to the main panel.</li> </ul>	<p><b>29</b></p>
<p><b><u>Power Cables</u></b></p> <p>For North America, power cables are provided to match the outlet configurations specified in Section 4.4. For other regions power cables should be ordered for the country of installation</p>	<p><b>32</b></p>
<p><b><u>Connecting the MS, LC, and Other Modules to Wall Outlets:</u></b></p> <p>Balance the current load on the circuits to which your system is connected.</p>	<p><b>33</b></p>
<p><b><u>Uninterruptible Power Supply:</u></b></p> <p>Systems installed in areas with intermittent line power must have uninterruptable power supplies installed.</p>	<p><b>35</b></p>

## 4.1 Quality of Power

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The quality of power supplied to your MSQ Plus MS detector is very important. The line voltage must be stable and within the specifications listed in this guide. The line voltage must be free of fluctuations due to slow changes in the average voltage, surges, sags, or transients.

Below are definitions for the most common voltage disturbances:

- Slow average is a gradual, long-term change in average root mean square (RMS) voltage level, with typical durations greater than 2 s.
- Sags and surges are sudden changes in average RMS voltage level, with typical durations between 50 ms and 2 s.
- Transients (or impulses) are brief voltage excursions of up to several thousand volts with durations of up to 50  $\mu$ s.
- Constant high line voltage, impulses, or surges in voltage can cause overheating and component failures. Constant low line voltage or sags in voltage can cause the system to function erratically or not at all
- Transients, even a few microseconds in duration, can cause electronic devices to fail catastrophically or to degrade and eventually shorten the lifetime of your system. Therefore, it is important to establish the quality of the line voltage in your laboratory before your MSQ Plus MS detector is installed.

## 4.2 Power Monitoring Devices

A variety of devices are available to monitor the quality of your line power. These devices provide a continuous record of line performance by analyzing and printing out information on three types of voltage disturbances: (1) slow average, (2) sag and surge, and (3) transient. In the first two cases, the duration as well as the amplitude of the disturbance are indicated by time interval recording. The Dranetz® power line disturbance analyzer is a device capable of detecting and recording most types of line power problems.<sup>1</sup> Line monitors can be rented from electrical equipment suppliers.

Monitor the power line 24 hours a day for seven consecutive days. If inspection of the printout indicates disturbances, terminate the test and take corrective action. Then, monitor the power again as described above.



**CAUTION.** In North America, any power monitoring device that you use should meet regulatory compliance certification for your region (for example, UL, CSA, or NRTL).

### 4.3 Power Conditioning Devices

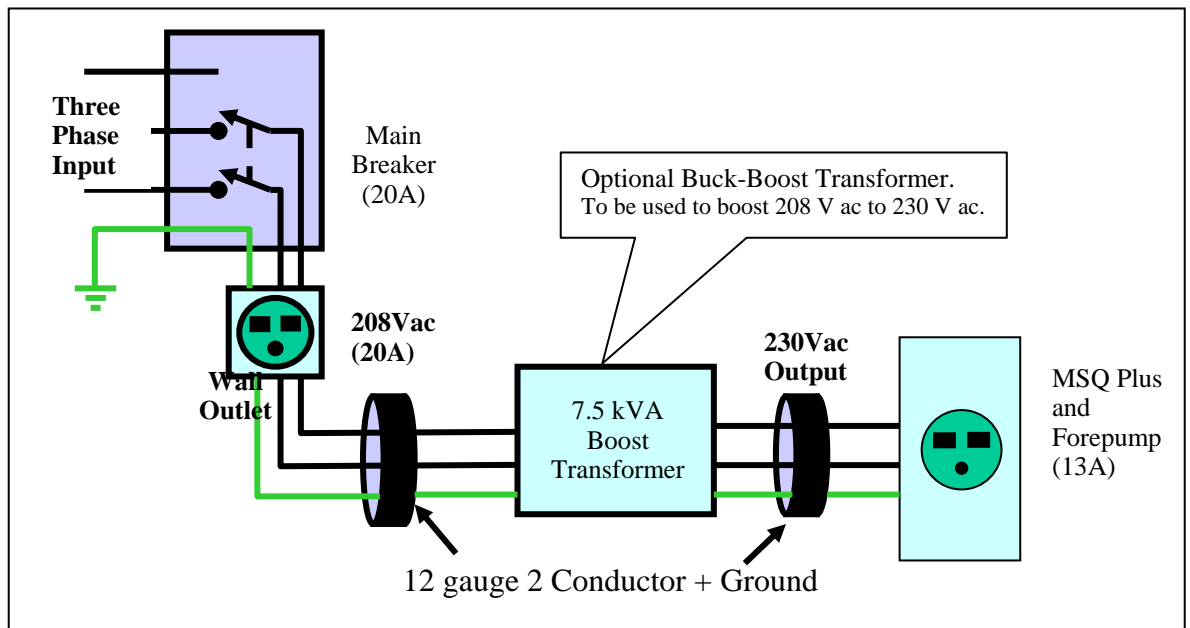
Various line voltage conditioning devices are available that can correct your line voltage problem. If you have good regulation but the power line disturbance analyzer shows transient voltages, then an isolation /noise-suppression transformer should be adequate to resolve the problem. If there are both transient and regulation problems, then consider power conditioners, which can control both of these problems.



**CAUTION.** Any conditioning devices installed with your system must be able to deal with the potentially high currents that are drawn during the initial startup of the system. For example, the forepump can draw as much as 30 A during startup.

When the line voltage is free from voltage sags, surges, and impulses but is more than 10% outside of the voltage specifications, the line voltage can be lowered (bucked 10%) or raised (boosted 10%) by using a buck/boost transformer. The buck/boost transformer kit is available from most electrical outlet stores. Figure 4-3 shows typical MSQ power configuration.

Note. Each buck/boost transformer is encased in a metal housing approximately 13 × 13 × 26 cm (5 × 5 × 10 in.) and is equipped with a 2 m (6 ft) power cable. Your electrician should install the buck/boost transformer before the installation of your system is started.



**Figure 4-3:** Using the optional buck-boost transformer to boost 208 V ac (nominal 3-phase for North America) to the required 230 V ac



**CAUTION.** For compliance and safety, ensure that your power conditioning devices are certified by recognized domestic and international organizations, such as UL, CSA, TÜV, VDE, and so on.

