Data Sheet

DC Electronic Loads

8500 Series



2400W



600 W - 1200 W



300 W

Versatile & Economical DC Electronic Loads

The 8500 series Programmable DC Electronic Loads can be used for testing and evaluating a variety of DC power sources. Their wide operating ranges of up to 500 V and 240 A, flexible operating modes and excellent measurement accuracy make the 8500 series well suited for characterizing DC Power supplies, DC-DC Converters, batteries, fuel cells and solar cells.

The loads can operate in CC, CV, CR or CP mode while voltage/current or resistance/power values are measured and displayed in real time. Load terminals are isolated and floating. Over temperature, over power, over voltage, over current and reverse polarity protection will help protect your valuable prototype and circuits.

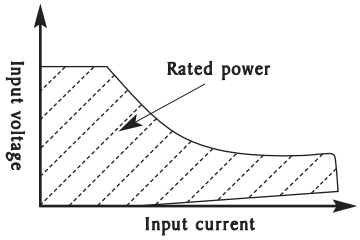
The DC loads are easy to use. All parameters can be set quickly and precisely from the front panel, or programmed via RS232 or USB interfaces.

The 8500 family offers 10 models with a wide range of ratings

Model	Power	Operating Voltage	Rated Current
8500	300 W	0.1 - 120 V	30 A
8502	300 W	0.1 - 500 V	15 A
8510	600 W	0.1 - 120 V	120 A
8512	600 W	0.1 - 500 V	30 A
8514	1200 W	0.1 - 120 V	240 A
8518	1200 W	0.1 - 60 V	240 A
8520	2400 W	0.1 - 120 V	240 A
8522	2400 W	0.1 - 500 V	120 A
8524	5000 W	0.1 - 60 V	240 A
8526	5000 W	0.1 - 500 V	120 A

When selecting a DC load, it is important to consider not only voltage and current requirements, but also power ratings. The power used when testing must fall within the hatched region for the appropriate DC load.

Some applications may require high voltage/low current and low voltage/high current which a single load may not be able to handle. B&K Precision's broad range of DC loads will allow you to select the optimal model for your requirements.



Technical data subject to change
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B&K PRECISION
ELECTRONIC TEST INSTRUMENTS

Features

- Constant current (CC), resistance (CR), voltage (CV) and power (CP) operation
- Wide voltage and current range, 0 to 500 V, 0 to 240 A (5000 W max)
- Low minimum operating voltage of < 0.1 V and minimum input resistance of 5 mΩ (model 8518) allowing the load to sink high current at low voltages, required for fuel and solar cell applications
- Selected models operate up to 500 V, suitable for high voltage applications
- Built-in transient generator
- Short circuit test
- Built-in high resolution (0.1 mA/1 mV) voltage and current measurement (models 8500 & 8502)
- Bright, easy to read display (VFD technology)
- Over-Current/Over-Voltage/Over-Power/Over-Temperature Protection
- RS232 to TTL, USB to TTL serial converter cables and application software included
- List mode operation for increased throughput.
- Battery testing mode to provide A*hr rating of battery (ending voltage level is adjustable)
- Flexible triggering: Create trigger events by front panel keystroke, back panel TTL signal, or software
- Remote voltage sensing to compensate for the effect of voltage drop in wires.
- Store 25 instrument setups
- Thermostatically-controlled fans allow operation in quiet environments with minimal disruption
- All models are rack mountable. Compact 300 W and 600 W models for bench use

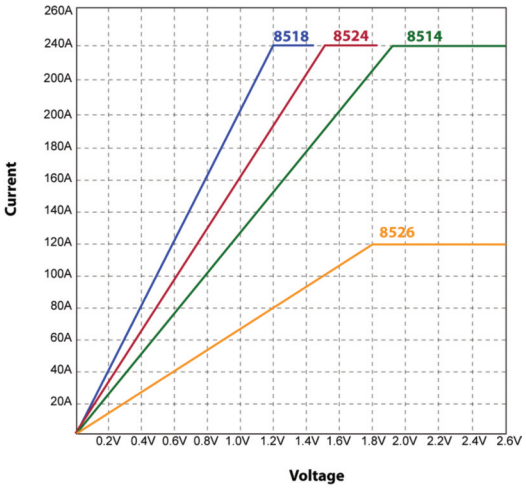


Applications:

- DC power supply testing
- Characterization of rechargeable batteries. A battery test mode is provided that will measure the ampere*hour (A*hr) characteristic of a battery
- Fuel and solar cell test
- High voltage applications

