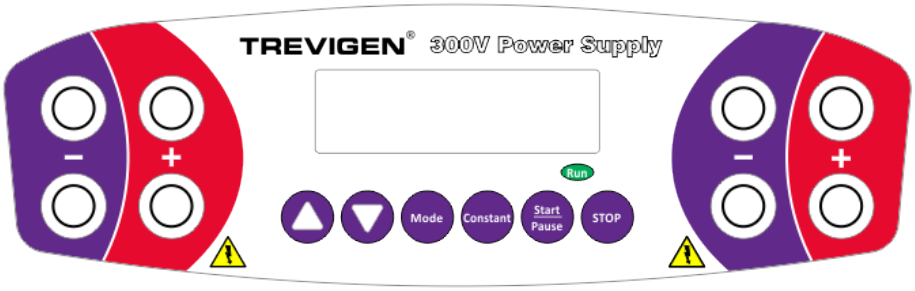
TREVIGEN®

Operating Manual

Model 300V

Electrophoresis

Power Supply



POWER SUPPLY INSTRUCTION MANUAL – TABLE OF CONTENTS

ELECTROPHORESIS POWER SOURCE 300V

1.0 BEFORE YOU BEGIN

1.1 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. The equipment generates and can radiate radio frequency energy which may interfere with radio communications if not installed and used in accordance with the instruction manual. Operation of this equipment in a residential area may 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.

1.2 SAFETY WARNINGS

The 300V Power Supply is to be used **for research use only**; it is not designed or intended for any animal or human therapeutic or diagnostic use.

1.2.1 AVOIDING ELECTRICAL SHOCK

To ensure safe, reliable operation, always operate the 300V Power Supply in accordance with instructions found in this operating manual. Always wear protective gloves and safety glasses when working in a laboratory environment. See Safety and Warranty Information in this manual.

- The 300V Power Supply produces an output of up to 300 volts and is electrically isolated from ground to reduce the risk of electrical shock to the user. Please follow the guidelines below and read this manual in its entirety to ensure safe operation of the unit.
- The 300V Power Supply has been designed for use with electrophoresis gel box systems with shielded (shrouded) banana plugs to minimize potential shock hazard to the user.
- Always use gel apparatus that are compatible with the power supply, have been designed for your application, and are suitable for the voltage and current range of the power supply.
- Always use gel box systems that have safety lids to prevent accidental electric shocks to the user. Trevigen strongly recommends against the use of gel box systems and/or power leads that have unshielded banana plugs.

To avoid electrical shock:

- **NEVER** connect or disconnect wire leads from the power jacks when the red indicator light near the START and STOP keys is on or when 'RUNNING' is displayed on the screen.
- **WAIT** at least 5 seconds after stopping a run before handling output leads or connected apparatus.
- **ALWAYS** ensure that hands, work area, and instruments are clean and dry before making any connections or operating the power supply.
- **ONLY** connect the power supply to a properly grounded AC outlet.

1.2.2 AVOIDING DAMAGE TO THE POWER SUPPLY

1. Proper ventilation is essential so 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, seal the unit in a plastic bag and allow at least two hours for the unit to equilibrate to room temperature before removing the bag and operating the unit.

1.2.3 SYMBOLS

Used on the 300V Power Supply to indicate where a potential shock hazard may exist.

1.3 PACKAGE CONTENTS

Upon receiving the power supply carefully examine the unit for any damage incurred during transit. Any damage claim must be filed with the carrier. The Trevigen warranty does not cover in-transit damage.