## 4.4 Available Outlets

The MSQ Plus MS detector operates at a nominal voltage of 230 V ac, 50/60 Hz. Line voltages can vary between a minimum of 207 V ac and a maximum of 253 Vac. The minimum and maximum voltage tolerances are in compliance with IEC 950, Amend 2, 1993, paragraph 1.6.5., as follows:

**Note:** “Equipment intended to operate directly from the main supply shall be designed for a minimum supply tolerance of +6% and -10%. If the rated voltage is 230 V ac single phase or 400 V ac three phase, the equipment shall operate safely within a minimum supply tolerance of  $\pm 10\%$ .”



**CAUTION.** Systems installed in areas with 208 V power will experience voltage sags during high use periods that might place the line voltage below the operating parameters discussed in this section. In that case, it is required that you protect your instrument by using a buck/boost transformer to ensure that power is within the specified parameters at all times.

**For systems installed in regions with both 120 V ac and 230 V ac service,** the basic power requirements for a MSQ Plus MS detector consist of the following:

- Nominal voltage of 120 V ac, +6% to -10% and 230 V ac,  $\pm 10\%$  and free from voltage variations above or below this operating range
- Frequency of 50/60 Hz
- Two fourplex outlets (single-phase power) with a minimum power rating of 20 A (120 V ac). This outlet will supply power for the PC Data System. Additional outlets may be required for optional printers or other PC peripherals. Ensure these power outlets are also within 2m of the MSQ Plus system.
- One 230 V ac power outlet for the MSQ positioned within 2 m of the instrument and with a minimum current rating of 20 Amps (recommended). This outlet will supply power for both the MSQ electronics (3A) and the rotary vacuum pump (10A).
- An additional 230 V ac (minimum current rating of 20 Amps (recommended) power outlet for the optional MSQ18LA nitrogen generator may also be required. This power outlet is also to be positioned within 2 m of the instrument.
- Earth ground hard-wired to the main panel

For systems installed in areas with 230 V ac only, the basic power requirement for a MSQ Plus MS detector consists of the following:

- Nominal voltage of and 230 V ac,  $\pm 10\%$  and free from voltage variations above or below this operating range
- Frequency of 50/60 Hz
- Three fourplex outlets, with a minimum power rating of 16 A at each fourplex outlet. This outlet will supply power for the PC Data System and MSQ Plus system. Additional outlets may be required for optional MSQ18LA nitrogen generator, printers or other PC peripherals. Ensure these power outlets are within 2m of the MSQ Plus system.



**CAUTION.** The values listed in Table 4-2 are the average currents drawn by each of the listed components. Any conditioning devices installed with your system must also be able to deal with the potentially high currents drawn during the initial startup of the system. **For example, the forepump can draw as much as 30 A during startup.** For more details on the surge requirements for your system, consult the forepump manuals. Contact your Service Engineer for more information.

Installing a conditioning device incapable of handling the potentially high currents drawn during the initial startup of the system could lead to personal injury!

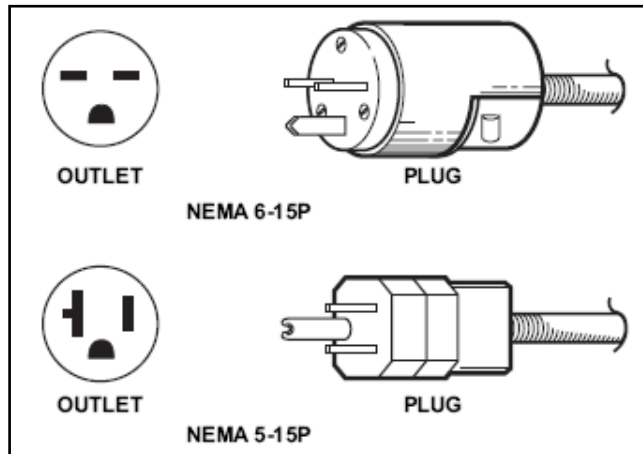
**Table 4-2.** Maximum current (single phase) for a MSQ Plus MS Detector at 230 V ac, an LC at 120 or 230 V ac, and the data system (with printer) at 120 or 230 V ac

Module	Voltage 120 V ac Current (in amps)	Voltage 230 V ac Current (in amps)
MSQ Plus (230 V ac only) and Forepump	NA	13
Forepump only	NA	10
Monitor	2	1
Computer	4	2
MSQ18LA N <sub>2</sub> generator (optional)	NA	6

**Note.** Refer to your LC/IC equipment manual for power requirements and specifications.

**Table 4-3.** MSQ Plus and PC data system plug configuration (North America).

Module	Receptacle Type (North America)
MSQ Plus (230 V ac only) and Forepump	NEMA 6-15R
PC and Monitor (2 minimum)	NEMA 6-15R
<u>or</u> (2 minimum)	NEMA 5-15R
Front-end Equipment	As needed



**CAUTION.** In North America, 207 V ac supplies (i.e.; 120 V ac, 3-phase connected Phase-Phase), are **NOT Suitable**.

**ATTENTION!** En Amérique du Nord, les alimentations électriques en 207 VAC (120 VAC triphasé connecté entre phases) **NE sont PAS utilisables**.

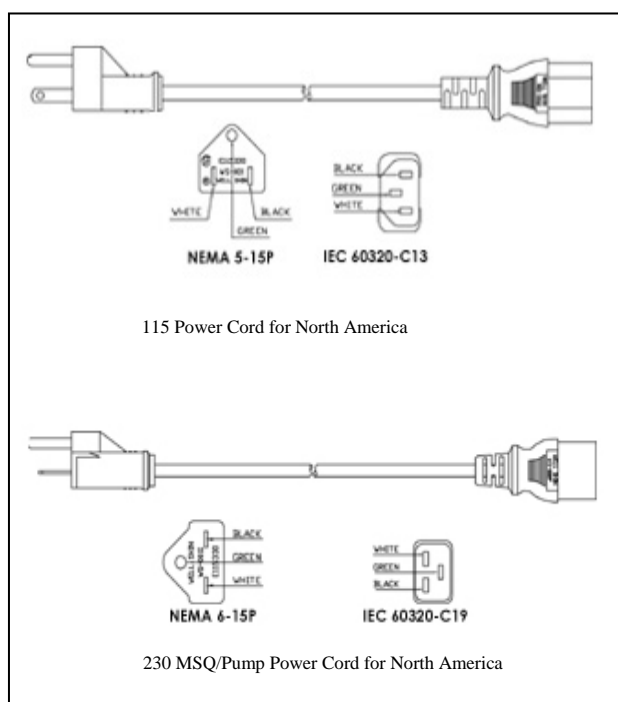
**Note.** If it is not possible to supply the MSQ from a wall-mounted socket, an isolator is required within 2 m of the instrument.

