



产品目录2018 / Product Catalog 2018

高科技电源与电子负载

High Tech **Power Supplies** and **Electronic Loads**



Elektro-Automatik



高品质
高可靠度
High quality
and absolute
reliability

新品研发
周期越来越短

Short development
cycles for
new equipment



新的理念
引领未来
产品的发展

New ideas
and visions
for products
of the future



“德国造”大功率电子产品

EA Elektro-Automatik GmbH & Co. KG是德国实验室电源、高性能供电设备与电子负载的领先制造商。EA Elektro-Automatik公司由Helmut Nolden先生，秉持为所有客户应用研发高品质电源设备的愿景，成立于1974年。如今EA Elektro-Automatik已成为一家现代化的中型企业。

公司总部共有约250名员工，在菲尔森市拥有10,000平方米的生产基地进行研发与生产。在广大经销商网络的协助下，来自莱茵河的高科技被传遍世界。

研发带来创新

创新是EA公司最关注的重心。我们热衷于研发和生产实验室用高性能电源与电子负载，并为其功能、灵活性和可靠性设定高标准。四十载的研发成果直接变为新产品。随着实验室电源灵活输出级和能量回馈式电子负载的引入，我们已成为新技术的领导先锋。

开启：最高水平的研发能力

我们电源产品的理念构想、设计、技术研发和规格制定，全部在公司内部完成。这样，研发团队所取得的技术成果可直接转化为成品。我们的工程师不仅专注当今的市场需求，还为未来的技术挑战提供解决方案。

激励：最短时间让新品面市

新产品的开发周期会越来越短。技术卓越意味着，我们必须有灵活的生产计划，以便满足客户短期的定制需求。

我们保证，在紧急情况下会快速反应。

High power electronics “made in Germany”

EA-Elektro-Automatik LLC is Germany's leading manufacturer of laboratory power supplies, high performance mains units and electronic loads. EA-Elektro-Automatik was founded in 1974 by Helmut Nolden with the vision of developing high quality power supplies for all applications. Today EA-Elektro-Automatik is a modern medium-sized enterprise.

Approximately 250 employees research, develop and manufacture at the 10.000 m² main site in Viersen. With the aid of an extensive dealer network, high-tech technology from Niederrhein is delivered globally.

Innovation through research & development

Innovation is of major significance at EA. We are passionate in our development and production of laboratory and high performance power supplies as well as electronic loads, which set standards for functionality, flexibility and reliability. The results of more than four decades research and development flow directly into new products. With the introduction of flexible output stages in laboratory power supplies and energy recovery from electronic loads we are pioneers of new technologies.

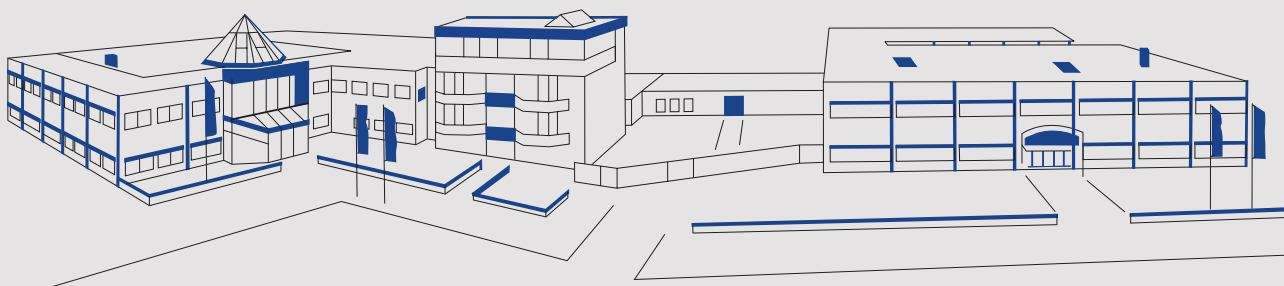
Switched on: Development competence on highest level

Concept, design, technical development and specification of our power supply systems is carried out in-house as a matter of principle. In this way the technical advances made by our development team can be incorporated directly in finished products. Thus our engineers look not only at the market requirements of today but develop solutions for the technical challenges of tomorrow.

Energized: Short time-to-market

Development cycles for new systems are getting shorter. Technological excellence means that we must have flexible production processes so that we can answer short term production-specific customer demands.

We guarantee our customers rapid reaction in the event of an emergency.





厂内实验室完成各类测试

所有EMC与安全测试均在厂内实验室完成。此外，我们的高科技产品均获得TÜV认证，符合EN 61010 B级标准。在生产制程中，组合模块和半成品使用自动测试台测试。随后，经电控测试系统，进行功能与品质相关参数的校准与测试。所有校准与测试数据都会被记录，方便以后查询。在最终测试阶段，所有产品会按最大负载进行“老化测试”。在40℃环境温度下，使用能量回馈式负载进行该测试。因此，测试中损耗的功率不会以热量散发，而是反馈到厂内用电源。

Competence in testing at our own laboratories

All EMC measurements and safety related tests are carried out in our in-house testing laboratories. Furthermore, our high-tech devices are TÜV certified to EN 61010 class B. During the manufacturing process the incorporated modules and building blocks are tested with an automatic test adaptor. Subsequently a computer controlled test system calibrates and performs tests for function and all quality relevant parameters. All test and calibration data are recorded and can be retrieved. Following final control all devices undergo a “burn-in test” under maximum load. These are carried out at an ambient temperature of 40°C using an electronic load with energy feedback. Thus the power consumed in the test is not released as heat but rather fed back into the domestic power supply.

最大限度满足客户

与客户保持密切联系，了解他们的每一项需求。合作伙伴的高技术水平，使我们能提供完全满足客户需求的电源与系统。专业的团队正为未来的技术需求，研发创新方案。

Proximity to customers

We maintain close contact with our customers. Thus we understand their needs. The high level of technical know-how of our associates enable us to deliver power supply units and systems which exactly meet customer requirements. Our highly specialised team are developing innovative solutions today for the technical demands of tomorrow.



定制：产品与技术支持

无论是实验室、工业还是培训领域，**EA**都能针对任何实际应用，提供广泛而深入的产品系列：实验室和工业用电源、电子负载以及可安装的DIN式导轨或19“插入式电源。基于这些标准功能，我们还可为客户的定制需求进行研发。主要归因于所有产品都具有最优化的能源利用，平均效率高达95%以上。此外，**EA**团队的技术专家会随时帮助解决有关电源与电子负载的所有问题。

品质是我们的标杆

在DIN ISO 9001-2015质量管理体系下，确保所有阶段的数据链都被记录。这使电源产品和电子负载具有高度可靠性。我们保证从收货、所有生产制程，到最终检查，都具高标准。

充分准备：着眼未来

德国和远东的生产基地，**EA**为未来做好了充分准备。这些都标志着扩展：技术核心、灵活性和短交期，使我们成为知名公司和机构的全球首选供应商。

Custom made: Products and support

Whether in the laboratory, industry or training, **EA** offers a wide and deep product spectrum for virtually any application: laboratory and industry power supplies, electronic loads as well as mountable, DIN rail or 19" plug-in power supplies. Based on these standard programs we also develop custom built equipment and systems to meet your requirements. A specific attribute is that all our products have an optimised energy usage through an above average efficiency of up to 95%. In addition, our **EA** team of highly specialised technology experts are there to help with all issues around power supply units and electronic loads.

Quality is our benchmark

A quality management system certified to DIN ISO 9001-2015 ensures that processes in all phases of the value chain are documented. This leads to the high technical reliability of our power supply equipment and electronic loads. We guarantee a continuous high quality, from goods receipt through all manufacturing steps to final inspection.

Well prepared: viewing the future

With manufacturing sites in Germany and the Far East, **EA** is well prepared for the future. The signs are set for expansion: technical know-how, flexibility and short lead times make us a globally preferred supplier of well-known companies and institutes.

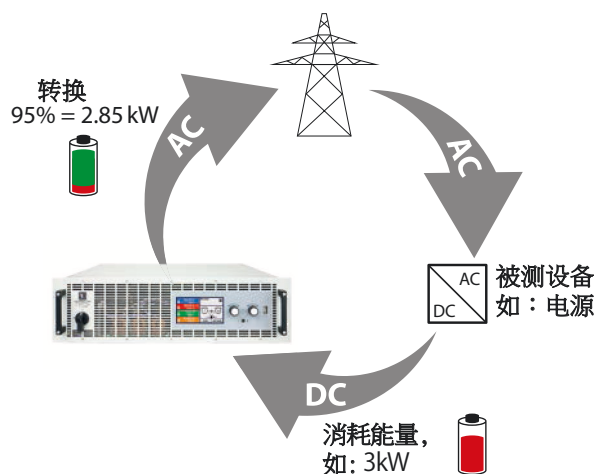
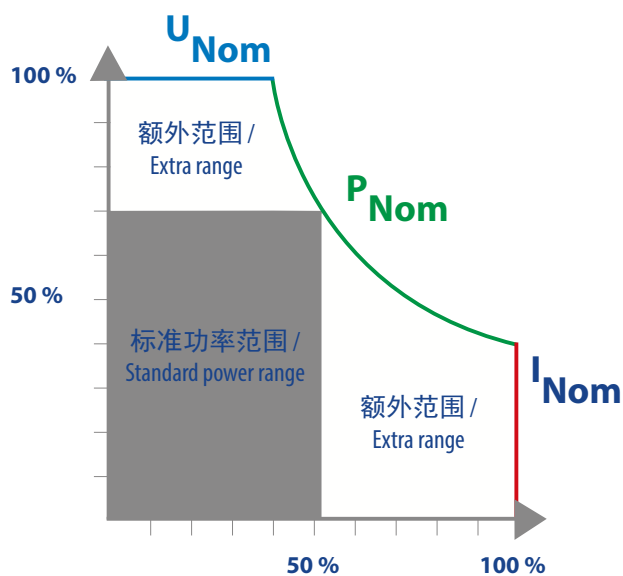


专注新科技

一旦有新技术出现，EA肯定是这个行业的领导者。带灵活调整输出特性的电源与能量回馈式负载，就是EA的独创之作。可直观操作实验室电源的彩色TFT触摸屏，也源于EA。

Focus on new technologies

When it comes to introducing new technologies EA is the leader in its sector. Laboratory power supplies with an auto-ranging feature of a flexible output stage and electronic loads with energy recovery were both the brainchild of EA. Colour TFT touch screens for intuitive operation of laboratory power supplies also have their origin at EA.



A

高效实验室直流电源 1.5 kW - 480 kW DC high efficiency laboratory power supplies

12-61
138 - 143



- | | |
|--|-----|
| ■ PSB 9000 3U / PSB 9000 3U SLAVE (双向电源/Bidirectional, 60 - 1500 V, 5 - 15 kW) | 12 |
| ■ PSI 9000 2U (40 - 750 V, 1 - 3 kW) | 20 |
| ■ PSI 9000 3U / PSI 9000 3U SLAVE (40 - 1500 V, 3.3 - 15 kW) | 28 |
| ■ PSI 9000 WR 3U / PSI 9000 WR 3U SLAVE (60 - 1500 V, 5 - 15 kW) | 36 |
| ■ PSI 9000 15U / 24U (80 - 1500 V, 30 - 90 kW) | 40 |
| ■ PS 9000 1U / 2U / 3U (40 - 1500 V, 1.5 - 15 kW) | 44 |
| ■ PSE 9000 3U (40 - 1500 V, 3.3 - 15 kW) | 60 |
| ■ PSI 9000 SYSTEMS 系统 (至 / up to 480 kW) | 138 |

B

桌面式实验室直流电源 320 W - 1500 W DC desktop laboratory power supplies

62-83



- | | |
|--|----|
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| ■ PSI 9000 DT (40 V - 750 V, 320 W - 1500 W) | 72 |
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直流电子负载400 W - 43200 W Electronic DC loads 400 W - 43200 W

84-115

C



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直流电子负载400 W - 43200 W Electronic DC loads 400 W - 43200 W

116-132

D



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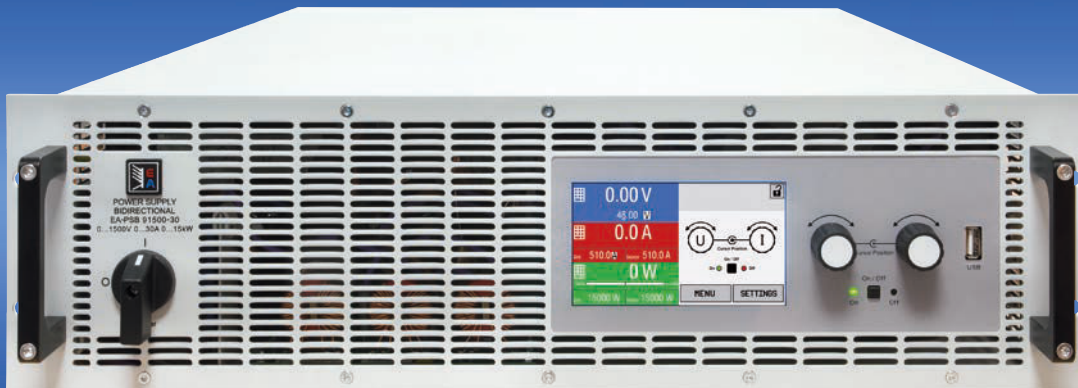
	范围可调的电压控制符号 Voltage control with adjustable voltage
	范围可调的电流控制符号 Current control with adjustable current
	范围可调的功率控制符号 Power control with adjustable power
	范围可调的内阻控制符号 Internal resistance control with adjustable power
	过压保护，可调或自动 Overvoltage protection, adjustable or automatic
	过流保护，可调 Overcurrent protection, adjustable
	过功率保护，可调 Overpower protection, adjustable
	过温保护 Overtemperature protection
	内置模拟接口 Integrated analog interface
	并联操作共享总线 Share Bus for parallel connection
	19"机柜外壳 19" rack compliant enclosure
	函数发生器 Function generator
	有汇总功能的主-从操作 Master-slave feature with totals formation
	内置USB端口 Built-in USB port
	内置Ethernet/LAN接口 Built-in Ethernet/LAN interface
	可选内置数字式IEEE/GPIB接口 Optional, digital plug-in interface IEEE/GPIB
	可选内置水冷器 Optional, built-in water cooling block
	配各种工业接口，可拆卸可更换接口模块，可选 Optional, retrofittable and exchangeable interface modules with various industrial interfaces

EA-PSB 9000 3U 5 kW - 15 kW



双向可编程直流电源

Programmable bidirectional DC power supplies



EA-PSB 91500-30 3U



- 宽范围交流输入电压：342...528 V，可在380 V，400 V与480 V电网下操作
- 双向-电源与负载融为一体
- 高效的能量回馈
- 输出功率：5 kW，10 kW或15 kW，还可扩展至480 kW
- 输出电压：60 V 至 1500 V
- 输出电流：30 A 至 360 A
- 灵活的功率调整输出
- 各种保护功能 (OVP, OCP, OPP, OTP)
- TFT触摸屏显示器，可显示参数、状态与报警
- 具自动感测功能的远程感测端
- 电隔离模拟接口
- 内置函数发生器
- 电池测试，MPP追踪模拟
- 本机配USB端口
- 可选数字接口模块
- EMC符合EN 55022等级B标准
- 支持SCPI与ModBus RTU
- 支持并提供LabView VI程序包

- AC wide range input 342-528 V, for operation on 380V, 400 V and 480 V grids
- Bidirectional - power supply and load in one
- Energy recovery with high efficiency
- Power ratings: 5 kW, 10 kW or 15 kW, expandable up to 480 kW
- Voltage ratings: 60 V up to 1500 V
- Current ratings: 30 A up to 360 A
- Flexible, power regulated DC<->AC stage
- Various protection circuits (OVP, OCP, OPP, OTP)
- Intuitive TFT touch panel with display for values, status and notifications
- Remote sensing with automatic detection
- Galvanically isolated, analog interface
- Integrated function generator
- Battery test, MPP tracking simulation
- USB port integrated
- Optional, digital interface modules
- SCPI and ModBus RTU
- LabView support by VI package

概要

这款微处理器控制的双向电源EA-PSB 9000 3U系列，融合了两个设备，一台电源（源）与一台能量回馈式负载（汇）。基于这两个设备的特征，产品也具有标准的两象限功能。其内部的电子负载通过给直流端子上的必要电容放电来实现高电压动态。如果连接的是电源，本产品是具有能量回馈功能的全电子负载，比如像EA-ELR 9000。

General

The microprocessor controlled, bidirectional power supplies of series EA-PSB 9000 3U incorporate two devices in one: a power supply (source) and an electronic load (sink) with energy recovery. Based on these two features the devices incorporate the functionality of two-quadrants operation as standard. The internal electronic loads achieves a high voltage dynamics by discharging the necessary capacitors located on the DC terminal. For a connected source, the device is a full electronic with energy recovery feature, such as in series EA-ELR 9000.

EA-PSB 9000 3U 5 kW - 15 kW

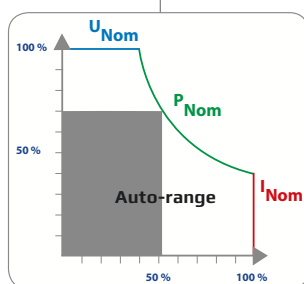
在电源操作模式下，本产品可以被当做灵活调整的宽范围电源，如EA-PSI 9000系列。将两种设备类型的优点融合在一起，同时消除了单个产品关于重量、空间和花时间将其应用到客制测试软件中的缺点。

交流供电

所有型号都采用主动式功率因数，专为典型的380 V与480 V AC 两相或三相交流电而设计。作为负载运行时，本产品会转化损耗的直流电能，并将其返回到本地电网。这有助于节省大量的用电成本。

自动调整的功率级

本系列所有型号的双向功率都可灵活调整。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定功率范围内。因此仅用一台产品就能覆盖广泛的应用。



直流输出

本系列有0...60 V和0...1500 V电压，0...30 A和0...360 A电流，0...5 kW, 0...10 kW或0...15 kW输出功率的不同型号。输出端位于产品后板上。

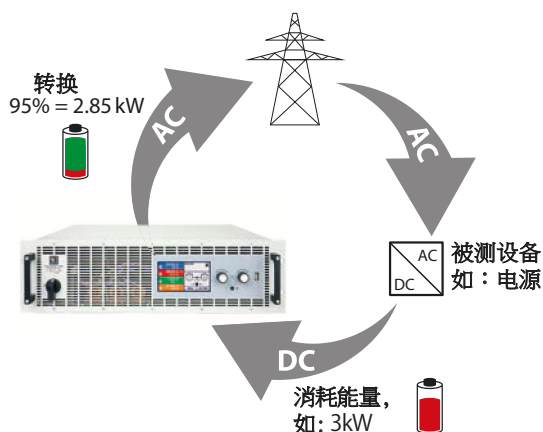
汇-源操作

本系列的另外一个重要特征是将称为汇电子负载，跟称为源的电源集成在一个产品上。意思是，它不仅可以当汇操作，也可当源运行。两种操作模式间的切换没有任何终端，也没有时间延迟。这也称为两象限操作。

实际的操作模式会显示于显示器上。

能量返回

本负载最主要的特点是，当与电网连接时，其AC输入端，也可用作带载操作期间所供直流电量返回时的输出端，且转换效率高达95%。这种能量转换方式有助于降低用电成本，且避免使用昂贵的制冷系统，因为普通电子负载使用过程中会将直流输入电量转化成热量，从而需要制冷系统进行冷却。原理示意图如下：



In source operation mode the device becomes a flexible, auto-ranging power supply like those of series EA-PSI 9000. It incorporates the advantages of both device types into one and at the same time it eliminates the disadvantages of separate units regarding weight, space requirement and effort to implement them into custom test software.

AC supply

All models are provided with an active Power Factor Correction circuit and are designed for a usage on a two- or three-phase supply with the typical rating between 380V and 480 V AC. During load operation, the device regenerates the consumed DC energy and feeds it back into the local power network. This help saving a lot of energy costs.

Auto-ranging power stage

All models are equipped with a flexible auto-ranging bi-directional power stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. The power set value is adjustable with these models. Therefore, a wide range of applications can already be covered by the use of just one unit.

DC output

DC voltages between 0...60 V and 0...1500 V, currents between 0...30 A and 0...360 A and output power ratings of 0...5 kW, 0...10kW, 0...10 kW or 0...15 kW are available. The DC terminal is located on the rear panel.

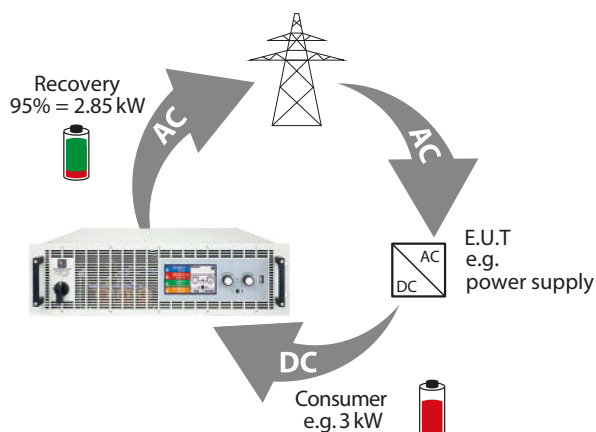
Source-sink operation

One salient feature of these devices is the coalescence of an electronic load, also called sink, and a power supply, also called source, into one unit. It means, the device can not only arbitrarily operate as sink or source, the switchover between these two operating modes occurs without interruption and time loss. This is also called two-quadrants operation.

The actual operating mode is indicated in the display.

Energy recovery

The most important feature of these devices is that the AC input while connected to the grid is also used as output for the recovery of the supplied DC energy, which is converted with an efficiency of up to 95%. This way of energy recovery helps to lower costs and can avoids expensive cooling systems, such as they are required for conventional electronic loads which only convert energy into heat. Principle view:

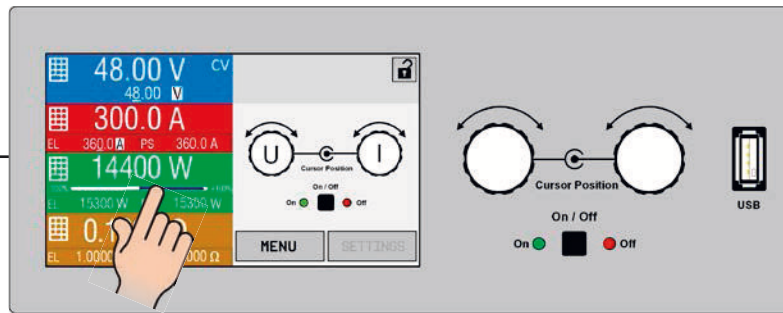


EA-PSB 9000 3U 5 kW - 15 kW



显示器与控制面板

带触摸屏的显示器
Display with touch panel



Display and control panel

轻松调节参数用旋钮
Knobs for comfortable value adjustment

上传和存储函数用的USB端口
USB port for loading and saving functions

设定与实际输出电压、电流与功率都清晰显示于图形显示器上。彩色的TFT屏幕为点触式，用一个手指就能控制所有功能。

Set values and actual values of input & output voltage / current / power are clearly represented on the graphic display. The colour TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger.

通过旋钮或者数字键盘直接输入参数，也可调节设定电压、电流、功率或阻值（内阻模拟）。若想防止意外操作，可锁定所有操作键。

Set values of voltage, current, power or resistance can be adjusted using the rotary knobs or entered directly via a numeric pad. To prevent unintentional operations, all operation controls can be locked.

多语言控制面板

Multi-language control panel



英文 / English



中文 / Chinese



俄文 / Russian



德文 / German

函数发生器

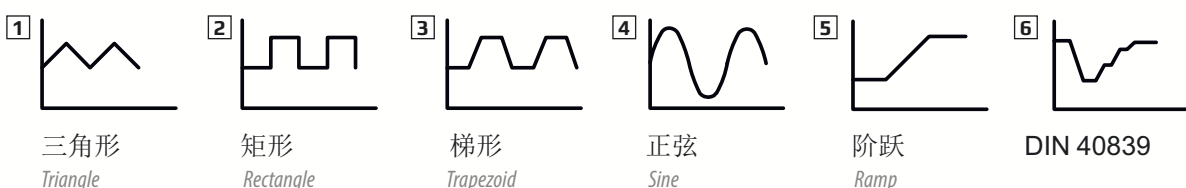
本系列所有型号都具有一可形成如下典型函数的真实函数发生器，并能将它们应用于输出电压或输出电流上。发生器可通过前板的触摸屏设置，或经某一数字接口远程配置。

预设函数会为用户提供所有必须的参数，如Y偏差值，时间/频率或幅度，整套配置完成。

Function generator

All models within this series include a true function generator which can generate typical functions, as displayed in the figure 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.



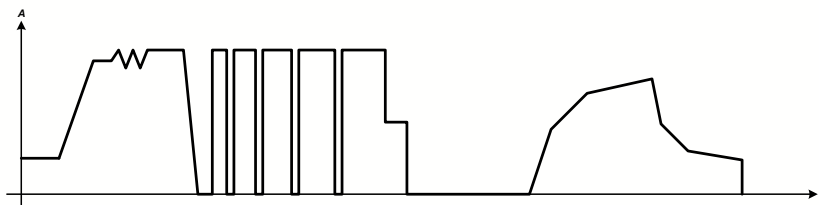
EA-PSB 9000 3U 5 kW - 15 kW

除了基于任意发生器产生的标准函数外，它还可形成某些复杂的函数，并能分成多达99组序列。这些可用于研发和生产的测试。通过前板的USB端口可将这些序列上载使用或存储于标准U盘上，这样可方便更换不同的测试序列。

下图是任意发生器可实现的由40个序列组成的复杂曲线，仅为虚构范例。可以在产品外或者于产品上创建函数，然后上载或保存：

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 99 sequence points. 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.

The figure below shows a fictional example of a complex function of 40 sequences, as it can be realised with the arbitrary generator. The function can be created on the device or externally and then loaded or saved:



主-从操作

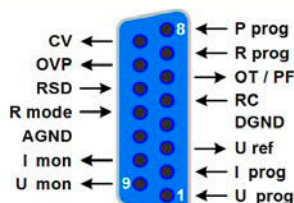
所有产品标配有一个数字式主-从总线。通过它可并联最多32台同型号产品，将实际电压、电流与功率汇总，形成更大的系统。经产品上的控制面板，或经任意数字通讯接口的远程控制，可完成主-从系统的全部配置。主机的操作也手动控制，也可远程控制（任意接口）。

Master-slave

All models feature a digital master-slave bus by default. It can be used to connect up to 32 units of identical models in parallel operation to a bigger system with totals formation of the actual value of voltage, current and power. The configuration of the master-slave system is either completely done on the control panels of the units or by remote control via any of digital communication interfaces. Handling of the master unit is possibly by manual or remote control (any interface).

内置模拟接口

产品后板上装有一隔离模拟接口端子。它具有一模拟输入脚，接上0 V...10 V或0 V...5 V电压，可设置0...100%的输出电压、电流、功率与内阻。要监控输出电压与电流，可给模拟输出脚接上0 V...10 V或0 V...5 V电压来完成。此外，还有几个输入脚和输出脚，可用来控制和监控产品状态。

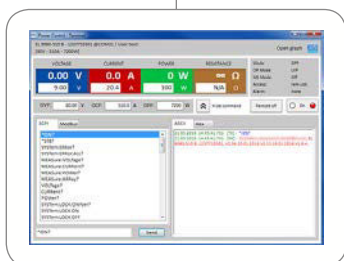


Analog interface

There is a galvanically isolated analog interface terminal, located on the rear of the device. It offers analog inputs to set voltage, current, power and resistance from 0...100% through control voltages of 0 V...10 V or 0 V...5 V. To monitor the output voltage and current, there are analog outputs with 0 V...10 V or 0 V...5 V. Also, several inputs and outputs are available for controlling and monitoring the device status.

控制软件

本产品还配有适合Windows系统下操作的控制软件，可以远程控制多台同型号产品，甚至不同型号产品。它有一个清晰的主界面，显示所有设定值与实际值，SCPI与ModBus RTU指令的直接输入模式，固件升级特性，以及被称为“排序”的半自动化控制表格。



Control software

Included with the device is a control software for Windows PC, which allows for the remote control of multiple identical or even different types of devices. It has a clear interface for all set and actual values, a direct input mode for SCPI and ModBus RTU commands, a firmware update feature and the semi-automatic table control named "Sequencing".

选项

- 适合RS232、CAN、CANopen、ModBus TCP、Profibus、Profinet/IO、EtherCAT或Ethernet的绝缘数字接口模块。接口插槽位于产品后板（仅针对标准型号），方便用户插上新模块或替换当前模块。产品会自动检测接口，并提示需要进行少许的配置或不用配置。也可参考134。
- 还可安装带固定GPIB端口的三位接口（3 W），代替接口模块用的默认插槽。

Options

- Digital interface modules for RS232, CAN, CANopen, ModBus TCP, Profibus, Profinet/IO, EtherCAT or Ethernet. The interface slot is located on the rear panel (standard models only), 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. See page 134.
- Three-way interface (3W) with a rigid GPIB port installed instead of the default slot for retrofittable interface modules

EA-PSB 9000 3U 5 kW - 15 kW



技术参数	Technical Data	Series PSB 9000 3U / 系列
交流输入	AC supply	
- 电压	- Voltage	342...528 V, 2ph/3ph
- 频率	- Frequency	45...66 Hz
- 功率因数	- Power factor	>0.99
直流: 电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
- 0-100%的负载调整率	- Load regulation 0-100%	<额定值的0.05% / <0.05% of rated value
- $\pm 10\% \Delta U_{AC}$ 线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.02% / <0.02% of rated value
- 带载10-100%调整需时	- Regulation 10-100% load	<2 ms
- 带载10-90%斜率(源)	- Slew rate (source) 10-90%	最大 / Max. 30 ms
- 过压保护	- Overvoltage protection	可调, 0...110% U_{Nenn} / Adjustable, 0...110% U_{Nom}
直流: 电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.15% / <0.15% of rated value
- 带载10-90%斜率(汇)	- Slew rate (sink) 10-90%	<50 μs
直流: 功率	DC: Power	
- 精确度	- Accuracy	<额定值的1% / <1% of rated value
直流: 阻值	DC: Resistance	
- 精确度	- Accuracy	$\leq$ 最大阻值的1% + 额定电流的0.3% $\leq 1\%$ of max. resistance + 0.3% of nominal current
保护功能	Protection	OT, OVP, OPP, OCP, PF ⁽²⁾
隔离耐压	Insulation	
- 直流输出对外壳 (PE)	- DC output to enclosure (PE)	型号不同而不同, 具体见型号规格表 / Depending on model, see tables
污染等级	Degree of pollution	2
保护等级	Protection class	1
显示器与面板	Display and panel	带触摸屏的图形显示器 / Graphics display with touch panel
数字接口	Digital interfaces	
- 内置	- Built-in	1x 通讯用B类USB端口 / 1x USB type B for communication 1x GPIB (3W选项功能时可选项) / 1x GPIB (optional with option 3W)
- 插槽	- Slot	1x 可拆卸内置模块 (不包括带3W选项功能的型号) / 1x for retrofittable plug-in modules (not with option 3W)
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
- 信号范围	- Signal range	0...5V 或 0...10V (可切换) / 0...5V or 0...10V (switchable)
- 输入脚	- Inputs	U, I, P, R, 远程开-关, 直流输出开-关, 内阻模式开-关 / U, I, P, R, Remote on-off, DC output on-off, resistance mode on-off
- 输出脚	- Outputs	U / I, 过压, 报警, 参考电压 / U / I, Overvoltage, alarms, reference voltage
- U / I / P / R 精确度	- Accuracy U / I / P / R	0...10V: <0.2% 0...5V: <0.4%
并联操作	Parallel operation	可实现, 通过真实主-从操作, 可连接多达32台产品 / Yes, with master-slave, up to 32 units
安规标准	Standards	IEC 1010, EN 61010, EN 60950
制冷方式	Cooling	温控风扇 (可选: 水冷) / Temperature controlled fans (optional: water)
工作温度	Operation temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
湿度	Relative humidity	<80%, 无凝露 / non-condensing
工作高度	Operation altitude	<2000 m
尺寸 (宽 高 深) ⁽¹⁾	Dimensions (W H D) ⁽¹⁾	19" 3 HE / 3U 670 mm

(1) 仅为标准版的外壳尺寸, 非整体尺寸 / Enclosure only, not overall

(2) 见第146页 / See page 146

EA-PSB 9000 3U 5 kW - 15 kW

技术参数	Technical Data	PSB 9060-120 3U	PSB 9080-120 3U	PSB 9200-70 3U	PSB 9360-40 3U
额定电压与范围	Rated voltage & range	0...60 V	0...80 V	0...200 V	0...360 V
- 纹波 (供电源) ⁽¹⁾	- Ripple (source) ⁽¹⁾	<200 mV _{PP} / <16 mV _{RMS}	<200 mV _{PP} / <16 mV _{RMS}	<300 mV _{PP} / <40 mV _{RMS}	<320 mV _{PP} / <55 mV _{RMS}
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±400 V DC	±400 V DC	±400 V DC	±400 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±400 V DC	±400 V DC	±600 V DC	±600 V DC
额定电流与范围	Rated current & range	0...120 A	0...120 A	0...70 A	0...40 A
额定功率与范围	Rated power & range	0...5000 W	0...5000 W	0...5000 W	0...5000 W
效率	Efficiency	~95%	~95%	~95%	~95%
重量 ⁽²⁾	Weight ⁽²⁾	~18 kg	~18 kg	~18 kg	~18 kg
订购编号 ⁽³⁾	Ordering number ⁽³⁾	30000319	30000301	30000302	30000303

技术参数	Technical Data	PSB 9500-30 3U	PSB 9750-20 3U	PSB 9060-240 3U	PSB 9080-240 3U
额定电压与范围	Rated voltage & range	0...500 V	0...750 V	0...60 V	0...80 V
- 纹波 (供电源) ⁽¹⁾	- Ripple (source) ⁽¹⁾	<350 mV _{PP} / <70 mV _{RMS}	<800 mV _{PP} / <200 mV _{RMS}	<320 mV _{PP} / <25 mV _{RMS}	<320 mV _{PP} / <25 mV _{RMS}
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±1500 V DC	±1500 V DC	±400 V DC	±400 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±1800 V DC	±1800 V DC	±400 V DC	±400 V DC
额定电流与范围	Rated current & range	0...30 A	0...20 A	0...240 A	0...240 A
额定功率与范围	Rated power & range	0...5000 W	0...5000 W	0...10000 W	0...10000 W
效率	Efficiency	~95%	~95%	~95%	~95%
重量 ⁽²⁾	Weight ⁽²⁾	~18 kg	~18 kg	~25 kg	~25 kg
订购编号 ⁽³⁾	Ordering number ⁽³⁾	30000304	30000305	30000320	30000306

技术参数	Technical Data	PSB 9200-140 3U	PSB 9360-80 3U	PSB 9500-60 3U	PSB 9750-40 3U
额定电压与范围	Rated voltage & range	0...200 V	0...360 V	0...500 V	0...750 V
- 纹波 (供电源) ⁽¹⁾	- Ripple (source) ⁽¹⁾	<300 mV _{PP} / <40 mV _{RMS}	<320 mV _{PP} / <55 mV _{RMS}	<350 mV _{PP} / <70 mV _{RMS}	<800 mV _{PP} / <200 mV _{RMS}
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±400 V DC	±400 V DC	±1500 V DC	±1500 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±600 V DC	±600 V DC	±1800 V DC	±1800 V DC
额定电流与范围	Rated current & range	0...140 A	0...80 A	0...60 A	0...40 A
额定功率与范围	Rated power & range	0...10000 W	0...10000 W	0...10000 W	0...10000 W
效率	Efficiency	~95%	~95%	~95%	~95%
重量 ⁽²⁾	Weight ⁽²⁾	~25 kg	~25 kg	~25 kg	~25 kg
订购编号 ⁽³⁾	Ordering number ⁽³⁾	30000307	30000308	30000309	30000310

技术参数	Technical Data	PSB 9060-360 3U	PSB 9080-360 3U	PSB 9200-210 3U	PSB 9360-120 3U
额定电压与范围	Rated voltage & range	0...60 V	0...80 V	0...200 V	0...360 V
- 纹波 (供电源) ⁽¹⁾	- Ripple (source) ⁽¹⁾	<320 mV _{PP} / <25 mV _{RMS}	<320 mV _{PP} / <25 mV _{RMS}	<300 mV _{PP} / <40 mV _{RMS}	<320 mV _{PP} / <55 mV _{RMS}
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±400 V DC	±400 V DC	±400 V DC	±400 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±400 V DC	±400 V DC	±600 V DC	±600 V DC
额定电流与范围	Rated current & range	0...360 A	0...360 A	0...210 A	0...120 A
额定功率与范围	Rated power & range	0...15000 W	0...15000 W	0...15000 W	0...15000 W
效率	Efficiency	~95%	~95%	~95%	~95%
重量 ⁽²⁾	Weight ⁽²⁾	~32 kg	~32 kg	~32 kg	~32 kg
订购编号 ⁽³⁾	Ordering number ⁽³⁾	30000321	30000312	30000313	30000314

(1) RMS值: 在BWL 300 kHz时测量的LF值, PP值: 在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

(2) 为标准版的重量, 带选项功能的则不同 / Weight of the base version, models with option(s) may vary

(3) 为标准版的订购编号, 带选项功能的则不同 / Ordering number of the base version, models with option(s) installed have different ordering numbers



EA-PSB 9000 3U 5 kW - 15 kW

技术参数	Technical Data	PSB 9500-90 3U	PSB 9750-60 3U	PSB 91000-40 3U	PSB 91500-30 3U
额定电压与范围	Rated voltage & range	0...500 V	0...750 V	0...1000 V	0...1500 V
- 纹波 (供电源) ⁽¹⁾	- Ripple (source) ⁽¹⁾	<350 mV _{PP} / <70 mV _{RMS}	<800 mV _{PP} / <200 mV _{RMS}	<1600 mV _{PP} / <300 mV _{RMS}	<2400 mV _{PP} / <400 mV _{RMS}
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±1500 V DC	±1500 V DC	±1500 V DC	±1000 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±1800 V DC	±1800 V DC	±1800 V DC	±1800 V DC
额定电流与范围	Rated current & range	0...90 A	0...60 A	0...40 A	0...30 A
额定功率与范围	Rated power & range	0...15000 W	0...15000 W	0...15000 W	0...15000 W
效率	Efficiency	~95%	~95%	~95%	~95%
重量 ⁽²⁾	Weight ⁽²⁾	~32 kg	~32 kg	~32 kg	~32 kg
订购编号 ⁽³⁾	Ordering number ⁽³⁾	30000315	30000316	30000317	30000318

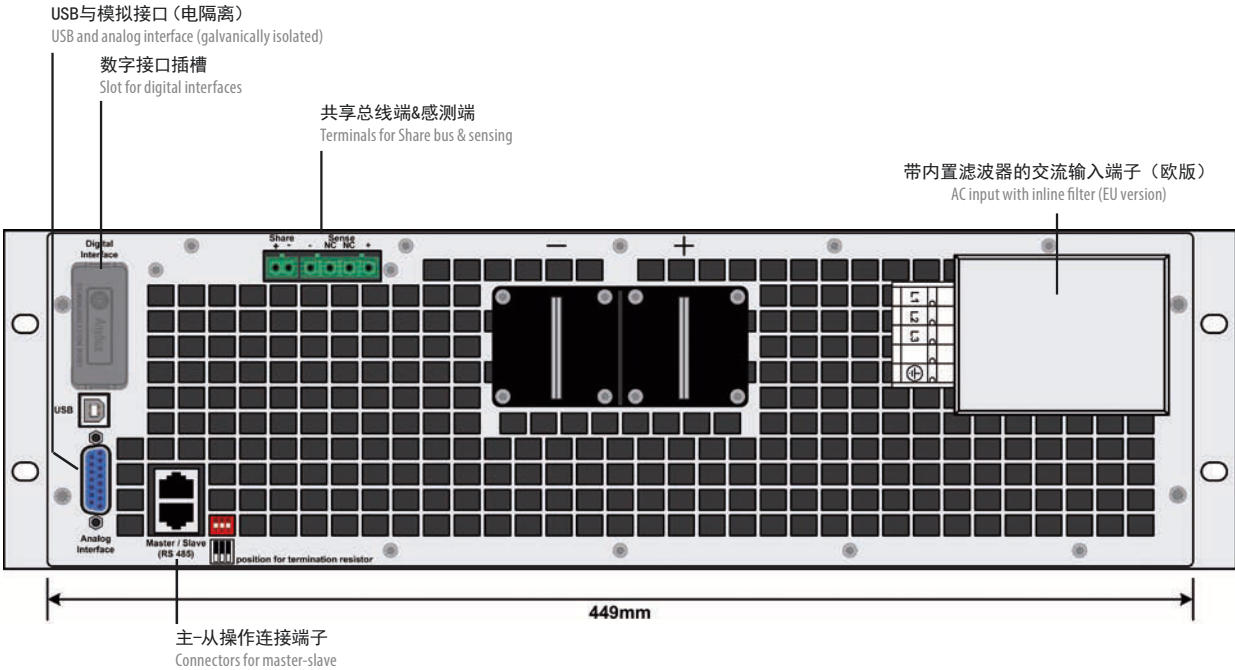
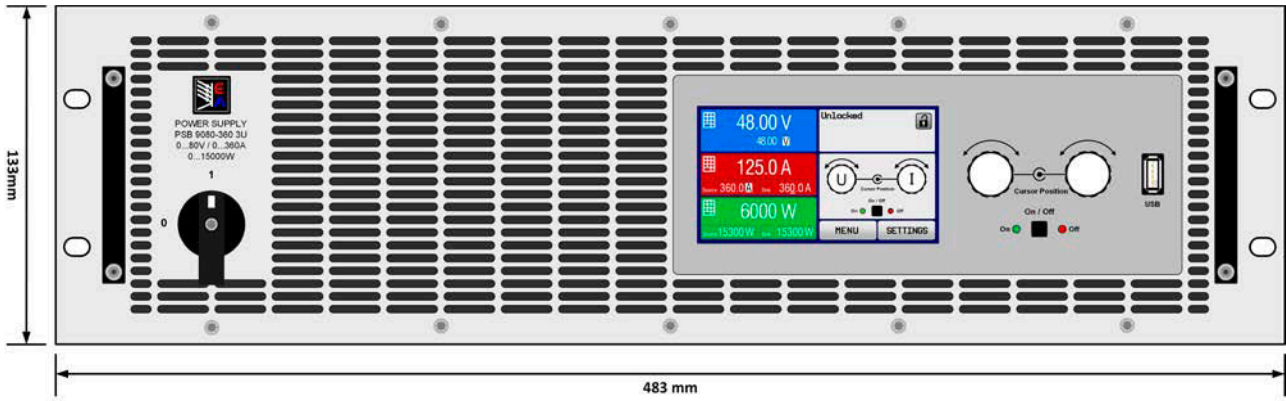
(1) RMS值：在BWL 300 kHz时测量的LF值，PP值：在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

(2) 为标准版的重量，带选项功能的则不同 / Weight of the base version, models with option(s) may vary

(3) 为标准版的订购编号，带选项功能的则不同 / Ordering number of the base version, models with option(s) installed have different ordering numbers

产品图

Product views



基本型号的后视图

Rear view of base model

EA-PSB 9000 3U Slave 15 kW

EA-PSB 9000 3U系列从机电源模块 Slave power supply modules for series EA-PSB 9000 3U



EA-PSB 9500-90 3U Slave

A

B

C

D

E

一般信息

被称为“从机模块”的EA-PSB 9000 3U Slave系列，可快速地扩展EA-PSB 9000 3U系列15kW型号的功率，且还节省成本。它们可并联，并进行主-从操作，最多可组合32台，以获得额定功率高达480 kW的直流电源系统。其所有技术规格都与EA-PSB 9000 3U系列一模一样，除了几个连接端子外。

操作与配置

正常的控制面板精简到剩下几个必要部件。为配合手动操作、状态指示与配置，配有少数几个LED灯，一个按钮，以及一个USB端口。本系列经前板USB端口可通过软件配置，比如EA Power Control（见136页）。

主-从系统

主-从系统的配置简易又快捷。将从机模块与主机装在一起，比如在一19“机柜内。将产品连至交流供电端，并联他们的直流输出（连线或铜条），再经主-从总线与共享总线连接起来。主机上的操作仅为启动主从操作，然后整个系统将按照通电的机器数量自己配置，并准备好供用户使用或者软件操作。

General

The so-called “slave module” of series EA-PSB 9000 3U Slave are available for quick and cost saving power extension of 15 kW models of series EA-PSB 9000 3U. Their purpose is to run in parallel connection and master-slave operation of up to 32 units in total, in order to achieve DC power supply systems with power ratings of up to 480 kW. All technical specifications are identical to EA-PSB 9000 3U series, except for the available connectors.

Handling and configuration

The usual control panel has been reduced to the absolute necessary. For manual handling, status indication and configuration it offers a few LEDs, a pushbutton and an USB port. The devices are configured with software through the front USB port, for example with EA Power Control (see page 136).

Master-slave system

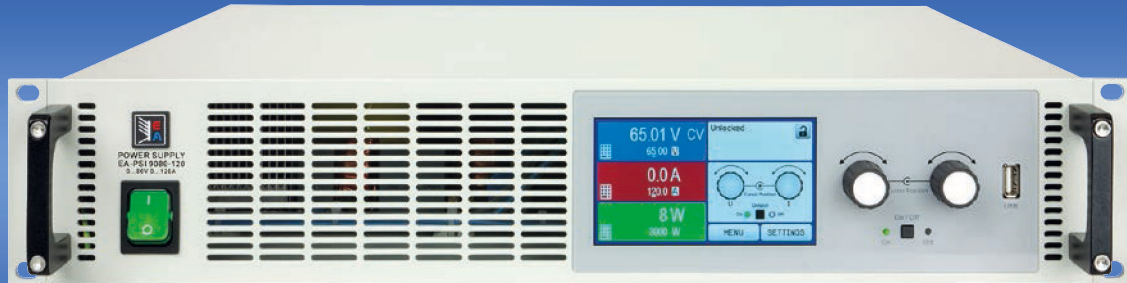
Configuring a master-slave system is very quick and easy. The slave modules and the master unit are installed together, for example in a 19” cabinet. Then they are connected to the AC supply and paralleled on their DC outputs (cables or copper bars), plus also linked via master-slave bus and Share bus. The only thing to do on the master is to enable master-slave and the system will self-configure to the number of powered units and represent itself to the user or a control software accordingly.

型号	功率	电压	电流	重量	适用于	尺寸 (宽x高x深)	订购编号
Model	Power	Voltage	Current	Weight	Suitable for	Dimensions (WxHxD)	Ordering number
EA-PSB 9060-360 3U Slave	0...15000 W	0...60 V	0...360 A	~ 30 kg	EA-PSB 9060-360 3U	483 mm x 3 HE / 3 U x 670 mm	30090321
EA-PSB 9080-360 3U Slave	0...15000 W	0...80 V	0...360 A	~ 30 kg	EA-PSB 9080-360 3U	483 mm x 3 HE / 3 U x 670 mm	30090312
EA-PSB 9200-210 3U Slave	0...15000 W	0...200 V	0...210 A	~ 30 kg	EA-PSB 9200-210 3U	483 mm x 3 HE / 3 U x 670 mm	30090313
EA-PSB 9360-120 3U Slave	0...15000 W	0...360 V	0...120 A	~ 30 kg	EA-PSB 9360-120 3U	483 mm x 3 HE / 3 U x 670 mm	30090314
EA-PSB 9500-90 3U Slave	0...15000 W	0...500 V	0...90 A	~ 30 kg	EA-PSB 9500-90 3U	483 mm x 3 HE / 3 U x 670 mm	30090315
EA-PSB 9750-60 3U Slave	0...15000 W	0...750 V	0...60 A	~ 30 kg	EA-PSB 9750-60 3U	483 mm x 3 HE / 3 U x 670 mm	30090316
EA-PSB 91000-40 3U Slave	0...15000 W	0...1000 V	0...40 A	~ 30 kg	EA-PSB 91000-30 3U	483 mm x 3 HE / 3 U x 670 mm	30090317
EA-PSB 91500-30 3U Slave	0...15000 W	0...1500 V	0...30 A	~ 30 kg	EA-PSB 91500-30 3U	483 mm x 3 HE / 3 U x 670 mm	30090318

EA-PSI 9000 2U 1000 W - 3000 W



可编程实验室直流电源 Programmable laboratory DC Power supplies



EA-PSI 9080-120 2U



- 宽范围输入电压90...264 V，带主动式PFC
- 效率高达 93%
- 输出功率: 0...1000 W 至 0...3000 W
- 输出电压: 0...40 V 至 0...750 V
- 输出电流: 0...4 A 至 0...120 A
- 灵活的功率调整输出级
- 各种保护功能 (OVP, OCP, OPP, OTP)
- 直观的TFT触摸屏可显示数值、状态与通知
- 远程感测端
- 隔离模拟接口
- 内置函数发生器
- 光伏方阵模拟功能
- 内阻模拟与调整
- 40 V产品型号符合SELV标准 (EN 60950)
- 配放电电路(在10 s内 $U_{out} < 60$ V)
- 内置USB端口
- 可选数字接口模块，或选择安装IEEE/GPIB端口
- 支持SCPI指令语言

概要

EA-PSI 9000 2U系列是一款由微处理器控制的实验室电源。它立足于用户友好的交互式操作概念，配备一套完整的标准功能。其输出参数、监控功能与其它设定都可配置，而且可更换式数字接口模块极其智能且操作舒适。所有输出参数的监控功能可帮助用户减少测试设备，几乎可不用安装外部监控硬件与软件。

- Wide input voltage range 90...264 V with active PFC
- High efficiency up to 93%
- Output power ratings: 0...1000 W up to 0...3000 W
- Output voltages: 0...40 V up to 0...750 V
- Output currents: 0...4 A up to 0...120 A
- Flexible, power regulated output stage
- Various protection circuits (OVP, OCP, OPP, OTP)
- Intuitive TFT touch panel with display for values, status and notifications
- Remote sensing
- Galvanically isolated, analog interface
- Integrated function generator
- Photovoltaics array simulation
- Internal resistance simulation and regulation
- 40 V models compliant to SELV (EN 60950)
- Discharge circuit ($U_{out} < 60$ V in ≤ 10 s)
- USB port integrated
- Optional, digital interface modules or alternatively installed IEEE/GPIB port
- SCPI command language supported

General

The microprocessor controlled laboratory power supplies of series EA-PSI 9000 2U offer a user-friendly, interactive handling concept, along with a remarkable set of standard features, which can facilitate operating them. Configuration of output parameters, supervision features and other settings, as well as the replaceable digital interface modules is smart and comfortable. The implemented supervision features for all output parameters can help to reduce test equipment and make it almost unnecessary to install external supervision hardware and software.

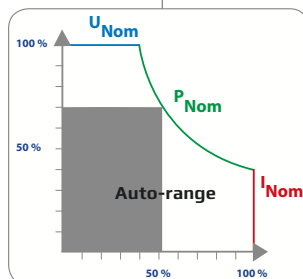
EA-PSI 9000 2U 1000 W - 3000 W

由两旋钮，一个按键，两个LED以及TFT彩色触摸屏组成的控制面板，显示所有关键数值与状态，用户只需轻轻一点手指，就可轻松操作本设备。若要集成到半自动与远程控制的自动化测试系统中，在其背面提供有一组接口（模拟与数字）。

The clear control panel with its two knobs, one pushbutton, two LEDs and the touch panel with colour TFT display for all important values and status enable the user to handle the device easily with a few touches of a finger. For the integration into semi-automatic and remotely controlled test and automation systems, the devices offer a set of interfaces (analog and digital) on their rear side.

功率级自动调整

本系列所有型号的输出功率都可灵活调整。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定功率范围内。它们的设定功率都可调，因此仅用一台产品就能覆盖广泛的应用。



Auto-ranging power stage

All models are equipped with a flexible auto-ranging output stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. The maximum power set value is adjustable with these models. Therefore, a wide range of applications can already be covered by the use of just one unit.

交流输入

本系列采用主动式功率因数，1.5 kW以下型号的输入电压为90 V_{AC}至264 V_{AC}，适合全球范围内使用。1.5 kW的型号在供电电压<150 V_{AC}时，输出功率自动减少到1 kW，3 kW的<205 V_{AC}时，则减少到2.5 kW。

AC input

All units are provided with an active Power Factor Correction circuit and models up to 1.5 kW are suitable for a worldwide usage on a mains supply from 90 V_{AC} up to 264 V_{AC}. With the 1.5 kW models, the output power is automatically reduced to 1 kW if the supply voltage is <150 V_{AC} and with the 3 kW models is reduced to 2.5 kW at <205 V_{AC}.

