

Instruction Manual



250 Volt

Electrophoresis Power Supply

A high current power supply for SDS-PAGE and DNA/RNA electrophoresis applications

Catalog Number

110 volt: E0303

230 volt: E0303-230V



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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.

Safety Information

Avoiding Electrical Shock

The ENDURO 250 Volt Power Supply produces up to 3 A or 250 voltage outputs which are electrically isolated from ground to reduce the risk of electrical shock to the user. Follow the guidelines below to ensure safe operation of the unit.

The ENDURO 250 Volt Power Supply has been designed for use with electrophoresis cells with shielded banana plugs thus minimizing any potential shock hazard to the user. Labnet recommends against the use of unshielded banana plugs.



To avoid electrical shock:

1. NEVER connect or disconnect wire leads from the power jacks when the red indicator light at the Start/Stop key is on or when "RUNNING" is displayed on the screen.
2. WAIT at least 5 seconds after stopping a run before handling output leads or connected apparatus.
3. ALWAYS make sure that hands, work area, and instruments are **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 may 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



Used on the ENDURO 250 Volt Power Supply to indicate an area where a potential shock hazard may exist.

Product Contents

Types of Products

This manual is supplied with the following products:

ENDURO 250 Volt Power Supply (115 / 230 VAC switchable, 50/60 Hz)

Product Contents

Component	Quantity
250V Power Supply	1 each
Instruction Manual	1 each
Extra Fuse	1 each
Power Cord	1 each
Warranty Card	1 each

Upon Receiving the Instrument

Examine the unit carefully for any damage incurred during transit. Any damage claims must be filed with the carrier, keep the supplied box for inspection. The warranty does not cover in-transit damage.



To ensure safe, reliable operation, always operate the ENDURO 250 Volt Power Supply in accordance with the manufacturer's instructions. Always wear protective gloves and safety glasses when working in a laboratory environment.



Product Specifications

ENDURO 250 Volt Power Supply Specifications

Input Power (Switchable)	115 VAC, 50-60 Hz 230 VAC, 50-60 Hz
Fuses	One 4A/250V, one extra fuse is provided
Output power max	300 watts
Output voltage range	5~250V
Output current range	10 mA~3 A
Timer	~99.99 per step
Terminal pairs	4: 4 positive voltage and 4 negative voltage
Operating Modes	
Constant Voltage	1V step
Constant Current	1 mA step
Constant Power	1 watt step
Crossover	Auto
Display type	LCD Graphic type
Display size	53.64 x 15.64 mm (W x H)
Pause function	Yes
Safety feature	No Load Detection Load Change Detection Overload detection Ground Leak Auto Restart
Programmable	Yes Store file no.: 10 Program: up to 10 steps
Stackable	Yes
Housing material	Flame retardant ABS
Housing size	200 x 290 x 70 mm (W x D x H)
Operating temp.	0-40°C
Operating environment	100% RH, 75 KPa-106 Kpa, Altitude not to exceed 2000 meters
Weight	2.6 kg
Certifications	CE; TUV; UL
Warranty	3 years

Introduction

Overview

The ENDURO 250 Volt Power Supply is a microprocessor-controlled power supply designed to meet most electrophoresis needs in a single easy to use unit. The power supply's small foot print and stacking feature conserve valuable bench space. The power supply is capable of running constant voltage, constant current or constant power applications and programming mode concurrently. This instrument is ideal for DNA/RNA electrophoresis, SDS-PAGE, native PAGE, and IEF applications. With four sets of output jacks that can be used simultaneously, the ENDURO 250 Volt Power Supply is designed to run applications at maximal power and efficiency. The ENDURO 250 Volt Power Supply offers three modes, Constant Voltage, Constant Current and Constant Wattage Mode. This manual describes the setup and operation of ENDURO 250 Volt Power Supply including important information on safety and maintenance of the unit.

