Programmable Electronic DC loads

- Wide AC supply voltage range: 90...264 V
- Input power ratings: 1.2 kW up to 14.4 kW, expandable in cabinets up to 460 kW
- Input voltages: 80 V up to 750 V
- Input currents: up to 1020 A per unit
- FPGA based digital control circuit
- Multilingual color touch panel
- Extensive 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 and ModBus RTU/TCP command set
- LabView VIs and remote control software (Windows)

General
This series of compact electronic DC loads, called EA-EL 9000 B, succeeds the former series EA-EL 9000 A and offers useful 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).
An FPGA based digital control circuit provides interesting features, such as a function generator for arbitrary curves and a table based XY 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 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 front offers a large color TFT touch panel for an intuitive kind of manual operation, such as it's prolific nowadays with smart phones or tablet computers. In parallel operation of multiple devices, a master-slave bus is used to link multiple units to a bigger system where the actual values are totaled.
Programmable electronic DC loads

EA-EL 9000 B  1.2 kW - 14.4 kW

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 0...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 152) for a significantly higher total current.

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’s 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, parallel connection and two-quadrants operation
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.

Thermal 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.

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.

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.

Options
- Pluggable and retrofittable, digital interface modules for CAN, CANopen, Ethernet, Profibus, Profinet I/O, RS232, EtherCAT or ModBus TCP. Also see page 144.
- Three-way interface (3W) with a rigid GPIB port installed instead of the default slot for retrofittable interface modules
## Programmable electronic DC loads

### EA-EL 9000 B  1.2 kW - 14.4 kW

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

### Technical Data Series EA-EL 9000 B

- **AC: Supply**
  - Voltage / Frequency: 90...264 V, 45...66 Hz

- **DC: Voltage**
  - Accuracy: ≤0.1% of rated value

- **DC: Current**
  - Accuracy: ≤0.2% of rated value

- **Load regulation 1-100% ΔU<sub>DC</sub>**
  - Accuracy: ≤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

- **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 (2)

- **Cooling**
  - Temperature-controlled fans

- **Ambient temperature**
  - 0...50 °C

- **Storage temperature**
  - -20...70 °C

- **Relative humidity**
  - ≤80%, non-condensing

- **Operation altitude**
  - ≤2000 m (1.242 mi)

- **Dimensions**
  - (1) (W x H x D) 19" x 3U x 464 mm (18.3")
  - 6U x 6U x 464 mm (18.3")

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(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

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