

Agilent 4107 Nitrogen Generator

User's Guide



Agilent Technologies

Notices

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Safety Notices

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.

WARNING

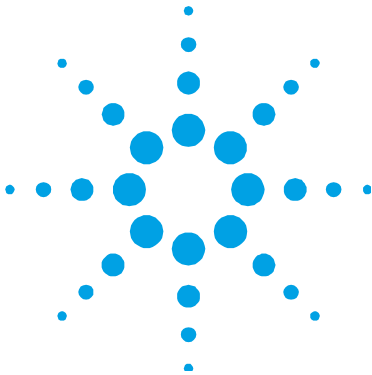
A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

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1. Safety Practices and Hazards

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General

Operation of an Agilent 4107 Nitrogen Generator involves the use of compressed gases. Careless, improper or unskilled use of this nitrogen generator can cause death or serious injury to personnel, and/or severe damage to equipment and property.

The nitrogen generator covers are designed to prevent inadvertent contact with any potential hazards. If the nitrogen generator is used in any manner not specified by Agilent, this protection may be impaired.

The safety practices described below are provided to help the user operate the nitrogen generator safely. Read each safety topic thoroughly before attempting to operate the nitrogen generator and *always* operate the nitrogen generator in accordance with these safety practices.

Safety Practices and Hazards

If you are unsure of the effects of any liquid, gas or chemical on the nitrogen generator, consult your Agilent field service engineer or approved representative before use.

Air supply

To avoid shortening its life, the nitrogen generator requires a supply of clean, dry, oil-free air. To assist in achieving this, the nitrogen generator has integral filters attached to the side of the unit. Depending on the quality of the air supply and the environmental conditions, additional driers and filters may be required. Please refer to the Agilent MP-AES Site Preparation Guide for further details and read the instructions regarding filters under the Maintenance chapter of this guide.

CAUTION

Under no circumstances should the nitrogen generator be operated without these filters connected or with the filters in a saturated condition.

CAUTION

Under no circumstances should the nitrogen generator be connected to an air supply containing oil. Permanent damage to the nitrogen generator will occur.

Contamination of the sorbent material with oil will invalidate the warranty.

Compressed Gas Hazards

Air compressors must be located and connected strictly in accordance with local safety codes and regulations.

All compressed gases (other than air) can create a hazard if they leak into the atmosphere. Even small leaks in gas supply systems can be dangerous. Any leak (except that of air) can result in an oxygen-deficient atmosphere which can cause asphyxiation. The area in which cylinders are stored and the area surrounding the instrument must be adequately ventilated to prevent such gas accumulations. Do not directly inhale the output gas from the nitrogen generator.

Periodically inspect the hoses to make sure they are in good condition and properly connected. Keep air hoses off the floor where they can be tripping hazards or become damaged. When disconnecting or connecting the hoses, make sure the hose is depressurized first.

Always wear safety glasses when connecting or disconnecting gas lines.

Electrical Hazards

Panels or covers which are retained by screws on the nitrogen generator may be opened *only* by Agilent-trained, Agilent-qualified or Agilent-approved field service engineers (unless specified otherwise).

The nitrogen generator is powered by an external AC-DC power supply. If the enclosure of this power supply is damaged it should be replaced immediately. Check the power cord for damage and replace it if it is visibly worn or damaged.

If necessary, replace the power cord only with a cord equivalent to the one specified in the site preparation guide.

Compressor

Consult the manuals or product labels supplied with your air compressor for safety information and to determine which parts of it are operator-accessible.

Other Precautions

The nitrogen generator weighs approximately 110 kg (242.5 lb). To avoid injury to personnel or damage to the instrument or property, always use a suitable mechanical lifting device to move the nitrogen generator.

Use only Agilent-supplied spares with your nitrogen generator.

Warning Symbols

The following is a list of symbols that appear in conjunction with warnings in this guide and on the nitrogen generator. The hazard they describe is also shown. The beginning of the warning text is noted by a warning icon:

WARNING

A triangular symbol indicates a warning. The meanings of the symbols that may appear alongside warnings in the documentation or on the instrument itself are as follows:



Eye hazard



*Heavy weight
(danger to feet)*



*Heavy weight
(danger to hands)*









Noxious gases

The following symbol may be used on warning labels attached to the instrument or in this guide. When you see this symbol, refer to the relevant operation or service manual for the correct procedure referred to by that warning label.



The following symbols appear on the instrument for your information.