Features of the ENDURO 250 Volt Power Supply

Important features of the ENDURO 250 Volt Power Supply are listed below:

- Constant Voltage, Power or Current
- Capable of running multiple electrophoresis units
- Large LCD display with clear menu prompts for easy use
- Programming capabilities for limiting voltage (V), current (mA), power (W).
- Four sets of output terminals
- Capability to specify run durations by time or volt-hours







Purpose of the Manual

This manual includes the following information:

- Safety information
- Instructions for setting up the instrument
- Operating instructions.
- Guidelines for repair and maintenance

Follow the recommendations and guidelines provided in this manual for your safety, best results, and optimal performance of your ENDURO 250 Volt Power Supply.

Operational keys

Key	Functions
	STOP key: Used to stop operation from the Running Screen
	START/PAUSE key: Used to start operation / temporarily interrupt power an operation in progress without terminating electrophoresis and to power after pausing without resetting the timer.
	CONSTANT key: Used to set up constant voltage or current values
	MODE key: Used to choose either Constant Voltage, Constant Current or Constant Wattage mode
	Down Arrow key: Used to move cursor down between parameters and to decrease numeric values
	Up Arrow key: Used to move cursor up between parameters and to increase numeric values

Getting Started

Installing the ENDURO 250 Volt Power Supply

1. Check the label located near the AC inlet to ensure that the unit is compatible with locally provided voltage.
2. Place the ENDURO 250 Volt Power Supply on a level laboratory bench. Keep the area around the power supply clear to ensure proper ventilation of the unit.
3. **For your safety:** Position the unit properly such that the **On-Off** switch and the AC inlet located on the rear of the unit are easily accessible.
4. Ensure the AC power switch is in the **Off** position.
5. Attach the power cord to the AC inlet. Use only properly grounded AC outlets and power cords.
6. Connect the leads from the electrophoresis unit; insert the red lead (+) into the red output jack, and the black lead (-) into the black output jack.

Important Guidelines

Introduction

The important guidelines for operating the ENDURO 250 Volt Power Supply are provided in this section. We recommend that you carefully review these guidelines before operating the instrument.



Important

For best results, do **NOT** use the ENDURO 250 Volt Power Supply at its maximum electrical load limits. Variations in buffer conditions can result in exceeding the power supply's maximum voltage, current, or power output capacity and produce undesirable variations in electrophoretic separations.

General Operating Instructions

Follow the instructions below to operate the ENDURO 250 Volt Power Supply.

- Turn on the ENDURO 250 Volt Power Supply using the power switch on the rear of the instrument. Upon start-up, the **current settings** appear on the screen.
- Use the **START/PAUSE** and **STOP** keys and output jacks for applications.
- Use the **CONSTANT** key to set up operation mode.

Recommendation

The duration of electrophoresis can be defined in time (hours/minutes). When using this or any electrophoresis product, we recommend that you adhere to the protocols given in the electrophoresis product manuals, and durations, specified in time.



Important

For best results, follow these important guidelines when running multiple gels and electrophoresis units concurrently.

For example:

- Avoid running samples of widely differing salt concentrations or sample buffers at the same time or on the same gel.
- Properly prepare and desalt your samples.

Note: Variations in conductivity due to differences in buffer salt concentrations can affect the run of all the samples run at the same time.

Operational Modes

Introduction

The ENDURO 250 Volt Power Supply is designed to operate under different modes, **Constant mode** or **Programming Mode**, depending upon your electrophoresis needs. Use the **Constant Voltage, Constant Power** or **Constant Current Operation** for applications that require only one specific voltage limit, current limit, and power limit continuously during the entire duration of electrophoresis.

Start-up

On power up use the ▼▲ arrow key to choose the operational Mode (**Constant Mode** or **Program Mode**), then press **Mode** to select..

