



Titan® Plus

Electrophoresis Power Supply



Operator's Manual

Cat. No. 1504, 110 Vac

Cat. No. 1505, 220 Vac

These symbols may be used on the instrument.



Caution, electric shock hazard, high voltages capable of causing personal injury - shut down the instrument and unplug the power cord before touching - do not operate with the cover(s) removed



Caution, heat hazard - allow heated components to cool before handling.



Caution, general hazard - see precautions and hazards (sections 3 and 4) of Operator's Manual before proceeding



Direct current



Alternating current



Both direct and alternating current



Ground (earth) terminal



Protective conductor terminal (grounded conductors)



Frame or chassis terminal



Equipotentiality (conductor with all parts at a single potential)



On (power switch)



Off (power switch)



Equipment protected throughout by double insulation or reinforced insulation (equivalent to Class II of IEC 536)

Titan Plus Power Supply
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ONE - Instrument Use and Function

The Titan Plus Power Supply is intended for use with all standard electrophoresis chambers. It can be used with all electrophoretic media including cellulose acetate, agar, starch, acrylamide and agarose support media. The power supply provides controlled voltage, variable current output with automatic or manual timing. It is for *in-vitro* diagnostic use in a laboratory or similar environment.

TWO - Principles of Operation

The functional units of the Titan Plus Power Supply are shown in Figure 1. User input is received from various controls on the instrument front. The user selects the output voltage and the electrophoresis time for automatic timing or bypassing the internal timer, and determines the information shown on the display.

An electromechanical timer is used for starting the run and for automatic timing. The timer can be bypassed, depending on the position of the Hold/Normal Switch. When Normal is selected, the electrophoresis time is selected on the Time knob, setting the electromechanical timer and starting the run. The timer

automatically cuts off power to the output jacks when time remaining reaches zero. When Hold is selected, the timer is bypassed so that the operator times and turns off electrophoresis power manually.

When a run has been started, the Voltage Adjust Knob sets an auto-transformer to determine the output voltage produced by the high-voltage power supply. The high voltage power supply output is measured by a meter and displayed according to the position of the Display Select Switch. Voltage is measured and displayed in one position, or current at right or left jacks is measured and displayed in other positions. The display has its own power supply.

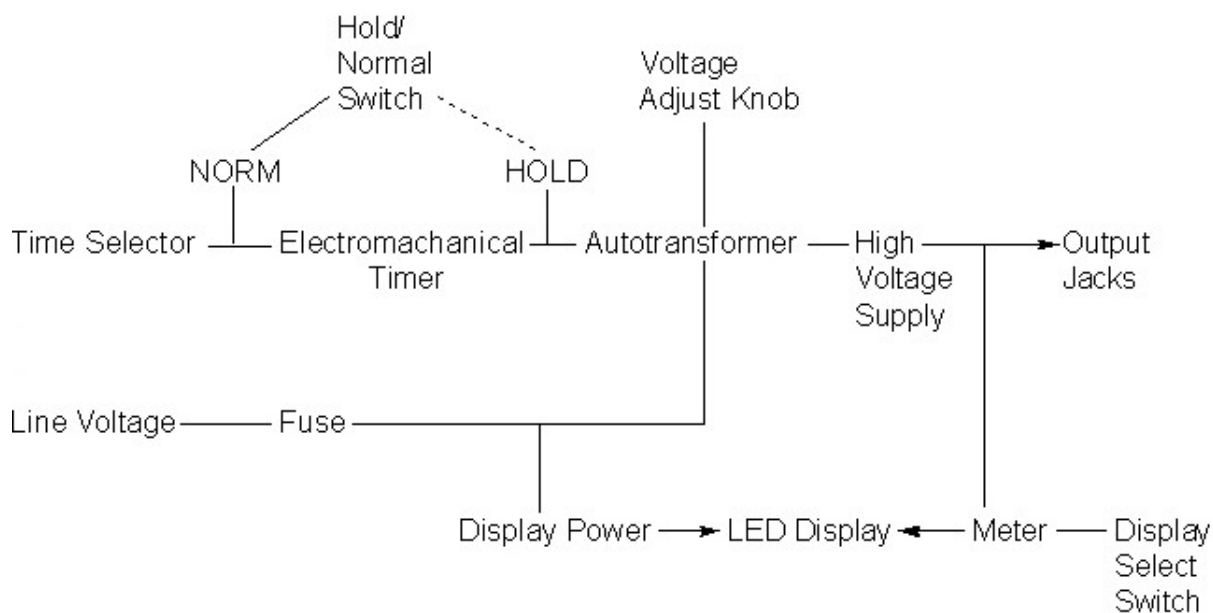


Fig. 1. Functional Block Diagram of Titan Plus Power Supply.