Component	Quantity
300V Power Supply	1 each
Instruction Manual	1 each
Extra Fuse (4A/250V)	1 each
AC line Power Cord	1 each (US cord supplied as standard)

1.4 300V POWER SUPPLY SPECIFICATIONS

Input power	110 or 230 VAC @ 50-60 Hz (set to 115 VAC as standard)
Fuses	One 4A/250V (extra fuse is provided)
Output power in watts	90 Watts
Output voltage/current range	2 to 300 VDC, 4 to 500 mA
Timer range	1 minute to 9 hours 59 minutes
Output terminals	4 positive and 4 negative
Operating modes	
Constant voltage	1 V increment settings
Constant current	1 mA increment settings
Crossover	Automatic
Display type and size	Backlit LCD, 53.6 mm W x 15.6 mm H
Safety features	
Pause function	Yes
No load, load change detection	Yes
Overload detection	Yes
Ground leak detection	Yes
Auto-restart	Yes
Housing size, material, weight	200 x 290 x 70 mm (W x D x H); Flame retardant ABS, 1.2 kg
Environmental conditions	0°C-40°C, 85% RH, KPa-106, altitude not to exceed 2,000 M
Certifications	CE, TUV, CUL

2.0 OPERATING INSTRUCTIONS

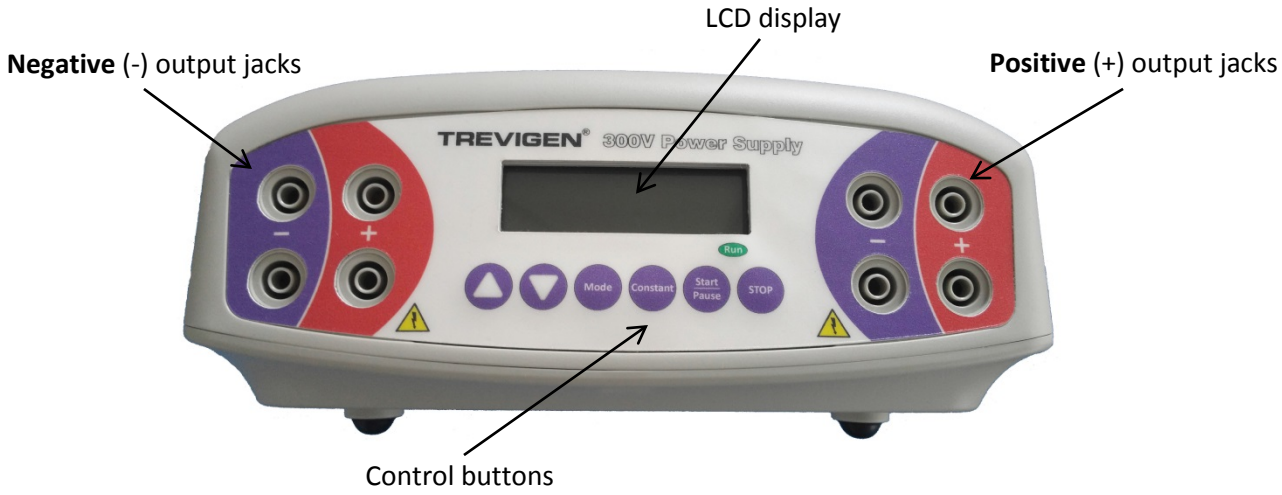
2.1 OVERVIEW

This manual describes the setup and operation of the microprocessor-controlled **300V Power Supply** including important information on safety and maintenance of the unit. The 300V is designed to meet most electrophoresis needs in an easy to use unit. It is ideal for Comet electrophoresis, DNA/RNA electrophoresis, SDS-PAGE, native PAGE, and for second-dimension SDS-PAGE applications.