	Direct current
	When attached to the rear of the instrument, it indicates that the product complies with the requirements of one or more EU directives.
	When attached to the rear of the product, indicates that the product has been certified (evaluated) to CSA 61010.1 and UL 61010-1.
	When attached to the rear of the product, indicates that the product complies with the South Korean Electromagnetic Compatibility (EMC) law applicable to Industrial and scientific use equipment.
 N10149	When attached to the rear of the instrument, indicates that the product complies with the requirements of ACMA.
	When attached to the rear of the instrument, indicates that the product complies with the requirements of WEEE ROHS directive.

CE Compliance

Your Agilent 4107 Nitrogen Generator has been designed to comply with the requirements of the Electromagnetic Compatibility (EMC) Directive and the Low Voltage (electrical safety) Directive (commonly referred to as the LVD) of the European Union. Agilent has confirmed that each product complies with the relevant Directives by testing a prototype against the prescribed EN (European Norm) standards.

Proof that a product complies with these directives is indicated by:

- the CE Marking appearing on the rear of the product, and
- the documentation package that accompanies the product containing a copy of the Declaration of Conformity. The Declaration of Conformity is the legal declaration by Agilent that the product complies with the directives listed above, and shows the EN standards to which the product was tested to demonstrate compliance.

Electromagnetic Compatibility

EN55011/CISPR11

Group 1 ISM equipment: group 1 contains all ISM equipment in which there is intentionally generated and/or used conductively coupled radio- frequency energy which is necessary for the internal functioning of the equipment itself.

Class A equipment is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

This device complies with the requirements of CISPR11, Group 1, Class A as radiation professional equipment. Therefore, there may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

Operation is subject to the following two conditions:

- 1 This device may not cause harmful interference.
- 2 This device must accept any interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

- 1 Relocate the radio or antenna.
- 2 Move the device away from the radio or television.
- 3 Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
- 4 Make sure that all peripheral devices are also certified.
- 5 Make sure that appropriate cables are used to connect the device to peripheral equipment.
- 6 Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.

Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

South Korean Class A EMC declaration

This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

A급 기기

(업무용 방송통신기자재)

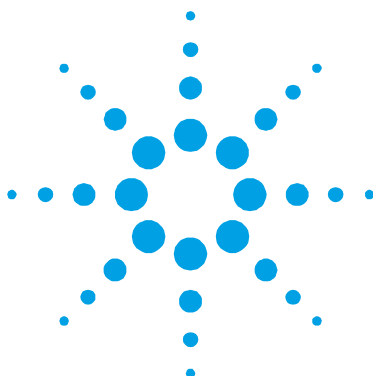
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ICES/NMB-001

This ISM device complies with Canadian ICES- 001.

Cet appareil ISM est conforme à la norme NMB-001 du Canada.

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2. Introduction

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Site Preparation Requirements

Prior to receiving your Agilent 4107 Nitrogen Generator you will have been provided with an Agilent MP-AES Site Preparation Guide, which describes the environmental and operating requirements of the MP-AES instrument and nitrogen generator. You must prepare the installation site according to these instructions before the nitrogen generator can be installed. You should keep the site preparation guide for future reference.

User Documentation

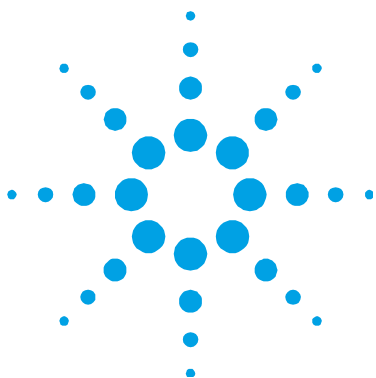
You have been provided with the following documentation to help you set up and operate your Agilent 4107 Nitrogen Generator:

- This User's Guide, with safety practices and hazards information, instructions for finding information about installing and maintaining the components of the nitrogen generator and a brief operation overview.
- The Agilent MP-AES Site Preparation Guide with safety information and site preparation instructions.

Notes and Tips

A Note is used to give advice or information.

A Tip is used to give practical hints to help you achieve the best possible performance from your instrument.



3. Installation

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The Agilent 4107 Nitrogen Generator must be installed by an Agilent-trained, Agilent-qualified or Agilent-authorized field service engineer.

You should have completed and returned the form in the site preparation guide stating that you have prepared the laboratory in accordance with the requirements detailed in that guide.

Details for unpacking the instrument and what to do in case it has been damaged in transit are also outlined in the site preparation guide.