**Note.** Ensure that the interconnected power outlets for the MSQ system have a common point to one ground connector. If there are two such common points, each connected to separate external grounds, it may cause noise current to flow through the ground system via the ground loop that is formed.

## 4.5 Power Cables

In North America, power cables supplied for the MSQ, mechanical pump, PC, and monitor are each fitted with a 2 m power cable with plugs, as specified in Table 4-3.

For installations in other regions around the world, power cables should be ordered for the country of installation. Please refer to the Dionex price list for part numbers. Three power cables are required (1 MSQ/Pump - 230V ac, 2 for PC and monitor – 115V ac or 230V ac). Additional power cables are required for options and accessories (AXP-MS pump and nitrogen generator), as well as any IC or LC equipment.



## 4.6 Connecting the MSQ and other Modules to Wall Outlets

Care must be taken to ensure that the wall outlet specifications are not exceeded. The maximum load for a 120 V ac fourplex outlet is typically 20 A, and the maximum load for a 230 V ac fourplex outlet is typically 16 A. Refer to Table 4-2 for the maximum current ratings for the MSQ Plus MS detector and the data system.

Table 4-4 and Table 4-5 show examples of how to balance the power load among three wall outlets without exceeding their specifications.

The specifications for the modules in your system might vary from those in this guide. The power specifications on the module always supersede those in the guide. The actual value depends on your equipment.

**Table 4-4.** Suggested power connections for an MSQ Plus MS detector at 230 V ac, an LC at 120 V ac, and the data system (with printer) at 120 V ac.

Module	Fourplex Outlet 120 V ac Circuit #1	Fourplex Outlet 120 V ac Circuit #2	Fourplex Outlet 230 V ac Circuit #1
MSQ Plus including Forepump			13 A
LC or IC	10 A		
AXP-MS Auxiliary Pump (optional)	5 A		
MSQ18LA N <sub>2</sub> generator (optional)			6 A
Monitor		2 A	
PC		4 A	
Printer (optional)		3 A	
TOTAL	15 A	9 A	19 A



**WARNING:** Take care to ensure that the wall outlet specifications are not exceeded.

**AVVERTIMENTO.** Assicuratevi che le specifiche della presa a muro non siano superate.

**ATTENTION!** Assurez-vous que les spécifications électriques sont respectées.

**WARNUNG!** Stellen Sie sicher, dass die Netzsteckdose für die elektrischen Anschlusswerte des MSQ geeignet ist.

**Table 4-5.** Suggested power connections for an MSQ Plus MS detector at 230 V ac, an LC or IC at 230 V ac, and the data system (with printer) at 230 V ac.

Module	Fourplex Outlet Circuit #1 230 V ac	Fourplex Outlet Circuit #2 230 V ac	Fourplex Outlet Circuit #3 230 V ac
MSQ Plus including Forepump		13 A	
LC or IC	5 A		
AXP-MS Auxiliary Pump (optional)	2.5 A		
MSQ18LA N <sub>2</sub> generator (optional)			6A
Monitor			1 A
PC			2 A
Printer (optional)			2 A
TOTAL	7.5 A	13 A	11 A



**CAUTION.** The MSQ Plus MS Detector and your LC or IC system should never be connected to the same electrical wall outlet circuit.

**WARNING.** Ensure that all instruments are earthed. We recommend the use of an earth leakage circuit breaker (GFI) to protect the power supply.

**AVVERTIMENTO.** Assicurarsi che tutti gli strumenti siano messi a terra. Si raccomanda di utilizzare un interruttore differenziale per proteggere da eventuali dispersioni verso terra.

**ATTENTION.** Assurez-vous que tous les instruments sont reliés à la terre. Il est recommandé d'utiliser un disjoncteur différentiel pour la protection de l'alimentation.

**WARNUNG!** Stellen Sie sicher, dass alle Geräte geerdet sind. Es wird die Verwendung eines Fehlerstrom-Schutzschalters (FI) zum Schutz des MSQ-Netzteils empfohlen

**Note.** Additional power outlets may be required for a printer, the LC or IC pumping configuration, and any test and cleaning equipment. We recommend that there are several additional power outlets close to the workbench space within your laboratory.

## 4.7 Uninterruptible Power Supply

If your local area is susceptible to corrupted power or power disruptions, then install an uninterruptible power supply (UPS) in your laboratory.



**CAUTION.** The UPS must be listed or recognized by an NTRL in the USA or by a European Recognized Agency.

# Chapter 5

## Fittings, Gases, Solvents, Labware

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**It is your responsibility as the user to provide correct gas and solvent supplies for the operation of your system.**

Your instrument requires high purity nitrogen gas and HPLC solvents. The Service Engineer will also require certain fittings, solvents, and labware for the installation verification of your system. Refer to Table 5-1 for a summary these requirements. More information on each of the requirements is available on the page indicated in the table.