Low voltage operation

The 8500 series can operate well below 1 V which is important for low voltage application such as fuel cell and solar cell testing. All models can regulate (provide a stable input) down to 0.1 V. Model 8518, due to its particularly low input resistance, can operate at full scale current of 240 A at 1.2 V (see image)



Typical minimum operating voltage at full scale current:

8500	8502	8510	8512	8514	8518	8520	8522	8524	8526
1.05 V	3 V	1.8 V	3 V	1.92 V	1.2 V	10.8 V	3.6 V	1.56 V	1.8 V

▲ Front panel

The numeric keys and rotary knob provide a convenient interface for setting the operating mode and desired current/voltage/resistance levels quickly and precisely. Voltage and current can be set to a maximum resolution of 1 mV and 0.1 mA respectively (models 8500 and 8502 only). Up to 25 different instrument setups can be stored and recalled from internal memory.



1) High resolution, easy to read display
Displays set values and measured values. Current/voltage and power/resistance displays can be toggled. Display resolution for current and voltage is user-selectable. Maximum resolution for model 8500 and 8502 is 1 mV/ 0.1 mA.

2) Convenient data entry
Rotary knob for quick analog-style control. Turn to adjust a setting value. Press to toggle measurement display mode.

3) Numeric keypad
Conveniently enter set values directly and access secondary functions.

4) Function keys
Activate current, voltage, power, or resistance modes and scroll through menus and options.

5) Front panel load terminals
Connect to device under test. Hex-head screw

Hex-head screw terminals

Terminals are used for models 8518 and 8520 – 8526 to connect wires.



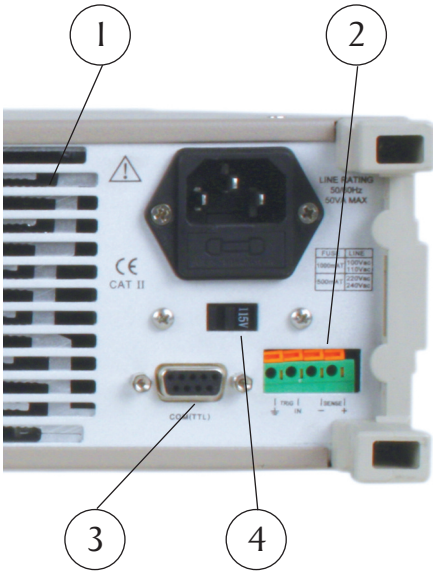
▲ Rear panel

1) Air vents
Temperature-controlled fan expels air through these vents to keep the temperature constant inside the system.

2) Trigger and remote sensing terminal block
Connect sensing lines to this terminal to compensate for voltage drops due to load wire resistance. This terminal block also contains the two connections for the remote TTL trigger input signal.

3) Interface connection
Serial interface connector for RS232 or USB communication.

4) Voltage switch
Line voltage selection switch (110 VAC or 220 VAC).



▲ Flexible operating modes

CC, CR, CV and CP mode

In Constant Current (CC) mode, the load will sink a current according to the programmed current value regardless of the input voltage. (CC) mode can be used for load regulation testing of DC power supplies or for characterizing the discharge profile of a battery.

Constant Power (CP) mode simulates a load whose power consumption is independent of the applied voltage. Constant Power (CP) mode is useful for battery testing and simulating a realistic discharge curve.

In Constant Voltage (CV) mode, the load will attempt to sink enough current to control the source voltage to the programmed value. This mode is suitable for testing battery chargers.

In Constant Resistance (CR) mode, the load will sink a current linearly proportional to the input voltage in accordance with the programmed resistance. Unlike conventional resistors, the load resistance stays constant regardless of the power level.

Transient generator

The 8500 series offers a variable frequency generator which can be used in all operating modes. The DC load will toggle between 2 preset levels at a frequency between 0.1 Hz to 1 kHz, either continuously or controlled by a trigger.

Triggered operation

Triggering is used to allow synchronization of the DC Load's behavior with other events. You can generate a trigger event by front panel keystroke, by applying an external TTL signal to the back panel terminal or by sending a commands over the serial bus. The trigger can be used in pulse mode, transient mode, list mode and works in CC, CR, CV and CP modes.



