Accessing the E-Gel® 96 System via the Quad-Z 215 with Disposable Tips

Application Note 211

Joan Stevens, PhD (Gilson, Inc.)

Introduction

The E-Gel® 96 gels are pre-cast, robot-compatible agarose gels that streamlines high-throughput DNA electrophoresis. The E-Gel 96 gel comes ready-to-use in a self-contained, disposable, UV-transparent cassette. The unique 96-well staggered format is compatible with multi-channel pipettors and robotic loading devices such as the Quad-Z 215 with Disposable Tips.

The Quad-Z 215 with Disposable Tips is well suited for the delivery of DNA fragments to the wells of the E-Gel 96 gels for electrophoresis. The liquid handler is a cartesian pipettor with 4 independent shafts and adjustable pitch. Therefore, it is capable of accessing individual wells for the samples, while at the same time each disposable tip can access a single multi-use vial containing the DNA marker. The bed of the Quad-Z 215 with Disposable Tips can accommodate the Plug & Play electrophoretic system, which consists of a mother and daughter base—each composed of a combined gel base and power supply all in one. Therefore, the user can load and run the E-Gel 96 gels directly on the Quad-Z 215 with Disposable Tips. The liquid handler can also accommodate the E-Gel® 96 holders, which can be loaded on the bed of the instrument and then removed and placed on the mother/daughter bases for electrophoresis.

Materials & Methods

Instruments and Accessories

Gilson Quad-Z 215 Liquid Handler, equipped with: 175-mm Z-arm and four independent shafts with interchangeable tips to accommodate 10-µL and 200-µL disposable tips

Gilson 444 QuadDilutor, equipped with: 4 independent syringe drives and 250-µL syringes

Invitrogen™ E-Gel® 96 High-Throughput Agarose Electrophoresis System and pre-cast E-Gel® 96 gels

Gilson Custom Rack Code 778 to accommodate the E-Gel 96 gels

Gilson 735 Sampler Software version 5.2

Gilson Custom Rack File, written in 735 Sampler Software and importable

Intel® Pentium® 4 Processor; >2 GHz, 512 MB RAM, 80 GB hard drive

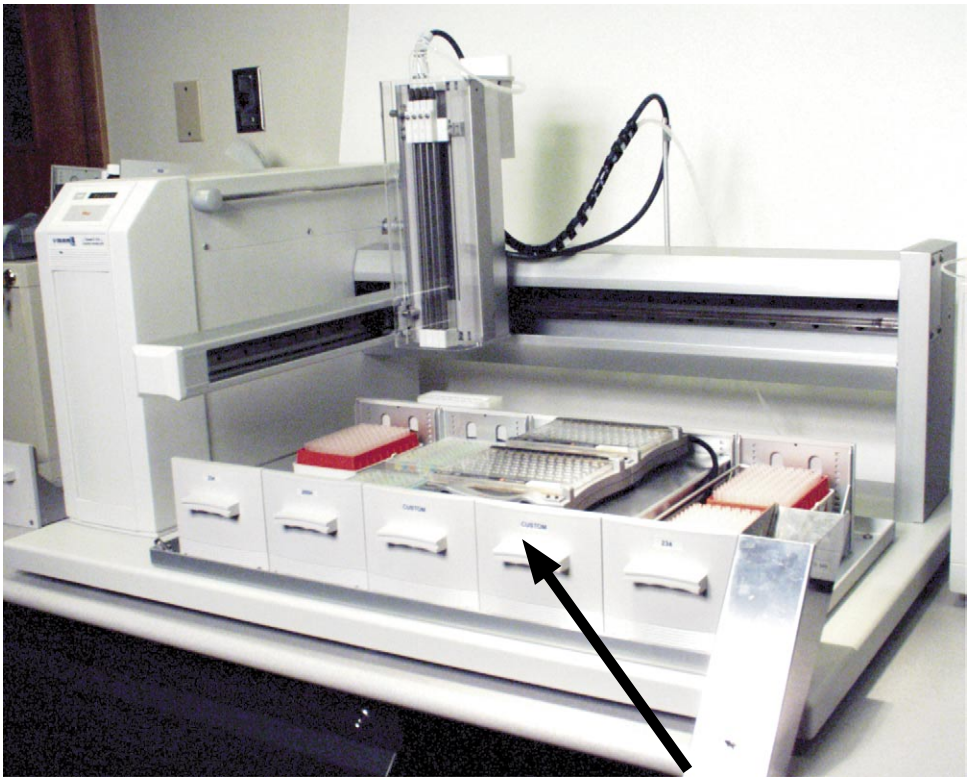

Photo 1: Quad-Z 215 with Disposable Tips Fitted with Custom Rack Code 778 to Accommodate the E-Gel 96 Gels

The E-Gel® 96 gels can be used with the electrophoretic mother and daughter bases or the E-Gel® 96 holders.