直流输出

本系列有0...40 V和0...750 V输出电压，0...4 A和0...120 A输出电流，0...1000 W和0...3000 W输出功率的不同型号。

DC output

DC output voltages between 0...40 V and 0...750 V, output currents between 0...4 A and 0...120 A and output powers between 0...1000 W and 0...3000 W are available.

不管是手动控制还是远程控制（模拟或数字），都可在0%至100%之间连续调节电流、电压与功率。输出端位于产品后面板上。

Current, voltage and power can thus be adjusted continuously between 0% and 100%, no matter if manually or remotely controlled (analog or digital). The output terminal is located on the rear panel of the devices.

放电电路

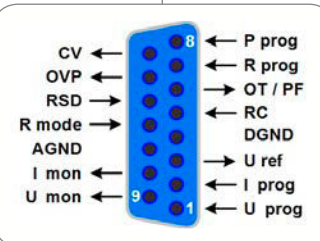
额定输出电压为200 V或以上的产品，其输出电容都配有一放电电路。在空载或带小负载时，它能确保危险电压在直流输出关闭后降至60 V DC以下。该电压值被认为是人体安全的最高电压。

Discharge circuit

Models with a nominal output voltage of 200 V or higher include a discharge circuit for the output capacities. For no load or low load situations, it ensures that the dangerous output voltage can sink to under 60 V DC after the DC output has been switched off. This value is considered as limit for voltages dangerous to human safety.

内置模拟接口

产品后板上装有一隔离模拟接口端子。它具有一模拟输入脚，接上0 V...10 V或0 V...5 V电压，可设置0...100%的输出电压、电流、功率与内阻。要监控输出电压与电流，可给模拟输出脚接上0 V...10 V或0 V...5 V电压来完成。此外，还有几个输入脚和输出脚，可用来控制和监控产品状态。



Built-in analog interface

There is a galvanically isolated analog interface terminal, located on the rear of the device. It offers analog inputs to set voltage, current, power and resistance from 0...100% through control voltages of 0 V...10 V or 0 V...5 V. To monitor the output voltage and current, there are analog outputs with 0 V...10 V or 0 V...5 V. Also, several inputs and outputs are available for controlling and monitoring the device status.

保护功能

为保护连接设备，可给产品设定一过压保护极限值(OVP)，以及过流(OCP)与过功率(OPP)保护极限值。

Protective features

For protection of the equipment connected, it is possible to set an overvoltage protection threshold (OVP), as well as one for overcurrent (OCP) and overpower (OPP).

一旦因故超过这三个值中的一个，直流输出会被立即切断，并在显示器与接口端发出一状态信号。

As soon as one of these thresholds is reached for any reason, the DC output will be immediately shut off and a status signal will be generated on the display and via the interfaces.

本产品还有过温保护，如果产品过热，它会关断直流输出。

There is furthermore an overtemperature protection, which will shut off the DC output if the device overheats.

EA-PSI 9000 2U 1000 W - 3000 W**远程感测**

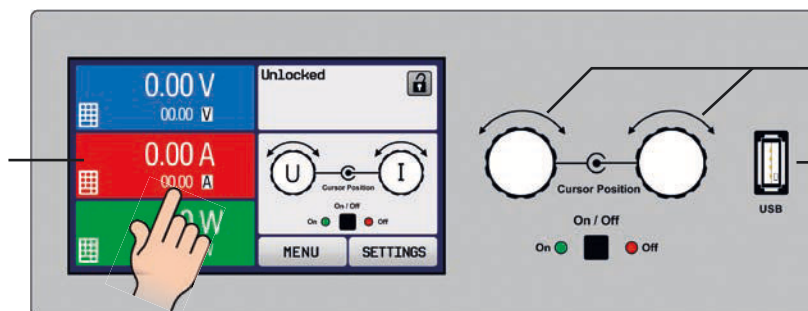
远程感测输入端可直接连到负载设备，以补偿连线上的部分压降。如果感测输入端已接到负载上，本电源会自动调整输出电压，以确保负载获得准确所需的电压值。

Remote sensing

The standard sensing input can be connected directly to the load in order to compensate for voltage drops along the power cables, up to a certain level. Once the sensing input is connected to the load, the power supply will adjust the output voltage automatically to ensure the accurate required voltage is available at the load.

**显示器与控制面板****Display and control panel**

触摸屏显示器
Display with touch panel



参数调节用旋钮
Knobs for comfortable value adjustment

上载和保存函数用
USB端口
USB port for loading and saving functions

设定与实际输出电压、电流与功率都清晰显示于图形显示器上。彩色的TFT屏幕为点触式，用一个手指就能控制所有功能。

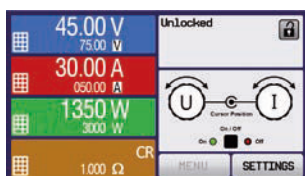
Set values and actual values of output voltage, output current and output power are clearly represented on the graphic display. The colour TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger.

通过旋钮或者数字键盘直接输入参数，也可调节设定电压、电流、功率或阻值（内阻模拟）。

Set values of voltage, current, power or resistance (internal resistance simulation) can be adjusted using the rotary knobs or entered directly via a numeric pad.

若想防止意外操作，可锁定所有操作键。

To prevent unintentional operations, all operation controls can be locked.

多语言控制面板**Multi-language control panel**

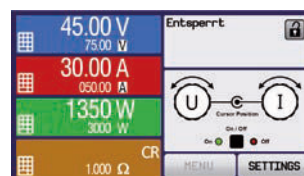
英文 / English



中文 / Chinese



俄文 / Russian



德文 / German

函数发生器

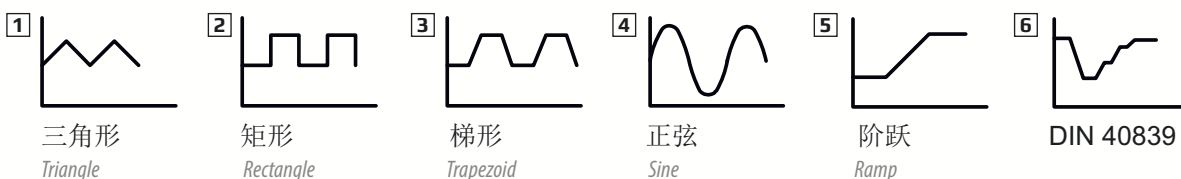
本系列所有型号都具有一可形成如下典型函数的真实函数发生器，并能将它们应用于输出电压或输出电流上。发生器可通过前板的触摸屏设置，或经某一数字接口远程配置。

预设函数会为用户提供所有必须的参数，如Y偏差值，时间/频率或幅度，整套配置完成。

Function generator

All models within this series include a true function generator which can generate typical functions, as displayed in the figure 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.

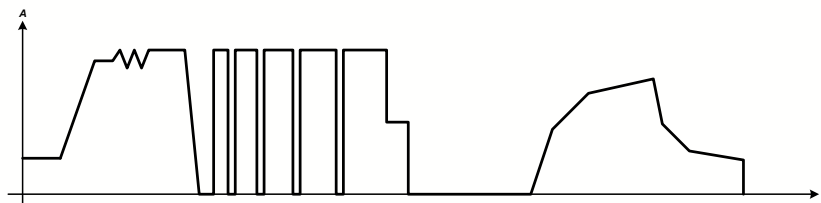
The predefined functions offer all necessary parameters to the user, such as Y offset, time / frequency or amplitude, for full configuration ability.



EA-PSI 9000 2U 1000 W - 3000 W

除了基于任意发生器产生的标准函数外，它还可形成某些复杂的函数，并能分成多达99组序列。这些可用于研发和生产的测试。通过前板的USB端口可将这些序列上载使用或存储于标准U盘上，这样可方便更换不同的测试序列。

下图是任意发生器可实现的由40个序列组成的复杂曲线，仅为虚构范例。可以在产品外或者于产品上创建函数，然后上载或保存：



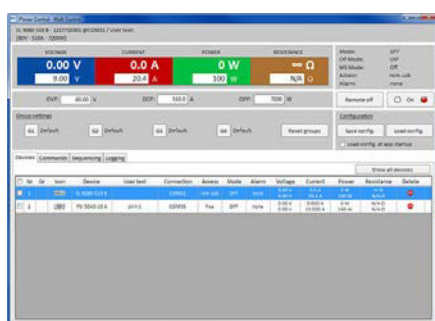
此外还有一个XY发生器，能产生如UI或IU这类的函数，用户一般以表格（CSV文档）形式创建，然后从U盘上上传。针对光伏相关的测试，还可形成PV曲线，作为用户可调关键参数。通过后续的固件升级，可安装更多的曲线特性，供用户选择。

主-从操作

所有产品标配有一个数字式主-从总线。通过它可并联最多16台同型号产品，将实际电压、电流与功率汇总，形成更大的系统。经产品上的控制面板，或经任意数字通讯接口的远程控制，可完成主-从系统的全部配置。主机的操作也手动控制，也可远程控制（任意接口）。

控制软件

本产品还配有适合Windows系统下操作的控制软件，可以远程控制多台同型号产品，甚至不同型号产品。它有一个清晰的主界面，显示所有设定值与实际值，SCPI与ModBus RTU指令的直接输入模式，固件升级特性，以及被称为“排序”的半自动化控制表格。



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 99 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.

Fictional example of a complex function (40 sequences) as it can be realised with the arbitrary generator. The function can be created on the device or externally and then loaded or saved:

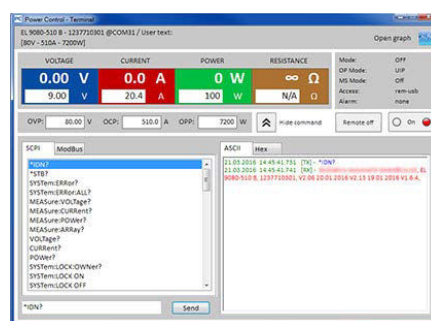
There is furthermore a XY generator, which is used to generate other functions, such as UI or IU, which are defined by the user in form of tables (CSV file) and then loaded from USB drive. For photovoltaics related tests, a PV curve can be generated and used from user-adjustable key parameters. Even more characteristics can be installed for user selection by applying future firmware updates.

Master-slave

All models feature a digital master-slave bus by default. It can be used to connect up to 16 units of identical models in parallel operation to a bigger system with totals formation of the actual value of voltage, current and power. The configuration of the master-slave system is either completely done on the control panels of the units or by remote control via any of digital communication interfaces. Handling of the master unit is possibly by manual or remote control (any interface).

Control software

Included with the device is a control software for Windows PC, which allows for the remote control of multiple identical or even different types of devices. It has a clear interface for all set and actual values, a direct input mode for SCPI and ModBus RTU commands, a firmware update feature and the semi-automatic table control named "Sequencing".

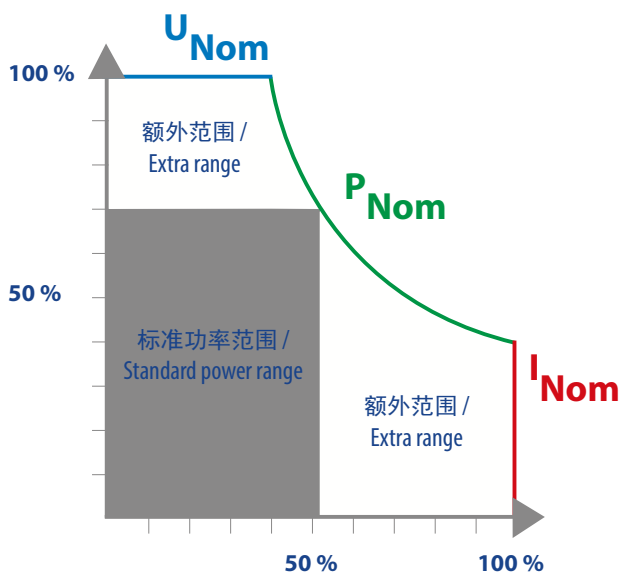


EA-PSI 9000 2U 1000 W - 3000 W**选项**

- 适合 RS232、CAN、CANopen、ModBus TCP、Profibus、Profinet/IO、EtherCAT 或 Ethernet 的绝缘数字接口模块。接口插槽位于产品后板（仅针对标准型号），方便用户插上新模块或替换当前模块。产品会自动检测接口，并提示需要进行少许的配置或不用配置。也可参考 134。
- 还可安装带固定 GPIB 端口的三位接口（3 W），代替接口模块用的默认插槽。

Options

- Isolated digital interface modules for RS232, CAN, CANopen, ModBus TCP, Profibus, Profinet/IO, EtherCAT or Ethernet. The interface slot is located on the rear panel (standard models only), 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. Also see page 134.
- Three-way interface (3W) with a rigid GPIB port installed instead of the default slot for retrofittable interface modules

数字接口模块**Digital interface modules****自动调整原理****Auto-ranging principle**

EA-PSI 9000 2U 1000 W - 3000 W

技术参数	Technical Data	Series PSI 9000 2U / 系列	
交流输入	Input AC		
- 电压	- Voltage	90...264 V, 1ph+N (型号 / Models 1000 W - 1500 W) 180...264 V, 1ph+N (型号 / Models 3000 W)	
- 频率	- Frequency	45...66 Hz	
- 功率因数	- Power factor	>0.99	
- 功率降额	- Derating	型号 / Models 1500 W: < 150 V AC 降至 / to $P_{out\ max}$ 1000 W 型号 / Models 3000 W: < 207 V AC 降至 / to $P_{out\ max}$ 2500 W	
直流: 电压	DC: Voltage		
- 精确度	- Accuracy	< 额定值的0.1% / <0.1% of rated value	
- 0-100%的负载调整率	- Load regulation 0-100%	< 额定值的0.05% / <0.05% of rated value	
- $\pm 10\% \Delta U_{AC}$ 线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	< 额定值的0.02% / <0.02% of rated value	
- 带载10-100%调整需时	- Regulation 10-100% load	<2 ms	
- 带载10-90%上升时间	- Rise time 10-90%	最大 / Max. 30 ms	
- 过压保护	- Overvoltage protection	可调, $0...110\% U_{Nenn}$ / Adjustable, $0...110\% U_{Nom}$	
直流: 电流	DC: Current		
- 精确度	- Accuracy	< 额定值的0.2% / <0.2% of rated value	
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	< 额定值的0.15% / <0.15% of rated value	
直流: 功率	DC: Power		
- 精确度	- Accuracy	< 额定值的1% / <1% of rated value	
过压类别	Overvoltage category	2	
保护功能	Protection	OTP, OVP, OCP, OPP, PF ⁽¹⁾	
隔离耐压	Insulation		
- 交流输入对外壳	- AC Input to enclosure	2500 V DC	
- 交流输入对直流输出	- AC Input to DC output	2500 V DC	
- 直流输出对外壳 (PE)	- DC output to enclosure (PE)	负极: 最大400 V DC, 正极: 最大400 V DC + 输出电压 / Negative: max. 400 V DC, positive: max. 400 V DC + output voltage	
污染等级	Degree of pollution	2	
保护等级	Protection class	1	
显示器与控制面板	Display / control panel	带触摸面板的图形显示器 / Graphics display with touch panel	
数字接口	Digital interfaces		
- 内置	- Built-in	1x 通讯用B类USB端口 / 1x USB type B for communication 1x GPIB (3W选项功能时可选项) / 1x GPIB (optional with option 3W)	
- 插槽	- Slot	1x 可拆卸内置模块 (仅针对标准版) / 1x for retrofittable plug-in modules (standard models only)	
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	
- 信号范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)	
- 输入脚	- Inputs	U, I, P, R, 远程开-关, 直流输出开-关, 内阻模式开-关 / U, I, P, R, Remote on-off, DC output on-off, resistance mode on-off	
- 输出脚	- Outputs	U / I, 过压, 报警, 参考电压 / U / I, Overvoltage, alarms, reference voltage	
- U / I / P / R 精确度	- Accuracy U / I / P / R	0...10 V: <0.2% 0...5 V: <0.4%	
并联操作	Parallel operation	可实现, 通过真实主-从操作, 可连接多达16台产品 (经共享总线) / Yes, with true master-slave, up to 16 units (via Share bus)	
安规标准	Standards	EN 60950, EN 61326, EN 55022 等级 B / Class B	
制冷方式	Cooling	温控风扇 / Temperature controlled fan(s)	
工作温度	Operation temperature	0...50 °C	
储存温度	Storage temperature	-20...70 °C	
湿度	Humidity	<80%, 无凝露 / non-condensing	
工作高度	Operation altitude	<2000 m	
机械结构	Mechanics	1000 W / 1500 W	3000 W
- 重量 ⁽²⁾	- Weight ⁽²⁾	12 kg	15 kg
- 尺寸 (宽 高 深) ⁽³⁾	- Dimensions (W H D) ⁽³⁾	19" x 2 HE/U x 463 mm	19" x 2 HE/U x 463 mm

(1) 见第146页 / See page 146

(2) 为标准版参数, 带选项功能的则会不同 / Standard version, models with options may vary

(3) 仅为标准版的外壳尺寸, 非整体尺寸, 带选项功能的还会不同 / Enclosure of the standard version and not overall size, versions with options may vary



EA-PSI 9000 2U 1000 W - 3000 W



型号	电压	电流	功率	效率	U的纹波 ⁽²⁾	I的纹波 ⁽²⁾	编程 ⁽¹⁾		订购编号 ⁽³⁾
Model	Voltage	Current	Power	Efficiency	Ripple U ⁽²⁾	Ripple I ⁽²⁾	U (typ.)	I (typ.)	Ordering number ⁽³⁾
PSI 9040-40 2U	0...40 V	0...40 A	0...1000 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	3.7 mA _{RMS}	~1.5 mV	~1.5 mA	06230319
PSI 9080-40 2U	0...80 V	0...40 A	0...1000 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	3.7 mA _{RMS}	~3 mV	~1.5 mA	06230304
PSI 9200-15 2U	0...200 V	0...15 A	0...1000 W	≤93%	164 mV _{pp} / 34 mV _{RMS}	2.2 mA _{RMS}	~7.6 mV	~0.6 mA	06230305
PSI 9360-10 2U	0...360 V	0...10 A	0...1000 W	≤93%	210 mV _{pp} / 59 mV _{RMS}	1.6 mA _{RMS}	~13.7 mV	~0.4 mA	06230306
PSI 9500-06 2U	0...500 V	0...6 A	0...1000 W	≤93%	190 mV _{pp} / 48 mV _{RMS}	0.5 mA _{RMS}	~19 mV	~0.23 mA	06230307
PSI 9750-04 2U	0...750 V	0...4 A	0...1000 W	≤93%	212 mV _{pp} / 60 mV _{RMS}	0.3 mA _{RMS}	~28.6 mV	~0.15 mA	06230308
PSI 9040-60 2U	0...40 V	0...60 A	0...1500 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	5.6 mA _{RMS}	~1.5 mV	~2.3 mA	06230320
PSI 9080-60 2U	0...80 V	0...60 A	0...1500 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	5.6 mA _{RMS}	~3 mV	~2.3 mA	06230309
PSI 9200-25 2U	0...200 V	0...25 A	0...1500 W	≤93%	164 mV _{pp} / 34 mV _{RMS}	3.3 mA _{RMS}	~7.6 mV	~1 mA	06230310
PSI 9360-15 2U	0...360 V	0...15 A	0...1500 W	≤93%	210 mV _{pp} / 59 mV _{RMS}	2.4 mA _{RMS}	~13.7 mV	~0.6 mA	06230311
PSI 9500-10 2U	0...500 V	0...10 A	0...1500 W	≤93%	190 mV _{pp} / 48 mV _{RMS}	0.7 mA _{RMS}	~19 mV	~0.4 mA	06230312
PSI 9750-06 2U	0...750 V	0...6 A	0...1500 W	≤93%	212 mV _{pp} / 60 mV _{RMS}	0.5 mA _{RMS}	~28.6 mV	~0.23 mA	06230313
PSI 9040-120 2U	0...40 V	0...120 A	0...3000 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	11 mA _{RMS}	~3 mV	~4.6 mA	06230321
PSI 9080-120 2U	0...80 V	0...120 A	0...3000 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	11 mA _{RMS}	~1.5 mV	~4.6 mA	06230314
PSI 9200-50 2U	0...200 V	0...50 A	0...3000 W	≤93%	164 mV _{pp} / 34 mV _{RMS}	6.5 mA _{RMS}	~7.6 mV	~1.9 mA	06230315
PSI 9360-30 2U	0...360 V	0...30 A	0...3000 W	≤93%	210 mV _{pp} / 59 mV _{RMS}	5 mA _{RMS}	~13.7 mV	~1.2 mA	06230316
PSI 9500-20 2U	0...500 V	0...20 A	0...3000 W	≤93%	190 mV _{pp} / 48 mV _{RMS}	1.5 mA _{RMS}	~19 mV	~0.8 mA	06230317
PSI 9750-12 2U	0...750 V	0...12 A	0...3000 W	≤93%	212 mV _{pp} / 60 mV _{RMS}	0.9 mA _{RMS}	~28.6 mV	~0.5 mA	06230318

(1) 忽略产品错误时的可编程分辨率 / Programmable resolution disregarding device errors

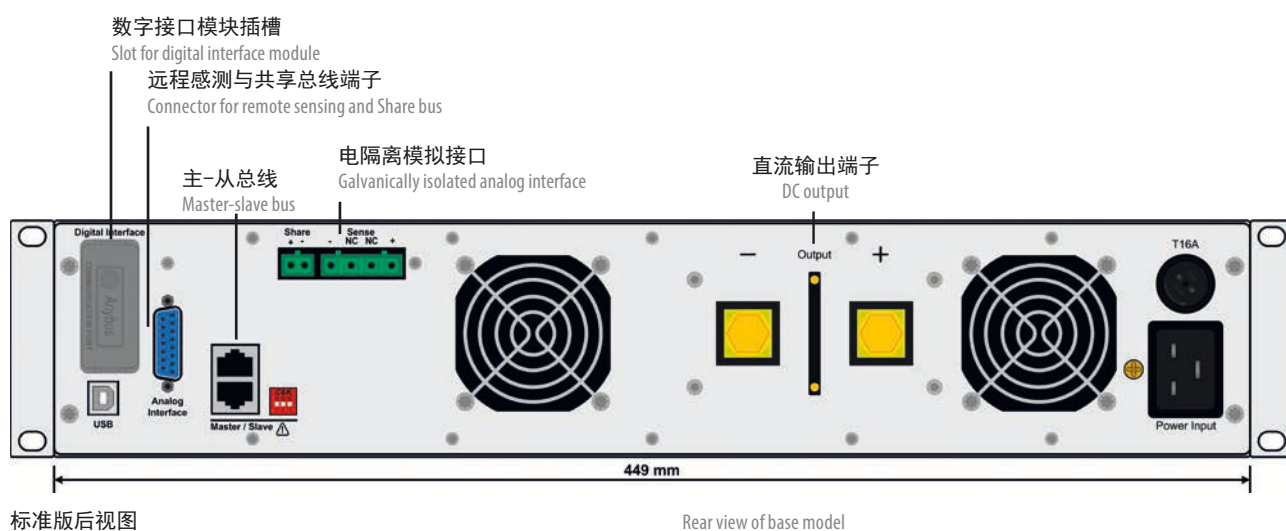
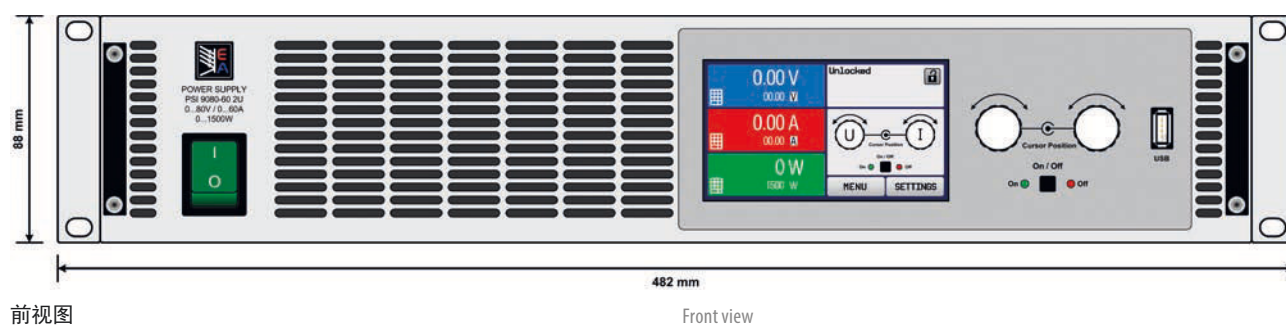
(2) RMS值: 在BWL 300 kHz时测量的LF值, PP值: 在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

(3) 为标准版的订购编号, 带3W选项功能的型号则为不同 / Ordering number of the standard version, models with option 3W installed have different ordering numbers

EA-PSI 9000 2U 1000 W - 3000 W

产品图片

Product views



EA-PSI 9000 3U 3.3 kW - 15 kW



可编程高效实验室直流电源
Programmable high efficiency DC Power supplies



EA-PSI 9080-120 2U



- 多相输入 400 V_{AC}
- 效率高达95.5%
- 输出功率等级: 3.3 kW, 5 kW, 6.6 kW, 10 kW, 或 15 kW, 还可扩展至480 kW
- 输出电压: 40 V 至 1500 V
- 输出电流: 30 A 至 510 A, 还可扩展至5100 A
- 灵活的功率调整输出级
- 各种保护功能 (OVP, OCP, OPP, OTP)
- 直观的TFT触摸屏可显示数值、状态与通知
- 能自动检测远程感测
- 隔离模拟接口
- 内置真实函数发生器
- 光伏方阵模拟功能
- 内阻模拟与调整
- 40 V产品型号符合SELV标准 (EN 60950)
- 配放电电路(在10 s内 $U_{\text{out}} < 60\text{ V}$)
- 内置USB端口
- EMC符合EN 61010 等级B, 且获得TÜV认证
- 可选数字接口模块, 或选择安装IEEE/GPIB端口
- 支持SCPI指令语言

- Multi-phase input for 400 V_{AC}
- High efficiency up to 95.5%
- Output power ratings: 3.3 kW, 5 kW, 6.6 kW, 10 kW or 15 kW, expandable up to 480 kW
- Output voltages: 40 V up to 1500 V
- Output currents: 30 A up to 510 A, expandable up to 5100 A
- Flexible, power regulated output stage
- Various protection circuits (OVP, OCP, OPP, OTP)
- Intuitive TFT touch panel with display for values, status and notifications
- Remote sensing with automatic detection
- Galvanically isolated, analog interface
- Integrated true function generator
- Photovoltaic array simulation
- Internal resistance simulation and regulation
- 40 V models compliant to SELV (EN 60950)
- Discharge circuit ($U_{\text{out}} < 60\text{ V}$ in $\leq 10\text{ s}$)
- USB port integrated
- EMC TÜV approved for EN 61010 Class B
- Optional, digital interface modules or alternatively installed IEEE/GPIB port
- SCPI command language supported

概要

EA-PSI 9000 3U系列是一款由微处理器控制的高效实验室电源, 其标准版配备多种功能和特征。用户友好交互式菜单导航功能, 让用户使用起来极其方便且有效率。

General

The microprocessor controlled high efficiency laboratory power supplies of series EA-PSI 9000 3U offer multiple functions and features in their standard version. User-friendly, interactive menu navigation makes the use of this equipment remarkably easy and most effective.

EA-PSI 9000 3U 3.3 kW - 15 kW

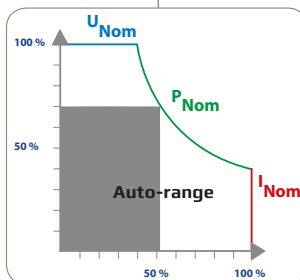
可对用户和进程文档进行编辑、存储，以及再次上载，从而改善测试或其它应用的可重复性。为了实现更大输出功率，可配置高达150 kW和42U的机柜，以满足用户需求。

交流输入

本系列所有型号采用主动式功率因数，专门设计成使用340 V至460 V AC的三相交流电。

功率级自动调整

所有型号的输出功率都灵活可调。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定功率范围内。它们的设定功率都可调，因此仅用一台产品就能覆盖广泛的应用。



User and process profiles can be edited, saved and archived so that the reproducibility of a test or other application is improved. In order to achieve even higher output power, cabinets with up to 150 kW and up to 42U size can be configured to suit the user's requirements.

AC input

All models are provided with an active Power Factor Correction circuit and are designed for a usage on a three-phase supply with 340 V up to 460 V AC.

Auto-ranging power stage

All models are equipped with a flexible auto-ranging output stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. The power set value is adjustable with these models. Therefore, a wide range of applications can already be covered by the use of just one unit.

直流输出

本系列有0...40 V和0...1500 V输出电压，0...4 A和0...510 A输出电流，0...3.3 kW，0...5 kW，0...10 kW或0...15 kW输出功率的不同型号。输出端位于产品后面板上。

DC output

DC output voltages between 0...40 V and 0...1500 V, output currents between 0...40 A and 0...510 A and output power ratings of 0...3.3 kW, 0...5 kW, 0...6.6 kW, 0...10 kW or 0...15 kW are available. The output terminal is located on the rear panel.

放电电路

额定输出电压为200 V或以上的产品，其输出电容都配有一放电电路。在空载或带小负载时，它能确保危险电压在直流输出关闭后降至60 V DC以下。该电压值被认为是对人体安全的最高电压。

Discharge circuit

Models with a nominal output voltage of 200 V or higher include a discharge circuit for the output capacitors. For no load or low load situations, it ensures that the dangerous output voltage can sink to under 60 V DC after the DC output has been switched off. This value is considered as limit for voltages dangerous to human safety.

保护功能

为保护连接设备，可给产品设定一过压保护极限值(OVP)，以及过流(OCP)与过功率(OPP)保护极限值。

一旦因故超过这三个值中的一个，直流输出会被立即切断，并在显示器与接口端发出一状态信号。本产品还有过温保护，如果产品过热，它会关断直流输出。

Protective features

For protection of the equipment connected, it is possible to set an overvoltage protection threshold (OVP), as well as one for overcurrent (OCP) and overpower (OPP).

As soon as one of these thresholds is reached for any reason, the DC output will be immediately shut off and a status signal will be generated on the display and via the interfaces. There is furthermore an overtemperature protection, which will shut off the DC output if the device overheats.

远程感测

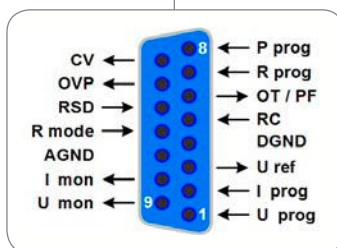
远程感测输入端可直接连到负载设备，以补偿连线上的部分压降。如果感测输入端已接到负载上，本电源会自动调整输出电压，以确保负载获得准确所需的电压值。

Remote sensing

The standard sensing input can be connected directly to the load in order to compensate voltage drops along the power cables up to a certain level. If the sensing input is connected to the load, the power supply will adjust the output voltage automatically to make ensure the accurate required voltage is available at the load.

内置模拟接口

产品后板上装有一隔离模拟接口端子。它具有一模拟输入脚，接上0 V...10 V或0 V...5 V电压，可设置0...100%的输出电压、电流与功率。要监控输出电压与电流，可给模拟输出脚接上0 V...10 V或0 V...5 V电压来完成。此外，还有几个输入脚和输出脚，可用来控制和监控产品状态。



Analog interface

There is a galvanically isolated analog interface terminal, located on the rear of the device. It offers analog inputs to set voltage, current, power and resistance from 0...100% through control voltages of 0 V...10 V or 0 V...5 V. To monitor the output voltage and current, there are analog outputs with 0 V...10 V or 0 V...5 V. Also, several inputs and outputs are available for controlling and monitoring the device status.

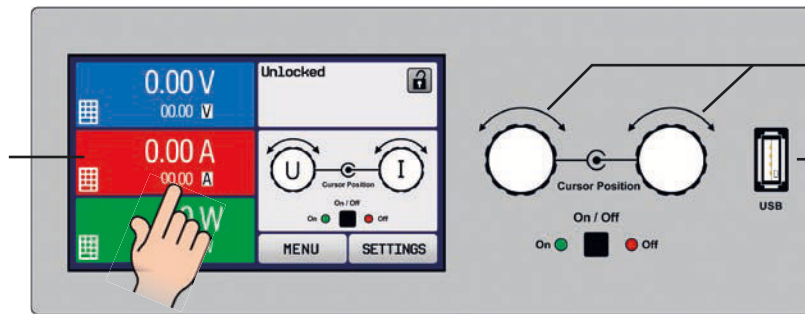
EA-PSI 9000 3U 3.3 kW - 15 kW



显示器与控制面板

Display and control panel

触摸屏显示器
Display with touch panel



参数调节用旋钮
Knobs for comfortable value adjustment

上载和保存函数用USB
端口
USB port for loading and saving functions

设定与实际输出电压、电流与功率都清晰显示于图形显示器上。彩色的TFT屏幕为点触式，用一个手指就能控制所有功能。

Set values and actual values of output voltage, output current and output power are clearly represented on the graphic display. The colour TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger.

通过旋钮或者数字键盘直接输入参数，也可调节设定电压、电流、功率或阻值（内阻模拟）。

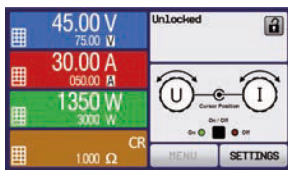
Set values of voltage, current, power or resistance (internal resistance simulation) can be adjusted using the rotary knobs or entered directly via a numeric pad.

若想防止意外操作，可锁定所有操作键。

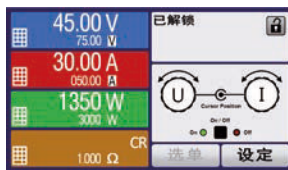
To prevent unintentional operations, all operation controls can be locked.

多语言控制面板

Multi-language control panel



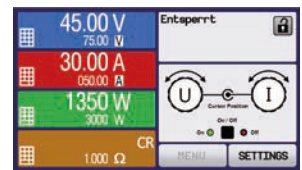
英文 / English



中文 / Chinese



俄文 / Russian



德文 / German

函数发生器

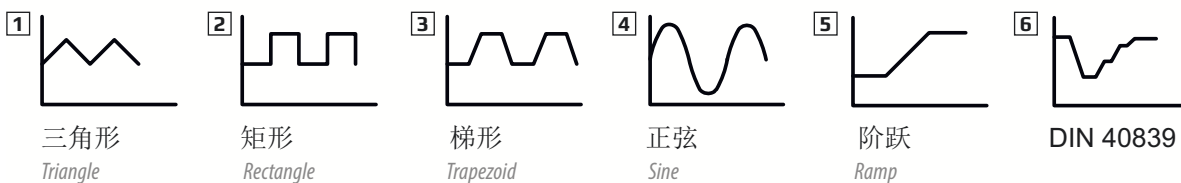
Function generator

本系列所有型号都具有一可形成如下典型函数的真实函数发生器，并能将它们应用于输出电压或输出电流上。发生器可通过前板的触摸屏设置，或经某一数字接口远程配置。

All models within this series include a true function generator which can generate typical functions, as displayed in the figure 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.

预设函数会为用户提供所有必须的参数，如Y偏差值，时间/频率或幅度，整套配置完成。

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



除了基于任意发生器产生的标准函数外，它还可形成某些复杂的函数，并能分成多达99组序列。这些可用于研发和生产的测试。通过前板的USB端口可将这些序列上载使用或存储于标准U盘上，这样可方便更换不同的测试序列。

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 99 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.

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此外还有一个XY发生器，能产生如UI或IU这类的函数，用户一般以表格（CSV文档）形式创建，然后从U盘上上传。

针对光伏相关的测试，还可形成PV曲线，作为用户可调关键参数。

通过后续的固件升级，可安装更多的曲线特性，供用户选择。

主-从操作

所有产品默认有一个数字式主-从总线。通过它可并联最多32台同型号产品，将实际电压、电流与功率汇总，形成更大的系统。经产品上的控制面板，或经任意数字通讯接口的远程控制，可完成主-从系统的全部配置。主机的操作可手动控制，也可远程控制（任意接口）。

控制软件

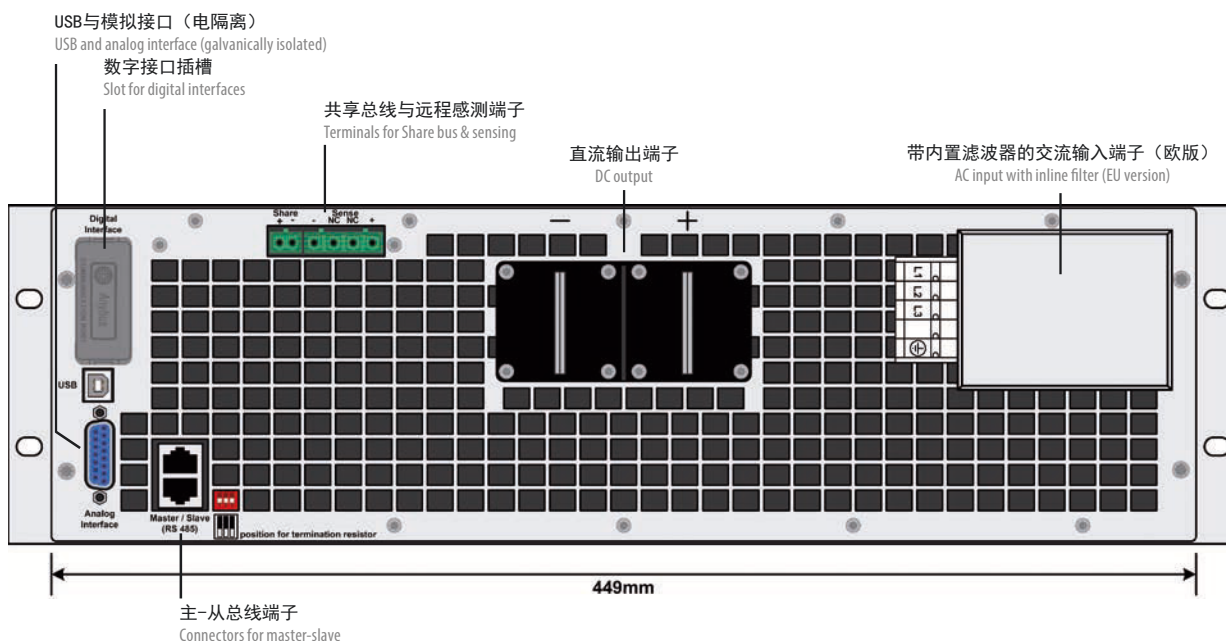
本产品还配有适合Windows系统下操作的控制软件，可以远程控制多台同型号产品，甚至不同型号产品。它有一个清晰的主界面，显示所有设定值与实际值，SCPI与ModBus RTU指令的直接输入模式，固件升级特性，以及被称为“排序”的半自动化控制表格。

选项

- 适合RS232、CAN、CANopen、ModBus TCP、Profibus、Profinet/IO、EtherCAT或Ethernet的绝缘数字接口模块。接口插槽位于产品后板（仅针对标准型号），方便用户插上新模块或替换当前模块。产品会自动检测接口，并提示需要进行少许的配置或不用配置。也可参考第134页。
- 还可安装带固定 GPIB端口的三位接口（3 W），代替接口模块用的默认插槽。
- 高速跃变（见第144页）*
- 水冷（按需可供，详见页面145）

* 并非针对所有电压 - 请咨询我们获取更多信息

产品视图



标准版后视图

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 form of tables (CSV file) and then loaded from USB drive.

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

Even more characteristics can be installed for user selection by applying future firmware updates.

Master-slave

All models feature a digital master-slave bus by default. It can be used to connect up to 32 units of identical models in parallel operation to a bigger system with totals formation of the actual value of voltage, current and power. The configuration of the master-slave system is either completely done on the control panels of the units or by remote control via any of digital communication interfaces. Handling of the master unit is possibly by manual or remote control (any interface).

Control software

Included with the device is a control software for Windows PC, which allows for the remote control of multiple identical or even different types of devices. It has a clear interface for all set and actual values, a direct input mode for SCPI and ModBus RTU commands, a firmware update feature and the semi-automatic table control named "Sequencing".

Options

- Digital interface modules for RS232, CAN, CANopen, ModBus TCP, Profibus, Profinet/IO, EtherCAT or Ethernet. The interface slot is located on the rear panel (standard models only), 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. See page 134.
- Three-way interface (3W) with a rigid GPIB port installed instead of the default slot for retrofittable interface modules
- High Speed ramping (see page 144) *
- Water Cooling (upon request, also see page 145)

* Not available for all voltages - please quote for availability

Product views

Rear view of base model

EA-PSI 9000 3U 3.3 kW - 15 kW



技术参数	Technical Data	Series PSI 9000 3U / 系列
交流：供电	AC: Supply	
- 电压标准	- Voltage standard	欧版型号 / European models: 340...460 V, 2ph/3ph 美版型号 / US models: 188...229 V, 2ph/3ph
- 频率	- Frequency	45...66 Hz
- 功率因数	- Power factor	>0.99
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
- 0-100%的负载调整率	- Load regulation 0-100%	<额定值的0.05% / <0.05% of rated value
- ±10% ΔU _{AC} 的线性调整率	- Line regulation ±10% ΔU _{AC}	<额定值的0.02% / <0.02% of rated value
- 带载10-100%调整需时	- Regulation 10-100% load	<2 ms
- 带载10-90%的斜率	- Slew rate 10-90%	最大 / Max. 30 ms
- 过压保护	- Overvoltage protection	可调, 0...110% U _{Nenn} / Adjustable, 0...110% U _{Nom}
- 直流关闭时空载放电时间	- No load discharge time on DC off	100% U 降至 / to <60 V; 少于 10 s / less than 10 s
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔU _{DC} 的负载调整率	- Load regulation 1-100% ΔU _{DC}	<额定值的0.15% / <0.15% of rated value
- ±10% ΔU _{AC} 的线性调整率	- Line regulation ±10% ΔU _{AC}	<额定值的0.05% / <0.05% of rated value
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的1% / <1% of rated value
过压类别	Overvoltage category	2
保护功能	Protection	OT, OVP, OPP, OCP, PF ⁽²⁾
隔离耐压 1	Insulation 1	
- 交流输入对外壳	- AC input to enclosure	2500 V DC
- 交流输入对直流输出	- AC input to DC output	2500 V DC
- 直流输出对外壳 (PE)	- DC output to enclosure (PE)	依型号而定, 具体见后面表格 / Depending on model, see tables
污染等级	Degree of pollution	2
保护等级	Protection class	1
显示器与面板	Display and panel	带触摸面板的图形显示器 / Graphics display with touch panel
数字接口	Digital interfaces	
- 内置	- Built-in	1x 通讯用B类USB端口 / 1x USB type B for communication 1x GPIB (3W选项功能时可选) / 1x GPIB (optional with option 3W)
- 插槽	- Slot	1x 可拆卸内置模块 (仅针对标准版) / 1x for retrofittable plug-in modules (standard models only)
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
- 输入范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U, I, P, R, 远程开-关, 直流输出开-关, 内阻模式开-关 / U, I, P, R, Remote on-off, DC output on-off, resistance mode on-off
- 输出脚	- Outputs	U/I, 过压, 报警, 参考电压 / U/I, Overvoltage, alarms, reference voltage
- U / I / P / R精确度	- Accuracy U / I / P / R	0...10 V: <0.2% 0...5 V: <0.4%
并联操作	Parallel operation	可实现, 通过真实主-从操作, 可接多达32台产品 / Yes, with master-slave, up to 32 units
安规标准	Standards	EN 61326, IEC 1010, EN 61010 EMC获得 TÜV 认证, 符合 / EMC TÜV approved according to IEC 61000-6-2:2005 IEC 61000-6-3:2006 Class B / 等级B
制冷方式	Cooling	温控风扇 (可选水冷) / Temperature controlled fans (optional: water)
工作温度	Operation temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
相对湿度	Relative humidity	<80%, 无凝露 / non-condensing
工作高度	Operation altitude	<2000 m
尺寸 (宽 高 深) ⁽¹⁾	Dimensions (W H D) ⁽¹⁾	19"x 3 HE / 3U x 609 mm

(1) 外壳尺寸非整体尺寸 / Enclosure only, not overall
(2) 见第146页 / See page 146

EA-PSI 9000 3U 3.3 kW - 15 kW

技术参数	Technical Data	PSI 9040-170 3U	PSI 9080-170 3U	PSI 9200-70 3U	PSI 9360-40 3U
额定电压&范围	Rated voltage & range	0...40 V	0...80 V	0...200 V	0...360 V
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<200 mV _{PP} <16 mV _{RMS}	<200 mV _{PP} <16 mV _{RMS}	<300 mV _{PP} <40 mV _{RMS}	<550 mV _{PP} <65 mV _{RMS}
- 感测补偿电压	- Sensing compensation	~1 V	~2 V	~5 V	~7.5 V
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±400 V DC	±400 V DC	±400 V DC	±400 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±400 V DC	±400 V DC	±600 V DC	±600 V DC
额定电流&范围	Rated current & range	0...170 A	0...170 A	0...70 A	0...40 A
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<80 mA _{RMS}	<80 mA _{RMS}	<22 mA _{RMS}	<18 mA _{RMS}
额定功率&范围	Rated power & range	0...3300 W	0...5000 W	0...5000 W	0...5000 W
效率	Efficiency	~93%	~93%	~95%	~93%
U的编程分辨率	Programming resolution U	≤2 mV	≤4 mV	≤9 mV	≤15 mV
I的编程分辨率	Programming resolution I	≤7 mA	≤7 mA	≤3 mA	≤2 mA
重量 ⁽²⁾	Weight ⁽²⁾	~17 kg	~17 kg	~17 kg	~17 kg
订购编号-欧版 ⁽³⁾	Ordering number Euro ⁽³⁾	06230350	06230351	06230352	06230353
订购编号-美版 ⁽³⁾	Ordering number US ⁽³⁾	06238350	06238351	06238352	06238353

技术参数	Technical Data	PSI 9500-30 3U	PSI 9750-20 3U	PSI 9040-340 3U	PSI 9040-510 3U
额定电压&范围	Rated voltage & range	0...500 V	0...750 V	0...40 V	0...40 V
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<350 mV _{PP} <70 mV _{RMS}	<800 mV _{PP} <200 mV _{RMS}	<320 mV _{PP} <25 mV _{RMS}	<320 mV _{PP} <25 mV _{RMS}
- 感测补偿电压	- Sensing compensation	~10 V	~15 V	~1 V	~1 V
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±725 V DC	±725 V DC	±400 V DC	±400 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±1000 V DC	±1000 V DC	±400 V DC	±400 V DC
额定电流&范围	Rated current & range	0...30 A	0...20 A	0...340 A	0...510 A
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<16 mA _{RMS}	<16 mA _{RMS}	<160 mA _{RMS}	<120 mA _{RMS}
额定功率&范围	Rated power & range	0...5000 W	0...5000 W	0...6600 W	0...10000 W
效率	Efficiency	~95.5%	~94%	~93%	~93%
U的编程分辨率	Programming resolution U	≤21 mV	≤31 mV	≤2 mV	≤2 mV
I的编程分辨率	Programming resolution I	≤2 mA	≤1 mA	≤14 mA	≤21 mA
重量 ⁽²⁾	Weight ⁽²⁾	~17 kg	~17 kg	~24 kg	~30 kg
订购编号-欧版 ⁽³⁾	Ordering number Euro ⁽³⁾	06230354	06230355	06230356	06230363
订购编号-美版 ⁽³⁾	Ordering number US ⁽³⁾	06238354	06238355	06238356	06238363

技术参数	Technical Data	PSI 9080-340 3U	PSI 9200-140 3U	PSI 9360-80 3U	PSI 9500-60 3U
额定电压&范围	Rated voltage & range	0...80 V	0...200 V	0...360 V	0...500 V
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<320 mV _{PP} <25 mV _{RMS}	<300 mV _{PP} <40 mV _{RMS}	<550 mV _{PP} <65 mV _{RMS}	<350 mV _{PP} <70 mV _{RMS}
- 感测补偿电压	- Sensing compensation	~2 V	~5 V	~7.5 V	~10 V
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±400 V DC	±400 V DC	±400 V DC	±725 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±400 V DC	±600 V DC	±600 V DC	±1000 V DC
额定电流&范围	Rated current & range	0...340 A	0...140 A	0...80 A	0...60 A
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<160 mA _{RMS}	<44 mA _{RMS}	<35 mA _{RMS}	<32 mA _{RMS}
额定功率&范围	Rated power & range	0...10000 W	0...10000 W	0...10000 W	0...10000 W
效率	Efficiency	~93%	~95%	~93%	~95%
U的编程分辨率	Programming resolution U	≤4 mV	≤9 mV	≤15 mV	≤21 mV
I的编程分辨率	Programming resolution I	≤14 mA	≤6 mA	≤4 mA	≤3 mA
重量 ⁽²⁾	Weight ⁽²⁾	~24 kg	~24 kg	~24 kg	~24 kg
订购编号-欧版 ⁽³⁾	Ordering number Euro ⁽³⁾	06230357	06230358	06230359	06230360
订购编号-美版 ⁽³⁾	Ordering number US ⁽³⁾	06238357	06238358	06238359	06238360

⁽¹⁾ RMS值: 在BWL 300 kHz时测量的LF值, PP值: 在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

⁽²⁾ 为标准版的重量, 带选项功能的则不同 / Weight of the base version, models with option(s) may vary

⁽³⁾ 为标准版的订购编号, 带选项功能的则不同 / Ordering number of the base version, models with option(s) installed have different ordering numbers



EA-PSI 9000 3U 3.3 kW - 15 kW



技术参数	Technical Data	PSI 9750-40 3U	PSI 91000-30 3U	PSI 9080-510 3U	PSI 9200-210 3U
额定电压&范围	Rated voltage & range	0...750 V	0...1000 V	0...80 V	0...200 V
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<800 mV _{PP} <200 mV _{RMS}	<1600 mV _{PP} <350 mV _{RMS}	<320 mV _{PP} <25 mV _{RMS}	<300 mV _{PP} <40 mV _{RMS}
- 感测补偿电压	- Sensing compensation	~15 V	~20 V	~2.5 V	~6 V
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±725 V DC	±725 V DC	±400 V DC	±400 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±1000 V DC	±1000 V DC	±400 V DC	±600 V DC
额定电流&范围	Rated current & range	0...40 A	0...30 A	0...510 A	0...210 A
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<32 mA _{RMS}	<22 mA _{RMS}	<240 mA _{RMS}	<66 mA _{RMS}
额定功率&范围	Rated power & range	0...10000 W	0...10000 W	0...15000 W	0...15000 W
效率	Efficiency	~94%	~95%	~93%	~95%
U的编程分辨率	Programming resolution U	≤31 mV	≤41 mV	≤4 mV	≤9 mV
I的编程分辨率	Programming resolution I	≤2 mA	≤2 mA	≤21 mA	≤9 mA
重量 ⁽²⁾	Weight ⁽²⁾	~24 kg	~24 kg	~30 kg	~30 kg
订购编号-欧版 ⁽³⁾	Ordering number Euro ⁽³⁾	06230361	06230362	06230364	06230365
订购编号-美版 ⁽³⁾	Ordering number US ⁽³⁾	06238361	06238362	06238364	06238365

技术参数	Technical Data	PSI 9360-120 3U	PSI 9500-90 3U	PSI 91000-40 3U	PSI 9750-60 3U	PSI 91500-30 3U
额定电压&范围	Rated voltage & range	0...360 V	0...500 V	0...1000 V	0...750 V	0...1500 V
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<550 mV _{PP} <65 mV _{RMS}	<350 mV _{PP} <70 mV _{RMS}	<2000 mV _{PP} <300 mV _{RMS}	<800 mV _{PP} <200 mV _{RMS}	<2400 mV _{PP} <400 mV _{RMS}
- 感测补偿电压	- Sensing compensation	~7.5 V	~10 V	~20 V	~15 V	~30 V
隔离耐压	Insulation					
- 直流负极 <-> PE	- Negative DC pole <-> PE	±400 V DC	±725 V DC	±725 V DC	±725 V DC	±725 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±600 V DC	±1000 V DC	±1000 V DC	±1000 V DC	±1500 V DC
额定电流&范围	Rated current & range	0...120 A	0...90 A	0...40 A	0...60 A	0...30 A
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<50 mA _{RMS}	<48 mA _{RMS}	<22 mA _{RMS}	<48 mA _{RMS}	<26 mA _{RMS}
额定功率&范围	Rated power & range	0...15000 W	0...15000 W	0...15000 W	0...15000 W	0...15000 W
效率	Efficiency	~93%	~95%	~95%	~94%	~95%
U的编程分辨率	Programming resolution U	≤15 mV	≤21 mV	≤41 mV	≤31 mV	≤61 mV
I的编程分辨率	Programming resolution I	≤5 mA	≤4 mA	≤2 mA	≤3 mA	≤2 mA
重量 ⁽²⁾	Weight ⁽²⁾	~30 kg	~30 kg	~30 kg	~30 kg	~30 kg
订购编号-欧版 ⁽³⁾	Ordering number Euro ⁽³⁾	06230366	06230367	06230370	06230368	06230369
订购编号-美版 ⁽³⁾	Ordering number US ⁽³⁾	06238366	06238367	06238370	06238368	06238369

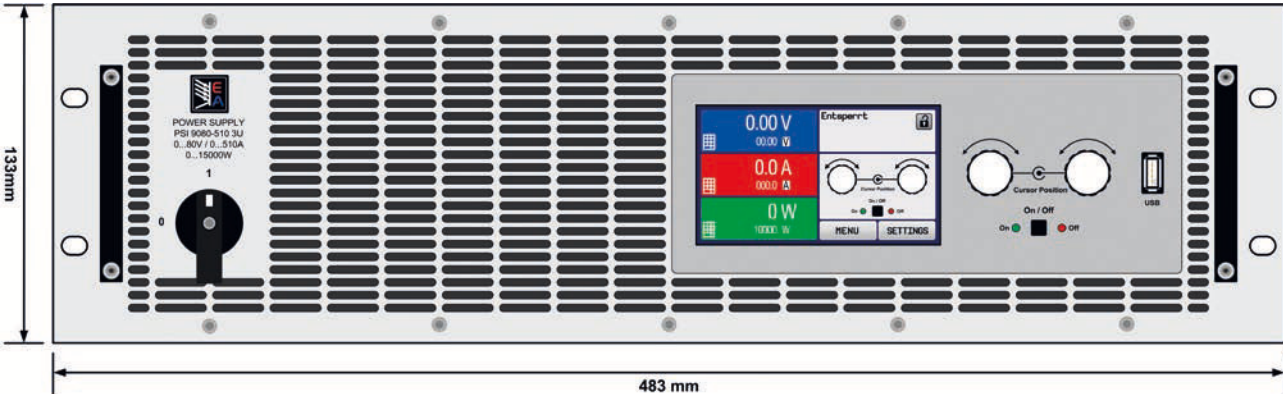
(1) RMS值: 在BWL 300 kHz时测量的LF值, PP值: 在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

(2) 为标准版的重量, 带选项功能的则不同 / Weight of the base version, models with option(s) may vary

(3) 为标准版的订购编号, 带选项功能的则不同 // Ordering number of the base version, models with option(s) installed have different ordering numbers

产品视图

Product views



EA-PSI 9000 3U SLAVE 15 kW

EA-PSI 9000 3U系列从机电源模块

Slave power supply modules for series EA-PSI 9000 3U



EA-PSI 9500-00 3U Slave

A

B

C

D

E

一般信息

被称为“从机模块”的EA-PSI 9000 3U Slave系列，可快速地扩展EA-PSI 9000 3U系列15kW型号的功率，且还节省成本。它们可并联，并进行主-从操作，最多可组合32台，以获得额定功率高达480 kW的直流电源系统。其所有技术规格都与EA-PSI 9000 3U系列一模一样，除了几个连接端子外。

操作与配置

正常的控制面板精简到剩下几个必要部件。为配合手动操作、状态指示与配置，配有少数几个LED灯，一个按钮，以及一个USB端口。本系列经前板USB端口可通过软件配置，比如EA Power Control（见136页）。

主-从系统

主-从系统的配置简易又快捷。将从机模块与主机装在一起，比如在一19“机柜内。将产品连至交流供电端，并联他们的直流输出（连线或铜条），再经主-从总线与共享总线连接起来。主机上的操作仅为启动主从操作，然后整个系统将按照通电的机器数量自己配置，并准备好供用户使用或者软件操作。

General

The so-called “slave module” of series EA-PSI 9000 3U Slave are available for quick and cost saving power extension of 15 kw models of series EA-PSI 9000 3U. Their purpose is to run in parallel connection and master-slave operation of up to 32 units in total, in order to achieve DC power supply systems with power ratings of up to 480 kW. All technical specifications are identical to EA-PSI 9000 3U series, except for the available connectors.