THREE - Precautions and Limitations

3.1. The entire operator's manual should be read and understood before attempting instrument operation.

3.2. Installation is to be performed by the operator.

3.3. Provide adequate room at the sides and back of the instrument for good air circulation.

3.4. No harsh cleansers, acids, or bases should be used or spilled on inner or outer surfaces. Do not immerse the unit. ALWAYS UNPLUG THE MAIN POWER CORD BEFORE CLEANING.

Should an instrument be contaminated by blood or blood derivative, spray any contaminated surface with a commercial virucidal and germicidal agent. Observe where the specimens are used inside the instrument and confine cleaning to that area. Wipe up the residue. These materials contain alcohol and alcohol is a corrosive to metal surfaces.

3.5. Before an electrophoresis run, ensure that the chamber polarity is correct, that the buffer tanks are filled to the correct level, and that the sample plates are oriented correctly.

FOUR - Hazards

4.1. If the instrument is used in a manner not specified by this manual, the protection provided by equipment design may be impaired.

4.2. This device contains very high voltages which can be extremely dangerous. Safeguards are built into the instrument to prevent user contact with high voltages, however, ALWAYS TURN OFF THE POWER, DISCONNECT THE MAIN POWER CORD, AND USE EXTREME CARE when attempting disassembly for cleaning, repair, or adjustments. Do not operate any instrument with the cover removed unless instructed to do so by a qualified service technician directly representing Helena Laboratories, its subsidiaries, or its distributors.

4.3. Do not attempt to operate the instrument without plugging the power cord into a grounded wall outlet of the proper voltage and frequency. This information is contained on the serial number plate located on the back of the instrument.

4.4. For emergency shut down, disconnect the power supply's power cord from the wall outlet or turn off the power using the On/Off switch.

FIVE - Description

5.1. Controls

POWER ON/OFF Switch: The power switch is located on the front panel and controls power to the instrument.

TIME Dial: In normal (internally timed) mode (see below), turn the dial counter-clockwise to set the electrophoresis run time, turning on the power to start the run.

HOLD/NORMAL Switch: NORMAL for automatic timing, HOLD to turn on power and bypass the internal timer.

VOLTAGE ADJUST Knob: Turn until desired output voltage is displayed.

DISPLAY SELECT Switch: Voltage position to display output voltage of all jacks. Set at OUTPUT CURRENT LEFT or RIGHT to display the output current (mA) of the respective output jacks.

5.2. Display

Three-character LED display shows electrophoresis voltage with Display Select switch set for VOLTAGE, or output current of either left or right output jacks when the display select switch is set at OUTPUT CURRENT LEFT or RIGHT.

SIX - Installation Instructions

WARNING: Read Section Three (Precautions and Limitations) and Section Four (Hazards) before attempting installation or operation.

6.1. Unpacking and Inspection

1. Check all shipping containers for signs of damage. If damage is found, immediately notify the shipping carrier.

2. Carefully unpack the instrument and accessories and remove them from the shipping cartons. The packing material should be removed undamaged, if possible, should repacking be necessary.

3. Remove plastic wrappings from the instrument and accessories. If scissors or a knife are used to cut the plastic or binding tape, take care not to scratch the instrument.

4. Inspect the instrument for any obvious signs of damage. If damage is found, notify the shipping carrier and Helena Laboratories.

5. Inventory all items: If any parts are missing, recheck the packing materials before notifying Helena Laboratories.

1. Select an environment free of excessive humidity and dust, and large temperature fluctuations. Ambient temperature should not be above 86oF (30oC) or below 59oF (15oC).

2. Place the power supply on a level, flat surface. Make sure that there is enough space behind and around it to allow good air circulation.

