

Programmable DC Electronic Loads 8600/B Series



The 8600/B Series programmable DC electronic loads provide the performance of modular system DC electronic loads in a compact benchtop form factor. With fast transient operation speeds and high I6-bit measurement resolution, these standalone DC loads can be used for testing and evaluating a variety of DC sources such as DC power supplies, DC-DC converters, batteries, battery chargers, and photovoltaic arrays.

The DC loads can operate in constant current (CC), constant voltage (CV), constant resistance (CR), or constant power (CW) mode and be configured to provide a dynamically changing load to the DC source with fast load switching times. Versatile internal, external, and remote triggering options allow the dynamic load behavior to be synchronized with other events.

Increase productivity by saving your test parameters into any one of the 100 memory areas for quick system recall. All load parameters such as voltage, current, slew rate, and width can be set via the front panel or programmed remotely. The 8600/B Series provides standard USB (USBTMC-compliant), and RS232 interfaces standard for remote communication. GPIB is available as an option on select models. To ensure the reliability of your testing, the 8600/B Series provides a power-on system self-test and numerous protection features: overtemperature (OTP), overvoltage (OVP), overcurrent (OCP), overpower (OPP), and local/ remote reverse voltage (LRV/RRV) protection.

Special applications

The 8600/B Series provides a built-in battery test mode to measure the ampere-hour (Ah) characteristic of a battery and a unique CR-LED mode to simulate the loading behavior of a typical LED.

Features and Benefits

- Voltage range up to 500 V
- Current range up to 720 A
- CC/CV/CR/CW operating modes
- I6-bit voltage and current measurement system providing 1 mV / 0.1 mA resolution
- Transient mode up to 25 kHz in CC mode
- List mode function



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USB	RS232	GPIB (select models)

Features and Benefits (cont.)

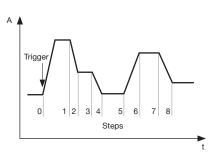
- Store and recall up to 100 setups
- Adjustable slew rate in CC mode
- Flexible triggering options via front panel, external input, timer, or bus
- Built-in battery test function with voltage level, capacity level, and timer stop conditions
- Test modes to validate the OCP/OPP protection functions of a power supply
- CR-LED mode to simulate the loading behavior of typical LEDs
- Remote sense
- Analog current control and monitoring
- Thermostatically controlled fan
- Standard USB (USBTMC-compliant) and RS232 interfaces supporting SCPI commands for remote control
- GPIB optional on select models
- OVP/OCP/OPP/OTP including local and remote reverse voltage (LRV/RRV) protection

Model	8600/B*	8601/B*	8602/B*	8610/B*	8612/B*	8614/B*	8616	8620	8622	8624	8625
Power	150 W	250 W	200 W	750 W	750 W	1500 W	1200 W	3000 W	2500 W	4500 W	6000 W
Operating Voltage	0 – 120 V	0 – 120 V	0 – 500 V	0 – 120 V	0 – 500 V	0 – 120 V	0 – 500 V	0 – 120 V	0 – 500 V	0 – 120 V	0 – I20 V
Rated Current	0 – 30 A	0 – 60 A	0 – 15 A	0 – 120 A	0 – 30 A	0 – 240 A	0 – 60 A	0 – 480 A	0 – 100 A	0 – 600 A	0 – 720 A
Form Factor		2U half-rack	·		3U					6	u

*Model numbers with suffix B (86xxB) do not include a GPIB interface. See ordering information on page 9 for details.

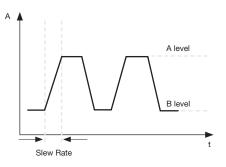
Flexible operation

List mode



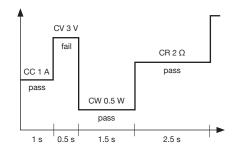
List mode lets you generate more complex sequences of input changes with several different levels. Up to 7 groups of list files can be saved. Each list can contain up to 84 steps with a minimum width time of 20 µs per step.

