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# ExionLC™ Degasser

Operator Guide

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# Introduction

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# 1

This guide describes the basic operation and troubleshooting for the ExionLC™ Degasser. Read this guide thoroughly before using the product and operate the product in accordance with the instructions in this guide.

This guide provides safety instructions and precautions to make sure that the user operates the system safely. Follow all Warning and Caution instructions provided in the guide.

Keep this guide for future reference. Make sure that it is accessible to the operator of the system.

## Electrical Precautions



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**WARNING! Electrical Shock Hazard. Do not remove the covers. Removing the covers might cause injury or malfunctioning of the system. The covers need not be removed for routine maintenance, inspection, or adjustment. Contact the SCIEX FSE for repairs that require the main cover to be removed.**

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For information on system electrical specifications, refer to the *Site Planning Guide*.

## Environmental Precautions

Use qualified personnel for the installation of electrical mains, heating, ventilation, and plumbing supplies and fixtures. Make sure that all of installations comply with local bylaws and biohazard regulations. For more information about the required environmental conditions for the system, refer to the *Site Planning Guide*.



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**WARNING! Fire Hazard. Do not operate the system in the presence of an open flame, or in the same room as equipment that could potentially emit sparks.**

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**WARNING! Fire Hazard. Do not use flammable sprays (such as hair sprays or insecticide sprays) near the system. They could ignite and cause a fire.**

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**WARNING! Biohazard. For biohazardous material use, always comply with local regulations for hazard assessment, control, and handling. This system or any part is not intended to act as a biological containment system.**

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**CAUTION: Potential System Damage. Avoid exposure to corrosive gas and excessive dust.**

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**CAUTION: Potential System Damage.** Take precautions to prevent the system from falling in the event of an earthquake.

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## Electromagnetic Environment

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**CAUTION: Potential Wrong Result.** Do not use this device in close proximity to sources of strong electromagnetic (EMC) radiation (for example, unshielded intentional RF sources), as EMC radiation might interfere with the proper operation and cause a wrong result.

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Make sure that a compatible electromagnetic environment for the equipment can be maintained so that the device will perform as intended.

## Decommissioning and Disposal (Waste, Electrical, and Electronic Equipment)

Decontaminate the system before decommissioning following local regulations. Follow the SCIEX Red Tag process and complete an instrument Decontamination Form for instrument returns.

When removing the system from service, separate and recycle different materials according to national and local environmental regulations..

Do not dispose of system components or subassemblies, including computer parts, as unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of WEEE (waste, electrical, and electronic equipment). To safely dispose of this equipment, contact a local Customer Service office for complimentary equipment pick-up and recycling.

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**Note:** SCIEX will not accept any system returns without a completed Decontamination Form.

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## Ventilation Precautions

The venting of fumes and disposal of waste must comply with all federal, state, provincial, and local health and safety regulations. Use the system indoors in a laboratory that complies with the environmental conditions recommended in the *Site Planning Guide* for the system.



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**WARNING! Fire and Toxic Chemical Hazard.** Make sure that the laboratory in which the system operates is well ventilated. Solvents used in high performance liquid chromatography are flammable and toxic.

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# Chemical Precautions

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**WARNING! Toxic Chemical Hazard.** Make sure that a water supply, such as a wash basin, is available. If solvent gets onto the eyes or skin, flush it away immediately.

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**WARNING! Biohazard, Toxic Chemical Hazard.** Connect the drain tubing properly, to prevent leaks.

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**CAUTION: Potential System Damage.** Do not submerge the end of the drain tubing in the waste liquid in the waste container.

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- Determine which chemicals have been used in the system prior to service and regular maintenance. Refer to Safety Data Sheets for the health and safety precautions that must be followed with chemicals.
- Work in a well-ventilated area.
- Always wear assigned personal protective equipment, including powder-free neoprene or nitrile gloves, safety glasses, and a laboratory coat.
- Follow required electrical safe work practices.
- Avoid ignition sources when working with flammable materials, such as isopropanol, methanol, and other flammable solvents.
- Take care in the use and disposal of any chemicals. Potential risk of personal injury if proper procedures for handling and disposing of chemicals are not followed.
- Avoid skin contact with chemicals during cleaning, and wash hands after use.
- Comply with all local regulations for the storage, handling, and disposal of biohazardous, toxic, or radioactive materials.
- (Recommended) Use secondary containment trays beneath solvent bottles and the waste collection container to capture potential chemical spills.

