

GE Healthcare



EPS2A201


Power Supply
Instrument User Manual





Contents

Important user information	ii
Unpacking	3
Specifications	4
Power supply safety	5
Parameter overview	6
Power supply operation	8
Troubleshooting	14
Care and maintenance	16
Technical service and repair	16
Ordering information	16



Important user information

All users must read this entire manual to fully understand the safe use of the EPS2A201. A translated version of this user manual is available in European union local languages on an available CD.



WARNING! The warning symbol highlights instructions that must be followed to avoid personal injury. It is important not to continue until all stated conditions are met and clearly understood. Read the instructions to avoid hazardous conditions.



CAUTION! The caution symbol highlights instructions that must be followed to avoid damage to the product or other equipment. It is important not to continue until all stated conditions are met and clearly understood.

Note: Note is used to indicate information important for trouble-free and optimal use of the product.

CE certification

This product complies with the European directives listed below, by fulfilling the corresponding harmonized standards listed under specification/product specification. A copy of the Declaration of conformity is available on request.

2006/42/EC	Machinery Directive
2006/95/EC	Low Voltage Directive
2004/108/EC	EMC Directive

The CE symbol and corresponding declaration of conformity is valid for the instrument when it is:

- used indoors, in a laboratory location, and
- connected to other CE-marked GE Healthcare instruments, or
- connected to other products recommended or described in this manual, and
- used in the same state as it was delivered from GE Healthcare except for alterations described in this manual.

Waste electrical and electronic equipment (WEEE)

ENG



This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of your equipment.

Power supply function and description



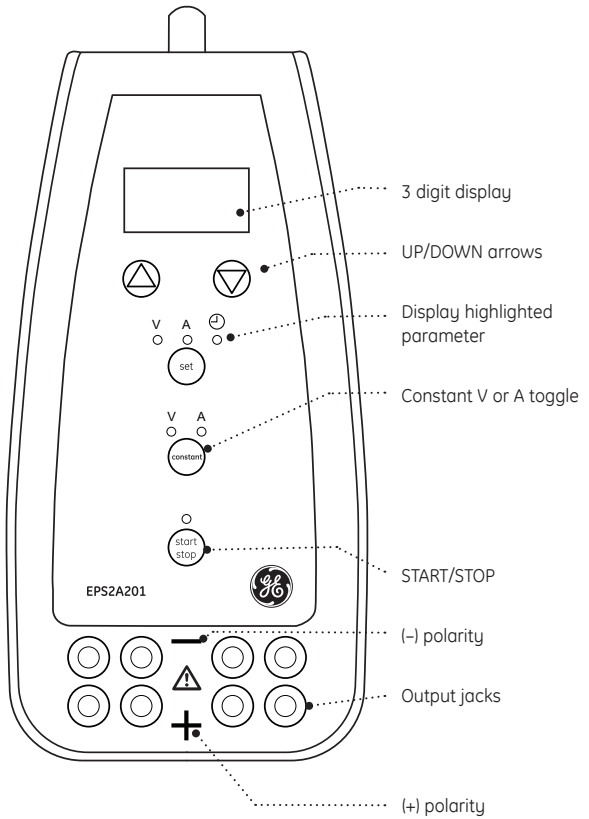
The EPS2A201 power supply provides the high current capability required for such electrophoresis applications as standard- and large-format tank transfers and multiple semidry electrotransfers. It is also suitable for submarine agarose electrophoresis and most vertical gel electrophoresis.

The LED display reports current status. Parameters are changed by pressing UP/DOWN arrow buttons in combination with a SET button. Four pairs of output jacks accept 4 mm plugs, which operate in parallel. The output jacks are color coded, recessed for safety, and accept 4 mm shielded (banana) plugs that come standard with most GE Healthcare electrophoresis equipment.

The user interface consists of a three digit LED readout, and five buttons on a membrane keypad. Diagrams of the front and rear panel are shown on the following pages.

The EPS2A201 operates in constant voltage or constant current modes. Output is controlled by setting a maximum value for voltage (up to 200 V), or current (up to 2.0 A). Run duration can be continuous or programmed to a maximum duration of 999 minutes.