Transient operation



Transient operation enables the module to periodically switch between two load levels. A power supply's regulation and transient characteristic can be evaluated by monitoring the supply's output voltage under varying combinations of load levels, frequency, duty cycle, and slew rate. Transient operation can simulate these conditions.

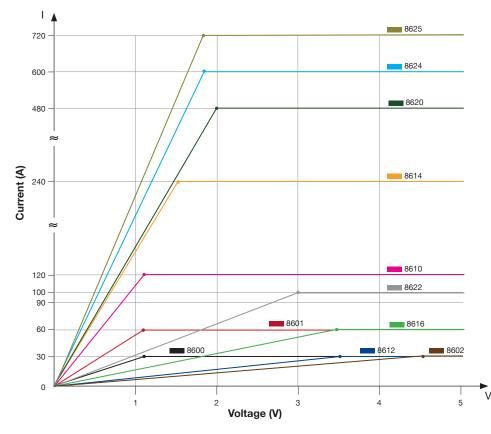
Automatic test mode



The 8600/B Series can execute multiple test sequences in automatic test mode. Up to 100 different sequences can be linked to run steps of various operating modes and loading conditions. Each sequence can also be programmed with upper and lower limit Pass/Fall criteria. When applied in production testing, you can easily judge whether the test parameters of your devices are within the specification limits and adjust your process according to the Pass/Fail verdict.

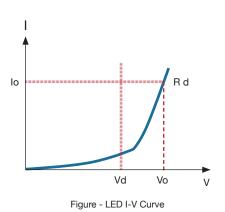
Low voltage operation

The 8600/B Series can operate at low voltages for applications such as fuel cell and solar cell testing.



Typical minimum operating voltage at full scale current										
8600	8601	8602	8610	8612	8614	8616	8620	8622	8624	8625
1.1 V	1.1 V	4.5 V	1.2 V	3.6 V	1.5 V	3.6 V	2 V	3 V	1.8 V	1.8 V

CR-LED mode



Vd = Forward voltage of the LED Rd = LED's operating resistance Vo = Operating voltage across the LED Io = Operating current across the LED

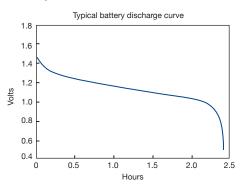
Use the load's unique CR-LED operating mode to test LED drivers. This function allows users to configure the LED's operating resistance and forward voltage along with the voltage range (same as CR operation) to simulate the loading behavior of typical LEDs.

Remote control and programming

Powerful communication interfaces

The 8600/B Series provides standard USB and RS232 interfaces for remote communication. GPIB is available as an option for select models. These interfaces offer SCPI and USBTMC standard communication protocols to control your electronic load from a PC.

Battery test function

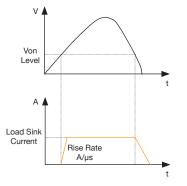


The built-in battery test function uses CC mode to calculate the battery capacity using a fixed current load discharge. Users can specify cut-off voltage level, capacity level, and time stop conditions.

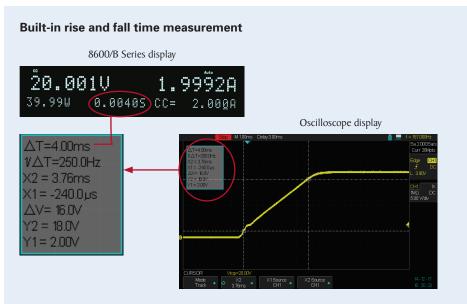
External analog programming and monitoring interface

In addition to front panel and remote interface control, current values can also be programmed with an analog control signal. The electronic loads can be externally controlled from zero to full scale with a 0-10 V input signal. A BNC output is available on the rear for monitoring the current with a 0-10 V output signal.

Voltage-on (Von) latch operation



Control the input turn on state for the DC electronic load by configuring the Von latch function. This can be used to start and stop discharging of a battery or other power source at a specified voltage level.



The 8600/B Series can measure the rise or fall time from a specified start and stop voltage level of the measured input without the need for an oscilloscope. This function can also be used as an internal timer to count how long the input has been enabled.