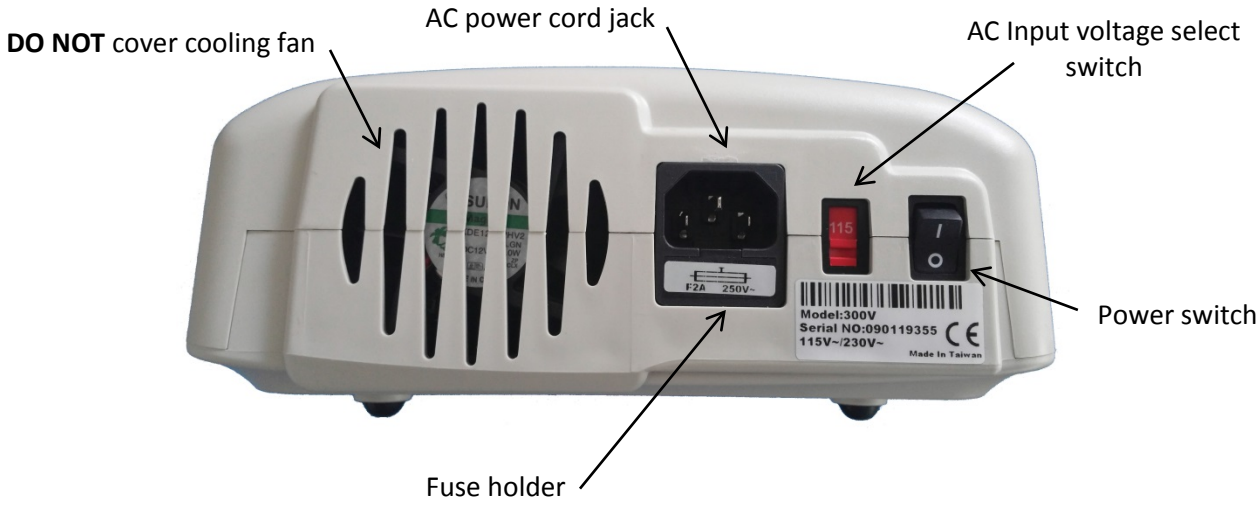
The 300V Power Supply offers two modes: **Constant Voltage** or **Constant Current**. With four sets of output jacks that may be used simultaneously, the 300V can efficiently handle multiple electrophoresis gel tanks while taking up little bench space.

2.2 FRONT AND BACK VIEWS OF THE POWER SUPPLY

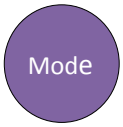
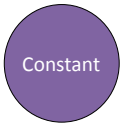
FRONT VIEW OF 300V POWER SUPPLY



REAR VIEW OF 300V POWER SUPPLY



2.3 DESCRIPTION OF BUTTONS

Button	Function Name	Description of Function
	**UP**	Used to move cursor between parameters and to increase numeric values
	**DOWN**	Used to move the cursor down between operating parameters and to decrease numeric values
	**MODE**	Press to choose between Constant Voltage(CV) or Constant Current (CC)
	**CONSTANT**	Press to set the values of the constant voltage or constant current
	**START/PAUSE**	Used to start operation or to temporarily interrupt power to the output terminals without termination of a timed operation. Pressing this button again resume operation.
	**STOP BUTTON**	Used to stop operation

2.4 SETTING UP THE 300V POWER SUPPLY

1. Check to see that the voltage select switch located near the power inlet is set to your local voltage (either 115 or 230 VAC).

   IMPORTANT: *If a power supply is set to 115 VAC and plugged into 230 VAC it will suffer damage and may be destroyed. This is not covered under warranty.*

2. Place the 300V Power Supply on a level laboratory bench taking care to ensure that the area AROUND THE POWER SUPPLY IS CLEAR TO ALLOW PROPER VENTILATION—THE POWER SUPPLY WILL GET WARM when run at capacity.

   Note: *For safety and convenience place the 300V so that the AC on/Off switch and AC cord are easily reached.*

3. Check to see that the AC power switch located on the back panel is in the OFF position.

4. Attach the AC power cord to the AC inlet. It is imperative that you use a properly grounded, undamaged, AC power cord.
5. Connect the power cords from the electrophoresis units that you intend to run by plugging the **Red** cords into the positive (+) output jacks and **Black** cords into the negative (-) output jacks.

   IMPORTANT: *For best results,* ***DO NOT*** *operate the 300V power supply at its maximum electrical load limits. Variations in buffer conditions can cause the power supply to exceed the maximum voltage, current, or power output capacity and produce undesirable variations in your gel runs.*

6. Turn on the 300V Power Supply by pressing the power switch on the rear panel to the ON position. Upon powering up the LCD display will illuminate and show the factory default settings or the last settings used.
7. Use the Start/Pause and Stop buttons to switch power to the output jacks either On or Off.
8. Electrophoresis duration can be set in (hours and minutes). When using this or any electrophoresis product, we recommend that you adhere to the times provided in protocols and application documents.

