



EC200XL

**Electrophoresis
Power Supply**



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Thermo Scientific EC200 Electrophoresis Power Supply

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Safety Considerations

Read and understand this manual completely before attempting to set up or use this instrument.



This equipment has been designed and tested to conform to CSA1010 safety standards, as applicable to laboratory instrumentation. This applies only to the EC200 when used as specified in the documentation, in its intended applications, with Thermo Scientific approved electrophoresis apparatus only. Usage in any other manor may not provide similar performance or safety protection.

This equipment is provided with a 3-conductor, grounded AC line cord. The protective earth ground is necessary for safe operation. Do not use any other AC line cord with this instrument.



The EC200 is a high voltage power supply capable of generating dangerous levels of voltage and current during operation. Exercise caution when working around and with the electrical connections of this equipment. Always check electrical connectors, wires, and associated apparatus for any signs of wear or damage before using with this equipment. Be sure to use only electrophoresis equipment that is suitably rated for the voltage and current capabilities of the EC200 power supply.

The output of the EC200 power supply is intended for connection to electrically isolated electrophoresis apparatus only. Use only with electrically isolated electrophoresis apparatus with minimum isolation of 600V. Do not connect any terminal of the EC200 output to earth ground. This may impair the safety protection provided by the equipment, or cause equipment damage.

The high voltage output of the EC200 power supply takes some amount of time to decay when unloaded or lightly loaded. Wait a minimum of 60 seconds after stopping a run before touching the power supply leads.



This equipment has a protective ground leakage current of 0.5mA at 120VAC, and 1mA at 230VAC. While significantly below the 3.5mA limitation for laboratory instrumentation, some applications and locations require a leakage current below 0.5mA. Check the specific requirements of your application before using this equipment.

This equipment is for indoor use only.

Introduction

Thank you for selecting a Thermo Scientific EC200 Electrophoresis power supply. This manual describes the operation of the EC200. The power supply that you have purchased is the most productive and easy-to-use unit available anywhere. This manual should answer any questions that might arise in operating your power supply; however, don't hesitate to call our Thermo Lab Equipment Technical Support Hotline at 1-800-943-2006 or 724-357-1022 if you need any assistance.

The EC200 power supply is designed to provide constant voltage or constant current output to apparatus used in electrophoresis applications. One to four sets of electrophoresis cells can be connected in parallel and run simultaneously. The EC200 can deliver up to 200W of total output power. When operating in constant voltage or constant current mode, the power supply automatically limits the other parameter to either the power supply maximum, or a lower limit if set by the user. If this non-constant limit is reached, the power supply will automatically switch control modes, from constant voltage to constant current, or vice versa. In this way, the EC200 protects your electrophoresis cells from damaging over power conditions. The EC200 power supply also provides for timed operation in either voltage or current modes, and allows an automatic completion in the event of a power loss if enabled by the user.

- 5-200V, adjustable in 1 volt steps
- 0.01-2.00A, adjustable in 0.01A steps
- 200W maximum output
- Automatic control mode crossover
- 0-99 hour 59 minute timed run
- Automatic restart if loss of AC power (if enabled)
- Large LCD display

Unpacking the Power Supply

When unpacking your EC200 power supply, be sure you have received the following items.

- EC200 unit
- AC line cord
- This manual

Inspect your equipment and packaging material for signs of damage. Damage to the shipping container may indicate rough handling which could cause internal damage to the power supply. If you suspect shipping damage to the power supply, contact your carrier for instructions on filing a claim. If you are missing any of the above items, contact your supplier for instructions.

Specifications

AC input Power

95-265VAC, 50-60Hz, 250VA Max

Environmental

Operating temperature: 0-40°C, 0-95% R.H. non-condensing

Altitude: 2000m

Overvoltage category II, IEC664

Pollution degree 2, IEC664

DC output Power

5-200VDC, 200W Max

0.01-2.00A, 200W Max

Ripple: $\pm 1\%$

Drift: $\pm 1\%$, after 30-minute warm-up

Getting Started



Select a location that allows for 3" clearance behind the power supply, and comfortable reach of the front panel controls and cell connections. Do not block the vented area of the case - on the front bottom of the unit, or the fan area at the rear. Connect the power supply to a 3-prong grounded AC outlet, **using the AC cord provided with the unit only**. Connect the electrophoresis apparatus to the power supply, making sure to match the red positive lead to the red positive jack, and the black negative lead to the black negative jack. Similarly, connect one or more electrophoresis apparatus to the power supply if you plan to run more than one in parallel. Power the unit on using the AC power switch located at the rear of the unit, next to the AC line cord entry.

