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PowerEase® 500
Power Supply

Version D
032202
IM-8634

PowerEase® 500 Power Supply

A programmable power supply for electrophoresis

Catalog nos. EI8600, EI8700, EI8675



www.invitrogen.com
tech_service@invitrogen.com

Warning

Federal Communications Commission Advisory

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 and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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Kit Contents

Types of Kits

This manual is supplied with the following kits:

Kit	Catalog no.
PowerEase® 500 Power Supply (100/120 Vac 50/60 Hz)	EI8600
PowerEase® 500 Power Supply (220/240 Vac 50/60 Hz)	EI8700
PowerEase® 500 Pre-Cast Gel System includes PowerEase® 500, Temperature Monitoring Probe, XCell *SureLock*™ Mini-Cell and XCell II™ Blot Module	EI8675

Kit Components

PowerEase® 500 Power Supply contains:

PowerEase® 500 Power Supply	1 each
Instruction Manual	1 each
Extra Fuses	2 each
Power Cord (U.S., Canada, Europe, Taiwan and Japan)	1 each
Warranty Card	1 each
Temperature Probe (Optional)	1 each

See next page for specifications and detailed description of PowerEase® 500 Power Supply.



Note

To ensure safe, reliable operation, always operate the PowerEase® 500 Power Supply in accordance with the manufacturer's instructions. Always wear protective gloves and safety glasses when working in a laboratory environment. See safety information on pages xi-xiii.

Warranty information is provided on page 17.

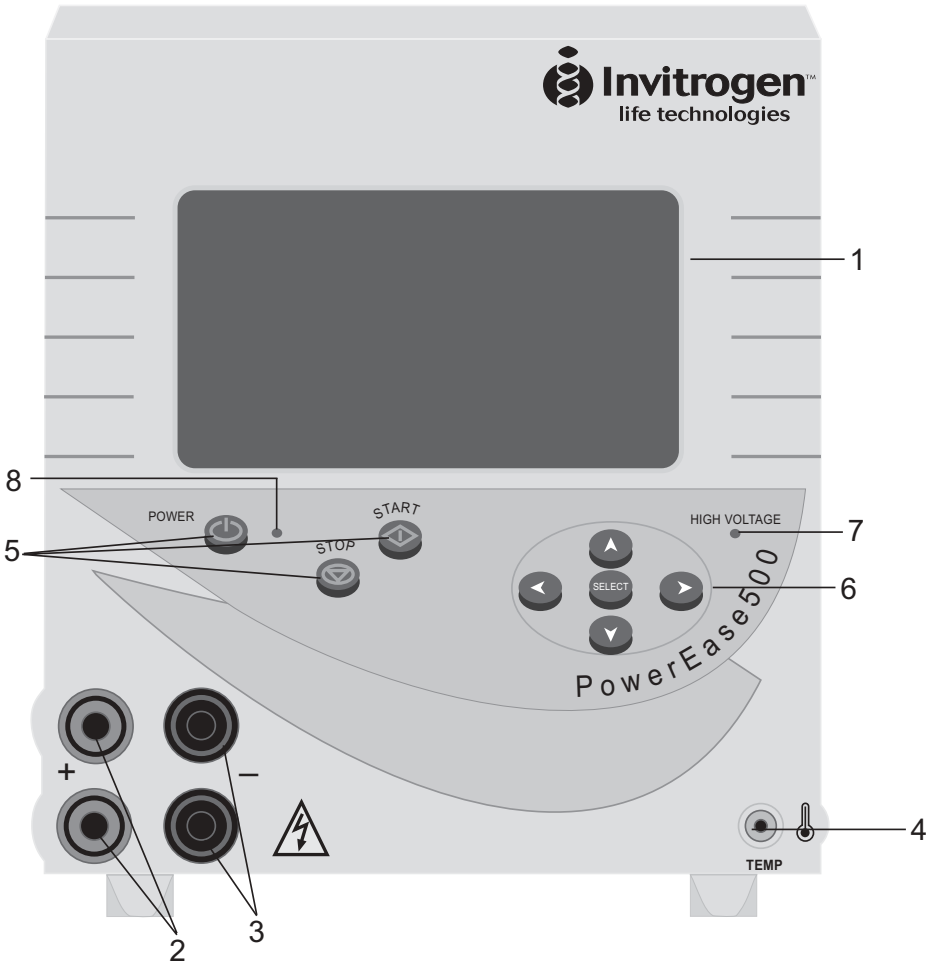
Description

Specifications

Input Power	
100/120 VAC	90-132V, 50/60 Hz, 100 watts at maximum load
Fuse	One 1A/250V/AGC, fast blow fuse
220/240 VAC	198-264VAC, 50/60 Hz, 260 mA at maximum load
Fuses	Two F1A/250V/5x20 mm fast blow fuses
Output Range	1-500 V (minimum step size 1 V)
	1-500 mA (minimum step size 1 mA)
	0.1-50 W (minimum step size 0.1 W)
	Automatic crossover on reaching set limits.
Accuracy	Voltage: ± 2% or ± 2 volts
	Current: ± 2% or ± 2 mA
	Wattage ± 2% or ± 0.2 watt
Drift	< 1% in 8 hours after 30 minute warm-up with constant supply voltage
Circuit Protection	Open Circuit; Short Circuit; Thermal Protection Over Voltage, Current, Wattage
Safety	Load Detection
	Thermal Shutoff (with optional temperature probe)
	Isolated Floating Ground
Memory Control	Non-volatile, up to 24 hours
	Custom Methods Stored to RAM
Computer Interface	RS232C
Display	LCD, view area 114 x 64 mm
	240 x 128 dots
Temperature	Ambient 4-30°C
Dimensions	16.5 cm (w) x 18 cm (h) x 20.5 cm (d)
Weight	2.9 kg (6.4 lbs)
Environmental Conditions	≤ 100% RH, 75 KPa-106 KPa