- On the **Display Screen**:
 - The controlling value (Volts, Amp or Watts) is displayed on the left-top side of the display screen.
 - The Timer is the first line on the right-top, and the other values (Volts, Amp or Watts) are displayed in the second and third line on the right side of the display screen.

Constant Operation Protocol

Introduction

Instructions for operating the ENDURO 250 Volt Power Supply in the **Constant Operation** are provided in this section. The **Constant Voltage, Current, or Power Mode** allow you to specify a voltage limit, current limit and power limit to be used during the entire duration of electrophoresis. Review the guidelines provided in this manual before starting electrophoresis using the ENDURO 250 Volt Power Supply. A basic **Constant Voltage, Current Mode, or Constant Power** operating procedure of the ENDURO 250 Volt Power Supply is provided below. We recommend reading the guidelines provided in this manual for best results before starting an operation.

1. Use the power switch on the rear side of the instrument to turn on the ENDURO 250 Volt Power Supply. On Display Screen **Constant Mode** and **Program Mode** will appear.
2. With the Constant Mode highlighted press the **Mode** key
3. Use the Mode Key to navigate to needed parameter (Volt. Amp, or Wat)
4. Press the **CONSTANT** key to select, **Constant Voltage Operation, Constant Current Operation** or **Constant Power Operation** from the **Display Screen**.
5. Use the ▼▲ arrow keys to set either voltage (VOLT)) or current (AMP) or Power (WAT) to the appropriate values.

6. Use the **Mode** key to select TIME and use ▼ ▲ arrow key to set the time (hours/minutes) to specify the duration of the electrophoresis.
7. Press **START/PAUSE** key to start electrophoresis.
8. Press the **START/PAUSE** key again to temporarily interrupt power to ongoing electrophoresis without terminating the operation along with LED flashing.
9. Press the **STOP** key to stop electrophoresis.
10. If the parameters need to be changed during the run you must stop electrophoresis by pressing the **Mode** key. Enter the changes and then press **Start/Stop** once again to restart your operation.

Note: After stopping and restarting an operation, the timer resets to selected time and does not take into account the time that electrophoresis was in progress before it was stopped.

Basic Programming Protocol

Introduction

Instructions for operating the ENDURO 250 Volt Power Supply in the **Programming Mode** are provided in this section. The **Programmable Mode** allows you to vary levels in voltage (V), current (mA), and power (W) during specified periods of time as discrete changes (STEP) for up to 10 steps, depending upon your electrophoresis needs.

A basic **Programmable Mode** operating procedure of the ENDURO 250 Volt Power Supply is provided below. We recommend reading the guidelines provided in this manual for best results before starting an operation.

Selecting a program

1. Select Program Mode by scrolling down using the ▼ key
2. When highlighted press **Mode** key
3. Select file number using the a ▼ ▲ arrow keys
4. When file number is located press the **Mode** key
5. Select the number of steps by using the arrow ▼ ▲ arrow keys
6. To enter the parameters of the run press the **Mode** key
7. Voltage will appear on the display to enter voltage press **Mode** key
8. To change voltage, use the ▼ ▲ arrow keys.
9. Select Amperage or Watts by pressing the **Mode** key until desired parameter is flashing.
10. Increase or decrease the value by using the ▼ ▲ arrow keys
11. To set the time in hours press the **Mode** key
12. Increase or decrease the value by using the ▼ ▲ arrow keys
13. Select the **Mode** key again to select minutes.

14. Increase or decrease the value by using the ▼▲ arrow keys
15. Repeat 6 thru 14 above to program successive steps.

Viewing a Program

1. Select the file number using the ▼▲ arrow keys when highlighted press the **Mode** key.
2. Press the **Mode** key 3 more times to advance to the programming.
3. If multiple steps use the **Mode** key to advance through the program to the next step.

Editing a program

1. When a file is selected the parameters can be edited by the **Mode** button
2. When the parameter is selected, it will flash. Use the ▼▲ arrow keys to either increase or decrease values.
3. Press the **Mode** key to migrate to the next parameter.
4. When the parameter is selected use the ▼▲ arrow keys to increase or decrease the values.