# Static Electricity Precautions

Liquid chromatography (LC) uses flammable organic solvents as the mobile phase. LC systems are also often used where large amount of flammable substances are present. Thus, there is a risk of accidents involving fire or explosion.

The major cause of these accidents is static electricity. Devising preventative measures for static electricity can be difficult, because the symptoms before an accident vary and can be hard to detect, because such accidents occur as a result of several simultaneous incidents. For recommended methods for preventing static electricity accidents, refer to the *Hardware User Guide* for the ExionLC™ system.

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## Equipment Use and Modification

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**WARNING! Personal Injury Hazard.** Contact the SCIEX representative if product installation, adjustment, or relocation is required.

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**WARNING! Electrical Shock Hazard.** Do not remove the covers. Removing the covers might cause injury or malfunctioning of the system. The covers need not be removed for routine maintenance, inspection, or adjustment. Contact the SCIEX FSE for repairs that require the main cover to be removed.

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Use the system indoors in a laboratory that complies with the environmental conditions recommended in the *Site Planning Guide*.

If the system is used in an environment or in a manner not prescribed by the manufacturer, then the protection provided by the equipment might be impaired.

Unauthorized modification or operation of the system might cause personal injury and equipment damage, and might void the warranty. Erroneous data might be generated if the system is operated either above or below the recommended environmental conditions or operated with unauthorized modifications. Contact an FSE for information on servicing the system.



**WARNING! Personal Injury Hazard.** Use SCIEX-recommended parts only. Use of parts not recommended by SCIEX or use of parts for any use other than their intended purpose may place the user at risk of harm or negatively impact system performance. The protection provided by the equipment might be impaired if the equipment is used in a manner not specified by SCIEX.

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## Maintenance, Inspections, and Adjustment

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**WARNING! Personal Injury Hazard.** Contact the SCIEX representative if product installation, adjustment, or relocation is required.

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**WARNING! Electrical Shock Hazard.** Always turn off the power and then unplug the instrument prior to performing inspection and maintenance. Otherwise, fire, electric shock, or a malfunction might occur.

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To maintain the performance of the module and to obtain accurate measurement data, perform daily inspection and periodic calibration.

- For planned maintenance, contact a SCIEX representative.

## Introduction

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- Replacement cycles described for periodic replacement parts are estimates. Replacement might be required earlier than the described replacement cycles depending on usage environment and frequency.

# Hazard Symbols

# 2

This section lists the hazard symbols and conventions used in the laboratory environment, on the system, and in the documentation.

## Occupational Health and Safety Symbols

This section describes some occupational health and safety symbols found in the documentation and laboratory environment.

**Table 2-1 General Hazard Symbol**

Safety Symbol	Description
	Personal Injury Hazard

**Table 2-2 Chemical Hazard Symbols**

Safety Symbol	Definition
	Biohazard
	Explosion Hazard
	Toxic Chemical Hazard

## Hazard Symbols

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Table 2-3 Electrical Hazard Warning Symbols

Safety Symbol	Definition
	Electrical Shock Hazard

Table 2-4 Mechanical Hazard Symbols

Safety Symbol	Definition
	Hot Surface Hazard
	Ultraviolet Radiation Hazard
	Laser Radiation Hazard

## Documentation Symbols and Conventions

The following symbols and conventions are used throughout the guide.



**DANGER!** Danger signifies an action which leads to severe injury or death.

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**WARNING!** Warning signifies an action that could cause personal injury if precautions are not followed.

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**CAUTION:** Caution signifies an operation that could cause damage to the system or corruption or loss of data if precautions are not followed.

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**Note:** Note emphasizes significant information in a procedure or description.

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**Tip!** Tip provides useful information that helps apply the techniques and procedures in the text for a specific need and provides shortcuts, but is not essential to the completion of a procedure.