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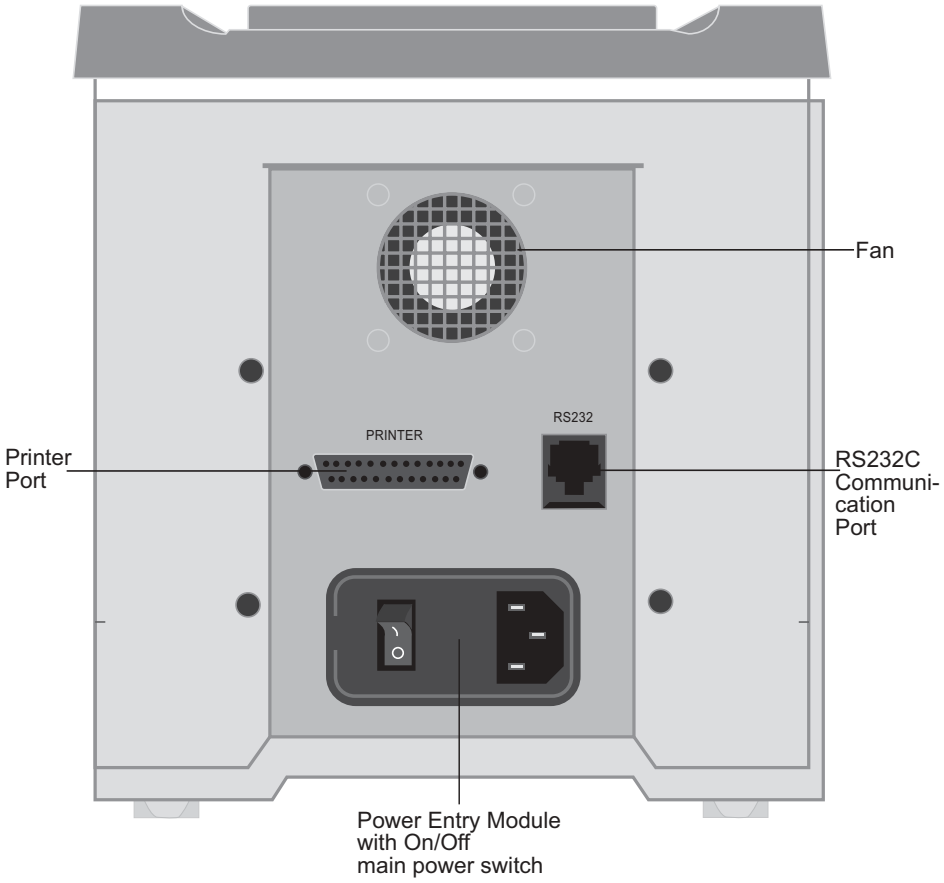
Front View of PowerEase® 500



1. LCD Screen
2. Power Output Jacks, Positive (Red)
3. Power Output Jacks, Negative (Black)
4. Temperature Probe Jack
5. Functional Keys (Power, Start, Stop)
6. Directional Keys (Up, Down, Left, Right)
7. High Voltage LED
8. Power LED

Continued on next page

Rear View of PowerEase® 500



Continued on next page

Description, Continued

Key Pad





Power button secondary On/Off switch for the high voltage components, fan, and LCD screen.



Start button used to start a selected method program.



Stop button used to end the selected method and to backup to a previous screen.



Select button used to select a menu choice and to move forward to the next applicable screen**.**



Left directional button for moving left around the menu.



Right directional button for moving right around the menu.



Up directional button for moving up around the menu and to adjust numerical and character values (higher).



Down direction button for moving down around the menu and to adjust numerical and character values (lower).

Safety Information

Avoiding Electrical Shock

The PowerEase® 500 Power Supply produces high voltage outputs which are electrically isolated from earth ground to reduce the risk of electrical shock to the user. Observe the following guidelines to ensure safe operation of the unit.

The PowerEase® 500 Power Supply has been designed for use with electrophoresis cells with shielded banana plugs thus minimizing potential shock hazard to the user. Invitrogen does not recommend use of other unshielded banana plugs.

To avoid electrical shock:

1. NEVER connect or disconnect wire leads from the power jacks when the amber high voltage indicator light is on.
2. WAIT at least 5 seconds after stopping a run before handling output leads or connected apparatus.
3. ALWAYS make sure hands and work area is clean and dry before making any connections or operating the power supply.
4. ONLY connect the power supply to a properly grounded AC outlet.

Avoiding Damage to the Instrument

1. For proper ventilation, leave at least 10 cm of space behind the instrument, and at least 5 cm of space on each side.
2. Do not operate the power supply in high humidity environments (> 95%), or where condensation can occur.
3. To avoid condensation after operating the power supply in a cold room, wrap the unit in a plastic bag and allow at least 2 hours for the unit to equilibrate to room temperature before removing the bag and operating the unit.

Symbols

The symbols used on the PowerEase® 500 Power Supply are explained below.



Used on the PowerEase® 500 Power Supply to indicate an area where a potential shock hazard may exist.

Used on the PowerEase® 500 Power Supply to indicate a warning. Consult the manual to avoid possible personal injury or instrument damage.

Used on the PowerEase® 500 keypad to indicate the secondary **Power** button.

Used on the PowerEase® 500 keypad to indicate the **Start** method button.

Used on the PowerEase® 500 keypad to indicate the **Stop** method button.

Consignes De Securite

Consignes De Securite

Le PowerEase® 500 génère des courants de haut voltage; la construction du système est faite suivant toutes précautions pour isoler l'utilisateur et éviter tout choc électrique. Toutefois, il est impératif d'observer les consignes suivantes pour éviter tout tisque lors de l'utilisation de l'appareil.

PowerEase® 500 est destiné à être utilisé avec des curves d'electrophorèse équipées avec des fiches banane protégées pour minimiser tout risque de choc électrique. L'utilisation d'autres types d'équipments n'est pas recommandée par Invitrogen et se fait aux risques et périls de l'utilisateur.

Pour éviter Tout Choc électrique

1. Ne jamais connecter ou déconnecter les cables des fiches quand l'indicateur haut voltage est allumé..
2. Attendre un minimum de 5 secondes après avoir arrêté le courant avant de manipuler le système.
3. Vérifier que vos mains sont séches et propres avant d'effectuer toute connection.
4. Utiliser des prises de courant munies d'une connection à la terre.

Pour éviter d'endommager l'appareil:

1. Assurer une ventilation correcte, en laissant un minimum d'espace derrière (10 cm) et sur les côtés (5 cm) de l'appareil.
2. N'utilisez pas le générateur dans un environement humide (> 95%) ou avec des risques de condensation.
3. Pour éviter la condensation lors de l'utilisation de l'appareil en chambre froide, enveloppez-le dans une poche plastique et laisser l'appareil s'équilbrer à la température ambiante avant de retirer le sac et de l'utiliser.

Signification des pictogrammes



Sur le PowerEase® 500, signale les zones où un risque de choc électrique peut exister.

Sur le PowerEase® 500, signale un risque potentiel pour l'utilisateur ou pour l'equipement. Veuillez consulter le mode d'emploi.

Sue le panneau du PowerEase® 500; bouton d'alimentation secondaire.

Sur le panneau du PowerEase® 500; permet de démarrer une méthode.

Sur le panneau du PowerEase® 500; bouton d'interruption.

Sicherheits Anweisungen

Sicherheits Anweisungen

Das PowerEase® 500 Stromversorgungsgerät produziert Gleichstrom-Hochspannung, die elektrisch getrennt ist vom Erdleiter, um das Risiko des Benutzers für einen Stromschlag zu minimieren. Trotzdem sollten folgende Sicherheitsrichtlinien beachtet werden, damit ein einwandfreier Betrieb des Gerätes gewährleistet ist.