3. Plug the female end of the line power cord into the receptacle in the back panel of the instrument.

4. Plug the other end of the power cord into a grounded wall outlet of the proper voltage and frequency (check the serial number plate on the back of the instrument for this information). The wall outlet should not be on the same circuit as any large load device such as a refrigerator, compressor, centrifuge, etc. The instrument's circuitry contains filters to reduce the effect of line voltage fluctuations; however, they should still be avoided. If the operator experiences difficulty, it may be necessary to install an isolation transformer.

Table 6-1. Inventory.

1 Titan Plus Power Supply
1 Power Cord
1 Fuse
1 Operator's Manual

6.2. Installation

NOTE: The Titan Plus Power Supply is a "Category II" device under EN 61010-1 and is for use in a laboratory or similar environment.

SEVEN - Operating Instructions

7.1. To Start Electrophoresis

1. Turn the VOLTAGE ADJUST knob fully counter-clockwise (to the minimum setting).

2. Put the DISPLAY SELECT switch in the VOLTAGE (center) position.

3. Turn on the POWER switch (located on the front panel). The display should read 000. If it does not, turn the TIMER completely clockwise to turn the timer off. If the display does not come on, refer to the troubleshooting table in Section 10.

4. Prepare the chamber(s) as instructed by the appropriate electrophoresis procedure supplied with the reagent kit.

5. Connect the positive and negative leads into the electrophoresis chamber(s), making sure that the display reads 000. This insures that no voltage is applied to the output circuit.

6. Connect the leads to the plugs in the front or back of the power supply. Use only one left and one right set of output jacks at a time. Make sure that the polarities at each end of the leads match.

Check the electrophoresis chamber for correct cable polarity, proper buffer level, and correct membrane or plate orientation.

7. With the HOLD/NORMAL switch at NORMAL, turn the TIME dial counter-clockwise past the desired electrophoresis time.

NOTE: The run is now in progress.

8. Quickly turn the VOLTAGE ADJUST knob clockwise until the desired voltage is displayed.

9. Turn the TIME dial clockwise to the desired electrophoresis duration for automatic timing.

At the end of the run, a beep will sound and power will be turned off. The display will return to 000.

10. Turn the VOLTAGE ADJUST knob fully counter-clockwise (minimum voltage) and remove the leads from the power supply.

SEVEN - Operating Instructions

7.2. Monitor Output

To monitor output during a run, move the DISPLAY SELECT switch.

In the VOLTAGE position, voltage at the output terminals is displayed in 1 V units. To view current flowing in the chamber(s), move the switch to the appropriate OUTPUT CURRENT LEFT or RIGHT position, then return it to the central VOLTAGE position. The current is displayed in 1 mA units.

7.3. Unlimited Time

To bypass the timer for any reason, follow the steps 1 to 6 in 7.1, above, and put the HOLD/NORMAL switch in the HOLD position, turning on the power.

To end the run, make sure that the timer is turned off and put the HOLD/NORMAL switch in the NORM position.

7.4. Stop Run

To stop the run, turn the TIME dial fully clockwise. A beep will sound and power will be cut off. The display will return to 000. Turn the VOLTAGE ADJUST knob fully counter-clockwise (minimum voltage) and remove the leads from the power supply.

EIGHT - Test Functions and Quality Control

8.1. Test Functions

No operator adjustments are possible.
Only a qualified electronics technician can check and adjust timer accuracy and output voltage or current levels.

8.2. Quality Control

Run an appropriate Helena Laboratories control with all patient samples.

NINE - Performance Specifications

Timing	Automatic or External
Input Power, Cat. No. 1504	110 Vac, 50/60 Hz, 110 W (max.)
Input Power, Cat. No. 1505	220 Vac, 50/60 Hz, 110 W (max.)
Voltage Output Range	0 to 650 Vdc +/- 3 V in 1 V increments
Current Output Range	0 to 120 mA +/- 2 mA in 1 mA increments
Timer	1 minute to 60 min., 1 min. increments
Fuse, 110 V unit	1 A, 250 V slow blow
Fuse, 220 V unit	0.5 A, 250 V slow blow
Dimensions (Approximate)	5.5 in. (14 cm) high 9.5 in. (24 cm) wide 10 in. (25 cm) deep
Weight	11 lb (5 kg)
End of Run Alarm	Audible signal, approximately 6 seconds
Chambers	Accepts all standard chambers
Support Media	All electrophoretic media, including cellulose acetate, agarose, acrylamide and starch

NINE - Performance Specifications

These symbols may be used on the instrument.



