

EA-EL 3000, EA-EL9000, EA-EL 9000 HP 400W - 7200W ELECTRONIC DC LOADS



Power ratings:

- 0...400W up to 0...7200W
- Cabinets with higher power upon request
- Input voltages: 0...80V, 0...160V, 0...400V, 0...750V
- Input currents: 0...25A up to 0...600A h Resistances: 0...1.2 Ω up to 0...800 Ω
- Over temperature protection (OT)
- Pulse operation with adjustable duty cycle
- Rise/Fall time adjustable

Operation modes

- Constant current (CC)
- Constant voltage (CV)
- Constant power (CP)
- Constant resistance (CR)
- Remote sense, trigger input, trigger output*
- Battery test mode with time and capacity counter
- Optional, digital interface cards
- RS232, CAN, USB, GPIB (IEEE)
- Ethernet/LAN
- Optional water cooling (EL 9000 series)

General

The microprocessor controlled electronic loads in the EA-EL 3000 and EA-EL 9000 series satisfy practically every need of modern laboratories and industry.

Operation modes

The loads provide the following operation modes: Constant Voltage (CV), Constant Current (CC), Constant Power (CP) and Constant Resistance (CR).

The mode is selected by a switch.

Appropriate parameters become available to protect the test equipment. For example, constant current can have a maximum power setting and constant voltage, power or resistance can have a maximum current and power setting.

Static operation

In static operation two values, A and B, can be set using a fine adjustment knob. The user can switch between these two values.

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Dynamic Operation

In dynamic operation, the microcontroller switches between two values A and B, according to the adjusted pulse width and duty cycle. For each value, a pulse interval between 50 μ s and 100s can be set. In addition, ramp up and down time between 30 μ s and 200ms can be adjusted. There is also an external trigger input on the analog interface to feed an external source in order to switch A and B.

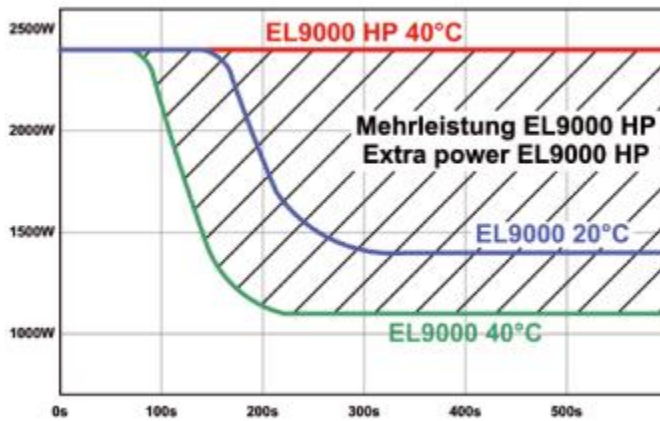
Battery test mode

In the battery test mode the battery is discharged under constant current, constant power or constant resistance until it reaches a predefined final discharge voltage. The discharge time and consumed capacity are measured and displayed.

Power range

The standard range provides loads from 400W to 7200W, or upon request cabinets with higher power. Units of the EL 9000 and EL 9000HP series are equipped with thermal derating in order to limit power and avoid overheating when operating in the maximum power range. The lower the ambient temperature and the better the cooling, the higher the power that the load can take. To circumvent this situation, models with water cooling can be delivered for permanent performance at maximum value and in extreme conditions.

Power characteristics EL 9000 / EL 9000 HP



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Display

All important information is directly represented on the display. Thus, information about the actual output values or set values for U, I, P, R, the actual regulation mode (CV, CC, CP, CR), error messages and settings in the setup menu are clearly available. Similarly, settings of the optionally available digital interfaces will be shown.

Analog interface

Inputs for voltage, current, power and resistance set values, outputs for voltage and current monitoring, control inputs, signal outputs and a trigger input are available.

Trigger output (EL 3000 only)

In dynamic operation, the internal trigger signal, which is generated for switching between A and B values, can be used to control or synchronize other applications.

System Bus

The System Bus“ at the rear of the EL 9000 and EL 9000 HP series has a number of functions, such as the remote sense input, the Share bus input to build a two quadrant operation system with laboratory power supplies of the PS 9000, PSI 9000, PSI 8000 or PS 8000 series, and switching of the internal regulation speed. One input serves to adjust a cross current for two-quadrants operation.