Das PowerEase® 500 ist entwickelt worden für den Betrieb von Elektrophoresezellen mit isolierten Bananen-Schutzkontaktsteckern. Somit ist eine Gefährdung durch Stromschlag bei sachgerechter Benutzung ausge schlossen. Die Verwendung von anderen, ungeschützten Bananensteckern geschieht auf Risiko des Benutzers und Invitrogen rät ausdrücklich davon ab.

So verhindern Sie eine Gefährdung durch Stromschlag

1. Stecken (oder ziehen) Sie niemals Kabel in die Stromausgangsbuchsen am Gerät, wenn das gelbe Licht (Hochspannungs-Indikator) am Bedienungsfeld leuchtet.
2. Warten Sie mindestens 5 Sekunden nach Beendigung und Ausschalten eines Laufs, bevor Sie die Anschlubkabel der Zelle herausziehen.
3. Achten Sie darauf, dab die Arbeitsplatzumgebung der Zelle sauber und rocken ist. Sie sollten niemals mit nassen Händen Gerät, Kabel oder Steckverbindungen anfassen.
4. Schlieben Sie das PowerEase® 500 nur an eine einwandfrei geerdete 220-230V Strombuchse an.

Um Beschädigung des Geräts zu vermeiden

1. Achten Sie auf wenigstens 10 cm Platz hinter und 5 cm neben dem Gerät, um seine eingebaute Kühlventilation nicht zu beeinträchtigen.
2. Verwenden Sie das Gerät nicht in Räumen mit hoher Luftfeuchtigkeit (>95%) oder wo es Wasserdampfkondensation ausgesetzt ist.
3. Ist das Gerät in einem Kühlraum verwendet worden, und soll es nach der Benutzung wieder unter Normaltemperaur arbeiten, ist es vor der Umsetzung in eine Kunststoffhülle zu packen. Es soll mindestens 2 Stunden darin auf die neue Umgebungstemperatur angepasst werden, bevor die Hülle entfernt und das Gerät wieder in Betrieb genommen wird.

Symbolerklärung



Weist auf eine Zone hin, wo Gefährdung durch Stromschlag besteht.

Lesen Sie die Bedienungsanleitung, um Verletzungen oder Beschädigung des Gerätes zu vermeiden.

1st der 2. Bertiebsschalter auf dem PowerEase® 500—Bedienungsfeld.

Start—Knopf auf dem Bedienungsfeld für eine programmierte Methode.

Stop—Knopf auf den Bedienungsfeld für einen Elektophorese—Lauf.

Accessory Products

Additional Products

Additional products that can be used with the PowerEase® 500 Power Supply or replacement parts for PowerEase® 500 Power Supply are available separately from Invitrogen. For more information, contact Technical Service (see page 21) or visit our Web site at www.invitrogen.com.

Product	Quantity	Catalog no
Temperature Monitoring Probe	1	EI8644
RS232 Cable and Adaptor	1	EI8663
Fuses 1A/250V/3AGL Fast Blow (100-120VAC units)	2	EI8670
Fuses F1A/250V/5x20mm Fast Blow (220-240V units)	4	EI8671
XCell *SureLock*™ Mini-Cell	1 unit	EI0001
XCell II™ Blot Module	1 unit	EI9051

Introduction

Overview

Introduction

The PowerEase® 500 Power Supply is a microprocessor-controlled power supply for electrophoresis of pre-cast and hand-poured mini-gels. The power supply is designed to simplify electrophoresis by combining high performance and programming flexibility with ease of use when running mini-gel and blotting applications.

The PowerEase® 500 Power Supply is designed around the single gel concept: you need to think only about the electrical parameters and limits for a single gel.

This manual describes the setup and operation of PowerEase® 500 Power Supply including important information on safety and maintaining the unit.

Features of PowerEase® 500

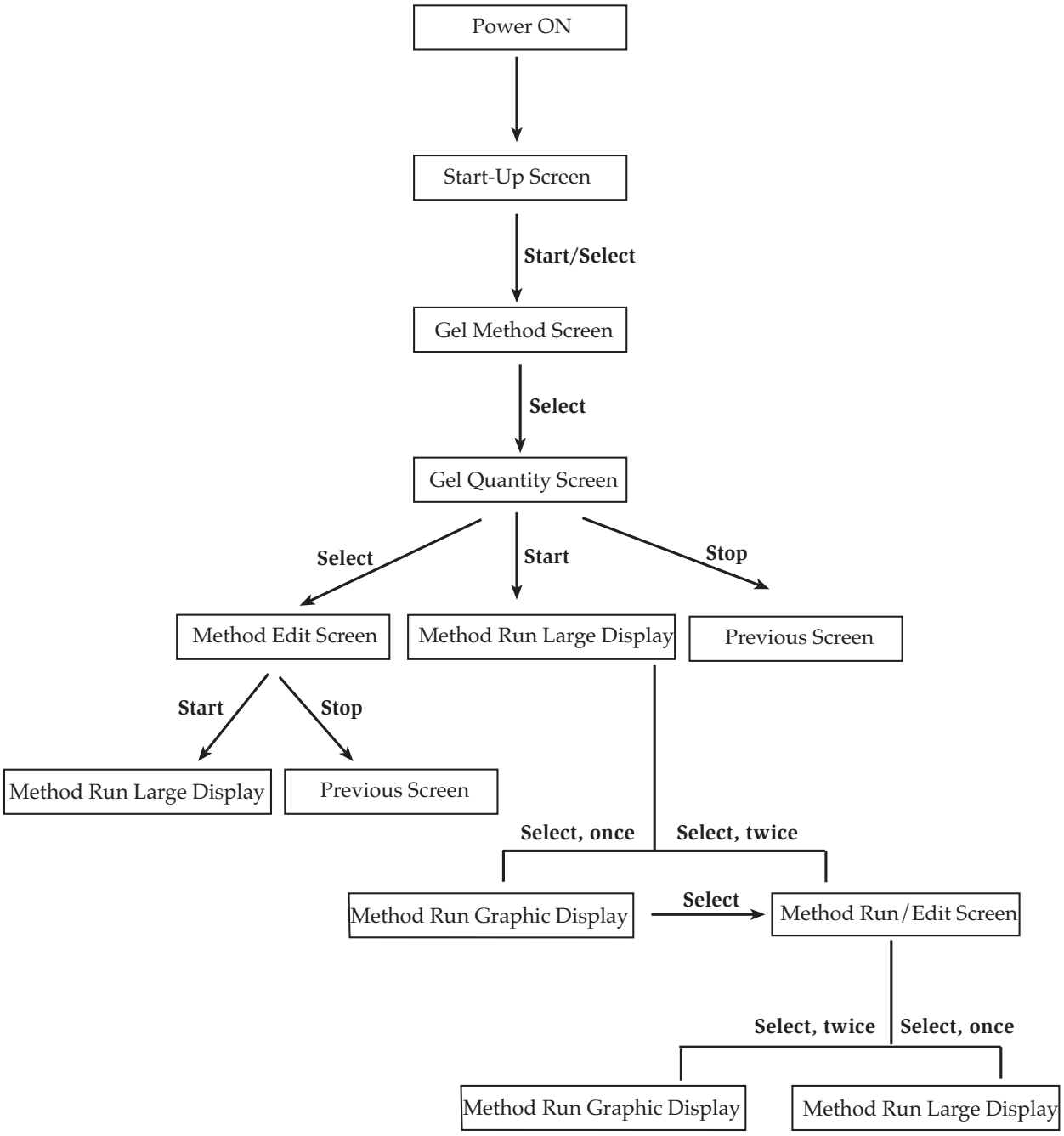
The important features of PowerEase® 500 Power Supply are listed below:

- Large LCD display allows electrical parameters to be displayed in either graphical or numerical formats
- Eight pre-programmed methods for running and blotting Novex® pre-cast mini-gels
- Four custom methods for running your custom applications
- Simple three step operating procedure to start running or blotting Novex® pre-cast gels
- Microprocessor control provides highly accurate electrical outputs resulting in exceptional blotting capability
- Parallel port for printing experimental results to most printers
- Optional Temperature Probe to continuously monitor the buffer temperature and shut the unit down in the event of overheating
- Two sets of output jacks allows electrophoresis of multiple mini-cell units in constant voltage, current, or watts

Continued on next page

Flowchart

The flowchart below describes the various screens displayed on the PowerEase® 500 Power Supply and the keypad buttons (**Start**, **Stop** or **Select**) used to navigate through the screens.



Methods

Getting Started

Installing PowerEase® 500

1. Place the PowerEase® 500 Power Supply on a level bench. Keep the area around the power supply clear to ensure proper ventilation of the unit.
2. Position the unit properly such that the **On-Off** switch and the power cord attachment module located on the rear of the unit are easily accessible.
3. Check the label located near the power entry module to ensure that the unit is of the proper local voltage. Attach the power cord to the power entry module. Use only properly grounded AC outlets.

Installing an Optional Printer

The PowerEase® 500 Power Supply has a DB25 parallel connector located on the rear of the unit. This allows the PowerEase® 500 Power Supply to print a report of your electrophoresis results in ASCII format to most commonly available printers.

Use the following steps to install a printer:

1. Using a parallel printer cable, connect the male DB25 end of the printer cable into the port marked "Printer" located on the rear of the PowerEase® 500 Power Supply.
2. Connect the opposite end of the cable into the appropriate connector on the printer. Refer the user manual of your printer for instructions on connecting the cable to the printer.

Installing an Optional Temperature Probe

If you have ordered the Temperature Monitoring Probe, follow the instructions below to install the probe:

1. Unpack the Temperature Monitoring Probe and inspect for any possible damage to the wire or connector which may have occurred during shipping.
2. Plug the connector end of the Temperature Monitoring Probe into the port located at the front lower right corner of the PowerEase® 500 Power Supply marked "TEMP".
3. Place the opposite end of the Temperature Monitoring Probe with the blue-colored bead into an electrophoresis cell buffer chamber to display temperature on the LCD screen of the PowerEase® 500 Power Supply. You can bent the wire, but avoid crimping or pinching the wire. Temperature will be displayed at all times even when the PowerEase® 500 Power Supply is stopped.

Operational Modes

Introduction

The PowerEase® 500 Power Supply is capable of operating at limiting voltage, limiting current, and limiting power. We recommend operating the PowerEase® 500 Power Supply at limiting voltage for most applications. See below for more details.

Voltage Limiting

The recommended setting for operating the PowerEase® 500 Power Supply is voltage limited. For most electrophoresis methods, resistance increases throughout the run. Using voltage limiting provides the following advantages:

- Current and watts decrease throughout the run, providing a natural safety margin.
- The same voltage setting can be used regardless of the number or thickness of gels being electrophoresed.

Current Limiting

Discontinuous buffer systems and, to a lesser extent continuous systems, increase resistance during the run. If you use the current limiting setting on the PowerEase® 500 Power Supply, the voltage will increase as resistance increases to satisfy Ohm's law (V=IR, see page 20). If no voltage limit is set and a local fault condition occurs, such as a poor connection, very high local resistance may cause the voltage to increase to a maximum of the power supply. This will lead to local overheating and damage to the electrophoresis cell or create unsafe conditions.

When running under constant current conditions, set a voltage limit on the power supply at or slightly above the maximum expected voltage.

Wattage Limiting

If power is constant, voltage will increase and current will decrease during a run, but the total amount of heat generated by the system will remain constant throughout the run. However, locally high resistance can cause a high proportion of the total heat to be generated over a small distance. This can damage the electrophoresis cell and/or gel(s).

If operating at wattage limiting, set the voltage limiting to slightly above the maximum expected for the run.

Using PowerEase® 500

Introduction

You can operate the PowerEase® 500 Power Supply immediately after installation using three simple steps (see below). For programming custom settings, see page 13.

Starting PowerEase® 500

1. Plug the power cord of the PowerEase® 500 Power Supply into an available electrical outlet rated at the appropriate electrical values for the power supply.
2. Turn on the main power switch located on the rear of the PowerEase® 500 Power Supply (see page ix for rear view of PowerEase® 500 Power Supply). Always leave this switch in the **ON** position to keep the back-up battery fully charged.
3. Press the **Power** button located on the keypad (see page x for a figure of the keypad). This **Power** button is a secondary power button and does not actually shut the instrument down, but shuts down the high voltage, fan, and LCD screen. When powered back up, the LCD screen will revert to the same screen as when the secondary power was shut off.
4. A **Start-Up** screen will appear (see next page).

To avoid condensation, the main power switch located on the rear of the unit should be left on between use during operation in a cold room or in high humidity environments.

Operating PowerEase® 500

A simple operating procedure of the PowerEase® 500 Power Supply is provided below. For more details on the different screens and custom methods, see pages 5-13.

1. Turn on the PowerEase® 500 Power Supply.
2. Press **Select** once the **Start-Up** screen appears.
3. Select your gel type from the **Gel Method** screen.
4. Choose the number of gels to be electrophoresed from the **Gel Quantity** screen.
5. Press the **Start** button to begin electrophoresis.

Note: To reset the PowerEase® 500 Power Supply, press the **Stop** button.



Note

The maximum number of Novex® mini-gels that can be electrophoresed at the same time using PowerEase® 500 Power Supply and the XCell *SureLock*™ Mini-Cell is listed below:

Gel Type	Number of Gels
Novex® Tris-Glycine Gels	10 gels
NuPAGE® Novex Tris-Acetate Gel	6 gels
NuPAGE® Novex Bis-Tris Gels	2 gels
Novex® Tricine Gels	4 gels
Novex® TBE-Urea gels	10 gels

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Start-Up Screen

The **Start-Up** screen is the first screen to appear after pressing the **Power** button on the keypad.



Press the **Select** button to advance to the **Gel Method** screen.