Handling and configuration

The extensive control panel, as usual with regular power supply models, has been reduced to the absolute necessary. For manual handling, status indication and configuration it offers a few LEDs, a pushbutton and an USB port. The devices are configured with software through the front USB port, for example with EA Power Control (see page 136).

Master-slave system

Configuring a master-slave system is very quick and easy. The slave modules and the master unit are installed together, for example in a 19” cabinet. Then they are connected to the AC supply and paralleled on their DC outputs (cables or copper bars), plus also linked via master-slave bus and Share bus. The only thing to do on the master is to enable master-slave and the system will self-configure to the number of powered units and represent itself to the user or a control software accordingly.

型号	功率	电压	电流	重量	适用于	尺寸 (宽x高x深)	订购编号
Model	Power	Voltage	Current	Weight	Suitable for	Dimensions (WxHxD)	Ordering number
EA-PSI 9080-510 3U Slave	0...15000 W	0...80 V	0...510 A	~ 30 kg	EA-PSI 9080-510 3U	483 mm x 3 HE / 3 U x 610 mm	06290364
EA-PSI 9200-210 3U Slave	0...15000 W	0...200 V	0...210 A	~ 30 kg	EA-PSI 9200-210 3U	483 mm x 3 HE / 3 U x 610 mm	06290365
EA-PSI 9360-120 3U Slave	0...15000 W	0...360 V	0...120 A	~ 30 kg	EA-PSI 9360-120 3U	483 mm x 3 HE / 3 U x 610 mm	06290366
EA-PSI 9500-90 3U Slave	0...15000 W	0...500 V	0...90 A	~ 30 kg	EA-PSI 9500-90 3U	483 mm x 3 HE / 3 U x 610 mm	06290367
EA-PSI 9750-60 3U Slave	0...15000 W	0...750 V	0...60 A	~ 30 kg	EA-PSI 9750-60 3U	483 mm x 3 HE / 3 U x 610 mm	06290368
EA-PSI 91500-30 3U Slave	0...15000 W	0...1500 V	0...30 A	~ 30 kg	EA-PSI 91500-30 3U	483 mm x 3 HE / 3 U x 610 mm	06290369

EA-PSI 9000 WR 3U 5 kW - 15 kW



宽范围输入的高效直流电源

High efficiency DC Power supplies with extended AC input range



EA-PSI 9200-210 WR 3U



- 多相输入342 - 528 V_{AC}
- 效率高达95.5%
- 输出功率等级: 5 kW, 10 kW, 或15 kW, 还可扩展至480 kW
- 输出电压: 40 V 至 1500 V
- 输出电流: 30 A 至 510 A, 还可扩展至5100 A
- 灵活的功率调整输出级
- 各种保护功能 (OVP, OCP, OPP, OTP)
- 内置真实函数发生器
- 光伏方阵模拟功能
- 内阻模拟与调整

- Multi-phase input for 342 - 528 V_{AC}
- High efficiency up to 95.5%
- Output power ratings: 5 kW, 10 kW or 15 kW, expandable up to 480 kW
- Output voltages: 40 V up to 1500 V
- Output currents: 30 A up to 510 A, expandable up to 5100 A
- Flexible, power regulated output stage
- Various protection circuits (OVP, OCP, OPP, OTP)
- Integrated true function generator
- Photovoltaic array simulation
- Internal resistance simulation and regulation

概要

EA-PSI 9000 WR 3U系列是一款由微处理器控制的高效实验室电源, 它是流行机EA-PSI 9000 3U系列在交流供电方面的升级版。其供电端可连接到额定电压为**380 V, 400 V或480 V**的通用公共电网上。本系列增加了一个功能, 加强了直流输出对地的隔离(见规格参数表)。这对太阳能板模拟这样的光伏应用是非常重要的, 因为太阳能逆变器要与电源连接, 进行终端测试。

交流供电

系列名称中, „WR“代表“宽范围”, 指**342 V - 528 V**宽范围的交流输入电压。所有其它功能与多数技术参数都与EA-PSI 9000 3U系列一样。

General

The microprocessor controlled high efficiency power supplies of series EA-PSI 9000 WR 3U are an advancement of the well-known series EA-PSI 9000 3U regarding the AC supply connection to common international grids with **380 V, 400 V or 480 V** nominal voltage.

The series furthermore features increased insulation of the DC output against ground (see technical specifications). This is especially required for photovoltaics applications such as solar panel simulation, in which solar inverters are connected to the power supply while running end tests.

AC supply

The “WR” in the name stands for “wide range” and point to the extended AC input range of **342 - 528 V**. All other functionality and most of the technical specifications are identical to series EA-PSI 9000 3U.

EA-PSI 9000 WR 3U 5 kW - 15 kW

扩展功能

本系列15 kW型号的功率可以扩展至480 kW，合并所谓的从机系列EA-PSI 9000 WR 3U Slave可以实现。它们需在主-从模式下运行，并与本系列的一个型号作为主机并联。一个该系统总共可以扩展32台机器。

按需求，我们可以提供全部配置好即时使用的机柜，也可供多机柜系统。更多信息请参考页面138。

直流输出

与EA-PSI 9000 3U系列相比，本系列多出4个额外的型号，其中一个就是第一次才有的60 V型号。这个电压级别特别应用于需超低压（SELV）的应用中。因此用户可在60 V至1500 V直流电压，20 A至510 A，功率为5 kW至15 kW之间的型号进行选择。

选项

- 适用于RS232, CAN, CANopen, ModBus TCP, Profibus, Profinet/IOT, EtherCAT 或 Ethernet的数字接口模块。接口插槽位于产品后板（仅标准版，无3W选项的方有）。用户只需插入新的接口，就能轻易更换旧款。接口卡能被产品自动检测到，且无需或仅需很少的配置。可参考页面134。
- 带固定 GPIB端口的三路接口（3W）可以代替可拆装接口模块默认插槽
- 告诉跃变选项（见页面144）*
- 水冷选项（按需可供，也见页面145）

* 非所有电压级别的都有—请咨询后再报价

Extensibility

For power extension of the 15 kW models in this series up to 480 kW there are so-called slave units from series EA-PSI 9000 WR 3U Slave available. Those are intended to run in **master-slave mode** and parallel connection with a master unit of this series, while the system can be extended to have up to 32 units in total.

Upon request, fully configured and ready-to-use cabinets, even as multi-cabinet system, are available. More information about these system can found from page 138.

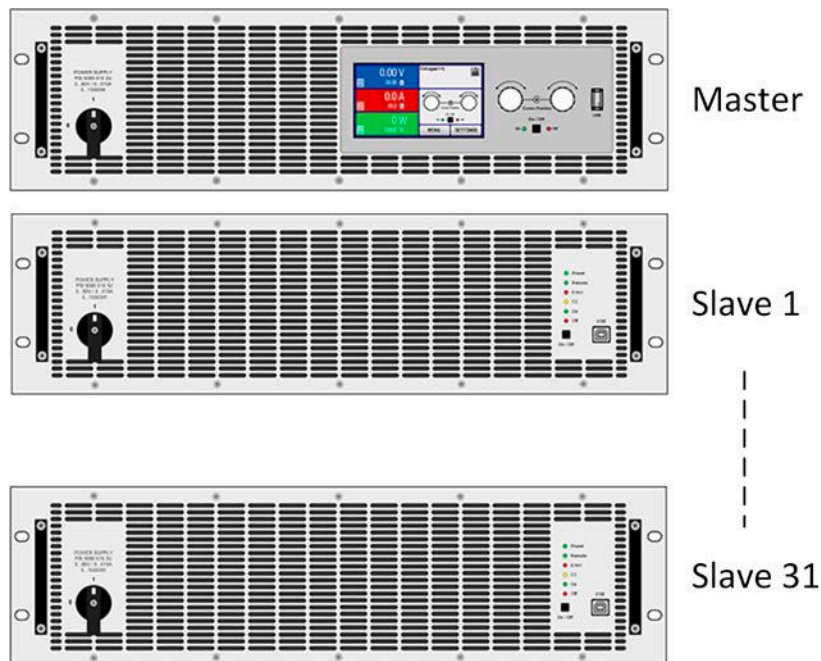
DC output

Compared to series EA-PSI 9000 3U this series features four additional models, amongst them for the first time models with 60 V rating. These are intended especially for the use in applications which requires extra low safety voltages (SELV). Thus the user can choose between models with DC voltages of 60 V to 1500 V, currents of 20 A to 510 A and power ratings of 5 kW to 15 kW.

Options

- Digital interface modules for RS232, CAN, CANopen, ModBus TCP, Profibus, Profinet/IOT, EtherCAT or Ethernet. The interface slot is located on the rear panel (only standard models without option 3W), 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. See page 134.
- Three-way interface (3W) with a rigid GPIB port installed instead of the default slot for retrofittable interface modules
- High Speed ramping (see page 144) *
- Water cooling (upon request, also see page 145)

* Not available for all voltages - please quote for availability



PSI 9000 WR 与 PSI 9000 WR Slave系列的连接原理图

Principle view of PSI 9000 WR with PSI 9000 WR Slave

EA-PSI 9000 WR 3U 5 kW - 15 kW



技术参数	Technical Data	Serie / Series PSI 9000 WR 3U
交流：供电	AC: Supply	
- 电压	- Voltage	342...528 V, 2ph/3ph
- 频率	- Frequency	45...66 Hz
- 功率因数	- Power factor	>0.99
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
- 0-100%的负载调整率	- Regulation 0-100% load	<2 ms
- 带载10-90%的斜率	- Slew rate 10-90%	最大 / Max. 30 ms
- 过压保护	- Overvoltage protection	可调, 0...110% U _{Nenn} / Adjustable, 0...110% U _{Nom}
- 直流关闭时空载放电时间	- No load discharge time on DC off	100% U 降至 / to <60 V: 少于 10 s / less than 10 s
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rating
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的1% / <1% of rated value
过压类别	Overvoltage category	2
保护功能	Protection	OT, OVP, OCP, OPP, PF ⁽²⁾
隔离耐压 1	Insulation 1	
- 交流输入对外壳	- AC input to enclosure	2500 V DC
- 交流输入对直流输出	- AC input to DC output	2500 V DC
- 直流输出对外壳 (PE)	- DC output to enclosure (PE)	依型号而定, 具体见后面表格 / Depending on model, see tables
显示器与面板	Display and panel	带触摸面板的图形显示器 / Graphics display with touch panel
并联操作	Parallel operation	可实现, 通过真实主-从, 可接多达32台产品 (经共享总线) / Yes, with true master-slave, up to 32 units (via Share bus)
制冷方式	Cooling	温控风扇 (可选水冷) / Temperature controlled fans (optional: water)

(1 仅为外壳尺寸, 非整体尺寸 / Enclosure only, not overall

(2 可参考页面146 / See page 146

型号	功率	电压	电流	重量	是否可接从机?	隔离 2		订购编号 ⁽¹⁾
						直流负极对外壳	直流正极对外壳	
Model	Power	Voltage	Current	Weight	Slave extension?	Insulation 2		Ordering number ⁽¹⁾
						DC- to enclosure	DC+ to enclosure	
EA-PSI 9060-170 WR	0...5000 W	0...60 V	0...170 A	~ 18 kg	-	±400 V _{DC}	±400 V _{DC}	06270350
EA-PSI 9080-170 WR	0...5000 W	0...80 V	0...170 A	~ 18 kg	-	±400 V _{DC}	±400 V _{DC}	06270351
EA-PSI 9200-70 WR	0...5000 W	0...200 V	0...70 A	~ 18 kg	-	±400 V _{DC}	±600 V _{DC}	06270352
EA-PSI 9360-40 WR	0...5000 W	0...360 V	0...40 A	~ 18 kg	-	±400 V _{DC}	±600 V _{DC}	06270353
EA-PSI 9500-30 WR	0...5000 W	0...500 V	0...30 A	~ 18 kg	-	±1500 V _{DC}	±1800 V _{DC}	06270354
EA-PSI 9750-20 WR	0...5000 W	0...750 V	0...20 A	~ 18 kg	-	±1500 V _{DC}	±1800 V _{DC}	06270355
EA-PSI 9060-340 WR	0...10000 W	0...60 V	0...340 A	~ 25 kg	-	±400 V _{DC}	±400 V _{DC}	06270356
EA-PSI 9080-340 WR	0...10000 W	0...80 V	0...340 A	~ 25 kg	-	±400 V _{DC}	±400 V _{DC}	06270357
EA-PSI 9200-140 WR	0...10000 W	0...200 V	0...140 A	~ 25 kg	-	±400 V _{DC}	±600 V _{DC}	06270358
EA-PSI 9360-80 WR	0...10000 W	0...360 V	0...80 A	~ 25 kg	-	±400 V _{DC}	±600 V _{DC}	06270359
EA-PSI 9500-60 WR	0...10000 W	0...500 V	0...60 A	~ 25 kg	-	±1500 V _{DC}	±1800 V _{DC}	06270360
EA-PSI 9750-40 WR	0...10000 W	0...750 V	0...40 A	~ 25 kg	-	±1500 V _{DC}	±1800 V _{DC}	06270361
EA-PSI 9060-510 WR	0...15000 W	0...60 V	0...510 A	~ 32 kg	-	±400 V _{DC}	±400 V _{DC}	06270363
EA-PSI 9080-510 WR	0...15000 W	0...80 V	0...510 A	~ 32 kg	是的 / yes	±400 V _{DC}	±400 V _{DC}	06270364
EA-PSI 9200-210 WR	0...15000 W	0...200 V	0...210 A	~ 32 kg	是的 / yes	±400 V _{DC}	±400 V _{DC}	06270365
EA-PSI 9360-120 WR	0...15000 W	0...360 V	0...120 A	~ 32 kg	是的 / yes	±400 V _{DC}	±600 V _{DC}	06270366
EA-PSI 9500-90 WR	0...15000 W	0...500 V	0...90 A	~ 32 kg	是的 / yes	±1500 V _{DC}	±1800 V _{DC}	06270367
EA-PSI 9750-60 WR	0...15000 W	0...750 V	0...60 A	~ 32 kg	是的 / yes	±1500 V _{DC}	±1800 V _{DC}	06270368
EA-PSI 91000-40 WR	0...15000 W	0...1000 V	0...40 A	~ 32 kg	是的 / yes	±1500 V _{DC}	±1800 V _{DC}	06270370
EA-PSI 91500-30 WR	0...15000 W	0...1500 V	0...30 A	~ 32 kg	是的 / yes	±1500 V _{DC}	±1800 V _{DC}	06270369

(1 订购编号为标准版的编号, 特别版或带选项功能的编号则不同 / Ordering number of the standard version, special models or models with options have different ordering numbers

EA-PSI 9000 WR 3U SLAVE 15 kW

EA-PSI 9000 WR 3U系列从机电源模块

Slave power supply modules for series EA-PSI 9000 WR 3U



EA-PSI 9500-00 WR 3U Slave



一般信息

EA-PSI 9000 WR 3U Slave系列只有15 kW “从机模块”，匹配EA-PSI 9000 WR 3U系列对应型号。其目的就是扩大总功率，并快速组建一个从30 kW至480 kW的电源系统。它们可并联，并进行主-从操作，最多可组合32台。所有技术规格都与EA-PSI 9000 WR 3U系列一模一样，除了几个连接端子外。

操作与配置

扩展后的控制面板精简到剩下几个必要部件。为配合手动操作、状态指示与配置，配有少数几个LED灯，一个按钮，以及一个USB端口。本系列经前板USB端口可通过软件配置，比如EA Power Control (见 136页)。

主-从系统

主-从系统的配置简易又快捷。将从机模块与主机装在一起，比如在一19“机柜内。将产品连至交流供电端，并联他们的直流输出（连线或铜条），再经主-从总线与共享总线连接起来。主机上的操作仅为启动主从操作，然后整个系统将按照通电的机器数量自己配置，并准备好供用户使用或者软件操作。

General

Series EA-PSI 9000 WR 3U Slave features 15 kW “slave modules”, matching the corresponding models of series EA-PSI 9000 WR 3U. Their purpose is to extend the total power and quickly build systems from 30 kW up to 480 kW rated power. They are designed to run in parallel connection and master-slave operation of up to 32 units in total. All technical specification are identical to EA-PSI 9000 WR 3U series, except for the available connectors.

Handling and configuration

The extensive control panel, as usual with regular power supply models, has been reduced to the absolute necessary. For manual handling, status indication and configuration it offers a few LEDs, a pushbutton and an USB port. The devices are configured with software through the front USB port, for example with EA Power Control (see page 136).

Master-slave system

Configuring a master-slave system is done by installing the slave modules and the master unit in, for example, a 19" cabinet. Then they are connected to the AC supply and paralleled on their DC outputs (cables or copper bars), plus also linked via master-slave bus and Share bus. The only thing to do on the master is to enable master-slave and the system will self-configure to the number of powered units and represent itself to the user or a control software accordingly.

型号	功率	电压	电流	重量	适用于	尺寸 (宽x高x深)	订购编号
Model	Power	Voltage	Current	Weight	Suitable for	Dimensions (WxHxD)	Ordering number
EA-PSI 9080-510 WR 3U Slave	0...15000 W	0...80 V	0...510 A	~ 32 kg	EA-PSI 9080-510 WR 3U	483 mm x 3 HE / 3 U x 670 mm	06280364
EA-PSI 9200-210 WR 3U Slave	0...15000 W	0...200 V	0...210 A	~ 32 kg	EA-PSI 9200-210 WR 3U	483 mm x 3 HE / 3 U x 670 mm	06280365
EA-PSI 9360-120 WR 3U Slave	0...15000 W	0...360 V	0...120 A	~ 32 kg	EA-PSI 9360-120 WR 3U	483 mm x 3 HE / 3 U x 670 mm	06280366
EA-PSI 9500-90 WR 3U Slave	0...15000 W	0...500 V	0...90 A	~ 32 kg	EA-PSI 9500-90 WR 3U	483 mm x 3 HE / 3 U x 670 mm	06280367
EA-PSI 9750-60 WR 3U Slave	0...15000 W	0...750 V	0...60 A	~ 32 kg	EA-PSI 9750-60 WR 3U	483 mm x 3 HE / 3 U x 670 mm	06280368
EA-PSI 91000-40 WR 3U Slave	0...15000 W	0...1000 V	0...40 A	~ 32 kg	EA-PSI 91000-40 WR 3U	483 mm x 3 HE / 3 U x 670 mm	06280370
EA-PSI 91500-30 WR 3U Slave	0...15000 W	0...1500 V	0...30 A	~ 32 kg	EA-PSI 91500-30 WR 3U	483 mm x 3 HE / 3 U x 670 mm	06280369

EA-PSI 9000 15U/24U 30 kW - 90 kW



可编程高效直流电源

Programmable high efficiency DC Power supplies



EA-PSI 9000 15U



EA-PSI 9000 24U



- 三相输入电压400 V 与 50/60 Hz
- 输出功率：在30 kW和90 kW之间
- 输出电压：80 V, 200 V, 360 V, 500 V, 750 V, 1500 V
- 输出电流可达3060 A
- 产品全部预设好，线也连好，可随时安装使用
- 内装PSI 9000 3U 系列电源，具有下列功能：
 - 真实函数发生器
 - 内置USB与模拟接口
 - 可选接口模块插槽，适用于Profinet, Profibus, CAN, CANopen, RS232, Ethernet或ModBus TCP
 - 支持SCPI与ModBus RTU指令
 - 带彩色TFT触摸屏

概要

EA-PSI 9000 15U/24U系列，是由PSI 9000 3U系列大功率型号全部装于标准的19" 机柜扩展而来的新产品。共能组成30种不同的配置，形成5种不同的功率级别。

一个机柜系统可被当作一个单独的加大功率电源，可手动操作与远程控制，同时还具有PSI 9000 3U系列标准型号的基本功能。

一般有两个基本款机柜，一款为15 U高，可形成30 kW与45 kW的功率，另一款为24 U高，形成60 kW, 75 kW与90 kW的功率。机柜的前后门可锁定，还有四个轮脚可固定。本机柜系统可全部配置好后发送给用户，待安装于目标位置后即可使用。

- For three-phase supply 400 V and 50/60 Hz
- Output power ratings: between 30 kW and 90 kW
- Output voltages: 80 V, 200 V, 360 V, 500 V, 750 V, 1500 V
- Currents of up to 3060 A
- Pre-configured, pre-wired, ready to be installed
- Including power supplies of series EA-PSI 9000 3U with:
 - True function generator
 - USB and analog interface built in
 - Slot for optional interface modules Profinet, Profibus, CAN, CANopen, RS232, Ethernet, ModBus TCP
 - Support for SCPI and ModBus RTU commands
 - Colour TFT touch panel

General

The new series EA-PSI 9000 15U/24U extends the power supply series EA-PSI 9000 3U with high power model in standard 19" cabinets. There is a choice of 30 different configurations in 5 different power ratings.

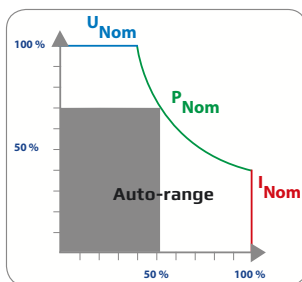
A cabinet system is considered as a single power supply device with extended power, with manual handling and remote control being usual, while offering the same features like the standard models of EA-PSI 9000 3U series.

There will be two base cabinets, one with 15 U of height for 30 kW and 45 kW and one with 24 U of height for 60 kW, 75 kW and 90 kW. The cabinet itself has lockable rear and front doors, as well as four casters which can be fixed. The system will be shipped completely configured and will be ready to use right after installation on location.

EA-PSI 9000 15U/24U 30 kW - 90 kW

功率级自动调整

本系列所有型号的输出功率都可灵活调整。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定功率范围内。它们的设定功率都可调，因此仅用一台产品就能覆盖广泛的应用。



Auto-ranging power stage

All models are equipped with a flexible auto-ranging output stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. The power set value is adjustable with these models. Therefore, a wide range of applications can already be covered by the use of just one unit.

直流输出

本系列有0...40 V和0...1500 V输出电压，0...60 A和0...3060 A输出电流，0...30 kW，0...45 kW，0...60 kW，0...75 kW或0...90 kW输出功率的不同型号。输出端位于产品后面板上。

DC output

DC output voltages between 0...80 V and 0...1500 V, output currents between 0...60 A and 0...3060 A and output power ratings of 0...30 kW, 0...45 kW, 0...60 kW, 0...75 kW or 0...90 kW are available. The output terminal is located on the rear panel.

显示器与控制面板

设定与实际输出电压、电流与功率都清晰显示于图形显示器上。彩色的TFT屏幕为点触式，用一个手指就能控制所有功能。

Display and control panel

Set values and actual values of output voltage, output current and output power are clearly represented on the graphic display. The colour TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger.

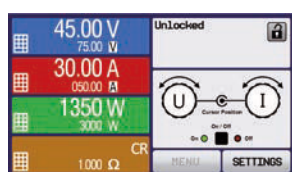
通过旋钮或者数字键盘直接输入参数，也可调节设定电压、电流、功率或阻值（内阻模拟）。

Set values of voltage, current, power or resistance (internal resistance simulation) can be adjusted using the rotary knobs or entered directly via a numeric pad.

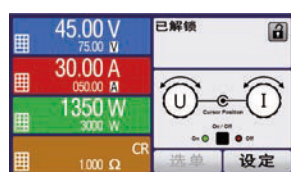
若想防止意外操作，可锁定所有操作键。

To prevent unintentional operations, all operation controls can be locked.

多语言控制面板



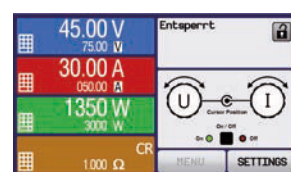
英文 / English



中文 / Chinese



俄文 / Russian



德文 / German

函数发生器

本系列所有型号都具有一可形成如下典型函数的真实函数发生器，并能将它们应用于输出电压或输出电流上。发生器可通过前板的触摸屏设置，或经某一数字接口远程配置。

预设函数会为用户提供所有必须的参数，如Y偏差值，时间/频率或幅度，整套配置完成。

Function generator

All models within this series include a true function generator which can generate typical functions, as displayed in the figure 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.

选项

- 适合 RS232、CAN、CANopen、ModBus TCP、Profibus、Profinet/IO、EtherCAT或Ethernet 的绝缘数字接口模块。接口插槽位于产品后板（仅针对标准型号），方便用户插上新模块或替换当前模块。产品会自动检测接口，并提示需要进行少许的配置或不用配置。也可参考第134页。
- 水冷选项（按需可供，也可见页面 145）
- 带停止开关、门磁开关以及外部断路器接触器用螺丝端子的紧急停止系统

Options

- Digital interface modules for RS232, CAN, CANopen, ModBus TCP, Profibus, Profinet/IO, EtherCAT or Ethernet. The interface slot is located on the rear panel (standard models only), 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. See page 134.
- Water cooling (upon request, also see page 145)
- Emergency stop system with stop switch, door contacts and screw terminals for external breaker contacts

EA-PSI 9000 15U/24U 30 kW - 90 kW



A

B

C

D

E

24U 90 kW后视图 /
Rear view 24U 90 kW直流总线端 /
DC bus terminal交流输入端 /
AC input terminal

型号	电压	电流	功率	输出电容	交流电流	隔离耐压 DC <> PE		高度	订购编号
Model	Voltage	Current	Power	Output capacitance	Supply current	DC -	DC +	Height	Ordering number
PSI 9080-1020 15U	0...80 V	0...1020 A	0...30 kW	50,8 mF	~ 56 A	± 400 V	+ 400 V	15 HE / U	06400601
PSI 9200-420 15U	0...200 V	0...420 A	0...30 kW	15,1 mF	~ 56 A	± 400 V	+ 600 V	15 HE / U	06400602
PSI 9360-240 15U	0...360 V	0...240 A	0...30 kW	2400 µF	~ 56 A	± 400 V	+ 600 V	15 HE / U	06400603
PSI 9500-180 15U	0...500 V	0...180 A	0...30 kW	1518 µF	~ 56 A	± 725 V	+ 1000 V	15 HE / U	06400604
PSI 9750-120 15U	0...750 V	0...120 A	0...30 kW	618 µF	~ 56 A	± 725 V	+ 1000 V	15 HE / U	06400605
PSI 91500-60 15U	0...1500 V	0...60 A	0...30 kW	168 µF	~ 56 A	± 1000 V	+ 1800 V	15 HE / U	06400606
PSI 9080-1530 15U	0...80 V	0...1530 A	0...45 kW	76,1 mF	~ 84 A	± 400 V	+ 400 V	15 HE / U	06400607
PSI 9200-630 15U	0...200 V	0...630 A	0...45 kW	22,7 mF	~ 84 A	± 400 V	+ 600 V	15 HE / U	06400608
PSI 9360-360 15U	0...360 V	0...360 A	0...45 kW	3600 µF	~ 84 A	± 400 V	+ 600 V	15 HE / U	06400609
PSI 9500-270 15U	0...500 V	0...270 A	0...45 kW	2277 µF	~ 84 A	± 725 V	+ 1000 V	15 HE / U	06400610
PSI 9750-180 15U	0...750 V	0...180 A	0...45 kW	927 µF	~ 84 A	± 725 V	+ 1000 V	15 HE / U	06400611
PSI 91500-90 15U	0...1500 V	0...90 A	0...45 kW	252 µF	~ 84 A	± 1000 V	+ 1800 V	15 HE / U	06400612
PSI 9080-2040 24U	0...80 V	0...2040 A	0...60 kW	101,5 mF	~ 112 A	± 400 V	+ 400 V	24 HE / U	06400613
PSI 9200-840 24U	0...200 V	0...840 A	0...60 kW	30,2 mF	~ 112 A	± 400 V	+ 600 V	24 HE / U	06400614
PSI 9360-480 24U	0...360 V	0...480 A	0...60 kW	4800 µF	~ 112 A	± 400 V	+ 600 V	24 HE / U	06400615
PSI 9500-360 24U	0...500 V	0...360 A	0...60 kW	3036 µF	~ 112 A	± 725 V	+ 1000 V	24 HE / U	06400616
PSI 9750-240 24U	0...750 V	0...240 A	0...60 kW	1236 µF	~ 112 A	± 725 V	+ 1000 V	24 HE / U	06400617
PSI 91500-120 24U	0...1500 V	0...120 A	0...60 kW	336 µF	~ 112 A	± 1000 V	+ 1800 V	24 HE / U	06400618
PSI 9080-2550 24U	0...80 V	0...2550 A	0...75 kW	127 mF	~ 140 A	± 400 V	+ 400 V	24 HE / U	06400619
PSI 9200-1050 24U	0...200 V	0...1050 A	0...75 kW	37,8 mF	~ 140 A	± 400 V	+ 600 V	24 HE / U	06400620
PSI 9360-600 24U	0...360 V	0...600 A	0...75 kW	6000 µF	~ 140 A	± 400 V	+ 600 V	24 HE / U	06400621
PSI 9500-450 24U	0...500 V	0...450 A	0...75 kW	3795 µF	~ 140 A	± 725 V	+ 1000 V	24 HE / U	06400622
PSI 9750-300 24U	0...750 V	0...300 A	0...75 kW	1545 µF	~ 140 A	± 725 V	+ 1000 V	24 HE / U	06400623
PSI 91500-150 24U	0...1500 V	0...150 A	0...75 kW	420 µF	~ 140 A	± 1000 V	+ 1800 V	24 HE / U	06400624
PSI 9080-3060 24U	0...80 V	0...3060 A	0...90 kW	152,3 mF	~ 168 A	± 400 V	+ 400 V	24 HE / U	06400625
PSI 9200-1260 24U	0...200 V	0...1260 A	0...90 kW	45,4 mF	~ 168 A	± 400 V	+ 600 V	24 HE / U	06400626
PSI 9360-720 24U	0...360 V	0...720 A	0...90 kW	7200 µF	~ 168 A	± 400 V	+ 600 V	24 HE / U	06400627
PSI 9500-540 24U	0...500 V	0...540 A	0...90 kW	4554 µF	~ 168 A	± 725 V	+ 1000 V	24 HE / U	06400628
PSI 9750-360 24U	0...750 V	0...360 A	0...90 kW	1854 µF	~ 168 A	± 725 V	+ 1000 V	24 HE / U	06400629
PSI 91500-180 24U	0...1500 V	0...180 A	0...90 kW	504 µF	~ 168 A	± 1000 V	+ 1800 V	24 HE / U	06400630

EA-PSI 9000 15U/24U 30 kW - 90 kW

技术参数	Technical Data	Series EA-PSI 9000 15U & EA-PSI 9000 24U / 系列
交流供电	AC Supply	
- 电压	- Voltage	340...460 V, 3ph
- 频率	- Frequency	45...66 Hz
- 功率因数	- Power factor	>0.99
直流: 电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
- 0-100%的负载调整率	- Load regulation 0-100%	<额定值的0.05% / <0.05% of rated value
- $\pm 10\% \Delta U_{AC}$ 的线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.02% / <0.02% of rated value
- 带载10-100%调整需时	- Regulation 10-100% load	<2 ms
- 带载10-90%的斜率	- Slew rate 10-90%	最大 / Max. 30 ms
- 过压保护	- Overvoltage protection	可调, 0...110% U_{Nenn} / Adjustable, 0...110% U_{Nom}
- 直流关闭时空载放电时间	- No load discharge time on DC off	100% U 降至 / to <60 V: 少于10 s / less than 10 s
直流: 电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.15% / <0.15% of rated value
- $\pm 10\% \Delta U_{AC}$ 的线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.05% / <0.05% of rated value
直流: 功率	DC: Power	
- 精确度	- Accuracy	<额定值的1% / <1% of rated value
过压类别	Overvoltage category	2
保护功能	Protection	OT, OVP, OPP, OCP, PF ⁽¹⁾
隔离耐压	Insulation	
- 交流输入对外壳	- AC input to enclosure	2500 V DC
- 交流输入对直流输出	- AC input to DC output	2500 V DC
- 直流输出对外壳 (PE)	- DC output to enclosure (PE)	依型号而定, 具体见后面各型号规格表 / Depending on model, see model table
污染等级	Degree of pollution	2
保护等级	Protection class	1
显示器与面板	Display and panel	带触摸屏的图形显示器 / Graphics display with touch panel
数字接口	Digital interfaces	
- 内置	- Built-in	1x 通讯用B类USB端口 / 1x USB type B for communication
- 插槽	- Slot	1x 可拆卸内置模块 / 1x for retrofittable plug-in modules
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
- 信号范围	- Signal range	0...5 V 或 0...10 V (可转换) / 0...5 V or 0...10 V (switchable)
- U / I / P / R 精确度	- Accuracy U / I / P / R	0...10 V: <0.2% 0...5 V: <0.4%
串联操作	Series operation	无 / No
并联操作	Parallel operation	无 / No
安规标准	Standards	EN 61326, IEC 1010, EN 61010 IEC 61000-6-3:2006 Class B / 等级B
制冷方式	Cooling	温控风扇 (可选: 水冷) / Temperature controlled fans (optional: water)
工作温度	Ambient temperature	0...40 °C
储存温度	Storage temperature	-20...70 °C
湿度	Relative humidity	<80%, 无凝露 / non-condensing
工作高度	Operation altitude	<2000 m
尺寸 (宽 高 深)	Dimensions (W H D)	19" x 15 HE / U x 1000 mm 19" x 24 HE / U x 1000 mm

(1) 见第146页 / See page 146



EA-PS 9000 1U 1500 W & 3000 W



可编程实验室直流电源 Programmable laboratory DC Power supplies



EA-PS 9080-100 1U

U

I

P

OVP

OCP

OPP

OTP



19"



- 宽范围输入电压100...264 V (1500 W型号)
- 效率高达 95%
- 输出功率: 0..1500 W 或 0..3000 W
- 输出电压: 0...80 V 至 0...750 V
- 输出电流: 0...6 A 至 0...100 A
- 灵活的功率调整输出级
- 有多种保护电路 (OVP, OCP, OPP, OTP)
- 带按键的蓝屏控制面板, 可显示实际值, 设定值, 状态与报警信息
- 远程感测
- 共享总线支持并联连接
- 电隔离模拟接口
- 超低的高度, 仅1 U高 (44 mm)
- 温控风扇制冷
- 内置USB与以太网端口
- EMC符合EN 550220 等级B标准
- 支持SCPI指令语言

概要

EA-PS 9000 1U系列是一款由微处理器控制的实验室电源。其标准型号配备多种功能和特征, 让用户使用起来更方便、有效。所有这些功能全部浓缩在44 mm高度的产品内。

控制面板上清晰地分布有两个旋钮、六个按键, 以及两个LED灯。同时还有一显示所有数值与状态的蓝色液晶显示器, 从而简化了产品的使用。

交流输入

本系列所有型号都采用主动式功率因数校正线路, 1.5 kW以下型号可在100 V_{AC}至264 V_{AC}的输入电压范围下使用。

- Wide input range 100...264 V (1500W models)
- High efficiency up to 95%
- Output power ratings: 0..1500 W or 0..3000 W
- Output voltages: 0...40 V up to 0...750 V
- Output currents: 0...6 A up to 0...100 A
- Flexible, power regulated output stage
- Various protection circuits (OVP, OCP, OPP, OTP)
- Control panel with pushbuttons and blue LCD for actual values, set values, status and alarms
- Remote sensing
- Share bus for support of parallel connection
- Galvanically isolated, analog interface
- Very low height of only 1 U (44 mm)
- Temperature controlled fans for cooling
- USB and Ethernet port integrated
- EMC according to EN 55022 Class B
- SCPI command language supported

General

The microprocessor controlled laboratory power supplies of series EA-PS 9000 1U offer many functions and features in their standard version, making the use of this equipment remarkably easy and most effective. All this comes in a flat design with only 44 mm of height.

The clearly arranged control panel features two rotary knobs, six pushbuttons and two LEDs. Together with an illuminated, blue LCD display for all values and status it simplifies the use of the device.

AC input

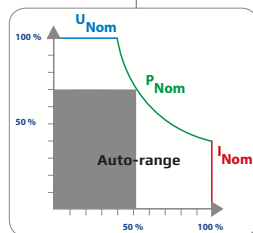
All units are provided with an active **Power Factor Correction** circuit and models up to 1.5 kW are even suitable for a worldwide operation on a supply from 100 V_{AC} up to 264 V_{AC}.

EA-PS 9000 1U 1500 W & 3000 W

两种功率级别的产品都会在输入电压低时自动减少输出功率，因此1.5 kW型号在输入电压为100...1150 V_{AC}时仍有1 kW。3 kW型号在输入电压为180...207 V_{AC}时仍可供应2.5 kW。

功率

所有型号的输出功率都可灵活调整。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定功率范围内。它们的设定功率都可调，因此仅用一台产品就能覆盖广泛的应用。



Both power classes reduce the output power automatically when the input supply is low, so the 1.5 kW models can still provide 1 kW power with an input supply of 100...150 V_{AC} and the 3 kW models can still provide 2.5 kW at 180...207 V_{AC}.

Power

All models are equipped with a flexible auto-ranging output stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. The power set value is adjustable with these models. Therefore, a wide range of applications can already be covered by the use of just one unit.

直流输出

本系列有多款不同型号，可选择0...80 V至0...750 V输出电压，0...6 A至0...100 A输出电流，0...1500 W至0...3000 W输出功率的类型。因此不管是手动控制还是远程控制（模拟或数字），都可在0%与100%之间连续调节电流、电压与功率。直流输出端位于产品后板。

放电电路

额定输出电压为200 V或以上的产品，其输出电容都配有一放电电路。在空载或带小负载时，它能确保危险电压在直流输出关闭后降至60 V DC以下。该电压值被认为是人体安全的最高电压。

DC output

DC output voltages between 0...80 V and 0...750 V, output currents between 0...6 A and 0...100 A and output power ratings of 0...1500 W or 0...3000 W are available. Current, voltage and power can thus be adjusted continuously between 0% and 100%, no matter if manually or remotely controlled (analog or digital). The DC output is located on the rear panel of the devices.

Discharge circuit

Models with a nominal output voltage of 200 V or higher include a discharge circuit for the output capacities. For no load or low load situations, it ensures that the dangerous output voltage can sink to under 60 V DC after the DC output has been switched off. This value is considered as limit for voltages dangerous to human safety.

保护功能

为保护连接设备，可给产品设定一过压保护极限值(OVP)，以及过流(OCP)与过功率(OPP)保护极限值。

一旦因故超过这三个值中的一个，直流输出会被立即切断，并在显示器与接口端发出一状态信号。本产品还有过温保护，如果产品过热，它会关断直流输出。

Protective features

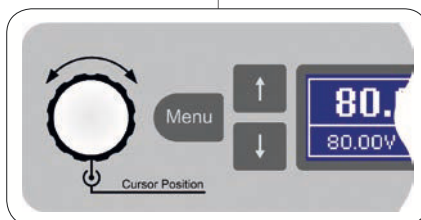
For protection of the equipment connected, it is possible to set an overvoltage protection threshold (OVP), as well as one for overcurrent (OCP) and overpower (OPP).

As soon as one of these thresholds is reached for any reason, the DC output will be immediately shut off and a status signal will be generated on the display and via the interfaces. There is furthermore an overtemperature protection, which will shut off the DC output if the device overheats.

显示器和控制键

产品所有重要信息都清晰地显示在点阵显示屏上。通过该显示器，电压与电流的实际输出值和预设值，(CV, CC, CP) 实际控制状态与其它状态，报警与设置菜单的设定，都清晰展现出来。

为了便于旋钮能调节参数，只需按一下该旋钮，就可更换数值小数点后的光标位置。所有这些特性都有助于操作者的便利性。其面板锁定功能可锁住整个面板，从而保护产品与连接负载免受意外误用。



Display and controls

All important information is clearly visualised on a dot matrix display.

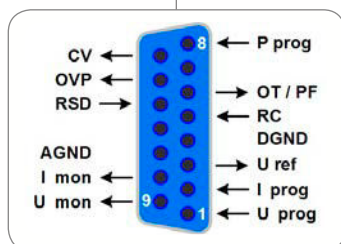
With this, information about the actual output values and set values of voltage and current, the actual control state (CV, CC, CP) and other statuses, as well as alarms and settings of the setup menu are clearly displayed.

In order to ease adjusting of values by the rotary knobs, pushing them can switch between decimal positions of a value. All these features contribute to an operator friendliness. With a panel lock feature, the whole panel can be locked in order to protect

the equipment and the loads from unintentional misuse.

模拟接口

产品后板上装有一隔离模拟接口端子。它具有一模拟输入脚，接上0 V...10 V或0 V...5 V电压，可设置0...100%的输出电压、电流与功率。要监控输出电压与电流，可给模拟输出脚接上0 V...10 V或0 V...5 V电压来完成。此外，还有几个输入脚和输出脚，可用来控制和监控产品状态。



Analog interface

There is a galvanically isolated analog interface terminal, located on the rear of the device. It offers analog inputs to set voltage, current and power from 0...100% through control voltages of 0 V...10 V or 0 V...5 V.

To monitor the output voltage and current, there are analog outputs with voltage ranges of 0 V...10 V or 0 V...5 V. Also, several inputs and outputs are available for controlling and monitoring the device status.



EA-PS 9000 1U 1500 W & 3000 W



数字接口

本系列标配有两个电隔离数字接口。分别是1x USB & 1x Ethernet。可通过发送SCPI语言指令或ModBus RTU协议，经它们控制和监控产品。

产品的远程控制可由所供软件EA Power Control或者客户定制应用来完成，我们提供有编程文档，以及LabView™ Virtual Instruments (VIs)。

Digital interfaces

All models features two galvanically isolated, digital interfaces by default. These are 1x USB and 1x Ethernet. Both can be used to control and monitor the devices with SCPI language commands or ModBus RTU protocol.

Remote control of a device can be done either by the included software EA Power Control or by a custom application, which is supported by a programming documentation, as well as LabView™ Virtual Instruments (VIs).



技术参数	Technical Data	Series EA-PS 9000 1U / 系列
交流供电	AC Supply	Models 1500 W / 型号: 100...264 V, 45...65 Hz, PF = 0.99 Models 3000 W / 型号: 180...264 V, 45...65 Hz, PF = 0.99
- 功率降额	- Derating	Models 1500 W / 型号: < 150 V AC 时降至 / to P _{out max} 1000 W Models 3000 W / 型号: < 207 V AC 时降至 / to P _{out max} 2500 W
直流: 电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
- 0-100%的负载调整率	- Load regulation 0-100%	<额定值的0.05% / <0.05% of rated value
- ±10% ΔU _{AC} 的线性调整率	- Line regulation ±10% ΔU _{AC}	<额定值的0.02% / <0.02% of rated value
- 带载10-100%调整需时	- Regulation 10-100% load	<2.2 ms
- 带载10-90% (CV)的斜率	- Rise time 10-90% (CV)	最大 / Max. 15 ms
直流: 电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔU _{DC} 的负载调整率	- Load regulation 1-100% ΔU _{DC}	<额定值的0.15% / <0.15% of rated value
- ±10% ΔU _{AC} 的线性调整率	- Line regulation ±10% ΔU _{AC}	<额定值的0.05% / <0.05% of rated value
直流: 功率	DC: Power	
- 精确度	- Accuracy	<额定值的1% / <1% of rated value
过压类别	Overtoltage category	2
保护功能	Protection	OTP, OVP, OCP, OPP, PF ⁽¹⁾
隔离耐压	Insulation	
- 交流输入对外壳	- AC input to enclosure	2500 V DC
- 交流输入对直流输出	- AC input to DC output	2500 V DC
- 直流输出对外壳 (PE)	- DC output to enclosure (PE)	负极: 最大400 V DC, 正极: 最大400 V DC + 输出电压 / Negative: max. 400 V DC, positive: max. 400 V DC + output voltage
污染等级	Degree of pollution	2
保护等级	Protection class	1
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
- 信号范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)
- U / I / P 精确度	- Accuracy U / I / P	0...10 V: <0.2% 0...5 V: <0.4%
- 输入脚	- Inputs	U, I, P, 远程开-关, 直流输出开-关 / U, I, P, Remote on-off, DC output on-off
- 输出脚	- Outputs	U / I, 过压, 报警, 参考电压 / U / I, Overtoltage, alarms, reference voltage
并联操作	Parallel operation	可实现, 利用共享总线操作或模拟接口 / Possible, via Share Bus operation or via analog interface
- 主-从	- Master-Slave	无 / No
安规标准	Standards	EN 60950, EN 61326, EN 55022 等级 B / Class B
制冷方式	Cooling	温控风扇 / Temperature controlled fan(s)
工作温度	Operation temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
湿度	Humidity	<80%, 无凝露 / non-condensing
工作高度	Operation altitude	<2000 m
机械结构	Mechanics	1500 W 3000 W
- 重量 ⁽²⁾	- Weight ⁽²⁾	~10.5 kg 11 kg
- 尺寸(宽 高 深) ⁽³⁾	- Dimensions (W H D) ⁽³⁾	19" x 1 HE/U x 500 mm 19" x 1 HE/U x 500 mm

(1) 见第146页 / See page 146

(2) 为标准版, 带选项功能的则会不同 / Standard version, models with options may vary

(3) 为标准版的外壳尺寸, 非整体尺寸, 带选项功能的则会不同 / Enclosure of the standard version and not overall size, versions with options may vary

EA-PS 9000 1U 1500 W & 3000 W

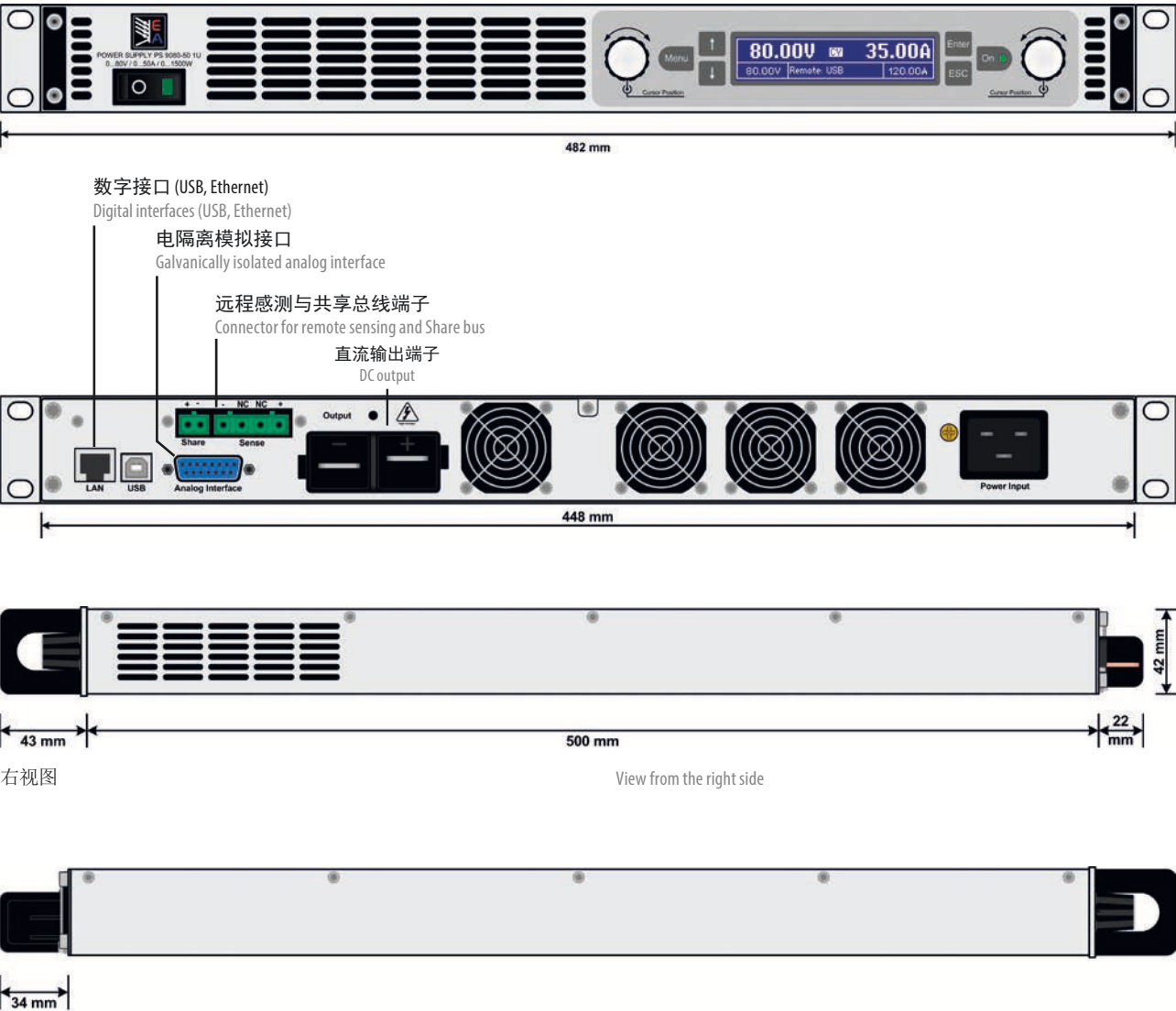
型号	电压	电流	功率	效率	U的纹波 ⁽²⁾	I的纹波 ⁽²⁾	编程 ⁽¹⁾		订购编号
Model	Voltage	Current	Power	Efficiency	Ripple U ⁽²⁾	Ripple I ⁽²⁾	U (typ.)	I (typ.)	Ordering number
PS 9080-50 1U	0...80 V	0...50 A	0...1500 W	≤91%	100 mV _{pp} / 5.2 mV _{RMS}	4 mA _{RMS}	3 mV	2 mA	06230400
PS 9200-25 1U	0...200 V	0...25 A	0...1500 W	≤93%	293 mV _{pp} / 51 mV _{RMS}	8 mA _{RMS}	8 mV	1 mA	06230401
PS 9360-15 1U	0...360 V	0...15 A	0...1500 W	≤94%	195 mV _{pp} / 33 mV _{RMS}	1.6 mA _{RMS}	14 mV	0.6 mA	06230402
PS 9500-10 1U	0...500 V	0...10 A	0...1500 W	≤94%	293 mV _{pp} / 63 mV _{RMS}	1.4 mA _{RMS}	20 mV	0.4 mA	06230403
PS 9750-06 1U	0...750 V	0...6 A	0...1500 W	≤95%	260 mV _{pp} / 40 mV _{RMS}	0.6 mA _{RMS}	30 mV	0.25 mA	06230404
PS 9080-100 1U	0...80 V	0...100 A	0...3000 W	≤92%	76 mV _{pp} / 4.2 mV _{RMS}	6 mA _{RMS}	3 mV	4 mA	06230405
PS 9200-50 1U	0...200 V	0...50 A	0...3000 W	≤93%	234 mV _{pp} / 40 mV _{RMS}	10 mA _{RMS}	8 mV	2 mA	06230406
PS 9360-30 1U	0...360 V	0...30 A	0...3000 W	≤93%	156 mV _{pp} / 26 mV _{RMS}	1.9 mA _{RMS}	14 mV	1.5 mA	06230407
PS 9500-20 1U	0...500 V	0...20 A	0...3000 W	≤93%	234 mV _{pp} / 50 mV _{RMS}	1.9 mA _{RMS}	20 mV	0.8 mA	06230408
PS 9750-12 1U	0...750 V	0...12 A	0...3000 W	≤93%	260 mV _{pp} / 40 mV _{RMS}	0.7 mA _{RMS}	30 mV	0.5 mA	06230409

(1) 忽略产品错误时的可编程分辨率 / Programmable resolution disregarding device errors

(2) RMS值: 在BWL 300 kHz时测量的LF值, PP值: 在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300kHz, PP value: measured at HF with BWL 20MHz

产品视图

Product views



带直流外盖的左视图 von links, mit DC-Abdeckung

View from the left side, with DC cover

EA-PS 9000 2U 1000 W - 3000 W



可编程实验室直流电源 Programmable laboratory DC Power supplies



EA-PS 9500-20 2U



- 多相输入 90...264 VAC，带主动式PFC
- 效率高达93%
- 输出功率有：0...1000 W至0...3000 W
- 输出电压：0...40 V 至 0...750 V
- 输出电流：0...4 A 至 0...120 A
- 灵活的功率调整输出
- 各种保护功能 (OVP, OCP, OPP, OTP)
- 带按键的控制面板与彩色液晶显示器，可显示实际值、设定值、状态与报警
- 隔离模拟接口
- 符合SELV标准 (EN 60950)的40 V产品型号
- 配放电电路(在10 s内 $U_{out} < 60$ V)
- 所有型号都可配高速选项功能
- 内置USB与以太网端口，或选择安装IEEE/GPIB端口
- EMC符合EN 55022等级B标准
- 支持SCPI指令语言

概要

EA-PS 9000 2U系列是一款由微处理器控制的实验室电源，其标准型号配备多种功能和特征，让用户使用起来更方便、有效。

控制面板上清晰地分布有两个旋钮，六个按键和两个LED灯。同时还有一显示所有数值与状态的彩色TFT液晶显示器，从而简化了产品的使用。

AC输入

所有型号都采用主动式功率因数校正线路，1.5 kW以下型号可在90 V_{AC}至264 V_{AC}的输入电压范围下使用。1.5 kW型号在输入电压<150 V_{AC}时，输出功率降至1 kW。3 kW型号在输入电压<205 V_{AC}时降至2.5 kW。

- Wide input voltage range 90...264 V, with active PFC
- High efficiency up to 93%
- Output power ratings: 0...1000 W up to 0...3000 W
- Output voltages: 0...40 V up to 0...750 V
- Output currents: 0...4 A up to 0...120 A
- Flexible, power regulated output stage
- Various protection circuits (OVP, OCP, OPP, OTP)
- Control panel with pushbuttons and color TFT for actual values, set values, status and alarms
- Galvanically isolated, analog interface with
- 40 V models according to SELV (EN 60950)
- Discharge circuit ($U_{out} < 60$ V in ≤ 10 s)
- High speed versions of all models
- USB and Ethernet port integrated or alternatively installed IEEE/GPIB port
- EMC according to EN 55022 Class B
- SCPI command language supported

General

The microprocessor controlled laboratory power supplies of series EA-PS 9000 2U offer many functions and features in their standard version, making the use of this equipment remarkably easy and most effective.

