



EA-EL 9000 DT 300 W - 1200 W

直流电子负载 / ELECTRONIC DC LOADS



EA-EL 9080-60 DT

- 输入功率级别: 0...300 W至0...1200 W
- 输入电压: 0...80 V至0...750 V
- 输入电流: 0...5 A至0...60 A
- 多语言彩色触摸屏
- 用户配置文档, 真实函数发生器
- 多个可调保护功能: OVP, OCP, OPP
- 操作模式: CV, CC, CP, CR
- 内置以太网接口, 模拟接口以及USB接口
- 配提拉手柄与倾斜支撑架
- 支持SCPI & ModBus
- 带控制软件 (Windows)
- LabView VIs

概述

EA-EL 9000 DT系列是一款新的电子负载, 它由10台EA-EL 9000 B产品组合而成。从而输出新的电压、电流与功率级别, 适用于实验鼠、学校或工作间日常的众多应用。

所有型号都有四种操作模式: 恒压 (CV), 恒流 (CC), 恒功率 (CP)和恒阻(CR)。控制电路的核心部件是一个微处理器, 它具有很多有趣的特征, 比如: 带有通用函数的真实函数发生器, 像正弦波, 方波或三角波, 还有一个任意函数。

大的彩色TFT触摸屏可以让用户直观地进行手动操作, 就像现在流行的智能手机或者平板电脑那样操作。

跟旧系列电子负载相比, 经模拟或数字接口控制产品时的响应时间已大大提高, 全归因于ARM处理器控制的硬件。

本系列标配的数字接口有USB与以太网, 以及一个模拟接口。所有接口都电隔离。

要远程控制产品并应用到客户指定应用都被SCPI与ModBus通用协议简化, 还有即时使用的LabView。

- Input power ratings: 0...300 W up to 0...1200 W
- Input voltages: 0...80 V up to 0...750 V
- Input currents: 0...5 A up to 0...60 A
- Multilingual colour touch panel
- User profiles, true function generator
- Adjustable protections: OVP, OCP, OPP
- Operation modes: CV, CC, CP, CR
- Ethernet, analog interface and USB interface built-in
- Carrying handle and tilt stand
- SCPI & ModBus supported
- Control software (Windows)
- LabView VIs

General

The new series of compact electronic DC loads, called EA-EL 9000 DT, extend series EA-EL 9000 B by 10 models to round up the portfolio. It offers new voltage, current and power ratings for a multitude of applications for daily use in laboratories, schools or workshops.

All models support the four regulation modes constant voltage (CV), constant current (CC), constant power (CP) and constant resistance (CR). The core of the control circuit is a fast microprocessor which provides interesting features, such as a true function generator with common functions like sine wave, rectangle or triangle, but also an arbitrary function.

The large colour TFT touch panel offers an intuitive kind of manual operation, like it is prolific nowadays with smartphones or tablet computers.

Response times during the control of the devices via analog or digital interface have been improved by an ARM processor controlled hardware, compared to older electronic load series.

Digital interfaces, such as USB and Ethernet, are standard with this series, as well as an analog one. All interfaces are galvanically isolated.

Remote control and implementation into custom applications for every purpose is simplified by the common protocols SCPI and ModBus, as well as by ready-to-use LabView components.

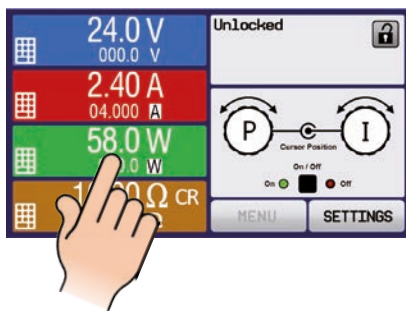


功率等级、电压和电流

本系列有0...80 V DC至0...750 V DC, 0...5A至0...60A输出电流的产品型号。输出功率级别有600W或1200W。

操作面板 (HMI)

手动操作通过TFT触摸屏、两个旋钮与一个按钮来完成。大的彩色显示器一次性显示所有设定与实际值。通过人机界面可完成整个设置, 包括函数(方形, 三角形, 正弦形)的配置等。
还提供多语言显示(德文, 英文, 俄文, 中文)。