WARNING



Heavy Weight

Danger to feet and hands. The nitrogen generator weighs approximately 110 kg (242.5 lb). To avoid injury to personnel or damage to equipment, always use a suitable lifting device when moving the instrument.

Overview

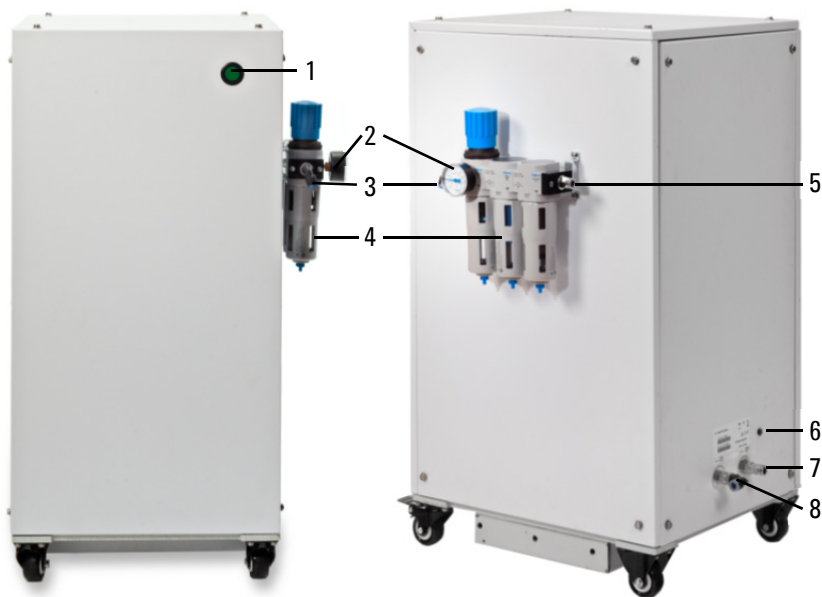


Figure 1. Agilent 4107 Nitrogen Generator front (left) and right side and back (right)

Where:

- | | | |
|-------------------------------|-------------------------------|------------------------------|
| 1. Power button and LED | 4. Filter regulator unit | 7. Nitrogen output |
| 2. Pressure regulator | 5. Filtered air supply output | 8. Filtered air supply input |
| 3. Air supply input connector | 6. Power supply connection | |

Installing the Nitrogen Generator

CAUTION

The nitrogen generator may suffer irreparable damage if operated without the required quality and filtering of the inlet air.

Unpacking

WARNING**Heavy Weight**

Danger to feet and hands. The nitrogen generator weighs approximately 110 kg (242.5 lb). To avoid injury to personnel or damage to equipment, always use a suitable lifting device when moving the instrument.

To unpack the nitrogen generator:

- 1 Remove the external packaging.
- 2 Unscrew the four screws attaching the side rails to the pallet on each side of the nitrogen generator. See 'Rail to pallet screws' below.

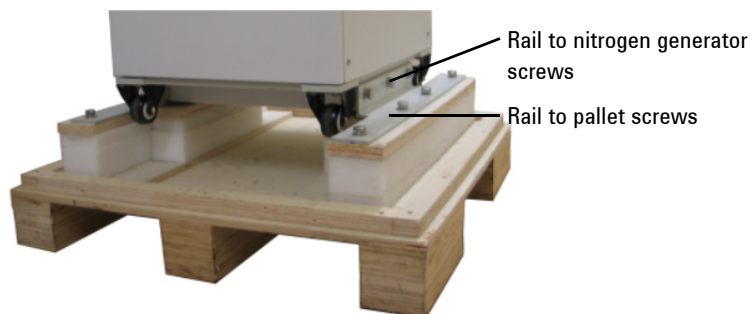


Figure 2. Location of the screws securing the nitrogen generator to the pallet

Installation

- 3 While still attached to the rails, use an overhead or portable hand crane and slings, thread the slings between the wheels and the substructure, both front and back and then lift the nitrogen generator.
- 4 Remove the pallet from underneath and then lower the nitrogen generator to the floor.
- 5 Once the instrument is completely off of the pallet, unscrew the three screws attaching the rail to the nitrogen generator.
- 6 The nitrogen generator can then be wheeled into position.

Position the nitrogen generator to allow easy access to the power button located on the front of the instrument.

