

EA-EL 9000 B 1.2 kW - 14.4 kW



Programmable Electronic DC loads



EA-EL 9080-510 B 3U



- Wide AC supply voltage range: 90...264 V, with active PFC
- Input power ratings: 1.2 kW...14.4 kW, expandable in cabinets up to 460 kW
- Input voltages: 0...80 V up to 0...750 V
- Input currents: up to 1020 A per unit
- FPGA based control circuit
- Multilingual color touch panel
- User profiles, true function generator
- Adjustable protections: OVP, OCP, OPP
- Operation modes: CV, CC, CP, CR
- Galvanically isolated interfaces (analog and USB)
- Master-slave bus for parallel connection
- Slot for a wide selection of industrial interface modules
- SCPI command set and ModBus RTU support
- LabView VIs and remote control software (Windows)

General

The new series of compact electronic DC loads, called EA-EL 9000 B, replaces the former series EA-EL 9000 A and offers new voltage, current and power ratings for a multitude of applications. All models support the four common regulation modes constant voltage (CV), constant current (CC), constant power (CP) and constant resistance (CR). The FPGA based control circuit provides interesting features, such as a function generator with a table based function for the simulation of nonlinear internal resistances.

The ratio between power consumption and height of the devices has been significantly increased compared to the former series EA-EL 9000 A. The new models with 3U of height are capable of consuming DC power of up to 7.2 kW per unit and the 6U models even twice as much.

The large color TFT touch panel offers an intuitive kind of manual operation, such as it is prolific nowadays with smart phones or tablet computers. In parallel operation of multiple devices, a master-slave bus is used to link the units to a bigger system where the actual values are totaled and the set values distributed.

Power ratings, voltages, currents

The available voltage range portfolio goes from models with 0...80 V DC up to models with 0...750 V DC. Input currents up to 1020 A with only one unit are available. The series offers various power classes amongst the single models, which can be extended up to 460 kW in cabinets (see from page 120) for a significantly higher total current.

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Construction

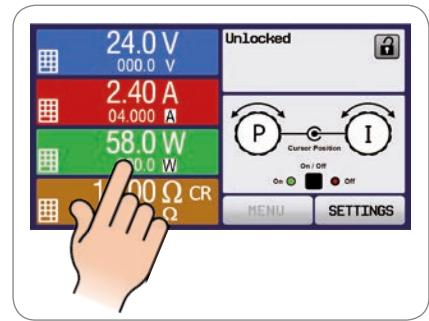
All models are built in 19" wide rack enclosures with 3U or 6U of height and 460 mm (18.1") of depth, which makes them ideal for use in 19" cabinets of various sizes, for example 42U, and for the design of systems with very high power. It is furthermore possible to build cabinet systems with mixed equipment, i.e. electronic loads and power supplies, in order to achieve the source-sink principle with high power ratings.

Handling (HMI)

Manual operation is done with a TFT touch panel, two rotary knobs and a pushbutton. The large color display shows all relevant set values and actual values at a glance. The whole setup is also done with the human-machine interface, as well the configuration of functions (square, triangle, sine) etc. The display is multilingual (German, English, Russian, Chinese).

Share Bus

The so-called „Share Bus“ is an analog connection at the rear of the devices and is used to balance current across multiple similar units in parallel connection, such as with loads of this series and series EA-ELR 9000. It can also be used to build a two-quadrants system in connection with power supplies of series EA-PSI 9000 or EA-PS 9000. This system is dedicated for testing purposes using the source-sink principle.

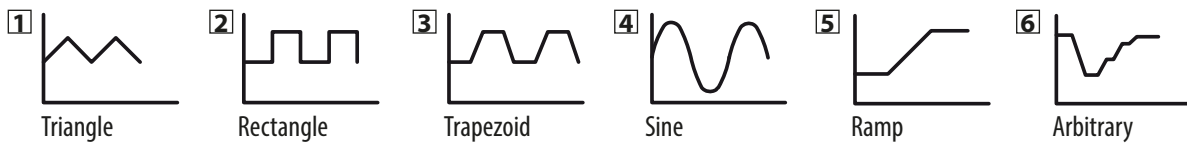


Power derating

The devices of the EA-EL 9000 B series are equipped with thermal derating in order to 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. The nominal intake power before the derating starts is defined at 21°C ambient temperature.

