BT406

High Current Power Supply

Cat. No. BT406
WARNING
BT Lab Systems High Current Power Supply has been tested and found to comply with the limits for the CE regulation. Also, it is RoHS compliant to deliver confident product which meets the environmental directive. These limits are designed to provide reasonable protection against harmful interference when the instrument series is operated in a commercial environment. This instrument series used together with power supply unit 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 instrument series 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. It is strongly recommended for the user to read the following points carefully before operating this equipment.

1. Read and follow the manual instructions carefully.
2. Do not alter the equipment. Failure to follow these directions could result in personal and/or laboratory hazards, as well as invalidate equipment warranty.
3. Use a properly grounded electrical outlet with correct voltage and current handling capacity.
4. Disconnect from power supply before maintenance and servicing. Refer servicing to qualified personnel.
5. Never use this instrument series without having the safety cover correctly in position.
6. Do not use the unit if there is any sign of damage to the external tank or cover. Replace damaged parts.
7. Do not use in the presence of flammable or combustible material; fire or explosion may result. This device contains components which may ignite such materials.
8. Refer maintenance and servicing to qualified personnel.
9. Ensure that the system is connected to electrical service according to local and national electrical codes. Failure to make a proper connection may create fire or shock hazard.
10. Use appropriate materials and operate correctly to avoid possible hazards of explosion, implosion or release of toxic or flammable gases arising from overheated materials.
11. The unit shall be operated only by qualified personnel.

Safety Information
Use high level of precaution against any electrical device. Before connecting the electrical supply, check to see if the supply voltage is within the range stated at the rating label, and see to it that the device be seated firmly. Place the unit in a safe and dry location; it must NOT touch the surrounding. Follow the safety precautions for chemicals / dangerous materials. If needed, please contact qualified service representative or info@BTLabSystems.com.
**Environmental Conditions**

Ensure the instrument is installed and operated strictly under the following conditions:

1. Indoor use only
2. ≤95% RH
3. 75-106 kPa
4. Altitude must not exceed 2000 meters
5. 4-40°C operating temperature
6. Pollution degree: 2
7. Mains supply voltage fluctuations up to ±10% of the normal voltage

**Avoiding Electrical Shock**

Follow the guidelines below to ensure safe operation of the unit.

The High Current Power Supply has been designed to utilize shielded wires thus minimizing any potential shock hazard to the user. BT Lab Systems recommends against the use of unshielded wires.

To avoid electrical shock:

1. In the event of solution spilling on the instrument, it must be dried out for at least 2 hours and restored to NORMAL CONDITION before each operation.
2. Never connect or disconnect wires loading from the power jacks when the red indicator light of power switch is on.
3. WAIT at least 5 seconds after stopping a run before handling output leads or any connected apparatus.
4. ALWAYS make sure that your hands, work area, and instruments are clean and dry before making any connections or operating the power supply.
5. ONLY connect the power cord to a properly grounded AC outlet.

**Avoiding Damage to the Instrument**

1. Do not attempt to operate the device if it is damaged.
2. Protect this unit from physical damage, corrosive agents and extreme temperatures (direct sunlight etc).
3. For proper ventilation and safety concerns, keep at least 10 cm of space behind the instrument, and at least 5 cm of space on each side.
4. Do not operate the power supplies in high humidity environments (> 95%), or where condensation may occur.
5. 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.
6. Prior to apply any cleaning or decontamination methods other than manufacturer’s recommendation, users should check with the manufacturer’s instruction to confirm if the proposed method will not damage the equipment.

**Equipment Operation**

Follow the guidelines below to ensure safe operation of the unit:

1. It must be checked the displayed figure to see if it is in the normal condition for use before using this unit.

2. NEVER access dangerous chemistry or other material to prevent possible hazards of explosion and damage.

**Symbol**

Symbols used on the power supply are explained below.

- Indicates an area where a potential shock hazard may exist. Consult the manual to avoid possible personal injury or instrument damage.
- Indicates disposal instruction. **DO NOT** throw this unit into a municipal trash bin when this unit has reached the end of its lifetime. To ensure utmost protection of the global environment and minimize pollution, please recycle this unit.