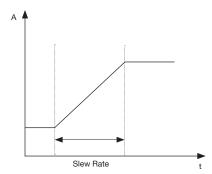
Application software



PC software is provided for front panel emulation, generating and executing test sequences, or logging measurement data without the need to write source code. Additionally, this application software integrates with NI Data Dashboard for LabVIEW[™] apps, which allows users to create a custom dashboard on a tablet computer or smartphone to remotely monitor 8600/B Series DC loads via this PC software.

- Remote monitoring on iOS, Android or Windows 8 compatible tablets or smartphones via NI Data Dashboard for LabVIEW[™] apps
- Log voltage, current, and power values with timestamp
- Run transient operation and list mode programs remotely
- Create an unlimited number of external list files to be executed from PC memory

Adjustable slew rate



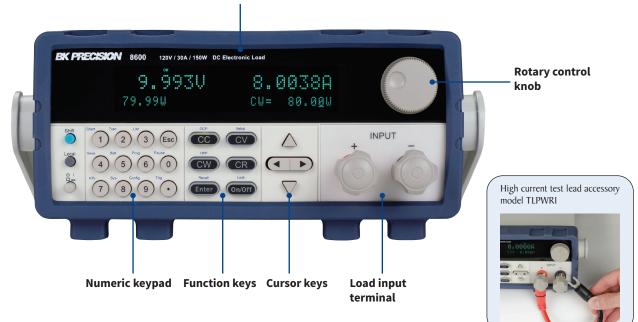
In CC mode, users can control the rate or slope of the change in current in a transient response test. Set the slew rate to as slow as 0.001 A/ms or as fast as 2.5 A/ μ s depending on the model and selected current range. Programmable DC Electronic Loads 8600/B Series

Models 8600/B, 8601/B & 8602/B

Front panel

Bright dual-line display

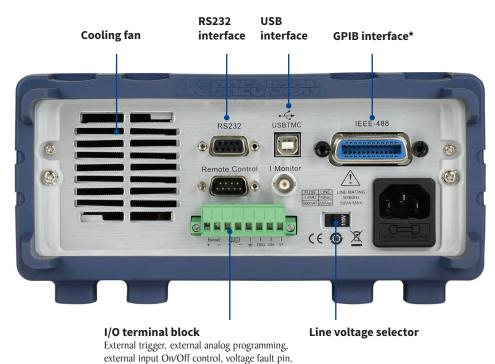
The 8600/B Series display shows both measured input values and set parameters simultaneously.



Intuitive user interface

The numeric keys and rotary knob provide a convenient interface for setting the operating mode and desired current, voltage, and resistance levels quickly and precisely.

Rear panel



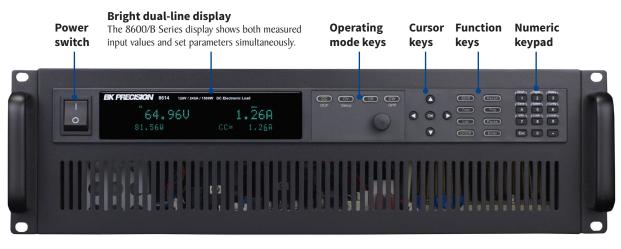
*GPIB optional on select models. See ordering information on page 9 for details.

and remote sense terminals

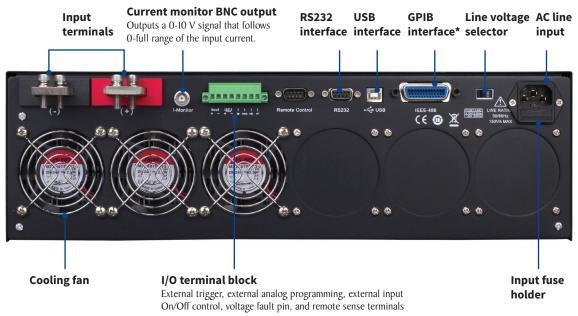
Programmable DC Electronic Loads 8600/B Series

Models 8610/B, 8612/B, 8614/B, 8616, 8620, 8622 (3U)

Front panel



Rear panel



▶ Models 8624 & 8625 (6U)



6U form factor models use the same front panel interface as the 3U models



The rear panel configurations of $6 \mbox{U}$ and $3 \mbox{U}$ models are identical, however the number of fans installed varies by model

*GPIB optional on select models. See ordering information on page 9 for details.