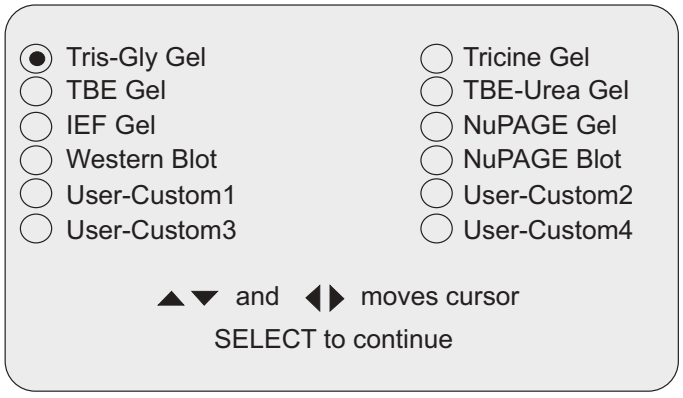
Note: After first use, the last screen previously in use will appear after shutting the power off and back on again.

Gel Method Screen

The **Gel Method** screen (see figure below) allows you to select from a choice of eight pre-programmed methods for Novex® mini-gels or four user-defined methods.

1. Use the directional arrow buttons to navigate through the menu.
2. Press the **Select** button to choose the method. You will advance to the **Gel Quantity** screen (see next page) if a pre-programmed method is chosen, or to the **Custom Method Option** screen (see page 13) if a user defined method is selected.

Note: The pre-programmed method durations are set to the shortest run time per gel type, or buffer level and buffer strength to prevent over-running a gel. Different percentage gels within a single gel type can cause a gel to take longer to run. Additional time can be added to the pre-programmed method before, during, and after a run (see page 11). The estimated durations for different percentage Novex® mini-gels are listed on page 18.



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Gel Quantity Screen

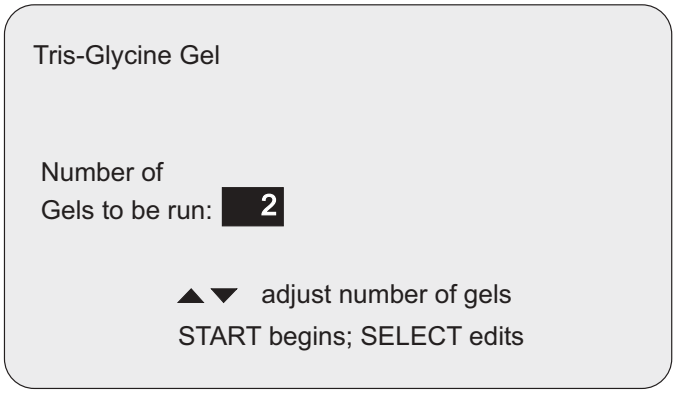
The **Gel Quantity** screen (see figure below) allows you to scale the pre-programmed method's current and power values by the number of gels that are to be run.

1. Use the **Up** and **Down** arrows on the keypad to increase or decrease the number of gels from 1 to the maximum allowable quantity of gels which can be run for the specified method.
2. Press the **Start** button to begins the electrophoresis. The **Method Run Large Display** screen will be displayed.
3. If you need to edit any electrophoresis parameters, press the **Select** button to advance to the **Method Edit** screen (see page 10).

The **Stop** button returns you to the **Gel Method** screen (or the **Custom Method Options** screen if a custom method is in use).

If the number of gels selected causes the current to be scaled such that the PowerEase® 500 Power Supply maximum power limit of 50 watts is exceeded, an error message "Power Limit Reached" will be displayed. Similarly, if the current exceeds 500 mA, an error message "Current Limit Reached" will be displayed. Change the number of gels appropriately to continue electrophoresis.

Note: Avoid changing the number of gels during the run, unless gels are removed during the run. If you would prefer to see the total output parameters, leave the gel number at "1" before starting.



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Method Run Large Display

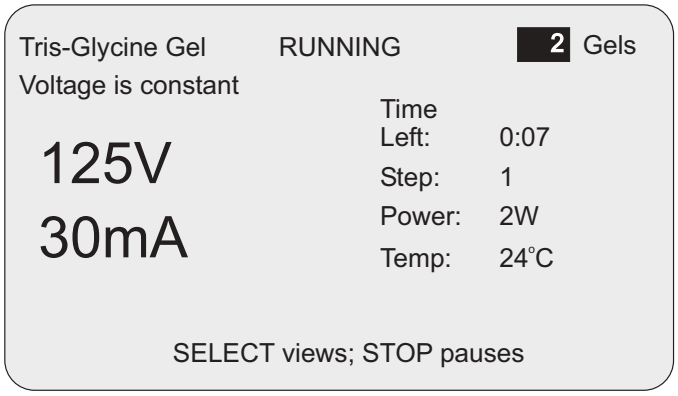
The **Method Run Large Display** screen (see figure below) is displayed after the **Start** button is pressed from the **Gel Quantity** screen or the **Method Edit** screen. This screen displays the status of the method during a run in an easy to read format. The screen displays:

- Selected Method
- Status (running or paused)
- Number of Gels
- Run Condition (Limiting Parameters)
- Actual Voltage and Current (large display)
- Step Time Remaining
- Present Step Number
- Actual Wattage (small display)
- Detected Temperature (if installed)

Pressing the **Select** button once takes you to the **Method Run Graphic Display** screen (see next page) and to the **Method Run/Edit** screen (see page 11) if pressed twice.

The **Stop** button pauses the run if pressed once, stops the method if the method is already in the paused state and takes you to the **Method Edit** screen.

To resume, press the **Start** button.



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Method Run Graphic Display

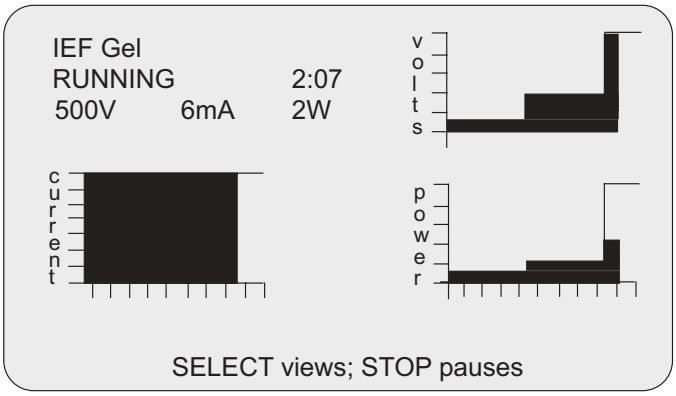
The **Method Run Graphic Display** screen (see figure below) is displayed after the **Select** button is pressed from the **Method Run Large Display** screen. This screen displays the status of the method during a run in a graphical format. The screen displays:

- Selected Method
- Status (running or paused)
- Present Run Time
- Voltage, Current, and Wattage (applied during the run)
- Run Condition (Limiting Parameter)

The **Select** button takes you to the **Method Run/Edit** screen (see page 11).