**Table 5-1.** Summary of solvent and gas preinstallation requirements

Requirement	Page
<p><b><u>Fittings and Parts:</u></b> It is your responsibility to supply all fittings and parts necessary for connecting gases during the installation of your system. The tubing for the nitrogen supply to the MSQ Plus MS detector is 6 mm OD PTFE. The installation kit for the MSQ Plus MS detector includes a 6 mm × 1/4-in. BSP half union fitting.</p>	<b>37</b>
<p><b><u>Nitrogen Gas:</u></b> High purity (99%). The required gas pressure is 5.5 Bar (80 psi).</p>	<b>38</b>
<p><b><u>Solvents</u></b> Clean solvents are necessary for the installation of your system.</p>	<b>39</b>
<p><b><u>Labware</u></b> In order to demonstrate of MSQ Plus installation qualification tests and provide training on MSQ user maintenance, specific pipetts, vials, and other labware is required.</p>	<b>40</b>
<p><b><u>Solvent Delivery System</u></b> In order to demonstrate of MSQ Plus installation qualification tests and provide training on MSQ user maintenance, specific pipetts, vials, and other labware is required.</p>	<b>41</b>

## 5.1 Fittings and Parts

Table 5-2 lists the minimum parts that are required to connect your MSQ Plus MS detector to your gas delivery system. **Your connections and gas delivery system might vary, and it is your responsibility to supply any fittings or connections necessary during installation.**

**Table 5-2.** Gas connection hardware required

Description	Quantity
6 mm OD, PTFE nitrogen supply tubing	2 m (6 ft) provided with MSQ Plus. Additional lengths may be required as needed by the lab
Adaptor, half union 6 mm - 1/4 BSP to connect to nitrogen regulator	1 ea – provided with MSQ Plus
Required only for N <sub>2</sub> tank or Dewar operation: Nitrogen regulator capable of measuring 0-100 psi.	1 ea - Not provided in kit. The customer is to supply these parts. Regulator is <u>not</u> required if using Dionex supplied nitrogen Generator (MSQ18LA).

## 5.2 Gases

Your system can use large amounts of nitrogen gas during daily operations. It is essential that the nitrogen gas is delivered with the necessary pressure and purity. The **nitrogen** for the API sheath gas and auxiliary gas needs to be, dry, high purity (99%). The required gas pressure is 5.5 Bar (80 psi).



**CAUTION.** Contaminants introduced during the installation of house lines used for gas delivery can cause damage to the system. Ensure that all gas lines used with your system have been cleaned of all particulates and oils. You are responsible for any damage to the instrument caused by contaminants introduced from your gas delivery system.

**Note** if using tanked nitrogen or a liquid nitrogen Dewar: To calibrate the MSQ Plus MS detector a nitrogen gas regulator must be available that can be adjusted from 0 to 690 kPa (0 to 100 psi).

### Run the nitrogen gas line to the rear of the MSQ Plus MS detector.

- The adaptor union, 6 mm - 1/4 BSP (supplied with MSQ Plus) is installed onto the nitrogen regulator.
- External nitrogen gas lines should be either PTFE (Supplied with MSQ Plus) or stainless steel.
- If connecting to the MSQ18LA nitrogen generator, limit the nitrogen gas supply line to 6 m (20 ft). Particulate filters can be a source of contamination; they are not recommended.
- Typical nitrogen gas consumption is approximately 13 L per min in the ESI mode and 8 L per min the APCI mode. Based on a 24 hour day, maximum usage can be up to 15800 L (560 ft<sup>3</sup>) per day. Therefore, it is recommended that nitrogen be supplied from one of the following sources:
  1. A large, sealed, thermally insulated cylinder containing liquid nitrogen from which the nitrogen gas is boiled off. The 230 psi model is recommended. The 35 and 80 psi models do not provide sufficient gas pressure. A typical cylinder of size 240 L yields 143850 L (5080 ft<sup>3</sup>) of gas. A nitrogen gas regulator capable of regulating from 0 – 100 psi is required (to be supplied by customer).
  2. A nitrogen generator with a minimum capacity of 13 L per min at 99% purity with 80 psi at the side panel. Nitrogen generators require an air compressor. Some models of air compressor are quite noisy. Therefore, be careful to select a quiet compressor. This is a continuous source; no replacement is required. Dionex recommends the MSQ18LA nitrogen generator.

## 5.3 Solvents

The solvents listed in Table 5-3 are useful in operating and maintaining your MSQ Plus MS detector. Installation of the MSQ Plus requires HPLC grade methanol and water. Solvents should be new and un-opened for best results during installation.

**Note.** Some solvent impurities are transparent to UV/Vis detectors. Therefore, some HPLC grade solvents might contain contaminants that interfere with the performance of the MSQ Plus MS detector. For operation of your MSQ Plus MS detector, choose high purity solvents with minimum contamination.

**Table 5-3.** Solvents and reagents and modifiers

Solvents / Reagent	Specifications
Methanol	HPLC grade
Acetonitrile	HPLC grade
Water	HPLC grade or degassed Ultrapure Water - 18 mega-ohm resistance
Formic Acid	Purity 98% (T)
Isopropyl Alcohol	HPLC or Semiconductor grade

**Note.** Do not filter solvents. Filtering solvents can introduce contamination.

**Note.** It is recommended that solvents from the following manufacturers are used: Merck, Mallinckrodt, or Burdick & Jackson.

**Note:** Store and handle all chemicals in accordance with standard safety procedures.

## 5.4 Labware

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In order to demonstrate of MSQ Plus installation qualification tests and provide training on MSQ user maintenance, specific pipettes, vials, and other labware is required.

- Precision pipettes capable of measurement in the 100 uL & 500 uL range
- 1 ea, 10 mL glass pipette graduated in 1/10th mL increments with valved delivery bulb
- 6 ea, 20 mL glass, capped sample vials
- 1 ea, 250 uL Syringe (Hamilton p/n 81165) or equivalent for injection of standards
- 1 ea, 500 mL, glass graduated cylinder
- 1 ea, 1L glass beaker
- 2 ea, 250 mL glass beakers
- Degassing apparatus: Ideally consisting of a sonication device and a vacuum source.
- Recommended: Dissecting microscope capable of 50 x magnification

## 5.5 Solvent Delivery

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If Dionex is not supplying the solvent delivery system (e.g. AXP-MS auxiliary solvent delivery pump), make sure that the specifications detailed in this section are met.

**Note.** If necessary, inform Dionex that you do not have a suitable solvent delivery system so that possible alternative solutions can be found prior to the arrival of the Dionex Service Engineer.

If the LC system does not provide a stable and pulse-free solvent delivery, the signal-to-noise specification will be compromised.

Solvent delivery requirements:

1. For direct injection, a pump giving a **stable, pulse-free** flow at a rate of 50  $\mu$ L to 2 mL/min is required.
2. For LC-Electrospray MS, an HPLC pump of similar performance is required.

## Chapter 6

# Waste and Exhaust

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**It is your responsibility as the user to provide proper waste and exhaust systems for the operation of your system.**

The proper performance of your system can be affected by the waste and exhaust arrangements for the instrument. Vacuum and solvent wastes must be vented separately, and wastes must be collected and disposed of properly. Refer to Table 6-1 for a summary of exhaust and waste system requirements. More information on each of the requirements is available on the page indicated in the table.