Specifications

Мо	del	8600/B	8601/B	8602/B	Readback voltag	je				
Input ratings					D	Low	0 – 18 V	0 – 18 V	0 – 50 V	
Input ve	oltage	0 – 120 V	0 – 120 V	0 – 500 V	Range	High	0 – I20 V	0 – I20 V	0 – 500 V	
Input	Low	0 – 3 A	0 – 6 A	0 – 3 A	Develoption	Low	0	.I mV	l mV	
current	High	0 – 30 A	0 – 60 A	0 – 15 A	Resolution	High	I mV		I0 mV	
Input p	oower	150 W	250 W	200 W	Accurac	y		±(0.05%+0.05% FS)	
Minimum	Low	0.II V at 3 A	0.18 V at 6 A	I V at 3 A	Readback curren	nt				
operating voltage	High	I.I V at 30 A	I.I V at 60 A	4.5 V at 15 A	Range	Low	0 – 3 A	0 – 6 A	0 – 3 A	
CV mode						High	0 – 30 A	0 – 60 A	0 – 15 A	
	Low	0 -	18 V	0 – 50 V	Resolution	Low	0.01 mA	0.1 mA	0.01 mA	
Range	High		20 V	0 – 500 V		High	0.1 mA	I mA	0.1 mA	
	Low		mV	ImV	Accurac	у	±(0.05%+ 0.05% FS)	±(0.05%+ 0.1% FS)	±(0.05%+ 0.05% FS)	
Resolution	High	l i	nV	I0 mV	Readback powe	r	0.03/010)	0.170107	0.03/01/3/	
	Low	±(0.05%+	±(0.025%+	±(0.05%+	Range		150 W	250 W	200 W	
Accuracy	LOW	0.02% FS)	0.05% FS)	0.025% FS)	Resolution			I0 mW	I	
,	High	±(0.05%+ 0.025% FS)	±(0.025%+ 0.05% FS)	±(0.05%+ 0.025% FS)	Accurac	у	±(1%+0.1% FS)	±(0.2%+0.2% FS)	±(0.1%+0.1% FS)	
CC mode		0.025/010/	0100/010/	0.025/010/	Protection range	e (typical)		1		
	Low	0 – 3 A	0 – 6 A	0 – 3 A	OPP		150 W	250 W	200 W	
Range	High	0 – 30 A	0 – 60 A	0 – 15 A	ОСР	Low	3.3 A	6.6 A	3.3 A	
	Low		0.1 mA		OCP	High	33 A	66 A	16.5 A	
Resolution	High		I mA		OVP		120 V	120 V	500 V	
	Low		±(0.05%+0.05% FS)	OTP	OTP				
Accuracy	High		±(0.05%+0.05% FS)	Short circuit (ty	pical)				
CR mode	U				Current (CC)	Low	3.3 A	6.6 A	3.3 A	
_	Low	0.05 Ω	– ΙΟ Ω	0.3 Ω – ΙΟ Ω		High		66 A	16.5 A	
Range	High		10 Ω - 7.5 kΩ		Voltage (Voltage (CV) 0 V				
Resolu	ution		I6 bit		Resistance (CR) 35 m Ω 30 m Ω				$300 \text{ m}\Omega$	
Accuracy	Low	0	.01%+0.08 S (12.5	Ω)	General (typical)				
(I>10% of	High	0.0	1%+0.0008 S (1250) Ω)	Input terminal in	npedance	150 kΩ	300 kΩ	ΙΜΩ	
range)	0			,	AC inpu	AC input		110 V/220 V ±10%, 50/60 Hz		
Ran	σe	150 W	250 W	200 W	Operating temperature		32 °F to 104 °F (0 °C to 40 °C)			
		150 W 250 W 200 W 10 mW		200 W	Storage temperature		I4 °F to I40 °F (-10 °C to 60 °C)			
Resolution Accuracy		0.1% + 0.1% FS	0.2% + 0.2% FS	0.1% + 0.1% FS		Humidity		Indoor use, ≤ 95%		
Transient mod		0.001 0.0010	012/01/012/01/0		Safety			, EU Low Voltage Dir		
TI & 1	Γ2 ^(I)	20 µs -	- 3600 s / Resolutio	n: 10 µs	Electromagnetic		Meets EMC Directive 2004/108/EC, EN 61000-3- 2:2006, EN 61000-3-3:1995+AI:2001+A2:2005			
Accu	racy	5 μs + 100 ppm		compatibility		EN 61000-4-2/-3/-4/-5/-6/-11, EN 61326-1:2006				
CL B (2)	Low	0.001-2	.5 A/ms	0.001-1 A/ms	Dimensions (W		8.5" x 3	.5" x 15.2" (218 x 90 x	387 mm)	
Slew Rate ⁽²⁾	High	0.001-2	2.5 A/µs	0.001-1 A/µs	Weight			9.9 lbs (4.5 kg)		
(1)					Warrant	у	3 Years			