函数发生器

本系列所有型号都配有函数发生器。它能形成多种典型函数, 如下所示, 并应用到输出电压或输出电流上。发生器可通过前面板的触摸屏或经其中一数字接口完全可控与配置。

预设的函数为用户提供一切需要的参数, 比如Y偏移值, 时间/频率或幅度, 形成整套配置。



三角形
Triangle



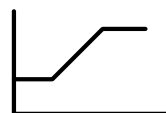
矩形
Rectangle



梯形
Trapezoid



正弦
Sine



阶跃式
Ramp



DIN 40839

除了基于任意发生器形成的标准函数外, 还可访问该基础发生器, 创建并执行一套复杂的函数, 将其分开在多达100个序列内。在研发与生产过程中可用它来做测试。

通过产品前板的USB端口可以从标准的U盘上传序列或者存储序列, 从而可在不同的测试序列间变换。

此外还有一个XY发生器, 可用来形成其它函数, 比如UI或IU, 用户可在(CSV文档)表格格式内定义, 或者用USB软件上传。

对于光伏方面的测试, 可使用用户可调关键参数形成一个PV曲线。还可应用固件升级, 安装更多的特性参数供用户选择。

远程控制 & 连接

进行远程控制时, 可使用产品后板默认配置的三个接口卡端口(1x analog, 1x USB, 1x Ethernet/LAN)。

产品前方还有一个USB端口, 用来插U盘, 方便上传与保存函数和用户配置文档。

Windows系统操作用户可以使用“EA Power Control”软件。它具有“Sequencing”特性, 能通过CSV格式的半自动表格控制产品。该表格就是简单的测试程序, 且可在MS Excel表格或其它CSV编辑器下创建和编辑, 然后导入我们的软件工具。

Power ratings, voltages, currents

The voltage range portfolio goes from models with 0...80 V DC up to models with 0...750 V DC. Input currents with 0...5 A up to 0...60 A per unit are available. The series offers two power classes with 600 W or 1200 W peak power.

Handling (HMI)

Manual operation is done with a TFT touch panel, two rotary knobs and a pushbutton. The large colour 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).

Function generator

All models within this series include a true function generator which can generate typical functions, as displayed in the figures below, and apply them to either the output voltage or the output 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.

The predefined functions offer all necessary parameters to the user, such as Y offset, time / frequency or amplitude, for full configuration ability.

Additionally to the standard functions, which are all based upon a so-called arbitrary generator, this base generator is accessible for the creation and execution of complex sets of functions, separated into up to 100 sequences. Those can be used for testing purposes in development and production.

The sequences can be loaded from and saved to a standard USB flash drive via the USB port on the front panel, making it easy to change between different test sequences.

There is furthermore a XY generator, which is used to generate other functions, such as UI or IU, which are defined by the user in the form of tables (CSV file) and then loaded from a USB flash drive.

For photovoltaics related tests, a PV curve can be generated and used from user-adjustable key parameters.

Remote control & connectivity

For remote control, there are by default three interface ports (1x analog, 1x USB, 1x Ethernet/LAN) available on the rear of the devices.

Another USB port, located on the front side, is intended for USB flash drives in order to load and save functions and user profiles.

Windows users can profit from the included 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 in our software tool.



功率降额

EA-EL 9000 DT系列产品具有热降额功能，当产品在最大功率级别下运行时避免过热。

环境温度越低，冷却状况越好，负载可吸收的功率就越大。功率降额后可持续吸收的功率是在25°C室温条件下定义的，并当温度上升时会快速减少。

电池测试模式

本产品还有一电池测试模式，可以通过恒流或恒阻放电来测试各类电池。它会显示累计的测试时间与消耗的容量 (Ah)。

如果用EA Power Control进行测试，数据会记录在电脑上，然后以CSV格式导出数据表。后续可在MS Excel或类似工具下进行分析，甚至能创建可视化的放电图。

关于更详细的设置，可以设定一可调极限值，以便停止低电压电池的测试，或者停止可调最大测试期。

Power derating

The devices of the EA-EL 9000 DT series are equipped with thermal derating in order to avoid overheating when operating in the maximum power range.

