

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.

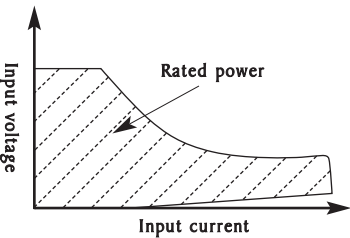
The DC loads are easy to use. All parameters can be set quickly and precisely from the front panel, or programmed via RS232 or USB interfaces.

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.



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

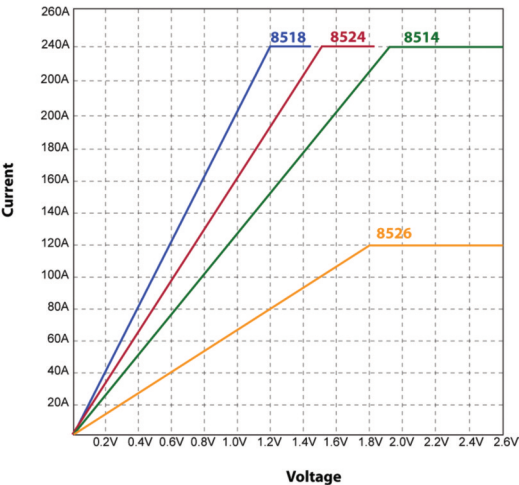


Applications:

- 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

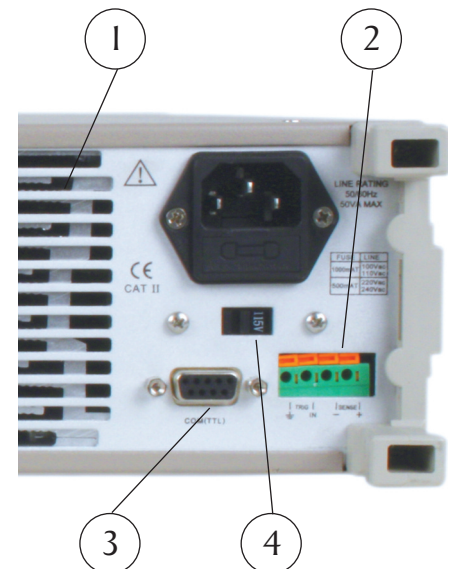
Connect sensing lines to this terminal to compensate for voltage drops due to load wire resistance. This terminal block also contains the two connections for the remote TTL trigger input signal.

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

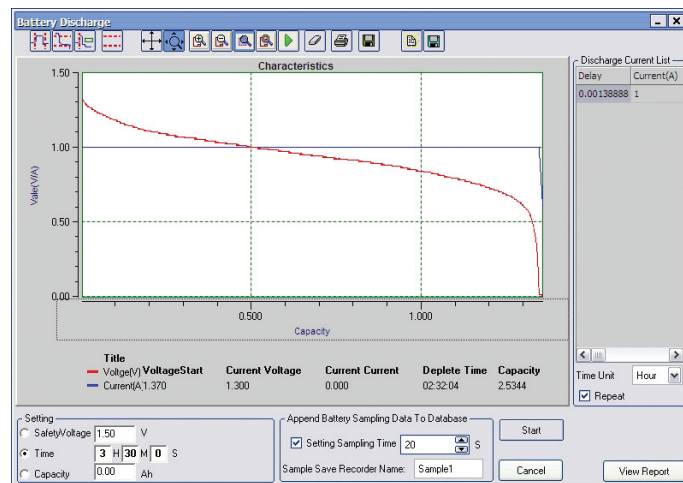
The DC loads can be remotely controlled from any PC with USB or RS232 interface, allowing the user to fully program and monitor all parameters. RS232 to TTL and USB to TTL serial converter cables are included. For users wanting to write their own custom software, a set of example programs are available 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 | 0.1 – 18 V | | $\pm(0.05\%+0.02\% \text{ FS})$ | 1 mV |
| Regulation | 0.1 – 120 V | 0.1 – 500 V | $\pm(0.05\%+0.025\% \text{ FS})$ | 10 mV |
| CC Mode | 0 – 3 A | 0 – 3 A | $\pm(0.1\%+0.1\% \text{ FS})$ | 0.1 mA |
| Regulation | 0 – 30 A | 0 – 15 A | $\pm(0.2\%+0.15\% \text{ FS})$ | 1 mA |
| Current Measurement | 0 – 3 A | 0 – 3 A | $\pm(0.1\% + 0.1\% \text{ FS})$ | 0.1 mA |
| | 0 – 30 A | 0 – 15 A | 8500: $\pm(0.2\%+0.15\% \text{ FS})$ 8502: $\pm(0.2\%+0.3\% \text{ FS})$ | 1 mA |
| Voltage Measurement | 0–18 V | | $\pm(0.02\% + 0.02\% \text{ FS})$ | 1 mV |
| | 0–120 V | 0 – 500 V | $\pm(0.02\% + 0.025\% \text{ FS})$ | 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 | 0.1–18 V | | | | $\pm(0.05\%+0.02\% \text{ FS})$ | 1 mV |
| Regulation | 0.1 V to Vmax | | | | $\pm(0.05\%+0.025\% \text{ FS})$ | 10 mV |
| CC Mode | 0–24 A | 0–12 A | 0–24 A | 0–12 A | $\pm(0.1\%+0.1\% \text{ FS})$ | 1 mA |
| Regulation | 0 – max Current | | | | $\pm(0.2\%+0.15\% \text{ FS})$ | 10 mA |
| Current Measurement | 0–24 A | 0–12 A | 0–24 A | 0–12 A | $\pm(0.1\% + 0.1\% \text{ FS})$ | 1 mA |
| | 0 – max. Current | | | | $\pm(0.2\%+0.15\% \text{ FS})$ | 10 mA |
| Voltage Measurement | 0 – 18 V | | | | 8522/8526: $(0.02\% + 0.02\% \text{ FS})$ 8520/8524: $(0.02\% + 0.025\% \text{ FS})$ | 1 mV |
| | 0 - Vmax | | | | $\pm(0.02\% + 0.025\% \text{ FS})$ | 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 |