Function generator

All models of this series include a function generator which can generate typical functions, as displayed in the figures below, and apply them to either the input voltage or the input current. The generator can be completely configured and controlled by using the touch panel on the front of the device, or by remote control via one of the digital interfaces.



Battery test & MPP tracking

For purposes of testing all kinds of batteries, such as for example constant current or constant resistance discharging, the devices offer a battery test mode. This show extra values for elapsed testing time and consumed capacity (Ah). All the data can be recorded directly to USB stick.

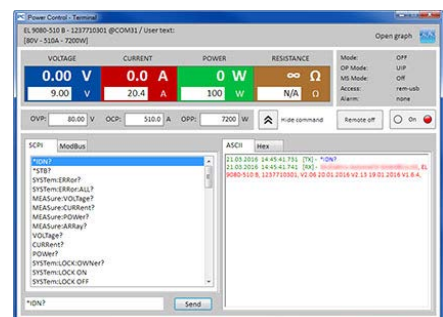
For photovoltaics related tests there is another function included as standard: MPP tracking. Four modes allow for simulation of the typical characteristics of solar inverters being connected to solar modules or panels. The function is used to determine typical operation parameters, such as the so-called Maximum Power Point and the related values U_{MPP} , I_{MPP} and P_{MPP} . One of the modes even offers particular analysis with different irradiation values in form of a table with 100 points.

Remote control & connectivity

For remote control, there are by default two interface ports (1x analog, 1x USB) available on the rear of the devices, which can also be extended by optional, pluggable and retrofittable, digital interface modules (dedicated slot).

For the implementation into the LabView IDE we offer ready-to-use components (VIs) to be used with the interface types USB, RS232, GPIB and Ethernet. Other IDEs and interfaces are supported by documentation about the communication protocol.

Windows users can profit from the free software "EA Power Control". It offers a feature called "Sequencing", where the device is controlled through a semi-automatic table in CSV format. This table represents a simple test procedure and can be created and edited in MS Excel or other CSV editors and then imported into the software tool. See page 118 for more information.



Options

- Pluggable and retrofittable, digital interface modules for CAN, CANopen, Ethernet, Profibus, ProfiNet I/O, RS232, EtherCAT or ModBus TCP. Also see page 116.
- Three-way interface (3W) with a rigid GPIB port installed instead of the default slot for retrofittable interface modules
- Water cooling (upon request, also see page 121)