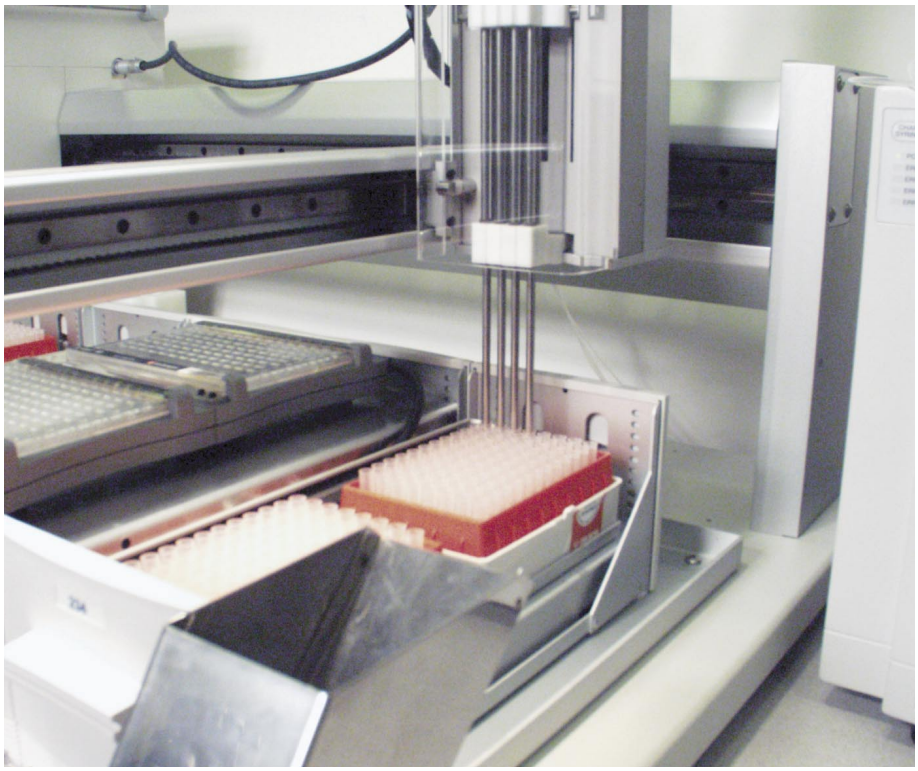

Photo 2: Quad-Z 215 Picking Up 10-µL Disposable Tips Prior to Sample Aspiration

Automation Criteria

Agarose electrophoresis using the E-Gel® 96 gels is at least twice as fast as conventional hand-cast methods. The Quad-Z 215 with Disposable Tips offers an automated solution to the analysis of plasmid preparation, PCR products, and restriction digests. The Quad-Z 215 with Disposable Tips is capable of adding deionized water (or buffer) to the required amount of DNA—for a total volume of 20 µL. (Maximum well volume is 20 µL, acceptable range is 10 to 20 µL of sample per well.) The following features of the Quad-Z 215 with Disposable Tips are especially useful for the preparation of the E-Gel 96 gels:

- Independent volume capability of each tip allows different sample volumes to be applied to the E-Gel wells for varying concentrations.
- Ability to import volumes via a Microsoft® Excel® spreadsheet allows greater versatility within a single method.
- Independent pitch capability of the tips allows variation in sample spacing.
- Independent Z movement of the tips allows one vessel (microcentrifuge tube) to be employed for the molecular weight marker, minimizing the space required for a multi-used sample or reagent (zone).