Water cooling (EL 9000 series only)

The optionally available water cooling replaces the standard fan cooling and has some advantages:

- No hot air exhaust on the device, no heat accumulation
- Significantly lower noise
- 100% permanent power
- Same enclosure size

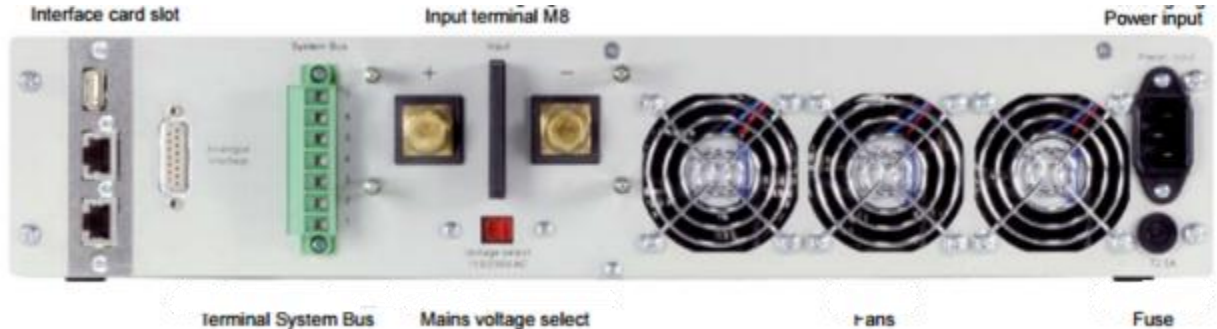
Options

- Isolated, digital interface cards for RS232, CAN, USB, GPIB (IEEE), Ethernet /LAN to control the device by PC. The interface slot is located on the rear panel, making it easy for the user to plug in a new interface or to replace an existing one.

The interface will be automatically detected by the device and requires no or only little configuration. Included with the interface cards is free Windows software which provides control and monitoring, data logging and semi-automatic sequences.

- Water cooling (**EL 9000 series only**)