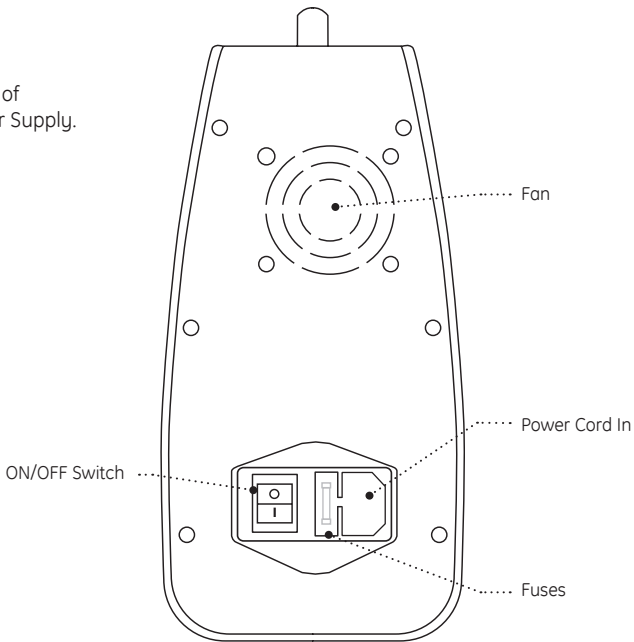
Fig 1. Front view of EPS2A201 Power Supply.



Unpacking

Unwrap all packages carefully and compare contents with the packing list, making sure all items arrived. If any part is missing, contact your local GE Healthcare sales office. Inspect all components for damage that may have occurred while the unit was in transit. If any part appears damaged, contact the carrier immediately. Be sure to keep all packing material for damage claims or to use should it become necessary to return the unit.

Fig 2. Rear view of EPS2A201 Power Supply.



Specifications

Power requirement	Frequency, 50–60 Hz Line voltage, 100–240 VAC 288 VA
User interface	3 digit, 7 segment, red LED membrane keypad
Output	5–200 V, 1 V increment 0.01–2.00 A, 0.01 A increment 200 W maximum 4 pairs output jacks in parallel
Output connector	4-mm plugs
Timer	1–999 min, 1 min increment
Environmental operating conditions	Indoor use: 4–40 °C Relative humidity: 0–80% noncondensing Altitude: <2000 m Pollution degree: 2 Installation category: II
Dimensions (h × w × d)	27 × 12.5 × 28 cm
Weight	2.3 kg
Safety protection circuits	Short circuit protection Open circuit protection
Product certifications	EN61010-1:2001, EN61326 A3:2003, EN 61326-1:2006, CE WEEE RoHS

Power supply safety



WARNING! Because this instrument can develop sufficient voltage and current to produce a lethal shock, care must be exercised in its operation.

Note: If exposed to excessive Radio Frequency interference that exceeds the permissible requirement per EMC directive 2004/108/EC, this product could exhibit a temporary malfunction.

- If this equipment is used in a manner not specified by GE Healthcare the protection provided by the equipment may be impaired.
- This instrument is designed for indoor laboratory use only.
- Only accessories and parts approved or supplied by GE Healthcare may be used for operating, maintaining, and servicing this product.
- This instrument is designed in accordance with the EN61010-1:2001 electrical safety standard. Nevertheless, it should be used only by properly trained operators. Read this entire manual before using the instrument and use only according to the instructions.
- The instrument must always be used with the earth lead of the power cord correctly grounded to earth at the mains outlet.
- Use only undamaged electrical wire and equipment specific for the voltages you will use. All equipment connected to high voltage should be in accordance with EN61010-1:2001.
- Keep the instrument as dry and clean as possible. Wipe regularly with a soft, damp cloth. Let the instrument dry completely before use.
- Do not operate the instrument in extreme humidity (above 80%). Avoid condensation by letting the unit equilibrate to ambient temperature when taking the instrument from a colder to a warmer environment.
- To permit sufficient cooling, ensure that the vents of the instrument are not covered.
- Because this instrument has high-current capability, check the rating of any equipment attached. Do not exceed its rating when setting the power supply limits.

Parameter overview

Note: The maximum power supply output is 200 W, so the maximum current of 2.0 A is available at 100 V or less.

At the maximum voltage setting of 200 V, the current is limited to 1.0 A.