The **Stop** button pauses the run if pressed once, stops the method if pressed twice and takes you to the **Method Edit** screen.

To resume, press the **Start** button.



Continued on next page

Method Edit Screen

The **Method Edit** screen (see figure below) is displayed after the **Select** button is pressed from the **Gel Quantity** screen. The **Method Edit** screen allows you to edit the following method parameters:

- Step Duration

  The maximum step duration is 24 hours. If the duration is set to zero, the step will be deleted and all following steps will be moved up. If you set an empty step to non-zero, the voltage, current, and wattage settings from the previous line will be copied.
- Step Voltage Limit
- Step Current Limit
- Step Power Limit
- Load Check State

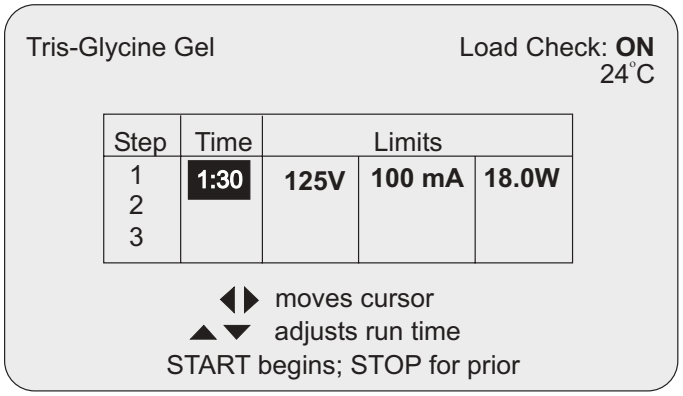
  The Load Check state is either ON or OFF, and determines whether or not the PowerEase® 500 Power Supply unit will detect 'No Load' conditions. The default value for Load Check is ON and is the recommended state.
- Gel Quantity

  The gel quantity limit determines the maximum voltage, current, and wattage for the step. Values must be in the range of 1 to 500 volts, 1 to 500 mA, and 0.1 to 50 watts for one gel (the values for current and watts will be reduced if multiple gels are selected).

If you have changed a pre-programmed method, the method will always run as edited until you cycle back to the **Gel Method** screen. At this point the pre-programmed method will revert to the default parameters.

To edit the parameters on this screen:

1. Press the **Left** or **Right** arrow buttons to move the cursor between different fields. As the cursor moves from field to field, a status message on LCD display is updated to show the affected parameters if changes are made.
2. Use the **Up** and **Down** buttons to adjust field values.
3. Press the **Start** button to begin the run and change the display to the monitor state. The **Stop** button takes you to the **Gel Quantity** screen (see page 7).



Continued on next page

Method Run/Edit Screen

The **Method Run/Edit** screen (see figure below) is displayed after the **Select** button is pressed from the **Method Run Large Display** screen or the **Method Run Graphic Display** screen. This screen displays the status of the method during a run and allows you to edit parameters during the run for the current step displayed on this screen.

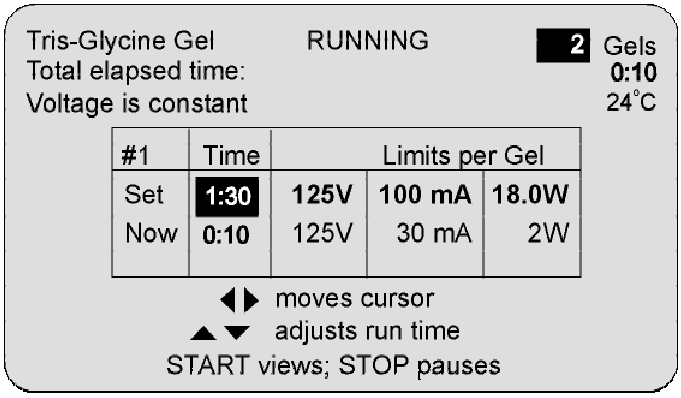
The screen displays:

- Selected Method
- Status (running or paused)
- Number of Gels
- Total Time Elapsed
- Run Condition (limiting parameter or error condition if detected)
- Detected Temperature (if probe is installed)
- Present Step Number
- Present Parameter Set Points
- Step Time Elapsed
- Actual Voltage, Current and Wattage

Make the appropriate change using the directional arrow keys and press the **Start** button.

The **Select** button takes you to the **Method Run Large Display** if pressed once, and to the graphic display if pressed twice.

The **Stop** button pauses the run if pressed once and stops the method if the method is already paused.



Printing

Print Screen

PowerEase® 500 Power Supply is equipped with a parallel port, allowing you to print your electrophoresis report.

1. If you wish to print a report, you need to connect the PowerEase® 500 Power Supply to a printer. See page 3 for **Installing an Optional Printer**.
2. After a run is completed (time left must be zero), the message "START prints STOP quits" is displayed at the bottom of the screen.
3. Press the **Start** button to print a report reflecting voltage, current, watts, and temperature changes which occurred during the run.

An example of a report is shown below:

Method name: IEF Gel

Run Data:

	Time	Voltage	Current	Power	Resistance	Temp
Step	**hh:mm**	**V**	**mA**	**W**	**Kohms**	**°C**
1	0:05	100	3.7	0.4	27.31	24
	0:10	100	3.2	0.4	32.55	24
	0:15	100	2.8	0.3	39.23	24
	0:20	100	2.3	0.2	45.71	23
	0:25	100	2.1	0.1	54.33	23

Custom Methods

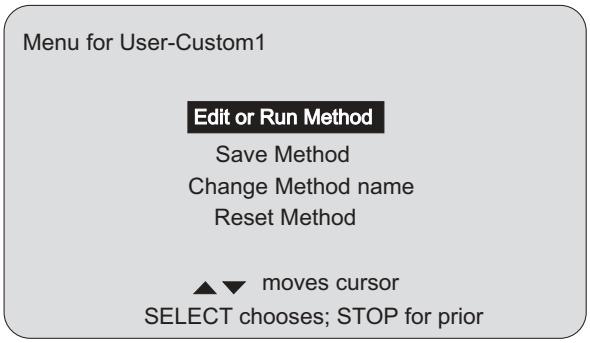
Custom Method Options Screen

The **Custom Method Options** screen (see figure below) allows you to program a custom method. The screen displays the following menu choices:

- Edit or Run Method
- Save Method
- Change Method name
- Reset Method

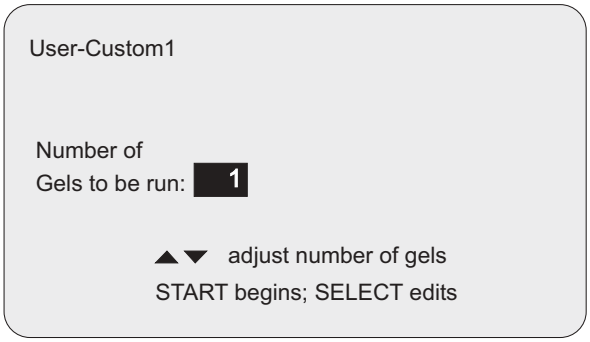
1. Use the **Up** and **Down** arrow buttons to choose from the menu items.
2. Press the **Select** button to select the current menu choice.