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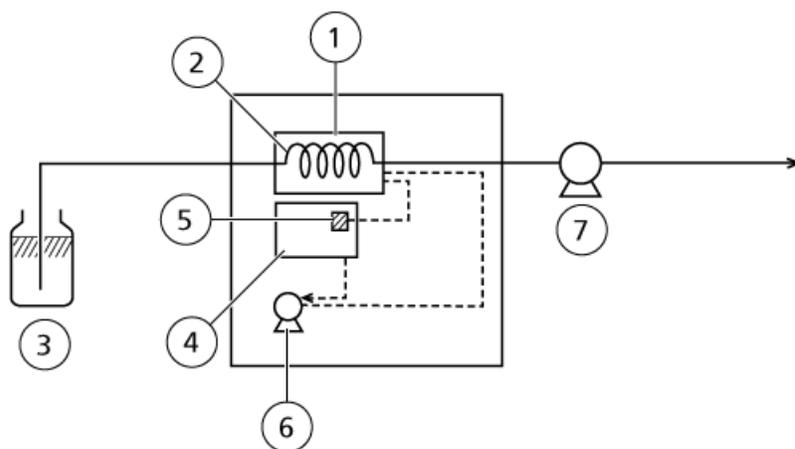
# Overview

# 3

The degasser continuously removes dissolved gases from liquids using a special degassing membrane. It prevents the formation of gas bubbles caused by dissolved gases, which can cause the pump to malfunction, and can cause fluctuations in the detector baseline. The degasser also helps improve the stability and reproducibility of HPLC analysis.

*Figure 3-1* shows the principle of how the degasser operates. The degasser includes three or five independent flow lines and provides the same degassing performance and functions for each flow line.

**Figure 3-1 Degasser Flow Lines**



Item	Description
1	Degassing chamber
2	Degassing membrane
3	Mobile phase
4	Control board
5	Pressure sensor
6	Vacuum pump
7	LC pump

## Overview

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Figure 3-2 Front View

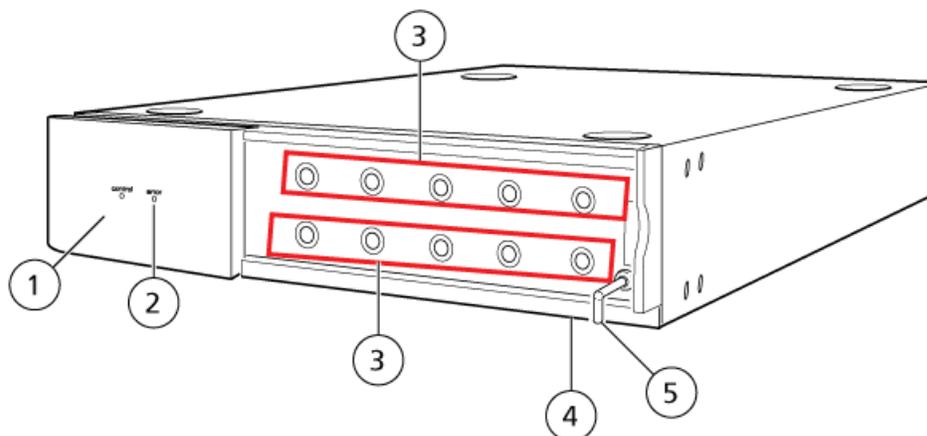
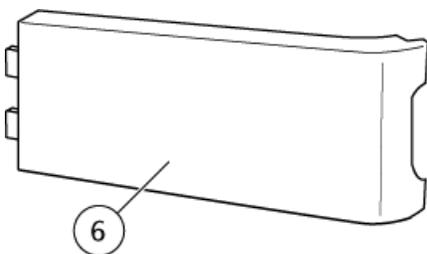