Power parameters

Because the power output limit is 200 W, and $W = V \times A$, the maximum current of 2.0 A can be delivered only if voltage is limited to < 100 V. Conversely, the maximum voltage of 200 V can be delivered only if the current is limited to < 1.0 A.

Variable ranges

Variable	Range	Increment
Voltage	5 – 200 V	1 volt
Current	0.01 – 2.00 A	0.01 amp
Time	0 – 999 minutes	1 minute
Timer = 0 = continuous run		
Timer = 1–999 = timed run in minutes		

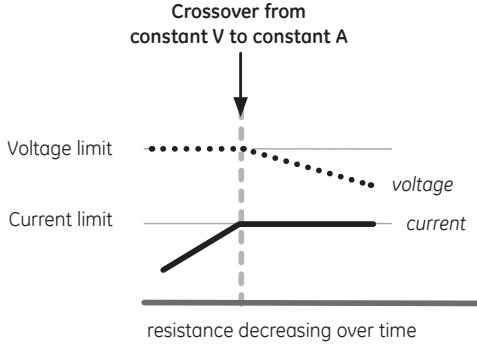
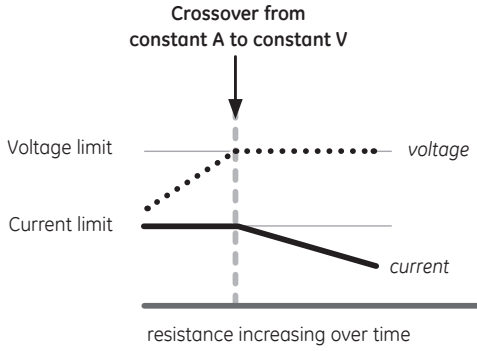
Power supply output limits

The EPS2A201 can be programmed to limit voltage (V) or current (mA). The power supply will operate at the set limits provided the “load,” or power requirement, does not exceed the power supply rating.

“Crossover” occurs when the second parameter limit is reached as system resistance changes (Fig 3). At this point the second parameter is held constant and the previously unchanging parameter is allowed to adjust downward as system resistance changes. (System resistance is affected by discontinuous buffers, changes in temperature, and buffer depletion.) During a run, the light above the CONSTANT button indicates which parameter is being held constant.

Note: In most cases, a power supply cannot deliver more than one maximum setting at a time.

Fig 3. Power supply crossover.



There are some conditions when the power supply will operate at the upper limit of 200 W of constant power. When this occurs, both the constant V and the constant A lights will be lit at the same time.

Power supply operation



WARNING! Use only one hand when making or breaking a connection to avoid making a complete circuit across your chest. Also, while connecting or disconnecting the leads, do not allow any part of your body to contact a grounded surface.

WARNING! If you are in the middle of a run and wish to connect or disconnect the leads, always turn the power supply off (press START/STOP) and wait for the display to read "OFF".

Recommended leads:

- 4 mm (banana) plugs, fixed insulating sheaths, which are found on most GE Healthcare electrophoresis equipment.

Will accept, but are not recommended*:

- 4 mm (banana) plugs, unsheathed or retractable sheaths
- Stackable plugs

*Exposed metal surfaces on voltage leads can potentially lead to electrical shocks. GE Healthcare does not recommend using unsheathed (bare metal) 4 mm plugs, or 4 mm plugs with retractable sheaths. If using these types of voltage leads, the following safety tips will reduce the risk of electrical shock.

1. Turn off the power supply before connecting or disconnecting the voltage leads.
2. Keep fingers away from metal components when connecting or disconnecting the voltage leads.

Connections

1

Connect the mains power cord. Select the appropriate mains power cord for your region, and connect it to the power cord receptacle on the rear panel and to a suitable grounded AC power outlet. Place the power supply so that the fan on the back panel and the vents on the bottom are not obstructed.

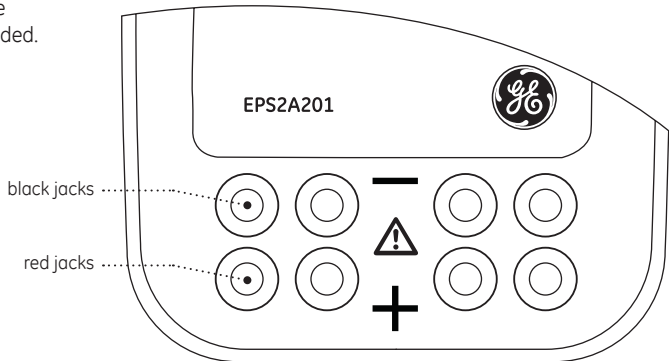
2

Connect the HV power leads. Connect the apparatus to the power supply by plugging the lead connectors into one pair of the recessed output jacks (Fig 4).

