

CS4-Series Bipolar Power Supplies



Features include:

- All Model CS4-10V versions are now CE-Marked!
- True Bipolar Operation with smooth sweeps through zero.
- Automated ramp with variable sweep rate settings.
- Flexible computer control via the standard RS-232 interface (IEEE-488.2 available).
- LabVIEW® drivers available at no extra charge.

<i>Available Models</i>	<i>Current Output</i>	<i>Output Voltage</i>
CS4-10V/60	± 60 amperes	± 10 volts
CS4-10V/100	± 100 amperes	± 10 volts
CS4-10V/125	± 125 amperes	± 10 volts (0-100A) ± 5 volts (101-125A)
CS4-10V/SHIM*	± 100 amperes	± 10 volts

* A special version of the CS4-10V/100 that has the capability of charging up to 12 different superconducting shim coils. These shim coils are used in many ICR and NMR systems. Contact the factory for further details.

The second generation of Cryomagnetics' CS4-Series Superconducting Magnet Power Supplies keeps the popular user interface while redesigned control circuitry using the latest technology improves stability and reliability. All 10 volt CS4 power supplies are CE-Marked, insuring compatibility with customers worldwide.

It is a true four-quadrant power supply – meaning it is capable of operating with positive current / positive voltage (sourcing power), positive current / negative voltage (sinking power), negative current / positive voltage (sinking power), and negative current / negative voltage (sourcing power). The supply allows the user to

generate smooth sweeps through zero current for performing hysteresis loop experiments or other research requiring smooth magnetic field reversal.

The quiet switch-mode design of the CS-4 makes it a low noise, highly efficient supply – and one that is proven stable even on the most sensitive superconducting magnets. Versatile programmability allows the user to specify several different sweep rates for different current ranges of the magnet – making it possible to sweep a magnet slower in a particular range if it is more sensitive there without user intervention.

RS-232 computer interfacing is standard and IEEE-488.2 is optional. LabVIEW® drivers are available at no additional charge.

The bright alphanumeric display indicates real time output current (or magnetic field) and voltage in a large font that is easy to read - even from across a room. The vacuum fluorescent display is visually pleasing, may be read from virtually any angle, and is far superior to backlit LCD alphanumeric displays offered by competing units.

Other power supply functions such as current limit, voltage limit, persistent switch power supply status, and sweep status are also simultaneously displayed.



In this menu, different ramp rates may be set over different ranges. Note the real time output current and voltage output as well as the sweep direction is displayed at the top.

CS4 display while in Menu Mode

Safety concerns during a magnet quench have been addressed by the quench detection and protection circuitry. In addition, if a quench is detected the CS-4 will give an audible and visual indication of the quench. The current at which the quench occurred will be displayed on the unit's front panel.

Should a power failure occur during operation of the magnet, the supply converts to a “Power Fail” mode wherein it draws its power from the discharging magnet rather than the AC line. When “Power Fail” mode is entered, the display is brought back on-line and the user can monitor the discharge of the magnet. If power is restored, the user can intervene to stop the discharge and re-energize the magnet if desired. “Power Fail” mode is a convenient feature of the CS-4 since it enables the user to simply turn OFF the power switch for the unit at the end of the day. The CS-4 will safely and automatically restore the display and discharge the magnet – quietly going to sleep when it’s done.

Power supplies used for energizing superconducting magnets have unique requirements placed upon them. The supplies are used to source energy to magnets which can have a wide range of inductance (mH to thousands of henries). In addition, the magnet load can range from a nearly pure resistance to a nearly pure inductance – and everything in between. This places demands on the supply that are far beyond what a typical power supply used for bench top electronics would see. The supply will experience the challenges of sinking energy when a magnet is discharging every day. At the same time, the potential exists for either the magnet or power supply to be damaged in the event of a power failure or magnet quench. The CS-4's advanced circuitry enables it to take virtually any scenario encountered in superconducting magnet operation in stride. Since Cryomagnetics is a leading manufacturer of superconducting magnets, the CS4-Series has been extensively tested. Superconducting magnets of various inductances and stored energies have all been successfully operated.



CS4-10V/100 Rear Panel View

Standard Features

- True bipolar operation with smooth sweeps through zero.
- Built-in programmer, ramp generator, and energy absorber.
- Simple, intuitive menu system.
- Automated ramp with variable sweep rate settings.
- Fast ramp capability to positive or negative current limit, or to zero current.
- Persistent switch heater power supply.
- Several current output models available: 60, 100, and 125 ampere.
- ± 10 volt output available for all versions, CE-Marked.
- Output current stability at 25 ± 1 °C: $\pm 0.005\%$ I_{max} or 2mA, whichever is greater.
- Ripple and noise less than 10mV RMS.
- RS-232 computer interface.
- Large, bright vacuum fluorescent display.
- Display can readout in output current or magnetic field (gauss or Tesla).
- Simple keypad with good tactile response.
- LabVIEW® drivers available at no extra charge.
- 15 feet length output cables.
- IEEE-488.2 Computer Interface available as an option

All information subject to change due to design improvements.
Visit www.cryomagnetics.com/cs-4.htm for the latest information.

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