EL 9000 2400W / Rear view EL 9000 2400W



EA-EL 3000, EA-EL9000, EA-EL 9000 HP 400W - 7200W ELECTRONIC DC LOADS

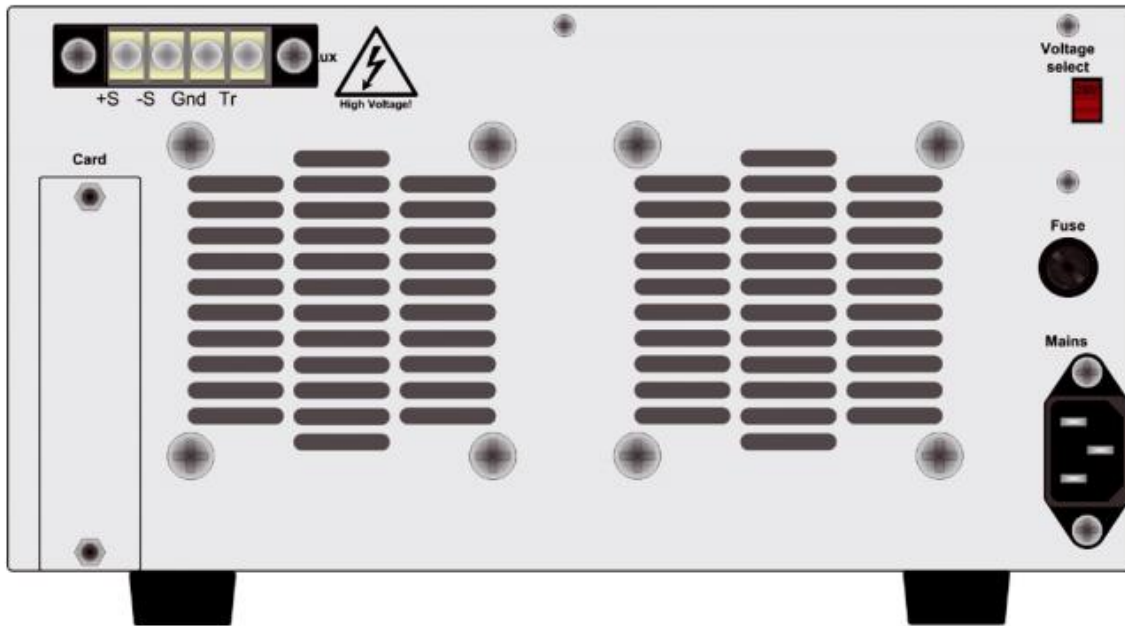
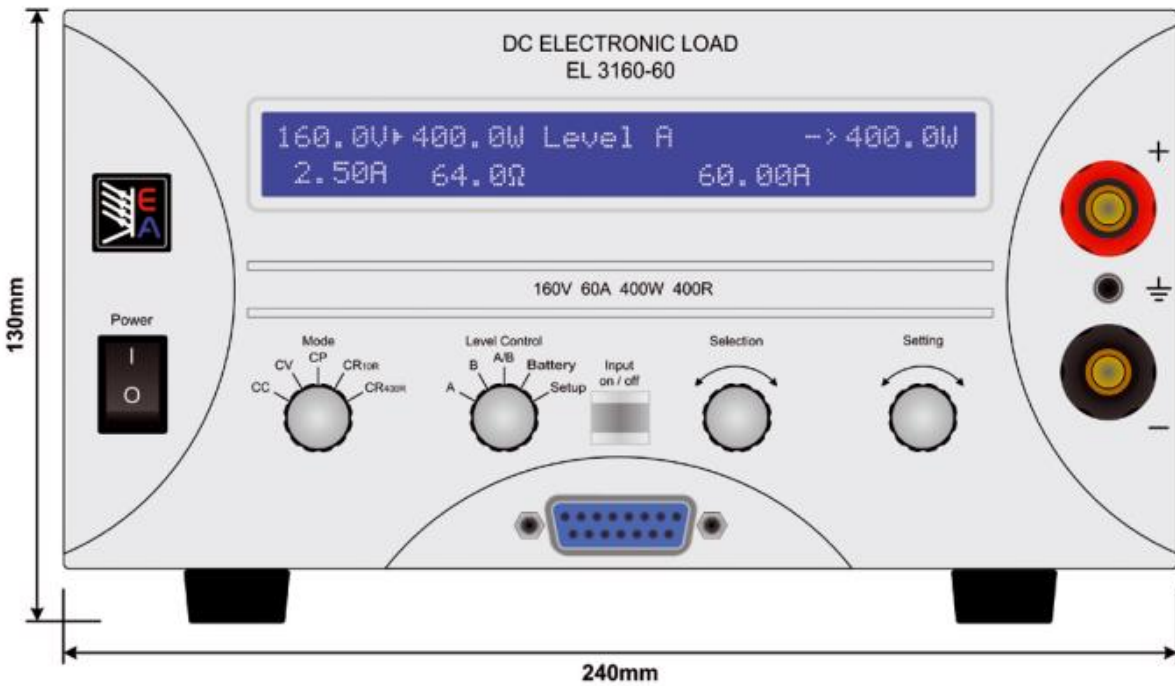
General specifications

Technical Data	EA-EL 3000	EA-EL 9000 / EA-EL 9000 HP
Power input voltage	115V/230V @ 50/60Hz	115V/230V @ 50/60Hz
Display	Display 2x40 Zeichen / 2x40 characters	Display 2x40 Zeichen / 2x40 characters
Batterie testing		
- Cut off voltage	Frei einstellbar / Free adjustable	Frei einstellbar / Free adjustable
- Read out at display	Entladedauer / Duration of discharge	Entladedauer / Duration of discharge
	Entladekapazität / Capacity of discharge	Entladekapazität / Capacity of discharge
Analog interface		
- Setting inputs U / I / P / R	0...10V	0...10V
- Monitoring outputs U / I	0...10V	0...10V
- Control signals	Intern / Extern, Eingang ein/aus / Input on/ off, R-Modus / R mode	Intern / Extern, Eingang ein/aus / Input on/ off, R-Modus / R mode
- Status signals	Überspannung / Overvoltage	Überspannung / Overvoltage
	Übertemperatur / Overtemperature	Übertemperatur / Overtemperature
- Reference voltage	10V	10V
Cooling	Temperaturgeregelter Lüfter / Temperature controlled fan	Temperaturgeregelte Lüfter / Temperature controlled fans
Terminals	Frontseite / Front panel	Rückseite / Rear panel
- Load input	Sicherheitsklemmen / Safety sockets	Schraubanschluß / Screw terminal M8
- System Bus	--	Schraubanschluß / Screw terminal 7 Pin
- Analog interface	Sub-D Buchse / Sub-D connector 15 Pin	Sub-D Buchse / Sub-D connector 15 Pin