3

Turn on the main power switch on the rear panel. The front panel should be illuminated.

Fig 4. Output jacks are recessed and color coded.



Using the EPS2A201

Note: The four pairs of output jacks always operate at the same voltage.

The sum of the current of all four outputs is displayed. This value can never exceed 2.0 A.

Note: When changing timer between "0" and "1", a message "PF1" or "PF0" will briefly be displayed, indicating that the Power Failure Detection Feature is either on (PF1) or off (PF0).

1

Select constant mode. Press the CONSTANT button to toggle between constant voltage and constant current mode. The selection is indicated by a green light.

2

Adjust limit. Press the UP and DOWN buttons to set the constant parameter to the desired value.

3

Check other run parameter. Press the SET button to check the set value of the other (non-constant) run parameter. This parameter is set by default to the maximum output of the power supply. This is the normal setting for many electrophoretic separations.

Optional: If there is another upper limit desired for this non-constant parameter, use the UP and DOWN buttons to set it to the desired value. The power supply can then operate in "Crossover" mode as explained on page 7.

4

Set the timer (optional). Press the SET button to move the green indicator light to under the clock symbol.

Continuous run. Set the timer to "0" to start a continuous run. The power supply will continue to operate indefinitely, until stopped manually. The timer will start counting up, indicating the length of the run in minutes.

Timed run. Press the UP and DOWN buttons to set the timer to the desired value (in minutes). During a timed run, the timer counts down, indicating the time remaining.

Note: The power supply slowly increases to the set value when starting a run.

The constant parameter can be adjusted during a run.

5

Start the run. Press the START/STOP button. The green light above the START/STOP button indicates that voltage and current are being applied to the output jacks. The green light above the CONSTANT button indicates which parameter (V or A) is limiting, and constant. The LED display shows the numerical value of the actual V or A output, or the time (press the SET button to toggle between the values).

6

In the case of a continuous run, press START/STOP to terminate the run. The LED display reads "OFF".

A timed run automatically stops with a warning beep. The word "OFF", and the conditions at the end of the run are flashed on the display so that the user can record the end conditions.

Pushing the SET button will return the power supply to the last run settings.

Pressing the CONSTANT button will reset the power supply.

Example: Set up conditions for running a standard transfer tank (e.g. TE 62) at a constant current of 1.0 A.

- 1 Press the CONSTANT button to position the indicator light under "A".
- 2 Press the UP and DOWN buttons to increase the LED display value from 0.01 to 1.00.
- 3 Press the SET button to position the indicator light under "V". Observe that the volt limit has been automatically set to the maximum value of 200 V.

Setting the voltage limit to the maximum setting ensures that the entire separation is run at 1.0 A for as long as possible. Should the buffer or gel lose too much conductivity during the run, the operational 200 V or 200 W limits may be reached, at which point "crossover" automatically occurs and V becomes the limiting variable. The current would slowly drop below 1.0 A at this point.

-
- 4 Press the SET button to position the indicator light under the Clock symbol. Use the UP and DOWN arrows to set the timer for a desired duration. If the run is continuous, set the timer to 0.
 - 5 Press the START/STOP button to start the run.

Example: Set up conditions for running a semi-dry transfer of a standard-size PAGE gel at 0.18 A and 30 V, with automatic crossover.

Note: If this crossover condition occurs and is not desired, stop the run. Check to see if the non constant parameter is set to its maximum value. Restart the run.

The power supply can automatically crossover between two different maximum settings, if desired. This will be illustrated below.

- 1 Press the CONSTANT button to position the indicator light under "A".
- 2 Press the UP and DOWN buttons to increase the LED display value from 0.01 to 0.18.
- 3 Press the SET button to position the indicator light under "V". Observe that the volt limit has been automatically set to the maximum value of 200 V. Press the UP and DOWN buttons to adjust this value down to 30 V.
- 4 Press the SET button to position the indicator light under the Clock symbol. Use the UP and DOWN arrows to set the timer for a desired duration. If the run is continuous, set the timer to 0.
- 5 Press the START/STOP button to start the run.