Model 8500

▲ Remote control & application software

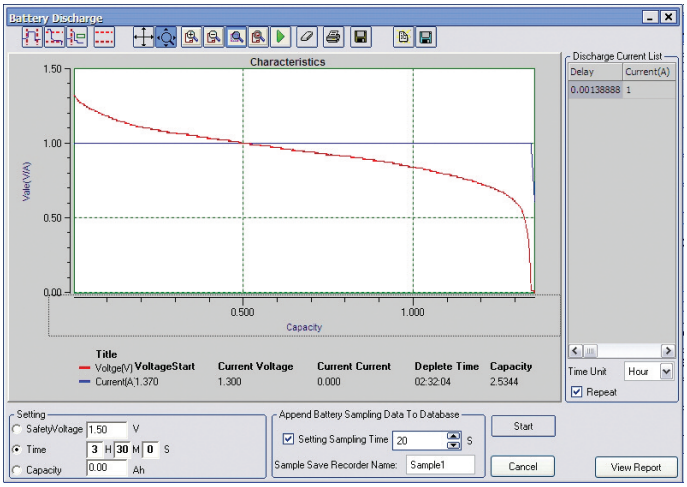
The DC loads can be remotely controlled from any PC with USB or RS232 interface, allowing the user to fully program and monitor all parameters. RS232 to TTL and USB to TTL serial converter cables are included. For users wanting to write their own custom software, a set of example programs are available for download on the B&K Precision website.

List Mode

A list of command sequences can be stored in non-volatile memory and executed independently of a computer. Execution in list mode greatly reduces command processing time and computer interaction during product testing. The command sequence can be entered manually from the front panel or downloaded from a PC via RS232 or USB interface.

Application Software

The included Application Software supports front panel emulation of the load and includes a battery test application which provides A*hr rating of a battery and adjustable ending voltage levels (safety voltage).



An example of battery discharge characteristics of an AA alkaline battery.

Whether you are designing a device with Nickel-Metal Hydride or Lithium-Ion batteries, the 8500 series have the capabilities to test their characteristics.

Specifications

▲ Models 8500 & 8502 (300 W)

Parameter		8500	8502
Input rating	Voltage	0 – 120 V	0 – 500 V
	Current	0 – 30 A	0 – 15 A
	Power	300 W	

Parameter	Range		Accuracy	Resolution
	8500	8502		
CV Mode Regulation	0.1-18 V		±(0.05%+0.02% FS)	1 mV
	0.1 – 120 V	0.1 – 500 V	±(0.05%+0.025% FS)	10 mV
CC Mode Regulation	0 – 3 A	0 – 3 A	±(0.1%+0.1% FS)	0.1 mA
	0 – 30 A	0 – 15 A	±(0.2%+0.15% FS)	1 mA
Current Measurement	0 – 3 A	0 – 3 A	±(0.1% + 0.1% FS)	0.1 mA
	0 – 30 A	0 – 15 A	8500: ±(0.2%+0.15% FS) 8502: ±(0.2%+0.3% FS)	1 mA
Voltage Measurement	0-18 V		±(0.02% + 0.02% FS)	1 mV
	0-120 V	0 – 500 V	±(0.02% + 0.025% FS)	10 mV

▲ Models 8510/8512/8514/8518 (600 W & 1200 W)

Parameter		8510	8512	8514	8518
Input rating	Voltage	0 – 120 V	0 – 500 V	0 – 120 V	0 – 60 V
	Current	0 – 120 A	0 – 30 A	0 – 240 A	0 – 240 A
	Power	600 W		1200 W	

Parameter	Range				Accuracy	Resolution
	8510	8512	8514	8518		
CV Mode Regulation	0.1-18 V				±(0.05%+0.02% FS)	1 mV
	0.1 V to Vmax				±(0.05%+0.025% FS)	10 mV
CC Mode Regulation	0-12 A	0-3 A	0-24 A		±(0.1%+0.1% FS)	1 mA
	0 – max Current				±(0.2%+0.15% FS)	10 mA
Current Measurement	0-12 A	0-3 A	0-24 A		±(0.1% + 0.1% FS)	1 mA
	0 – max. Current				±(0.2%+0.15% FS)	10 mA
Voltage Measurement	0 – 18 V				8510/8514: (0.02% + 0.025% FS) 8512/8518: (0.02% + 0.02% FS)	1 mV
	0 - Vmax				±(0.02% + 0.025% FS)	10 mV

▲ Models 8520/8522/8524/8526 (2400 W & 5000 W)

Parameter		8520	8522	8524	8526
Input rating	Voltage	0 – 120 V	0 – 500 V	0 – 60 V	0 – 500 V
	Current	0 – 240 A	0 – 120 A	0 – 240 A	0 – 120 A
	Power	2400 W		5000 W	