Standard accessories

Optional accessories

 $^{(\mathrm{l})}$ Fast pulse trains with large transitions may not be achievable.

⁽²⁾ The slew rate specifications are not warranted, but are descriptions of typical performance. The actual transition time is defined as the time for the input to change from 10% to 90%, or vice versa, of the programmed current values. In case of very large load changes, e.g. from no load to full load, the actual transition time will be larger than the expected time. The load will automatically adjust the slew rate to fit within the range (high or low) that is closest to the programmed value.

bkprecision.com

User manual, power cord, certificate of calibration

TLPWRI high current test leads, IT-EI5I rackmount kit

(models 8600/B, 8601/B, and 8602/B only)

Specifications (cont.)

Mode	el	8610/B	8612/B	8614/B	8616	8620	8622	8624	8625	
Input ratings	;								1	
Input volt	age	0 – 120 V	0 – 500 V	0 – I20 V	0 – 500 V	0 – 120 V	0 – 500 V	0 – 120 V	0 – 120 V	
Input	Low	0 – 12 A	0 – 3 A	0 – 24 A	0 –6 A	0 – 48 A	0 – 10 A	0-60 A	0 – 72 A	
current	High	0 – 120 A	0 – 30 A	0 – 240 A	0 –60 A	0 – 480 A	0 – 100 A	0 – 600 A	0 – 720 A	
Input po	wer	750) W	1500 W	1200 W	3000 W	2500 W	4500 W	6000 W	
Minimum	Low	0.12 V at 12 A	0.36 V at 3 A	0.15 V at 24 A	0.36 V at 6 A	0.2 V at 48 A	0.3 V at 10 A	0.18 V at 60 A	0.18 V at 72 A	
operating voltage	High	1.2 V at 120 A	3.6 V at 30 A	I.5 V at 240 A	3.6 V at 60 A	2 V at 480 A	3 V at 100 A	18 V at 600 A	I.8 V at 720 A	
CV mode					1		<u> </u>	1		
	Low	0 – 18 V	0 – 50 V	0 – 18 V	0 – 50 V	0 – 18 V	0 – 50 V	0 – 18 V	0 – 18 V	
Range	High	0 – I20 V	0 – 500 V	0 – I20 V	0 – 500 V	0 – 120 V	0 – 500 V	0 – I20 V	0 – I20 V	
	Low	0.1 mV	I mV	0.1 mV	I mV	I mV	I mV	I mV	l mV	