Caution, electric shock hazard, high voltages capable of causing personal injury - shut down the instrument and unplug the power cord before touching - do not operate with the cover(s) removed



Caution, heat hazard - allow heated components to cool before handling.



Caution, general hazard - see precautions and hazards (sections 3 and 4) of Operator's Manual before proceeding



Direct current



Alternating current



Both direct and alternating current



Ground (earth) terminal



Protective conductor terminal (grounded conductors)



Frame or chassis terminal



Equipotentiality (conductor with all parts at a single potential)



On (power switch)



Off (power switch)



Equipment protected throughout by double insulation or reinforced insulation (equivalent to Class II of IEC 536)

TEN - Maintenance, Troubleshooting, Warranty

10.1. Maintenance

1. Inspect the electrophoresis cables for cracks and nicks in the insulation at least monthly. Replace defective cables.

2. To replace a blown fuse:

- 1) Turn off the power.
- 2) Unplug the power cord.

3) Use a small screwdriver to pry out the fuse cartridge using the tab in the plug socket.

4) Lift up the locking tab on the fuse cartridge (extends beyond the rest of the cartridge) and pull out the fuse holder.

5) Pull out the old fuse and replace it with one of the proper rating (1 A/250 V SB for 110 V unit, 0.5 A/250 V SB for 220 V unit).

WARNING: For continued protection from fire hazard, use only fuses of the same type and rating specified.

6) Push the fuse holder back into the cartridge (line up the notch in the holder with the locking tab) until it snaps in place.

7) Push the fuse cartridge back into the housing so that the exposed fuse end enters first and the small tab fits into the notch at the bottom of the power cord socket.

8) Plug the power cord back into the wall outlet and turn on the power.

If the fuse fails again, turn off the power and contact Helena Laboratories for assistance.

3. Clean spills with a soft damp cloth only after turning off the power and unplugging the power cord.

No harsh cleansers, acids, or bases should be used or spilled on inner or outer surfaces. Do not immerse the unit. **ALWAYS UNPLUG THE MAIN POWER CORD BEFORE CLEANING.**

Should an instrument be contaminated by blood or blood derivative, spray any contaminated surface with a commercial virucidal and germicidal agent. Observe where the specimens are used inside the instrument and confine cleaning to that area. Wipe up the residue. These materials contain alcohol and alcohol is a corrosive to metal surfaces.

Dry the power supply completely before plugging the power cord back in and turning on the power.

TEN - Maintenance, Troubleshooting, Warranty

10.2. Troubleshooting

Refer to the table below for troubleshooting. Contact Helena Laboratories for assistance should the suggested solutions not correct a problem.

Problem	Possible Cause	Solution
Display does not come on after power on	Instrument not plugged into wall outlet or cord not plugged into instrument	Plug in power cord firmly at both ends
	Fuse Blown	Replace fuse
Display comes on but no output	Timer is not on	Set the timer
Unable to obtain desired voltage	Selected voltage beyond instrument range	Reset voltage
	Bad electrical connection	Check for proper connection of leads, check for damaged lead insulation
	Improper chamber set up	Check for correct plate orientation, adequate buffer level, correct buffer
Current readings lower than normal	Bad electrical connection	Check for proper connection of leads, check for damaged lead insulation
	Improper chamber set up	Check for correct plate orientation, adequate buffer level, correct buffer, check buffer concentration, make sure wicks contact both buffer and support media, check purity of water source

TEN - Maintenance, Troubleshooting, Warranty

10.3. Warranty

Helena Laboratories warrants its products to meet Helena's published specifications and to be free from defects in materials and workmanship. Helena's liability under this contract or otherwise shall be limited to replacement or refund of any amount not to exceed the purchase price attributable to the goods as to which such claim is made. These alternatives shall be the buyer's exclusive remedies.

In no case will Helena Laboratories be liable for consequential damages even if Helena has been advised as to the possibility of such damages.

The foregoing warranties are in lieu of all warranties expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

For additional information, call Helena Laboratories at 800-231-5663 toll free.

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