**Table 6-1.** Summary of waste and exhaust preinstallation requirements

Requirement	Page
<b><u>Exhaust system:</u></b> Vacuum pumps and solvent wastes must both be vented to fume exhausts. The pumps must be connected to a fume exhaust system that is separate from that to which solvents are vented.	<b>43</b>
<b><u>Solvent Waste</u></b> A suitable container for the solvent wastes must be installed with the system. A solvent trap is supplied with the MSQ Plus MS detector.	<b>46</b>

## 6.1 Exhaust System

Much of what is introduced into the MSQ Plus MS detector is eventually exhausted from the forepump, along with the small amount of oil vapor that these pumps characteristically emit. Therefore, the forepump should be connected to a fume exhaust system.

**Note.** An efficient fume exhaust system is required for the proper operation of your forepump. Most API applications contribute to the accumulation of solvents in the forepump. These solvents must be purged from the mechanical pump oil periodically by opening the ballast valve located on the top of the pump. When the ballast valve is opened, a large volume of volatile solvent waste might enter the fume exhaust system. Therefore, your fume exhaust system must be able to accommodate the periodic purging of the solvents. The frequency of the purging is dependent on the throughput of your system.

The forepump has two functions: (1) providing a vacuum for the capillary skimmer of the API source, (2) providing backing pressure for the turbomolecular pump. Consult local regulations for the proper method of exhausting the fumes from your system. There are two exhaust lines to consider:

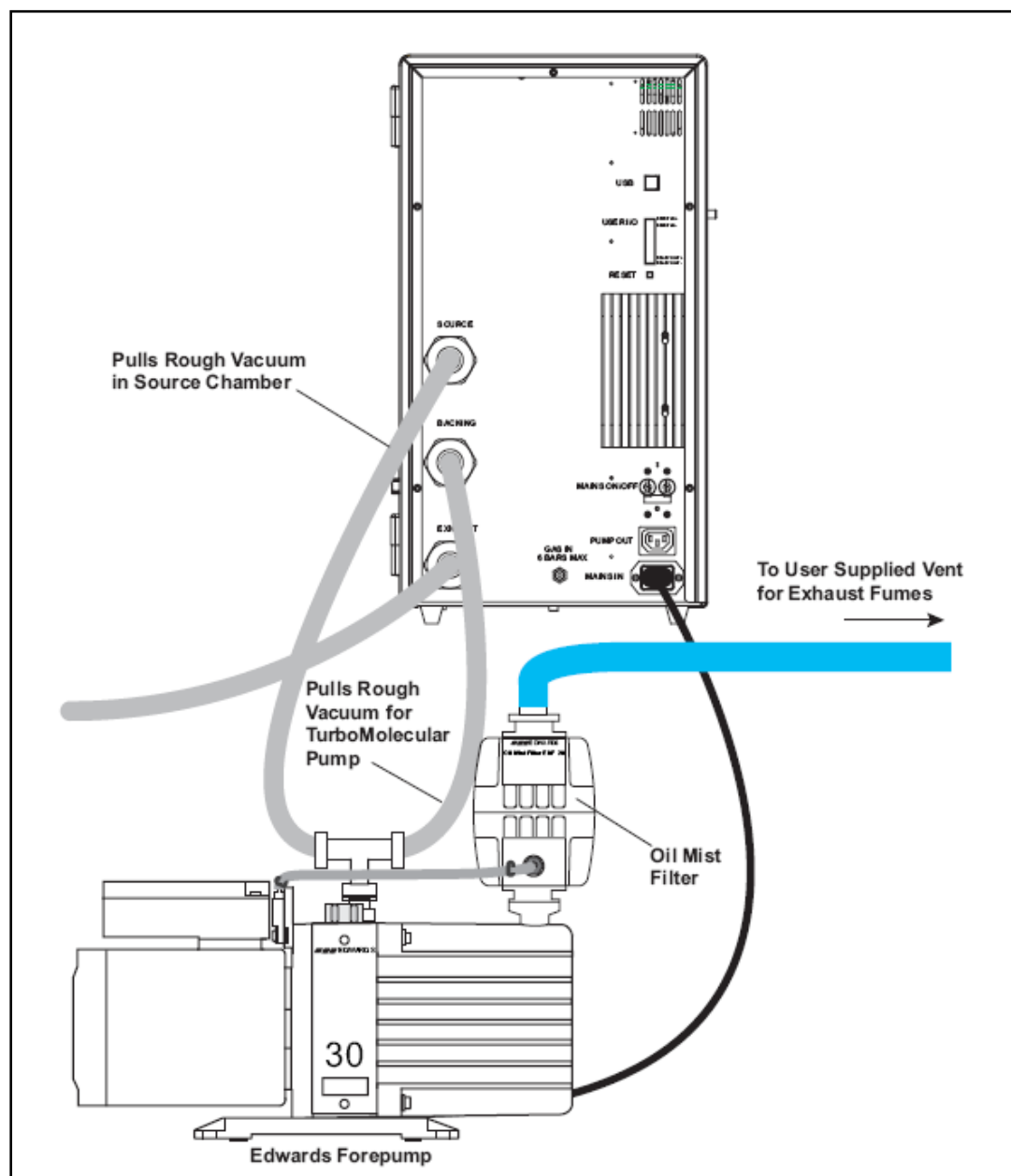
- Forepump Exhaust
- Electrospray / APCI Exhaust



**CAUTION.** Your laboratory must contain an appropriate exhaust system. The lack of an appropriate exhaust system can lead to personal injury

## Forepump Exhaust

The exhaust line from the forepump must be vented to the atmosphere external to the laboratory. This must be by way of a user-supplied fume hood or industrial vent exclusive to the forepump. See Figure 6-1.



**Figure 6-1** Forepump exhaust system using oil mist filter

## Electrospray / APCI Exhaust (API Source)

The exhaust line that connects the drain at the bottom of the source compartment to the Exhaust port on the rear panel of the MSQ Plus MS detector must be connected to a solvent trap. The solvent trap must be vented to the atmosphere, external to the laboratory. During installation, a Dionex Field Service Engineer will connect the solvent trap to a user-supplied fume hood or industrial vent by using the 2.5 m × 19 mm ID tubing supplied with the system. See Figure 6-2.