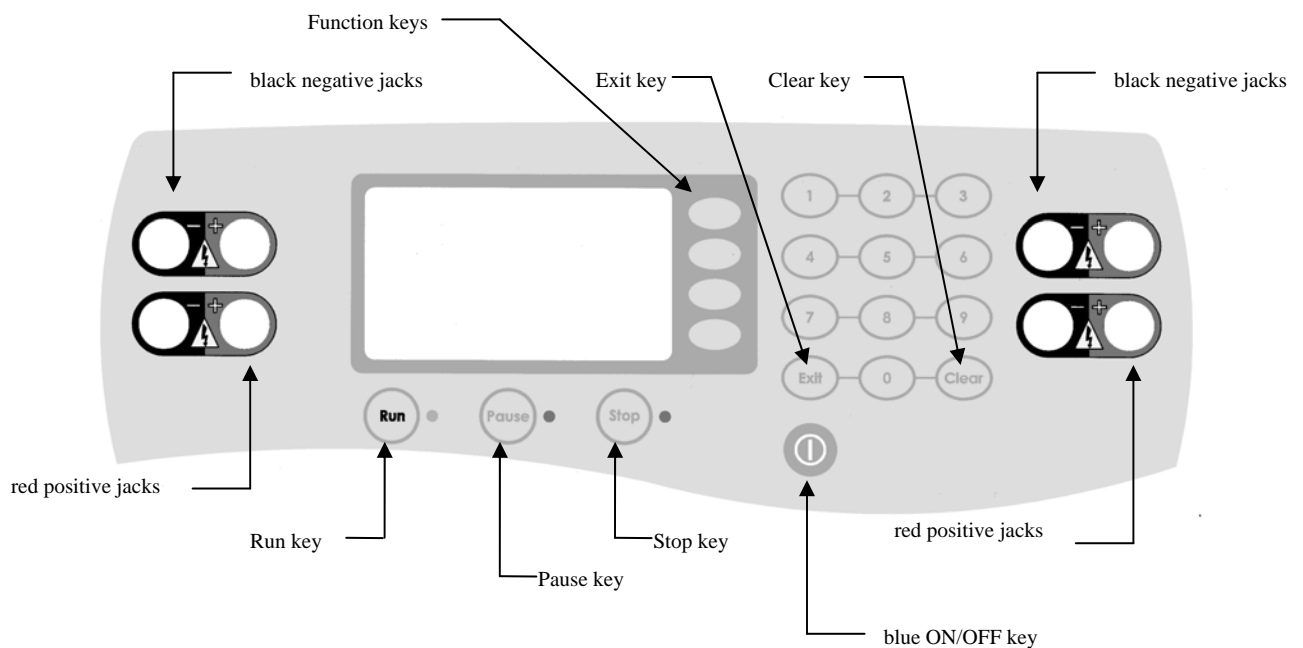


Figure 1. Front Panel Controls

Using the Power Supply

Press the blue key on the front of the unit to enable/disable the control logic. The LCD display will illuminate and show the values of the last saved run setup. The EC200 preserves the run settings each time you start a run. One set of conditions is saved for each mode, constant voltage or constant current. The setpoint value, limit parameter, time duration, and power-fail restart settings are all saved. This allows convenient setup for repetitive runs.

To change the control mode, press the Exit key. From the resulting screen, select either constant volts or constant amps using the function keys to the right of the display.

After selecting a control mode, either constant voltage or current, and setting the limit and timed run parameters if desired (see Constant Voltage/Current Operations) press the Run key to energize the power supply output. The power supply output will ramp up to the appropriate setpoint, while not allowing the limit parameter to be exceeded. If the limit parameter should be exceeded, then the power supply will crossover control modes, making the limit parameter the new control

setpoint. The run mode display shows the controlled parameter highlighted, and will automatically change if a crossover has occurred.