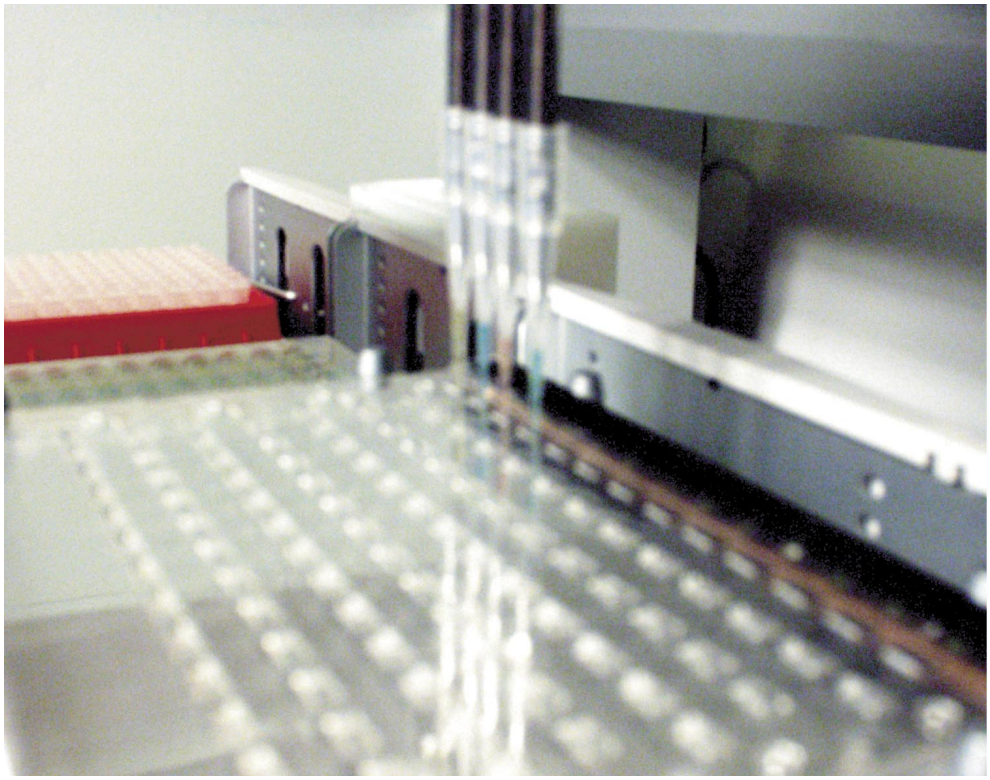

Photo 3: Quad-Z 215 with Disposable Tips Accessing the E-Gel 96 gels

The E-Gel® 96 gel wells are spaced 9 mm on center. The sample is drawn in by capillary action; maximum sample volume is 20 µL per well. E-Gel 96 gels come pre-programmed for 12 minutes, but can be set for 1 to 99 minutes to meet specific needs.