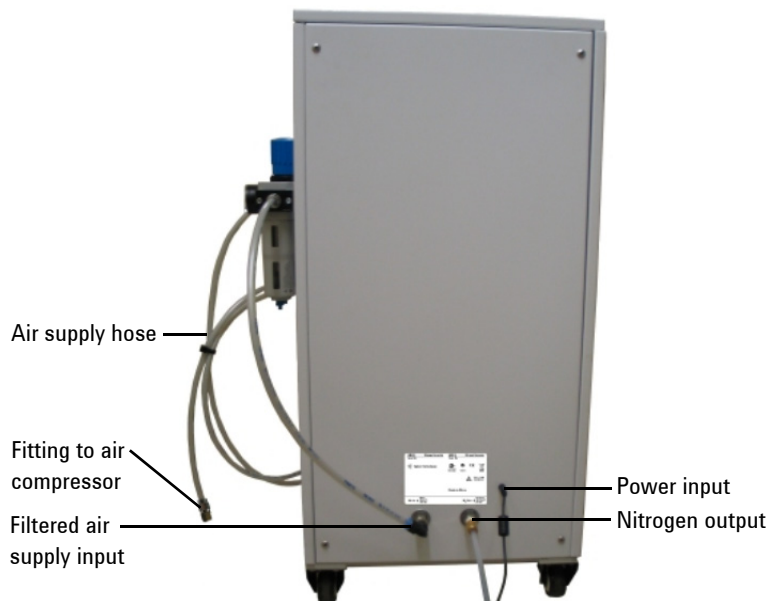


Figure 3. Nitrogen generator tubing and power connections

Connecting the nitrogen generator to the air supply

To connect the nitrogen generator to the air supply:

The air supply hose is attached at the factory to the nitrogen generator.

- 1 Ensure that the air supply meets the requirements specified in the Agilent MP-AES Site Preparation Guide.
- 2 Using the supplied fitting, connect the free end of the hose to the air supply connection. PTFE tape may be used to ensure a leak-free connection.

NOTE

The supplied fitting can be removed from the hose using the push-release feature.

Connecting the nitrogen generator output to the MP-AES instrument

To connect the nitrogen generator output to the MP-AES instrument:

- 1 Ensure a 1/4 inch Swagelok fitting is attached to the end of the gas supply hose.
- 2 Connect one end of the nitrogen gas supply hose to the nitrogen output on the rear of the nitrogen generator (see Figure 3) and the other end to the nitrogen inlet on the MP-AES instrument or EGCM (see Figure 4 and Figure 5).

NOTE

The External Gas Control Module (EGCM) will need a separate nitrogen generator to the one supplying nitrogen to the MP-AES instrument.

Installation

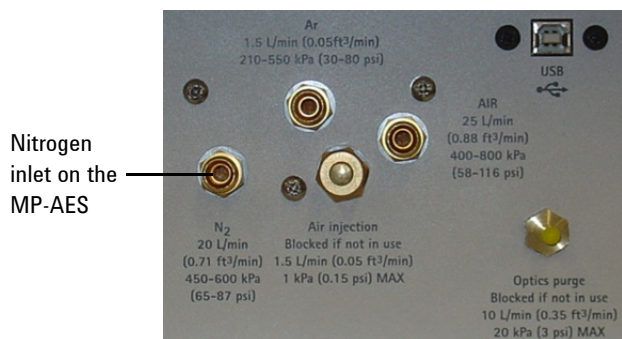


Figure 4. Nitrogen inlet on the bottom right side of the MP-AES instrument

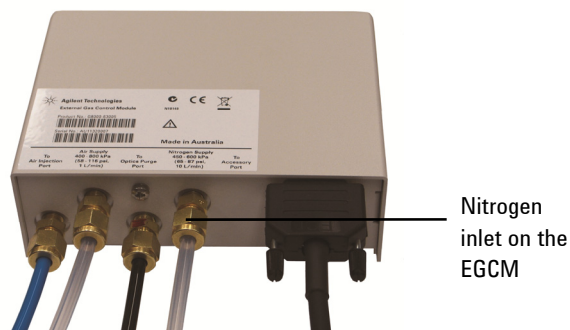


Figure 5. Nitrogen inlet on the EGCM

- 3 Ensure that the fittings are tightened firmly.