   Note: *Avoid running multiple apparatus with differing buffer salt concentrations at the same time. Variations is conductivity due to differences in salt concentrations can affect the way samples run.*

2.5 CONSTANT CURRENT (CC) AND CONSTANT VOLTAGE (CV) MODES

The 300V Power Supply is designed for efficient operation in two modes: **Constant Current (CC)** and **Constant Voltage (CV)**. Use Constant Voltage for applications that require only one specific voltage limit or Constant Current to limit the current during electrophoresis.

The Display Screen will illuminate after the 300V is turned on. The unit will display the default factory settings or the last settings used. You can choose the operational Mode (Constant Voltage or Constant Current) by pressing the 'CONSTANT' button.

- The chosen constant parameter (Voltage or Current) will be displayed on the left side of the display.
- The timer is the first line at the top on the right. The NON-constant value is displayed on the second line on the right side of the screen.

2.6 CHOOSING LIMITING PARAMETER SETTINGS

We recommend operating the 300V Power Supply at limiting voltage for most applications. For most electrophoresis methods, resistance increases during the run.

2.6.1 VOLTAGE LIMITING

Voltage limited operation provides the following advantages:

- The same voltage setting can be used regardless of the number or thickness of gels being run.
- Current and power output decrease throughout the run providing a greater margin of safety over time.

2.6.2 CURRENT LIMITING

Discontinuous buffer systems and, to some extent, continuous systems increase resistance during the run. If you use the current limiting setting on the 300V 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 electrode connection, very high resistance may cause the voltage to increase to the limit of the supply. This may lead to overheating and damage to the electrophoresis tank or create unsafe conditions.

> ***Note:*** *When operating under constant current conditions, set a voltage limit on the power supply at or slightly above the maximum expected voltage.*

2.6.3 BASIC CONSTANT OPERATION PROTOCOL

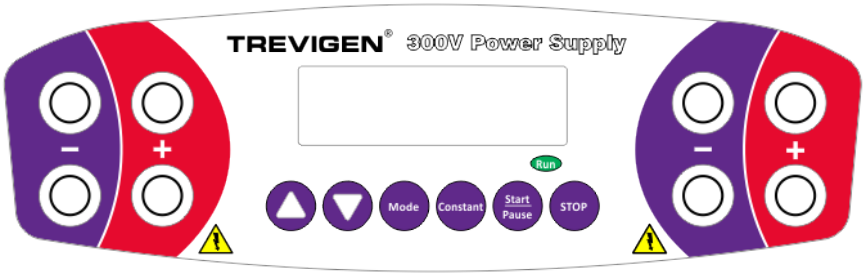
The **Constant Voltage** and **Constant Current Modes** allow you to specify a voltage limit and a current limit to be used continuously during the duration of your electrophoresis run.