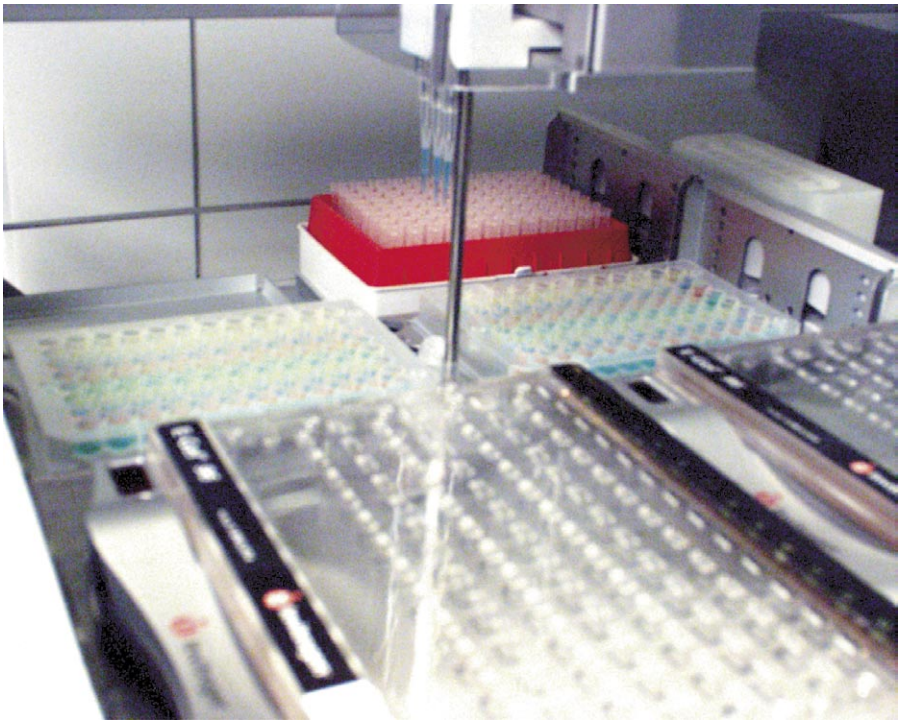

Photo 4: Quad-Z 215 with Disposable Tips Demonstrating Independent Tip Movement
Independent tip movement allows the Quad-Z 215 with Disposable Tips to access a single vial.

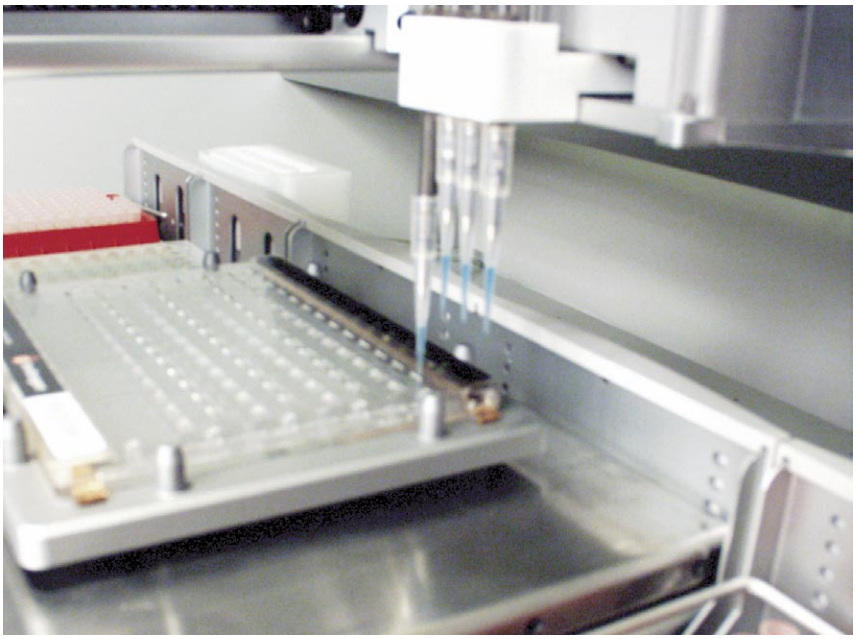

Photo 5: Quad-Z 215 with Disposable Tips Demonstrating Independent Control to Access the Last Marker Lane

735 Method

1) Pick up tips
2) Aspirate 10-µL sample
3) Dispense 10 µL into E-Gel® 96 well
4) Eject tips

System Controller

The Quad-Z 215 with Disposable Tips is controlled via 735 Sampler Software. 735 is a user-friendly, drag-and-drop software package that allows for modifications in the method, racks, and trays while the system is running. Implementation of the changes will occur upon restarting the application list. Customization of many aspects of the software is available. Thus, a custom rack can be made to accommodate the E-Gel® 96 gels and a special rack file created to allow access to the sample wells.