Max. voltage: 300 V  
Max. current: 3,000 mA  
Max. watt: 300 W

**INTRODUCTION**

**Overview**

BT Lab Systems High Current Power Supply is recognized as one of the most advanced high current power supplies equipped with outstanding specifications to cover the majority of electrophoresis applications on the market. Sufficient and accurate output voltages, four pairs of terminator, compact size, RoHS and CE compliance for environmental and safety concerns can deliver accurate and reliable experimental results from one experiment to another. Both of them are perfectly designed to accomplish with any of electrophoresis systems/units on the market.
**Product Description & Feature**

The High Current Power Supply is microprocessor controlled power supply designed to meet most electrophoresis needs in a personal, single, easy to use unit. This manual describes the setup and operation of the High Current Power Supply including important information on safety and maintenance of the unit. The High Current power supply is capable of running horizontal & vertical electrophoresis, SDS-PAGE, native PAGE applications, and two-dimensional electrophoresis, and electro-blotting. In addition, A Timer with alarm function is also equipped in the unit, and so is Pause function. Furthermore, the powerful specifications plus four pairs of terminator pairs can be used for multi electrophoresis units simultaneously.

BT Lab Systems High Current power supply provides Constant Voltage or Constant Current or Constant Power to instruments used in electrophoresis. 4 pairs of terminator and the powerful specification equipped enable the maximum capability of High Current power supply compared to other existing similar product on the market. High Current also has a 2.6” LCD screen where many of parameters are shown on the same display, which provides a better concern of user friendly to the user.

- Compact size
- Advanced capacity: 300W, 3,000mA, 300V
- Microprocessor controller
- Constant voltages, constant currents and constant power
- Four pairs of outlet terminator
- LCD display
- Timer with alarm function
- Advanced safety devices
- Stackability
- Wide applications for DNA, RNA and protein electrophoresis
<table>
<thead>
<tr>
<th><strong>TECHNICAL SPECIFICATION</strong></th>
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<tbody>
<tr>
<td><strong>Cat. No</strong></td>
</tr>
<tr>
<td><strong>Output Voltage / Inc.</strong></td>
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<tr>
<td><strong>Output Current / Inc.</strong></td>
</tr>
<tr>
<td><strong>Max. Watt / Inc.</strong></td>
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<tr>
<td><strong>Output Type</strong></td>
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<tr>
<td><strong>Control</strong></td>
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<td><strong>Program Storage</strong></td>
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<td><strong>Program Multi-Step</strong></td>
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<td><strong>Terminal Pairs</strong></td>
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<td><strong>Display</strong></td>
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<td><strong>Timer</strong></td>
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<td><strong>Safety Device</strong></td>
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<tr>
<td><strong>Crossover</strong></td>
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<tr>
<td><strong>Operation Temperature</strong></td>
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<td><strong>Unit Dimension</strong></td>
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<tr>
<td><strong>Construction material</strong></td>
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<tr>
<td><strong>Stackable</strong></td>
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<tr>
<td><strong>Weight</strong></td>
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<tr>
<td><strong>Rated Voltage</strong></td>
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<tr>
<td><strong>Input Rating</strong></td>
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INSTALLATION INSTRUCTIONS
High Current Power Supply is actually a pre-installed instrument. As long as it is placed on a sturdy and level surface in a safe, dry place, and further connects with well-prepared electrophoresis system, it is ready for operation.

OPERATION INSTRUCTIONS

*Control interface*

**Front Control Panel**

1. **Key** - to move cursor up between parameters and to increase numeric values

2. **Key** - to move cursor down between parameters and to decrease numeric values

3. **Key** - to move cursor left forward between parameters

4. **Key** - to move cursor right forward between parameters

5. **Key** – to select either Constant Voltage or Constant Current mode or Time

6. **Key** – to enter the numeric value set up

7. **Key** – to activate or stop the unit

8. **Key** – to temporarily interrupt power to an operation in progress without terminating electrophoresis and to resume power after pausing without resetting the timer
Start the operation

*Note: To operate under constant voltage or constant current modes, adjust the other parameter to the maximum value. For example, to operate under constant voltage, adjust current to max before running using constant voltage, and vice versa.

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

The *MS* is the display screen to appear after turning on the power to your instrument. You can choose the operational Mode (Constant or Program) on the downward side of the display screen.

Afterwards, on the Display Screen, you would select either Constant Setup: or Program Setup:

**Constant Setup Operation**

Instructions for operating High Current Power Supply in the **Constant Operation** are provided in this section. The **Constant Voltage / Current / Power Mode** allows you to specify a voltage limit, and current limit to be used continuously during the entire duration of electrophoresis. Review the guidelines provided in this manual before starting electrophoresis using High Current Power Supply. We recommend reading the guidelines provided in this manual for best results before starting an operation.

1. Place High Current Power Supply on a sturdy and level surface in a safe, dry place, away from laboratory traffic.

2. Ensure that the AC power switch is OFF, and then plug the three-pronged power cord into a grounded three-prong AC outlet of the appropriate voltage (110V to 240V as indicated on the rating sticker near the AC cord on the back of the unit).