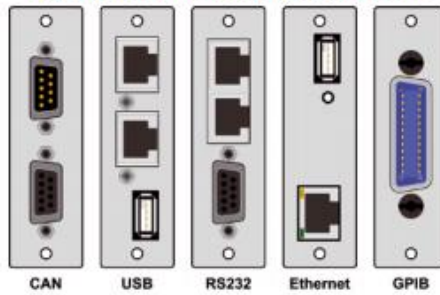
Series EL 3000 The electronic loads in the EA-EL 3000 series are in compact table-top enclosures and offer all the facilities that can be expected of an electronic load.

Technical Data	EA-EL 3160-60	EA-EL 3400-25
Steady power input at 20°C	400W	400W
Input voltage DC	0...160V	0...400V
- Resolution	100mV	100mV
- Accuracy	≤0.1%	≤0.1%
- Min. voltage at max. current	ca. / approx. 1.4V	ca. / approx. 1.0V
Input current	0...60A	0...25A
- Resolution	10mA	10mA
- Accuracy	≤0.2%	≤0.2%
Input power	0...400W	0...400W
- Resolution	100mW	100mW
- Accuracy	≤2%	≤2%
Resistance		
- Adjustment range 1	0...10Ω	0...40Ω
- Resolution	10mΩ	10mΩ
- Adjustment range 2	0...400Ω	0...800Ω
- Resolution	100mΩ	1Ω
- Accuracy	≤2%	≤2%
Dynamic function	2 Pegel / 2 levels	2 Pegel / 2 levels
- Duty cycle level A / B	50μs...100s	50μs...100s
- Level rise and fall time	30μs...200ms	30μs...200ms
Dimensions (WxHxD)	240 x 120 x 300mm	240 x 120 x 300mm
Weight	6.0 kg	6.0 kg
Article number	35320200	35320201

EA-EL 3000 400W ELECTRONIC DC LOADS



Digitale Schnittstellen / Digital interfaces



EA-EL9000 2400W - 7200W ELECTRONIC DC LOADS

Series EL 9000 The electronic loads in the EA-EL9000 series have proved themselves thousand-fold and offer all the facilities that can be expected of an electronic load.