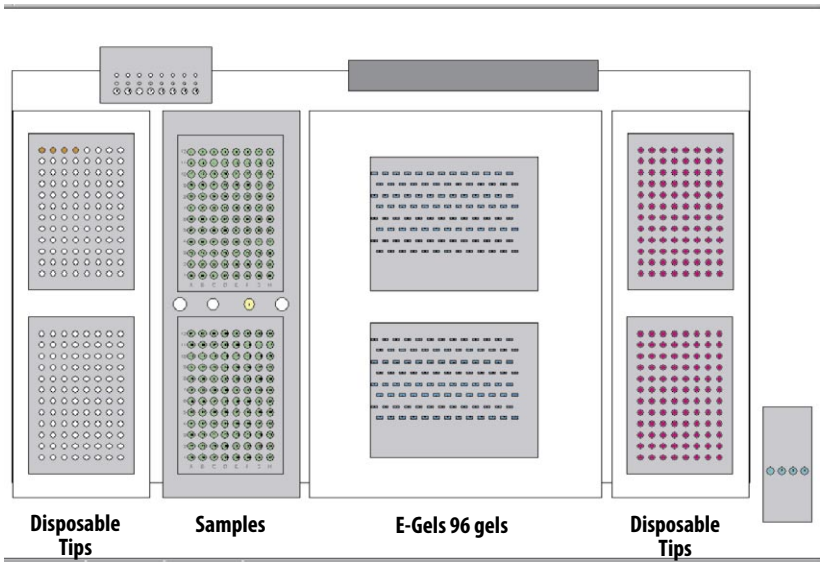

Figure 1: 735 Sampler Software Tray File for the Quad-Z 215 with Disposable Tips and the Custom Rack Code 778 for the E-Gel 96 gels

One rack accommodates both the mother/daughter electrophoretic gels and the E-Gel 96 holders.

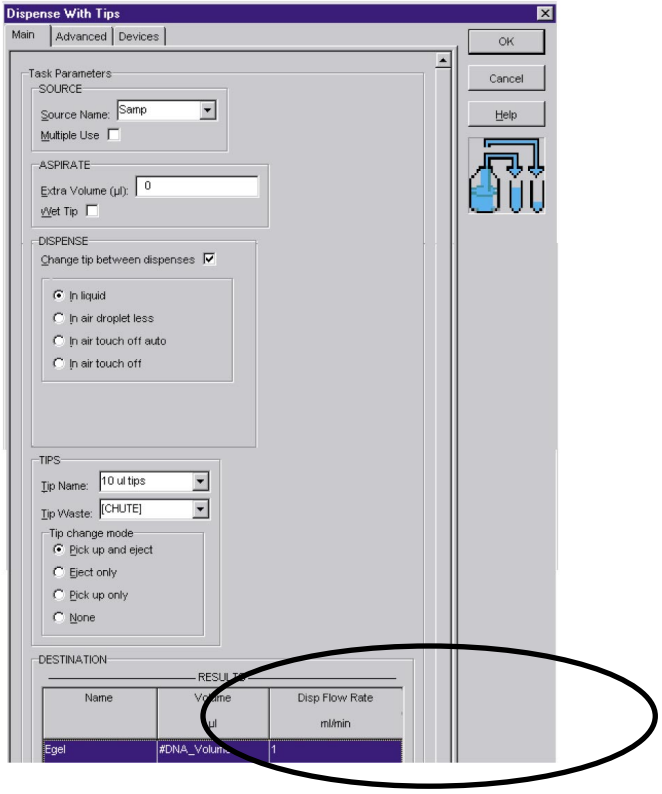

Figure 2: 735 Sampler Software Task Used to Dispense the Sample into the E-Gel® 96 gels

Variables (#volume) can be used if different volumes of sample are required and can be imported via a Microsoft® Excel® spreadsheet.

Conclusion

The versatile Quad-Z 215 with Disposable Tips is capable of preparing two E-Gel® 96 gels in less than 30 minutes, which includes tip changes between samples. The Quad-Z 215 with Disposable Tips offers an automated solution to the analysis of plasmid preparation, PCR products, and restriction digests. Its flexibility is shown in its ability to accommodate unique formats via custom racks, rack files, variables, and independent probe positioning, which minimizes the positions required for specific multiple-use reagents and samples.

The 735 Sampler Software that controls the Quad-Z 215 with Disposable Tips is a very user-friendly interface that allows researchers to optimize their methods quickly, make changes, and store multiple applications with various layouts. This offers users the adaptability that they require for multiple pipetting tasks, constantly changing needs, and automation of new assays.

Gilson, Inc. World Headquarters
3000 W. Beltline Hwy., P.O. Box 620027, Middleton, WI 53562-0027 USA
Telephone: (1) 800-445-7661 or (1) 608-836-1551• Fax: (1) 608-831-4451

Gilson S.A.S.
19, avenue des Entrepreneurs, BP 145, F-95400 VILLIERS LE BEL France
Telephone: (33-1) 34 29 50 00 • Fax: (33-1) 34 29 50 20

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