**CAUTION.** Serious damage to the instrument as well as personal injury might occur if the electrospray / APCI exhaust line is connected to the forepump exhaust line.

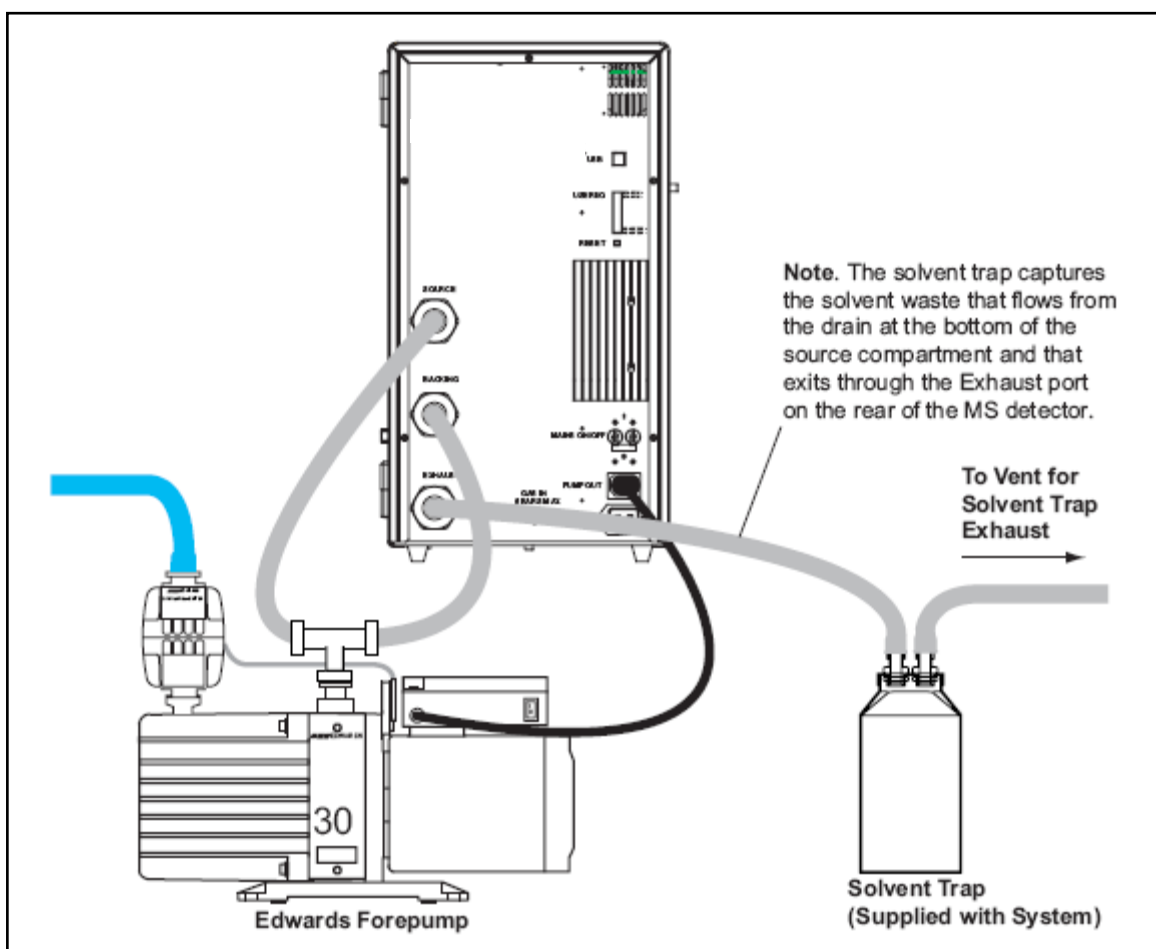
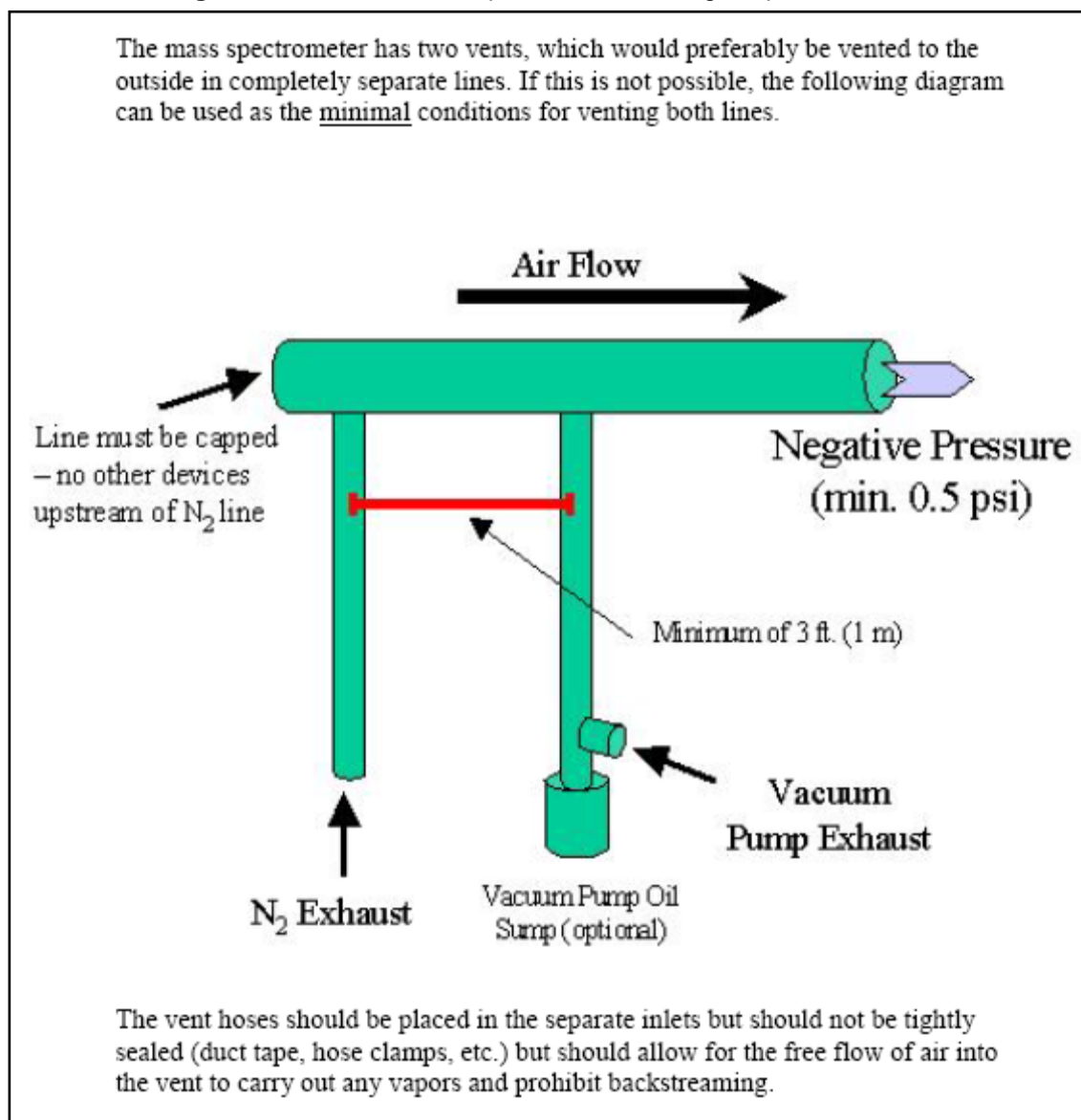