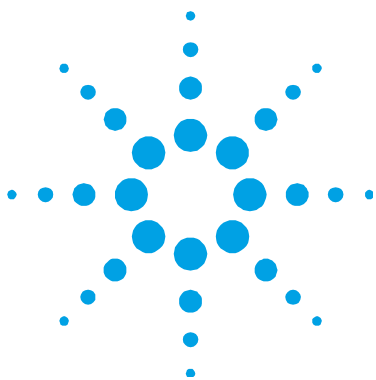
Connecting the nitrogen generator power

To connect the electrical power to the nitrogen generator:

- 1 Plug the small DC output connector from the power supply to the receptacle on the rear of the nitrogen generator. See Figure 3.
- 2 Plug the AC supply cable into the power supply.

NOTE

Plug the AC supply cable in to an outlet complying with the nitrogen generator requirements specified in the Agilent MP-AES Site Preparation Guide.



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Before Operation

Before starting the nitrogen generator, carefully read the ‘Safety Practices and Hazards’ section at the front of this guide and ensure that the laboratory is set up according to the details specified in the Agilent MP-AES Site Preparation Guide.

In operation, the nitrogen generator cycles approximately every 40 seconds. At the end of each cycle the oxygen enriched air is vented to the room from a vent in the bottom of the nitrogen generator. A noise may be heard as this gas is released.

Turning on the Nitrogen Generator

To turn on the nitrogen generator:

- 1 Ensure that the gas filters are installed correctly and do not need replacing.
- 2 Ensure the air and nitrogen hoses are connected to the nitrogen generator and that the air supply is turned on.
- 3 Check the pressure indicated on the pressure gauge of the filter regulator unit on the right side of the nitrogen generator meets the specification.

Operation

- 4 Switch on the nitrogen generator. The green LED will illuminate to indicate that it is powered and operating.

NOTE

If the pressure on the pressure gauge does not meet the specification, check the air supply system. The regulator is preset and is not user-adjustable.

CAUTION

Do not use the gas produced by the nitrogen generator to run the plasma until the nitrogen generator has been purged.

WARNING



Eye hazard

Do not disconnect the air supply or nitrogen outlet hoses without first depressurizing the nitrogen generator. The rapid escape of gas could cause injury. Always wear safety goggles and other appropriate safety clothing when disconnecting the gas supply.

Selecting the Nitrogen Generator

The nitrogen generator must be selected for use in the MP Expert software on the Instrument page.

To select the nitrogen generator for use:

- 1 Turn on the instrument exhaust system.
- 2 Turn on the MP-AES instrument.
- 3 Turn on the nitrogen generator.
- 4 From within the MP Expert software, click **Instrument > Configuration**.
- 5 Select **Use nitrogen generator**.
- 6 Close the Instrument window.

Purging the Nitrogen Generator

The nitrogen generator does not produce nitrogen of the required purity immediately after connection and turning on. A period of purging is necessary to produce the required purity of nitrogen gas.

To purge the nitrogen generator:

- 1 Turn on the instrument exhaust system.
- 2 Turn on the MP-AES instrument.
- 3 Turn on the nitrogen generator.
- 4 Start the MP Expert software.
- 5 Ensure that the nitrogen generator is enabled for use by selecting **Use nitrogen generator** in **Instrument > Configuration**.
- 6 Click **Status**.
- 7 Click **Start Purge**.
- 8 The system will purge for up to 20 minutes.

The nitrogen generator is now ready for use.

NOTE

The purge will stop once the O₂ sensor indicates a safe level for ignition. If the 20 minute time out is reached, an error will be shown and automatic purge will be disabled until reconnection of the instrument.

From a powered down state the nitrogen generator may require up to 20 minutes of purge before it delivers nitrogen of the required purity.

Turning Off the Nitrogen Generator

The nitrogen generator does not need to be turned off for short idle periods. It uses a small amount of electric power and air when the connected instrument or accessory is off but the nitrogen generator is left running. This gives the fastest possible start-up when the idle period is over. For longer idle periods the nitrogen generator may be turned off to save air and electric power.

To turn off the nitrogen generator:

- 1 Press the power button on the front panel to turn off the power to the nitrogen generator.
- 2 If desired, close the valve between the air supply and the nitrogen generator. The nitrogen generator does not use any air when turned off.

NOTE

The nitrogen generator will require purging when restarted.

Depressurizing the Nitrogen Generator

WARNING



Eye hazard

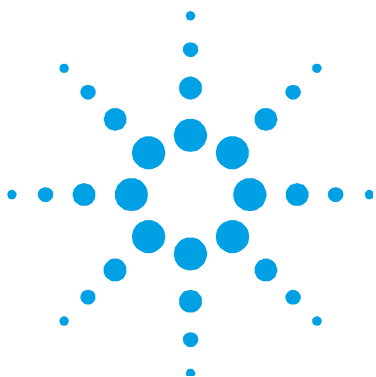
Do not disconnect the air supply or nitrogen outlet hoses without first depressurizing the nitrogen generator. The rapid escape of gas could cause injury. Always wear safety goggles and other appropriate safety clothing when disconnecting the gas supply.