The clearly arranged control panel features two rotary knobs, six pushbuttons and two LEDs. Together with a colour TFT display for all values and status it simplifies the use of the device.

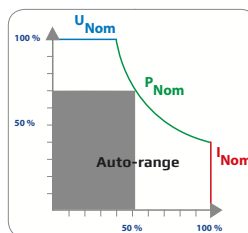
AC input

All units are provided with an active Power Factor Correction circuit and models up to 1.5 kW are even suitable for a worldwide operation on a supply from 90 V_{AC} up to 264 V_{AC}. With the 1.5 kW models, the output power is automatically reduced to 1 kW if the supply voltage is <150 V_{AC} and with the 3 kW models is reduced to 2.5 kW at <205 V_{AC}.

EA-PS 9000 2U 1000 W - 3000 W

功率级自动调整

本系列所有型号的输出功率都可灵活调整。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定功率范围内。它们的设定功率都可调，因此仅用一台产品就能覆盖广泛的应用。



Power

All models are equipped with a flexible auto-ranging output stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. The power set value is adjustable with these models. Therefore, a wide range of applications can already be covered by the use of just one unit.

直流输出

本系列有0...40 V和0...750 V输出电压，0...4 A和0...120 A输出电流，0...1000 W与0...3000 W输出功率的不同型号。

因此不管是手动控制还是远程控制（模拟或数字），都可在0%与100%之间连续调节电流、电压与功率。输出端位于产品后面板上。

放电电路

额定输出电压为200 V或以上的产品，其输出电容都配有一放电电路。在空载或带小负载时，它能确保危险电压在直流输出关闭后降至60 V DC以下。该电压值被认为是人体安全的最高电压。

保护功能

为保护连接设备，可给产品设定一过压保护极限值(OVP)，以及过流(OCP)与过功率(OPP)保护极限值。

一旦因故超过这三个值中的一个，直流输出会被立即切断，并在显示器与接口端发出一状态信号。本产品还有过温保护，如果产品过热，它会关断直流输出。

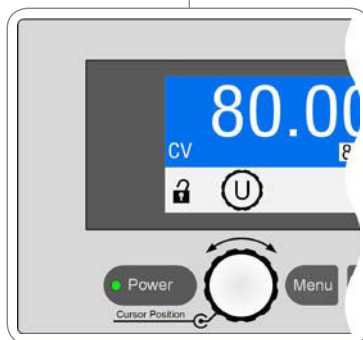
显示器和控制键

产品所有重要信息都清晰地显示在彩色的TFT显示屏上。

通过该显示器，电压与电流的实际输出值和预设值，(CV, CC, CP) 实际控制状态与其它状态，报警与设置菜单的设定，都清晰显示出来。

为使旋钮可以调节参数，只需按一下该旋钮，就可更换数值小数点后的光标位置。所有这些特性都有助于操作者的便利性。

其面板锁定功能可锁住整个面板，从而保护产品与连接负载免受意外误用。



Display and controls

All important information is clearly visualised on a colour TFT display.

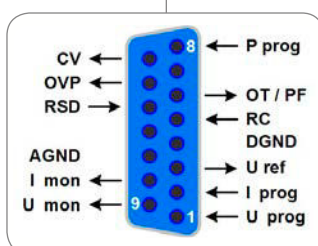
With this, information about the actual output values and set values of voltage and current, the actual control state (CV, CC, CP) and other statuses, as well as alarms and settings of the setup menu are clearly displayed.

In order to ease adjusting of values by the rotary knobs, pushing them can switch between decimal positions of a value. All these features contribute to an operator friendliness.

With a panel lock feature, the whole panel can be locked in order to protect the equipment and the loads from unintentional misuse.

模拟接口

产品后板上装有一隔离模拟接口端子。它具有一模拟输入脚，接上0 V...10 V或0 V...5 V电压，可设置0...100%的输出电压、电流与功率。要监控输出电压与电流，可给模拟输出脚接上0 V...10 V或0 V...5 V电压来完成。此外，还有几个输入脚和输出脚，可用来控制和监控产品状态。



Analog interface

There is a galvanically isolated analog interface terminal, located on the rear of the device. It offers analog inputs to set voltage, current and power from 0...100% through control voltages of 0 V...10 V or 0 V...5 V.

To monitor the output voltage and current, there are analog outputs with voltage ranges of 0 V...10 V or 0 V...5 V. Also, several inputs and outputs are available for controlling and monitoring the device status.



EA-PS 9000 2U 1000 W - 3000 W



数字接口

所有型号在其后板默认有两个电隔离数字接口（标准版：1x USB & 1x Ethernet，带3W选项的：1x USB & 1x GPIB）。可通过发送SCPI语言指令或ModBus RTU协议，经USB与Ethernet接口，控制和监控产品，而GPIB仅支持SCPI语言。

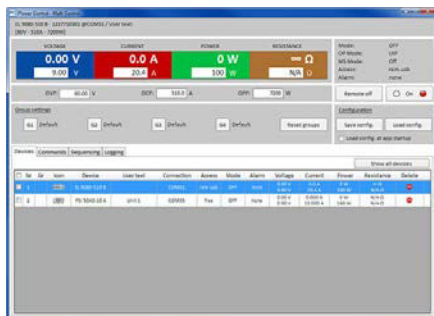
A

软件与编程

通过电脑远程控制本产品，可以使用随附产品的EA Power Control软件。它可同时应用于多台不同或同型号的PS 9000 2U 系列产品上，对其监控与控制。本软件还有一固件更新工具，以及数据记录功能，和用半自动表格处理来控制产品的特征。

对于更复杂的应用，还提供有一个完整的编程文件，以及可直接应用的LabView VIs。

PS 9000 2U所有型号支持通用SCPI指令语言，以及ModBus RTU通讯协议。但是带3 W选项功能的型号，通过GPIB端口仅能使用SCPI语言。



远程感测

远程感测输入端可直接用线连到负载设备，以补偿连线上的部分压降。如果感测输入端已接到负载上，本电源会自动调整输出电压，以确保负载获得准确所需的电压值。

远程感测连接端子在产品后板。

选购件

- 还可安装带固定GPIB端口的三位接口（3W），代替默认以太网插槽

Digital interfaces

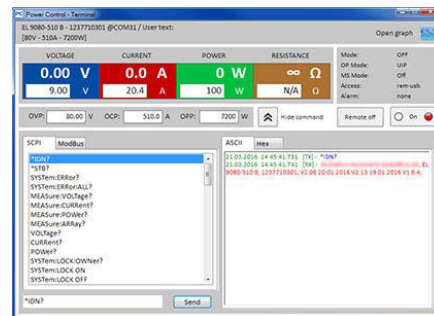
All models features two galvanically isolated, digital interfaces by default (standard: 1x USB & 1x Ethernet, with option 3W: 1x USB & 1x GPIB), which are located on the rear side. USB and Ethernet can be used to control and monitor the devices either with SCPI language commands or ModBus RTU protocol, while with GPIB only SCPI is supported.

Software and programming

For remote control from a Windows PC there is a software EA Power Control included with the device. It can be used with multiple different or identical models of series PS 9000 2U to monitor and control the units. The software furthermore includes a firmware update tool, as well as a feature to record data and to control the units by a semi-automatic table processing.

For even more sophisticated, customer specific applications there is a complete programming documentation and also LabView VIs for direct implementation available.

All models of series PS 9000 2U support the common command language SCPI and the ModBus RTU protocol via both, Ethernet and USB. Models with option 3W can only use SCPI via the GPIB port.



Remote sensing

Remote sensing can be done via a dedicated input which is directly connected to the load equipment, in order to compensate voltage drops along the load cables. The power supply detects automatically whether the sensing input is connected and will stabilise the voltage directly at the load.

The connection for the remote sensing is located on the rear of the device.

Options

- Three-way interface (3W) with a rigid GPIB port installed instead of the default Ethernet port

EA-PS 9000 2U 1000 W - 3000 W

技术参数	Technical Data	Series PS 9000 2U / 系列	
交流供电	AC Supply		
- 电压	- Voltage	90...264 V, 1ph+N (型号 / Models 1000 W - 1500 W) 180...264 V, 1ph+N (型号 / Models 3000 W)	
- 频率	- Frequency	45...66 Hz	
- 功率因数	- Power factor	>0.99	
- 功率降额	- Derating	型号 / Models 1500 W: < 150 V AC 时降至 / to $P_{out\ max}$ 1000 W 型号 / Models 3000 W: < 207 V AC 时降至 / to $P_{out\ max}$ 2500 W	
直流: 电压	DC: Voltage		
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value	
- 0-100%的负载调整率	- Load regulation 0-100%	<额定值的0.05% / <0.05% of rated value	
- $\pm 10\% \Delta U_{AC}$ 线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.02% / <0.02% of rated value	
- 带载10-100%调整需时	- Regulation 10-100% load	<2 ms	
- 带载10-90%上升时间	- Rise time 10-90%	最大 / Max. 30 ms	
- 过压保护	- Overvoltage protection	可调, 0...110% U_{Nenn} / Adjustable, 0...110% U_{Nom}	
直流: 电流	DC: Current		
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value	
- 1-100% ΔI_{DC} 的负载调整率	- Load regulation 1-100% ΔI_{DC}	<额定值的0.15% / <0.15% of rated value	
- $\pm 10\% \Delta U_{AC}$ 的线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.05% / <0.05% of rated value	
直流: 功率	DC: Power		
- 精确度	- Accuracy	<额定值的1% / <1% of rated value	
过压类别	Overvoltage category	2	
保护功能	Protection	OTP, OVP, OCP, OPP, PF ⁽¹⁾	
隔离耐压	Insulation		
- 交流输入对外壳	- AC input to enclosure	2500 V DC	
- 交流输入对直流输出	- AC input to DC output	2500 V DC	
- 直流输出对外壳 (PE)	- DC output to enclosure (PE)	负极: 最大400 V DC, 正极: 最大400 V DC + 输出电压 / Negative: max. 400 V DC, positive: max. 400 V DC + output voltage	
污染等级	Degree of pollution	2	
保护等级	Protection class	1	
显示器与面板	Display and panel	彩色显示器, 调节旋钮与按钮 / Colour display, knobs and pushbuttons	
数字接口	Digital interfaces		
- 内置	- Built-in	1x 通讯用B类USB端口, 1x Ethernet / 1x USB type B for communication, 1x Ethernet 可选: 1x GPIB (针对3W选项功能) / optional: 1x GPIB (with option 3W)	
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	
- 信号范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)	
- 输入脚	- Inputs	U, I, P, 远程开-关, 直流输出开-关 / U, I, P, Remote on-off, DC output on-off	
- 输出脚	- Outputs	U / I, 过压, 报警, 参考电压 / U / I, Overvoltage, alarms, reference voltage	
- U / I / P 精确度	- Accuracy U / I / P	0...10 V: <0.2% 0...5 V: <0.4%	
并联操作	Parallel operation	可实现, 利用共享总线操作或模拟接口 / Possible, via Share Bus operation or via analog interface	
- 主-从	- Master-Slave	无 / No	
安规标准	Standards	EN 60950, EN 61326, EN 55022 等级 B / Class B	
制冷方式	Cooling	温控风扇 / Temperature controlled fan(s)	
工作温度	Operation temperature	0...50 °C	
储存温度	Storage temperature	-20...70 °C	
湿度	Humidity	<80%, 无凝露 / non-condensing	
湿度	Humidity	<80%	
工作高度	Operation altitude	<2000 m	
机械结构	Mechanics	1000 W / 1500 W 3000 W	
- 重量 ⁽²⁾	- Weight ⁽²⁾	12 kg 15 kg	
- 尺寸(宽 高 深) ⁽³⁾	- Dimensions (W H D) ⁽³⁾	19" x 2 HE/U x 463 mm 19" x 2 HE/U x 463 mm	

(1) 见第146页 / See page 146

(2) 为标准版参数, 带选项功能的则会不同 / Standard version, models with options may vary

(3) 仅为标准版的外壳尺寸, 非整体尺寸, 带选项功能的还会不同 / Enclosure of the standard version and not overall size, versions with options may vary



EA-PS 9000 2U 1000 W - 3000 W



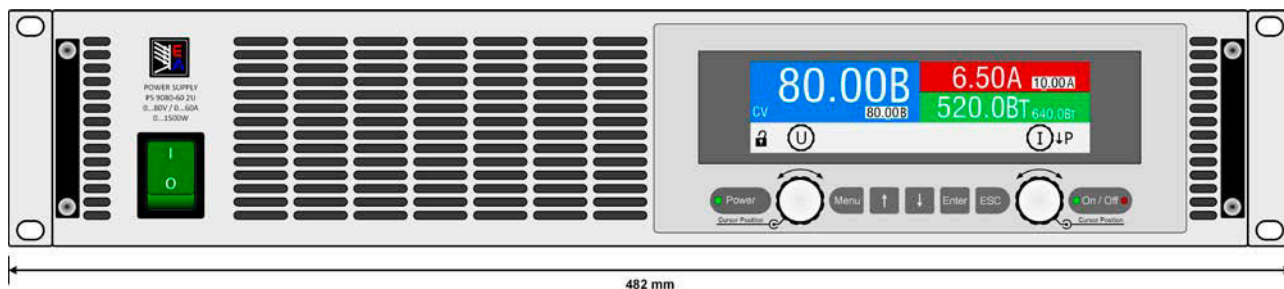
型号	电压	电流	功率	效率	U的纹波 ⁽²⁾	I的纹波 ⁽²⁾	编程 ⁽¹⁾		订购编号 ⁽³⁾
Model	Voltage	Current	Power	Efficiency	Ripple U ⁽²⁾	Ripple I ⁽²⁾	U (typ.)	I (typ.)	Ordering number ⁽³⁾
PS 9040-40 2U	0...40 V	0...40 A	0...1000 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	3.7 mA _{RMS}	~1.5 mV	~1.5 mA	06230219
PS 9080-40 2U	0...80 V	0...40 A	0...1000 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	3.7 mA _{RMS}	~3 mV	~1.5 mA	06230204
PS 9200-15 2U	0...200 V	0...15 A	0...1000 W	≤93%	164mV _{pp} /34mV _{RMS}	2.2 mA _{RMS}	~7.6 mV	~0.6 mA	06230205
PS 9360-10 2U	0...360 V	0...10 A	0...1000 W	≤93%	210 mV _{pp} / 59 mV _{RMS}	1.6 mA _{RMS}	~13.7 mV	~0.4 mA	06230206
PS 9500-06 2U	0...500 V	0...6 A	0...1000 W	≤93%	190 mV _{pp} / 48 mV _{RMS}	0.5 mA _{RMS}	~19 mV	~0.23 mA	06230207
PS 9750-04 2U	0...750 V	0...4 A	0...1000 W	≤93%	212mV _{pp} /60mV _{RMS}	0.3 mA _{RMS}	~28.6 mV	~0.15 mA	06230208
PS 9040-60 2U	0...40 V	0...60 A	0...1500 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	5.6 mA _{RMS}	~1.5 mV	~2.3 mA	06230220
PS 9080-60 2U	0...80 V	0...60 A	0...1500 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	5.6 mA _{RMS}	~3 mV	~2.3 mA	06230209
PS 9200-25 2U	0...200 V	0...25 A	0...1500 W	≤93%	164mV _{pp} /34mV _{RMS}	3.3 mA _{RMS}	~7.6 mV	~1 mA	06230210
PS 9360-15 2U	0...360 V	0...15 A	0...1500 W	≤93%	210 mV _{pp} / 59 mV _{RMS}	2.4 mA _{RMS}	~13.7 mV	~0.6 mA	06230211
PS 9500-10 2U	0...500 V	0...10 A	0...1500 W	≤93%	190mV _{pp} /48mV _{RMS}	0.7 mA _{RMS}	~19 mV	~0.4 mA	06230212
PS 9750-06 2U	0...750 V	0...6 A	0...1500 W	≤93%	212mV _{pp} /60mV _{RMS}	0.5 mA _{RMS}	~28.6 mV	~0.23 mA	06230213
PS 9040-120 2U	0...40 V	0...120 A	0...3000 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	11 mA _{RMS}	~3 mV	~4.6 mA	06230221
PS 9080-120 2U	0...80 V	0...120 A	0...3000 W	≤92%	114 mV _{pp} / 8 mV _{RMS}	11 mA _{RMS}	~1.5 mV	~4.6 mA	06230214
PS 9200-50 2U	0...200 V	0...50 A	0...3000 W	≤93%	164mV _{pp} /34mV _{RMS}	6.5 mA _{RMS}	~7.6 mV	~1.9 mA	06230215
PS 9360-30 2U	0...360 V	0...30 A	0...3000 W	≤93%	210 mV _{pp} / 59 mV _{RMS}	5 mA _{RMS}	~13.7 mV	~1.2 mA	06230216
PS 9500-20 2U	0...500 V	0...20 A	0...3000 W	≤93%	190mV _{pp} /48mV _{RMS}	1.5 mA _{RMS}	~19 mV	~0.8 mA	06230217
PS 9750-12 2U	0...750 V	0...12 A	0...3000 W	≤93%	212mV _{pp} /60mV _{RMS}	0.9 mA _{RMS}	~28.6 mV	~0.5 mA	06230218

(1) 忽略产品错误时的可编程分辨率 / Programmable resolution disregarding device errors
(2) RMS值：在BWL 300 kHz时测量的LF值，PP值：在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz
(3) 为标准版的订购编号，带3W选项功能的型号则为不同 / Ordering number of the standard version, models with option 3W installed have different ordering numbers

EA-PS 9000 2U 1000 W - 3000 W

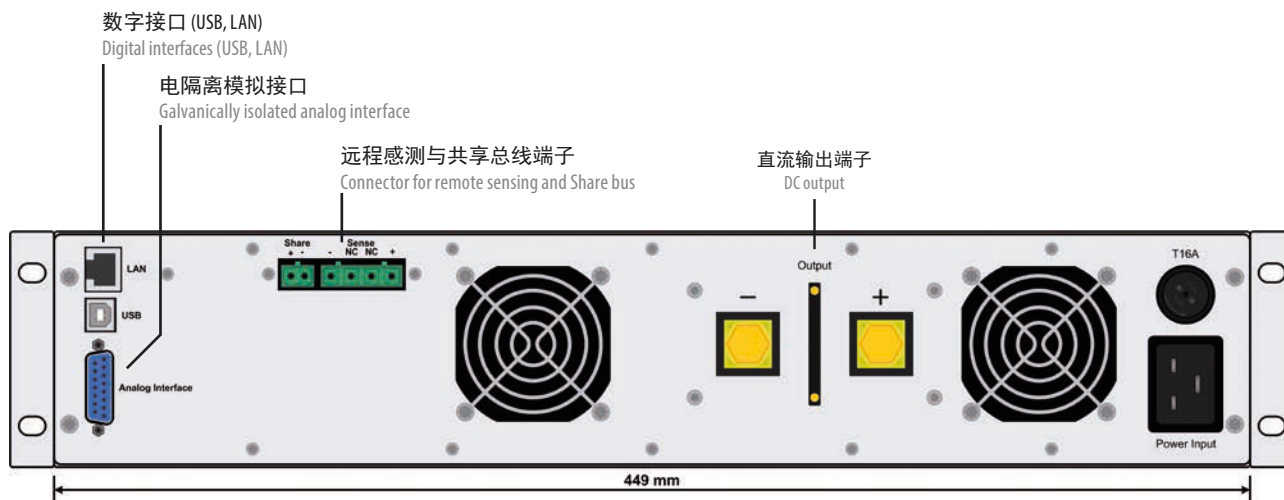
产品图片

Product views



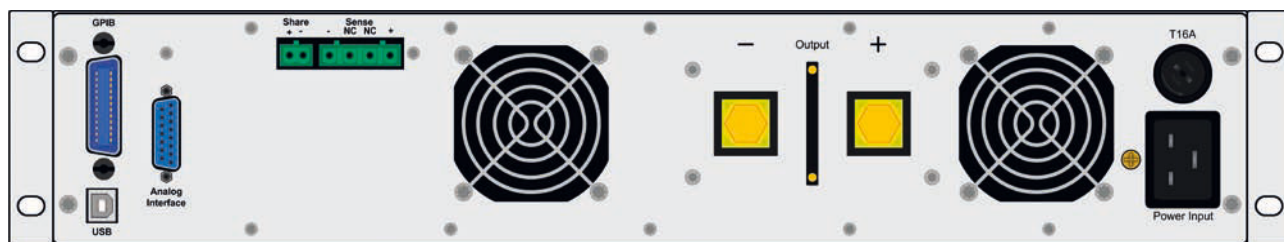
前视图

Front view



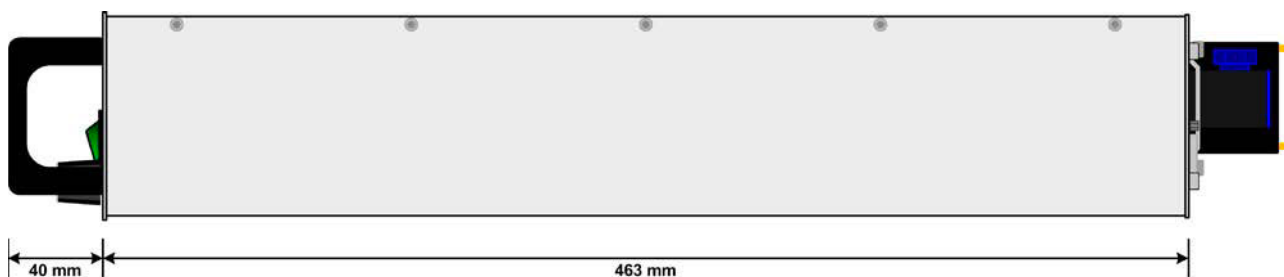
标准版后视图

Rear view of base model



带3W选项的后视图

Rear view of model with option 3W



标准版侧视图

Side view of base model

EA-PS 9000 3U 3.3 kW - 15 kW



可编程高效直流电源

Programmable high efficiency DC Power supplies



EA-PS 9500-90 3U



- 多相输入电压340...460 V_{AC}
- 效率高达95.5%
- 输出功率等级: 3.3 kW, 5 kW, 6.6 kW, 10 kW, 或 15 kW, 还可扩展至480 kW
- 输出电压: 0...40 V 至 0...1500 V
- 输出电流: 30 A 至 510 A, 还可扩展至5100 A
- 灵活的功率调整输出级
- 各种保护功能 (OVP, OCP, OPP, OTP)
- 带按键的控制面板与液晶显示器, 可显示实际值、设定值、状态与报警
- 隔离模拟接口
- 温控风扇制冷
- 40 V产品型号符合SELV标准 (EN 60950)
- 配放电电路(在10 s内 $U_{out} < 60 V$)
- 内置USB与以太网端口, 或可选择安装IEEE/GPIB端口
- EMC符合EN 61010 等级B, 且获得TÜV认证
- 支持SCPI指令语言

概要

EA-PS 9000 3U系列是一款由微处理器控制的高效实验室电源, 其标准型号配备多种功能和特征, 用户使用起来更方便、有效。

控制面板上清晰地分布有两个旋钮, 六个按键, 以及两个LED灯。同时还有一显示所有数值与状态的彩色TFT液晶显示器, 从而简化了产品的使用。

若想获得比单机更大的输出功率, 可按用户需求, 配置高达42U的机柜, 以获得最大150 kW的功率。也可见138页。

- Multi-phase input 340...460 V_{AC}
- High efficiency up to 95.5%
- Output power ratings: 3.3 kW, 5 kW, 6.6 kW, 10 kW or 15 kW, expandable up to 480 kW
- Output voltages: 0...40 V up to 0...1500 V
- Output currents: 30 A up to 510 A, expandable up to 5100 A
- Auto-ranging output stage
- Various protection circuits (OVP, OCP, OPP, OTP)
- Control panel with pushbuttons and colored TFT for actual values, set values, status and alarms
- Galvanically isolated, analog interface
- Temperature controlled fans for cooling
- 40 V models according to SELV (EN 60950)
- Discharge circuit ($U_{out} < 60 V$ in $\leq 10 s$)
- USB and Ethernet port integrated or alternatively installed IEEE/GPIB port
- EMC TÜV approved for EN 61010 Class B
- SCPI command language supported

General

The microprocessor controlled high efficiency laboratory power supplies of series EA-PS 9000 3U offer many functions and features in their standard version, making the use of this equipment remarkably easy and most effective.

The clearly arranged control panel features two rotary knobs, six pushbuttons and two LEDs. Together with a colour TFT display for all values and status it simplifies the use of the device.

In order to achieve even higher output power than the single units can supply, cabinets with up to 150 kW and up to 42U size can be configured to suit the user's requirements. Also see page 138.

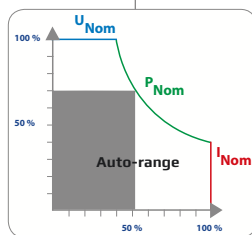
EA-PS 9000 3U 3.3 kW - 15 kW

AC输入

所有型号都采用主动式功率因数，专门设计成在340 V至460 V AC 的三相交流电。

功率级

本系列所有型号的输出功率都可灵活调整。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定功率范围内。因此仅用一台产品就能覆盖广泛的应用。



直流输出

本系列有0...40 V和0...1500 V输出电压，0...30 A和0...510 A输出电流，0...3.3 kW，0...5 kW，0...6.6 kW，0...10 kW或0...15 kW输出功率的不同型号。输出端位于产品后面板上。

放电电路

额定输出电压为200 V或以上的产品，其输出电容都配有一放电电路。在空载或带小负载时，它能确保危险电压在直流输出关闭后降至60 V DC以下。该电压值被认为是对人体安全的最高电压。

保护功能

为保护连接设备，可给产品设定一过压保护极限值(OVP)，以及过流(OCP)与过功率(OPP)保护极限值。

一旦因故超过这三个值中的一个，直流输出会被立即切断，并在显示器与接口端发出一状态信号。

本产品还有过温保护，如果产品过热，它会关断直流输出。

显示器和控制键

产品所有重要信息都清晰地显示在彩色的TFT显示屏上。

通过该显示器，电压与电流的实际输出值和预设值，(CV, CC, CP)实际控制状态与其它状态，报警与设置菜单的设定，都清晰显示出来。

为了便于旋钮能调节参数，只需按一下该旋钮，就可更换数值小数点后的光标位置。所有这些特性有助于操作者的便利性。

其面板锁定功能可锁住整个面板，从而保护产品与连接负载免受意外误用。

扩展功能

可按需求将本系列单机产品组成各种配置，并装于高至42U的机柜内，并联后获得一个总功率高达480 kW的组合系统。也可参考第138页。

AC input

All models are provided with an active Power Factor Correction circuit and are designed for a usage on a three-phase supply with 340 V up to 460 V AC.

Power

The devices are equipped with a flexible auto-ranging output stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. Therefore, a wide range of applications can already be covered by the use of just one unit.

DC output

DC output voltages between 0...40 V and 0...1500 V, output currents between 0...30 A and 0...510 A and output power ratings of 0...3.3 kW, 0...5 kW, 0...6.6 kW, 0...10 kW or 0...15 kW are available. The output terminal is located in the rear panel.

Discharge circuit

Models with a nominal output voltage of 200 V or higher include a discharge circuit for the output capacities. For no load or low load situations, it ensures that the dangerous output voltage can sink to under 60 V DC after the DC output has been switched off. This value is considered as limit for voltages dangerous to human safety.

Protective features

For protection of the equipment connected, it is possible to set an overvoltage protection threshold (OVP), as well as one for overcurrent (OCP) and overpower (OPP).

As soon as one of these thresholds is reached for any reason, the DC output will be immediately shut off and a status signal will be generated on the display and via the interfaces. There is furthermore an overtemperature protection, which will shut off the DC output if the device overheats.

Display and controls

All important information is clearly visualised on a colour TFT display.

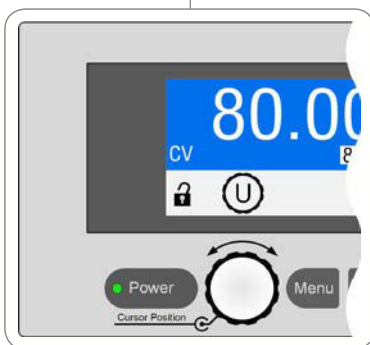
With this, information about the actual output values and set values of voltage and current, the actual control state (CV, CC, CP) and other statuses, as well as alarms and settings of the setup menu are clearly displayed.

In order to ease adjusting of values by the rotary knobs, pushing them can switch between decimal positions of a value. All these features contribute to an operator friendliness.

With a panel lock feature, the whole panel can be locked in order to protect the equipment and the loads from unintentional misuse.

Extensibility

The single units can be combined into various configurations upon request and in cabinets of up to 42U height, in order to build parallel systems of up to 480 kW total power. Also see page 138.



EA-PS 9000 3U 3.3 kW - 15 kW



远程感测

远程感测输入端可直接用线连到负载设备，以补偿连线上的部分压降。如果感测输入端已接到负载上，本电源会自动调整输出电压，以确保负载获得准确所需的电压值。

数字接口

所有型号在其后板默认有两个电隔离数字接口（标准版：1x USB & 1x Ethernet，带3W选项的：1x USB & 1x GPIB）。可通过发送SCPI语言指令或ModBus RTU协议，经USB与Ethernet接口，控制和监控产品，而GPIB仅支持SCPI语言。

模拟接口

产品后板上装有一隔离模拟接口端子。它具有一模拟输入脚，接上0 V...10 V或0 V...5 V电压，可设置0...100%的输出电压、电流与功率。

要监控输出电压与电流，可给模拟输出脚接上0 V...10 V或0 V...5 V电压完成。此外，还有几个输入脚和输出脚，可用于控制和监控产品状态。

可选件

- 高速跃变（也可见144）*
- 水制冷（仅针对200 V以下型号）
- 还可安装带固定GPIB端口的三位接口（3 W），而非接口模块用的默认插槽

* 并非针对所有电压--具体请咨询

Remote sensing

The standard sensing input can be connected directly to the load in order to compensate voltage drops along the power cables. If the sensing input is connected to the load, the power supply will adjust the output voltage automatically to ensure the required voltage is available at the load.

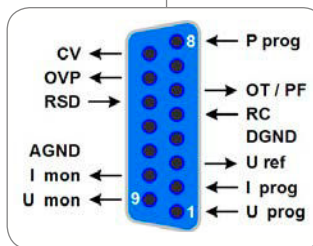
Digital interfaces

All models features two galvanically isolated, digital interfaces by default (standard: 1x USB & 1x Ethernet, with option 3W: 1x USB & 1x GPIB), which are located on the rear side. USB and Ethernet can be used to control and monitor the devices either with SCPI language commands or ModBus RTU protocol, while with GPIB only SCPI is supported.

Analog interface

There is a galvanically isolated analog interface terminal, located on the rear of the device. It offers analog inputs to set voltage, current and power from 0...100% through control voltages of 0...10 V or 0...5 V.

To monitor the output voltage and current, there are analog outputs with voltage ranges of 0...10 V or 0...5 V. Also, several status inputs and outputs are available.



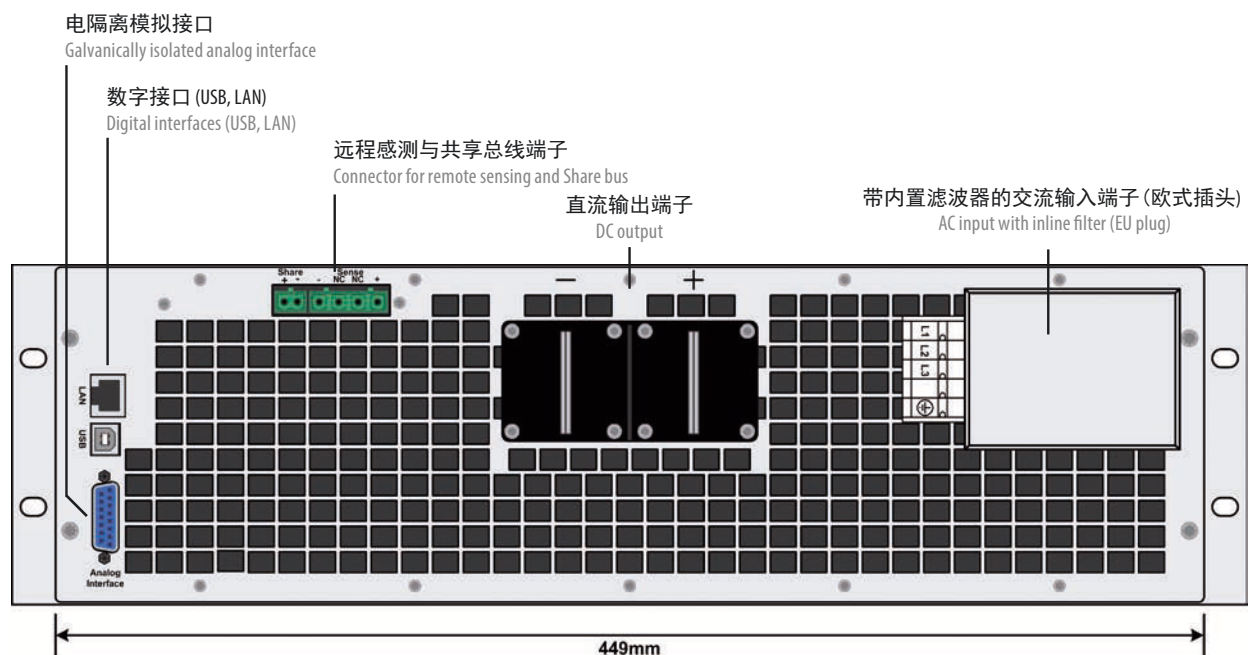
Options

- High speed ramping (see page 144) *
- Water cooling (only for models up to 200 V)
- Three-way interface (3W) with a rigid GPIB port installed instead of the default Ethernet port

* Not available for all voltages - please quote for availability

产品视图

Product views



EA-PS 9000 3U 3.3 kW - 15 kW

技术参数	Technical Data	Series PS 9000 3U / 系列
交流：供电	AC: Supply	
- 电压	- Voltage	340...460 V, 2ph/3ph
- 频率	- Frequency	45...66 Hz
- 功率因数	- Power factor	>0.99
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
- 0-100%的负载调整率	- Load regulation 0-100%	<额定值的0.05% / <0.05% of rated value
- $\pm 10\% \Delta U_{AC}$ 线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.02% / <0.02% of rated value
- 带载10-100%调整需时	- Regulation 10-100% load	<2 ms
- 带载10-90%上升时间	- Rise time 10-90%	最大 / Max. 30 ms
- 过压保护	- Overvoltage protection	可调, 0...110% U_{Nenn} / Adjustable, 0...110% U_{Nom}
直流关闭时空载放电时间	- No load discharge time on DC off	100% U 降至 / to <60 V: 少于 10 s / less than 10 s
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔI_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.15% / <0.15% of rated value
- $\pm 10\% \Delta U_{AC}$ 的线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.05% / <0.05% of rated value
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的1% / <1% of rated value
过压类别	Overvoltage category	2
保护功能	Protection	OTP, OVP, OCP, OPP, PF ⁽¹⁾
隔离耐压	Insulation	
- 交流输入对外壳	- AC input to enclosure	2500 V DC
- 交流输入对直流输出	- AC input to DC output	2500 V DC
- 直流输出对外壳 (PE)	- DC output to enclosure (PE)	取决于具体型号, 见各型号规格表 / Depending on models, see tables
污染等级	Degree of pollution	2
保护等级	Protection class	1
显示器与面板	Display and panel	彩色显示器, 调节旋钮与按钮 / Colour display, knobs and pushbuttons
数字接口	Digital interfaces	
- 内置	- Built-in	1x 通讯用B类USB端口, 1x Ethernet / 1x USB type B for communication, 1x Ethernet 可选: 1x GPIB (针对3W选项功能) / optional: 1x GPIB (with option 3W)
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
- 信号范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U, I, P, 远程开-关, 直流输出开-关 / U, I, P, Remote on-off, DC output on-off
- 输出脚	- Outputs	U/I, 过压, 报警, 参考电压 / U / I, Overvoltage, alarms, reference voltage
- U / I / P 精确度	- Accuracy U / I / P	0...10 V: <0.2% 0...5 V: <0.4%
并联操作	Parallel operation	可实现 / Possible
- 主-从	- Master-Slave	无 / No
安规标准	Standards	EN 61326, IEC 1010, EN 61010 EMC通过了TÜV认证, 符合 / EMC TÜV approved according to IEC 61000-6-2:2005 IEC 61000-6-3:2006 Class B / 等级 B
制冷方式	Cooling	温控风扇 (可选: 水冷) / Temperature controlled fans (optional: water)
工作温度	Operation temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
湿度	Humidity	<80%, 无凝露 / non-condensing
工作高度	Operation altitude	<2000 m
尺寸 (宽 高 深) ⁽²⁾	Dimensions (W H D) ⁽²⁾	19" x 3 HE/U x 609 mm

⁽¹⁾ 见第146页 / See page 146⁽²⁾ 为标准版的外壳尺寸, 非整体尺寸, 带选项功能的则不同 / Enclosure of the standard version and not overall size, versions with options may vary

EA-PS 9000 3U 3.3 kW - 15 kW



技术参数	Technical Data	PS 9040-170 3U	PS 9080-170 3U	PS 9200-70 3U	PS 9360-40 3U
额定电压&范围	Rated voltage & range	0...40 V	0...80 V	0...200 V	0...360 V
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<200 mV _{PP} <16 mV _{RMS}	<200 mV _{PP} <16 mV _{RMS}	<300 mV _{PP} <40 mV _{RMS}	<550 mV _{PP} <65 mV _{RMS}
- 感测补偿电压	-Sensing compensation	~1 V	~2 V	~5 V	~7.5 V
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±400 V DC	±400 V DC	±400 V DC	±400 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±400 V DC	±400 V DC	±600 V DC	±600 V DC
额定电流&范围	Rated current & range	0...170 A	0...170 A	0...70 A	0...40 A
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<80 mA _{RMS}	<80 mA _{RMS}	<22 mA _{RMS}	<18 mA _{RMS}
额定功率&范围	Rated power & range	0...3300 W	0...5000 W	0...5000 W	0...5000 W
效率	Efficiency	~93%	~93%	~95%	~93%
U的编程分辨率	Programming resolution U	≤2 mV	≤4 mV	≤9 mV	≤15 mV
I的编程分辨率	Programming resolution I	≤7 mA	≤7 mA	≤3 mA	≤2 mA
重量 ⁽²⁾	Weight ⁽²⁾	~17 kg	~17 kg	~17 kg	~17 kg
订购编号-欧版 ⁽³⁾	Ordering number EU model ⁽³⁾	06230250	06230251	06230252	06230253
订购编号-美版 ⁽³⁾	Ordering number US model ⁽³⁾	06238250	06238251	06238252	06238253

技术参数	Technical Data	PS 9500-30 3U	PS 9750-20 3U	PS 9040-340 3U	PS 9040-510 3U
额定电压&范围	Rated voltage & range	0...500 V	0...750 V	0...40 V	0...40 V
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<350 mV _{PP} <70 mV _{RMS}	<800 mV _{PP} <200 mV _{RMS}	<320 mV _{PP} <25 mV _{RMS}	<320 mV _{PP} <25 mV _{RMS}
- 感测补偿电压	-Sensing compensation	~10 V	~15 V	~1 V	~1 V
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±725 V DC	±725 V DC	±400 V DC	±400 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±1000 V DC	±1000 V DC	±400 V DC	±400 V DC
额定电流&范围	Rated current & range	0...30 A	0...20 A	0...340 A	0...510 A
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<16 mA _{RMS}	<16 mA _{RMS}	<160 mA _{RMS}	<120 mA _{RMS}
额定功率&范围	Rated power & range	0...5000 W	0...5000 W	0...6600 W	0...10000 W
效率	Efficiency	~95.5%	~94%	~93%	~93%
U的编程分辨率	Programming resolution U	≤21 mV	≤31 mV	≤2 mV	≤2 mV
I的编程分辨率	Programming resolution I	≤2 mA	≤1 mA	≤14 mA	≤21 mA
重量 ⁽²⁾	Weight ⁽²⁾	~17 kg	~17 kg	~24 kg	~30 kg
订购编号-欧版 ⁽³⁾	Ordering number EU model ⁽³⁾	06230254	06230255	06230256	06230263
订购编号-美版 ⁽³⁾	Ordering number US model ⁽³⁾	06238254	06238255	06238256	06238263

技术参数	Technical Data	PS 9080-340 3U	PS 9200-140 3U	PS 9360-80 3U	PS 9500-60 3U
额定电压&范围	Rated voltage & range	0...80 V	0...200 V	0...360 V	0...500 V
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<320 mV _{PP} <25 mV _{RMS}	<300 mV _{PP} <40 mV _{RMS}	<550 mV _{PP} <65 mV _{RMS}	<350 mV _{PP} <70 mV _{RMS}
- 感测补偿电压	-Sensing compensation	~2 V	~5 V	~7.5 V	~10 V
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±400 V DC	±400 V DC	±400 V DC	±725 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±400 V DC	±600 V DC	±600 V DC	±1000 V DC
额定电流&范围	Rated current & range	0...340 A	0...140 A	0...80 A	0...60 A
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<160 mA _{RMS}	<44 mA _{RMS}	<35 mA _{RMS}	<32 mA _{RMS}
额定功率&范围	Rated power & range	0...10000 W	0...10000 W	0...10000 W	0...10000 W
效率	Efficiency	~93%	~95%	~93%	~95%
U的编程分辨率	Programming resolution U	≤4 mV	≤9 mV	≤15 mV	≤21 mV
I的编程分辨率	Programming resolution I	≤14 mA	≤6 mA	≤4 mA	≤3 mA
重量 ⁽²⁾	Weight ⁽²⁾	~24 kg	~24 kg	~24 kg	~24 kg
订购编号-欧版 ⁽³⁾	Ordering number EU model ⁽³⁾	06230257	06230258	06230259	06230260
订购编号-美版 ⁽³⁾	Ordering number US model ⁽³⁾	06238257	06238258	06238259	06238260

(1) RMS值: 在BWL 300 kHz时测量的LF值, PP值: 在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

(2) 为标准版的重量, 带选项功能的则不同 / Weight of the base version, models with option(s) may vary

(3) 为标准版的订购编号, 带选项功能的则不同 / Ordering number of the base version, models with option(s) installed have different ordering numbers

EA-PS 9000 3U 3.3 kW - 15 kW

技术参数	Technical Data	PS 9750-40 3U	PS 91000-30 3U	PS 9080-510 3U	PS 9200-210 3U
额定电压&范围	Rated voltage & range	0...750 V	0...1000 V	0...80 V	0...200 V
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<800 mV _{PP} <200 mV _{RMS}	<1600 mV _{PP} <350 mV _{RMS}	<320 mV _{PP} <25 mV _{RMS}	<300 mV _{PP} <40 mV _{RMS}
- 感测补偿电压	-Sensing compensation	~15 V	~20 V	~2.5 V	~6 V
隔离耐压	Insulation				
- 直流负极 <-> PE	- Negative DC pole <-> PE	±725 V DC	±725 V DC	±400 V DC	±400 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±1000 V DC	±1000 V DC	±400 V DC	±600 V DC
额定电流&范围	Rated current & range	0...40 A	0...30 A	0...510 A	0...210 A
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<32 mA _{RMS}	<22 mA _{RMS}	<240 mA _{RMS}	<66 mA _{RMS}
额定功率&范围	Rated power & range	0...10000 W	0...10000 W	0...15000 W	0...15000 W
效率	Efficiency	~94%	~95%	~93%	~95%
U的编程分辨率	Programming resolution U	≤31 mV	≤41 mV	≤4 mV	≤9 mV
I的编程分辨率	Programming resolution I	≤2 mA	≤2 mA	≤21 mA	≤9 mA
重量 ⁽²⁾	Weight ⁽²⁾	~24 kg	~24 kg	~30 kg	~30 kg
订购编号-欧版 ⁽³⁾	Ordering number EU model ⁽³⁾	06230261	06230262	06230264	06230265
订购编号-美版 ⁽³⁾	Ordering number US model ⁽³⁾	06238261	06238262	06238264	06238265

技术参数	Technical Data	PS 9360-120 3U	PS 9500-90 3U	PS 9750-60 3U	PS 91000-40 3U	PS 91500-30 3U
额定电压&范围	Rated voltage & range	0...360 V	0...500 V	0...750 V	0...1000 V	0...1500 V
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<550 mV _{PP} <65 mV _{RMS}	<350 mV _{PP} <70 mV _{RMS}	<800 mV _{PP} <200 mV _{RMS}	<2000 mV _{PP} <300 mV _{RMS}	<2400 mV _{PP} <400 mV _{RMS}
- 感测补偿电压	-Sensing compensation	~7.5 V	~10 V	~15 V	~20 V	~30 V
隔离耐压	Insulation					
- 直流负极 <-> PE	- Negative DC pole <-> PE	±400 V DC	±725 V DC	±725 V DC	±725 V DC	±725 V DC
- 直流正极 <-> PE	- Positive DC pole <-> PE	±600 V DC	±1000 V DC	±1000 V DC	±1000 V DC	±1500 V DC
额定电流&范围	Rated current & range	0...120 A	0...90 A	0...60 A	0...40 A	0...30 A
- 纹波 ⁽¹⁾	- Ripple ⁽¹⁾	<50 mA _{RMS}	<48 mA _{RMS}	<48 mA _{RMS}	<22 mA _{RMS}	<26 mA _{RMS}
额定功率&范围	Rated power & range	0...15000 W	0...15000 W	0...15000 W	0...15000 W	0...15000 W
效率	Efficiency	~93%	~95%	~94%	~95%	~95%
U的编程分辨率	Programming resolution U	≤15 mV	≤21 mV	≤31 mV	≤41 mV	≤61 mV
I的编程分辨率	Programming resolution I	≤5 mA	≤4 mA	≤3 mA	≤2 mA	≤2 mA
重量 ⁽²⁾	Weight ⁽²⁾	~30 kg	~30 kg	~30 kg	~30 kg	~30 kg
订购编号-欧版 ⁽³⁾	Ordering number EU model ⁽³⁾	06230266	06230267	06230268	06230270	06230269
订购编号-美版 ⁽³⁾	Ordering number US model ⁽³⁾	06238266	06238267	06238268	06238270	06238269

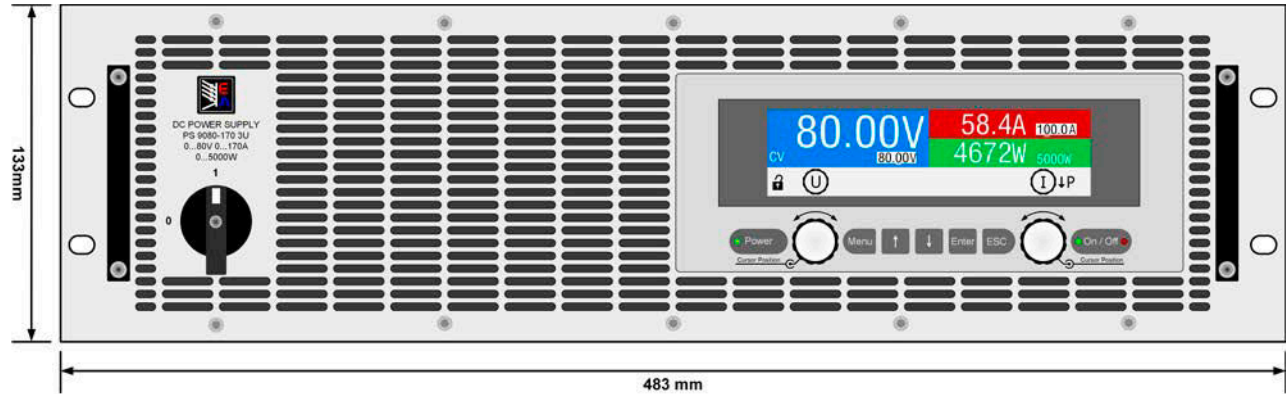
(1) RMS值: 在BWL 300 kHz时测量的LF值, PP值: 在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

(2) 为标准版的重量, 带选项功能的则不同 / Weight of the base version, models with option(s) may vary

(3) 为标准版的订购编号, 带选项功能的则不同 / Ordering number of the base version, models with option(s) installed have different ordering numbers

产品视图

Product views



EA-PSE 9000 3U 3.3 kW - 15 kW



可编程高效直流电源

Programmable high efficiency DC Power supplies



EA-PSE 9500-90 3U



- 多相输入电压340...460 V_{AC} 或 188...229 V_{AC} (US)
- 效率高达95.5%
- 输出功率有: 3.3 kW, 5 kW, 6.6 kW, 10 kW, 15 kW还可扩展至240 kW
- 输出电压: 0...40 V 至 0...1500 V
- 输出电流: 30 A 至 510 A, 还可以扩展至5100 A
- 灵活的功率调整输出
- 各种保护功能 (OVP, OCP, OPP, OTP)
- 带按键的蓝屏控制面板, 可显示实际值、设定值、状态与报警
- 隔离模拟接口
- 温控风扇制冷
- 符合SELV标准 (EN 60950)的40 V产品型号
- 放电电路 (在10 s内U_{out} < 60 V)
- 内置USB端口与主-从端口
- 可选数字接口模块
- 支持SCPI指令语言

- Multi-phase input 340...460 V_{AC} or 188...229 V_{AC} (US)
- High efficiency up to 95.5%
- Output power ratings: 3.3 kW, 5 kW, 6.6 kW, 10 kW or 15 kW, expandable up to 240 kW
- Output voltages: 0...40 V up to 0...1500 V
- Output currents: 30 A up to 510 A, expandable up to 5100 A
- Auto-ranging output stage
- Various protection circuits (OVP, OCP, OPP, OTP)
- Control panel with pushbuttons and blue LCD for actual values, set values, status and alarms
- Galvanically isolated, analog interface
- Temperature controlled fans for cooling
- 40 V models according to SELV (EN 60950)
- Discharge circuit (U_{out} < 60 V in ≤ 10 s)
- USB port and master-slave integrated
- Optional, digital interface modules
- SCPI command language supported

概要

EA-PSE 9000 3U系列是一款由微处理器控制的高效实验室电源, 它融合了EA-PSI 9000 3U与EA-PS 9000 3U系列的一些重要特征。其交流供电与直流输出, 以及型号的技术规格都与这两个系列相同。与EA-PS 9000 3U系列相比, 其不同之处在于, 可配备更多数量的数字接口, 甚至可以连接到现场总线。另外一方面, 与EA-PSI 9000 3U系列相比, 有意的减少了一些额外功能与手动操作。从而使PSE系列非常适用于仅用远程控制的系统。

General

The microprocessor controlled high efficiency laboratory power supplies of series EA-PSE 9000 3U merge some of important features of series EA-PSI 9000 3U and EA-PS 9000 3U. All technical specifications regarding AC supply and DC output, as well as all models are identical to those two series. The difference of the EA-PSE 9000 series devices compared to those of EA-PS 9000 3U is the bigger number of available digital interfaces, which even allow for the connection to field buses. On the other hand, the number of available extra features compared to series EA-PSI 9000 3U and manual handling have been reduced intentionally. This makes the PSE devices ideal for systems which are only used in remote control.