Choosing Limiting Parameter Settings

Introduction

The ENDURO 250 Volt Power Supply is capable of operating at limiting Voltage, or limiting Current or limiting Watts. We recommend operating the ENDURO 250 Volt Power Supply at limiting voltage for most applications. See below for more details.

Voltage Limiting

For most electrophoresis methods resistance increases throughout the run. Limiting the voltage provides the following advantages:

- Current and power decrease throughout the run, providing an improving margin of safety over time.
- 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 ENDURO 250 Volt Power Supply, the voltage will increase as resistance increases to satisfy Ohm's law ($V=IR$). 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 the maximum

capacity of the power supply. This may lead to local overheating and damage to the electrophoresis cell or create unsafe conditions. When operating under constant current conditions, set a voltage limit on the power supply at or slightly above the maximum expected voltage.

Power Limiting

Watts is a function of voltage and current $W=IV$. If voltage is increased watts will also be increased depending on the gel system, R should be a constant. Watts will be reflected by the heat generated during a gel run. The power limiting function may be used when running sequencing gels to remove the APS from the wells and to heat the gel to an optimal temperature for DNA separations.

Troubleshooting

Review the information in the table below to troubleshoot operating problems.

Problem	Cause	Solution
The LCD screen remains blank and the fan does not run when the power is turned on	AC power cord is not connected The fuse has blown	Check AC power cord connections at both ends. Use the correct cords. Replace the fuse
Operation stops with alarm The screen displays "NO LOAD"	1. Electrophoresis leads are not connected to the power supply. 2. The electrophoresis unit(s), is not connected. 3. There is a broken circuit in the electrophoresis cell 4. High resistance due to tape left on a pre-cast gel 5. Incorrect buffer concentration, or incorrect buffer volumes in the electrophoresis cell 6. High voltage application is set to run on a very low current	1. Check the connections to the power supply and on your electrophoresis cell to make sure the connection is intact; check condition of wires in electrophoresis unit. 2. Close the circuit by reconnecting the cables. 3. Press START/PAUSE to restart the run. 4. Correct the condition by making sure the tape is removed from the pre-cast gel. 5. Make sure buffers are prepared correctly, and the recommended volume of buffer is added to the electrophoresis unit. 6. Change current setting.

<p>Operation stops with alarm: Display shows "OVER VOLTAGE"</p>	<p>Circuit is interrupted</p>	<ol style="list-style-type: none"> 1. Verify that the running buffer is correct. 2. Verify the all cables are attached correctly 3. Turn the Power switch off and on again; restart application. 4. If you cannot restart the instrument, turn off the power, disconnect the power cord from the outlet, and contact Technical Service.
<p>Operation stops with alarm: Display shows "LEAKAGE"</p>	<p>Ground leak detected during run</p>	<ol style="list-style-type: none"> 1. Check the electrophoresis system for improper grounding. 2. Restart the power supply by turning the Power switch off and on.
<p>Operation stops with alarm: Display shows "OVER TEMP"</p>	<p>Power supply is overheating</p>	<ol style="list-style-type: none"> 1. Turn off power supply. Check for sufficient airflow around the power supply fan. After cooling down, restart the power supply. 2. If you cannot restart the instrument, turn off the power, disconnect the power cord from the outlet, and contact Technical Service.

Operational Electrical Parameters

Power Considerations

Electrophoresis is the migration of a charged particle under the influence of an electrical field. The power supply output parameters voltage, current, and power are related by the following two equations:

Voltage (V) = Current (I) x Resistance (R); ($V=IR$)

Power (W) = Current (I) x Voltage (V); ($W=IV$)

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 an electrophoretic separation. 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 with 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

The power in Watts, or the rate of heat generated by the system, is directly proportional

to voltage and current ($W=IV$).