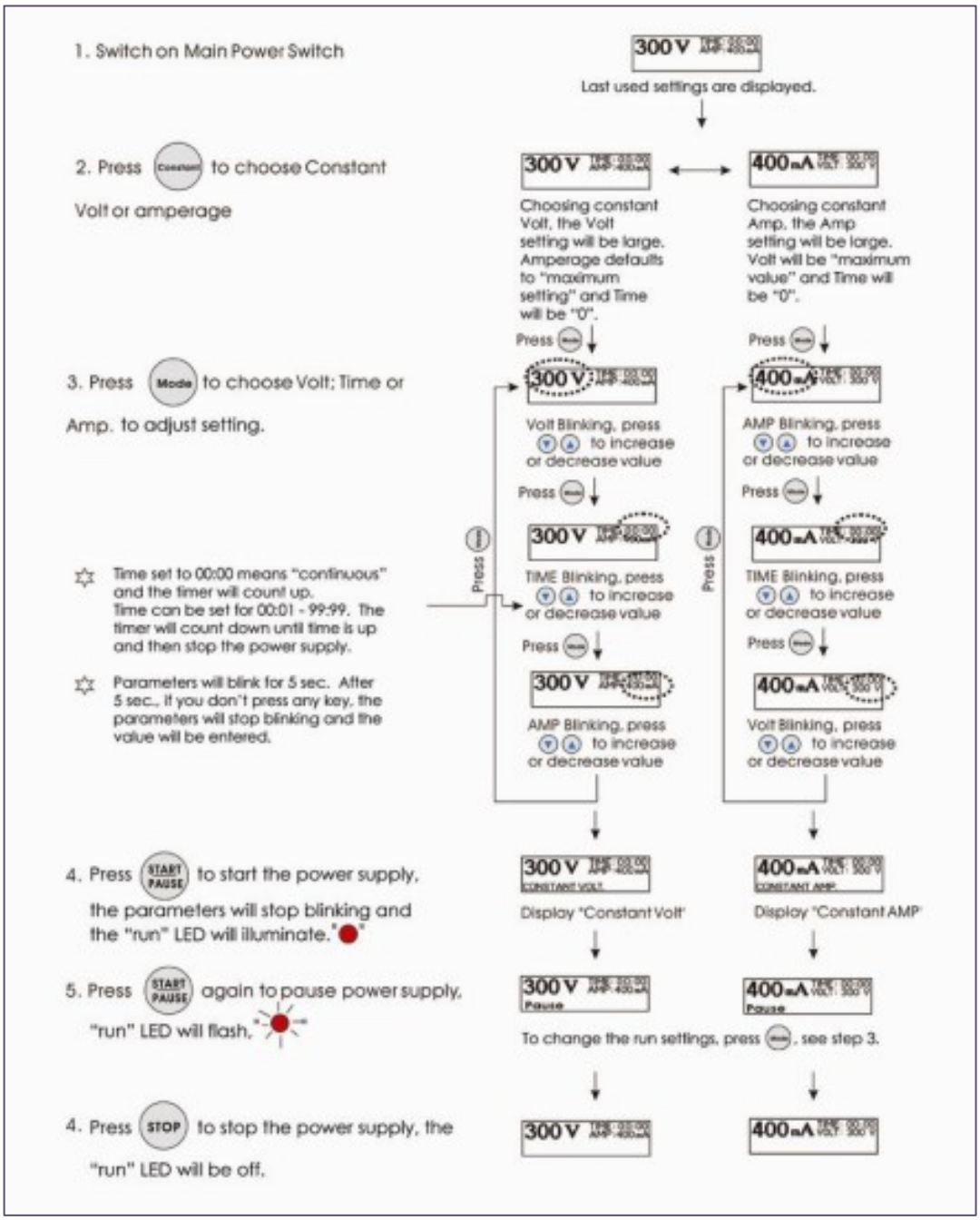
Constant Voltage/Constant Current Mode operating procedures for the 300V Power Supply are detailed below. Please read the remainder of this manual before beginning electrophoresis.

1. Turn the 300V Power Supply on using the power switch located on the rear panel. The display screen will illuminate.
2. Press the CONSTANT key to set either Constant Voltage or Constant Current Operation from the Display Screen.
3. Use the UP Arrow/ DOWN Arrow keys to set either voltage (V) or current (mA) parameters to the appropriate values.
4. Press the MODE key to choose the TIME parameter and use the UP Arrow/DOWN Arrow keys to set the duration (hours/minutes) of the electrophoresis run.
5. Press START/PAUSE key to keys to start electrophoresis
6. Press START/PAUSE key again to temporarily interrupt power. The red 'Run' LED will flash to indicate that the electrophoresis run is paused. Pressing the START/PAUSE key again will restart the run.
7. Press the STOP key to permanently halt the electrophoresis run, this will reset the timer to '0'.
8. To change the limits (Voltage or Amperage) of the electrophoresis run in progress: Press the MODE key then enter the changes using the UP Arrow/DOWN Arrow keys. Press the START/PAUSE key again to restart operation.