3. Connect the DC output jacks from the electrophoresis unit; insert the red lead (+) into the red output jack, and the black lead (-) into the black output jack.

4. Use the power switch on the rear of the instrument to turn on the High Current Power Supply. The *MS* will appear on the screen.
5. Use Key and Key to select and then press Key or Key to enter the next screen.

6. Use Key, Key, Key and Key to move cursor to the parameter, for instance voltage (V) or current (mA) or power (W) or Time (Minute), press Key to set the specified parameter.

7. Use Key, Key to set the appropriate value, and then press Key, and move to the next parameter until all the parameters are set in the same operation method.

8. Press Key to start electrophoresis, the LED is lit, and the screen will show the real time parameter values, and press Key or Key to see the following screen.

9. Press Key to temporarily interrupt power to ongoing electrophoresis without terminating the operation, the LED is flashing. Press Key to restart the run.

10. Press the Key again to stop electrophoresis.

11. When the run is completed, operation stops with alarm and is shown on the screen. Press Key to terminate a timed run, and Turn the AC power OFF by the switch on the rear.

12. To change Limits of Electrophoresis in Progress.
If you need to make changes to the current running limits, you must stop electrophoresis by pressing the Key. Press Key to enter the setting screen, Enter the changes and then press Key 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.

**Programming Setup Operation**

Instructions for operating High Current Power Supply in the Programming Operation 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) or as gradients (RAMP) for up to 6 Steps, depending upon your electrophoresis needs. The High Current power supply is capable of having 30 different program files storages for user’s convenience. We recommend reading the guidelines provided in this manual for best results before starting an operation.

1. Place High Current Power Supply on a sturdy and level surface in a safe, dry place, away from laboratory traffic.

2. Ensure that the AC power switch is OFF, and then plug the three-pronged power cord into a grounded three-prong AC outlet of the appropriate voltage (110V to 240V as indicated on the rating sticker near the AC cord on the back of the unit).

3. Connect the DC output jacks from the electrophoresis unit; insert the red lead (+) into the red output jack, and the black lead (-) into the black output jack.

4. Use the power switch on the rear of the instrument to turn on the High Current Power Supply. The will appear on the screen.

5. Use Key and Key to select , and then press Key or Key to enter the next screen.

6. Press Key fist and then use Key, Key to select appropriate file number, and then press Key to enter the following screen,
7. Use Key, Key, Key and Key to move cursor to the parameter, for instance voltage (V) or current (mA) or power (W) or Time (Minute), press Key to set the specified parameter.

8. Use Key, Key to set the appropriate value, and then press Key, and move to the next parameter until all the parameters are set in the same operation method.

9. Use Key to move down to for setting Step 4-6. Press Key back to Step 1-3 screen.

10. Press Key to start electrophoresis, , the LED is lit, and the screen will show the real time parameter values, , and press Key or Key to see the following screen, Key or Key back to .

11. Press Key to temporarily interrupt power to ongoing run without terminating the operation, , the LED is flashing. Press Key to restart the run.

12. When electrophoresis is completed, is shown on the screen. Press the Key again to stop electrophoresis.

13. To change Limits of Electrophoresis in Progress

If you need to make changes to the current running limits, you must stop electrophoresis by pressing the Key. Press Key to enter the setting screen, Enter the changes and then press Key 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.

**Limiting Parameter Setting**
The High Current Power Supply is capable of operating at limiting voltage, or limiting Current, or limiting power no matter Constant Setup mode or Programming Setup mode. We use Programming Setup mode as an example.

Voltage Limiting

1. Use Key, Key, Key, Key, and Key to set Maximum Current (3A) and Maximum Power (300W), and on the real time screen “Volt” is shown in hollow type, for instance,

   ![Voltage Limiting Example](image)

Current Limiting

1. Use Key, Key, Key, Key, and Key to set Maximum Voltage (300V) and Maximum Power (300W), and on the real time screen “mA” is shown in hollow type, for instance,

   ![Current Limiting Example](image)

Power Limiting

1. Use Key, Key, Key, Key, and Key to set Maximum Voltage (300V) and Maximum Current (3A), and on the real time screen “Wat” is shown in hollow type, for instance,