Resolution	High	l mV	I0 mV	l mV	I0 mV	I0 mV	I0 mV	I0 mV	I0 mV	
Accuracy	Low	±(0.025% -	+ 0.05% FS)	±(0.025%+ 0.025% FS)	±(0.025%+ 0.05% FS)		±(0.025% -	+ 0.05% FS)		
	High			1	±(0.025% -	⊦ 0.05% FS)				
CC mode		1					· · · · · · · · · · · · · · · · · · ·			
D	Low	0 – 12 A	0 – 3 A	0 – 24 A	0 – 6 A	0 – 48 A	0 – 10 A	0 – 60 A	0 – 72 A	
Range	High	0 – 120 A	0 – 30 A	0 – 240 A	0 – 60 A	0 – 480 A	0 – 100 A	0 – 600 A	0 – 720 A	
Resolution	Low	I mA	0.1 mA	I mA	0.1 mA	I mA	I mA	I mA	I mA	
Resolution	High	I0 mA	I mA	I0 mA	I mA	I0 mA	I0 mA	I0 mA	I0 mA	
Accuracy	Low	±(0.05%+ 0.1% FS)	±(0.05%+ 0.05% FS)	±(0.05%+ 0.1% FS)	±(0.05%+ 0.05% FS) ±(0.025%+ 0.05% FS)					
Accuracy	High	±(0.05%+ 0.1% FS)	±(0.05%+ 0.05% FS)	±(0.05%+ 0.1% FS)	±(0.05%+ 0.05% FS)	±(0.025%+ 0.05% FS)				
CR mode										
Range	Low	$0.02 \ \Omega - 10 \ \Omega$	$0.15 \ \Omega - 10 \ \Omega$	$0.01 \ \Omega - 10 \ \Omega$	$0.01 \ \Omega - 10 \ \Omega$	$0.01 \ \Omega - 10 \ \Omega$	$0.03~\Omega - 10~\Omega$	$0.01 \ \Omega - 10 \ \Omega$	0.005 Ω – ΙΟ Ω	
Range	High	10 Ω - 7.5 kΩ								
Resoluti	on				16	bit				
Accuracy	Low				0.01%+0.0	8 S (I2.5 Ω)				
(I>10% of range)	High				0.01%+0.000	08 S (1250 Ω)				
CW mode		l								
Range		750) W	1500 W	1200 W	3000 W	2500 W	4500 W	6000 W	
Resoluti	on	10	mW			100	mW			
Accura	у				0.2% +	0.2% FS				
Transient mo	ode (CC i	mode)								
TI & T2	(1)				20 µs - 3600 s /	Resolution: 10 µs				
Accura	y				5 µs + 1	00 ppm				
Slew Rate ⁽²⁾	Low	0.001-0.25 A/µs	0.0001-0.1 A/µs	0.001-0.25 A/µs	0.000I-0.I A/µs	0.00I-0.25 A/µs	0.00I-0.I A⁄µs	0.00I-0.25 A/µs	0.001-0.25 A/µs	
Siew Kate (-)	High	0.01-2.5 A/µs	0.00I-I A⁄µs	0.0I-2.5 A/µs	0.00I-I A⁄µs	0.0I-2.5 A/µs	0.0I-I A⁄µs	0.01-2.5 A/µs	0.0I-2.5 A/µs	

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Specifications (cont.)