To stop a run in progress, press the Run key, the Stop key, or the blue ON/OFF key. The display will change to "STOP" signifying that the output is no longer energized. To pause a run in progress, press the Pause key. The display will change to "PAUSE" signifying that the output is no longer energized, and that the run can be resumed. Pressing Run or Pause resumes the run from the previous point (i.e. for a timed run). Only a run that has been paused can be restarted. After Stopping a run, or to change parameters of a (paused) run, you must cycle the control logic off and then back on by pressing the blue ON/OFF key.

During a run, the display will show the actual values of voltage and current. The time value displays elapsed time for an untimed run, or time left for a timed run.

Constant Voltage Operations

From the mode selection screen, select constant voltage operation by pressing the appropriate function key located to the right of the display. To get to the selection screen from an operating screen, press Exit, or cycle the control logic off and then back on by pressing the blue ON/OFF key. The EC200 will display the last saved values for constant voltage mode. To change a parameter, press the function key located to the right of the display, next to the parameter you wish to change. The EC200 will allow a new value to be entered using the keypad numeric keys. Press the function key labeled "Enter" to complete the new setting. Press Clear to erase previous keystrokes. Press Exit to cancel entering a new value. The EC200 will not accept a voltage setpoint outside of the allowed range. Press Clear to re-enter an appropriate value.

The limit parameter, in this case current, is normally set to the power supply maximum value of 2.00 A. The EC200 will not accept a current limit outside of the allowed range.

In addition, the EC200 will never exceed the maximum power output specification of 200W. When starting a run, the power supply calculates a maximum limit parameter, above which the power supply maximum power output rating would be exceeded. If this value is lower than the limit setpoint entered, the EC200 will automatically lower the limit parameter.

Constant Current Operations

From the mode selection screen, select constant current operation by pressing the appropriate function key located to the right of the display. To get to the selection screen from an operating screen, press Exit, or cycle the control logic off and then back on by pressing the blue ON/OFF key. The EC200 will display the last saved values for constant current mode. To change a parameter, press the function key located to the right of the display, next to the parameter you wish to change. The EC200 will allow a new value to be entered using the keypad numeric keys. Press the function key labeled "Enter" to complete the new setting. Press Clear to erase previous keystrokes. Press Exit to cancel entering a new value. The EC200 will not accept a current setpoint outside of the allowed range. Press Clear to re-enter an appropriate value.

The limit parameter, in this case voltage, is normally set to the power supply maximum value of 200 volts. The EC200 will not accept a voltage limit outside of the allowed range.

In addition, the EC200 will never exceed the maximum power output specification of 200W. When starting a run, the power supply calculates a maximum limit parameter, above which the power supply maximum power output rating would be exceeded. If this value is lower than the limit setpoint entered, the EC200 will automatically lower the limit parameter.

Timed Operations

It is possible to enter an amount of time for the power supply to provide power, after which it will automatically shut off. Use this feature for timed runs.

Enter a time parameter as described above for setting a voltage or current setpoint. Enter a time duration of 0-99 hours, 59 minutes. A time duration of zero effectively disables timed run mode.

When running a timed run, the time parameter displays the time remaining in the run. When running a non-timed run, the time parameter displays the elapsed time during the run

Automatic Power-fail Restart

Automatic power-fail restart capability allows a timed run which is interrupted by loss of AC power to be restarted automatically, so that the total time programmed for the time parameter will be met. **NOTE:** Loss of AC power includes switching off the unit using the power switch located at the rear of the unit. *When performing timed runs with power-fail restart enabled, always use the front panel controls to stop a run in progress.*

To enable power-fail restart, press the top function key when in the operating mode screen (constant voltage or current). The state of power-fail restart will toggle from off to on or on to off with each keypress.