   ![Power Limiting Example](image)
**TROUBLESHOOTING GUIDE**

Many operating problems may be solved by carefully reading and following the instructions in this manual accordingly. Some suggestions for troubleshooting are given below. Should these suggestions not resolve the problem, contact our SERVICE DEPARTMENT or a distributor in your region for assistance. If troubleshooting service is required, please include a full description of the problem.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Display / lights</td>
<td>No AC power</td>
<td>Check if MS power supply is unplugged, or AC power source problem</td>
</tr>
<tr>
<td></td>
<td>AC power cord is not connected</td>
<td>Check AC power cord connections at both ends. Use the correct cords.</td>
</tr>
<tr>
<td></td>
<td>The fuse has blown</td>
<td>Replace the fuse</td>
</tr>
<tr>
<td>Repeated fuse broken</td>
<td>Hardware failure</td>
<td>Contact Major Science service department</td>
</tr>
<tr>
<td>Operation stops with alarm: The screen displays “</td>
<td>Electrophoresis leads are not connected to the power supply or to the electrophoresis unit(s), or there is a broken circuit in the electrophoresis cell</td>
<td>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. Close the circuit by reconnecting the cables. Press START/STOP to restart the run.</td>
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<tr>
<td></td>
<td>High resistance due to tape left on a pre-cast gel, incorrect buffer concentration, or incorrect buffer volumes in the electrophoresis cell</td>
<td>Correct the condition by making sure the tape is removed from the pre-cast gel, buffers are prepared correctly, and the recommended volume of buffer is added to the electrophoresis unit.</td>
</tr>
<tr>
<td>Operation stops with alarm: Display shows</td>
<td>Bad connections for terminal connectors or damaged wires or damaged platinum wires</td>
<td>Check all the connections to terminators, cables, wires, and gel tanks</td>
</tr>
<tr>
<td>Operation stops with alarm:</td>
<td>Display shows</td>
<td>Circuit is interrupted</td>
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<tr>
<td></td>
<td></td>
<td>- Verify that the running buffer is correct.</td>
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<tr>
<td></td>
<td></td>
<td>- Verify the all cables are attached correctly</td>
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<tr>
<td></td>
<td></td>
<td>- Turn the Power switch off and on again; restart application.</td>
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<tr>
<td></td>
<td></td>
<td>- If you cannot restart the instrument, turn off the power, disconnect the power cord from the outlet, and contact Technical Service.</td>
</tr>
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</table>

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<tr>
<th>Operation stops with alarm:</th>
<th>Display shows</th>
<th>Circuit is interrupted</th>
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<thead>
<tr>
<th>Operation stops with alarm:</th>
<th>Display shows</th>
<th>Ground leak detected during run</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Check the electrophoresis system for improper grounding. Restart the power supply by turning the Power switch off and on.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Operation stops with alarm:</th>
<th>Display shows</th>
<th>Power supply is overheating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>- Turn off power supply. Check for sufficient airflow around the power supply fan. After cooling down, restart the power supply by turning the Power switch to the on position.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- If you cannot restart the instrument, turn off the power, disconnect the power cord from the outlet, and contact Technical Service.</td>
</tr>
</tbody>
</table>
Operation stops with alarm:
Display shows restart ON and countdown

- Power supply is getting restarted.
- Verify that the electrophoresis condition and system is correct.
- Pay attention to the own safety.

**Encountering Problems**
1. Check the troubleshooting section.
2. Call Technical Service or e-mail to info@BTLabSystems.com
3. If the unit must be shipped back for repair, contact BT Lab Systems or the distributor for a Return Authorization Number and shipping instructions. The unit will be repaired as quickly as possible and returned to you.

**Replacing the Fuse**
For additional fuses, contact BT Lab Systems.

**To replace the fuse:**
1. Turn off the main power switch on the rear of High Current Power Supply and detach the power cord from the rear of High Current Power Supply.
2. Open the fuse compartment located inside the Power Entry Module by inserting a small flathead 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.
**Maintenance**
The High Current Power Supply series uses all solid-state components and should require no maintenance or recalibration under normal use. The casing may be cleaned with a dry cloth. If the unit must be returned for repair, contact our **SERVICE DEPARTMENT** or your local distributor for shipping instruction.

**WARRANTY**
BT Lab Systems warrants apparatus of its manufacture against defects in materials and workmanship, under normal service, for **one year from the shipping date to purchaser**. This warranty excludes damages resulting from shipping, misuse, carelessness, or neglect. BT Lab Systems’s liability under the warranty is limited to the receipt of reasonable proof by the customer that the defect is embraced within the terms of the warranty. All claims made under this warranty must be presented to BT Lab Systems within one year following the date of delivery of the product to the customer.

**TECHNICAL SUPPORT**
BT Lab Systems offers technical support for all of its products. If you have any questions about the product’s use or, operation, please contact BT Lab Systems at the following info.

E-Mail: [info@BTLabSystems.com](mailto:info@BTLabSystems.com)