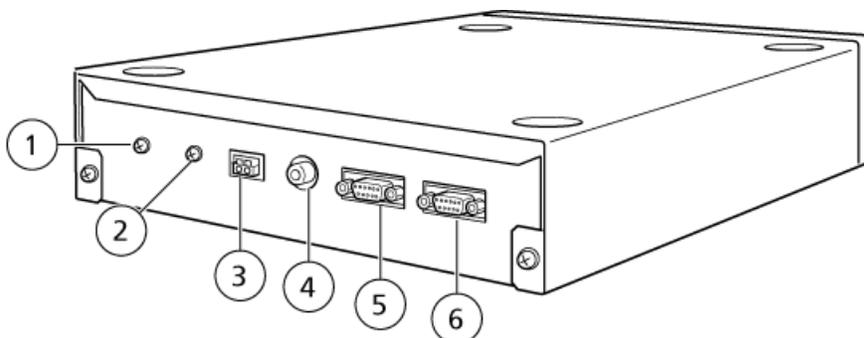
Figure 3-3 Front Panel



Item	Status Indicator	Function
1	Control light	The green LED illuminates when there is sufficient vacuum for degassing and degassing can be performed properly.
2	Error light	The red LED flashes when the target vacuum level is not maintained. After 6 minutes of flashing red, the LED illuminates without flashing and the vacuum pump stops.
3	Solvent IN/OUT ports	Inlet and outlet ports for the solvent. The upper and lower ports are paired into independent flow lines, so configure tubing connections by combining upper and lower ports. The ports are not specifically designated as either inlet or outlet.
4	Leakage drain outlet	Any solvent leakage is discharged through this port and then discarded through the waste port for the LC pump, located under the degasser.
5	Exhaust port	Air from the internal flow lines is discharged from this port.
6	Front panel	Protects the tubing connectors.

**Note:** The degassing membrane is made of highly gas-permeable material and might allow permeation of mobile phase or moisture. If the power is turned off while moisture is present in the vacuum line, then condensation might occur due to the fluctuation of room temperature. When the power is turned on again in this condition, the pressure in the vacuum line might be temporarily unstable, and the Error lamp might illuminate.

**Figure 3-4 Back View**



Item	Label	Description
1	Ground terminal for degasser	Used to ground the degasser.
2	Ground terminal for ALARM	To reduce the external noise for ALARM signal line.
3	ALARM terminal	Sends external output signal when alarms occur.
4	DGU PRESS OUT connector	Used to output the vacuum pressure level.
5	AUX power supply connector	Supplies power to other components.
6	PUMP power supply connector	The power cable D SUB 9-pin connector is inserted.

## Degassing Performance

The degasser uses the pressure reduction degassing method using membrane, which provides many advantages over the helium degassing method. However, because the gas is removed by permeating the solvent through a membrane, its degassing capacity (degassing performance) can be limited, depending on the flow rate.

When low pressure gradients are generated with the low pressure gradient valve connected, bubble formation can occur above a certain flow rate (the flow rate depends on the solvent being used).

## Overview

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### **Note:**

The following flow rate ranges can be used to avoid bubble formation during generating gradients when a low pressure gradient valve is connected to the degasser. When one flow line of the degasser is connected to each solvent:

- HPLC-grade water/methanol: 1.5 mL/min

When using the degasser at a flow rate higher than 1.5 mL/min, degas the mobile phase using an ultrasonic vacuum degassing system beforehand.

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**WARNING! Electrical Shock Hazard.** Always turn off the power and then unplug the instrument prior to performing inspection and maintenance. Otherwise, fire, electric shock, or a malfunction might occur.

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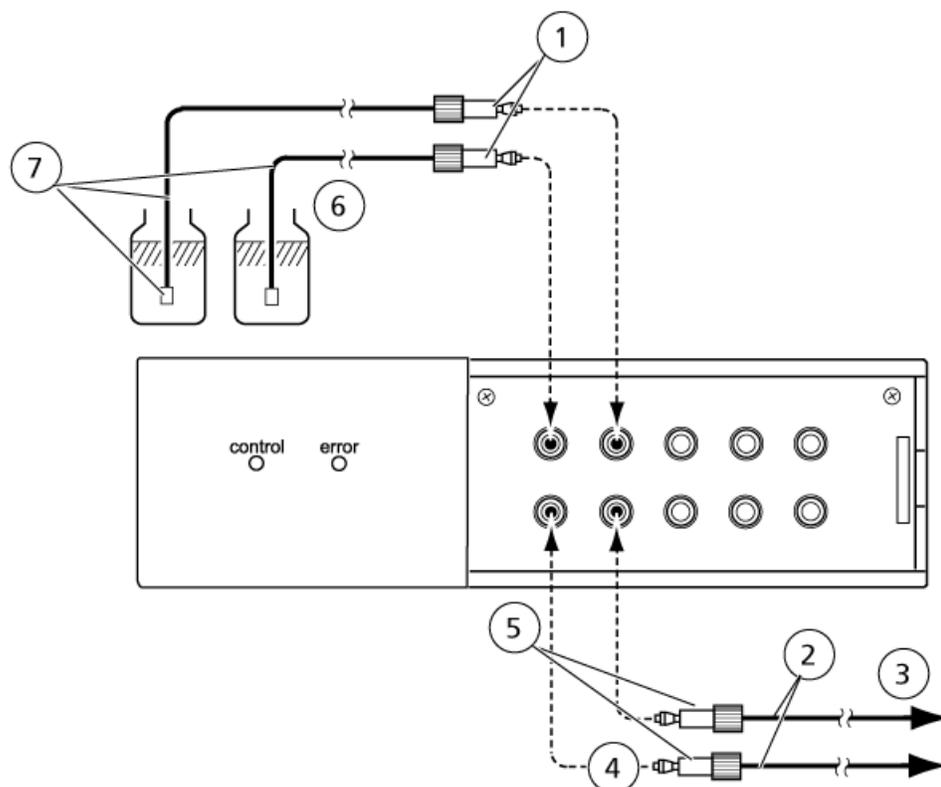
## Plumbing the Degasser