When AC power is restored during a timed run in which power-fail restart is enabled, the display will show "POWER-FAIL RESTART" for approximately 10 seconds indicating power-fail restart pending. During this time the output is not energized, to allow safely stopping the run (by pressing Run). After the power-fail restart pending delay is completed, the power supply output will ramp up to the setpoint value and the time will continue from that point. Any number of power interruptions can occur during the completion of a single run.

Cleaning



Before cleaning the unit, be sure to always turn off AC power using the switch at the rear of the unit, and then disconnecting the AC line cord. The front of the unit is sealed and can be wiped clean with any mild detergent solution. Avoid harsh cleaners or agents as they may deteriorate the surface of the tactile membrane keys.

Troubleshooting and Error Indications

The EC200 detects and reports several events and conditions that are considered errors. The EC200 will stop any run in process and display "ERROR XX" where XX is one of the below listed errors. When the EC200 is displaying an error indication, press the blue ON/OFF key to clear the error and return to setup mode, or press the Run key to resume the run (after correcting the cause of the error). Note that loss of AC power during a run is considered an error condition. Always stop a run before turning off AC power to the EC200.

'XX'	Condition and possible remedy
00	Minimum load current detected. The output is not connected, or the electrophoresis apparatus is not set up properly. Check your setup and connections.
01	Maximum load current exceeded. The output is short circuit, or the electrophoresis apparatus is not set up properly. Check your setup and connections
02	Step load current change. The EC200 has detected a large change in load current. Check your setup and connections
04	Loss of AC power; PF disabled and not completed. The EC200 detected loss of AC power, the run was not completed since PF was not enabled.
05	Loss of AC power; run not timed. The EC200 detected loss of AC power.
06-99	The EC200 detected an internal error condition. Contact technical support for instructions.

Before servicing the unit, be sure to always turn off AC power using the switch at the rear of the unit, and then disconnecting the AC line cord. The EC200 power supply requires no periodic servicing and should provide years of trouble free operation. Should you need to replace the fuses proceed as follows:

Replacing a fuse

CAUTION: The EC200 uses double pole neutral fusing.

Turn off AC power using the switch at the rear of the unit, and then disconnecting the AC line cord. Remove the fuse holder assembly using a small flat blade screwdriver.

Always replace both fuses with appropriate replacement fuses: 3A, 250V, 5X20mm, type T fuse (T3A,250V) (Thermo catalog number FB-FUSE-2).



EC200 Warranty Statement

The Thermo Scientific Company ("Thermo") warrants to the direct purchaser that the EC200 will be free from defects in material or workmanship for a specified warranty period. During that period, Thermo will repair or replace the product or provide credit, at its sole option, upon prompt notification and compliance with its instructions. For EC200 power supplies that specified period is 48 months from manufacturing date.

Unless otherwise agreed, the warranty is limited to the country in which the product is sold.

No Thermo employee, agent or representative has the authority to bind Thermo to any oral representation or warranty concerning any product sold. Any oral representation or warranty made prior to purchase of any product and not set forth in writing and signed by a duly authorized officer of Thermo shall not be enforceable by the purchaser.

THERMO EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Thermo's sole responsibility and the purchaser's exclusive remedy for any claim arising out of the purchase of any product listed above is repair, replacement or credit as described above, where applicable. In no event: 1) shall the cost of the exclusive remedy exceed the purchase price: 2) shall Thermo be liable for any special, indirect, incidental, consequential, or exemplary damages, howsoever arising, even if Thermo has been advised of the possibility of such damages.

Each article that Thermo furnishes will conform to the written specifications given in this manual, or those of a further improved model. Changes are made often to the information in the manual and will be incorporated into future editions.

Compliance

CSA 1010

This equipment has been designed and tested to conform to CSA1010 safety standards, as applicable to laboratory instrumentation. This applies only to the EC200 when used as specified in the documentation, in its intended applications, with Thermo Scientific approved electrophoresis apparatus only. Usage in any other manner may not provide suitable protection.

Replacement Parts

AC line cord	FB-CORD-1
Fuse, T3A,250V	FB-FUSE-2

For replacement parts contact Thermo Scientific at:

Technical Support: 1-800-943-2006 or 1-800-926-0505

Accessories

Adapter for Cells	FBAD-1
Under Counter Bracket	FBUB3000