Mod	el	8610/B	8612/B	8614/B	8616	8620	8622	8624	8625			
Readback vol	tage											
	Low	0 – 18 V	0 – 50 V	0 – 18 V	0 – 50 V	0 – 18 V	0 – 50 V	0	18 V			
Range	High	0 – 120 V	0 – 500 V	0 – 120 V	0 – 500 V	0 – 120 V	0 – 500 V	0 – 120 V	0 – 120 V			
	Low	0.1 mV	I mV	0.1 mV		1	I mV	1	1			
Resolution	High	I mV	I0 mV	I mV			I0 mV					
Accura	-		±(0.05% +	- 0.05% FS)			±(0.025% +	- 0.025% FS)				
Readback cur	rent											
	Low	0 – 12 A	0 – 3 A	0 – 24 A	0 – 6 A	0 – 48 A	0 – 10 A	0 – 60 A	0 – 72 A			
Range	High	0 – I20 A	0 – 30 A	0 – 240 A	0 – 60 A	0 – 480 A	0 – 100 A	0 – 600 A	0 – 720 A			
	Low	I mA	0.1 mA	I mA	0.1 mA		l r	nA				
Resolution	High	I0 mA	I mA	I0 mA	I mA		10	mA				
Accura	_	±(0.05%+ 0.1% FS)	±(0.05%+ 0.05% FS)	±(0.05%+ 0.1% FS)	±(0.05%+ 0.05% FS)	±(0.05%+ 0.1% FS)	±(0.05%+ 0.05% FS)		05%+ 6 FS)			
Readback pov	ver						1					
Range	2	750) W	1500 W	1200 W	3000 W	2500 W	4500 W	6000 W			
Resolut		10	mW			100	mW	1				
Accura	су				±(0.2% +	- 0.2% FS)						
Protection rai	-)				,						
OPP			0 W	1550 W	1250 W	3050 W	2550 W	4550 W	6050 W			
	Low	13.2 A	3.3 A	26.4 A	6.6 A	26.4 A	IIA	66 A	79.2 A			
OCP	High	132 A	33 A	264 A	66 A	264 A	II0 A	660 A	792 A			
OVP	0	130 V	530 V	130 V	530 V	130 V	530 V	130 V	130 V			
OTP			1	185 °F (85 °C)								
Short circuit (typical)											
	Low	13.2 A	3.3 A	26.4 A	6.6 A	52.8 A	II A	66 A	79.2 A			
Current (CC)	High	132 A	33 A	264 A	66 A	528 A	II0 A	660 A	793 A			
Voltage (-		0 V									
Resistance		10 mΩ	l20 mΩ	6 mΩ	60 mΩ	5 mΩ	30 mΩ	3 mΩ	2.5 mΩ			
General (typic		-										
nput terminal		300 kΩ	ΙΜΩ	300 kΩ	ΙΜΩ	300 kΩ	ΙΜΩ	300 kΩ	300 kΩ			
AC inp				10 V/220 V ±10%. 50/60 Hz								
Operating ten				32 °F to I04 °F (0 °C to 40 °C)								
Storage temp			14 °F to 140 °F (-10 °C to 60 °C)									
Humid			Indoor use, ≤ 95%									
Safety			EN6I010-1:2001, EU Low Voltage Directive 2006/95/EC									
Electroma	gnetic Meets E			MC Directive 2004/108/EC, EN 61000-3-2:2006, EN 61000-3-3:1995+AI:2001+A2:2005 EN 61000-4-2/-3/-4/-5/-6/-II, EN 61326-1:2006								
Dimensions (W x H x D)			17.3" x 5.3" x 22.5" (439 x 133.3 x 580 mm) 17.3" x 10.5" x 23.2" (439 x 266 x 590 mm)									
Weight			54 lbs (24.6 kg) 142 lbs (64.4 kg)									
Warrar	ty				3 Y	ears						
Standard acc	essories			User	manual, power corc	l, certificate of calib	ration					
Optional acc	essories				•	urrent test leads						

Programmable DC Electronic Loads 8600/B Series

Ordering Information

8600/B Series DC Electronic Loads

With GPIB	Without GPIB
8600	8600B
8601	8601B
8602	8602B
8610	8610B
8612	8612B
8614	8614B
8616	-
8620	-
8622	-
8624	-

About B&K Precision

For more than 70 years, B&K Precision has provided reliable and value-priced test and measurement instruments worldwide.

Our headquarters in Yorba Linda, California houses our administrative and executive functions as well as sales and marketing, design, service, and repair. Our European customers are most familiar with B&K through our French subsidiary, Sefram. Engineers in Asia know us through our B+K Precision Taiwan operation. The independent service center in Singapore services customers in Singapore, Malaysia, Vietnam, and Indonesia.



Quality Management System

B&K Precision Corporation is an ISO9001 registered company employing traceable quality management practices for all processes including product development, service, and calibration.

ISO9001:2015

Certification body NSF-ISR Certificate number 6Z241-IS8



Video Library

View product overviews, demonstrations, and application videos in English, Spanish and Portuguese.

http://www.youtube.com/user/BKPrecisionVideos

Product Applications

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