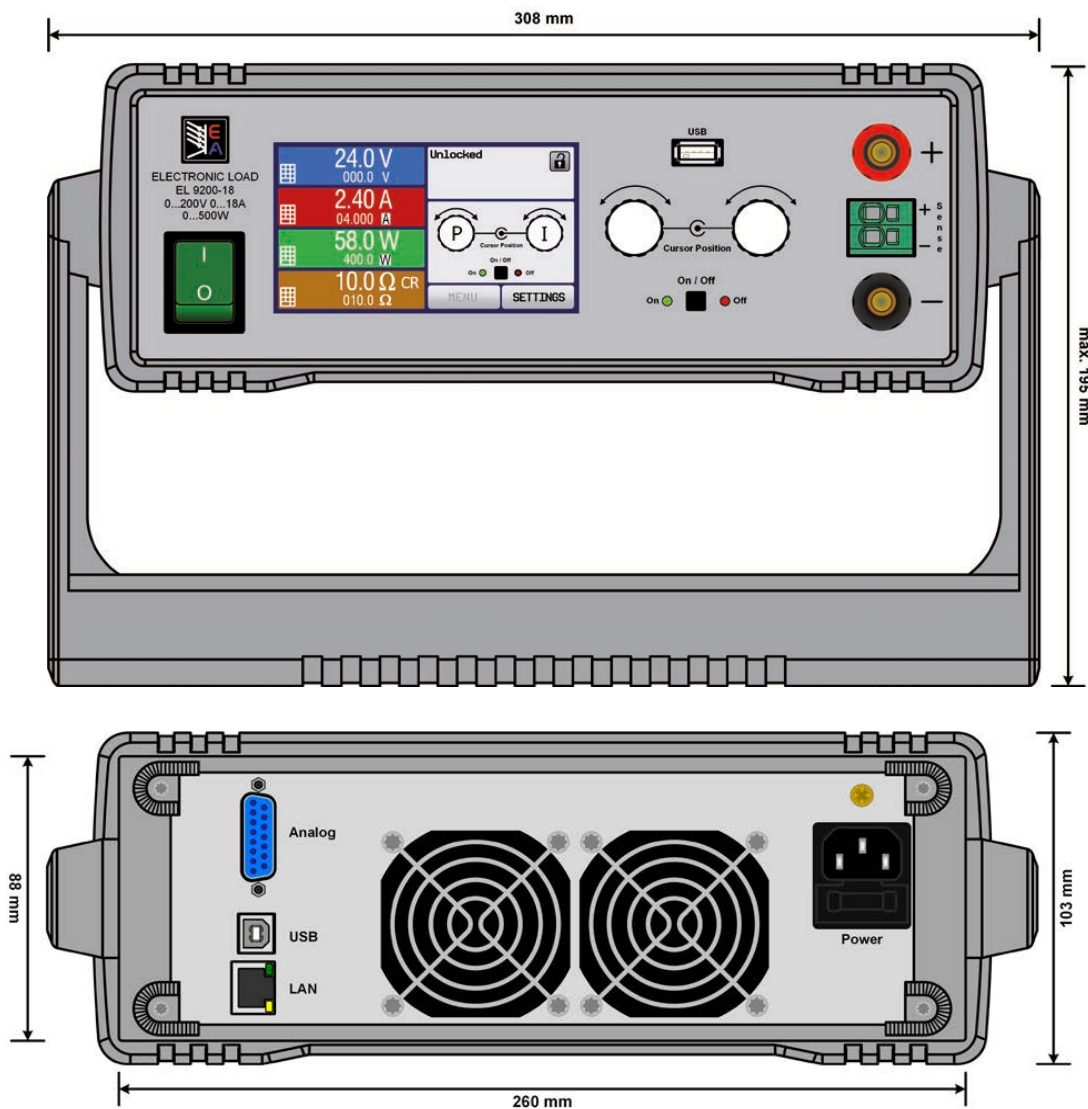
The lower the ambient temperature and the better the cooling, the higher the power that the load can take. The continuous intake power after derating is defined at 25°C ambient temperature and will show an insignificant reduction with rising temperatures.

Battery test

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 shows extra values for elapsed testing time and consumed capacity (Ah).

Data recorded by the PC during tests with, for example, EA Power Control can be exported as Excel table in CSV format and analysed later in MS Excel or similar tools and even visualised as a discharge diagram.

For more detailed setup, there is also an adjustable threshold to stop the battery test on low battery voltage, as well as an adjustable maximum test period.