The **Stop** button returns you to the **Gel Method** screen (see page 6).

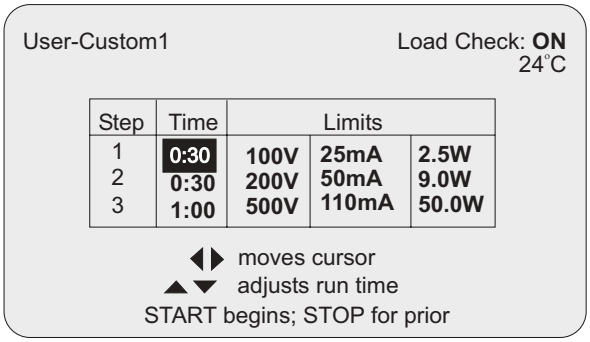


Edit or Run Method

The **Edit or Run Method** option displays the **Gel Quantity** screen (see figure below) for the pre-programmed methods. Enter the number of gels to be run and press **Start** to begin the run.



If you need to edit run parameters, press **Select** to display the **Method Edit** screen (see figure below).



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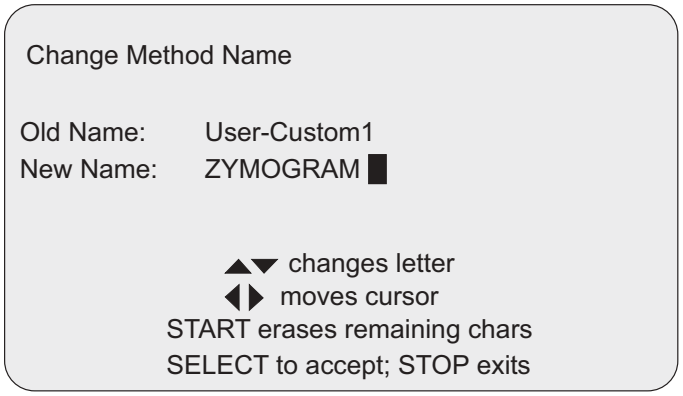
Save Method

The **Save Method** option saves any changes made to the method during the previous editing session. It is not necessary to save the method before the method is run. Method is saved to RAM.

Change Method Name

The **Change Method Name** screen (see figure below) allows you to change a custom method user name. The screen displays the current default custom method user name (i.e. User-Custom1) and a new name field that is used to change the default method user name.

1. Use the **Left** or **Right** arrow buttons to change the current character (only capital letters, numbers 0 to 9, and a few other characters such as "-" and "\" are available).
2. Press the **Start** button to delete the character directly under the cursor and all remaining characters to the right of the cursor.
3. Press the **Select** button to accept the new name as the name of the method and return you to the **Custom Method Options** screen. The **Stop** button abandons changing the method name and returns you to the **Custom Method Options** screen.

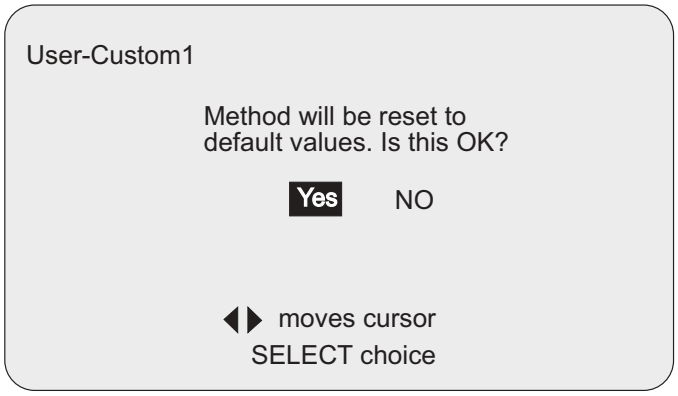


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Reset Method

The **Reset Method** screen returns all method parameters including the custom name back to the original default parameters.

1. To reset, choose "Yes" with the **Left** button and then press the **Select** button.
2. The custom method is cleared and the **Gel Method** screen is displayed. Choosing "No" and pressing the **Select** button, or pressing the **Stop** button returns you to the **Custom Method Options** screen.



Troubleshooting

Introduction

Review the information in the table below to troubleshoot your experimental results.

Problem	Cause	Solution
The LCD screen remains blank and the fan does not come on when the main power is turned on	Power cord not connected or the fuse has blown	Check power cord connections at both ends or replace the fuse (see page 19).
	Secondary power off	Press the **Power** button on the keypad.
Display shows PAUSE and Load Error	Electrophoresis cell(s) are not connected, are disconnected during the run, or there is a broken connection in the electrophoresis cell	Check the connections to the power supply and on your electrophoresis cell to make sure the connection is intact.
	High resistance due to tape left on a pre-cast gel, incorrect buffer concentration, or incorrect buffer volumes in the electrophoresis cell	Press the **Stop** button. Correct the condition by making sure the tape is removed from the pre-cast gel, buffers are prepared correctly, and the recommended volume of buffer is added to the electrophoresis cell. Restart the method.
Display shows PAUSE and Hardware Error	--	Reset unit by holding front panel **Power** button down while switching rear power switch off and then on again. Release front **Power** button.
Display shows PAUSE and Temperature Error (if temperature probe is connected)	Buffer temperature exceeds the preset temperature limit	Check the run conditions for the correct current and power settings. Make sure the buffer is prepared correctly. Raise the temperature limit.
"Current Limit Reached" is displayed on the **Gel Quantity** screen	Number of gels selected exceeds the set current limit	Number of gels is limited by the maximum current available. Decrease the number of gels or change the current settings.
"Power Limit Reached" is displayed on the **Gel Quantity** screen	Number of gels selected exceeds the set power limit	Number of gels is limited by maximum power available. Decrease the number of gels or change the power settings.

Appendix

Warranty

PowerEase® 500 Power Supply Warranty

Invitrogen warrants that this product will be free from defects in material and workmanship for a period of one (1) year from date of purchase. If a defect is present, Invitrogen will, at its option, repair, replace, or refund the purchase price of this product at no charge to you, provided it is returned during the warranty period. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or misapplication, or from ordinary wear and tear. For your protection, items being returned must be insured against possible damage or loss. This warranty shall be limited to the replacement of defective products. IT IS EXPRESSLY AGREED THAT THIS WARRANTY WILL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANTY OF MERCHANTABILITY.

Run Conditions for Gels

Introduction

The estimated run duration for Novex® 1.0 mm thick mini-gel is listed below. A 1.5 mm thick gel will take 5-10 minutes longer than similar 1.0 mm thick gel.