Configure the tubing between the reservoirs and degasser and between the degasser and LC pump (or low pressure GE unit). Refer to [Connect to a Low Pressure GE Unit \(Optional LPGE\) on page 17](#).

When the degasser is not used for an extended period of time, these stop joints are necessary for preventing dust and debris from entering the flowlines.

1. Before connecting the tubing, remove the stop joints that are installed on the solvent IN/OUT ports of the degasser.
2. Leave the stop joints installed on the flow lines that are not being used. Save the stop joints that were removed.
3. Connect the mobile phase solvent line to the degasser inlet.

**Figure 4-1 Connecting the Degasser to the System**



Item	Description
1	Flangeless fittings provided with the degasser.
2	Use the FEP tubing provided with each LC pump, cut to the appropriate length. (3 mm yo.d. × 1.5 mm i.d. FEP tubing)
3	Connection to the inlet on LC pump (or the inlet on low pressure GE unit).
4	Ferrule
5	Flangeless fittings provided with the degasser.
6	Mobile phases
7	Suction filters and tubings provided with the LC pump.

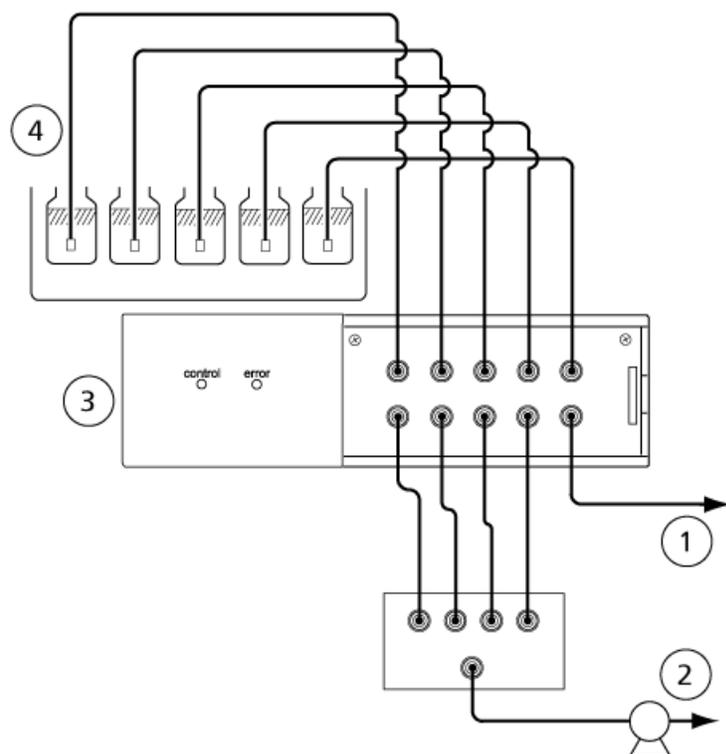
**Note:**

- Cut the FEP tubing at a right angle. When connecting lines to the solvent IN/OUT ports on the degasser, be careful to orient the ferrule correctly. Refer to [Figure 4-1](#). Make sure that the FEP tubing end is pushed in until it contacts the far side of the joint and then firmly tighten the flangeless fitting so the ferrule securely grips the tubing. It is secured when the flangeless fitting no longer turns. Do not force the nut beyond that point, because the flangeless fitting could break.
- The FEP tubing leading from the degasser OUT ports to the LC pump inlet or from the degasser OUT ports to the low pressure GE unit should not be too long. If the tubing is unnecessarily long, it could suction out the air from inside the FEP tubing.
- When connecting lines to the inlet of the LC pump, use the connector joints used with each LC pump.