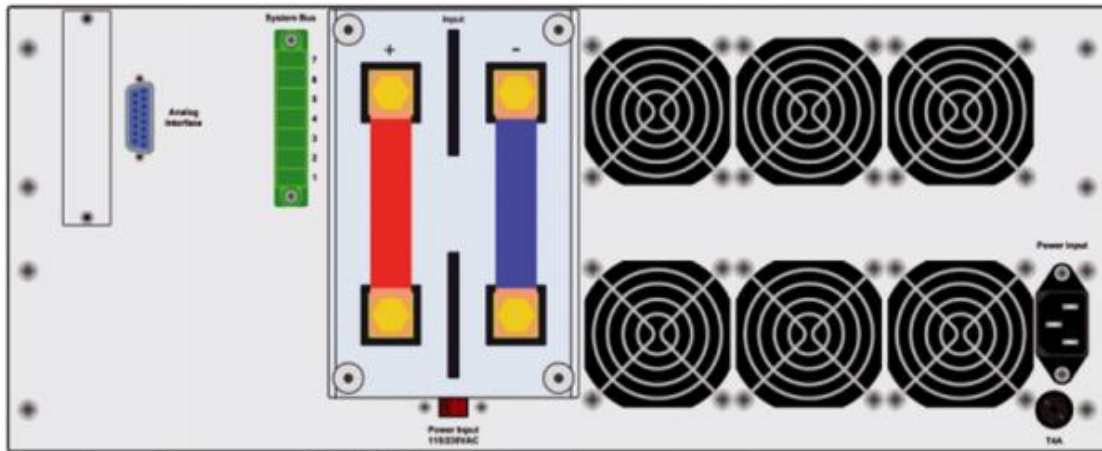
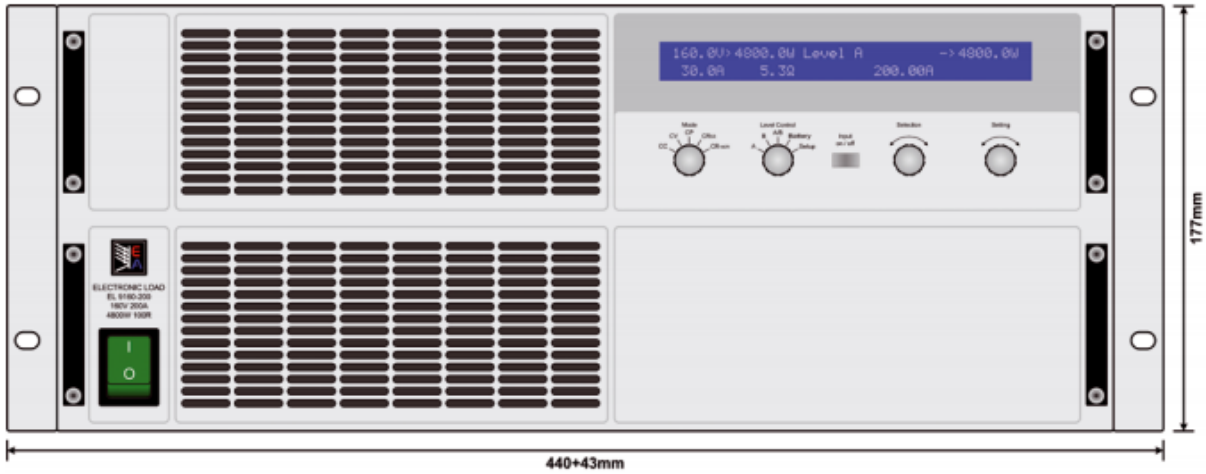
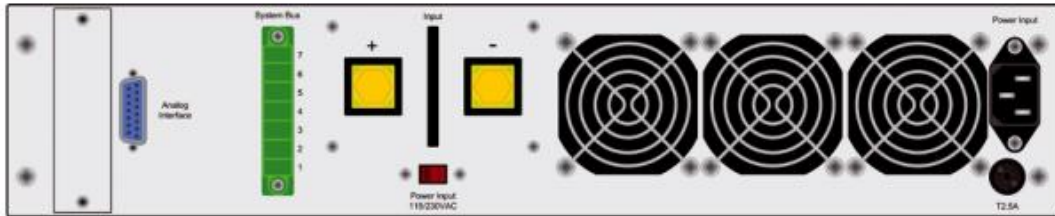
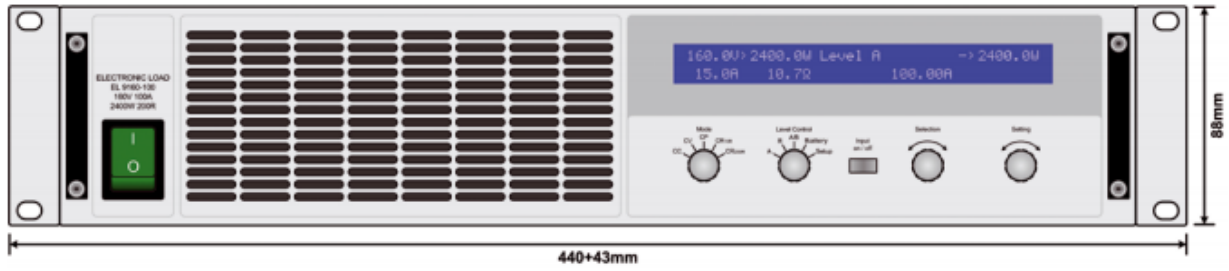
Technical Data	EA-EL 9080-200	EA-EL 9080-400	EA-EL 9080-600
Steady power input at 20°C	1500W	3000W	4500W
Input voltage DC	0...80V	0...80V	0...80V
- Resolution	100mV	100mV	100mV
- Accuracy	≤0.1%	≤0.1%	≤0.1%
- Min. voltage at max. current	ca. / approx. 1.0V	ca. / approx. 1.0V	ca. / approx. 1.0V
Input current	0...200A	0...400A	0...600A
- Resolution	100mA	100mA	100mA
- Accuracy	≤0.2%	≤0.2%	≤0.2%
Input power	0...2400W	0...4800W	0...7200W
- Resolution	1W	1W	1W
- Accuracy	≤2%	≤2%	≤2%
Resistance			
- Adjustment range 1	0...5Ω	0...2.5Ω	0...1.2Ω
- Resolution	10mΩ	1mΩ	1mΩ
- Adjustment range 2	0...100Ω	0...50Ω	0...25Ω
- Resolution	100mΩ	100mΩ	10mΩ
- Accuracy	≤2%	≤2%	≤2%
Dynamic function	2 Pegel / 2 levels	2 Pegel / 2 levels	2 Pegel / 2 levels
- Duty cycle level A / B	50μs...100s	50μs...100s	50μs...100s
- Level rise and fall time	30μs...200ms	30μs...200ms	30μs...200ms
Dimensions (W H D)	19" 2HE/U 460mm	19" 4HE/U 460mm	19" 6HE/U 460mm
Weight	16kg	26 kg	36 kg
Article number	33200230	33200231	33200232