Parameter	Range				Accuracy	Resolution
	8520	8522	8524	8526		
CV Mode Regulation	0.1-18 V				±(0.05%+0.02% FS)	1 mV
	0.1 V to Vmax				±(0.05%+0.025% FS)	10 mV
CC Mode Regulation	0-24 A	0-12 A	0-24 A	0-12 A	±(0.1%+0.1% FS)	1 mA
	0 – max Current				±(0.2%+0.15% FS)	10 mA
Current Measurement	0-24 A	0-12 A	0-24 A	0-12 A	±(0.1% + 0.1% FS)	1 mA
	0 – max. Current				±(0.2%+0.15% FS)	10 mA
Voltage Measurement	0 – 18 V				8522/8526: (0.02% + 0.02% FS) 8520/8524: (0.02% + 0.025% FS)	1 mV
	0 - Vmax				±(0.02% + 0.025% FS)	10 mV

▲ Common characteristics

Parameter	Range	Accuracy	Resolution
CR Mode Regulation			
(Input current ≥ FS 10% Input voltage≥ FS 10%)	0.1 -10 Ω	±(1%+0.3% FS)	0.001 Ω
	10-99 Ω	±(1%+0.3% FS)	0.01 Ω
	100-999 Ω	±(1%+0.3% FS)	0. 1 Ω
	1K-4 KΩ	±(1%+0.8% FS)	1 Ω
CW Mode Regulation			
(Input current ≥ FS 10% Input voltage≥ FS 10%)	0-100 W	±(1%+0.1% FS)	1 mW
	100 W - max power	±(1%+0.1% FS)	100 mW
Power Measurement			
(Input current ≥ FS 10% Input voltage ≥ FS 10%)	0-100 W	±(1%+0.1% FS)	1 mW
	100 W - max power	±(1%+0.1% FS)	100 mW
Other			
Battery testing function	Input = 0.1 V – 120 V, Max measurement capacity = 999 Ah Resolution = 10 mA, Timer range = 1-60000 sec		
Transition mode	Range of Frequency 0.1 Hz-1 kHz, Frequency error rate 0.5%		
AC input	110 / 220 (see note below)* VAC ± 10%, 47 – 63 Hz		
Operating temperature	32 °F - 104 °F (0 - 40 °C)		
Storage temperature	50 °F - 140 °F (10 - 60 °C)		
Humidity	≤ 95% relative humidity, non-condensing		
Safety	EN61010-1:2001, EU Low Voltage Directive 73/23/EEC amended by 93/68/EEC		
Electromagnetic compatibility	Meets EMC Directive 89/336/EEC amended by 93/68/EEC, EN50081-1, EN50082-1		
			One-Year Warranty

* All 8500 series models, with the exception of models 8524 and 8526, can be configured for 110 V or 220 V operation via the AC line switch in the rear panel. Base models 8524 and 8526 operate with 110 V only. For 220 V operation, order model 8524-220V or 8526-220V respectively. "-220V" denotes 220 V operation only and these models cannot be reconfigured for 110 V operation.

▲ Mechanical specifications

Model	Dimensions (W x H x D)	Weight
8500	8.46" x 3.46" x 14" (215 mm x 88 mm x 355 mm)	11.5 lb (5.2 kg)
8502	8.46" x 3.46" x 14" (215 mm x 88 mm x 355 mm)	11.5 lb (5.2 kg)
8510	16.9" x 3.46" x 14" (429 mm x 88 mm x 355 mm)	31 lb (14 kg)
8512	16.9" x 3.46" x 14" (429 mm x 88 mm x 355 mm)	31 lb (14 kg)
8514	16.9" x 3.46" x 14" (429 mm x 88 mm x 355 mm)	31 lb (14 kg)
8518	16.9" x 3.46" x 14" (429 mm x 88 mm x 355 mm)	31 lb (14 kg)
8520	17.48" x 7.09" x 21.22" (444 mm x 180 mm x 539 mm)	66 lb (30 kg)
8522	17.48" x 7.09" x 21.22" (444 mm x 180 mm x 539 mm)	66 lb (30 kg)
8524	17.48" x 14.06" x 21.22" (444 mm x 357 mm x 539 mm)	148 lb (67 kg)
8526	17.48" x 14.06" x 21.22" (444 mm x 357 mm x 539 mm)	148 lb (67 kg)

▲ Accessories

Standard	Power cord, user manual, installation CD with application software, RS232 to TTL serial converter cable IT-E131, USB to TTL serial converter cable IT-E132, certificate of calibration and test report
Optional	Rack mount kit IT-E151 for models 8500, 8502, 8510, 8512, 8514 and 8518 only