Both Voltage and Current are monitored during the run. The power supply initially outputs 0.18 A constant current. The voltage output will be <30 V, but may rise during the transfer because of gradual depletion of the buffer. If the voltage never exceeds 30 V during the run, then the gels will run at 0.18 A for the entire run. If the voltage increases to 30 V, then the power supply will automatically "crossover" to constant voltage mode, in order to keep voltage from exceeding 30 V. Now, output current will slowly decrease below the original 0.18 A setting because 30 V is now the limiting value in the circuit.

Power Failure Detection (PFD)

The Power Failure Detection feature will save the time, voltage and current settings in the event of a power outage, and automatically continue the run when the power is restored.

To alert the user that a power failure occurred during the run, the error message “E6” flashes at the end of the run, instead of the usual “OFF” message. The “E6” error message means that despite the power outage, the power supply successfully supplied the programmed voltage and current for the entire length of time that was programmed. The time shown at the end of the run is the time the gel ran since power was restored, not the total time of the run.

The default settings for Power Failure Detection are:

Run	Time Setting	PFD	Code
Timed Run	1-999 minutes	ON	PF1
Continuous run	0	OFF	PF0

The Power Failure Detection feature can be deactivated during a timed run.

- 1 Press the SET button to move the indicator light under the Clock symbol.
- 2 Press the UP and DOWN buttons to enter in a nonzero time value.
- 3 Press both the UP and DOWN buttons at the same time. The display will briefly show “PF0”, indicating that the PFD mode is disabled.
- 4 Press both the UP and DOWN buttons at the same time again. The display will show “PF1”, indicating that the PFD mode is enabled.

Troubleshooting

The power supply has built-in error messages to help troubleshoot problems with the electrical circuit. The error messages, and possible corrective actions, are listed below:

Error Code	Explanation	Possible Solutions
E1	No Load Detected. The voltage leads to the electrophoresis cell are not attached. The current load for the separation is below .01 A, the lower limit of the power supply.	Check all connections. Verify that buffer volumes are sufficient to contact all electrode wires and that buffer is contacting both surfaces of the gel. A constant volt run with low volt setting may result in a current below the .01 A limit. Press any button* to clear the error code.
E3	Change in Load Resistance. Open circuit was detected at some point after a successful start. Buffer is leaking from the cells. There is a loose electrical connection in the circuit.	Check and correct all potential resistance problems. Check buffer volumes. Check all voltage leads. Check the fit of power supply adapters, if used. The output current may have fallen below the .01 A limit of the power supply. Press any button* to clear the error code.
E4	Power Failure during a continuous run (no timer being used).	Restart the run, if desired. Press any button* to clear the error code.
E5	Power Failure during a timed run with PFD option disabled. Run was not completed.	Restart the run, if desired. Press any button* to clear the error code. See page 13 for information on the PFD option.
E6	Power Failure during a timed run with PFD option enabled. Despite the power outage the run was completed successfully.	Press any button* to clear the error code. See page 13 for information on the PFD option.
E7	Short Circuit Load current exceeded 2 A.	Check for any short circuit or evidence of electrical arcing. Buffer concentration too high.

*Press any button, except the START/STOP button, to clear the error message.

Other problems

No display and/or fan not operating

- Check that the power supply is plugged into a working receptacle.
- Check that the main power switch is on. Check fuses.

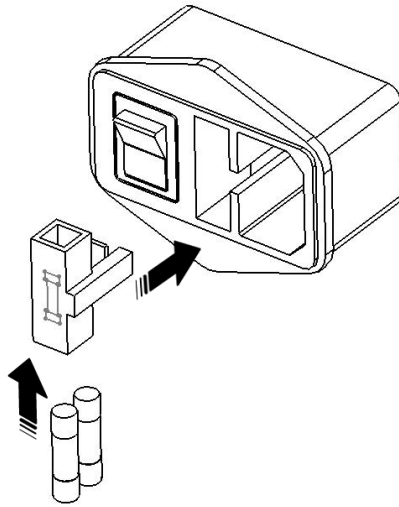


CAUTION! Turn the mains power supply switch off and detach the power cord before replacing input mains fuses!