EA-PSE 9000 3U 3.3 kW - 15 kW

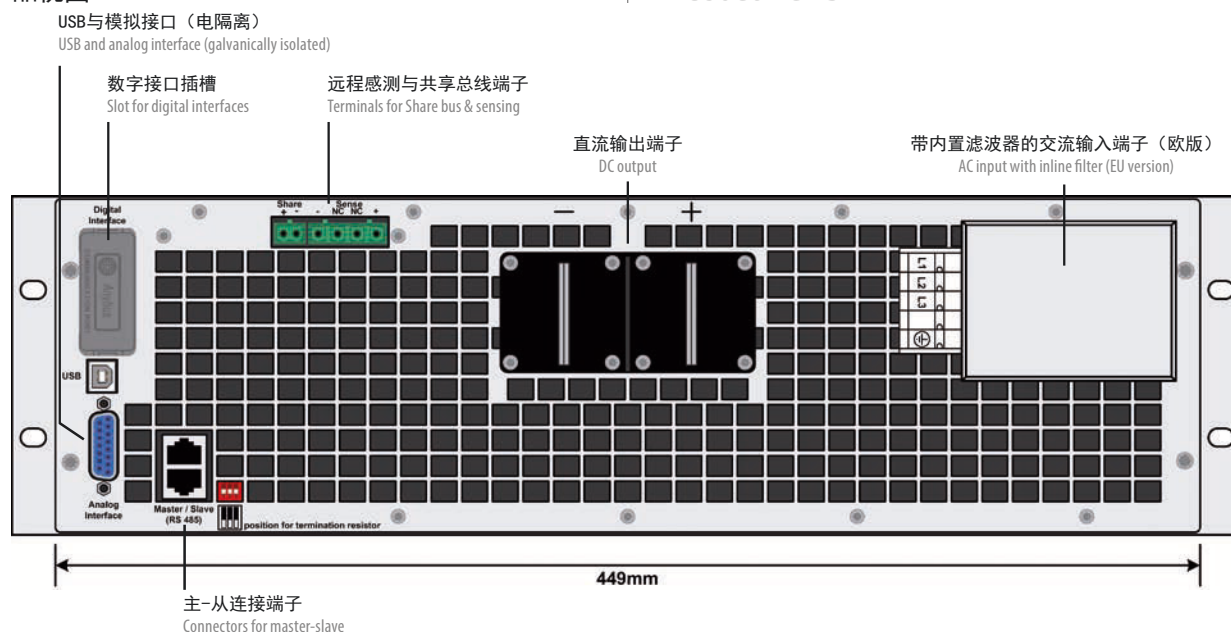
主-从操作

所有产品标配有一个数字式主-从总线。通过它可并联最多32台同型号产品，将实际电压、电流与功率汇总，形成更大的系统。经产品上的控制面板，或经任意数字通讯接口的远程控制，可完成主-从系统的全部配置。主机的操作也手动控制，也可远程控制（任意接口）。

可选件

- 供RS232, CAN, CANopen, ModBus TCP, Profibus, Profinet/IO, EtherCAT或Ethernet数字接口模块。其插槽位于产品后板，可轻松插入新的接口或者更换现有接口。详情见134。
- 水冷选项（近针对200 V以上型号）

产品视图



技术参数

EA-PSE 9000 3U系列下列产品型号的有关技术规格，请参考EA-PS 9000 3U(从54页面开始)与EA-PSI 9000 3U(从28页面开始)系列同型号规格。

Modell	Spannung	Strom	Leistung	Artikelnr.
Model	Voltage	Current	Power	Ordering nr.
EA-PSE 9040-170 3U	0...40 V	0...170 A	0...3300 W	06230700
EA-PSE 9080-170 3U	0...80 V	0...170 A	0...5000 W	06230701
EA-PSE 9200-70 3U	0...200 V	0...70 A	0...5000 W	06230702
EA-PSE 9360-40 3U	0...360 V	0...40 A	0...5000 W	06230703
EA-PSE 9500-30 3U	0...500 V	0...30 A	0...5000 W	06230704
EA-PSE 9750-20 3U	0...750 V	0...20 A	0...5000 W	06230705
EA-PSE 9040-340 3U	0...40 V	0...340 A	0...6600 W	06230706
EA-PSE 9040-510 3U	0...40 V	0...510 A	0...10000 W	06230707
EA-PSE 9080-340 3U	0...80 V	0...340 A	0...10000 W	06230708
EA-PSE 9200-140 3U	0...200 V	0...140 A	0...10000 W	06230709
EA-PSE 9360-80 3U	0...360 V	0...80 A	0...10000 W	06230710

Master-slave

All models feature a digital master-slave bus by default. It can be used to connect up to 32 units of identical models in parallel operation to a bigger system with totals formation of the actual value of voltage, current and power. The configuration of the master-slave system is either completely done on the control panels of the units or by remote control via any of digital communication interfaces. Handling of the master unit is possible by manual or remote control (any interface).

Options

- Digital interface modules for RS232, CAN, CANopen, ModBus TCP, Profibus, Profinet/IO, EtherCAT or Ethernet. 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. See page 134.
- Water cooling (only for models up to 200 V)

Product views

Technical specifications

For the remaining technical specifications of the below listed models please refer to the identical models of series EA-PS 9000 3U (from page 54) and EA-PSI 9000 3U (from page 28).

Modell	Spannung	Strom	Leistung	Artikelnr.
Model	Voltage	Current	Power	Ordering nr.
EA-PSE 9500-60 3U	0...500 V	0...60 A	0...10000 W	06230711
EA-PSE 9750-40 3U	0...750 V	0...40 A	0...10000 W	06230712
EA-PSE 91000-30 3U	0...1000 V	0...30 A	0...10000 W	06230713
EA-PSE 9080-510 3U	0...80 V	0...510 A	0...15000 W	06230714
EA-PSE 9200-210 3U	0...200 V	0...210 A	0...15000 W	06230715
EA-PSE 9360-120 3U	0...360 V	0...120 A	0...15000 W	06230716
EA-PSE 9500-90 3U	0...500 V	0...90 A	0...15000 W	06230717
EA-PSE 9750-60 3U	0...750 V	0...60 A	0...15000 W	06230718
EA-PSE 91000-40 3U	0...1000 V	0...40 A	0...15000 W	06230720
EA-PSE 91500-30 3U	0...1500 V	0...30 A	0...15000 W	06230719

EA-PS 3000 C 160 W - 640 W



可编程桌面式直流电源 Programmable desktop DC Power supplies



EA-PSI 9080-60 DT

U **I** **P** **OVP** **OCP** **OPP** **OTP**

Option: **USB** **LAN**

- 宽范围的输入电压：90...264 V，带主动式PFC
- 额定输出功率：0...160 W 至 0...640 W
- 输出电压：0...40 V 至 0...200 V
- 输出电流：0...2 A 至 0...40 A
- 灵活的可调整输出
- 监控功能 (OVP, OCP, OPP)
- 过温保护 (OT)
- 远程感测
- 彩色显示器显示数值、状态与通知
- 可选隔离接口（模拟式 / 数字式）
- 放电电路
- 支持SCPI与ModBus RTU
- 支持LabView VI

- Wide input voltage range 90...264 V with active PFC
- Output power ratings: 0...160 W up to 0...640 W
- Output voltages: 0...40 V up to 0...200 V
- Output currents: 0...2 A up to 0...40 A
- Flexible, power regulated output stage
- Supervision (OVP, OCP, OPP)
- Overtemperature protection (OT)
- Remote sensing
- Colour display for values, status and notifications
- Optional, galvanically isolated interfaces (analog / digital)
- Discharge circuit ($U_{out} < 60 \text{ V}$ in $\leq 10 \text{ s}$)
- SCPI and ModBus RTU supported
- LabView VI supported

一般信息

EA-PS 3000 C新系列为用户带来一款紧凑的桌面式电源产品，能广泛应用于需求小电压、电流与功率的场合。小巧的外壳、彩色的控制面板、前板可触直流输出设置端口，连接和操作都很方便。

除了电源的标准功能外，还有额外的功能可以简化操作，并节省时间。设定数值除了用旋钮调节外，用户还可快速设置几个保护极限，调出用户配置文档。

General

The new series EA-PS 3000 C offers the user compact desktop power supply devices for a manifold of applications where it requires small voltages, currents and powers. The small enclosure dimensions, the intuitive control panel with the colour display and the front side accessible DC output facilitate setup, connection and handling on place.

Besides standard features of power supplies these devices offer some additional functions to simplify handling and to save time. Apart from set value adjustment with knobs, the user can also quickly configure several protection thresholds and call user profiles.

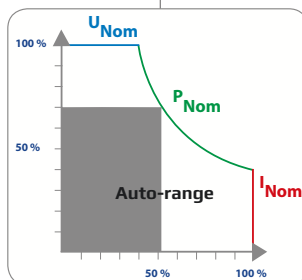
EA-PS 3000 C 160 W - 640 W

交流供电

本系列产品使用主动式功率因素校正（简称：PFC），使之能够在宽范围的输入电压90 V_{AC} 至 264 V_{AC} 之间都能使用。

功率级别自动调整

本系列所有型号的输出功率都可灵活调整。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定功率范围内。它们的最大设定功率都可调，因此仅用一台产品就能覆盖广泛的应用。



直流输出

本系列有0...40 V和0...200 V输出电压，0...2 A和0...40 A输出电流，0...160 W和0...640 W输出功率的不同型号。

因此不管是手动控制还是远程控制（模拟或数字），都可在0%与100%之间连续调节电流、电压与功率。输出端位于产品前面板上。

保护功能

为保护连接设备，可给产品设定一过压保护极限值（OVP），以及过流（OCP）与过功率（OPP）保护极限值。

一旦因故超过这三个值中的一个，直流输出会被立即切断，并在显示器与接口端发出一状态信号。本产品还有过温保护，如果产品过热，它会关断直流输出。

远程感测

远程感测输入端可直接连到负载设备，以补偿连线上的部分压降。如果感测输入端已接到负载上，本电源会自动调整输出电压，以确保负载获得准确所需的电压值。

HMI操作

本产品的手动操作通过一个彩色显示器、两个旋钮以及六个按钮完成。大显示器会一次性显示所有有关设定值与实际值。整个设置通过人机界面完成。可显示多种语言（德文，英文，俄文，中文）。

远程控制 & 连接

要进行远程控制，可从三种接口卡中选取，用户都可在现场快速并轻松地安装：

- USB
- USB + Ethernet（以太网）
- USB + Analog（模拟）

使用数字接口（USB，以太网），用户可从免费版软件“EA Power Control”中获利。它具有一功能，称作“排序”，产品可由CSV格式的半自动表格来控制。

AC supply

The equipment uses an active **Power Factor Correction** (short: PFC), enabling worldwide use on a mains input from 90 V_{AC} up to 264 V_{AC}.

Auto-ranging power stage

All models are equipped with a flexible auto-ranging output stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. The maximum power set value is adjustable with these models. Therefore, a wide range of applications can already be covered by the use of just one unit.

DC output

DC output voltages between 0...40 V and 0...200 V, output currents between 0...2 A and 0...40 A and output power ratings between 0...160 W and 0...640 W are available.

Current, voltage and power can thus be adjusted continuously between 0% and 100%, no matter if manually or remotely controlled (analog or digital). The output terminals are located on the front side of the devices.

Protective features

For protection of the equipment connected, it is possible to set an overvoltage protection threshold (OVP), as well as one for overcurrent (OCP) and overpower (OPP).

As soon as one of these thresholds is reached for any reason, the DC output will be immediately shut off and a status signal will be generated on the display and via the interfaces. There is furthermore an overtemperature protection, which will shut off the DC output if the device overheats.

Remote sensing

The standard sensing input can be connected directly to the load in order to compensate voltage drops along the cables. If the sensing input is connected to the load, the power supply will detect this and adjust the output voltage automatically to ensure the accurate required voltage is available at the load.

Handling (HMI)

Manual operation is done with a colour display, two rotary knobs and six pushbuttons. The large display shows all relevant set values and actual values at a glance. The whole setup is also done with the human-machine interface. The display is multilingual (German, English, Russian, Chinese).

Remote control & connectivity

For remote control, there are three types of interface cards optionally available which can be quickly and easily installed by user on location:

- USB
- USB + Ethernet
- USB + Analog

Using the digital interface (USB, Ethernet), 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.



EA-PS 3000 C 160 W - 640 W

该表就是一简单的测试程序，可在MS Excel或其它CSV编辑器下创建与编辑，然后应用到软件工具。此软件还能再可选功能“多台控制”（须附注册码，非免费）下一次性控制多达20台产品。参考页面136了解更多信息。

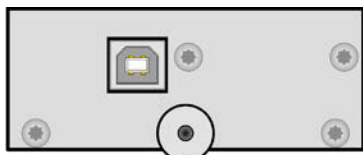
选项

- 接口卡（数字式或数字/模拟式），即插即用，可拆装

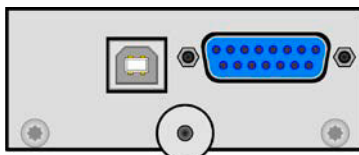
This table represents a simple test procedure and can be created and edited in MS Excel or other CSV editors and then imported into the software tool. This software also allows for the control of up to 20 units at once with an optional feature called "Multi Control" (licensed, not free of charge). See page 136 for more information.

Options

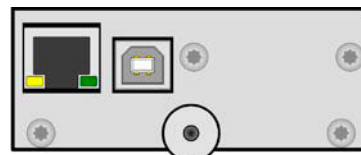
- Interface card (digital or digital/analog), plug 'n play, retrofittable



USB

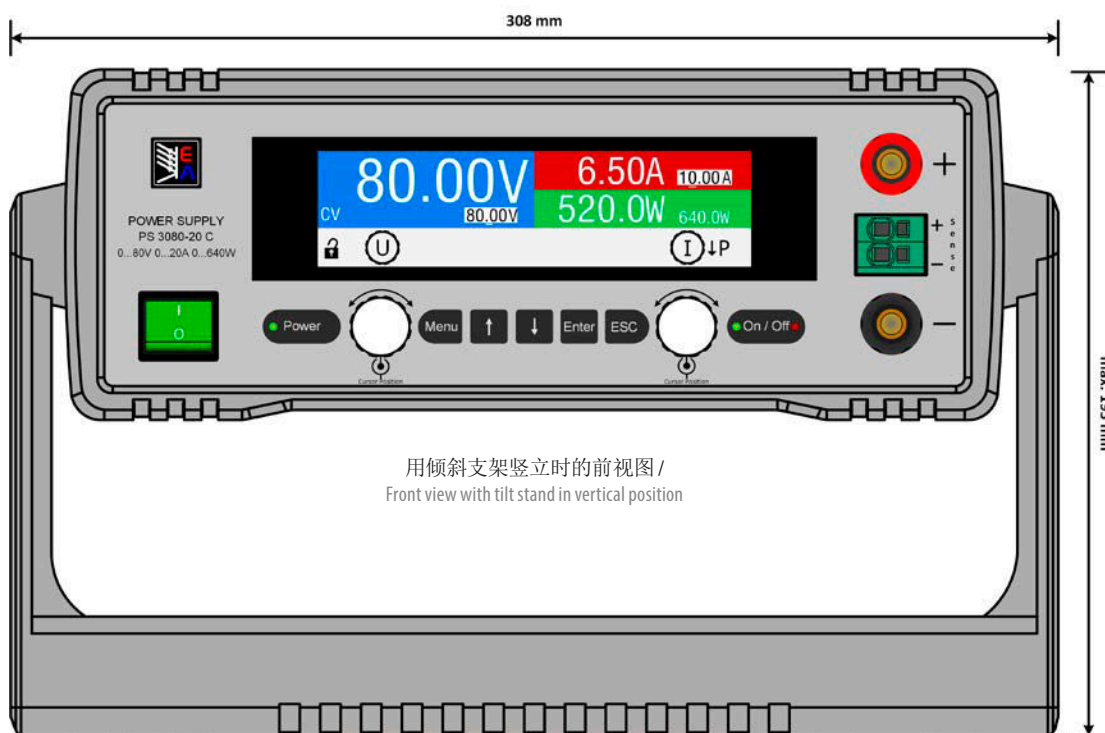
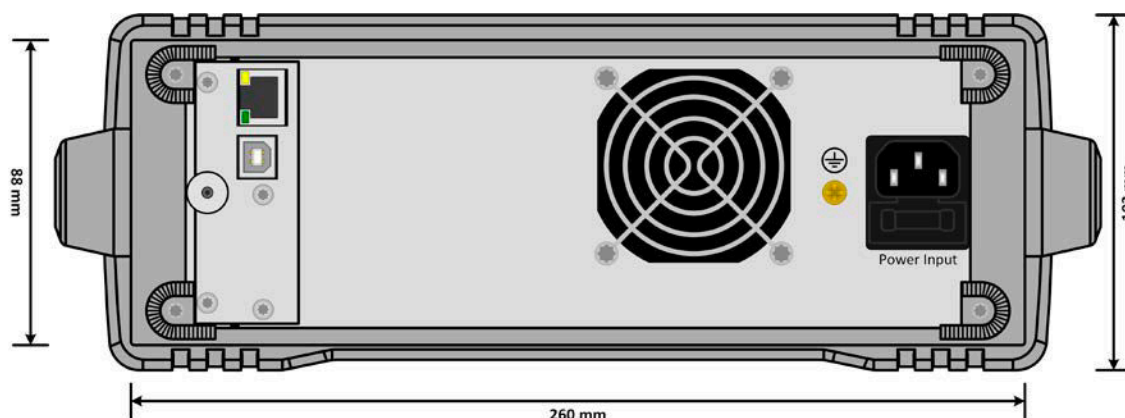


USB+ANALOG



USB+Ethernet

接口与连接端子 / Interfaces and their connectors

用倾斜支架竖立时的前视图 /
Front view with tilt stand in vertical position装有USB + 以太网接口的产品后视图（可选） /
Rear view with installed interface USB + Ethernet (optional)

EA-PS 3000 C 160 W - 640 W

技术参数	Technical Data	Series EA-PS 3000 C / 系列
交流：供电	AC: Supply	
- 电压	- Voltage / Frequency	90...264 V, 45...66 Hz
- 功率因数	- Power factor correction (PFC)	>0.99
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
- 0-100%的负载调整率	- Load regulation 0-100%	<额定值的0.05% / <0.05% of rated value
- $\pm 10\% \Delta U_{AC}$ 线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.02% / <0.02% of rated value
- 带载10-100%调整需时	- Regulation 10-100% load	<2ms
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔI_{DC} 的负载调整率	- Load regulation 1-100% ΔI_{DC}	<额定值的0.15% / <0.15% of rated value
- $\pm 10\% \Delta U_{AC}$ 的线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.05% / <0.05% of rated value
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的0.5% / <0.5% of rated value
保护等级	Protection class	1
显示器 / 控制面板	Display / control panel	彩色显示器、旋钮与按钮 / Colour display, knobs and pushbuttons
数字接口（可选）	Digital interfaces (optional)	
- 可供型号	- Available models	IF-KES USB (33100232): 1x USB Typ B IF-KES USB/LAN (33100233): 1x USB Typ B + 1x Ethernet (RJ45)
模拟接口（可选）	Analog interface (optional)	5-针D-Sub母插，电隔离 / 15-pole D-Sub, galvanically isolated
- 可供型号	- Available models	IF-KES USBANALOG: 1x Analog + 1x USB Typ B
- 信号范围	- Signal range	0...5 V 或 0...10 V (可转换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U, I, P, 远程开-关，直流输出开-关 / U, I, P, remote control on-off, DC output on-off
- 输出脚	- Outputs	U, I, 过压，报警，参考电压 / U, I, overvoltage, alarms, reference voltage
- U / I / P 精确度	- Accuracy U / I / P	0...10 V: <0.2% 0...5 V: <0.4%
制冷	Cooling	温控风扇 / Temperature controlled fan
操作温度	Operation temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
湿度	Humidity	<80%, 无凝露 / non-condensing



型号	功率	电压	电流	纹波 ⁽¹⁾	重量	尺寸 (宽 x 高 x 深) ⁽²⁾	订购编号
Model	Power	Voltage	Current	Ripple ⁽¹⁾	Weight	Dimensions (W x H x D) ⁽²⁾	Ordering number
EA-PS 3040-10 C	0...160 W	0...40 V	0...10 A	30 mV _{PP} / 3 mV _{RMS}	~ 4 kg	308 mm x 103 mm x 323 mm	35320208
EA-PS 3080-05 C	0...160 W	0...80 V	0...5 A	35 mV _{PP} / 4 mV _{RMS}	~ 4 kg	308 mm x 103 mm x 323 mm	35320209
EA-PS 3200-02 C	0...160 W	0...200 V	0...2 A	70 mV _{PP} / 13 mV _{RMS}	~ 4 kg	308 mm x 103 mm x 323 mm	35320210
EA-PS 3040-20 C	0...320 W	0...40 V	0...20 A	30 mV _{PP} / 3 mV _{RMS}	~ 4 kg	308 mm x 103 mm x 323 mm	35320211
EA-PS 3080-10 C	0...320 W	0...80 V	0...10 A	35 mV _{PP} / 4 mV _{RMS}	~ 4 kg	308 mm x 103 mm x 323 mm	35320212
EA-PS 3200-04 C	0...320 W	0...200 V	0...4 A	70 mV _{PP} / 13 mV _{RMS}	~ 4 kg	308 mm x 103 mm x 323 mm	35320213
EA-PS 3040-40 C	0...640 W	0...40 V	0...40 A	25 mV _{PP} / 4 mV _{RMS}	~ 5 kg	308 mm x 103 mm x 350 mm	35320214
EA-PS 3080-20 C	0...640 W	0...80 V	0...20 A	40 mV _{PP} / 6 mV _{RMS}	~ 5 kg	308 mm x 103 mm x 350 mm	35320215
EA-PS 3200-10 C	0...640 W	0...200 V	0...10 A	100 mV _{PP} / 25 mV _{RMS}	~ 5 kg	308 mm x 103 mm x 350 mm	35320216

(1) RMS-Wert: gemessen bei NF mit BWL 300 kHz, PP-Wert: gemessen bei HF mit BWL 20 MHz / RMS value: measured at LF with BWL 300 kHz, PP value: measured at HF with BWL 20 MHz

(2) Nur Gehäuse, nicht über alles (siehe Abbildungen) / Enclosure only, not over all (see depictions)

EA-PSI 9000 T 320 W - 1500 W



桌面式可编程直流电源 Programmable desktop DC Power supplies



EA-PSI 9080-60 T



Option: LAN

- 宽范围输入电压90...264 V，带主动式PFC
- 效率高达 92%
- 输出功率：0...320 W 至0...1500 W
- 输出电压：0...40 V 至 0...500 V
- 输出电流：0...4 A 至 0...60 A
- 灵活的功率调整输出级
- 监测功能 (OVP, OCP, OPP)
- 过温保护 (OT)
- 触摸屏显示器显示数值、状态与通知
- 标配USB端口，可选以太网与模拟接口（所有接口都已电隔离）
- 内置函数发生器
- 可模拟与调整内阻
- 符合SELV标准 (EN 60950)的40 V产品型号
- 支持SCPI指令语言
- LabView VIs
- Windows操作程序下的控制软件

- Wide input voltage range 90...264 V with active PFC
- High efficiency up to 92%
- Output power ratings: 0...320 W up to 0...1500 W
- Output voltages: 0...40 V up to 0...500 V
- Output currents: 0...4 A up to 0...60 A
- Flexible, power regulated output stage
- Supervision (OVP, OCP, OPP)
- Overtemperature protection (OT)
- Intuitive touch panel with display for values, status and notifications
- USB port as standard, Ethernet & analog optional (all interfaces galvanically isolated)
- Integrated function generator
- Internal resistance simulation and regulation
- 40 V models compliant to SELV (EN 60950)
- SCPI command language supported
- LabView VIs
- Control software for Windows

概要

EA-PSI 9000 T系列是一款由微处理器控制的实验室电源。它立足于用户友好的交互式操作概念，配备一套完整的标准功能。其输出参数、监控功能与其它设定的配置很智能且舒适。

所有输出参数的监控功能，可帮助用户减少测试设备，且几乎可不用安装外部监控硬件与软件。

General

The microprocessor controlled laboratory power supplies of series EA-PSI 9000 T offer a user-friendly, interactive handling concept, along with a extensive set of standard features, which can facilitate operating them. Configuration of output parameters, supervision features and other settings is smart and comfortable.

The implemented supervision features for all output parameters can help to reduce test equipment and make it almost unnecessary to install external supervision hardware and software.

EA-PSI 9000 T 320 W - 1500 W

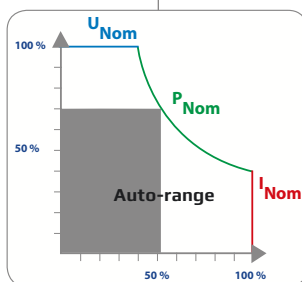
由两旋钮，一个按键，三个LED以及TFT彩色触摸屏组成的控制面板，显示所有关键数值与状态，用户只需轻轻一点手指，就可轻松操作本设备。

交流输入

本系列采用主动式功率因数（简称：PFC），输入电压为90 V_{AC}至264 V_{AC}，适合全球范围内使用。1.5 kW的型号在供电电压<150 V_{AC}时，输出功率自动减少到1 kW。

功率级自动调整

本系列所有型号的输出功率都可灵活调整。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定功率范围内。它们的最大设定功率都可调，因此仅用一台产品就能覆盖广泛的应用。



直流输出

本系列有0...40 V和0...500 V输出电压，0...4 A和0...60 A输出电流，0...320 W和0...1500 W输出功率的不同型号。

因此不管是手动控制还是远程控制（模拟或数字），都可在0%与100%之间连续调节电流、电压与功率。它还有一内阻模式，能模拟一内部在线电阻。

输出端位于产品前面板上。

放电电路

额定输出电压为200 V或以上的产品，其输出电容都配有一放电电路。在空载或带小负载时，它能确保危险电压在直流输出关闭后降至60 V DC以下。该电压值被认为是人体安全的最高电压。

保护功能

为保护连接设备，可给产品设定一过压保护极限值(OVP)，以及过流(OCP)与过功率(OPP)保护极限值。

一旦因故超过这三个值中的一个，直流输出会被立即切断，并在显示器与接口端发出一状态信号。本产品还有过温保护，如果产品过热，它会关断直流输出。

远程感测

远程感测输入端可直接连到负载设备，以补偿连线上的部分压降。如果感测输入端已接到负载上，本电源会自动调整输出电压，以确保负载获得准确所需的电压值。远程感测端子位于产品前板。

The clear control panel with its two knobs, one pushbutton, three LEDs and the touch panel with colour display for all important values and status enable the user to handle the device easily with a few touches of a finger.

AC input

The equipment uses an active Power Factor Correction (short: PFC), enabling worldwide use on a mains input from 90 V_{AC} up to 264 V_{AC}. Models with 1.5 kW will derate their output power to 1 kW below input voltages of 150 V_{AC}.

Auto-ranging power stage

All models are equipped with a flexible auto-ranging output stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. The maximum power set value is adjustable with these models. Therefore, a wide range of applications can already be covered by the use of just one unit.

DC output

DC output voltages between 0...40 V and 0...500 V, output currents between 0...4 A and 0...60 A and output power ratings between 0...320 W and 0...1500 W are available.

Current, voltage and power can thus be adjusted continuously between 0% and 100%, no matter if manually or remotely controlled (analog or digital). There is furthermore the resistance mode which offers simulation of an internal in-line resistor.

The output terminals are located on the front side of the devices.

Discharge circuit

Models with a nominal output voltage of 200 V or higher include a discharge circuit for the output capacities. For no load or low load situations, it ensures that the dangerous output voltage can sink to under 60 V DC after the DC output has been switched off. This value is considered as limit for voltages dangerous to human safety.

Protective features

For protection of the equipment connected, it is possible to set an overvoltage protection threshold (OVP), as well as one for overcurrent (OCP) and overpower (OPP).

As soon as one of these thresholds is reached for any reason, the DC output will be immediately shut off and a status signal will be generated on the display and via the interfaces. There is furthermore an overtemperature protection, which will shut off the DC output if the device overheats.

Remote sensing

The standard sensing input can be connected directly to the load in order to compensate voltage drops along the cables. If the sensing input is connected to the load, the power supply will detect this and adjust the output voltage automatically to ensure the accurate required voltage is available at the load. The remote sensing connector is located on the front of the device.

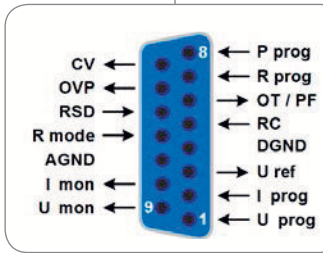


EA-PSI 9000 T 320 W - 1500 W



可选模拟接口

本系列产品后板可选择安装隔离模拟接口。该模拟接口具有一模拟输入脚，接上0 V...10 V或0 V...5 V电压，可设置0...100%的输出电压、电流与功率。要监控输出电压与电流，可给模拟输出脚接上0 V...10 V或0 V...5 V来完成。此外，还有几个输入脚和输出脚，可用来控制和监控产品状态。



Optional analog interface

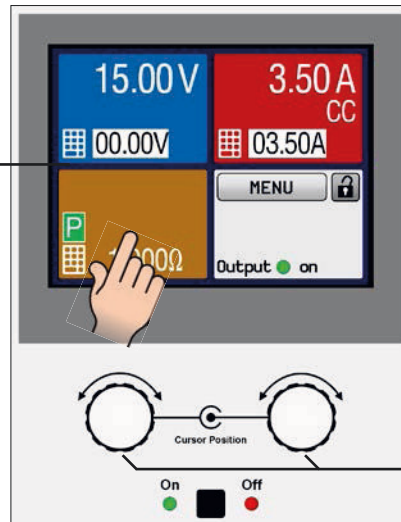
A galvanically isolated analog interface can be installed optionally and subsequently, located on the rear of the device. It offers analog inputs to set voltage, current, power and resistance from 0...100% through control voltages of 0 V...10 V or 0 V...5 V. To monitor the output voltage and current there are analog outputs with 0 V...10 V or 0 V...5 V. Also, several inputs and outputs are available for controlling and monitoring the device status.



显示器与控制面板

Display and control panel

触摸屏显示器
Display with touch panel



参数调节用旋钮
Knobs for comfortable value adjustment

设定与实际输出电压、电流与功率都清晰显示于图形显示器上。彩色的TFT屏幕为点触式，用一个手指就能控制所有功能。

Set values and actual values of output voltage, output current and output power are clearly represented on the graphic display. The colour TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger.

通过旋钮或者数字键盘直接输入参数，也可调节设定电压、电流、功率或模拟阻值。

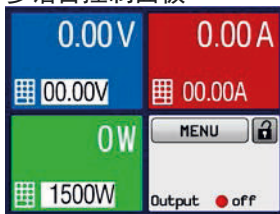
Set values of voltage, current, power or the simulated, internal resistance can be adjusted using the rotary knobs or entered directly via a numeric pad.

若想防止意外操作，可锁定所有操作键。

To prevent unintentional operations, all operation controls can be locked.

多语言控制面板

Multi-language control panel



英文 / English



中文 / Chinese



俄文 / Russian



德文 / German

函数发生器

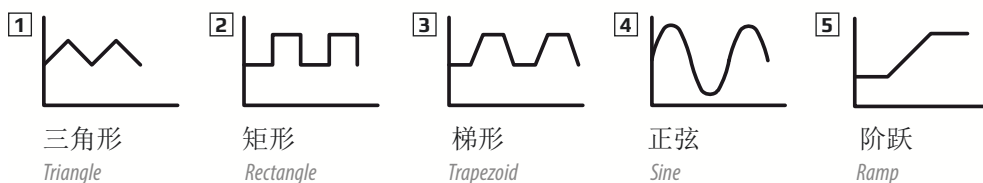
本系列所有型号都具有一可形成如下典型函数的真实函数发生器，并能将它们应用于输出电压或输出电流上。发生器可通过前板的触摸屏设置，或经某一数字接口远程配置。

预设函数会为用户提供所有必须的参数，如Y偏差值，时间/频率或幅度，整套配置完成。

Function generator

All models within this series include a true function generator which can generate typical functions, as displayed in the figure 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.

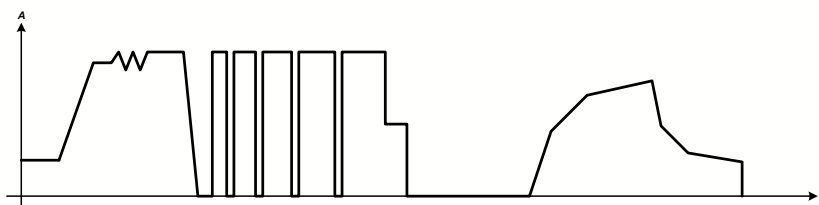
EA-PSI 9000 T 320 W - 1500 W

除了基于任意发生器产生的标准函数外，它还可形成某些复杂的函数，并能分成多达**99**组序列。这些可用于研发和生产的测试。通过前板的**USB**端口可将这些序列上载使用或存储于标准U盘上，这样方便更换不同的测试序列。

下图是任意发生器可实现的由**40**个序列组成的复杂曲线，仅为虚构范例。可以在产品外或者于产品上创建函数，然后上载或保存：

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 99 sequences. These 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.

Fictional example of a complex function (40 sequences) as it can be realised with the arbitrary generator. The function can be created on the device or externally and then loaded or saved:

**输出值的预设**

设定输出值不会对输出状态有直接影响。它显示于显示器上，就在实际值下方。

利用该特性，用户可通过旋钮或触摸屏直接输入参数，预设所需的电压、电流和功率。还有**5**个用户配置文档，能让用户在常用设定值之间简便地转换，激活不同的配置文档即可完成。

控制软件

还可通过在**Windows**操作软件下运行的控制软件，对多台同型号，甚至不同型号的产品进行远程控制。它有一个显示所有设定值与实际值、直接输入**SCPI**与**ModBus RTU**指令的模式，固件更行，以及称为“排序”的半自动控制表。

产品还可注册码解锁，用“多功能控制”应用在一个窗口下一次性监控多达**20**台产品。此时还能使用排序与数据记录功能。

Presetting of output values

To set output values without a direct impact on the output condition, the set values are also shown on the display, positioned below the actual values.

With this, the user can preset required values for voltage, current and power. It is either done by using the rotary knobs or by direct input on the touch panel. The five user profiles furthermore enable the user to switch easily between often used set values, just by activating a different user profile.

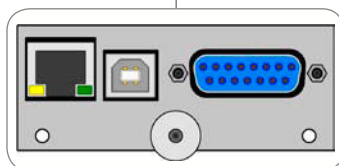
Control software

Included with the device is a control software for Windows PC, which allows for the remote control of multiple identical or even different types of devices. It has a clear interface for all set and actual values, a direct input mode for **SCPI** and **ModBus RTU** commands, a firmware update feature and the semi-automatic table control named “Sequencing”.

Optionally unlockable with a licence code, the app “Multi Control” can monitor and control up to 20 units at once and in one windows. The sequencing feature and data logging are here available as well.

可选项

- 带**USB**、以太网与模拟端口的可拆装接口模块

**Options**

- Retrofittable interface module with **USB**, **Ethernet** and analog ports

EA-PSI 9000 T 320 W - 1500 W



技术参数	Technical Data	Series EA-PSI 9000 T / 系列	
交流：供电	AC: Supply		
- 电压	- Voltage	90...264 V, 1ph+N	
- 频率	- Frequency	45...65 Hz	
- 功率因数	- Power factor	>0.99	
- 功率降额	- Derating	型号 / Models 1500 W: < 150 V AC 降至 / to P _{out max} 1000 W	
直流：电压	DC: Voltage		
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value	
- 0-100%的负载调整率	- Load regulation 0-100%	<额定值的0.05% / <0.05% of rated value	
- ±10% ΔU _{AC} 线性调整率	- Line regulation ±10% ΔU _{AC}	<额定值的0.02% / <0.02% of rated value	
- 带载10-100%调整需时	- Regulation 10-100% load	<2 ms	
- 带载10-90%上升时间	- Rise time 10-90%	最大 / Max. 30 ms	
- 过压保护	- Overvoltage protection	可调, 0...110% U _{Nenn} / Adjustable, 0...110% U _{Nom}	
直流：电流	DC: Current		
- 精确度	- Accuracy	<额定值的0.1% / <0.2% of rated value	
- 1-100% ΔI _{DC} 的负载调整率	- Load regulation 1-100% ΔU _{DC}	<额定值的0.15% / <0.15% of rated value	
- ±10% ΔU _{AC} 的线性调整率	- Line regulation ±10% ΔU _{AC}	<额定值的0.05% / <0.05% of rated value	
直流：功率	DC: Power		
- 精确度	- Accuracy	<额定值的1% / <1% of rated value	
过压类别	Overvoltage category	2	
保护功能	Protection	OT, OVP, OCP, OPP, PF ⁽²⁾	
隔离耐压	Insulation		
- 交流输入对外壳	- AC input to enclosure	2500 V DC	
- 交流输入对直流输出	- AC input to DC output	2500 V DC	
- 直流输出对外壳 (PE)	- DC output to enclosure	负极：最大400 V DC；正极：最大400 V DC+ / Negative: max. 400 V DC, positive: max. 400 V DC + output voltage	
污染等级	Degree of pollution	2	
保护等级	Protection class	1	
模拟接口（可选）	Analog interface (optional)	可选 (15-针D-Sub母插, 电隔离) / optionally available (15-pole D-Sub, galvanically isolated)	
- 信号范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)	
- 输入脚	- Inputs	U, I, P, R, 远程开-关, 直流输出开-关, 内阻模式开-关 / U, I, P, R, Remote on-off, DC output on-off, resistance mode on-off	
- 输出脚	- Outputs	U, I, 过压, 报警, 参考电压 / U, I, Overvoltage, alarms, reference voltage	
- U / I / P / R精确度	- Accuracy U / I / P / R	0...10 V: <0.2%	0...5 V: <0.4%
并联操作	Parallel operation	可实现 / Possible	
安规标准	Standards	EN 60950, EN 61326, EN 61010, EN 55022 等级 B / Class B	
制冷方式	Cooling	温控风扇 / Temperature controlled fan	
工作温度	Operation temperature	0...50 °C	
储存温度	Storage temperature	-20...70 °C	
相对湿度	Relative humidity	<80%, 无凝露 / non-condensing	
工作高度	Operation altitude	<2000 m	
机械结构	Mechanics		
- 重量	- Weight	320 W - 640 W: ~ 7 kg	1000 W - 1500 W: ~ 8 kg
- 尺寸 (宽 高 深) ⁽¹⁾	- Dimensions (W x H x D) ⁽¹⁾	320 W - 640 W: 92 x 239 x 352 mm	1000 W - 1500 W: 92 x 239 x 412 mm

(1) 仅为机身尺寸 / Body only

(2) 也可见第146页 / See page 146

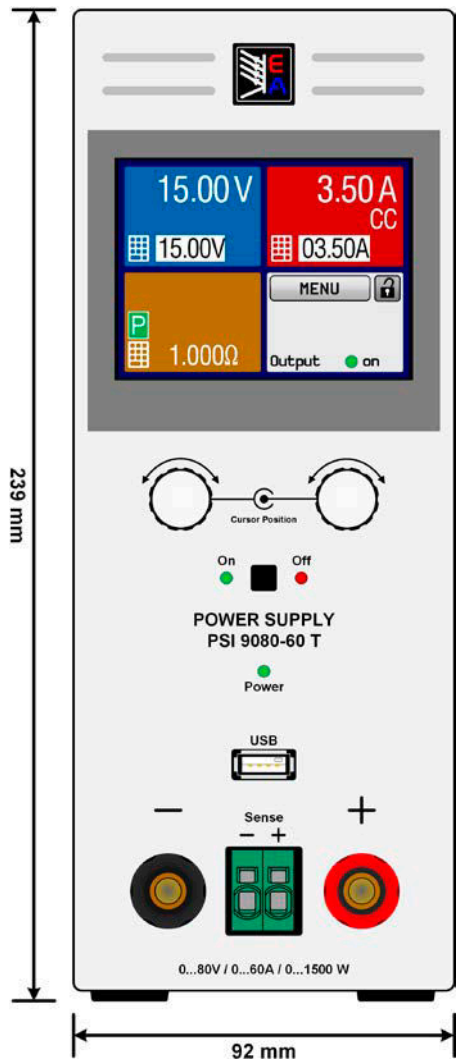
EA-PSI 9000 T 320 W - 1500 W

型号	电压	电流	功率	效率	U最大时的纹波 ⁽²⁾	I最大时的纹波	编程 ⁽¹⁾			订购编号
Model	Voltage	Current	Power	Efficiency	Ripple U ⁽²⁾	Ripple I	U (typ.)	I (typ.)	P (typ.)	Ordering number
PSI 9040-20 T	0...40 V	0...20 A	0...320 W	≤88%	20 mV _{pp} / 2 mV _{RMS}	1 mA _{RMS}	1.5 mV	0.8 mA	0.012 W	06200540
PSI 9080-10 T	0...80 V	0...10 A	0...320 W	≤89%	20 mV _{pp} / 2 mV _{RMS}	1 mA _{RMS}	3.1 mV	0.4 mA	0.012 W	06200541
PSI 9200-04 T	0...200 V	0...4 A	0...320 W	≤89%	50 mV _{pp} / 6 mV _{RMS}	1.5 mA _{RMS}	7.6 mV	0.2 mA	0.012 W	06200542
PSI 9040-40 T	0...40 V	0...40 A	0...640 W	≤89%	20 mV _{pp} / 2 mV _{RMS}	1 mA _{RMS}	1.5 mV	1.5 mA	0.024 W	06200543
PSI 9080-20 T	0...80 V	0...20 A	0...640 W	≤91%	20 mV _{pp} / 2 mV _{RMS}	1 mA _{RMS}	3.1 mV	0.8 mA	0.024 W	06200544
PSI 9200-10 T	0...200 V	0...10 A	0...640 W	≤92%	50 mV _{pp} / 6 mV _{RMS}	1.5 mA _{RMS}	7.6 mV	0.4 mA	0.024 W	06200545
PSI 9040-40 T	0...40 V	0...40 A	0...1000 W	≤92%	25 mV _{pp} / 4 mV _{RMS}	6 mA _{RMS}	1.5 mV	1.5 mA	0.038 W	06200546
PSI 9080-40 T	0...80 V	0...40 A	0...1000 W	≤92%	25 mV _{pp} / 4 mV _{RMS}	6 mA _{RMS}	3.1 mV	1.5 mA	0.038 W	06200547
PSI 9200-15 T	0...200 V	0...15 A	0...1000 W	≤93%	150 mV _{pp} / 23 mV _{RMS}	1.8 mA _{RMS}	7.6 mV	0.6 mA	0.038 W	06200548
PSI 9500-06 T	0...500 V	0...6 A	0...1000 W	≤93%	155 mV _{pp} / 33 mV _{RMS}	8 mA _{RMS}	19.1 mV	0.2 mA	0.038 W	06200549
PSI 9040-60 T	0...40 V	0...60 A	0...1500 W	≤92%	25 mV _{pp} / 4 mV _{RMS}	6 mA _{RMS}	1.5 mV	2.3 mA	0.057 W	06200550
PSI 9080-60 T	0...80 V	0...60 A	0...1500 W	≤92%	25 mV _{pp} / 4 mV _{RMS}	6 mA _{RMS}	3.1 mV	2.3 mA	0.057 W	06200551
PSI 9200-25 T	0...200 V	0...25 A	0...1500 W	≤93%	150 mV _{pp} / 23 mV _{RMS}	1.8 mA _{RMS}	7.6 mV	1 mA	0.057 W	06200552
PSI 9500-10 T	0...500 V	0...10 A	0...1500 W	≤93%	155 mV _{pp} / 33 mV _{RMS}	8 mA _{RMS}	19.1 mV	0.2 mA	0.057 W	06200553

(1) 可编程分辨率忽略产品误差 / Programmable resolution disregarding device errors
(2) RMS值: 在BWL 300 kHz时测量的LF值, PP值: 在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

产品图片

Product views



后视图 (1000 W / 1500 W) / Rear view (1000 W / 1500 W)

EA-PSI 9000 DT 320 W - 1500 W



桌面式可编程直流电源

Programmable desktop DC Power supplies



EA-PSI 9080-60 DT



- 宽范围输入电压90...264 V，带主动式PFC
- 效率高达 92%
- 输出功率: 0...320 W 至 0...1500 W
- 输出电压: 0...40 V 至 0...750 V
- 输出电流: 0...4 A 至 0...60 A
- 灵活的功率调整输出级
- 监测功能 (OVP, OCP, OPP)
- 过温保护 (OT)
- 触摸屏显示器，显示数值、状态与通知
- 电隔离模拟接口
- 内置USB与模拟端口
- 内置函数发生器
- 可模拟与调整内阻
- 低纹波
- 桌面式外壳配有提手与倾斜支架
- 符合SELV标准 (EN 60950)的40 V产品型号
- 配放电电路(在10 s内 $U_{out} < 60$ V)
- 支持SCPI指令语言

概要

EA-PSI 9000 DT系列是一款由微处理器控制的实验室电源。它立足于用户友好的交互式操作概念，配备一套完整的标准功能。其输出参数、监控功能与其它设定的配置很智能且舒适。

所有输出参数的监控功能，可帮助用户减少测试设备，且几乎可不用安装外部监控硬件与软件。

- **Wide input voltage range 90...264 V with active PFC**
- **High efficiency up to 92%**
- **Output power ratings: 0...320 W up to 0...1500 W**
- **Output voltages: 0...40 V up to 0...750 V**
- **Output currents: 0...4 A up to 0...60 A**
- **Flexible, power regulated output stage**
- **Supervision (OVP, OCP, OPP)**
- **Overtemperature protection (OT)**
- **Intuitive touch panel with display for values, status and notifications**
- **Galvanically isolated analog interface**
- **USB port and Ethernet built in**
- **Integrated function generator**
- **Internal resistance simulation and regulation**
- **Low ripple**
- **Desktop enclosure with carrying handle and tilt stand**
- **40 V models compliant to SELV (EN 60950)**
- **Discharge circuit ($U_{out} < 60$ V in ≤ 10 s)**
- **SCPI command language supported**

General

The microprocessor controlled laboratory power supplies of series EA-PSI 9000 DT offer a user-friendly, interactive handling concept, along with a extensive set of standard features, which can facilitate operating them. Configuration of output parameters, supervision features and other settings is smart and comfortable.

The implemented supervision features for all output parameters can help to reduce test equipment and make it almost unnecessary to install external supervision hardware and software.

EA-PSI 9000 DT 320 W - 1500 W

由两旋钮，一个按键，三个LED以及彩色触摸屏组成的控制面板，显示所有关键数值与状态，用户只需轻轻一点手指，就可轻松操作本设备。

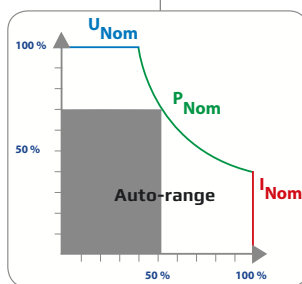
若要集成到半自动与远程控制的自动化测试系统中，在其背面提供有一组接口（模拟和数字均可）。

交流输入

本系列采用主动式功率因数（简称：PFC），输入电压为90 V_{AC}至264 V_{AC}，适合全球范围内使用。1.5 kW的型号在供电电压<150 V_{AC}时，输出功率自动减少到1 kW。

功率级自动调整

本系列所有型号的输出功率都可灵活调整。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定输出功率范围内。其最大设定功率可调，因此仅用一台产品就能覆盖广泛的应用。



直流输出

本系列有0...40 V和0...750 V输出电压，0...4 A和0...60 A输出电流，0...320 W和0...1500 W输出功率的不同型号。

因此不管是手动控制还是远程控制（模拟或数字），都可在0%与100%之间连续调节电流、电压与功率。它还有一内阻模式，能模拟一内部在线电阻。

输出端位于产品后面板上。

与其它系列电源相比，PSI 9000 DT还内置有一个额外的输出滤波器，可使纹波更低，即：输出电压的噪音更低。

放电电路

额定输出电压为200 V或以上的产品，其输出电容都配有一放电电路。在空载或带小负载时，它能确保危险电压在直流输出关闭后降至60 V DC以下。该电压值被认为是对人体安全的最高电压。

保护功能

为保护连接设备，可给产品设定一过压保护极限值(OVP)，以及过流(OCP)与过功率(OPP)保护极限值。

一旦因故超过这三个值中的一个，直流输出会被立即切断，并在显示器与接口端发出一状态信号。本产品还有过温保护，如果产品过热，它会关断直流输出。

远程感测

远程感测输入端可直接连到负载设备，以补偿连线上的部分压降。如果感测输入端已接到负载上，本电源会自动调整输出电压，以确保负载获得准确所需的电压值。

The clear control panel with its two knobs, one pushbutton, two LEDs and the touch panel with colour display for all important values and status enable the user to handle the device easily with a few touches of a finger.