Figure 6-2 Source compartment exhaust system for the MSQ Plus

## Separation of API Source & Forepump Exhaust

The API Source exhaust must be kept separate from the Forepump exhaust in order to avoid contamination of the API Source region. It is preferable to vent to two regions separately however, if it is necessary to vent into a single fume hood for example, separate the two per Figure 6-3.

**Figure 6-3** Minimal Mass Spectrometer Venting Requirements



## 6.2 Solvent Waste

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The API source can accommodate high solvent flow rates and is fitted with a drainage port in its bottom. Therefore, provisions must be made to collect the waste solvent that exits the exhaust manifold on the rear panel of the MSQ Plus MS detector. The 19 mm (0.75 in) ID drain tube that exits the exhaust manifold must be connected to the solvent trap that is supplied with the system. The solvent trap is a 4-L wide-mouth square bottle with two brass fittings on the top. The drainage tubing that extends from the exhaust manifold is connected to one fitting. Additional tubing long enough to reach a user-supplied fume hood or industrial vent is connected to the other fitting (Figure 6-2).



**CAUTION.** Do **not** vent the drain tubing (or any vent tubing connected to the waste container) to the same fume exhaust system to which you have connected the forepump.

# Chapter 7

## Instrument Arrival

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Dionex instruments are shipped by electronic equipment carriers (arranged by Dionex) who specialize in handling delicate equipment. The delivery advice note will detail the number of boxes and their contents.

**Please do not open any boxes without prior permission from Dionex.** Your warranty and/or Dionex's insurance risk may be invalidated if permission is not sought in writing.

Requirement	Page
<b><u>Domestic Shipments</u></b> One of two methods may be used: FOB (free on board) Sunnyvale, California, USA or (b) FOB destination.	<b>49</b>
<b><u>International Shipments</u></b> Instruments shipped outside of the USA are shipped CIP (carriage and insurance paid to) destination unless specified differently.	<b>50</b>
<b><u>Receiving your MSQ Plus System</u></b> Precautions when receiving your instrument.	<b>51</b>

## 7.1 Domestic Shipments

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**Domestic Shipments:** Instruments are shipped using one of the following methods: (a) FOB (free on board) Sunnyvale, California, USA or (b) FOB destination. The method of shipment determines who has responsibility for filing a claim against the carrier if the system is damaged in transit.

Most systems are shipped FOB Dionex-Sunnyvale, and in this instance any damage(s) incurred in shipment is the responsibility of the purchaser and the carrier. However, Dionex will assist with claims filing and (billable) repairs if necessary.

If the system is shipped FOB destination, Dionex will file a claim against the carrier.

**Note:** Dionex will not accept liability for damage if materials are received with obvious damage and the damage is not recorded on the receiving documents.

When your system arrives, move it to a protected location indoors. If you have questions about moving your system, contact your local Dionex office.

## 7.2 International Shipments

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**International Shipments:** Instruments shipped outside of the USA are shipped CIP (carriage and insurance paid) to destination unless specified differently. If the system is shipped CIP destination and if any damages are incurred in shipment, Dionex will file a claim against the carrier.

**Note:** Dionex will not accept liability for damage if materials are received with obvious damage and the damage is not recorded on the receiving documents.

## 7.3 Receiving your MSQ Plus

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Please take the following precautions when receiving your instrument:

- Check carefully for obvious damage or evidence of rough handling.
- If external damage is apparent, note this fact on all copies of the receiving documents and describe briefly the extent of the damage. If possible document damage with digital photographs. The driver should sign (or initial) next to your comments to signify agreement with your observations.
- Contact the appropriate Dionex office to report the damage
- If no external damage is apparent, Dionex strongly recommends signing all copies of the receiving documents "*Received but not inspected*" to indicate that the boxes have not been opened.
- Place the boxes near the place of installation, in a warm, dry, secure area until the installation engineer arrives. If you have any questions about moving your system, contact your local Dionex office.

**Note.** Freight insurance requires that obvious damage be noted on the receiving documents.

**Note.** Dionex will not accept liability for damage if materials are signed for without comment and found subsequently to be damaged.

# Chapter 8

## Installation

**Prior to installation, make sure that all preparations described in the previous chapters are complete.**

A Dionex Customer Support Engineer will install your system and demonstrate the system marketing specifications that are in force at the time of purchase (as defined in your Sales Order Contract). Contact your local Dionex office for details.

It is important to ensure that your laboratory is prepared for the installation. Once the laboratory is ready, **complete and return the Preinstallation Checklist** (at the rear of this guide) to your local Dionex representative, who will ensure an engineer is allocated to carry out the installation as soon as possible.

The major part of your acceptance of your MSQ system is the demonstration, by the engineer, that the system conforms to the specifications laid down under standard operating conditions.