To replace the filters you must depressurize the nitrogen generator before disconnecting the air supply or nitrogen outlet hoses.

To depressurize the nitrogen generator:

- 1 Ensure that the nitrogen generator is switched on.
- 2 Shut off the valve between the air supply and the nitrogen generator.
- 3 Allow 10 minutes for the reservoir in the nitrogen generator to empty.

The nitrogen generator may now be safely disconnected or the filters replaced.



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This chapter includes the Agilent 4107 Nitrogen Generator maintenance requirements that may be carried out by an operator. Any maintenance procedures not specifically mentioned in this chapter should be carried out only by Agilent-trained, Agilent-qualified or Agilent-authorized field service engineers.

NOTE

This section refers to maintenance procedures for the nitrogen generator. You should refer to your instrument guide for the Agilent MP-AES instrument maintenance procedures, and to the MP Expert Help for the maintenance procedures for any accessories you ordered.

Routine Maintenance

The following parts of the nitrogen generator require routine maintenance.

Daily

- Check the filter sight glasses for collected liquid and drain if required

Monthly

- Check power supply and cords for damage
- Check gas tubing for leaks.

Yearly

- Confirm the air supply system still complies with all applicable local regulations
- Replace the gas filters

Draining Liquid from the Filter Housing

To drain liquid that has collected in the filter housing:

- 1 Ensure you have a container to catch the liquid as it begins to drain to avoid spills.
- 2 Loosen the screw at the bottom of the filter housing. See (1) in the Figure below for the screw location.

Liquid will begin to drain immediately.



Figure 6. Filter housing screw location

IMPORTANT

Disposal of all chemical waste must comply with any rules and/or regulations that may be imposed by the local authorities.

Replacing the Gas Filters

The compressed air filter assembly for the nitrogen generator consists of three separate different filters. The first (closest to the pressure gauge) is a large particle filter, the middle filter is a small particle filter and the final filter is for oil vapor removal.

CAUTION

The filter locations are not interchangeable. You must replace the filter in the correct location; otherwise damage to the nitrogen generator may occur.

To replace the gas filters:

- 1 Depressurize the nitrogen generator as described on Page 24.
- 2 Unscrew and remove the filter housing, this should be hand tight but may require the use of a spanner (24 mm).



Figure 7. Nitrogen generator gas filter housing removal

- 3 Unscrew the filter and replace it.



Figure 8. Nitrogen generator gas filters with filter housing removed

- 4 Replace the filter housing. Repeat for each filter.

NOTE

Before using the system, purge the nitrogen generator as described on Page 23.

Checking the Gas Supply Tubing for Leaks

When any gas filter is changed, inspect all gas hoses. Replace any hoses showing signs of damage or deterioration.

WARNING



Eye Hazard

Pressurized gases pose a potential risk to sight. It is essential that appropriate protective eyewear be worn at all times when maintaining gas lines that may still be under pressure.

Pressurize the system and test all connections for leaks using a commercial leak testing solution, a mild detergent, or an electronic leak detector.

When changing air supply:

- check all gas supply hoses for leaks
- using the air pressure gauge on the filter regulator unit, check the air pressure meets the specifications listed in the Agilent MP-AES Site Preparation Guide
- ensure that shut-off valves are functioning correctly

Spare Parts

For details on additional spare parts and consumables ordering information not listed here, refer to the Agilent Technologies website:

www.agilent.com

The following is a list of recommended spares to keep on hand to minimize down time during maintenance and repairs.

Maintenance, Spare Parts and Troubleshooting

Part number	Part Description
G8001-64004	Filter kit
G8001-64003	Hose kit

To replace the items listed above, you must use Agilent-manufactured parts, which can be ordered online from the Agilent website or through your local sales representative.

Technical Support

For technical support contact information, refer to the Agilent Technologies website for details:

www.agilent.com

Troubleshooting

For troubleshooting information, refer to the MP Expert Help.

In This Guide

The guide describes the following:

- Safety Practices and Hazards
- Introduction
- Installation
- Operation
- Maintenance, Spare Parts and Troubleshooting

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