For the integration into semi-automatic and remotely controlled test and automation systems, the devices offer a set of interfaces (analog and digital) on their rear side.

AC input

The equipment uses an active Power Factor Correction (short: PFC), enabling worldwide use on a mains input from 90 V_{AC} up to 264 V_{AC}. Models with 1.5 kW will derate their output power to 1 kW below input voltages of 150 V_{AC}.

Auto-ranging power stage

All models are equipped with a flexible auto-ranging output stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. The maximum power set value is adjustable with these models. Therefore, a wide range of applications can already be covered by the use of just one unit.

DC output

DC output voltages between 0...40 V and 0...750 V, output currents between 0...4 A and 0...60 A and output power ratings between 320 W and 0...1500 W are available.

Current, voltage and power can thus be adjusted continuously between 0% and 100%, no matter if manually or remotely controlled (analog or digital). The output terminals are located on the front side of the devices.

Compared to other power supply series, the PSI 9000 DT feature a built-in, additional output filter to achieve much lower ripple, i. e. low noise on the DC output voltage.

Discharge circuit

Models with a nominal output voltage of 200 V or higher include a discharge circuit for the output capacitors. For no load or low load situations, it ensures that the dangerous output voltage can sink to under 60 V DC after the DC output has been switched off. This value is considered as limit for voltages dangerous to human safety.

Protective features

For protection of the equipment connected, it is possible to set an overvoltage protection threshold (OVP), as well as one for overcurrent (OCP) and overpower (OPP).

As soon as one of these thresholds is reached for any reason, the DC output will be immediately shut off and a status signal will be generated on the display and via the interfaces. There is furthermore an overtemperature protection, which will shut off the DC output if the device overheats.

Remote sensing

The standard sensing input can be connected directly to the load in order to compensate voltage drops along the cables. If the sensing input is connected to the load, the power supply will detect this and adjust the output voltage automatically to ensure the accurate required voltage is available at the load.

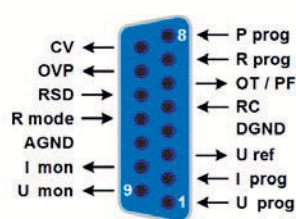


EA-PSI 9000 DT 320 W - 1500 W



内置模拟接口

产品后板上装有一隔离模拟接口端子。它具有一模拟输入脚，接上0 V...10 V或0 V...5 V电压，可设置0...100%的输出电压、电流与功率。要监控输出电压与电流，可给模拟输出脚接上0 V...10 V或0 V...5 V来完成。此外，还有几个输入脚和输出脚，可用来控制和监控产品状态。



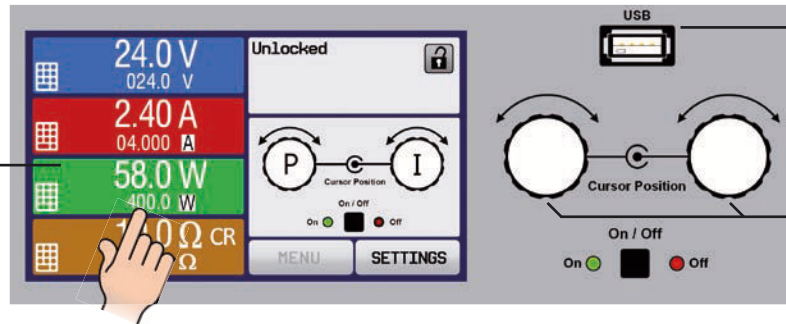
Built-in analog interface

There is a galvanically isolated analog interface terminal, located on the rear of the device. It offers analog inputs to set voltage, current, power and resistance from 0...100% through control voltages of 0 V...10 V or 0 V...5 V. To monitor the output voltage and current, there are analog outputs with 0 V...10 V or 0 V...5 V. Also, several inputs and outputs are available for controlling and monitoring the device status.

显示器与控制面板

Display and control panel

触摸屏显示器
Display with touch panel



上载和保存函数用USB端口
USB port for loading and saving functions

参数调节用旋钮
Knobs for comfortable value adjustment

设定与实际输出电压、电流与功率都清晰显示于图形显示器上。彩色的TFT屏幕为点触式，用一个手指就能控制所有功能。

Set values and actual values of output voltage, output current and output power are clearly represented on the graphic display. The colour TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger.

通过旋钮或者数字键盘直接输入参数，也可调节设定电压、电流、功率或阻值（内阻模拟）。

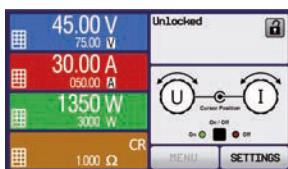
Set values of voltage, current, power or resistance (internal resistance simulation) can be adjusted using the rotary knobs or entered directly via a numeric pad.

若想防止意外操作，可锁定所有操作键。

To prevent unintentional operations, all operation controls can be locked.

多语言控制面板

Multi-language control panel



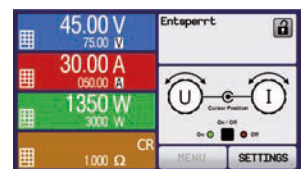
英文 / English



中文 / Chinese



俄文 / Russian



德文 / German

函数发生器

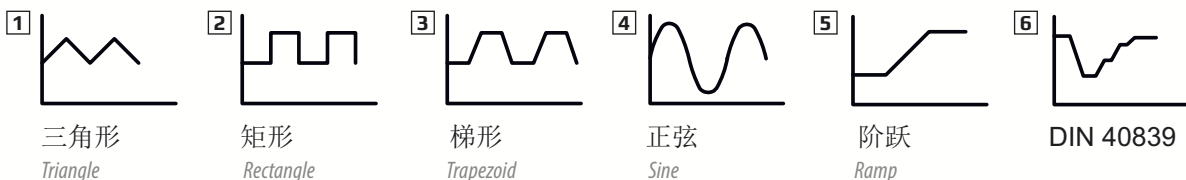
Function generator

本系列所有型号都具有一可形成如下典型函数的真实函数发生器，并能将它们应用于输出电压或输出电流上。发生器可通过前板的触摸屏设置，或经某一数字接口远程配置。

All models within this series include a true function generator which can generate typical functions, as displayed in the figure 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.

预设函数会为用户提供所有必须的参数，如Y偏差值，时间/频率或幅度，整套配置完成。

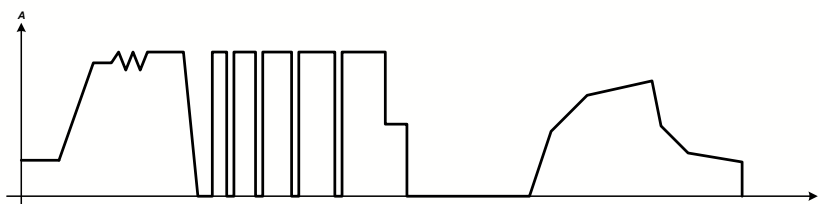
The predefined functions offer all necessary parameters to the user, such as Y offset, time / frequency or amplitude, for full configuration ability.



EA-PSI 9000 DT 320 W - 1500 W

除了基于任意发生器产生的标准函数外，它还可形成某些复杂的函数，并能分成多达99组序列。这些可用于研发和生产的测试。通过前板的USB端口可将这些序列上载使用或存储于标准U盘上，这样方便更换不同的测试序列。

下图是任意发生器可实现的由40个序列组成的复杂曲线，仅为虚构范例。可以在产品外或者于产品上创建函数，然后上载或保存：



输出值的预设

设定输出值不会对输出状态有直接影响。它显示于显示器上，就在实际值下方。

利用该特性，用户可通过旋钮或触摸屏上直接输入参数，预设所需的电压、电流和功率。还有5个用户配置文档，能让用户在常用设定值之间简便地转换，激活不同的配置文档即可完成。

监控功能

本系列都有电压与电流监控功能，且可配置成监控电压或电流是否过冲与下冲。作为反应，产品会以下列可选类型生成一个通知：

- 只显示信号；即使错误仍存在，也不影响输出。
- 警告一直持续，故障排除后必须确认该警告信息。
- 报警会暂时关断输出。

控制软件

本产品还配有适合Windows系统操作的控制软件，可远程控制多台同型号产品，甚至不同型号。它有一个清晰的主界面，显示所有设定值与实际值，SCPI与ModBus RTU指令的直接输入模式，固件升级，以及被称为“排序”的半自动化控制表格。产品还可注册码解锁，用“多功能控制”应用在一个窗口下一次性监控多达20台产品。此时还能使用排序与数据记录功能。

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 99 sequences. These 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.

Fictional example of a complex function (40 sequences) as it can be realised with the arbitrary generator. The function can be created on the device or externally and then loaded or saved:

Presetting of output values

To set output values without a direct impact on the output condition, the set values are also shown on the display, positioned below the actual values.

With this, the user can preset required values for voltage, current and power. It is either done by using the rotary knobs or by direct input on the touch panel. The five user profiles furthermore enable the user to switch easily between often used set values, just by activating a different user profile.

Supervision features

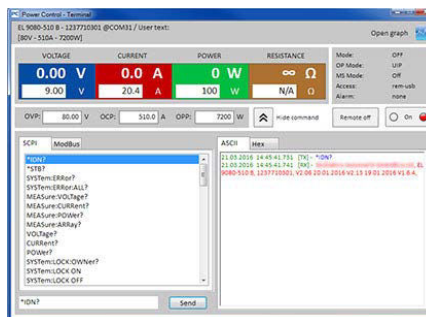
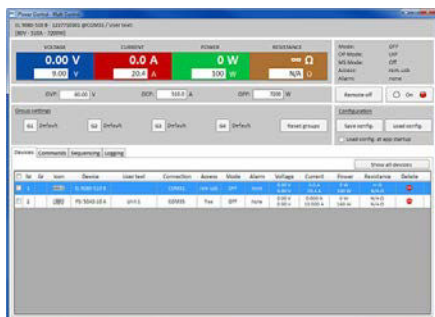
All models offer supervision features for voltage and current steps. The supervision is configurable to monitor voltage or current over- and under-shooting. As a reaction, the device can generate a notification of selectable type:

- Signals are displayed only; even if the fault is still active, without affecting the output
- Warnings remain active and must be acknowledged after the fault is removed
- Alarms will instantly shut off the output

Control software

Included with the device is a control software for Windows PC, which allows for the remote control of multiple identical or even different types of devices. It has a clear interface for all set and actual values, a direct input mode for SCPI and ModBus RTU commands, a firmware update feature and the semi-automatic table control named “Sequencing”.

Optionally unlockable with a licence code, the app “Multi Control” can monitor and control up to 20 units at once and in one windows. The sequencing feature and data logging are here available as well.



EA-PSI 9000 DT 320 W - 1500 W



技术参数	Technical Data	Series EA-PSI 9000 DT / 系列	
交流：供电	AC: Supply		
- 电压	- Voltage	90...264 V, 1ph+N	
- 频率	- Frequency	45...65 Hz	
- 功率因数	- Power factor	>0.99	
- 功率降额	- Derating	型号 / Models 1500 W: < 150 V AC 降至 / to P _{out max} 1000 W	
直流：电压	DC: Voltage		
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value	
- 0-100%的负载调整率	- Load regulation 0-100%	<额定值的0.05% / <0.05% of rated value	
- ±10% ΔU _{AC} 线性调整率	- Line regulation ±10% ΔU _{AC}	<额定值的0.02% / <0.02% of rated value	
- 带载10-100%调整需时	- Regulation 10-100% load	<2 ms	
- 带载10-90%上升时间	- Rise time 10-90%	最大 / Max. 30 ms	
- 过压保护	- Overvoltage protection	可调, 0...110% U _{Nenn} / Adjustable, 0...110% U _{Nom}	
直流：电流	DC: Current		
- 精确度	- Accuracy	<额定值的0.1% / <0.2% of rated value	
- 1-100% ΔI _{DC} 的负载调整率	- Load regulation 1-100% ΔI _{DC}	<额定值的0.15% / <0.15% of rated value	
- ±10% ΔU _{AC} 的线性调整率	- Line regulation ±10% ΔU _{AC}	<额定值的0.05% / <0.05% of rated value	
直流：功率	DC: Power		
- 精确度	- Accuracy	<额定值的1% / <1% of rated value	
过压类别	Overvoltage category	2	
保护功能	Protection	OT, OVP, OCP, OPP, PF ⁽²⁾	
隔离耐压	Insulation		
- 交流输入对外壳	- AC input to enclosure	2500 V DC	
- 交流输入对直流输出	- AC input to DC output	2500 V DC	
- 直流输出对外壳 (PE)	- DC output to enclosure	负极：最大400 V DC，正极：最大400 V DC + 输出电压 / Negative: max. 400 V DC, positive: max. 400 V DC + output voltage	
污染等级	Degree of pollution	2	
保护等级	Protection class	1	
数字接口	Digital interfaces	1x B类USB端口（通讯用） / 1x USB type B (for communication) 1x A类USB端口（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	
- 信号范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)	
- 输入脚	- Inputs	U, I, P, R, 远程开-关，直流输出开-关，内阻模式开-关 / U, I, P, R, Remote on-off, DC output on-off, resistance mode on-off	
- 输出脚	- Outputs	U / I, 过压，报警，参考电压 / U / I, Overvoltage, alarms, reference voltage	
- 精确度	- Accuracy	0...10 V: <0.2%	0...5 V: <0.4%
并联操作	Parallel operation	可实现 / Possible	
安规标准	Standards	EN 60950, EN 61326, EN 61010, EN 55022 等级 B / Class B	
制冷方式	Cooling	温控风扇 / Temperature controlled fan	
工作温度	Operation temperature	0...50 °C	
储存温度	Storage temperature	-20...70 °C	
相对湿度	Relative humidity	<80%, 无凝露 / non-condensing	
工作高度	Operation altitude	<2000 m	
机械结构	Mechanics		
- 重量	- Weight	320 W - 650 W: ~ 7.5 kg	1000 W - 1500 W: ~ 8.2 kg
- 尺寸 (宽 高 深) ⁽¹⁾	- Dimensions (W x H x D) ⁽¹⁾	320 W - 650 W: 308 x 103 x 355 mm	1000 W - 1500 W: 308 x 103 x 415 mm

(1) 仅为机身尺寸 / Body only

(2) 也可见第146页 / See page 146

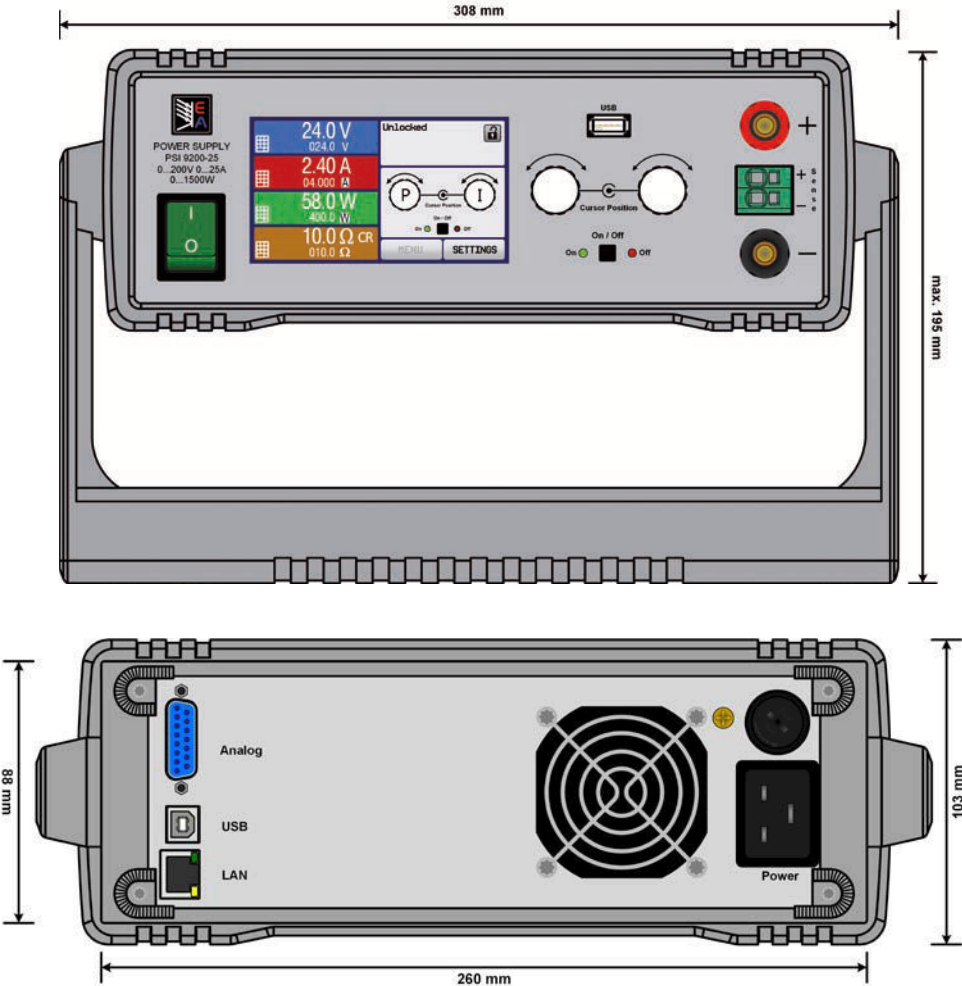
EA-PSI 9000 DT 320 W - 1500 W

型号	电压	电流	功率	效率	U的纹波 ⁽²⁾	I的纹波 ⁽²⁾	编程 ⁽¹⁾			订购编号
Model	Voltage	Current	Power	Efficiency	Ripple U ⁽²⁾	Ripple I ⁽²⁾	U (typ.)	I (typ.)	P (typ.)	Ordering number
PSI 9040-20 DT	0...40 V	0...20 A	0...320 W	≤88%	8 mV _{pp} / 0.8 mV _{RMS}	1 mA _{RMS}	1.5 mV	0.8 mA	0.012 W	06200500
PSI 9080-10 DT	0...80 V	0...10 A	0...320 W	≤89%	8 mV _{pp} / 0.8 mV _{RMS}	1 mA _{RMS}	3.1 mV	0.4 mA	0.012 W	06200501
PSI 9200-04 DT	0...200 V	0...4 A	0...320 W	≤89%	20 mV _{pp} / 2.5 mV _{RMS}	1.5 mA _{RMS}	7.6 mV	0.2 mA	0.012 W	06200502
PSI 9040-40 DT	0...40 V	0...40 A	0...640 W	≤89%	8 mV _{pp} / 0.8 mV _{RMS}	1 mA _{RMS}	1.5 mV	1.5 mA	0.024 W	06200503
PSI 9080-20 DT	0...80 V	0...20 A	0...640 W	≤91%	8 mV _{pp} / 0.8 mV _{RMS}	1 mA _{RMS}	3.1 mV	0.8 mA	0.024 W	06200504
PSI 9200-10 DT	0...200 V	0...10 A	0...640 W	≤92%	20 mV _{pp} / 2.5 mV _{RMS}	1.5 mA _{RMS}	7.6 mV	0.4 mA	0.024 W	06200505
PSI 9040-40 DT	0...40 V	0...40 A	0...1000 W	≤92%	10 mV _{pp} / 1.5 mV _{RMS}	6 mA _{RMS}	1.5 mV	1.5 mA	0.038 W	06200517
PSI 9080-40 DT	0...80 V	0...40 A	0...1000 W	≤92%	10 mV _{pp} / 1.5 mV _{RMS}	6 mA _{RMS}	3.1 mV	1.5 mA	0.038 W	06200506
PSI 9200-15 DT	0...200 V	0...15 A	0...1000 W	≤93%	60 mV _{pp} / 9 mV _{RMS}	1.8 mA _{RMS}	7.6 mV	0.6 mA	0.038 W	06200507
PSI 9360-10 DT	0...360 V	0...10 A	0...1000 W	≤93%	58 mV _{pp} / 11 mV _{RMS}	2 mA _{RMS}	13.7 mV	0.4 mA	0.038 W	06200508
PSI 9500-06 DT	0...500 V	0...6 A	0...1000 W	≤93%	62 mV _{pp} / 13 mV _{RMS}	8 mA _{RMS}	19.1 mV	0.2 mA	0.038 W	06200509
PSI 9750-04 DT	0...750 V	0...4 A	0...1000 W	≤93%	94 mV _{pp} / 16 mV _{RMS}	10 mA _{RMS}	28.6 mV	0.2 mA	0.038 W	06200510
PSI 9040-60 DT	0...40 V	0...60 A	0...1500 W	≤92%	10 mV _{pp} / 1.5 mV _{RMS}	6 mA _{RMS}	1.5 mV	2.3 mA	0.057 W	06200516
PSI 9080-60 DT	0...80 V	0...60 A	0...1500 W	≤92%	10 mV _{pp} / 1.5 mV _{RMS}	6 mA _{RMS}	3.1 mV	2.3 mA	0.057 W	06200511
PSI 9200-25 DT	0...200 V	0...25 A	0...1500 W	≤93%	60 mV _{pp} / 9 mV _{RMS}	1.8 mA _{RMS}	7.6 mV	1 mA	0.057 W	06200512
PSI 9360-15 DT	0...360 V	0...15 A	0...1500 W	≤93%	58 mV _{pp} / 11 mV _{RMS}	2 mA _{RMS}	13.7 mV	0.6 mA	0.057 W	06200513
PSI 9500-10 DT	0...500 V	0...10 A	0...1500 W	≤93%	62 mV _{pp} / 13 mV _{RMS}	8 mA _{RMS}	19.1 mV	0.2 mA	0.057 W	06200514
PSI 9750-06 DT	0...750 V	0...6 A	0...1500 W	≤93%	94 mV _{pp} / 16 mV _{RMS}	10 mA _{RMS}	28.6 mV	0.2 mA	0.057 W	06200515

(1) 忽略产品错误时的可编程分辨率 / Programmable resolution disregarding device errors
(2) RMS值: 在BWL 300 kHz时测量的LF值, PP值: 在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

产品图片

Product views



EA-PS 9000 T 320 W - 1500 W



桌面式可编程直流电源 Programmable desktop DC Power supplies



EA-PS 9080-60 T

U **I** **P** **OVP** **OCP** **OPP** **OTP** **USB**

Option: **LAN**

- 宽范围输入电压90...264 V，带主动式PFC
- 效率高达 92%
- 输出功率：0...320 W 至0...1500 W
- 输出电压：0...40 V 至 0...500 V
- 输出电流：0...4 A 至 0...60 A
- 灵活的功率调整输出级
- 监测功能 (OVP, OCP, OPP)
- 过温保护 (OT)
- 触摸屏显示器，显示数值、状态与通知
- 标配USB端口，可以选择以太网 & 模拟端口（所有接口都电隔离）
- 符合SELV标准 (EN 60950)的40 V产品型号
- 支持SCPI指令语言
- Windows操作程序下的LabView VIs & 控制软件

概要

EA-PS 9000 T系列是一款由微处理器控制的实验室电源。它立足于用户友好的交互式操作概念，配备一套完整的标准功能。其输出参数、监控功能与其它设定的配置很智能且舒适。

所有输出参数的监控功能，可帮助用户减少测试设备，且几乎可不用安装外部监控硬件与软件。

由两旋钮，一个按键，三个LED以及彩色触摸屏组成的控制面板，显示所有关键数值与状态，用户只需轻轻一点手指，就可轻松操作本设备。

- **Wide input voltage range 90...264 V with active PFC**
- **High efficiency up to 92%**
- **Output power ratings: 0...320 W up to 0...1500 W**
- **Output voltages: 0...40 V up to 0...500 V**
- **Output currents: 0...4 A up to 0...60 A**
- **Flexible, power regulated output stage**
- **Supervision (OVP, OCP, OPP)**
- **Overtemperature protection (OT)**
- **Intuitive touch panel with display for values, status and notifications**
- **USB port as standard, Ethernet & analog optional (all interfaces galvanically isolated)**
- **40 V models compliant to SELV (EN 60950)**
- **SCPI command language supported**
- **LabView VIs & control software for Windows**

General

The microprocessor controlled laboratory power supplies of series EA-PS 9000 T offer a user-friendly, interactive handling concept, along with a extensive set of standard features, which can facilitate operating them. Configuration of output parameters, supervision features and other settings is smart and comfortable.

The implemented supervision features for all output parameters can help to reduce test equipment and make it almost unnecessary to install external supervision hardware and software.

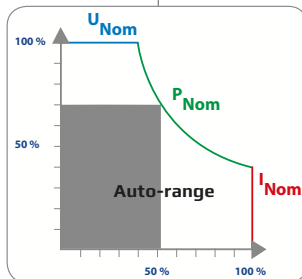
The clear control panel with its two knobs, one pushbutton, three LEDs and the touch panel with colour display for all important values and status enable the user to handle the device easily with a few touches of a finger.

EA-PS 9000 T 320 W - 1500 W**交流输入**

本系列采用主动式功率因数（简称：PFC），输入电压为90 V_{AC}至264 V_{AC}，适合全球范围内使用。1.5 kW的型号在供电电压<150 V_{AC}时，输出功率自动减少到1 kW。

功率级自动调整

本系列所有型号的输出功率都可灵活调整。可在较低电流时输出较高电压，或在低电压时输出较高电流，但总是维持在最大额定功率范围内。其最大设定功率可调，因此仅用一台产品就能覆盖广泛的应用。

**AC input**

The equipment uses an active Power Factor Correction (short: PFC), enabling worldwide use on a mains input from 90 V_{AC} up to 264 V_{AC}. Models with 1.5 kW will derate their output power to 1 kW below input voltages of 150 V_{AC}.

Auto-ranging power stage

All models are equipped with a flexible auto-ranging output stage which provides a higher output voltage at lower output current, or a higher output current at lower output voltage, always limited to the max. nominal output power. The maximum power set value is adjustable with these models. Therefore, a wide range of applications can already be covered by the use of just one unit.

直流输出

本系列有0...40 V和0...500 V输出电压，0...4 A和0...60 A输出电流，0...320 W和0...1500 W输出功率的不同型号。

因此不管是手动控制还是远程控制（模拟或数字），都可在0%与100%之间连续调节电流、电压与功率。它还有一内阻模式，能模拟一内部在线电阻。输出端位于产品后面板上。

DC output

DC output voltages between 0...40 V and 0...500 V, output currents between 0...4 A and 0...60 A and output power ratings between 0...320 W and 0...1500 W are available.

Current, voltage and power can thus be adjusted continuously between 0% and 100%, no matter if manually or remotely controlled (analog or digital). The output terminals are located on the front side of the devices.

放电电路

额定输出电压为200 V或以上的产品，其输出电容都配有一放电电路。在空载或带小负载时，它能确保危险电压在直流输出关闭后降至60 V DC以下。该电压值被认为是人体安全的最高电压。

Discharge circuit

Models with a nominal output voltage of 200 V or higher include a discharge circuit for the output capacities. For no load or low load situations, it ensures that the dangerous output voltage can sink to under 60 V DC after the DC output has been switched off. This value is considered as limit for voltages dangerous to human safety.

保护功能

为保护连接设备，可给产品设定一过压保护极限值(OVP)，以及过流(OCP)与过功率(OPP)保护极限值。

一旦因故超过这三个值中的一个，直流输出会被立即切断，并在显示器与接口端发出一状态信号。本产品还有过温保护，如果产品过热，它会关断直流输出。

Protective features

For protection of the equipment connected, it is possible to set an overvoltage protection threshold (OVP), as well as one for overcurrent (OCP) and overpower (OPP).

As soon as one of these thresholds is reached for any reason, the DC output will be immediately shut off and a status signal will be generated on the display and via the interfaces. There is furthermore an overtemperature protection, which will shut off the DC output if the device overheats.

远程感测

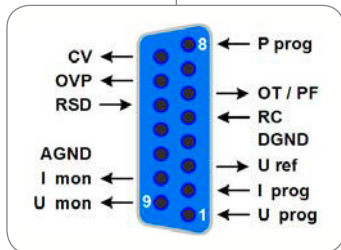
远程感测输入端可直接连到负载设备，以补偿连线上的部分压降。如果感测输入端已接到负载上，本电源会自动调整输出电压，以确保负载获得准确所需的电压值。

Remote sensing

The standard sensing input can be connected directly to the load in order to compensate voltage drops along the cables. If the sensing input is connected to the load, the power supply will detect this and adjust the output voltage automatically to ensure the accurate required voltage is available at the load.

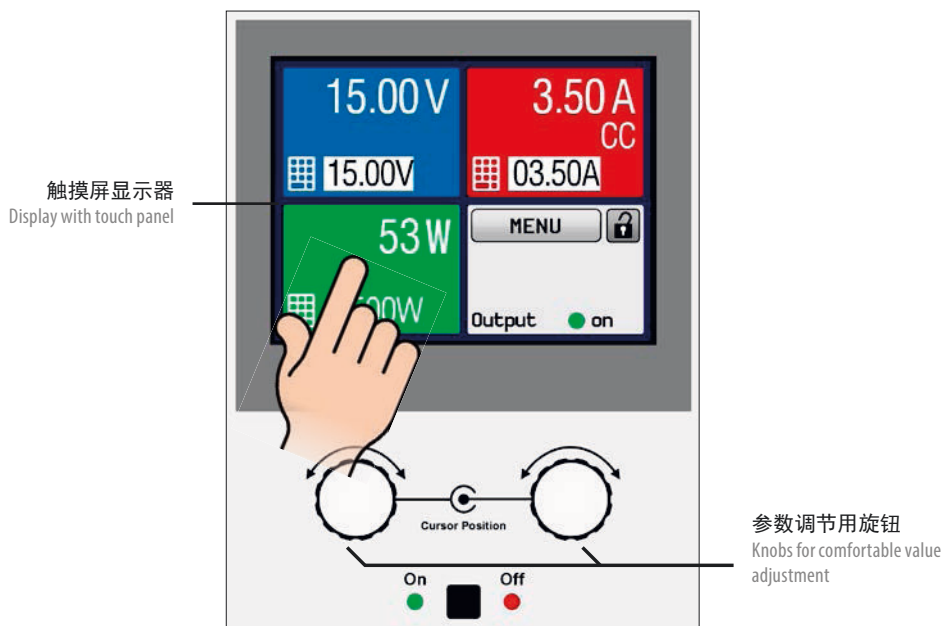
可选模拟接口

可以选择产品后板安装一电隔离模拟接口。该接口具有一模拟输入脚，接上0 V...10 V或0 V...5 V电压，可设置0...100%的输出电压、电流与功率。要监控输出电压与电流，可给模拟输出脚接上0 V...10 V或0 V...5 V来完成。此外，还有几个输入脚和输出脚，可用于控制和监控产品状态。

**Optional analog interface**

A galvanically isolated analog interface can be installed optionally and subsequently, located on the rear of the device. It offers analog inputs to set voltage, current and power from 0...100% through control voltages of 0 V...10 V or 0 V...5 V. To monitor the output voltage and current there are analog outputs with 0 V...10 V or 0 V...5 V. Also, several inputs and outputs are available for controlling and monitoring the device status.



EA-PS 9000 T 320 W - 1500 W**显示器与控制面板****Display and control panel**

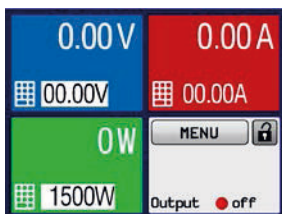
设定与实际输出电压、电流与功率都清晰显示于图形显示器上。彩色的TFT屏幕为点触式，用一个手指就能控制所有功能。

通过旋钮或者数字键盘直接输入参数，也可调节设定电压、电流或功率。
若想防止意外操作，可锁定所有操作键。

Set values and actual values of output voltage, output current and output power are clearly represented on the graphic display. The colour TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger.

Set values of voltage, current or power can be adjusted using the rotary knobs or entered directly via a numeric pad.

To prevent unintentional operations, all operation controls can be locked.

多语言控制面板**Multi-language control panel**

英文 / English



中文 / Chinese



俄文 / Russian



德文 / German

控制软件

本产品还配有适合Windows系统操作的控制软件，可远程控制多台同型号产品，甚至不同型号产品。它有一个清晰的主界面，显示所有设定值与实际值，SCPI与ModBus RTU指令的直接输入模式，固件升级特性，以及被称为“排序”的半自动化控制表格。

产品还可注册码解锁，用“多功能控制”应用在一个窗口下一次性监控多达20台产品。此时还能使用排序与数据记录功能。

Control software

Included with the device is a control software for Windows PC, which allows for the remote control of multiple identical or even different types of devices. It has a clear interface for all set and actual values, a direct input mode for SCPI and ModBus RTU commands, a firmware update feature and the semi-automatic table control named “Sequencing”.

Optionally unlockable with a licence code, the app “Multi Control” can monitor and control up to 20 units at once and in one windows. The sequencing feature and data logging are here available as well.

EA-PS 9000 T 320 W - 1500 W

输出值的预设

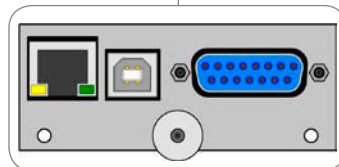
设定输出值不会对输出状态有直接影响。它也会显示于显示器上，就在实际值下方。利用该特性，用户可通过旋钮或触摸屏上直接输入参数，预设所需的电压、电流和功率。还有5个用户配置文档，能让用户在常用设定值之间简便地转换，激活不同的配置文档即可完成。

Presetting of output values

To set output values without a direct impact on the output condition, the set values are also shown on the display, positioned below the actual values. With this, the user can preset required values for voltage, current and power. It is either done by using the rotary knobs or by direct input on the touch panel. The five user profiles furthermore enable the user to switch easily between often used set values, just by activating a different user profile.

可选项

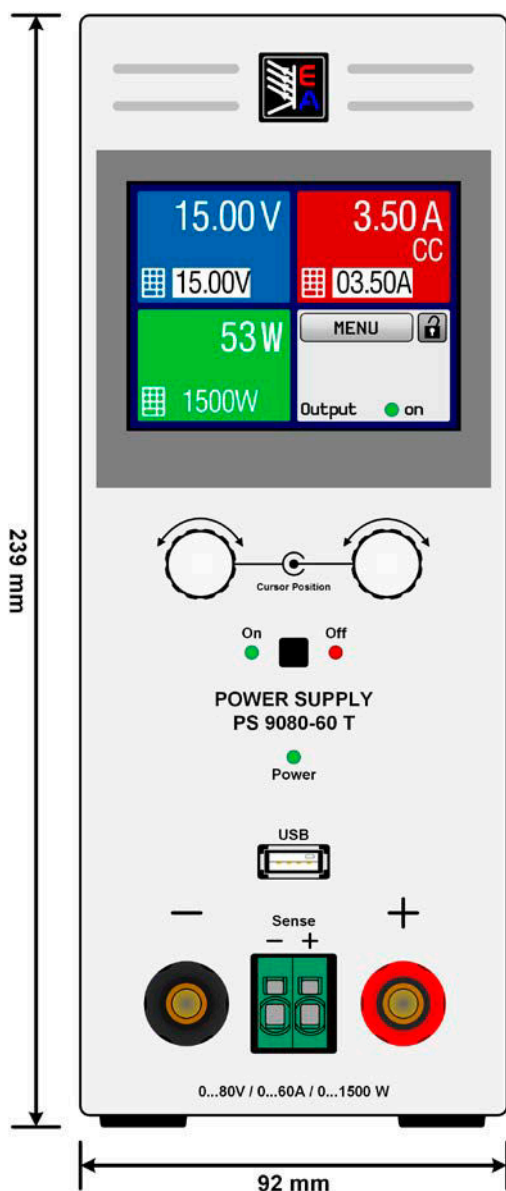
- 带USB、以太网与模拟端口的可拆装接口模块



Options

- Retrofittable interface module with USB, Ethernet and analog ports

产品图片



Product views



后视图 (1000 W / 1500 W) / Rear view (1000 W / 1500 W)

EA-PS 9000 T 320 W - 1500 W



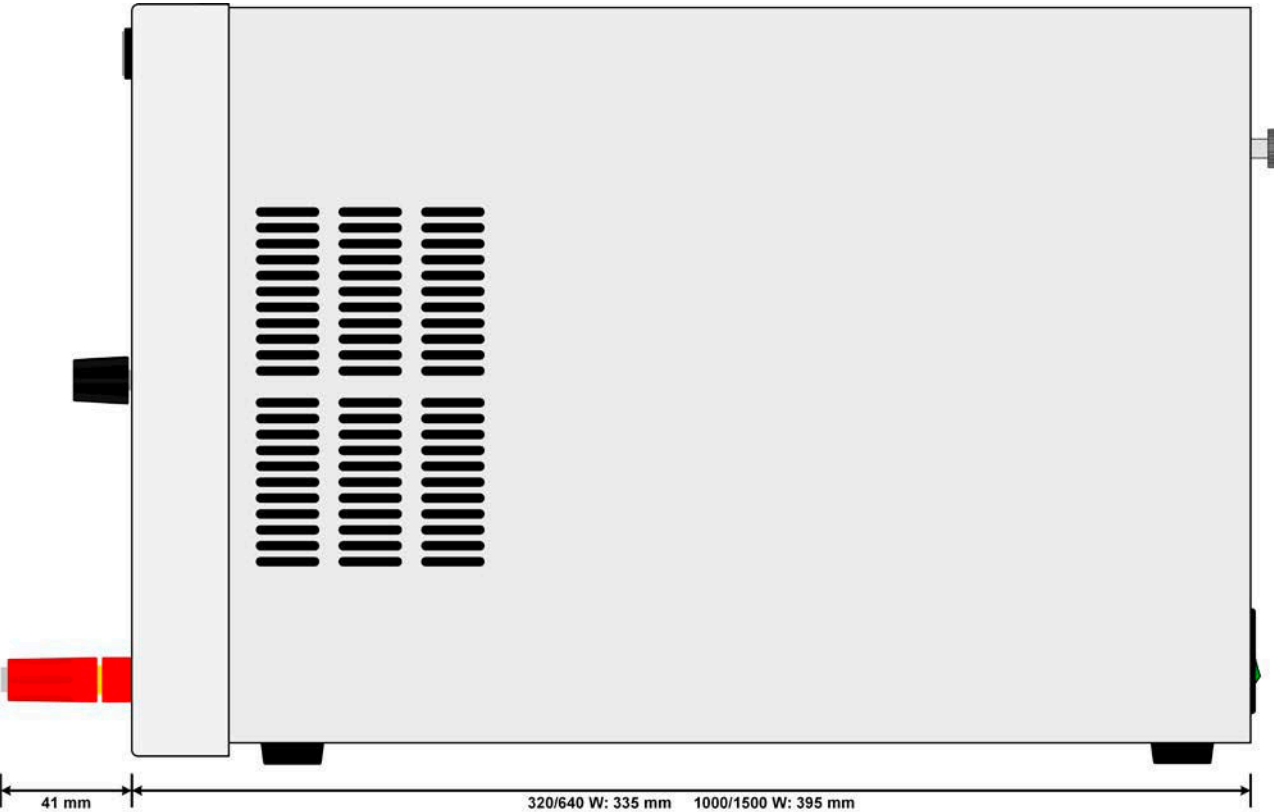
技术参数	Technical Data	Series EA-PS 9000 T / 系列	
交流：供电	AC: Supply		
- 电压	- Voltage	90...264 V, 1ph+N	
- 频率	- Frequency	45...65 Hz	
- 功率因数	- Power factor	>0.99	
- 功率降额	- Derating	仅针对1500 W型号: < 150 V AC 降至 $P_{out\ max}\ 1000\ W$ Only models with 1500 W: < 150 V AC to $P_{out\ max}\ 1000\ W$	
直流：电压	DC: Voltage		
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value	
- 0-100%的负载调整率	- Load regulation 0-100%	<额定值的0.05% / <0.05% of rated value	
- $\pm 10\% \Delta U_{AC}$ 线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.02% / <0.02% of rated value	
- 带载10-100%调整需时	- Regulation 10-100% load	<2 ms	
- 带载10-90%上升时间	- Rise time 10-90%	最大 / Max. 30 ms	
- 过压保护	- Overvoltage protection	可调, $0...110\% U_{Nenn}$ / Adjustable, $0...110\% U_{Nom}$	
直流：电流	DC: Current		
- 精确度	- Accuracy	<额定值的0.1% / <0.2% of rated value	
- 1-100% ΔI_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.15% / <0.15% of rated value	
- $\pm 10\% \Delta U_{AC}$ 的线性调整率	- Line regulation $\pm 10\% \Delta U_{AC}$	<额定值的0.05% / <0.05% of rated value	
直流：功率	DC: Power		
- 精确度	- Accuracy	<额定值的1% / <1% of rated value	
过压类别	Overvoltage category	2	
保护功能	Protection	OT, OVP, OCP, OPP, PF ⁽²⁾	
隔离耐压	Insulation		
- 交流输入对外壳	- AC input to enclosure	2500 V DC	
- 交流输入对直流输出	- AC input to DC output	2500 V DC	
- 直流输出对外壳 (PE)	- DC output to enclosure	负极：最大400 V DC，正极：最大400 V DC + 输出电压 / Negative: max. 400 V DC, positive: max. 400 V DC + output voltage	
污染等级	Degree of pollution	2	
保护等级	Protection class	1	
模拟接口	Analog interface	可选（15-针D-Sub母插，电隔离） / optionally available (15-pole D-Sub, galvanically isolated)	
- 信号范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)	
- 输入脚	- Inputs	U, I, P, 远程开-关，直流输出开-关 / U, I, P, Remote on-off, DC output on-off	
- 输出脚	- Outputs	U/I, 过压，报警，参考电压 / U/I, Overvoltage, alarms, reference voltage	
- U / I / P 精确度	- Accuracy U / I / P	0...10 V: <0.2%	0...5 V: <0.4%
并联操作	Parallel operation	可实现 / Possible	
安规标准	Standards	EN 60950, EN 61326, EN 61010, EN 55022 等级 B / Class B	
制冷方式	Cooling	温控风扇 / Temperature controlled fan	
工作温度	Operation temperature	0...50 °C	
储存温度	Storage temperature	-20...70 °C	
相对湿度	Relative humidity	<80%, 无凝露 / non-condensing	
工作高度	Operation altitude	<2000 m	
机械结构	Mechanics		
- 重量	- Weight	320 W - 640 W: ~ 7 kg	1000 W - 1500 W: ~ 8 kg
- 尺寸 (宽x高x深) ⁽¹⁾	- Dimensions (W x H x D) ⁽¹⁾	320 W - 640 W: 92 x 239 x 352 mm	1000 W - 1500 W: 92 x 239 x 412 mm

(1) 仅为机身尺寸 / Body only
(2) 也可见第146页 / See page 146

EA-PS 9000 T 320 W - 1500 W

型号	电压	电流	功率	效率	U的纹波 ⁽²⁾	I的纹波	编程 ⁽¹⁾			订购编号
Model	Voltage	Current	Power	Efficiency	Ripple U ⁽²⁾	Ripple I	U (typ.)	I (typ.)	P (typ.)	Ordering number
PS 9040-20 T	0...40 V	0...20 A	0...320 W	≤88%	20 mV _{pp} / 2 mV _{RMS}	1 mA _{RMS}	1.5 mV	0.8 mA	0.012 W	06200440
PS 9080-10 T	0...80 V	0...10 A	0...320 W	≤89%	20 mV _{pp} / 2 mV _{RMS}	1 mA _{RMS}	3.1 mV	0.4 mA	0.012 W	06200441
PS 9200-04 T	0...200 V	0...4 A	0...320 W	≤89%	50 mV _{pp} / 6 mV _{RMS}	1.5 mA _{RMS}	7.6 mV	0.2 mA	0.012 W	06200442
PS 9040-40 T	0...40 V	0...40 A	0...640 W	≤89%	20 mV _{pp} / 2 mV _{RMS}	1 mA _{RMS}	1.5 mV	1.5 mA	0.024 W	06200443
PS 9080-20 T	0...80 V	0...20 A	0...640 W	≤91%	20 mV _{pp} / 2 mV _{RMS}	1 mA _{RMS}	3.1 mV	0.8 mA	0.024 W	06200444
PS 9200-10 T	0...200 V	0...10 A	0...640 W	≤92%	50 mV _{pp} / 6 mV _{RMS}	1.5 mA _{RMS}	7.6 mV	0.4 mA	0.024 W	06200445
PS 9040-40 T	0...40 V	0...40 A	0...1000 W	≤92%	25 mV _{pp} / 4 mV _{RMS}	6 mA _{RMS}	1.5 mV	1.5 mA	0.038 W	06200446
PS 9080-40 T	0...80 V	0...40 A	0...1000 W	≤92%	25 mV _{pp} / 4 mV _{RMS}	6 mA _{RMS}	3.1 mV	1.5 mA	0.038 W	06200447
PS 9200-15 T	0...200 V	0...15 A	0...1000 W	≤93%	150 mV _{pp} / 23 mV _{RMS}	1.8 mA _{RMS}	7.6 mV	0.6 mA	0.038 W	06200448
PS 9500-06 T	0...500 V	0...6 A	0...1000 W	≤93%	155 mV _{pp} / 33 mV _{RMS}	8 mA _{RMS}	19.1 mV	0.2 mA	0.038 W	06200449
PS 9040-60 T	0...40 V	0...60 A	0...1500 W	≤92%	25 mV _{pp} / 4 mV _{RMS}	6 mA _{RMS}	1.5 mV	2.3 mA	0.057 W	06200450
PS 9080-60 T	0...80 V	0...60 A	0...1500 W	≤92%	25 mV _{pp} / 4 mV _{RMS}	6 mA _{RMS}	3.1 mV	2.3 mA	0.057 W	06200451
PS 9200-25 T	0...200 V	0...25 A	0...1500 W	≤93%	150 mV _{pp} / 23 mV _{RMS}	1.8 mA _{RMS}	7.6 mV	1 mA	0.057 W	06200452
PS 9500-10 T	0...500 V	0...10 A	0...1500 W	≤93%	155 mV _{pp} / 33 mV _{RMS}	8 mA _{RMS}	19.1 mV	0.2 mA	0.057 W	06200453

(1) 忽略产品错误时的可编程分辨率 / Programmable resolution disregarding device errors
(2) RMS值：在BWL 300 kHz时测量的LF值，PP值：在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz



EA-EL 3000 B 400 W



可编程直流电子负载 Programmable Electronic DC loads



EA-EL 3500-10 B



- 输入功率: 0...400 W
- 输入电压: 0...80 V 至 0...500 V
- 输入电流: 0...10 A 至 0...60 A
- 多语言彩色显示器
- 用户配置文档, 真实的函数发生器
- 可调保护极限: OVP, OCP, OPP
- 操作模式有: CV, CC, CP, CR
- 带倾斜式支撑功能的手提
- 支持SCPI & ModBus RTU
- 控制软件 (Windows)
- LabView VIs
- 可选: USB, 以太网或模拟

基本信息

2017新款紧凑型直流负载EA-EL 3000 B, 是第二代小型桌面式负载, 功率为400 W。配有新的电压与电流等级, 适合实验室、学校或车间日常的多种用途。

所有型号都支持四种调节模式: 恒压 (CV), 恒流 (CC), 恒功率 (CP) 与恒阻 (CR)。其控制电路核心是一个快速微处理器, 具有这些功能: 带通用函数的真实函数发生器, 如: 矩形、三角形或阶跃形。彩色显示器与键盘, 以及连个旋钮, 使用户手操更灵活。

与旧系列的电子负载相比, 经模拟或数字接口控制产品的响应时间, 通过ARM处理器控制的硬件有了很大改善。

- Input power rating: 0...400 W
- Input voltages: 0...80 V up to 0...500 V
- Input currents: 0...10 A up to 0...60 A
- Multilingual colour display
- User profiles, true function generator
- Adjustable protections: OVP, OCP, OPP
- Operation modes: CV, CC, CP, CR
- Carrying handle with tilt stand
- SCPI & ModBus RTU supported
- Control software (Windows)
- LabView VIs
- Optional: USB, Ethernet or Analog

General

The 2017 series of compact electronic DC loads, called EA-EL 3000 B, is the second generation of small desktop loads with a power rating of 400 W. It offers new voltage and current 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 rectangle, triangle or ramp. The colour display, together with a keyboard and two rotary knobs, enables the user an intuitive kind of manual operation and better overview.

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.

EA-EL 3000 B 400 W

可选配件有多款数字接口，如：USB与以太网，还有一个模拟接口。所有接口都电隔离。

通过SCPI与ModBus RTU通用协议，以及即用LabView组件，大大简化了远程控制在客制应用下的使用。

功率等级、电压和电流

本系列有0...80 V DC，0...200 V DC与0...500 V DC这些等级的输出电压，单台机器的输入电流等级有0...10 A，0...25 A或0...60 A。功率等级为400 W稳定功率。

操作面板 (HMI)

手动操作通过彩色显示屏、两个旋钮与六个按钮来完成。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，三角形等其它）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

所有型号都配有可生成典型函数的函数发生器，如下图所示，可以应用到输入电压或电流上。函数发生器可由前板的旋钮跟按钮完全配置和控制，或者经数字接口远程控制。

预设函数为用户提供完整配置的所有参数，比如：Y偏移值，时间或幅度。

Digital interfaces, such as USB and Ethernet, are available as optional accessory, 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 RTU, as well as by ready-to-use LabView components.

Power ratings, voltages, currents

The voltage range portfolio offers models with 0...80 V DC, 0...200 V DC and 0...500 V DC. Input currents with 0...10 A, 0...25 A or 0...60 A per unit are available. The series offers a power class with 400 W steady power.

Handling (HMI)

Manual operation is done with a colour display, two rotary knobs and six pushbutton.s The large display shows all relevant set values and actual values at a glance. The whole setup is also done with the human-machine

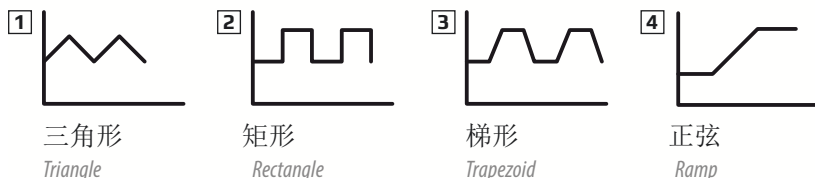
interface, as well the configuration of functions (square, triangle and others) etc.

The display is multilingual (German, English, Russian, Chinese).

Function generator

All models within 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 knobs and buttons 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 or amplitude, for full configuration ability.



电池测试

用恒流或恒阻放电来测试各类电池的这种测试，本产品也可以执行，它具有电池测试模式。它会显示累计的测试时间与消耗的容量 (Wh)。

EA Power Control测试期间，由电脑记录的数据，可以CSV格式导出Excel表，然后在MS Excel或类似工具下进行分析，甚至能创建可视化的放电图。关于其它设置，还可设定一可调节限值，当电池电压低时停止测试，或者停止可调最大测试期。

MPP追踪

对于光伏相关的测试，本产品还有一项功能，且作为其标准功能。它有四种模式，可模拟连接到太阳能模块或面板的逆变器的典型特性。该功能可以确定典型操作的参数，例如所谓的最大功率点和相关值 U_{MPP} ， I_{MPP} 和 P_{MPP} 。其中一种模式甚至含有不同辐射值的特定分析，该值由100个点组成并以表格形式存在。

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. It counts values for elapsed testing time and consumed capacity (Ah) and energy (Wh).

Data recorded by the PC during tests with 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 an adjustable threshold to stop the battery test on low battery voltage, as well an adjustable test period.

MPP tracking

For photovoltaics related tests there is another function included as standard. 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 value 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.