技术参数	Technical Data	Series EA-EL 9000 DT / 系列
AC输入电压	AC input	
- 电压 / 频率	- Voltage / Frequency	90...264 V, 45...66 Hz
- 功率因素校正(PFC)	- Power factor correction (PFC)	>0.99
- 功率损耗	- Power consumption	最大 40 W
DC输入: 电流	DC input: Current	
- 精确度	- Accuracy	<0.2%
- 5-100% ΔU_{DC} 负载调整率	- Load regulation 5-100% ΔU_{DC}	<0.1%
- 10-90% 负载上升时间	- Rise time 10-90% load step	<50 μ s
DC输入: 电压	DC input: Voltage	
- 精确度	- Accuracy	<0.1%
- 0-100% ΔI_{DC} 负载调整率	- Load regulation 0-100% ΔI_{DC}	<0.05%
DC输入: 功率	DC input: Power	
- 精确度	- Accuracy	<0.5%
DC输入: 内阻	DC input: Resistance	
- 精确度	- Accuracy	\leq 额定电流的1% + 0.3% / \leq 1% + 0.3% of nominal current
显示器与面板	Display and panel	带TFT控制面板的彩显屏 / Graphics display with TFT touch panel
数字接口	Digital interfaces	
- 内置	- Built-in	1x B型USB (通讯用) / 1x USB type B (for communication) 1x A型USB (存储设备用) / 1x USB type A (for storage device) 1x Ethernet
模拟接口	Analog interface	内置15-针D-Sub母插, 电隔离 / Built in, 15-pole D-Sub (female), galvanically isolated
- U/I/P/R设定输入脚	- Setting inputs U/I/P/R	0...10 V / 0...5 V
- U/I监控输出脚	- Monitoring outputs U/I	0...10 V / 0...5 V
- 控制信号	- Control signals	远程开-关, 直流输入开-关, 内阻模式开-关 / Remote on-off, DC input on-off, resistance mode on-off
- 状态信号	- Status signals	过压保护, 过温保护 / Overvoltage, Overtemperature
- 参考电压	- Reference voltage	10 V / 5 V
制冷	Cooling	温控风扇 / Temperature controlled fans
- 操作温度	- Operation temperature	0...50 °C
- 储存温度	- Storage temperature	-20...70 °C
前板端子	Terminals on front	
- 负载输入	- Load input	前板, 插拔式 & 螺丝端子 / Frontside, plug & screw terminal
- 远程感测	- Remote sensing	夹式端子 / Clamp terminal
后板端子	Terminals on rear	
- 模拟接口	- Analog interface	15-针Sub-D连接器 / Sub-D connector 15 pole
- 数字接口	- Digital interfaces	USB (Type B), RJ45
机械特性	Mechanics	
- 尺寸 (宽 x 高 x 深) ⁽¹⁾	- Dimensions (W x H x D) ⁽¹⁾	276 x 103 x 415 mm
- 重量	- Weight	600W: \approx 6.5 kg 1200 W: \approx 7.5 kg

(1 仅为外壳尺寸 / Body only

型号	功率 / Power		电压	电流	内阻	I最大时的最小电压 ⁽²⁾	订购编号
Model	峰值 / Peak	恒定值 ⁽¹⁾ / Cont. ⁽¹⁾	Voltage	Current	Resistance	U _{Min} for I _{Max} ⁽²⁾	Ordering number
EL 9080-40 DT	600 W	300 W	0...80 V	0...40 A	0.1...30 Ω	\approx 2.2 V	33210501
EL 9200-18 DT	500 W	300 W	0...200 V	0...18 A	0.6...170 Ω	\approx 2 V	33210502
EL 9360-10 DT	450 W	300 W	0...360 V	0...10 A	1.6...540 Ω	\approx 2 V	33210503
EL 9500-08 DT	300 W	300 W	0...500 V	0...8 A	4...1000 Ω	\approx 6.5 V	33210504
EL 9750-05 DT	300 W	300 W	0...750 V	0...5 A	8...2200 Ω	\approx 5.5 V	33210505
EL 9080-60 DT	1200 W	600 W	0...80 V	0...60 A	0.12...30 Ω	\approx 2.2 V	33210506
EL 9200-36 DT	1000 W	600 W	0...200 V	0...36 A	0.8...172 Ω	\approx 2 V	33210507
EL 9360-20 DT	900 W	600 W	0...360 V	0...20 A	1.6...440 Ω	\approx 2 V	33210508
EL 9500-16 DT	600 W	600 W	0...500 V	0...16 A	3.2...1000 Ω	\approx 6.5 V	33210509
EL 9750-10 DT	600 W	600 W	0...750 V	0...10 A	4...2200 Ω	\approx 5.5 V	33210510

(1 室温为 25°C 时的参数 / At 25°C ambient temperature

(2 给负载提供最小的直流输入电压, 以获得最大的输入电流 / Minimum DC input voltage to supply for the load to achieve the max. input current