Replacing the fuses

- 1 Locate the fuse compartment on the rear panel.
- 2 Use a screwdriver to pry out the fuse compartment. There are two fuses in the compartment. Check and replace any blown fuses with a fuse of the same size and ratings.

FUSES; 250 V 5A 5 × 20 mm Fast Blow (2).





Care and maintenance

- Turn the mains power switch off and unplug the power cord before cleaning.
- Use a soft cloth dampened with water or a mild cleaning solution to clean the cabinet and display.
- If spilled liquids contact the circuit boards, unplug the power supply and allow to dry completely. Call GE Healthcare for advice before using.

Technical service and repair

GE Healthcare offers complete technical support for all of our products. If you have any questions about how to use this product, or would like to arrange to repair it, please call or fax your local GE Healthcare representative.

Ordering information

	Qty.	Code no.
EPS2A201 Power Supply, universal voltage	1	28-9202-14
Power cord, 115 V	1	80-6106-03
Power cord, 230 V	1	80-6230-10
User manual	1	28-9274-75
Fuses 250 V 5.0 A FB, 5 × 20 mm	pk/3	80-6111-92

www.gehealthcare.com

GE Healthcare Bio-Sciences AB
Björkgatan 30
751 84 Uppsala
Sweden

All goods and services are sold subject to the terms and conditions of sale of the company within GE Healthcare which supplies them. GE Healthcare reserves the right, subject to any regulatory and contractual approval, if required, to make changes in specifications and features shown herein, or discontinue the product described at any time without notice or obligation.

Contact your local GE Healthcare representative for the most current information.

© 2010 General Electric Company — All rights reserved.

GE Healthcare Bio-Sciences AB, a General Electric company.

GE Healthcare
Munzinger Strasse 9, D-79111 Freiburg, Germany

GE Healthcare
Amersham Place, Little Chalfont, Buckinghamshire,
HP7 9NA, UK

GE Healthcare
800 Centennial Avenue, P.O. Box 1327, Piscataway, NJ
08855-1327, USA

GE Healthcare
Sanken Bldg. 3-25-1, Hyakunincho, Shinjuku-ku,
Tokyo 169-0073, Japan

Asia Paci.c Tel: +852 2811 8693 Fax: +852 2811 5251 • Australasia Tel: + 61 2 9899 0999 Fax: +61 2 9899 7511 • Austria Tel: 01/57606-1619 Fax: 01/57606-1627 • Belgium Tel: 0800 73 888 Fax: 03 272 1637 • Canada Tel: 800 463 5800 Fax: 800 567 1008 • Central, East, & South East Europe Tel: +43 1 982 3826 Fax: +43 1 985 8327 • Denmark Tel: 45 16 2400 Fax: 45 16 2424 • Finland & Baltics Tel: +358-(0)9-512 39 40 Fax: +358 (0)9 512 39 439 • France Tel: 01 69 35 67 00 Fax: 01 69 41 96 77 • Germany Tel: 0761/4903-490 Fax: 0761/4903-405 • Italy Tel: 02 27322 1 Fax: 02 27302 212 • Japan Tel: +81 3 5331 9336 Fax: +81 3 5331 9370 • Latin America Tel: +55 11 3933 7300 Fax: +55 11 3933 7304 • Middle East & Africa Tel: +30 210 9600 687 Fax: +30 210 9600 693 • Netherlands Tel: 0165 580 410 Fax: 0165 580 401 • Norway Tel: 815 65 555 Fax: 815 65 666 • Portugal Tel: 21 417 7035 Fax: 21 417 3184 • Russia & other C.I.S. & N.I.S Tel: +7 (095) 232 0250, 956 1137 Fax: +7 (095) 230 6377 • South East Asia Tel: 60 3 8024 2080 Fax: 60 3 8024 2090 • Spain Tel: 93 594 49 50 Fax: 93 594 49 55 • Sweden Tel: 018 612 1900 Fax: 018 612 1910 • Switzerland Tel: 0848 8028 12 Fax: 0848 8028 13 • UK Tel: 0800 616928 Fax: 0800 616927 • USA Tel: 800 526 3593 Fax: 877 295 8102



imagination at work