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Model	Power max.	Power @ 21°C	Power @ 35°C	Voltage	Current	Resistance	Weight	Height	Ordering number ⁽¹⁾
EA-EL 9080-170 B	0...2400 W	1500 W	1200 W	0...80 V	0...170 A	0.045...15 Ω	≈ 9 kg (19.8 lb)	3U	33200260
EA-EL 9200-70 B	0...2000 W	1500 W	1200 W	0...200 V	0...70 A	0.25...85 Ω	≈ 9 kg (19.8 lb)	3U	33200261
EA-EL 9360-40 B	0...1800 W	1500 W	1200 W	0...360 V	0...40 A	0.8...270 Ω	≈ 9 kg (19.8 lb)	3U	33200262
EA-EL 9500-30 B	0...1200 W	1200 W	1200 W	0...500 V	0...30 A	1.5...500 Ω	≈ 9 kg (19.8 lb)	3U	33200263
EA-EL 9750-20 B	0...1200 W	1200 W	1200 W	0...750 V	0...20 A	3.5...1100 Ω	≈ 9 kg (19.8 lb)	3U	33200264
EA-EL 9080-340 B	0...4800 W	3000 W	2400 W	0...80 V	0...340 A	0.023...7.5 Ω	≈ 13 kg (28.8 lb)	3U	33200265
EA-EL 9200-140 B	0...4000 W	3000 W	2400 W	0...200 V	0...140 A	0.13...43 Ω	≈ 13 kg (28.8 lb)	3U	33200266
EA-EL 9360-80 B	0...3600 W	3000 W	2400 W	0...360 V	0...80 A	0.4...135 Ω	≈ 13 kg (28.8 lb)	3U	33200267
EA-EL 9500-60 B	0...2400 W	2400 W	2400 W	0...500 V	0...60 A	0.75...250 Ω	≈ 13 kg (28.8 lb)	3U	33200268
EA-EL 9750-40 B	0...2400 W	2400 W	2400 W	0...750 V	0...40 A	1.75...550 Ω	≈ 13 kg (28.8 lb)	3U	33200269
EA-EL 9080-510 B	0...7200 W	4500 W	3600 W	0...80 V	0...510 A	0.015...5 Ω	≈ 17 kg (37.5 lb)	3U	33200270
EA-EL 9200-210 B	0...6000 W	4500 W	3600 W	0...200 V	0...210 A	0.08...28 Ω	≈ 17 kg (37.5 lb)	3U	33200271
EA-EL 9360-120 B	0...5400 W	4500 W	3600 W	0...360 V	0...120 A	0.27...90 Ω	≈ 17 kg (37.5 lb)	3U	33200272
EA-EL 9500-90 B	0...3600 W	3600 W	3600 W	0...500 V	0...90 A	0.5...167 Ω	≈ 17 kg (37.5 lb)	3U	33200273
EA-EL 9750-60 B	0...3600 W	3600 W	3600 W	0...750 V	0...60 A	1.2...360 Ω	≈ 17 kg (37.5 lb)	3U	33200274
EA-EL 9080-1020 B	0...14400 W	9000 W	7200 W	0...80 V	0...1020 A	0.0075...2.5 Ω	≈ 33 kg (72.8 lb)	6U	33200275
EA-EL 9200-420 B	0...12000 W	9000 W	7200 W	0...200 V	0...420 A	0.04...14 Ω	≈ 33 kg (72.8 lb)	6U	33200276
EA-EL 9360-240 B	0...10800 W	9000 W	7200 W	0...360 V	0...240 A	0.14...45 Ω	≈ 33 kg (72.8 lb)	6U	33200277
EA-EL 9500-180 B	0...7200 W	7200 W	7200 W	0...500 V	0...180 A	0.25...88 Ω	≈ 33 kg (72.8 lb)	6U	33200278
EA-EL 9750-120 B	0...7200 W	7200 W	7200 W	0...750 V	0...120 A	0.6...180 Ω	≈ 33 kg (72.8 lb)	6U	33200279

(1) Ordering number of the standard version, models with option 3W installed have different ordering numbers
 (2) Minimum DC input voltage to supply for the load to achieve the max. input current

Technical Data	Series EA-EL 9000 B
AC: Supply	
- Voltage	90...264 V
- Frequency	45...66 Hz
- Power consumption	3U: max. 130 W 6U: max. 260 W
DC: Voltage	
- Accuracy	<0.1% of rated value
DC: Current	
- Accuracy	<0.2% of rated value
- Load regulation 1-100% ΔU _{DC}	<0.1% of rated value
- Rise time 10-90%	<50 μs
DC: Power	
- Accuracy	<0.5% of rated value
DC: Resistance	
- Accuracy	≤1% of max. resistance + 0.3% of rated current
Protection	OT, OVP, OPP, PF, OCP ⁽²⁾
Display / control panel	Graphics display with TFT touch panel
Digital interfaces	
- Built in	1x USB type B for communication
- Slot	1x for retrofittable plug-in modules (RS232, CAN, CANopen, Ethernet, EtherCAT, Profinet, Profibus, ModBus TCP)
Analog interface	Built in, 15 pole D-Sub (female), galvanically isolated
- Signal range	0...5 V or 0...10 V (switchable)
Cooling	Temperature-controlled fans (optional: water)
Ambient temperature	0...50 °C
Storage temperature	-20...70 °C
Relative humidity	<80%, non-condensing
Operation altitude	<2000 m (1.242 mi)
Terminals on rear panel	DC input (screw terminal), Share Bus (plug connector, 2 pole), Sense (plug connector, 4 pole), analog interface (sub-d, 15 pole), module socket, master-slave (2x RJ45), USB
Dimensions ⁽¹⁾ (W x H x D)	19" x 3U x 464 mm (18.3") 19" x 6U x 464 mm (18.3")

(1) Enclosure only
 (2) See page 126