EA-EL 3000 B 400 W**远程控制 & 连接**

本产品的远程控制可通过三种可选接口卡来完成，快速且简单：

- USB
- USB + 以太网
- USB + 模拟

利用数字接口（USB，以太网），Windows用户还可使用“EA Power Control”免费软件。它具有“排序”功能，通过CSV格式的半自动化表格控制产品。此表能代表简易的测试程序，可在MS Excel或其它CSV编辑器下创建与编写，然后导入软件工具内。

该软件利用“多功能控制”特性（需注册码，非免费），可一次性监控多达20台产品。更多信息见136页。

可选项

- 带USB、USB+以太网或USB+模拟端口的接口卡，都是即插即用型，且可更换。

Remote control & connectivity

For remote control, there are three types of interface cards optionally available which can be quickly and easily installed by user on location:

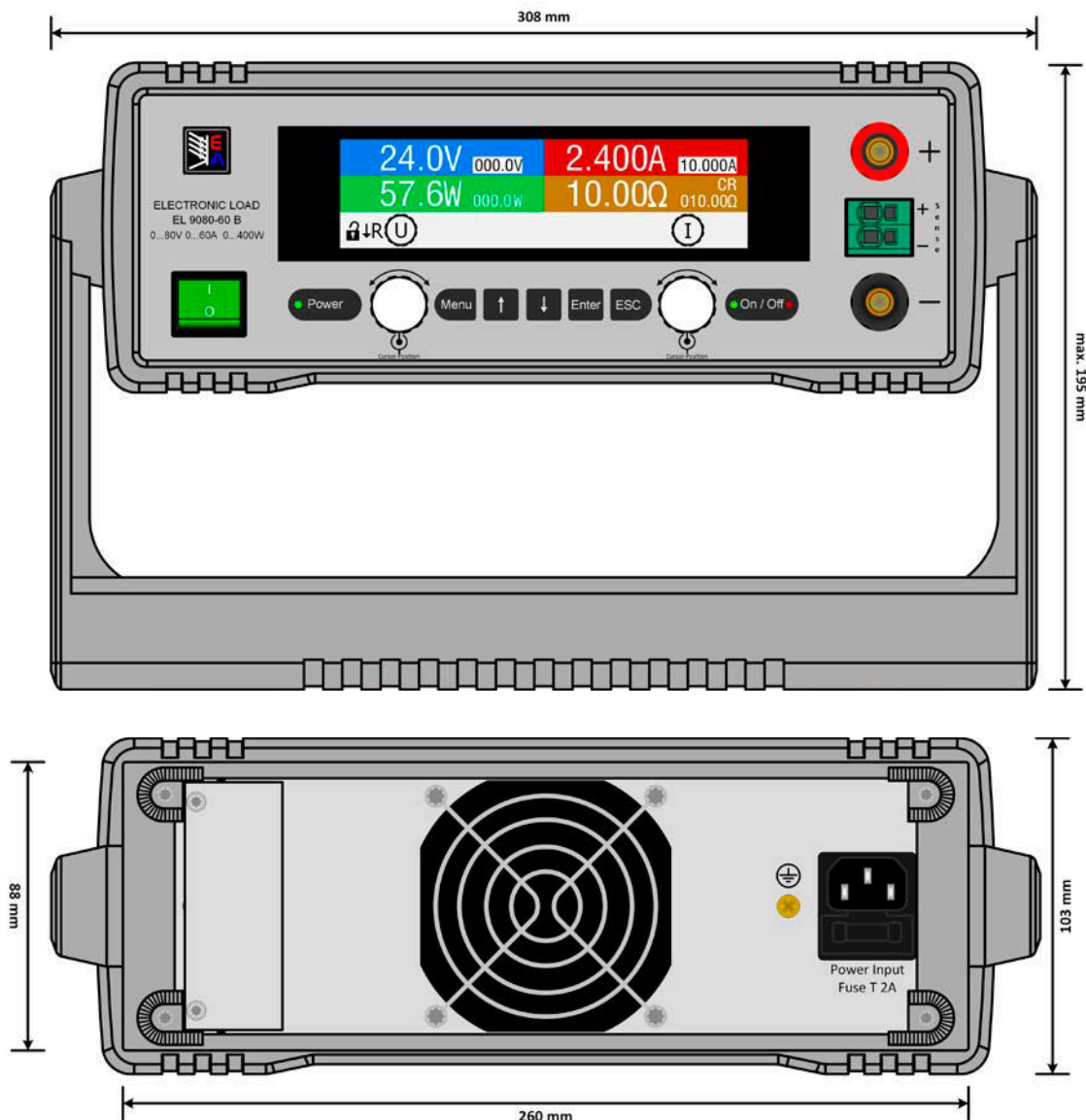
- USB
- USB + Ethernet
- USB + Analog

Using the digital interface (USB, Ethernet), 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.

This software also allows for the control of up to 20 units at once with an optional feature called “Multi Control” (licensed, not free of charge). See page 136 for more information.

Options

- Interface cards with either USB, USB+Ethernet or USB+Analog port, all plug 'n play and retrofittable



标配版的后视图 /

Rear view of the standard configuration

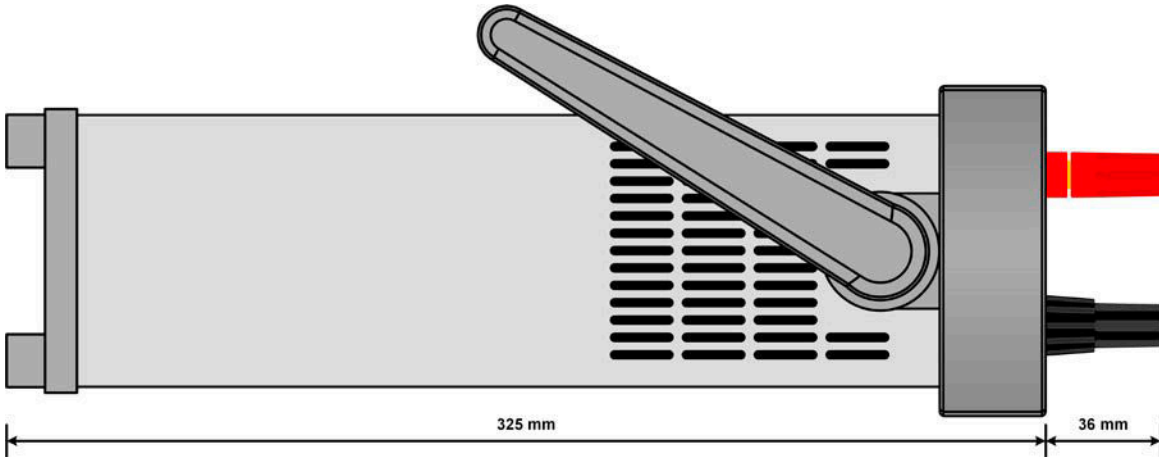
EA-EL 3000 B 400 W

技术参数	Technical Data	Series EA-EL 3000 B 系列
交流：供电	AC input	
- 电压	- Voltage	90...264 V
- 频率	- Frequency	45...66 Hz
- 功率损耗	- Power consumption	最大40 W
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 负载调整率1-100% ΔU_{DC}	- Load regulation 1-100% ΔU_{DC}	<额定值的0.1% / <0.1% of rated value
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的0.5% / <0.5% of rated value
直流：阻值	DC: Resistance	
- 精确度	- Accuracy	$\leq$ 最大阻值的1% + 额定电流的0.3% / $\leq 1\%$ of max. resistance + 0.3% of rated current
显示器与控制面板	Display and control panel	TFT液晶显示器，按键条，旋钮 / TFT display, keypad, rotary knobs
数字接口（可选）	Digital interfaces (optional)	
- 可选	- Available	IF-KE5 USB: 1x USB Typ B IF-KE5 USBLAN: 1x USB Typ B + 1x Ethernet (RJ45)
模拟接口（可选）	Analog interface (optional)	IF-KE5 USBANALOG: 1x Analog (D-Sub 15) + 1x USB Typ B
- 信号范围	- Signal range	0...5 V 或 0...10 V (可转换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U/I/P/R, 远程开-关，直流输入开-关，内阻模式开-关 / U/I/P/R, Remote on-off, DC input on-off, resistance mode on-off
- 输出脚	- Outputs	U/I, 过压，报警，参考电压 / U/I, Overvoltage, alarms, reference voltage
- U/I/P/R精确度	- Accuracy U/I/P/R	0...10 V: <0.2% 0...5 V: <0.4%
制冷	Cooling	温控风扇 / Temperature controlled fan
操作温度	Operation temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
机械结构	Mechanics	
- 尺寸 (W x H x D) ⁽¹⁾	- Dimensions (W x H x D) ⁽¹⁾	308 x 103 x 325 mm
- 重量	- Weight	4 kg

(1) 仅为机身尺寸 / Body only

型号	稳定功率	电压	电流	内阻	U_{Min} 时 I_{Max} ⁽¹⁾	订购编号
Model	Steady Power	Voltage	Current	Resistance	U_{Min} for I_{Max} ⁽¹⁾	Ordering number
EA-EL 3080-60 B	0...400 W	0...80 V	0...60 A	0.12...40 Ω	~ 2.6 V	35320205
EA-EL 3200-25 B	0...400 W	0...200 V	0.25 A	1...340 Ω	~ 1.9 V	35320206
EA-EL 3500-10 B	0...400 W	0...500 V	0...10 A	6...2000 Ω	~ 4.7 V	35320207

(1) 供给负载的最小直流输入电压，以达到最大输入电流 / Minimum DC input voltage to supply for the load to achieve the max. input current



EA-EL 9000 T 400 W - 600 W



可编程直流电子负载 Programmable Electronic DC loads



EA-EL 9080-45 T



- 输入功率级别: 0...400 W, 0...500 W至0...600 W
- 输入电压: 0...80 V, 0...200 V, 0...500 V
- 输入电流: 0...5 A, 0...18 A, 0...45 A
- 多语言彩色触摸屏
- 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
- 标配USB端口
- 可选以太网接口, 模拟接口
- 支持SCPI & ModBus RTU
- 带控制软件(Windows)
- LabView VIs

概要

EA-EL 9000 T系列是一款新的小型电子负载, 供有三款塔式型号, 适合实验室、学校日常的众多应用。小额定功率型号可以执行多种测试, 既节省成本, 也节省空间。

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: 配通用函数的真实函数发生器, 如: 正弦波, 方波或三角波, 还有一个任意函数。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。

- Input power ratings: 0...400 W, 0...500 W, 0...600 W
- Input voltages: 0...80 V, 0...200 V, 0...500 V
- Input currents: 0...5 A, 0...18 A, 0...45 A
- Multilingual colour touch panel
- True function generator
- Adjustable protections: OVP, OCP, OPP
- Operation modes: CV, CC, CP, CR
- USB port as standard
- Ethernet & analog interface optional
- SCPI & ModBus RTU supported
- Control software (Windows)
- LabView VIs

General

The new series of compact electronic DC loads, called EA-EL 9000 T, offers three tower models for the daily application in research laboratories and even schools. Lower power ratings allow for a multitude of test applications while being cost effective and space saving.

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 colour TFT touch panel offers an intuitive kind of manual operation, like it is prolific 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.

EA-EL 9000 T 400 W - 600 W

本系列标配有一个USB端口，用户可以选择安装以太网与模拟接口。所有接口都电隔离。通过公共协议SCPI和ModBus-RTU以及即用型LabView组件，简化了针对各种定制应用程序的远程控制和应用。

功率等级、电压和电流

本系列有0...80 V, 0...200 V或0...500 V输入电压, 0...5A, 0...18 A或0...45A输入电流的产品型号。输出功率有三个级别，分别为固定功率400W, 500W或600W。

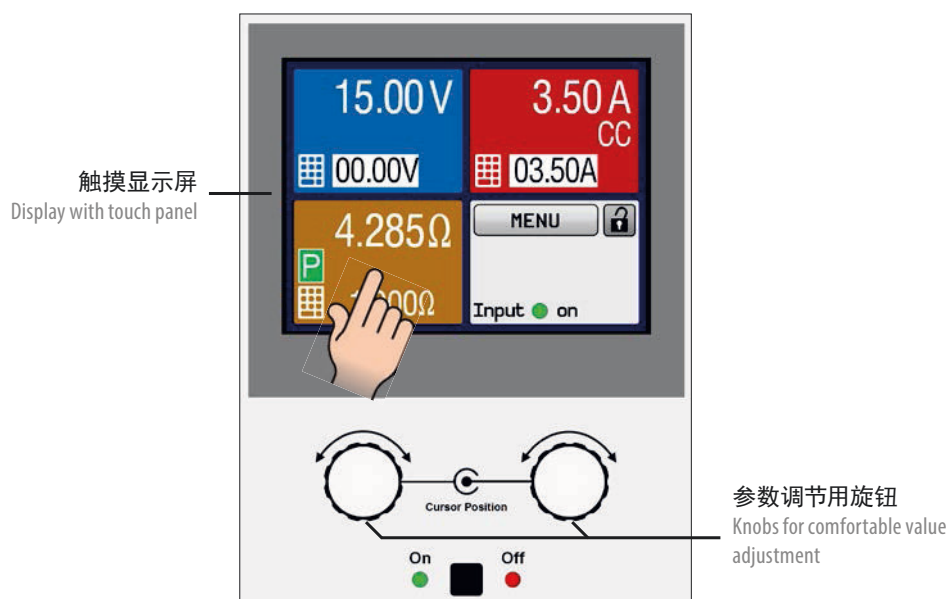
显示器与操作

An USB port is standard with this series, Ethernet and analog interfaces can be optionally retrofitted by the user. All interfaces are galvanically isolated. Remote control and implementation into custom applications for every purpose is simplified by the common protocols SCPI and ModBus RTU, as well as by ready-to-use LabView components.

Power ratings, voltages, currents

Available are models with inputs voltages of 0...80 V, 0...200 V or 0...500 V and input currents of 0...8 A, 0...18 A or 0...45 A. The series offers three power classes with 400 W, 500 W or 600 W steady power.

Display and handling



设定与实际输入电压、电流与功率都清晰显示于彩屏上。彩色的TFT屏幕为敏感点触式，用一个手指就能控制所有功能。

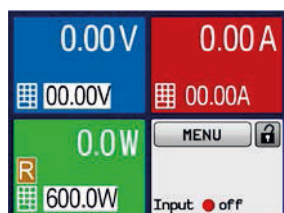
通过旋钮或者数字键盘，可直接输入或调节设定电压、电流、功率或内阻。若想防止意外操作，可锁定所有操作键。

Set values and actual values of input voltage, current and power are clearly represented on the graphic display. The colour TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger.

Set values of voltage, current, power or resistance can be adjusted using the rotary knobs or entered directly via a numeric pad.

To prevent unintentional operations, all operation controls can be locked.

多语言控制面板



英文 / English



中文 / Chinese



俄文 / Russian



德文 / German

Multi-language control panel

EA-EL 9000 T 400 W - 600 W



函数发生器

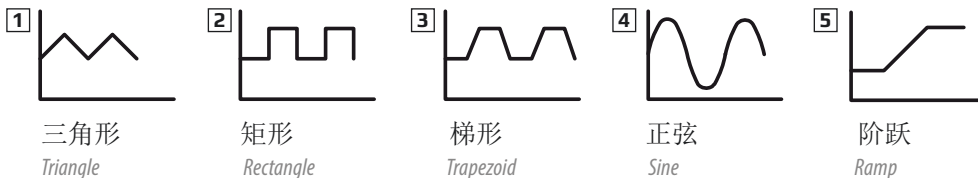
本系列所有型号都具有可形成如下典型函数的真实函数发生器，并能将它们应用于输入电压或输入电流上。发生器可通过前板的触摸屏进行全面的设置，或经某一数字接口进行远程控制。

预设函数会为用户提供所有必须的参数，如Y偏差值，时间/频率或幅度，整套配置完成。

Function generator

All models within 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.

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

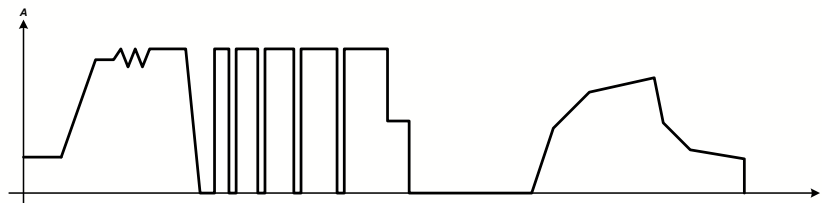


除了基于任意发生器产生的标准函数外，它还可形成某些复杂的函数，并能分成多达99组序列。这些可用于研发和生产的测试。

通过前板的USB端口可将这些序列上载使用或存储于标准U盘上，这样方便更换不同的测试序列。下图是任意发生器可实现的由40个序列组成的复杂曲线，仅为虚构范例。可以在产品外或者于产品上创建函数，然后上载或保存：

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 99 sequences. These 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. Below is a depiction of a fictional example of a complex function (40 sequences) as it can be realised with the arbitrary generator. The function can be created on the device or externally and then loaded or saved:



电池测试

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(Ah)与消耗的容量(Wh)。

EA Power Control测试期间，由电脑记录的数据，可以CSV格式导出Excel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，还可设定一可调极限值，当电池电压低时停止测试，或者停止可调最大测试期。

功率降额

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

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. It counts values for elapsed testing time and consumed capacity (Ah) and energy (Wh).

Data recorded by the PC during tests with 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 an adjustable maximum test period.

Power derating

The devices of the EA-EL 9000 T 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 25°C ambient temperature.

EA-EL 9000 T 400 W - 600 W

远程控制 & 连接

本产品后板默认有一个USB端口，可经其进行远程控制。另外还有一个选择，用户可插上一块装有USB、以太网与模拟接口电子板的三路系统。

产品前板还有一个USB端口，可以插U盘，以便上传与保存函数和用户配置文档。

Windows用户还可使用“EA Power Control”免费软件。它具有“排序”功能，通过CSV格式的半自动化表格控制产品。此表能代表简易的测试程序，可在MS Excel或其它CSV编辑器下创建与编写，然后导入软件工具内。

该软件利用“多功能控制”特性（需注册码，非免费），可一次性监控多达20台产品。更多信息见136页。

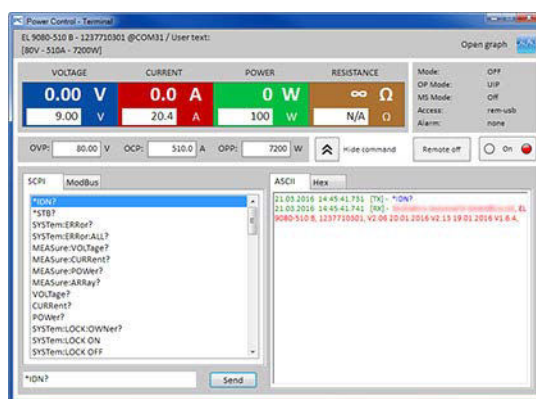
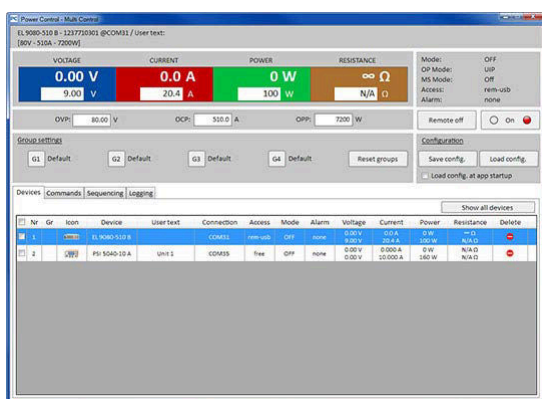
Remote control & connectivity

For remote control, there is by default an USB interface port available on the rear of the devices. As an option, a 3-way system can installed by the user simply by plugging an electronic board, which hold an USB, an Ethernet and an analog interface.

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

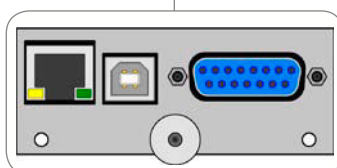
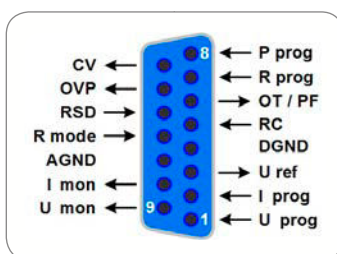
Windows users can profit from the free software “EA Power Control”. It offers a feature called “Sequencing”, where the device is controlled through a semi-automatic table in CSV format. This table represents a simple test procedure and can be created and edited in MS Excel or other CSV editors and then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

This software also allows for the control of up to 20 units at once with an optional feature called “Multi Control” (licensed, not free of charge). See page 136 for more information.



可选模拟接口

还可选择在产品后板上装一电隔离模拟接口。它具有一模拟输入脚，接上0 V...10 V或0 V...5 V电压，可设置0...100%的输出电压、电流、功率与内阻。要监控输出电压与电流，可给模拟输出脚接上0 V...10 V或0 V...5 V来完成。此外，还有几个输入脚和输出脚，可用来控制和监控产品状态。



可选项

- 带USB、以太网与模拟端口的可拆装接口模块

Optional analog interface

A galvanically isolated analog interface can be installed optionally and subsequently, located on the rear of the device. It offers analog inputs to set voltage, current, power and resistance from 0...100% through control voltages of 0 V...10 V or 0 V...5 V. To monitor the DC input voltage and current there are analog outputs with 0 V...10 V or 0 V...5 V. Also, several inputs and outputs are available for controlling and monitoring the device status.

Options

- Retrofittable interface module with USB, Ethernet and analog port

EA-EL 9000 T 400 W - 600 W



技术参数	Technical Data	Series EA-EL 9000 T / 系列
交流：供电	AC: Supply	
- 电压	- Voltage	90...264 V,
- 频率	- Frequency	45...66 Hz
- 功率损耗	- Power consumption	最大 / max. 40 W
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔU _{DC} 的负载调整率	- Load regulation 1-100% ΔU _{DC}	<额定值的0.1% / <0.1% of rated value
- 10-90%上升时间	- Rise time 10-90%	<50 μs
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的0.5% / <0.5% of rated value
直流：内阻	DC: Resistance	
- 精确度	- Accuracy	≤最大电阻的1% + 额定电流的0.3% / ≤1% of max. resistance + 0.3% of nominal current
显示器与控制面板	Display and control panel	TFT触摸屏彩色显示器 / Graphics display with TFT touch panel
数字接口	Digital interfaces	
- 标配	- As standard	1x B类USB端口（通讯用） / 1x USB type B (for communication) 1x A类USB端口（存储设备用） / 1x USB type A (for storage device)
- 选配	- Optionally available	1x Ethernet (未分开，总是跟USB与模拟接口结合在一起) / 1x Ethernet (not separate, always in combination with USB and analog interface)
模拟接口（可选）	Analog interface (optional)	15针D-Sub母插，电隔离 / 15-pole D-Sub, galvanically isolated
- 信号范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U, I, P, R, 远程开-关，直流输入开-关，内阻模式开-关 / U, I, P, R, Remote on-off, DC input on-off, resistance mode on-off
- 输出脚	- Outputs	U/I, 过压，报警，参考电压 / U/I, Overvoltage, alarms, reference voltage
- U/I/P/R精确度	- Accuracy U/I/P/R	0...10 V: <0.2% 0...5 V: <0.4%
制冷方式	Cooling	温控风扇 / Temperature controlled fan
工作温度	Ambient temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
前板端子类型	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	夹线端子 / Clamp terminal
- 数字接口	- Digital interfaces	USB (A型)
后板端子类型	Terminals on rear	
- 模拟接口	- Analog interface	可选/ optional: 15针Sub-D连接器 / Sub-D connector 15 pole
- 数字接口	- Digital interfaces	内置：USB (B型)，可选（以太网） / Built-in: USB (type B), optional: Ethernet
机械结构	Mechanics	
- 尺寸 (宽x高x深) ⁽¹⁾	- Dimensions (W x H x D) ⁽¹⁾	92 x 239 x 352 mm
- 重量	- Weight	~ 7 kg

(1) 仅为机身尺寸 / Body only

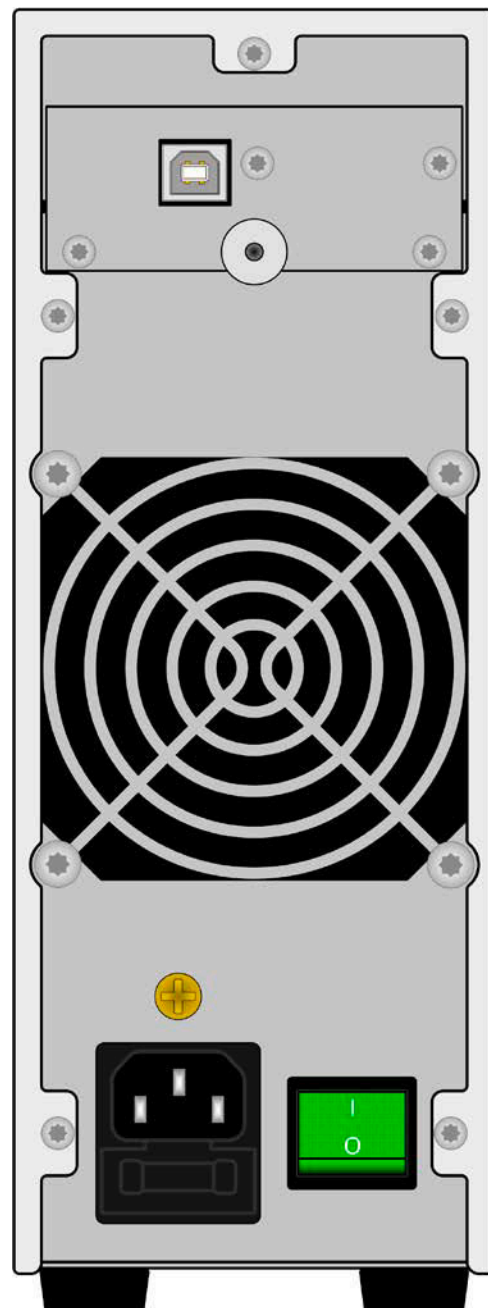
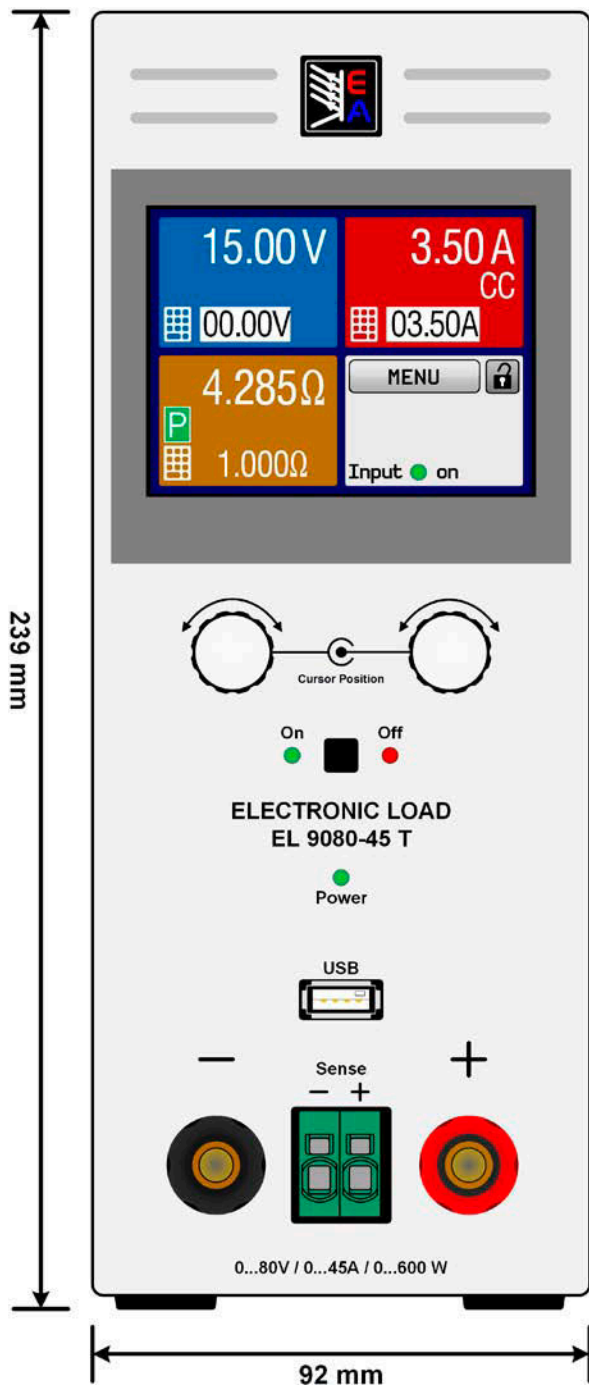
型号	功率	功率 @ 40°C	电压	电流	内阻	I _{Max} 时U _{Min} ⁽¹⁾	订购编号
Model	Power	Power @ 40°C	Voltage	Current	Resistance	U _{Min} for I _{Max} ⁽¹⁾	Ordering number
EL 9080-45 T	600 W	550 W	0...80 V	0...45 A	0.12...40 Ω	~ 2.2 V	33210511
EL 9200-18 T	500 W	500 W	0...200 V	0...18 A	1...340 Ω	~ 2 V	33210512
EL 9500-08 T	400 W	400 W	0...500 V	0...8 A	6...2000 Ω	~ 6.5 V	33210513

(1) 用最小直流输入电压供给负载以获得最大输入电流 / Minimum DC input voltage to supply the load to achieve the max. input current

EA-EL 9000 T 400 W - 600 W

产品图片

Product views



EA-EL 9000 DT 400 W - 1200 W



可编程直流电子负载 Programmable Electronic DC loads



EA-EL 9080-60 DT



- 输入功率级别: 0...400 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
- 可调保护功能: OVP, OCP, OPP
- 操作模式: CV, CC, CP, CR
- 标配以太网、模拟与USB端口
- 带有倾斜支撑架的提手
- 支持SCPI & ModBus RTU
- 带控制软件(Windows)
- LabView VIs

概要

EA-EL 9000 DT系列是一款新的小型电子负载, 由EA-EL 9000 T系列扩展出来的10款新型号, 组装于桌面式外壳内。它提供新的电压、电流与功率, 适合实验室、学校或车间日常的众多应用。

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: 配通用函数的真实函数发生器, 如: 正弦波, 方波或三角波, 还有一个任意函数。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。

- **Input power ratings: 0...400 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 and USB port as standard**
- **Carrying handle with tilt stand**
- **SCPI & ModBus RTU supported**
- **Control software (Windows)**
- **LabView VIs**

General

The new series of compact electronic DC loads, called EA-EL 9000 DT, extends series EA-EL 9000 T by 10 models in a desktop enclosure to round up the portfolio of electronic loads. 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 colour TFT touch panel offers an intuitive kind of manual operation, like it is prolific 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.

EA-EL 9000 DT 400 W - 1200 W

本系列标配有一些数字接口，如USB与以太网端口，以及模拟端口。所有端口都电隔离。通过公共协议SCPI和ModBus-RTU以及即用型LabView组件，简化了针对各种定制应用程序的远程控制和应用。

功率等级、电压和电流

本系列有0...80 V至0...750 V输入电压，0...5A至0...60A输入电流的产品型号。输入功率有两个级别，峰值功率为600W或1200W。

操作面板 (HMI)

通过TFT触摸屏、两个旋钮与一按钮，可对本产品进行手动操作。大的彩显屏会显示所有相关的设定值与实际值。经人机界面可完成整个设置，以及函数的配置（方波，三角波，正弦波）等。

显示器为多语言界面（有德文，中文，英文，俄文）。

函数发生器

本系列所有型号都具有一可形成如下典型函数的真实函数发生器，并能将它们应用于输入电压或输入电流上。发生器可通过前板的触摸屏进行全面的设置，或经某一数字接口进行远程控制。

预设函数会为用户提供所有必须的参数，如Y偏差值，时间/频率或幅度，整套配置完成。

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 RTU, as well as by ready-to-use LabView components.

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)

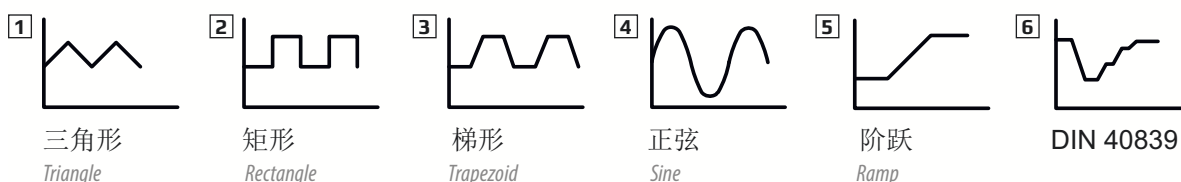
Manual operation is done with a TFT touch panel, two rotary knobs and a pushbutton. The large colour display shows all relevant set values and actual values at a glance. The whole setup is also done with the human-machine interface, as well the configuration of functions (square, triangle, sine) etc.

The display is multilingual (German, English, Russian, Chinese).

Function generator

All models within this series include a 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.

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



除了基于任意发生器产生的标准函数外，它还可形成某些复杂的函数，并能分成多达99组序列。这些可用于研发和生产的测试。通过前板的USB端口可将这些序列上载使用或存储于标准U盘上，这样方便更换不同的测试序列。

电池测试

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(Ah)与消耗的容量(Wh)。

EA Power Control测试期间，由电脑记录的数据，可以CSV格式导出Excel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，还可设定一可调极限值，当电池电压低时停止测试，或者停止可调最大测试期。

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 99 sequences. These 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.

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. It counts values for elapsed testing time and consumed capacity (Ah) and energy (Wh).

Data recorded by the PC during tests with 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 an adjustable maximum test period.

EA-EL 9000 DT 400 W - 1200 W**功率降额**

EA-EL 9000 DT系列产品具有热降额功能，可避免产品在最大功率下运行时过热。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。

远程控制 & 连接

本产品后板标配USB、以太网与模拟端口，可经其进行远程控制。

产品前板还有一个USB端口，可以插U盘，以便上传与保存函数和用户配置文档。

Windows用户还可使用“EA Power Control”免费软件。它具有“排序”功能，通过CSV格式的半自动化表格控制产品。此表能代表简易的测试程序，可在MS Excel或其它CSV编辑器下创建与编写，然后导入软件工具内。

该软件利用“多功能控制”特性（需注册码，非免费），可一次性监控多达20台产品。更多信息见136页

可选项

- 19“系统安装架 (2U)

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 nominal intake power before the derating starts is defined at 25°C ambient temperature.

Remote control & connectivity

For remote control, there are USB, Ethernet and analog ports available as standard on the rear of the devices.

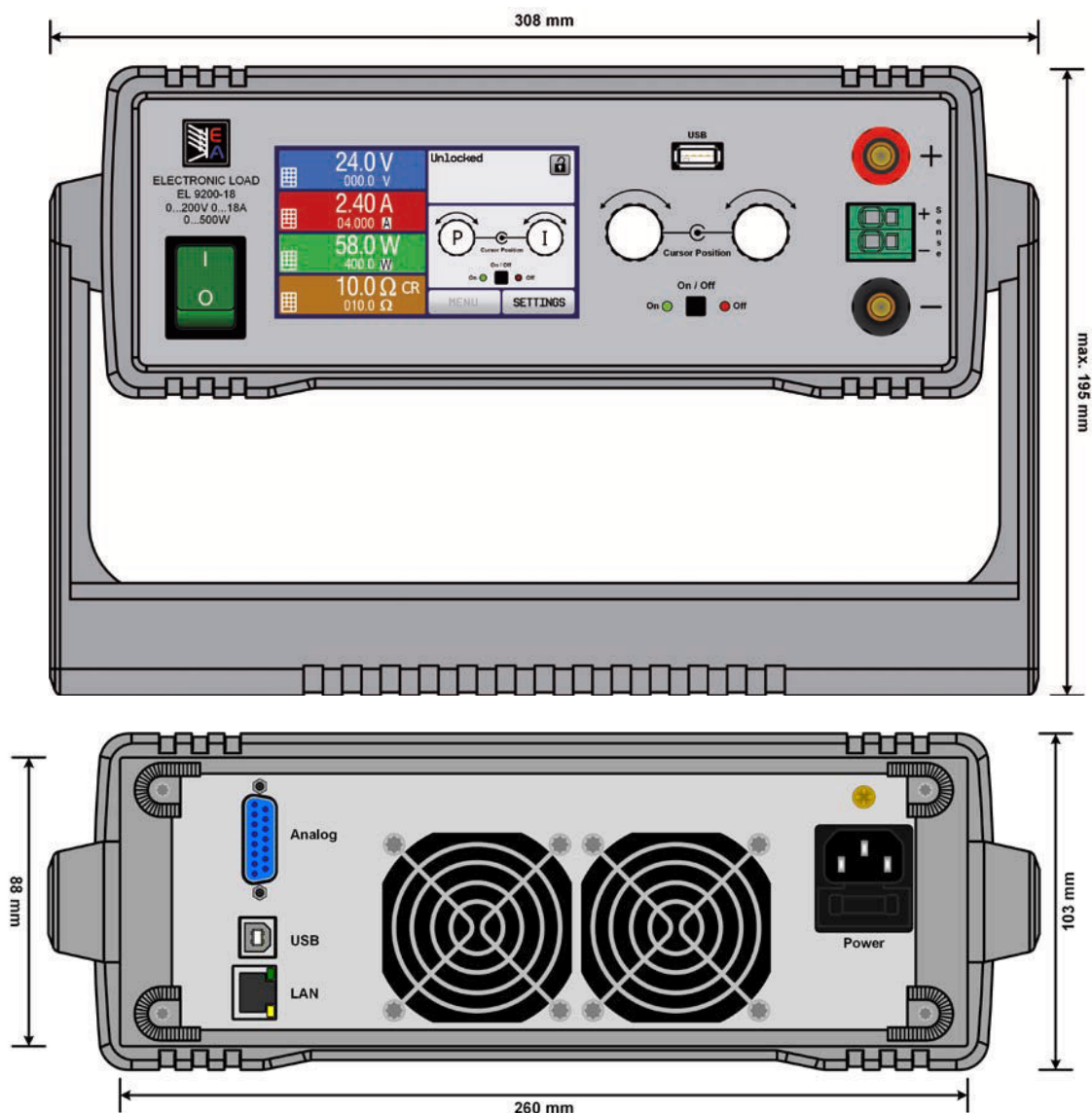
Another USB port, located on the front side, is intended for USB sticks in order to load and save functions and user profiles.

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.

This software also allows for the control of up to 20 units at once with an optional feature called “Multi Control” (licensed, not free of charge). See page 136 for more information.

Options

- Mounting frame (2U) for 19” systems



EA-EL 9000 DT 400 W - 1200 W

技术参数	Technical Data	Series EA-EL 9000 DT / 系列
交流：供电	AC: Supply	
- 电压	- Voltage	90...264 V,
- 频率	- Frequency	45...66 Hz
- 功率损耗	- Power consumption	最大 / max. 40 W
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.1% / <0.1% of rated value
- 10-90% 上升时间	- Rise time 10-90%	<50 μ s
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的0.5% / <0.5% of rated value
直流：内阻	DC: Resistance	
- 精确度	- Accuracy	$\leq$ 最大电阻的1% + 额定电流的0.3% / $\leq 1\%$ of max. resistance + 0.3% of nominal current
显示器与控制面板	Display and control panel	TFT触摸屏彩色显示器 / Graphics display with TFT touch panel
数字接口	Digital interfaces	1x B类USB端口（通讯用） / 1x USB type B (for communication) 1x A类USB端口（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
- 信号范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U/I/P/R, 远程开-关, 直流输入开-关, 内阻模式开-关 / U/I/P/R, Remote on-off, DC input on-off, resistance mode on-off
- 输出脚	- Outputs	U, I, 过压, 报警, 参考电压 / U, I, overvoltage, alarms, reference voltage
- U/I/P/R 精确度	- Accuracy U/I/P/R	0...10 V: <0.2% 0...5 V: <0.4%
制冷方式	Cooling	温控风扇 / Temperature controlled fans
工作温度	Operation temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
机械结构	Mechanics	
- 尺寸 (宽x高x深) ⁽¹⁾	- Dimensions (W x H x D) ⁽¹⁾	308 x 103 x 415 mm
- 重量	- Weight	600 W: ~ 6.5 kg 1200 W: ~ 7.5 kg

(1) 仅为机身尺寸 / Body only

型号	功率 @ 25°C	功率 @ 40°C	电压	电流	内阻	I_{Max} 时 U_{Min} ⁽¹⁾	订购编号
Model	Power @ 25°C	Power @ 40°C	Voltage	Current	Resistance	U_{Min} for I_{Max} ⁽¹⁾	Ordering number
EA-EL 9080-45 DT	600 W	500 W	0...80 V	0...45 A	0.09...30 Ω	~ 2.2 V	33210501
EA-EL 9200-18 DT	500 W	500 W	0...200 V	0...18 A	0.5...170 Ω	~ 2 V	33210502
EA-EL 9360-10 DT	450 W	450 W	0...360 V	0...10 A	1.6...540 Ω	~ 2 V	33210503
EA-EL 9500-08 DT	400 W	400 W	0...500 V	0...8 A	3...1000 Ω	~ 6.5 V	33210504
EA-EL 9750-05 DT	400 W	400 W	0...750 V	0...5 A	7...2200 Ω	~ 5.5 V	33210505
EA-EL 9080-60 DT	1200 W	800 W	0...80 V	0...60 A	0.09...30 Ω	~ 2.2 V	33210506
EA-EL 9200-36 DT	1000 W	800 W	0...200 V	0...36 A	0.5...170 Ω	~ 2 V	33210507
EA-EL 9360-20 DT	900 W	800 W	0...360 V	0...20 A	1.6...540 Ω	~ 2 V	33210508
EA-EL 9500-16 DT	600 W	600 W	0...500 V	0...16 A	3...1000 Ω	~ 6.5 V	33210509
EA-EL 9750-10 DT	600 W	600 W	0...750 V	0...10 A	7...2200 Ω	~ 5.5 V	33210510

(1) 用最小直流输入电压供给负载以获得最大输入电流 / Minimum DC input voltage to supply for the load to achieve the max. input current



EA-EL 9000 B 1.2 kW - 14.4 kW



可编程直流电子负载 Programmable Electronic DC loads



EA-EL 9080-510 B 3U



- 输入功率级别：1.2 kW...14.4 kW，还可扩展至机柜系统，功率高达72 kW
- 输入电压：0...80 V至0...750 V
- 输入电流：每台高达1020 A
- 基于FPGA的控制电路
- 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
- 电隔离接口（模拟与USB端口）
- 并联用主-从总线
- 支持SCPI & ModBus RTU
- LabView VIs与远程控制软件(Windows)

- **Input power ratings: 1.2 kW...14.4 kW, expandable in cabinets up to 72 kW**
- **Input voltages: 0...80 V up to 0...750 V**
- **Input currents: up to 1020 A per unit**
- **FPGA based control circuit**
- **Multilingual colour 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**
- **SCPI & ModBus RTU supported**
- **LabView VIs and remote control software (Windows)**

概要

EA-EL 9000 B系列是一款新的小型电子负载，它将取代之前的EA-EL 9000 A系列，供应新的电压、电流与功率级别，适用于众多应用。

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）。基于FPGA的控制电路具有很多有趣的特征，比如：真实函数发生器，它可使用表格做成的函数模拟非线性内阻。

与之前的EA-EL 9000 A系列相比，其功率损耗与高度之间的比例得到很大地提升。所有型号都只为3U高，而每台产品消耗的直流功率可达7.2 kW，6U型号则为两倍。

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 non-linear 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.

EA-EL 9000 B 1.2 kW - 14.4 kW

大的彩色TFT触摸屏可以让用户直观地手动操作，就像现在流行的智能手机或者平板电脑那样操作。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FPGA处理器控制的硬件。多台产品并联时，可以使用主-从总线，将这些产品连接起来，组成更大的系统。此系统的实际输出值会被汇总，而设定值会均衡分布。

功率等级、电压和电流

本系列有0...80 V DC至0...750 V DC输出电压的多个型号，单台机器的输入电流就高达1020A。单个型号的功率级别有很多，因此多台本系列型号装入机柜后，可扩展至144 kW(见138页)，从而获得更大的总电流。

结构

本系列所有型号都组装在一个19"宽，3U或6U高，460 mm深的柜式外壳内，可以简便地装入不同尺寸的19"机柜，比如42U，以组成更高的功率。还可将不同的设备安装到机柜系统，比如：电子负载与电源一起，这样可以组成一个大功率的供电-吸收电的系统。

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）。

函数发生器与表格控制

本产品还具有一基于FPGA的数字函数与任意发生器。它可控制和运行用户定制的负载配置文档，并产生任意顺序的正弦、方形、锯齿形以及跳跃型函数。

通过3276个有效点数自由编程的数值表，能实时嵌入到控制电路中，然后可重现非线性内阻，如：电池或LED灯条中的内阻。

The large colour TFT touch panel offers an intuitive kind of manual operation, such as it is prolific nowadays with smartphones or tablet computers. Response times for the control via analog or digital interfaces have been improved by the FPGA controlled hardware.

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 totalled 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 144 kW in cabinets (see from page 138) 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 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)

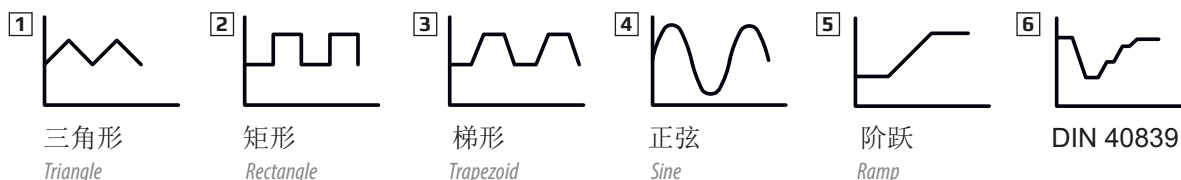
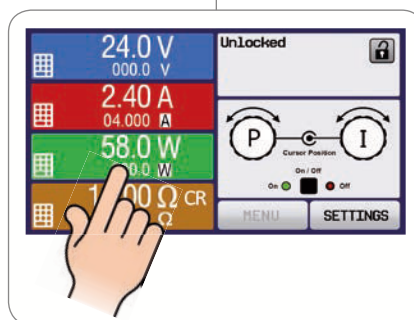
Manual operation is done with a TFT touch panel, two rotary knobs and a pushbutton. The large colour display shows all relevant set values and actual values at a glance. The whole setup is also done with the human-machine interface, as well as the configuration of functions (square, triangle, sine) etc.

The display is multilingual (German, English, Russian, Chinese).

Function generator and table control

A special feature is the comfortable, FPGA based, digital function and arbitrary generator. It enables controlling and running user-customisable load profiles and can generate sine, square, saw tooth and ramp functions in arbitrary order.

With a freely programmable digital value table of 3276 effective points, which is embedded in the control circuit, the devices can reproduce non-linear internal resistances, such as those of batteries or LED chains.

**Share-Bus-共享总线**

产品后板有一个模拟连接端子叫“Share Bus”，用来均衡多台类似产品并联时的电流，如：本系列的负载产品与EA-ELR 9000系列并联。还可通过此端子连接EA-PSI 9000，EA-PS 9000与EA-PSE 9000系列电源，以便组建两象限系统。该系统专门利用源-沉原理进行测试用途。

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, EA-PS 9000 and EA-PSE 9000. This system is dedicated for testing purposes using the source-sink principle.

EA-EL 9000 B 1.2 kW - 14.4 kW



功率降额

EA-EL 9000 B系列产品具有热降额功能，可避免产品在最大功率下运行时过热。

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21°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

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(Ah)与消耗的容量(Wh)。

EA Power Control测试期间，由电脑记录的数据，可以CSV格式导出Excel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，还可设定一可调极限值，当电池电压低时停止测试，或者停止可调最大测试期。

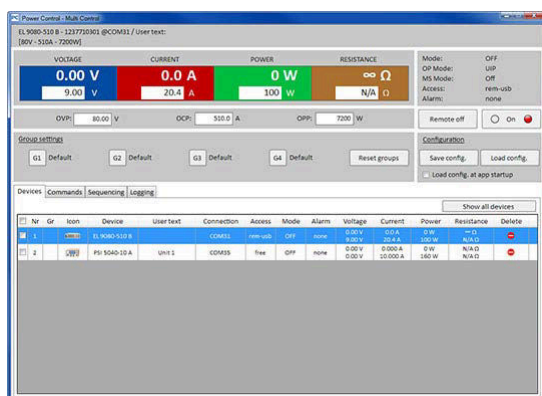
远程控制 & 连接

本产品后板标配有两个接口（1x 模拟，1x USB），可经其进行远程控制。还可选择一插拔式数字接口模块（插到指定插槽）进行扩展。

如要应用到LabView IDE，我们还提供即用的组建（VIs），能与USB，RS232，GPIB以及以太网接口一起使用。其它IDE与接口类型则需通讯协议才能支持。

Windows用户还可使用“EA Power Control”免费软件。它具有“排序”功能，通过CSV格式的半自动化表格控制产品。此表能代表简易的测试程序，可在MS Excel或其它CSV编辑器下创建与编写，然后导入软件工具内。

该软件利用“多功能控制”特性（需注册码，非免费），可一次性监控多达20台产品。更多信息见136页。



可选项

- 可插拔、可替换的数字接口模块，适合CAN，CANopen，Ethernet（1个或2个端口），Profibus，ProfiNet I/O（1个或2个端口），RS232，EtherCAT 或 ModBus TCP。可参见第134页。
- 可插拔带规定GPIB端口的三路接口（3W），可替代接口模块的默认插槽
- 水冷（按需可供，也可参考页面145）

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.

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.

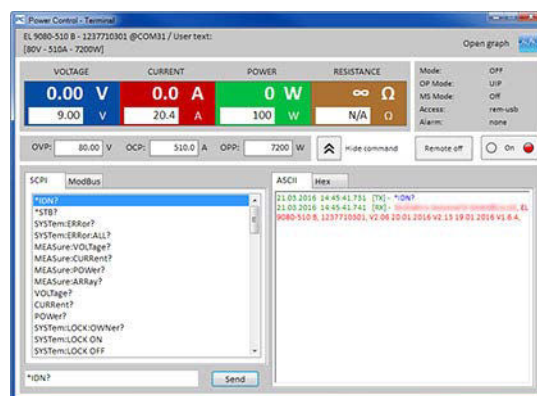
Remote control & connectivity

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.

This software also allows for the control of up to 20 units at once with an optional feature called “Multi Control” (licensed, not free of charge). See page 136 for more information.



