



PRODUCT MANUAL

PACKED-BED GRADIENT MIXERS

USED ON DIONEX GRADIENT PUMPS
GPM-1, GPM-2, AGP AND GP40

GM-2 (4-mm) (1/4-28)
(P/N 037146)

GM-3 (4-mm) (10-32)
(P/N 042126)

GM-4 (2-mm) (10-32)
(P/N 049135)

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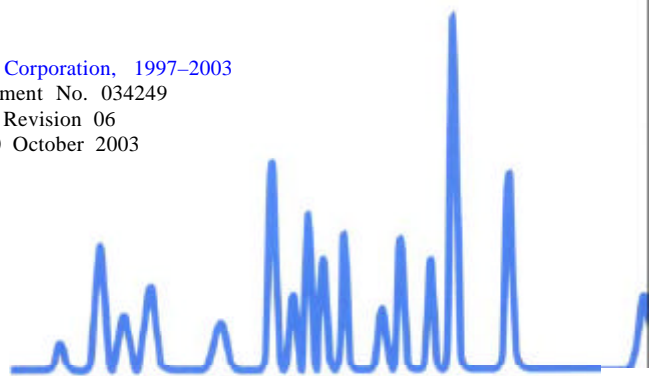


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SECTION 1 - INTRODUCTION

The installation of a high-pressure packed-bed gradient mixer between the pressure transducer of the gradient pump and the injection valve offers significant improvement in mixing of the eluents proportioned by the gradient pump. These mixers provide excellent mixing of the gradient components used in most applications.

This manual assumes that you are familiar with the installation and operation of the Dionex Ion Chromatograph (IC) and the suppressor. If you do not understand the operation of the system, take the time to familiarize yourself with the various system components before beginning an analysis.

The differences in the gradient mixers are listed in the Table 1, "Packed-Bed Gradient Mixer Specifications," below. It may be necessary to obtain one or more Tefzel[®] liquid lines with a PEEK bolt and ferrule fitting on one end and a 1/4-28 ThermoFlare fitting on the other end. See, "Dionex Liquid Line Fittings," for detailed instructions on purchasing or making these lines.

Table 1
Packed-Bed Gradient Mixer Specifications

Column	Format	Product P/N	Assembly P/N	Packing Material	Dimensions Dia x L (mm)	End Fitting Type	Pump
GM-2	4-mm	037146	038879	Teflon [®] Rods	9.2 x 27	1/4-28	GPM-1, GPM-2
GM-3	4-mm	042126	042760	Teflon Rods	4 x 48	10/32	AGP
GM-4**	2-mm	049135	049136	Teflon Rods	4 x 35	10/32	Microbore GP40

** The 4-mm version is an active mixer that is built into the GP40 Gradient Pump.

SECTION 2 - INSTALLATION AND REGENERATION

2.1 Required Chemicals

Make sure that all eluents are made with high purity chemicals. Reagent grade inorganic chemicals should always be used to prepare ionic eluents. Whenever possible, inorganic chemicals that meet or surpass the latest American Chemical Society standard for purity should be used. These inorganic chemicals will detail the purity by having an actual lot analysis on each label. When applicable, preparation of organic components of eluents should be made with HPLC grade or better. Filter these eluents through 0.2 μm pore filters.

The deionized water used to prepare eluents should be **Type I Reagent Grade Water** with a specific resistance of 18.2 megohm-cm. The deionized water should be free of ionized impurities, organics, microorganisms and particulate matter larger than 0.2 μm . Bottled HPLC-Grade Water should not be used since most bottled water contains an unacceptable level of ionic impurities. Finally, degas all deionized water prior to preparing any eluents.

2.2 Installation of the Gradient Mixer

- A. **Prime the gradient pump.** Use the eluent of choice as described in the gradient pump manual.
 - B. **Connect one end of the Gradient Mixer to the PEEK tubing from the pressure transducer of the Gradient Pump.** Use a PEEK compression fitting and ferrule (P/N 042500 and P/N 042504).
 - C. **Flush the Gradient Mixer with eluent.** Start the pump at a flow rate of 9.0 mL/min (2 mL/min for GP40). Flush the Gradient Mixer for 2 minutes to fill the mixer with eluent and remove any air.
 - D. **Connect the outlet of the Gradient Mixer to the inlet of the injection valve.** Use PEEK tubing and PEEK compression fittings and ferrules.
 - E. Your system is now ready for operation.
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SECTION 3 - TROUBLESHOOTING GUIDE

The purpose of the Troubleshooting Guide is to help you to solve operating problems that may arise while using Dionex Gradient Mixers. For more information on problems that originate with the Ion Chromatograph (IC) refer to the appropriate Product Manual. If you cannot solve the problem on your own, call the nearest Dionex Office (see, "Dionex Worldwide Offices").