Technical Data	EA-EL 9160-100	EA-EL 9160-200	EA-EL 9160-300
Steady power input at 20°C	1500W	3000W	4500W
Input voltage DC	0...160V	0...160V	0...160V
- Resolution	100mV	100mV	100mV
- Accuracy	≤0.1%	≤0.1%	≤0.1%
- Min. voltage at max. current	ca. / approx. 0.7V	ca. / approx. 0.7V	ca. / approx. 0.7V
Input current	0...100A	0...200A	0...300A
- Resolution	100mA	100mA	100mA
- Accuracy	≤0.2%	≤0.2%	≤0.2%
Input power	0...2400W	0...4800W	0...7200W
- Resolution	1W	1W	1W
- Accuracy	≤2%	≤2%	≤2%
Resistance			
- Adjustment range 1	0...10Ω	0...5Ω	0...2.5Ω
- Resolution	10mΩ	10mΩ	1mΩ
- Adjustment range 2	0...200Ω	0...100Ω	0...50Ω
- Resolution	100mΩ	100mΩ	100mΩ
- Accuracy	≤2%	≤2%	≤2%
Dynamic function	2 Pegel / 2 levels	2 Pegel / 2 levels	2 Pegel / 2 levels
- Duty cycle level A / B	50μs...100s	50μs...100s	50μs...100s
- Level rise and fall time	30μs...200ms	30μs...200ms	30μs...200ms
Dimensions (W H D)	19" 2HE/U 460mm	19" 4HE/U 460mm	19" 6HE/U 460mm
Weight	16kg	26kg	36kg
Article number	33200233	33200234	33200235

EA-EL9000 2400W - 7200W ELECTRONIC DC LOADS

Technical Data	EA-EL 9400-50	EA-EL 9400-100	EA-EL 9400-150
Steady power input at 20°C	1500W	3000W	4500W
Input voltage DC	0...400V	0...400V	0...400V
- Resolution	100mV	100mV	100mV
- Accuracy	≤0.1%	≤0.1%	≤0.1%
- Min. voltage at max. current	ca. / approx. 0.5V	ca. / approx. 0.5V	ca. / approx. 0.5V
Input current	0...50A	0...100A	0...150A
- Resolution	10mA	100mA	100mA
- Accuracy	≤0.2%	≤0.2%	≤0.2%
Input power	0...2400W	0...4800W	0...7200W
- Resolution	1W	1W	1W
- Accuracy	≤2%	≤2%	≤2%
Resistance			
- Adjustment range 1	0...10Ω	0...5Ω	0...5Ω
- Resolution	10mΩ	10mΩ	10mΩ
- Adjustment range 2	0...400Ω	0...200Ω	0...100Ω
- Resolution	100mΩ	100mΩ	100mΩ
- Accuracy	≤2%	≤2%	≤2%
Dynamic function	2 Pegel / 2 levels	2 Pegel / 2 levels	2 Pegel / 2 levels
- Duty cycle level A / B	50μs...100s	50μs...100s	50μs...100s
- Level rise and fall time	30μs...200ms	30μs...200ms	30μs...200ms
Dimensions (W H D)	19" 2HE/U 460mm	19" 4HE/U 460mm	19" 6HE/U 460mm
Weight	16kg	26kg	36kg
Article number	33200236	33200237	33200238
Technical Data	EA-EL 9750-25	EA-EL 9750-50	EA-EL 9750-75
Steady power input at 20°C	1500W	3000W	4500W
Input voltage DC	0...750V	0...750V	0...750V
- Resolution	100mV	100mV	100mV
- Accuracy	≤0.1%	≤0.1%	≤0.1%
- Min. voltage at max. current	ca. / approx. 0.5V	ca. / approx. 0.5V	ca. / approx. 0.5V
Input current	0...25A	0...50A	0...75A
- Resolution	10mA	10mA	10mA
- Accuracy	≤0.2%	≤0.2%	≤0.2%
Input power	0...2400W	0...4800W	0...7200W
- Resolution	1W	1W	1W
- Accuracy	≤2%	≤2%	≤2%
Resistance			
- Adjustment range 1	0...40Ω	0...20Ω	0...15Ω
- Resolution	10mΩ	10mΩ	10mΩ
- Adjustment range 2	0...800Ω	0...400Ω	0...300Ω
- Resolution	100mΩ	100mΩ	100mΩ
- Accuracy	≤2%	≤2%	≤2%
Dynamic function	2 Pegel / 2 levels	2 Pegel / 2 levels	2 Pegel / 2 levels
- Duty cycle level A / B	50μs...100s	50μs...100s	50μs...100s
- Level rise and fall time	30μs...200ms	30μs...200ms	30μs...200ms
Dimensions (W H D)	19" 2HE/U 460mm	19" 4HE/U 460mm	19" 6HE/U 460mm
Weight	16kg	26kg	36kg
Article number	33200252	33200253	33200254