   > ***Note:*** *After using the STOP key to and restarting operation, the timer resets and does not take into account the elapsed time electrophoresis was in progress before it was stopped.*

3.0 OPERATING FLOWCHART





4.0 OHM'S LAW CONVERSIONS

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

Voltage (V) = Current (I) x Resistance (R)	As a formula V=IR
Power (W) = Current (I) x Voltage (V	As a formula W=IV

RESISTANCE

Resistance of the electrophoresis tank and gel is dependent upon 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, resistance may vary over the course of an electrophoretic separation.

VOLTAGE

The velocity with which an ion moves through an electric field is proportional to the field strength (volts per unit distance). A higher voltage will move an ion faster.

CURRENT

Current is a function of the number of ions passing a given cross-section of a 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 the cross sectional area of the number or thickness of the gels.

POWER

Power in Watts is a measure of heat generated by the system and is directly proportional to the Voltage and the Current as described by the equation: W= IV.

5.0 TROUBLESHOOTING

Review information in the table below to troubleshoot operating problems.

Problem	Cause	Solution
LCD screen remains blank and the fan does not run after power is turned on	AC power cord not connected	Check AC power cord connections. Check condition of cord
	Fuse has blown	Replace fuse
Operation stops with alarm. The screen displays **'NO LOAD'**.	Electrophoresis leads are not connected to the power supply or to the electrophoresis unit(s) or there is a broken circuit in the electrophoresis tank.	Check connections to the power supply and on your tank to ensure the connection is electrically intact. Check condition of tank electrodes. Close the circuit by reconnecting cables. Press START/PAUSE to restart the run.
	High resistance due to sealing tape left on a pre-cast gel, incorrect buffer concentration, and incorrect buffer volume in the tanks.	Correct the condition by ensuring the tape is removed. Prepare buffers correctly and use recommended volume of buffer.
	High voltage application set to run on a very low current	DISABLE No Load alarm on the display screen.
Operation stops with alarm. The screen displays **'OVER VOLTAGE'**.	Circuit is interrupted	Verify that the running buffer is correct Check to see that all cables are attached correctly Turn the power switch off then on to restart the system If you cannot restart the power supply, turn off the power, disconnect the AC cord and send unit for service.
Operation stops with alarm. The screen displays **'OVER TEMP'**.	Power supply is overheating	Turn off power supply, check for sufficient airflow around the rear fan. After allowing the supply to cool, restart by turning the Power Switch to ON. If you cannot restart the power supply, turn off the power, disconnect the AC cord and send unit for service.

6.0 REPAIR AND MAINTENANCE OF 300V POWER SUPPLY

The 300V Power Supply requires no maintenance other than an occasional wipe-down. Do not allow fluids to enter the housing.

6.1 WHEN YOU ENCOUNTER PROBLEMS

1. Check the troubleshooting section.
2. Contact our technical Service Department.
3. If the supply must be returned for repair, contact us for a Return Authorization Number and shipping instructions. The unit will be repaired as quickly as possible and returned to you.

Should you have any problems with this unit, please contact:

TREVIGEN
8405 Helgerman Court
Gaithersburg, MD 20877 USA

Phone: 301-216-2800 9 to 5PM EST (GMT -5) Monday through Friday
Fax: 301-560-4973
Email: info@trevigen.com

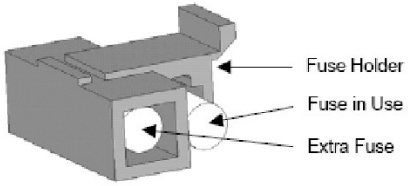
6.2 REPLACING THE FUSE

One extra fuse is supplied with the 300V Power Supply. For additional fuses, contact our Service Department. To replace the fuse:

1. Turn off the main power switch at the rear of the 300V supply and detach the AC power cord.
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. 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 wire, replace the fuse with a fuse identical to that as provided in the fuse holder (4A/250V).
4. Place the fuse holder back in the compartment and snap the cover closed.