During installation, your nominated operator will be made familiar with the basic operation of the instrument and specified techniques purchased with it. At the end of each session, a specification will be verified and the acceptance record signed by the responsible person. It is important that the responsible person is available for the duration of the installation.

Upon successful completion of the acceptance specifications, the instrument will pass into the agreed warranty period, during which Dionex will rectify, free of charge, faults attributable to defective materials or workmanship. Routine maintenance arising from normal use of the instrument is not covered by this warranty and we recommend that the customer take out a preventive maintenance contract

**Table 8-1.** More information on the installation of your system

Requirement	Page
<p><a href="#">User Maintenance for the MSQ Plus</a></p> <p>Routine and preventive maintenance of your MSQ system is your responsibility, as the user:</p>	<b>53</b>
<p><b>Preinstallation Checklist</b></p> <p>It is important to ensure that your laboratory is prepared for the installation. Once the laboratory is ready, <b>complete and return the Preinstallation Checklist</b> (at the end of this guide) to your local Dionex representative, who will ensure an engineer is allocated to carry out the installation as soon as possible.</p>	<b>54</b>

## **8.1 User Maintenance**

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Routine and preventive maintenance of your MSQ system is your responsibility, as the defined user. Regular preventive maintenance is essential and will increase the life of your system, result in maximum uptime, and provide you with optimum performance. Maintenance techniques are covered in the following manuals:

1. MSQ Hardware Manual (Included with MSQ)
2. Manuals that come with your PC, LC, and other modules of your MSQ Plus MS detector.

The automated tuning program will aid in performing routine mass calibration and resolution checks. Depending on the type and number of samples run, periodic cleaning of source parts (particularly the entrance and exit cones and API Probes) is the responsibility of the user. This is covered in the MSQ Hardware Manual.

# PREINSTALLATION CHECKLIST

## MSQ Plus Preinstallation Requirements Guide

### Revision A

Remove this sheet and use it as a guide while preparing your site for the installation of your MSQ system. First, make sure that your site meets all the requirements listed in this guide. Then, request installation by returning this completed form to Dionex.

#### 1. Complete the checklist below (tick each box) and answer all the questions.

Refer to the related topic in this guide for more information about each step. (Items in **bold** are very important)

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> 1. All laboratory remodeling is complete.</li> <li><input type="checkbox"/> 2. Your MSQ Plus system is on site.</li> <li><input type="checkbox"/> 3. Principal operator will be available during the installation / certification period.</li> <li><input type="checkbox"/> 4. Doorways, hallways, etc. are a minimum width of 70 cm (28 in.).</li> <li><input type="checkbox"/> 5. Available floor area is sufficient and flooring will support the load.</li> <li><input type="checkbox"/> 6. Sufficient bench space is available for all of the equipment. List the following (pg 12):<br/>Width: _____<br/>Depth: _____<br/>Height: _____</li> <li><input type="checkbox"/> 7. Workbench can support the load of the MS detector [60 kg (132 lbs)] and the LC or IC system (pg 13).</li> <li><input type="checkbox"/> 8. Lighting is adequate (pg 20).</li> <li><input type="checkbox"/> 9. <b>Main power is installed and is in compliance with local electrical codes.</b></li> <li><input type="checkbox"/> 10. Power for test and cleaning equipment is installed.</li> <li><input type="checkbox"/> 11. <b>Power outlets are of the correct configuration (pg 32).</b><br/>Note NEMA type: _____</li> <li><input type="checkbox"/> 12. <b>Voltage of power outlet has been measured (pg 30).</b><br/>Note <i>measured</i> voltage: _____</li> <li><input type="checkbox"/> 13. Power is free from fluctuations due to slow changes in the average voltage or changes due to surges, sags, or transients (pg 27).</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> 14. Air conditioning is adequate for temperature, Humidity, and particulate matter control. The laboratory can be maintained at a constant temperature, between 15 and 27 °C or 59 and 81 °F (pg 17).</li> <li><input type="checkbox"/> 15. Relative humidity is between 40% and 80% with no condensation (pg 18).</li> <li><input type="checkbox"/> 16. System work area is free from magnetic disruption and electrostatic discharge (pg 23).</li> <li><input type="checkbox"/> 17. <b>A supply of nitrogen gas is on site, gas lines are installed, an appropriate gas regulator is available, appropriate adaptors for connecting to 6 mm OD PTFE tubing are installed on the nitrogen supply line (pg 39).</b><br/>List gas purity _____</li> <li><input type="checkbox"/> 18. A new or recently cleaned HPLC system is available that produces a pulse-free, continuous flow from 50 to 2000 µL/min (pg 41).</li> <li><input type="checkbox"/> 19. <b>HPLC grade water, methanol, acetonitrile, formic acid and isopropyl alcohol are available for testing the performance of your instrument (pg 39).</b></li> <li><input type="checkbox"/> 20. There is a suitable exhaust system present that is separate from solvent waste (pg 43).</li> <li><input type="checkbox"/> 21. Provision has been made for collecting solvent waste from the API source (pg 46).</li> <li><input type="checkbox"/> 22. One voice telephone line is installed near the system (pg 16).</li> <li><input type="checkbox"/> 23. Installation area is in compliance with all relevant safety regulations.</li> </ul> |
|--|--|

Have any special acceptance specifications been agreed within the contract? If YES please attach full details of specifications.	Yes	No
Is there any additional equipment that needs to be interfaced to the system? If YES please supply details.	Yes	No
Are there any special precautions that an engineer should take when on site? If YES please supply details.	Yes	No

**Please note: If the laboratory is not ready for the installation when the engineer arrives, we reserve the right to invoice for the engineer's time.**

#### 2. Request installation.

Once you have completed the checklist, fill out the form below and fax or mail this page to your local Dionex Customer Service office. If you are not sure where to send this form, contact the Customer Service office assigned to your area.

Name \_\_\_\_\_  
 Title \_\_\_\_\_  
 Company \_\_\_\_\_  
 Address \_\_\_\_\_  
 City/State/Postal Code \_\_\_\_\_ Country \_\_\_\_\_  
 Telephone \_\_\_\_\_ Fax \_\_\_\_\_  
 Date purchased \_\_\_\_\_ The MSQ is already on-site (Y/N) \_\_\_\_\_  
 Signature \_\_\_\_\_ Date \_\_\_\_\_