Gel Type	Voltage	Approximate Duration
4% Tris-Glycine	125 V	90 minutes
6% Tris-Glycine	125 V	95 minutes
8% Tris-Glycine	125 V	100 minutes
10% Tris-Glycine	125 V	105 minutes
12% Tris-Glycine	125 V	110 minutes
14% Tris-Glycine	125 V	110 minutes
16% Tris-Glycine	125 V	115 minutes
18% Tris-Glycine	125 V	120 minutes
4-12% Tris-Glycine	125 V	105 minutes
4-20% Tris-Glycine	125 V	110 minutes
8-16% Tris-Glycine	125 V	105 minutes
10-20% Tris-Glycine	125 V	120 minutes
10% Tricine	125 V	70 minutes
16% Tricine	125 V	90 minutes
10-20% Tricine	125 V	75 minutes
10% Zymogram	125 V	100 minutes
12% Zymogram	125 V	110 minutes
4-16% Zymogram	125 V	100 minutes
6% TBE	100 V	65 minutes
10% TBE	100 V	100 minutes
20% TBE	200 V	105 minutes
4-20% TBE	200 V	70 minutes
6% TBE-Urea	180 V	45 minutes
10% TBE-Urea	180 V	60 minutes
15% TBE-Urea	180 V	80 minutes
IEF pH 3-7, Step 1	100 V	60 minutes
IEF pH 3-7, Step 2	200 V	60 minutes
IEF pH 3-7, Step 3	500 V	30 minutes
IEF pH 3-10, Step 1	100 V	60 minutes
IEF pH 3-10, Step 2	200 V	60 minutes
IEF pH 3-10, Step 3	500 V	30 minutes
NuPAGE® Novex 10% Bis-Tris with MES SDS Running Buffer	200 V	35 minutes
NuPAGE® Novex 4-12% Bis-Tris with MES SDS Running Buffer	200 V	35 minutes
NuPAGE® Novex 10% Bis-Tris with MOPS SDS Running Buffer	200 V	50 minutes
NuPAGE® Novex 4-12% Bis-Tris with MOPS SDS Running Buffer	200 V	50 minutes
NuPAGE® Novex 7% Tris-Acetate	150 V	60 minutes
NuPAGE® Novex 3-8% Tris-Acetate	150 V	70 minutes

Repair and Maintenance of PowerEase® 500

Introduction

The PowerEase® 500 Power Supply requires no periodic maintenance program with the exception of an occasional wipe-down of the instrument to remove salt deposits which may built up over time.

On Receiving the Instrument

Examine the unit carefully for any damage inflicted during transit. Any damage claims must be filed with the carrier. The warranty does not cover in-transit damage.

For a Problem Requiring Service

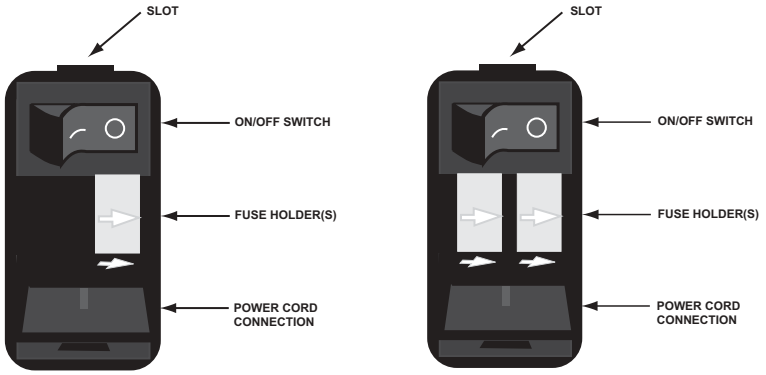
1. Check the troubleshooting section on the previous page.
2. Call Technical Service (see page 21).
3. If the unit must be shipped back for repair, contact Invitrogen or the distributor for a Return Authorization Number and shipping instructions. The unit will be repaired as quickly as possible and returned to you.

Replacing the Fuse

Extra fuses are supplied with PowerEase® 500 Power Supply. For additional fuses, see page xiv for ordering information.

1. Turn off the main power switch at the rear of the PowerEase® 500 Power Supply and detach the power cord from the rear of the PowerEase® 500 Power Supply.
2. Open the fuse compartment located inside the Power Entry Module (see page ix for rear view of the PowerEase® 500 Power Supply) by inserting a small flat blade screwdriver into the slot above the ON/OFF switch. Turn the screwdriver to gently pry open the fuse compartment.

   Note: The fuse compartment will not open with the power cord in place.
3. Pull the fuse holder out of the compartment and inspect the fuse. If the fuse is burned or there is a break in the fuse element, replace the fuse with the identical type fuse (see figure below).
4. Place the fuse holder(s) back into the compartment, making sure that the arrow(s) on the fuse holder point in the same direction as the arrows on the inside of the fuse compartment as shown in the figure below.
5. Snap the cover closed.



100/120V UNIT **220/240V UNIT**

Theory of Operation

Power Considerations

Electrophoresis is the migration of a charged particle under the influence of an electrical field. The influence of various power supply output parameters (volts, current and watts) is derived from two equations:

Voltage = Current x Resistance (V=IR)

Wattage = Current x Voltage (W=IV)

Resistance

Resistance of the assembled electrophoresis cell is dependent on the conductivity of the gel buffer, the thickness of the gel, and the number of gels being run. Although the resistance is determined by the gel system, the resistance can vary over the course of the run. For instance, in the Tris-Glycine buffer system, the fast moving, highly conductive chloride ions in the gel are gradually replaced by the slower moving, less conductive glycine ions from the running buffer as the gel runs. As a result, the resistance of the gel increases as the chloride/glycine front moves down the gel, and the current decreases.

Voltage

The velocity in which an ion moves in an electric field will vary in proportion to the field strength (Volts per unit distance). The higher the voltage the faster an ion will move.

Current

Current is a function of the number of ions passing a given cross-section of the circuit at a given time. For a given gel/buffer system, at a given temperature, current will vary in proportion to the field strength (voltage) and/or cross-sectional area (number and/or thickness of the gels). Ions in solution and at a given voltage will move faster as the temperature increases, increasing current.

Power

Watts, or the rate of heat generated by the system, is a function of voltage and current (W=IV). For a given gel system if either voltage is doubled, watts will also double (as V=IR, and R is a "constant" determined by the gel system).

Technical Service

World Wide Web



Visit the Invitrogen Web Resource using your World Wide Web browser. At the site, you can:

- Get the scoop on our hot new products and special product offers
- View and download vector maps and sequences
- Download manuals in Adobe® Acrobat® (PDF) format
- Explore our catalog with full color graphics
- Obtain citations for Invitrogen products
- Request catalog and product literature

Once connected to the Internet, launch your web browser (Netscape 3.0 or newer), then enter the following location (or URL):

http://www.invitrogen.com

...and the program will connect directly. Click on underlined text or outlined graphics to explore. Don't forget to put a bookmark at our site for easy reference!

Contact Us

For more information or technical assistance, please call, write, fax, or email. Additional international offices are listed on our Web page (www.invitrogen.com).

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