Common Errors found with Electrophoresis Power Supplies

No load

- The electrophoresis system is not connected to the power leads, check the power leads
- The electrophoresis system has a short, the Pt wire is broken or the banana connectors are damaged
- Buffer concentration too low
- Buffer volume too low
- Short in power cord
- Current has dropped below acceptable rating (4 mA)

Short circuit

- Load exceeds 500 mA
- Blown fuse in the power supply
- Incorrect input voltage (check input voltage switch near power inlet)

Change in load

- Electrophoresis systems were added or removed during a run
- Buffer leaking in a connected system
- Excessive temperature increase
- Excessive buffer evaporation
- Loose connection in a connected system
- Amperage set to low

Change in constant mode

- Voltage changes to amperage
 1. Amperage set to low. Ceiling hit and constant mode changed from voltage to amperage.
Increase amperage to 500 mA.
- Amperage changes to voltage
 1. Voltage set to low. Ceiling hit and constant mode changed from amperage to voltage.
Increase voltage to 300 volts

The 300 volt system has automatic cross over, set voltage or amperage, and preset wattage. During the electrophoresis process only one parameter is limiting at a time. The limiting parameter, together with the conductivity in the electrophoresis system, and the values for the other parameters determine the maximum output.

Repair and Maintenance of ENDURO 250 Volt Power

Supply

Introduction

The ENDURO 250 Volt Power Supply requires no periodic maintenance program with the exception of an occasional dry wipe-down of the instrument.

Encountering Problems

1. Check the troubleshooting section.
2. Call Technical Service.
3. If the unit must be shipped back for repair, contact Labnet for a Return Authorization Number and shipping instructions.

Replacing the Fuse

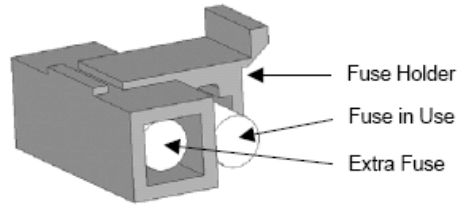
For additional fuses, contact Labnet International Technical Service.

To replace the fuse:

1. Turn off the main power switch at the rear of the ENDURO 250 Volt Power Supply and detach the power cord from the rear of the ENDURO 250 Volt Power Supply.
2. Open the fuse compartment located inside the Power Entry Module by inserting a small flat blade screwdriver into the slot below 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 an identical type of fuse (4A/250V) as provided in the fuse holder (see figure below).
4. Place the fuse holder back into the compartment.
5. Snap the cover closed.



Technical Service

Web Resources

Visit the Labnet's website at www.labnetlink.com for:

- Complete technical service contact information.
- Access to Labnet's Online Catalog, and information about accessories and related products.
- Additional product information and special offers.

Contact Us For information or technical assistance contact your local Dealer or Labnet representative.

Legal Address of Manufacturer

United States

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732-417-0700
<http://www.labnetlink.com>

Europe

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Warranty

Labnet International, Inc. warrants that this product will be free from defects in material and workmanship for a period of three (3) years from date of purchase. If a defect is present, Labnet 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.

For research use only. Not intended for any animal or human therapeutic or diagnostic use.

Equipment disposal



This equipment is marked with the crossed out wheeled bin symbol to indicate that this equipment must not be disposed of with unsorted waste.

Instead it's your responsibility to correctly dispose of your equipment at lifecycle -end by handling it over to an authorized facility for separate collection and recycling. It's also your responsibility to decontaminate the equipment in case of biological, chemical and/or radiological contamination, so as to protect from health hazards the persons involved in the disposal and recycling of the equipment.

For more information about where you can drop off your waste of equipment, please contact your local dealer from whom you originally purchased this equipment.

By doing so, you will help to conserve natural and environmental resources and you will ensure that your equipment is recycled in a manner that protects human health.

Thank you.