## Connect to a Low Pressure GE Unit (Optional LPGE)

For use with the optional LPGE, connect the mobile phase lines to the degasser as shown in the following figure.

**Figure 4-2 Low Pressure GE Unit**



## Degasser Maintenance

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Item	Description
1	Autosampler rinse solution
2	LC pump
3	Low pressure GE unit
4	Mobile phases

- When generating binary or ternary gradients, connect the unused ports on the low pressure GE unit to one of the mobile phase reservoirs. If air fills an unused flowline, then the air will mix with the mobile phase and prevent the gradient from being generated correctly. Always keep flow lines filled with liquid by keeping unused lines connected. Refer to [Figure 4-2](#).

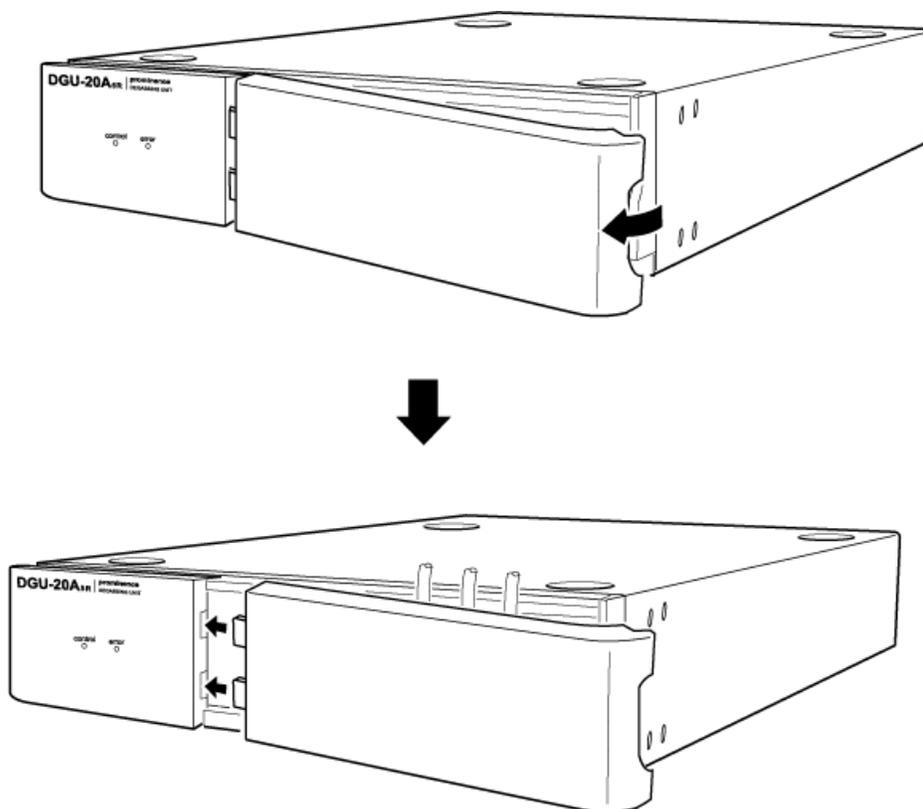
## Prepare for Inspection and Maintenance

1. Replace the mobile phase in the flow lines with HPLC-grade water.
2. Wipe away any dirt from the front panel and the main cover.

## Mounting and Dismounting the Front Panel

1. To connect the tubing from reservoirs or LC pump to the degassing unit, remove the front panel, as shown in [Figure 4-3](#).

Figure 4-3 Front Panel



2. After connecting the tubing, replace the front panel to protect and secure the tubing. Align the two lugs at the left of the front panel with the recesses in the unit.

# Revision History

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Revision	Description	Date
A	First release of document.	May 2015