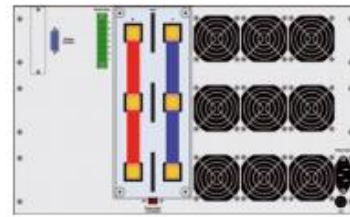
EA-EL9000 2400W - 7200W ELECTRONIC DC LOADS



Models with input voltage >80V will have a plexi glass cover on the DC input



7200W 6HE/U Model



EA-EL 9000 HP 2400W - 7200W ELECTRONIC DC LOADS

Series EL 9000 HP

The electronic loads in the EA-EL 9000 HP series offer an upgrade of the EA-EL 9000 series by incorporating a high performance cooler and blower.

At maximum input power thermal derating of the load commences at an ambient temperature of 40°C. At such a temperature the performance of the EA-EL 9000 HP series is approx. 60% higher than that of the EA-EL 9000 series.

A similar advantage may also be gained with water cooling, which is available as an optional extra.

Technical Data	EA-EL 9080-200 HP	EA-EL 9080-400 HP	EA-EL 9080-600 HP
Steady power input at 40°C	2400W	4800W	7200W
Input voltage DC	0...80V	0...80V	0...80V
- Resolution	100mV	100mV	100mV
- Accuracy	≤0.1%	≤0.1%	≤0.1%
- Min. voltage at max. current	ca. / approx. 1.0V	ca. / approx. 1.0V	ca. / approx. 1.0V
Input current	0...200A	0...400A	0...600A
- Resolution	100mA	100mA	100mA
- Accuracy	≤0.2%	≤0.2%	≤0.2%
Input power	0...2400W	0...4800W	0...7200W
- Resolution	1W	1W	1W
- Accuracy	≤2%	≤2%	≤2%
Resistance			
- Adjustment range 1	0...5Ω	0...2.5Ω	0...1.2Ω
- Resolution	10mΩ	1mΩ	1mΩ
- Adjustment range 2	0...100Ω	0...50Ω	0...25Ω
- Resolution	100mΩ	100mΩ	10mΩ
- Accuracy	≤2%	≤2%	≤2%
Dynamic function	2 Pegel / 2 levels	2 Pegel / 2 levels	2 Pegel / 2 levels
- Duty cycle level A / B	50µs...100s	50µs...100s	50µs...100s
- Level rise and fall time	30µs...200ms	30µs...200ms	30µs...200ms
Dimensions (W H D)	19" 3HE/U 460mm	19" 6HE/U 460mm	19" 9HE/U 460mm
Weight	19kg	29 kg	39 kg
Article number	33200240	33200241	33200246