3.1 High Back Pressure

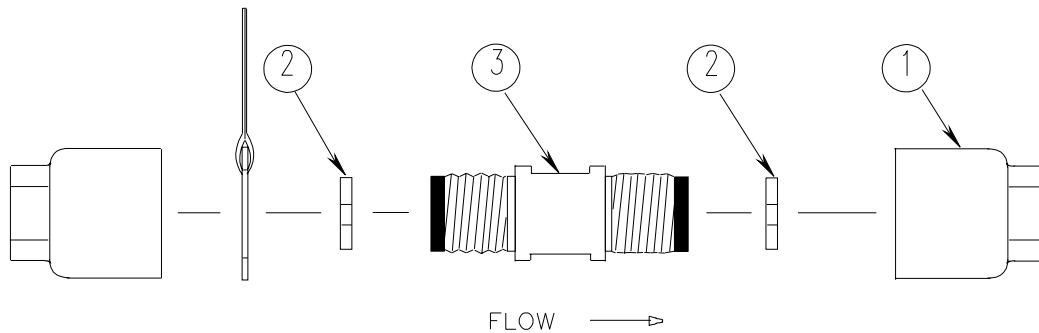


Figure 1
4-mm Gradient Mixers

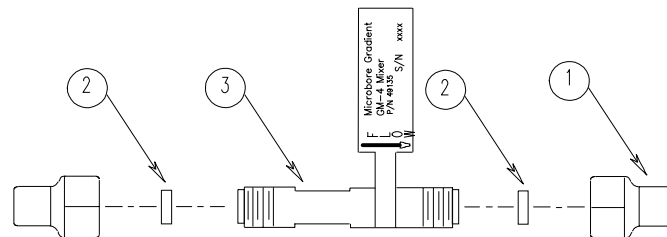


Figure 2
2-mm Gradient Mixers

Table 2
Packed-Bed Gradient Mixer Components

Column	Format	Product P/N	Assembly P/N	End Fitting (1)	Bed Support Assembly (2)	Body (3)	Where Used
GM-2	4-mm	037146	038879	038722	039037	039039	GPM-1, GPM-2
GM-3	4-mm	042126	042760	042895	042897 **	042896	AGP
GM-4***	2-mm	049135	049136	042367	042955	041190	Microbore GP40

** The GM-3 version contains seal washers only instead of bed support assemblies.

*** The 4-mm version is an active mixer that is built into the GP40 Gradient Pump.

If the Gradient Mixer is the cause of high back pressure, its inlet or outlet end fitting may be plugged. Note that the GM-3 uses seal washer between the end of the column tube and the end fitting instead of bed supports.

NOTE

Whenever you disconnect a liquid line with a ThermoFlare Fitting, inspect the opening of the line to be sure that it is not occluded. When reconnecting the liquid line, be careful not to over torque the bolt. Overtightening the bolt can seal off the end of the liquid line at the ThermoFlare.

- A. Disconnect the Gradient Mixer.** Remove it from the injection valve and the liquid line coming from the gradient pump pressure transducer.
 - B. Determine if the back pressure is due to a plugged liquid line.** Pump eluent through the line at 1 mL/min to determine that the line is not plugged. If the pressure is over 50 psi, replace the line.
 - C. Determine if the Gradient Mixer is plugged.** Connect the Gradient Mixer inlet to the line from the pump pressure transducer and pump eluent through the Gradient Mixer at 1 mL/min to determine if the Gradient Mixer is plugged. If the pump registers pressure over 100 psi, disconnect the Gradient Mixer from the liquid line to the gradient pump and connect the line to the outlet of the Gradient Mixer. Proceed to “backflush” the Gradient Mixer at 1 mL/min.
 - D. If plugged, inspect the inlet bed support assembly.** If the flushing and backflushing of the Gradient Mixer as described in Step C does not reduce the pump pressure to below 100 psi, carefully unscrew one end fitting at a time and visually inspect the eluent passages in the end fitting to determine if they are plugged or damaged.
 - E. If you cannot resolve the problem yourself call for help.** If the Gradient Mixer still shows high back pressure contact the nearest Dionex Office (see, “Dionex Worldwide Offices”) for further assistance.
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