7.0 CARE AND HANDLING

7.1 MATERIALS AND CARE

Routine inspection and maintenance will ensure both the safety and the performance of your power supply. For a replacement AC power cord, call your distributor or Trevigen Technical Support.

- Because of the relatively high voltages that may be used, inspect electrical connections and power cords often. If power cords show any signs of wear or damage (e.g., cracks, nicks, abrasions, melted insulation or bare wire), replace immediately.
- Examine the electrode banana plugs and connection nuts on your gel boxes to ensure they are free of corrosion or they may offer higher resistance thus heating up and risking sparks and fire.

7.2 EQUIPMENT DISPOSAL

It's 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.

7.3 INSTRUCTIONS FOR RETURN SHIPMENT

IMPORTANT: Before sending the unit back to us, it is absolutely necessary to call our Technical Support department to **get authorization to return products**!

- Return only defective devices. For technical problems which are not definitively recognizable as device faults please contact Trevigen Technical Support.
- Use the original product packaging whenever possible to avoid damage to the unit being returned. All returned material must be cleaned and decontaminated prior to shipping.
- Label the outside of the box with **CAUTION! SENSITIVE INSTRUMENT!**
- Please enclose a detailed description of the fault and when, or how, the problem occurred.

Important: Clean all parts of the instrument from residues and of biologically dangerous, chemical and radioactive contaminants. Please enclose a note which contains the following:

1. Sender's name and address and,
2. Name of a contact person for further inquiries with telephone number.

7.3.1 NOTICE REGARDING THE RETURN OF CONTAMINATED PRODUCTS

In order to comply with US federal regulations and to protect the health and safety of employees, it is imperative that all customers read this notice and adhere to the requirements regarding the return of products. The US Department of Transportation, the Department of Health and Human Services, and the Nuclear Regulatory Commission have strict regulations on the shipment of hazardous materials (49 CFR Part 173) including etiologic agents (49 CFR Part 173 and 42 CFR Part 72) and radioactive materials (CFR 49 Part 173 and 10 CFR Part 20).

Materials received that have not been properly decontaminated or units which do not have hazard labels (such as 'caution radioactive materials') may be decontaminated at the customer's expense (approximately $350) and may result in delay or refusal of repair. In addition, in the case of radioactive contamination, Trevigen may be required to notify a licensing authority that in turn may be required to notify the customer's licensing authority.

8.0 WARRANTY

8.1 WARRANTY

Trevigen warrants this power supply against defects in materials and workmanship, under normal service, for one year from the date of receipt by the purchaser. This warranty excludes damages resulting from shipping, misuse, carelessness, or neglect. Trevigen's liability under the warranty is limited to the repair of such defects or the replacement of the product, at its option, and is subject to receipt of reasonable proof by the customer that the defect is embraced within the terms of the warranty.

This warranty is in lieu of any other warranties or guarantees, expressed or implied, arising by law or otherwise. Trevigen makes no other warranty, expressed or implied, including warranties of merchantability or fitness for a particular purpose. Under no circumstances shall Trevigen be liable for damages either, consequential, compensatory, incidental or special, sounding in negligence, strict liability, breach of warranty or any other theory, arising out of the use of the product listed herein.

In the interest of bettering performance, Trevigen reserves the right to make improvements to the design, construction, and appearance without notice.

8.2 DECLARATION OF CONFORMITY AND CE MARK

Note: The information outlined in this section applies only to customers located in the European Union (EU).

This power supply is identified with the **CE** mark. This mark indicates that the product complies with the following EU Directives and Standards:

APPLICATION OF COUNCIL DIRECTIVE(S):

89/336/EEC	Electromagnetic Compatibility
73/23/EEC	Low Voltage Directive

STANDARDS:

EN 50081-1:1992	Emissions
EN 50082-1:1992	Immunity
EN 61010-1:1993	Product Safety