Technical Data	EA-EL 9160-100 HP	EA-EL 9160-200 HP	EA-EL 9160-300 HP
Steady power input at 40°C	2400W	4800W	7200W
Input voltage DC	0...160V	0...160V	0...160V
- Resolution	100mV	100mV	100mV
- Accuracy	≤0.1%	≤0.1%	≤0.1%
- Min. voltage at max. current	ca. / approx. 0.7V	ca. / approx. 0.7V	ca. / approx. 0.7V
Input current	0...100A	0...200A	0...300A
- Resolution	100mA	100mA	100mA
- Accuracy	≤0.2%	≤0.2%	≤0.2%
Input power	0...2400W	0...4800W	0...7200W
- Resolution	1W	1W	1W
- Accuracy	≤2%	≤2%	≤2%
Resistance			
- Adjustment range 1	0...10Ω	0...5Ω	0...2.5Ω
- Resolution	10mΩ	10mΩ	1mΩ
- Adjustment range 2	0...200Ω	0...100Ω	0...50Ω
- Resolution	100mΩ	100mΩ	100mΩ
- Accuracy	≤2%	≤2%	≤2%
Dynamic function	2 Pegel / 2 levels	2 Pegel / 2 levels	2 Pegel / 2 levels
- Duty cycle level A / B	50μs...100s	50μs...100s	50μs...100s
- Level rise and fall time	30μs...200ms	30μs...200ms	30μs...200ms
Dimensions (W H D)	19" 3HEU 460mm	19" 6HEU 460mm	19" 9HEU 460mm
Weight	19kg	29kg	39kg
Article number	33200242	33200243	33200247

EA-EL 9000 HP 2400W - 7200W ELECTRONIC DC LOADS

Technical Data	EA-EL 9400-50 HP	EA-EL 9400-100 HP	EA-EL 9400-150 HP
Steady power input at 40°C	2400W	4800W	7200W
Input voltage DC	0...400V	0...400V	0...400V
- Resolution	100mV	100mV	100mV
- Accuracy	≤0.1%	≤0.1%	≤0.1%
- Min. voltage at max. current	ca. / approx. 0.5V	ca. / approx. 0.5V	ca. / approx. 0.5V
Input current	0...50A	0...100A	0...150A
- Resolution	100mA	100mA	100mA
- Accuracy	≤0.2%	≤0.2%	≤0.2%
Input power	0...2400W	0...4800W	0...7200W
- Resolution	1W	1W	1W
- Accuracy	≤2%	≤2%	≤2%
Resistance			
- Adjustment range 1	0...10Ω	0...5Ω	0...5Ω
- Resolution	10mΩ	10mΩ	10mΩ
- Adjustment range 2	0...400Ω	0...200Ω	0...100Ω
- Resolution	100mΩ	100mΩ	100mΩ
- Accuracy	≤2%	≤2%	≤2%
Dynamic function	2 Pegel / 2 levels	2 Pegel / 2 levels	2 Pegel / 2 levels
- Duty cycle level A / B	50μs...100s	50μs...100s	50μs...100s
- Level rise and fall time	30μs...200ms	30μs...200ms	30μs...200ms
Dimensions (W H D)	19" 3HEU 460mm	19" 6HEU 460mm	19" 9HEU 460mm
Weight	19kg	29kg	39kg
Article number	33200244	33200245	33200248

Technical Data	EA-EL 9750-25 HP	EA-EL 9750-50 HP	EA-EL 9750-75 HP
Steady power input at 40°C	2400W	4800W	7200W
Input voltage DC	0...750V	0...750V	0...750V
- Resolution	100mV	100mV	100mV
- Accuracy	≤0.1%	≤0.1%	≤0.1%
- Min. voltage at max. current	ca. / approx. 0.5V	ca. / approx. 0.5V	ca. / approx. 0.5V
Input current	0...25A	0...50A	0...75A
- Resolution	10mA	10mA	10mA
- Accuracy	≤0.2%	≤0.2%	≤0.2%
Input power	0...2400W	0...4800W	0...7200W
- Resolution	1W	1W	1W
- Accuracy	≤2%	≤2%	≤2%
Resistance			
- Adjustment range 1	0...40Ω	0...20Ω	0...15Ω
- Resolution	10mΩ	10mΩ	10mΩ
- Adjustment range 2	0...800Ω	0...400Ω	0...300Ω
- Resolution	100mΩ	100mΩ	100mΩ
- Accuracy	≤2%	≤2%	≤2%
Dynamic function	2 Pegel / 2 levels	2 Pegel / 2 levels	2 Pegel / 2 levels
- Duty cycle level A / B	50μs...100s	50μs...100s	50μs...100s
- Level rise and fall time	30μs...200ms	30μs...200ms	30μs...200ms
Dimensions (W H D)	19" 3HEU 460mm	19" 6HEU 460mm	19" 9HEU 460mm
Weight	19kg	29kg	39kg
Article number	33200249	33200250	33200251