Options

- Pluggable and retrofittable, digital interface modules for CAN, CANopen, Ethernet (1 or 2 ports), Profibus, ProfiNet I/O (1 or 2 ports), RS232, EtherCAT or ModBus TCP. See page 134.
- 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 145)

EA-EL 9000 B 1.2 kW - 14.4 kW

技术参数	Technical Data	Series EA-EL 9000 B / 系列
交流：供电	AC: Supply	
- 电压	- Voltage	90...264 V
- 频率	- Frequency	45...66 Hz
- 功率损耗	- Power consumption	3 HE / 3 U: 最大 / max. 130 W 6 HE / 6 U: 最大 / max. 260 W
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.1% / <0.1% of rated value
- 10-90% 上升时间	- Rise time 10-90%	<50 μ s
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的0.5% / <0.5% of rated value
直流：内阻	DC: Resistance	
- 精确度	- Accuracy	$\leq$ 最大电阻的1% + 额定电流的0.3% / $\leq 1\%$ of max. resistance + 0.3% of nominal current
保护功能	Protection	OT, OVP, OPP, PF, OCP ⁽²⁾
显示器与面板	Display and panel	TFT触摸屏彩色显示器 / Graphics display with TFT touch panel
数字接口	Digital interfaces	
- 内置	- Built in	1x 通讯用B类USB端口 / 1x USB type B for communication
- 插槽	- Slot	1x 更换内置模块用 / 1x for retrofittable plug-in modules
模拟接口	Analog interface	内置15极D-Sub母插，电隔离 / Built in, 15-pole D-Sub (female), galvanically isolated
- 信号范围	- Signal range	0...5 V 或 0...10 V (可转换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U, I, P, R, 远程开-关，直流输入开-关，内阻模式开-关 / U, I, P, R, Remote on-off, DC input on-off, resistance mode on-off
- 输出脚	- Output	U, I, 过压，报警，参考电压 / U, I, Overvoltage, alarms, reference voltage
- U / I / P / R 精确度	- Accuracy U / I / P / R	0...10 V: <0.2% 0...5 V: <0.4%
制冷方式	Cooling	温控风扇（可选：水冷） / Temperature controlled fans (optional: water)
工作温度	Ambient temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
相对湿度	Relative humidity	<80%, 无凝露 / non-condensing
工作高度	Operation altitude	<2000 m
后板端子	Terminals on rear panel	
- 直流输入	- DC input	螺丝端 / Screw terminal
- 共享总线 & 感测	- Share Bus & Sense	2极&4极插式连接器 / Plug connector 2 pole & 4 pole
- 模拟接口	- Analog interface	15极Sub-D连接器 / Sub-D connector 15 pole
- 数字接口	- Digital interfaces	模块插座 / Module socket 主-从 / Master-Slave (2x RJ45), USB
尺寸 ⁽¹⁾ (宽 x 高 x 深)	Dimensions ⁽¹⁾ (W x H x D)	19" x 3 HE/U x 464 mm 19" x 6 HE/U x 464 mm

(1) 仅为外壳尺寸 / Enclosure only

(2) 见第146页 / See page 146



EA-EL 9000 B 1.2 kW - 14.4 kW

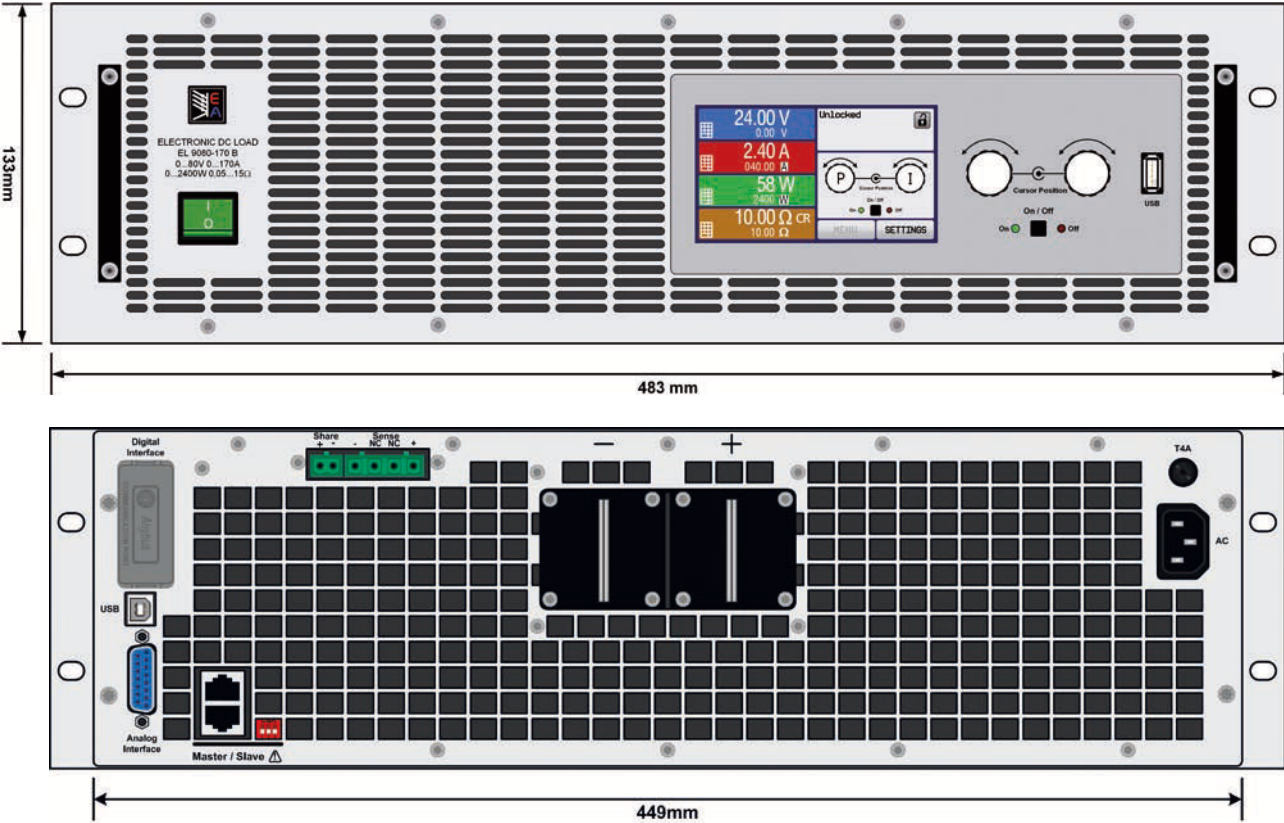


型号	功率	功率 @ 21°C	电压	电流	内阻	$I_{Max} \cdot U_{Min}^{(2)}$	重量	高度	订购编号 ⁽¹⁾
Model	Power	Power @ 21°C	Voltage	Current	Resistance	U_{Min} for $I_{Max}^{(2)}$	Weight	Height	Ordering number ⁽¹⁾
EA-EL 9080-170 B	0...2400 W	1500 W	0...80 V	0...170 A	0.045...15 Ω	~2.2 V	~9 kg	3 HE / 3 U	33200260
EA-EL 9200-70 B	0...2000 W	1500 W	0...200 V	0...70 A	0.25...85 Ω	~2 V	~9 kg	3 HE / 3 U	33200261
EA-EL 9360-40 B	0...1800 W	1500 W	0...360 V	0...40 A	0.8...270 Ω	~2 V	~9 kg	3 HE / 3 U	33200262
EA-EL 9500-30 B	0...1200 W	1200 W	0...500 V	0...30 A	1.5...500 Ω	~6.5 V	~9 kg	3 HE / 3 U	33200263
EA-EL 9750-20 B	0...1200 W	1200 W	0...750 V	0...20 A	3.5...1100 Ω	~5.5 V	~9 kg	3 HE / 3 U	33200264
EA-EL 9080-340 B	0...4800 W	3000 W	0...80 V	0...340 A	0.023...7.5 Ω	~2.2 V	~13 kg	3 HE / 3 U	33200265
EA-EL 9200-140 B	0...4000 W	3000 W	0...200 V	0...140 A	0.13...43 Ω	~2 V	~13 kg	3 HE / 3 U	33200266
EA-EL 9360-80 B	0...3600 W	3000 W	0...360 V	0...80 A	0.4...135 Ω	~2 V	~13 kg	3 HE / 3 U	33200267
EA-EL 9500-60 B	0...2400 W	2400 W	0...500 V	0...60 A	0.75...250 Ω	~6.5 V	~13 kg	3 HE / 3 U	33200268
EA-EL 9750-40 B	0...2400 W	2400 W	0...750 V	0...40 A	1.75...550 Ω	~5.5 V	~13 kg	3 HE / 3 U	33200269
EA-EL 9080-510 B	0...7200 W	4500 W	0...80 V	0...510 A	0.015...5 Ω	~2.2 V	~17 kg	3 HE / 3 U	33200270
EA-EL 9200-210 B	0...6000 W	4500 W	0...200 V	0...210 A	0.08...28 Ω	~2 V	~17 kg	3 HE / 3 U	33200271
EA-EL 9360-120 B	0...5400 W	4500 W	0...360 V	0...120 A	0.27...90 Ω	~2 V	~17 kg	3 HE / 3 U	33200272
EA-EL 9500-90 B	0...3600 W	3600 W	0...500 V	0...90 A	0.5...167 Ω	~6.5 V	~17 kg	3 HE / 3 U	33200273
EA-EL 9750-60 B	0...3600 W	3600 W	0...750 V	0...60 A	1.2...360 Ω	~5.5 V	~17 kg	3 HE / 3 U	33200274
EA-EL 9080-1020 B	0...14400 W	9000 W	0...80 V	0...1020 A	0.0075...2.5 Ω	~2.2 V	~33 kg	6 HE / 6 U	33200275
EA-EL 9200-420 B	0...12000 W	9000 W	0...200 V	0...420 A	0.04...14 Ω	~2 V	~33 kg	6 HE / 6 U	33200276
EA-EL 9360-240 B	0...10800 W	9000 W	0...360 V	0...240 A	0.14...45 Ω	~2 V	~33 kg	6 HE / 6 U	33200277
EA-EL 9500-180 B	0...7200 W	7200 W	0...500 V	0...180 A	0.25...88 Ω	~6.5 V	~33 kg	6 HE / 6 U	33200278
EA-EL 9750-120 B	0...7200 W	7200 W	0...750 V	0...120 A	0.6...180 Ω	~5.5 V	~33 kg	6 HE / 6 U	33200279

(1) 为标准版的订购编号，带3W选项的则为不同编号 / Ordering number of the standard version, models with option 3W installed have different ordering numbers
(2) 用最小直流输入电压供给负载以获得最大输入电流 / Minimum DC input voltage to supply for the load to achieve the max. input current

3U版本的产品视图

Views of 3U version



EA-EL 9000 B SLAVE 7.2 kW

Slave-Lasten für Serie EA-EL 9000 B Slave loads for series EA-EL 9000 B



EA-EL 9080-510 B Slave



一般信息

EA-EL 9000 B Slave系列可以快速匹配EA-EL 9000 B系列选定型号，来扩大功率。其目的就是，通过并联与主-从操作，最多组合16台，从而获得一个高达115 kW的直流电子负载系统。所有技术规格都与EA-EL 9000 B系列一模一样，除了几个连接端子外。

操作与配置

扩展后的控制面板精简到剩下几个必要部件。为配合手动操作、状态指示与配置，配有少数几个LED灯，一个按钮，以及一个USB端口。本系列经前板USB端口可通过软件配置，比如EA Power Control (见 136页)。

主-从系统

主-从系统的配置简易又快捷。将从机模块与主机装在一起，比如在一19“机柜内。将产品连至交流供电端，并联他们的直流输出（连线或铜条），再经主-从总线与共享总线连接起来。主机上的操作仅为启动主从操作，然后整个系统将按照通电的机器数量自己配置，并准备好供用户使用或者软件操作。

General

The so-called “slave module” of series EA-EL 9000 B Slave are available for quick and cost saving power extension select models of series EA-EL 9000 B. Their purpose is to run in parallel connection and master-slave operation of up to 16 units in total, in order to achieve electronic DC load systems with power ratings of up to 115 kW. All technical specifications are identical to EA-EL 9000 B series, except for the available connectors.

Handling and configuration

The extensive control panel, as usual with regular electronic load models, has been reduced to the absolute necessary. For manual handling, status indication and configuration it offers a few LEDs, a pushbutton and an USB port. The devices are configured with software through the front USB port, for example with EA Power Control (see page 136).

Master-slave system

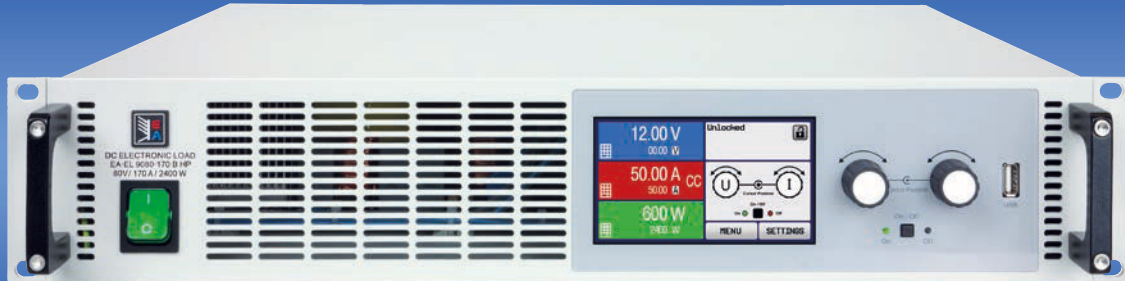
Configuring a master-slave system is very quick and easy. The slave modules and the master unit are installed together, for example in a 19” cabinet. Then they are connected to the AC supply and paralleled on their DC inputs (cables or copper bars), plus also linked via master-slave bus and Share bus. The only thing to do on the master is to enable master-slave and the system will self-configure to the number of powered units and represent itself to the user or a control software accordingly.

型号	最大功率	功率 @ 21°C	电压	电流	适用于	高度	重量	订购编号
Model	Power max.	Power @ 21°C	Voltage	Current	Suitable for	Height	Weight	Ordering number
EA-EL 9080-510 B Slave	0...7200 W	4500 W	0...80 V	0...510 A	EA-EL 9080-510 B	3 HE / 3 U	~ 17 kg	33290270
EA-EL 9200-210 B Slave	0...6000 W	4500 W	0...200 V	0...210 A	EA-EL 9200-210 B	3 HE / 3 U	~ 17 kg	33290271
EA-EL 9360-120 B Slave	0...5400 W	4500 W	0...360 V	0...120 A	EA-EL 9360-120 B	3 HE / 3 U	~ 17 kg	33290272
EA-EL 9500-90 B Slave	0...3600 W	3600 W	0...500 V	0...90 A	EA-EL 9500-90 B	3 HE / 3 U	~ 17 kg	33290273
EA-EL 9750-60 B Slave	0...3600 W	3600 W	0...750 V	0...60 A	EA-EL 9750-60 B	3 HE / 3 U	~ 17 kg	33290274

EA-EL 9000 B HP 600 W - 2400 W



可编程直流电子负载 Programmable Electronic DC loads



EA-EL 9080-170 B HP 2U



- 输入功率级别: 0...600 W至0...2400 W
- 输入电压: 0...80 V至0...750 V
- 输入电流: 每台高达170 A
- 基于FPGA的控制电路
- 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
- 电隔离接口 (模拟与USB端口)
- 并联用主-从总线
- 可选:
 - 数字式、即插即用型接口
- 支持SCPI & ModBus RTU
- LabView VIs与远程控制软件(Windows)

概要

EA-EL 9000 B HP 系列电子负载将取代之前的EA-EL 9000 HP系列, 将之前的3U高度减至2U。这意味着, 之前需要9U的7200 W固定功率型号, 现在仅需6U。这样可给19"机柜节省约33%的空间, 而达到更大的功率。

所有型号都有四种通用操作模式: 恒压 (CV), 恒流 (CC), 恒功率(CP)和恒阻(CR)。基于FPGA的控制电路具有很多有趣的特征, 比如: 真实函数发生器, 它可使用表格做成的函数模拟非线性内阻。

- **Steady input power ratings: 0...600 W up to 0...2400 W**
- **Input voltages: 0...80 V up to 0...750 V**
- **Input currents: up to 170 A per unit**
- **FPGA based control circuit**
- **Multilingual colour 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**
- **Optional:**
 - **Digital, plug & play interfaces**
- **SCPI & ModBus RTU supported**
- **LabView VIs and remote control software (Windows)**

General

The electronic DC loads of series EA-EL 9000 B HP 2U replace the former series EA-EL 9000 HP and reduce the required unit height from former minimum 3U to now only 2U. It means that the steady power of 7200 W of a former EA-EL 9000 HP device can nowadays already be achieved in 6U of height where it required 9U before. The result is a space saving of 33% which allows for achieving even more power in a 19" cabinet.

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 non-linear internal resistances.

EA-EL 9000 B HP 600 W - 2400 W

大的彩色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。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FPGA处理器控制的硬件。

多台产品并联时，可以使用主-从总线，将这些产品连接起来，组成更大的系统。此系统的实际输出值会被汇总，而设定值会均衡分布。

功率等级、电压和电流

本系列有0...80 V DC至0...750 V DC输出电压的多个型号，单台机器的输入电流就高达170A。本系列每个电压级都有两个功率级，比如：对于一台80V型号产品，在正常环境温度下，有0...1200 W或0...2400 W两个固定功率。

结构

所有型号都组装在一个19"宽，2U高，460 mm深的柜式外壳内，可以很简便地配进不同尺寸的19"机柜，比如42U，以组成更高的功率。还可将不同的设备安装到机柜系统，比如：电子负载与电源一起，这样可以组成一个大功率的供电-吸收电的系统。

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）。

函数发生器与表格控制

本产品还具有一基于FPGA的数字函数与任意发生器。它可控制和运行用户定制的负载配置文档，并产生任意顺序的正弦、方形、锯齿形以及跳跃型函数。

通过3276个有效点数自由编程的数值表，能实时嵌入到控制电路中，然后可重现非线性内阻，如：电池或LED灯条中的内阻。

The large colour TFT touch panel offers an intuitive kind of manual operation, such as it is prolific nowadays with smartphones or tablet computers. Response times for the control via analog or digital interfaces have been improved by the FPGA controlled hardware.

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 totalled and the set values distributed.

Power ratings, voltages, currents

The available voltage range portfolio offers five different voltage from 0...80 V DC up to 0...750 V DC. Input currents up to 170 A with only one unit are available. The series offers two power classes for every voltage class, for example 0...1200 W or 0...2400 W steady power at normal ambient temperatures with, for instance, an 80 V model.

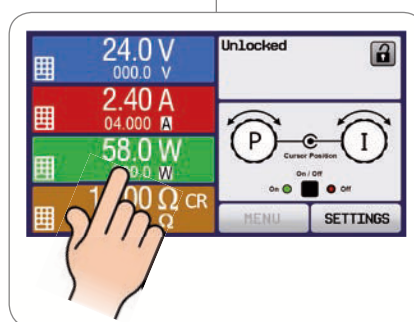
Construction

All models are built in 19" wide rack enclosures with 2U of height and 460 mm 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 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.

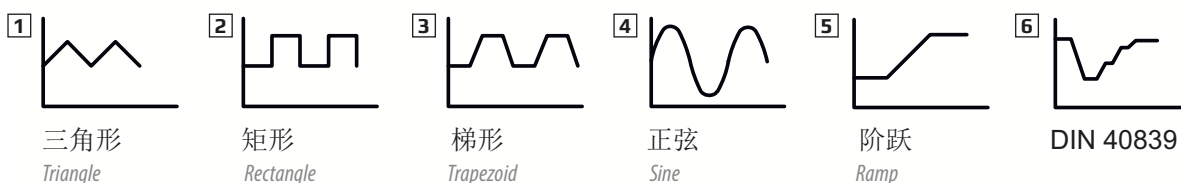
The display is multilingual (German, English, Russian, Chinese).



Function generator and table control

A special feature is the comfortable, FPGA based, digital function and arbitrary generator. It enables controlling and running user-customisable load profiles and can generate sine, square, saw tooth and ramp functions in arbitrary order.

With a freely programmable digital value table of 3276 effective points, which is embedded in the control circuit, the devices can reproduce non-linear internal resistances, such as those of batteries or LED chains.



Share-Bus-共享总线

产品后板有一个模拟连接端子叫“Share Bus”，用来均衡多台类似产品并联时的电流，如：本系列的负载产品与EA-ELR 9000系列并联。

还可通过此端子连接EA-PSI 9000，EA-PS 9000与EA-PSE 9000系列电源，以便组建两象限系统。该系统专门利用源-沉原理进行测试用途。

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-EL 9000 B.

It can also be used to build a two-quadrants system in connection with power supplies of series EA-PSI 9000, EA-PS 9000 and EA-PSE 9000. This system is dedicated for testing purposes using the source-sink principle.

EA-EL 9000 B HP 600 W - 2400 W



功率降额

本系列的名称缩写“HP”表示“大功率”。它定义的是，在平均30°C室温条件下，比其它电子负载更大的固定功率，比如：EA-EL 9000 B系列。除此之外，它还会基于热降额特征，减少输入功率，避免过热。

电池测试

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)。

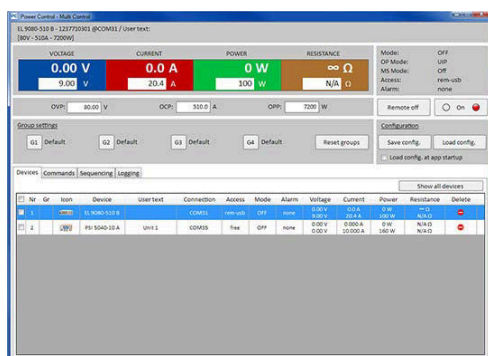
EA Power Control测试期间，由电脑记录的数据，可以CSV格式导出Excel表。后续可在MS Excel或类似工具下进行分析，甚至能创建可视化的放电图。关于更详细的设置，还可设定一可调极限值，当电池电压低时停止测试，或者停止可调最大测试期。

远程控制 & 连接

本产品后板标配有两个接口（1x 模拟，1x USB），可经其进行远程控制。还可选择一插拔式数字接口模块（插到指定插槽）进行扩展。如要应用到LabView IDE，我们还提供即用的组建（VIs），能与USB，RS232，GPIB以及以太网接口一起使用。其它IDE与接口类型则需通讯协议才能支持。

Windows用户还可使用“EA Power Control”免费软件。它具有“排序”功能，通过CSV格式的半自动化表格控制产品。此表能代表简易的测试程序，可在MS Excel或其它CSV编辑器下创建与编写，然后导入软件工具内。

该软件利用“多功能控制”特性（需注册码，非免费），可一次性监控多达20台产品。更多信息见136页。



可选项

- 可插拔、可替换的数字接口模块，适合CAN，CANopen，Ethernet（1个或2个端口），Profibus，ProfiNet I/O（1个或2个端口），RS232，EtherCAT 或 ModBus TCP。可参见第134页。

Power derating

The abbreviation “HP” in the series name stands for “High Power”. It defines a higher steady power at an average ambient temperature of 30°C, compared to other electronic loads, for example from series EA-EL 9000 B. Despite of it, all models of this series will reduce the input power based in a thermal derating in order to avoid overheating.

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 show 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 an adjustable maximum test period.

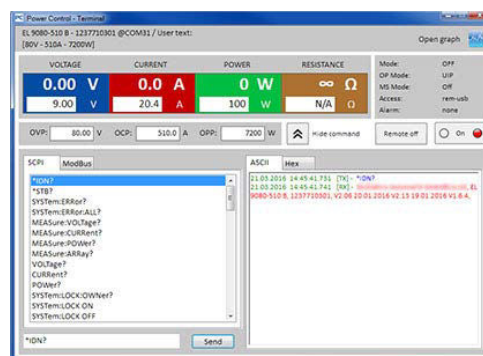
Remote control & connectivity

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.

This software also allows for the control of up to 20 units at once with an optional feature called “Multi Control” (licensed, not free of charge). See page 136 for more information.



Options

- Pluggable and retrofittable, digital interface modules for CAN, CANopen, Ethernet (1 or 2 ports), Profibus, ProfiNet I/O (1 or 2 ports), RS232, EtherCAT or ModBus TCP. See page 134.

EA-EL 9000 B HP 600 W - 2400 W

技术参数	Technical Data	Series EA-EL 9000 B HP / 系列
交流：供电	AC: Supply	
- 电压	- Voltage	90...264 V
- 频率	- Frequency	45...66 Hz
- 功率损耗	- Power consumption	最大 / max. 80 W
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.1% / <0.1% of rated value
- 10-90%上升时间	- Rise time 10-90%	<50 μ s
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的0.5% / <0.5% of rated value
直流：内阻	DC: Resistance	
- 精确度	- Accuracy	$\leq$ 最大电阻的1% + 额定电流的0.3% / $\leq 1\%$ of max. resistance + 0.3% of nominal current
显示器与控制面板	Display and control panel	TFT触摸屏彩色显示器 / Graphics display with TFT touch panel
数字接口	Digital interfaces	
- 内置	- Built in	1x 通讯用B类USB端口 / 1x USB type B for communication
- 插槽	- Slot	1x 更换内置模块用 / 1x for retrofittable plug-in modules
模拟接口	Analog interface	内置15极D-Sub母插，电隔离 / Built in, 15-pole D-Sub (female), galvanically isolated
- 信号范围	- Signal range	0...5 V 或 0...10 V (可转换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U, I, P, R, 远程开-关, 直流输入开-关, 内阻模式开-关 / U, I, P, R, Remote on-off, DC input on-off, resistance mode on-off
- 输出脚	- Output	U, I, 过压, 报警, 参考电压 / U, I, Overvoltage, alarms, reference voltage
- U / I / P / R 精确度	- Accuracy U / I / P / R	0...10 V: <0.2% 0...5 V: <0.4%
制冷方式	Cooling	温控风扇 (可选: 水冷) / Temperature controlled fans (optional: water)
工作温度	Ambient temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
后板端子	Terminals on rear	
- 直流输入	- DC input	螺丝端 / Screw terminal
- 共享总线 & 感测	- Share Bus & Sense	2极&4极插式连接器 / Plug connector 2 pole & 4 pole
- 模拟接口	- Analog interface	15极Sub-D连接器 / Sub-D connector 15 pole
- 数字接口	- Digital interfaces	模块插座 / Module socket; 主-从 / Master-Slave (2x RJ45), USB
尺寸 ⁽¹⁾ (宽 x 高 x 深)	Dimensions ⁽¹⁾ (W x H x D)	19" x 2 HE/U x 464 mm

(1) 仅为外壳尺寸 / Enclosure only

型号	功率	功率 @ 40°C	电压	电流	内阻	I_{Max} 时 U_{Min} ⁽¹⁾	重量	订购编号
Model	Power	Power @ 40°C	Voltage	Current	Resistance	U_{Min} for I_{Max} ⁽¹⁾	Weight	Ordering number
EA-EL 9080-85 B HP	0...1200 W	0...1000 W	0...80 V	0...85 A	0.08...30 Ω	~ 2.2 V	~ 9 kg	33200700
EA-EL 9200-35 B HP	0...1000 W	0...1000 W	0...200 V	0...35 A	0.44...200 Ω	~ 2 V	~ 9 kg	33200701
EA-EL 9360-20 B HP	0...900 W	0...900 W	0...360 V	0...20 A	1.4...600 Ω	~ 2 V	~ 9 kg	33200702
EA-EL 9500-15 B HP	0...600 W	0...600 W	0...500 V	0...15 A	2.5...1200 Ω	~ 6.5 V	~ 9 kg	33200703
EA-EL 9750-10 B HP	0...600 W	0...600 W	0...750 V	0...10 A	6...2500 Ω	~ 5.5 V	~ 9 kg	33200704
EA-EL 9080-170 B HP	0...2400 W	0...2000 W	0...80 V	0...170 A	0.04...15 Ω	~ 2.2 V	~ 13 kg	33200705
EA-EL 9200-70 B HP	0...2000 W	0...2000 W	0...200 V	0...70 A	0.22...100 Ω	~ 2 V	~ 13 kg	33200706
EA-EL 9360-40 B HP	0...1800 W	0...1800 W	0...360 V	0...40 A	0.7...300 Ω	~ 2 V	~ 13 kg	33200707
EA-EL 9500-30 B HP	0...1200 W	0...1200 W	0...500 V	0...30 A	1.25...600 Ω	~ 6.5 V	~ 13 kg	33200708
EA-EL 9750-20 B HP	0...1200 W	0...1200 W	0...750 V	0...20 A	3...1250 Ω	~ 5.5 V	~ 13 kg	33200709

(1) 用最小直流输入电压供给负载以获得最大输入电流 / Minimum DC input voltage to supply for the load to achieve the max. input current



EA-EL 9000 B 2Q 600 W - 2400 W



可编程直流电子负载 Programmable Electronic DC loads



EA-EL 9500-30 B 2Q 2U



- 两象限模块
- 输入功率级别：0...600 W至0...2400 W
- 输入电压：0...80 V至0...750 V
- 输入电流：每台高达170 A
- 基于FPGA的控制电路
- 带LED状态灯的控制面板
- 多个可调保护功能：OVP, OCP, OPP
- 操作模式：CV, CC, CP, CR
- 电隔离接口（模拟与USB端口）
- 并联用主-从总线
- 可选：
 - 数字式、即插即用型接口
- 支持SCPI & ModBus RTU协议
- LabView VIs与远程控制软件(Windows)

概要

专为所谓的“两象限操作”而设计的EA-EL 9000 B 2Q系列电子负载，可以结合EA-PS 9000， EA-PSI 90000与EA-PSE 9000系列一起操作。该负载系列特别关注输出电压改变时的动态变化。

将电子负载直接连到电源输出端就可来实现。负载还要连到共享总线上，这样可由兼容的电源设备控制。

默认情况下，本负载产品的配置为，以全功率、全电流和最小电压运行，可独立运行，也可在主-从模式下运行。其他参数则经远程控制进行配置，例如使用软件EAPC软件（也可见136）。

- Two-quadrants module
- Power ratings: 0...600 W up to 0...2400 W
- Input voltages: 0...80 V up to 0...750 V
- Input currents: up to 170 A per unit
- FPGA based control circuit
- Control panel with status LEDs
- Adjustable protections: OVP, OCP, OPP
- Operation modes: CV, CC, CP, CR
- Galvanically isolated interfaces (analog and USB)
- Master-slave bus for parallel connection
- Optional:
 - Digital, plug & play interfaces
- SCPI & ModBus RTU supported
- LabView VIs and remote control software (Windows)

General

The series EA-EL 9000 B 2Q offers electronic load which are designed for the so-called “two-quadrants operation” in combination with the series EA-PS 9000, EA-PSI 9000 and EA-PSE 9000. The electronic loads care for an improved dynamics regarding output voltage changes.

This is achieved by connecting the electronic loads directly to the output of a power supply. The loads are furthermore connected on the so-called Share bus, so they can be controlled by a compatible power supply device. By default the devices are configured to run with full power and current and minimal voltage, stand-alone or in master-slave. Other parameters can be configured via remote control, for example with the software EA Power Control (also see page 136).

EA-EL 9000 B 2Q 600 W - 2400 W

两象限操作

两象限操作（2Q, 2QO）具有广泛的应用。例如，减速电机的再生能量可以被消耗掉。从而保护电机以及电源，防止过压。另一个例子就是，各种类型的电池或其他储能设备的最终测试或其特性的模拟。电池可以使用2Q系统进行充放电。

当与电源并联运行时，可以实现在极短的时间内快速下降电压。它通过对电源产品的输出电容放电，形成动态的电压进程来实现。

功率等级、电压和电流

EA-EL 9000B 2Q新负载系列为模块式产品，可以组成一个或两个功率级。有0...80 V DC至0...750 V不同的DC输出电压，单机输入电流就高达170A。从而可以匹配本公司不同额定电压与电流的实验室电源系列。此兼容性能使EA-EL 9000 B 2Q系列与EA-S 9000, EA-PSI 9000与EA-PSE 9000系列电源组合使用。

结构

所有型号都组装在一个19"宽，2U高，460 mm深的柜式外壳内，可以很简便地配进不同尺寸的19"机柜，比如42U，以组成更高的功率。

还可将不同的设备混合安装到机柜系统，比如：电子负载与电源一起，这样可以组成一个大功率的供电-吸收电的系统。

控制面板

本系列最初可经共享总线由电源控制。对于特殊应用可选择接口设置所有参数。

产品状态由多个彩色LED灯指示出来。前板的USB端口用来快速访问直流输入相关的参数，如：设定值（电流/功率等），以及保护极限值（OCP, OPP等）。

Share-Bus-共享总线

产品后板有一个模拟连接端子叫“Share Bus”，用来将与EA-S 9000, EA-PSI 9000与EA-PSE 9000系列电源连接起来，组成两象限系统。该系统专门利用源-沉原理进行测试用途。

这个共享总线端子还可用来均衡多台负载产品并联时的电流，以获得提升的功率。

功率降额

如EA-EL 9000 B HP系列一样，缩写“HP”表示“大功率”。本系列在环境温度30°C以下时达到额定功率。在此之上，所有型号基于热降额，根据环境温度具体数据，来降低输入功率。

Two-quadrants operation

There is wide application spectrum for the two-quadrants operation (2Q, 2QO). For example, the regenerated energy of decelerating motor could be consumed. This protects the motor as well as the power supply against overvoltage. Another example is the end tests of various types of batteries or other kinds of energy storage devices or simulation of their characteristics. A battery can be charged and discharged with a system using 2Q.

When running the loads in parallel to a power supply it can achieve very short voltage fall times. This is done by loads discharging the typical output capacitor of power supplies, resulting in dynamic voltage progression.

Power ratings, voltages, currents

The electronic loads of the new series EA-EL 9000 B 2Q are modular and can be equipped with one or two power stages. The available voltage range portfolio offers five different voltage from 0...80 V DC up to 0...750 V DC. Input currents up to 170 A with only one unit are available. This adapts the rated voltages and currents to the laboratory power supply series of the company. This compatibility enables combination of series EA-EL 9000 B 2Q with power supply series EA-PS 9000, EA-PSI 9000 and EA-PSE 9000.

Construction

All models are built in 19" wide rack enclosures with 2U of height and approx. 460 mm 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 also possible to assemble cabinet systems with mixed equipment, i.e. electronic loads and power supplies, in order to achieve the source-sink principle with high power ratings.

Control panel

The devices of this series are primarily controlled via the Share bus from a power supply. For special applications the optional available interfaces offer to set up all parameters.

The device status is indicated with several coloured LEDs. The front USB port is used for easy and quick access to all DC input related parameters, such as set values (current / power etc.), as well as protections (OCP, OPP etc.).

Share Bus

The „Share Bus“ is an analog connection at the rear of the devices and is used to build a two-quadrants system in connection with compatible power supplies of series EA-PSI 9000, EA-PS 9000 or EA-PSE 9000. Such a system is ideal for all testing purposes requiring the source-sink principle.

This Share bus is furthermore used to balance the current across multiple identical load units in parallel connection to gain power uprating.

Power derating

Like with series EA-EL 9000 B HP, where the abbreviation “HP” in the series name stands for “High Power”, this series achieves its rated power up to an ambient temperature of 30°C. Above that point, all models of this series will reduce the input power based upon a thermal derating which depends on the ambient temperature.



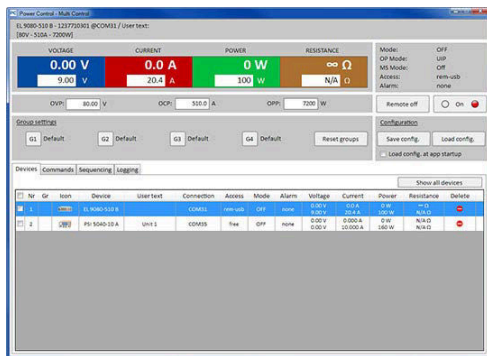
EA-EL 9000 B 2Q 600 W - 2400 W**远程控制 & 连接**

经内置USB接口或多款可选数字接口的其中一款可以监控、控制和配置本系列负载(见134页)。它还有一个可以控制与监控的标准模拟接口。所有接口都有直流输入隔离开来。

如要应用到LabView IDE, 我们还提供即用的组建(VIs), 能与USB, RS232以及以太网接口一起使用。其它IDE与接口类型则需通讯协议才能支持。

Windows用户还可使用“EA Power Control”免费软件。它具有“排序”功能, 通过CSV格式的半自动化表格控制产品。此表能代表简易的测试程序, 可在MS Excel或其它CSV编辑器下创建与编写, 然后导入软件工具内。

该软件利用“多功能控制”特性(需注册码, 非免费), 可一次性监控多达20台产品。更多信息见136页。

**可选项**

- 可插拔、可替换的数字接口模块, 适合CAN, CANopen, Ethernet (1个或2个端口), Profibus, ProfiNet I/O (1个或2个端口), RS232, EtherCAT 或 ModBus TCP。可参见第134页。

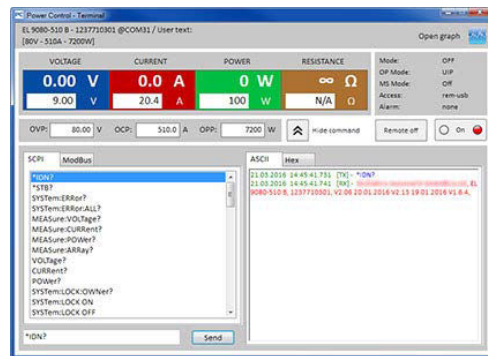
Remote control & connectivity

Monitoring, control and configuration of these load devices can either be done using the built-in USB interface or via one of various optional digital interfaces (see page 134). There is furthermore a standard analog interface for control and monitoring. All interfaces are galvanically isolated from the DC input.

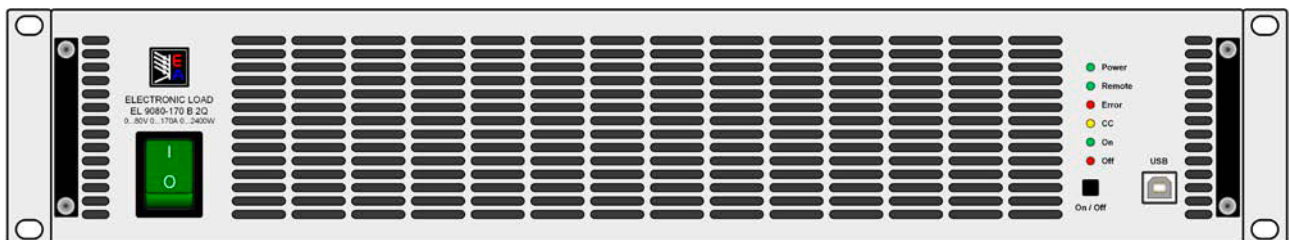
For the implementation into the LabView IDE we offer ready-to-use components (VIs) to be used with the interface types USB, RS232 and Ethernet. Other IDEs and interfaces are supported by documentation about the communication protocol.

Windows users can profit from the free software “EA Power Control”. It offers a feature called “Sequencing”, where the device is controlled through a table in CSV format to achieve automatic test runs. This table represents simple to complex test procedure and can be created and edited in MS Excel or other CSV editors and then imported into the software tool.

This software also allows for the control of up to 20 units at once with an optional feature called “Multi Control” (licensed, not free of charge). See page 136 for more information.

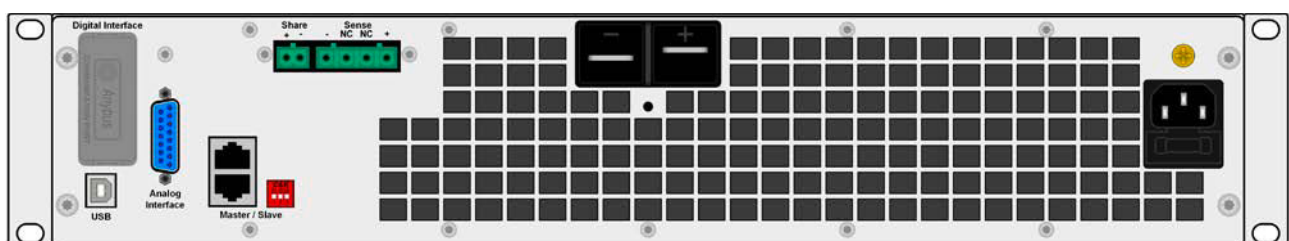
**Options**

- Pluggable and retrofittable, digital interface modules for CAN, CANopen, Ethernet (1 or 2 ports), Profibus, ProfiNet I/O (1 or 2 ports), RS232, EtherCAT or ModBus TCP. See page 134.



前视图

Front view



后视图

Rear view

EA-EL 9000 B 2Q 600 W - 2400 W

技术参数	Technical Data	Series EA-EL 9000 B 2Q / 系列
交流：供电	AC: Supply	
- 电压	- Voltage	90...264 V
- 频率	- Frequency	45...66 Hz
- 功率损耗	- Power consumption	最大 / max. 80 W
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.1% / <0.1% of rated value
- 10-90% 上升时间	- Rise time 10-90%	<50 μ s
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的0.5% / <0.5% of rated value
直流：内阻	DC: Resistance	
- 精确度	- Accuracy	$\leq$ 最大阻值的1% + 额定电流的0.3% / $\leq$ 1% of max. resistance + 0.3% of rated current
显示器与控制面板	Display and control panel	LED状态灯与按钮 / Status LEDs and pushbutton
数字接口	Digital interfaces	2x 通讯用B类USB端口 / 2x USB type B for communication
- 插槽	- Slot	1x 更换内置模块用 / 1x for retrofittable plug-in modules
模拟接口	Analog interface	内置, 15极D-Sub连接器, 电隔离 / Built in, 15-pole D-Sub (female), galvanically isolated
- 信号范围	- Signal range	0...5 V 或 0...10 V (可转换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U, I, P, R, 远程开-关, 直流输入开-关, 内阻模式开-关 / U, I, P, R, Remote on-off, DC input on-off, resistance mode on-off
- 输出脚	- Output	U, I, 过压, 报警, 参考电压 / U, I, Overvoltage, alarms, reference voltage
- U / I / P / R 精确度	- Accuracy U / I / P / R	0...10 V: <0.2% 0...5 V: <0.4%
兼容性	2Q compatible power supply series	EA-PSI 9000 2U, EA-PSI 9000 3U, EA-PS 9000 1U, EA-PS 9000 2U, EA-PS 9000 3U, EA-PSE 9000, EA-PSB 9000, EA-PSI 9000 WR
制冷方式	Cooling	温控风扇 / Temperature controlled fans
工作温度	Ambient temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
后板端子	Terminals on rear	
- 负载输入	- Load input	螺丝端 / Screw terminal
- 共享总线 & 感测	- Share Bus & Sense	2极&4极插式连接器 / Plug connector 2 pole & 4 pole
- 模拟接口	- Analog interface	15针Sub-D连接器 / Sub-D connector 15 pole
- 数字接口	- Digital interfaces	模块插座 / Module socket 主-从 / Master-Slave (2x RJ45), USB
尺寸 ⁽¹⁾ (宽 x 高 x 深)	Dimensions ⁽¹⁾ (W x H x D)	19" x 2 HE/U x 464 mm

(1) 仅为外壳尺寸 / Enclosure only

型号	功率	功率 @ 40°C	电压	电流	内阻	重量	订购编号
Model	Power	Power @ 40°C	Voltage	Current	Resistance	Weight	Ordering number
EA-EL 9080-85 B 2Q	0...1200 W	0...1000 W	0...80 V	0...85 A	0.08...30 Ω	~ 9 kg	33200710
EA-EL 9200-35 B 2Q	0...1000 W	0...1000 W	0...200 V	0...35 A	0.44...200 Ω	~ 9 kg	33200711
EA-EL 9360-20 B 2Q	0...900 W	0...900 W	0...360 V	0...20 A	1.4...600 Ω	~ 9 kg	33200712
EA-EL 9500-15 B 2Q	0...600 W	0...600 W	0...500 V	0...15 A	2.5...1200 Ω	~ 9 kg	33200713
EA-EL 9750-10 B 2Q	0...600 W	0...600 W	0...750 V	0...10 A	6...2500 Ω	~ 9 kg	33200714
EA-EL 9080-170 B 2Q	0...2400 W	0...2000 W	0...80 V	0...170 A	0.04...15 Ω	~ 13 kg	33200715
EA-EL 9200-70 B 2Q	0...2000 W	0...2000 W	0...200 V	0...70 A	0.22...100 Ω	~ 13 kg	33200716
EA-EL 9360-40 B 2Q	0...1800 W	0...1800 W	0...360 V	0...40 A	0.7...300 Ω	~ 13 kg	33200717
EA-EL 9500-30 B 2Q	0...1200 W	0...1200 W	0...500 V	0...30 A	1.25...600 Ω	~ 13 kg	33200718
EA-EL 9750-20 B 2Q	0...1200 W	0...1200 W	0...750 V	0...20 A	3...1250 Ω	~ 13 kg	33200719



EA-EL 9000 B 15U/24U 10.8 kW - 43.2 kW



大功率可编程直流电子负载 Programmable high power electronic DC loads



EA-EL 9000 B 15U



EA-EL 9000 B 24U



- 宽范围输入电压90...264 V
- 多个额定功率级
- 电压级: 80 V, 200 V, 360 V, 500 V, 750 V
- 电流高达3060 A
- 预配置, 预连线, 即可可安装
- 基于EA-EL 9000 B系列电子负载:
 - 真实函数发生器
 - 内置USB与模拟接口
 - 可选接口模块插槽, 适合Profinet, Profibus, CAN, CANopen, RS232, Ethernet, ModBus TCP
 - 支持SCPI与ModBus指令
 - 彩色TFT触摸屏

概要

新系列电子负载EA-EL 9000 B 15U 与 EA-EL 9000 B 24U, 是EA-EL 9000 B系列大功率型号装于可移动19"机柜组成的。因此会有20组不同的配置, 形成不同的功率级别。一个机柜系统可被当作一个扩大功率的单机负载, 在具有EA-EL 9000 B系列标准型号的基本特性外, 也有手动操作与远程控制。

本系列供有两种机柜尺寸, 15U或24U, 根据型号不同, 可配3至6台负载。有些型号通过重装, 增加另外一台负载, 则可扩展更大功率。这些机柜有可锁定后门与前门, 以及四个可固定的脚轮。机柜系统可完全配置好出货, 待安装到指定位置后即可使用。

- Wide AC supply for 90...264 V
- Various power ratings
- Voltages: 80 V, 200 V, 360 V, 500 V, 750 V
- Currents of up to 3060 A
- Pre-configured, pre-wired, ready to be installed
- Based on electronic loads of series EA-EL 9000 B with:
 - True function generator
 - USB and analog interface built in
 - Slot for optional interface modules Profinet, Profibus, CAN, CANopen, RS232, Ethernet, ModBus TCP
 - Support for SCPI and ModBus RTU commands
 - Colour TFT touch panel

General

The new series EA-EL 9000 B 15U and EA-EL 9000 B 24U extend the electronic load series EA-EL 9000 B with high power models in mobile 19" cabinets. There is a choice of 20 different configurations with various power ratings. A cabinet system is considered as a single electronic load device with extended power, with manual handling and remote control being usual, while offering the same features like the standard models of EA-EL 9000 B series.

There are two cabinet sizes with 15U or 24U, which are equipped with 3 to 6 load units, depending on the model. Some models even offer to further extend the available power by adding another load unit through retrofitting. The cabinets have lockable rear and front doors, as well as four casters which can be fixed. The system will be shipped completely configured and will be ready to use right after installation on location.

EA-EL 9000 B 15U/24U 10.8 kW - 43.2 kW

功率等级、电压和电流

本系列有0...80 V DC至0...750 V DC输出电压的多个型号，单台机器的输入电流就高达3060A。本系列有多个功率级，有10.8 kW至27 kW固定功率，与10.8 kW至43.2 kW峰值功率的型号。

功率降额

EA-EL 9000 B 15U/24U系列产品具有热降额功能，当产品在最大功率下运行时避免过热。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21°C室温条件下定义的，并当温度上升时会快速减少。

显示器与控制键

输出电压、电流和功率清晰显示于彩色显示器上。彩色的TFT屏幕为点触式，用一个手指就能控制所有功能。

通过旋钮或者数字键盘直接输入参数，也可调节设定电压、电流、功率或阻值（内阻模拟）。若想防止意外操作，可锁定所有操作键。

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...3060 A with only one cabinet are available. The series offers various power classes with 10.8 kW up to 27 kW steady power and 10.8 kW up to 43.2 kW peak power.

Power derating

The devices of the EA-EL 9000 B 15U/24U 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.

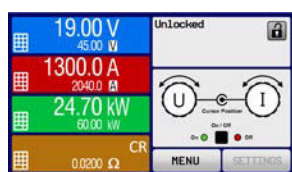
Display and control panel

Set values and actual values of output voltage, output current and output power are clearly represented on the graphic display. The colour TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger.

Set values of voltage, current, power or resistance can be adjusted using the rotary knobs or entered directly via a numeric pad.

To prevent unintentional operations, all operation controls can be locked.

多语言控制面板



英文 / English

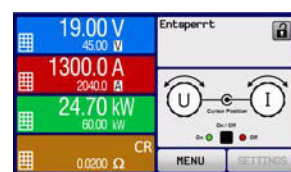


中文 / Chinese

Multi-language control panel



俄文 / Russian



德文 / German

函数发生器

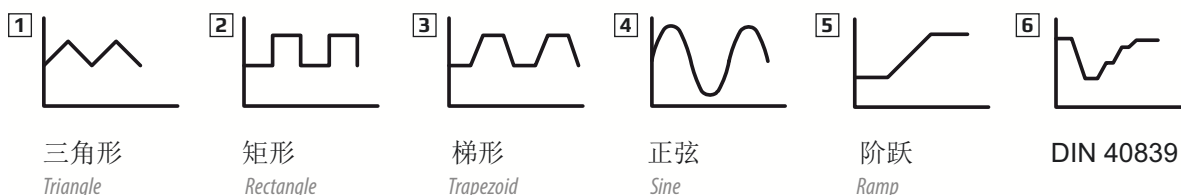
本系列所有型号都具有一可形成如下典型函数的真实函数发生器，并能将它们应用于输入电压或输入电流上。发生器可通过前板的触摸屏设置，或经某一数字接口远程配置。

预设函数会为用户提供所有必须的参数，如Y偏差值，时间/频率或幅度，整套配置完成。

Function generator

All models within this series include a true function generator which can generate typical functions, as displayed in the figure 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.

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



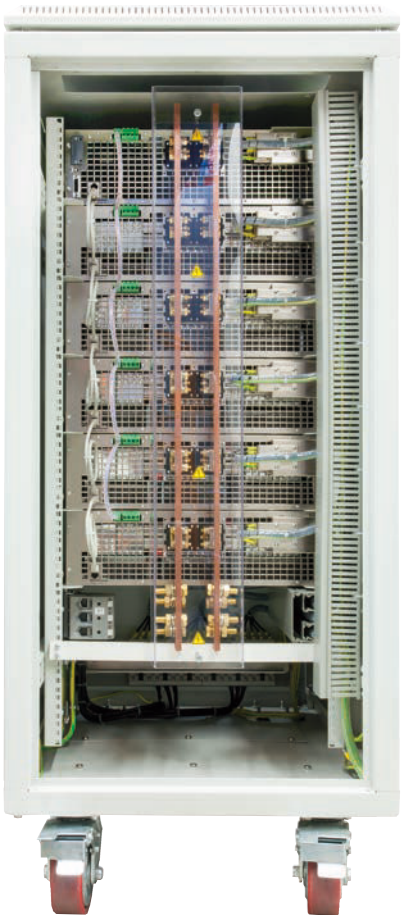
可选项

- 可插拔、可替换的数字接口模块，适合RS232, CAN, CANopen, ModBus TCP, Profibus, ProfiNet I/O EtherCAT 或 Ethernet。接口插槽位于产品后板（仅针对标准型号），方便用户插入新接口，或更换现有接口。且会被产品自动识别，并要求设置几步或无需设置。可参见第134页。
- 水冷选项（按需可供，也可见页面 145）
- 带停止开关、门磁开关以及外部断路器接触器用螺丝端子的紧急停止系统

Options

- Digital interface modules for RS232, CAN, CANopen, ModBus TCP, Profibus, Profinet/I/O, EtherCAT or Ethernet. The interface slot is located on the rear panel (standard models only), 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. See page 134.
- Water cooling (upon request, also see page 145)
- Emergency stop system with stop switch, door contacts and screw terminals for external breaker contacts

EA-EL 9000 B 15U/24U 10.8 kW - 43.2 kW



24U 90 kW型号后视图 /
Rear view 24U 90 kW



直流总线端子 /
DC bus terminal

型号	P _{峰值}	P _{MAX} @ 21°C	P _{MAX} @ 35°C	电压	电流	阻值	重量	高度	订购编号 ⁽¹⁾
Model	P _{PEAK}	P _{MAX} @ 21°C	P _{MAX} @ 35°C	Voltage	Current	Resistance	Weight	Height	Ordering number ⁽¹⁾
EA-EL 9080-1530 B 15U	21.6 kW	0...13.5 kW	0...10.8 kW	0...80 V	0...1530 A	0.005...1.6666 Ω	~ 120 kg	15 HE / U	33240600
EA-EL 9200-630 B 15U	18 kW	0...13.5 kW	0...10.8 kW	0...200 V	0...630 A	0.0266...85 Ω	~ 120 kg	15 HE / U	33240601
EA-EL 9360-360 B 15U	16.2 kW	0...13.5 kW	0...10.8 kW	0...360 V	0...360 A	0.09...30 Ω	~ 120 kg	15 HE / U	33240602
EA-EL 9500-270 B 15U	10.8 kW	0...10.8 kW	0...10.8 kW	0...500 V	0...270 A	0.1667...55.666 Ω	~ 120 kg	15 HE / U	33240603
EA-EL 9750-180 B 15U	10.8 kW	0...10.8 kW	0...10.8 kW	0...750 V	0...180 A	0.4...120 Ω	~ 120 kg	15 HE / U	33240604
EA-EL 9080-2040 B 24U	28.8 kW	0...18 kW	0...14.4 kW	0...80 V	0...2040 A	0.0038...1.25 Ω	~ 170 kg	24 HE / U	33240605
EA-EL 9200-840 B 24U	24 kW	0...18 kW	0...14.4 kW	0...200 V	0...840 A	0.02...7 Ω	~ 170 kg	24 HE / U	33240606
EA-EL 9360-480 B 24U	21.6 kW	0...18 kW	0...14.4 kW	0...360 V	0...480 A	0.0675...22.5 Ω	~ 170 kg	24 HE / U	33240607
EA-EL 9500-360 B 24U	14.4 kW	0...14.4 kW	0...14.4 kW	0...500 V	0...360 A	0.125...41.75 Ω	~ 170 kg	24 HE / U	33240608
EA-EL 9750-240 B 24U	14.4 kW	0...14.4 kW	0...14.4 kW	0...750 V	0...240 A	0.3...90 Ω	~ 170 kg	24 HE / U	33240609
EA-EL 9080-2550 B 24U	36 kW	0...22.5 kW	0...18 kW	0...80 V	0...2550 A	0.003...1 Ω	~ 187 kg	24 HE / U	33240610
EA-EL 9200-1050 B 24U	30 kW	0...22.5 kW	0...18 kW	0...200 V	0...1050 A	0.016...5.6 Ω	~ 187 kg	24 HE / U	33240611
EA-EL 9360-600 B 24U	27 kW	0...22.5 kW	0...18 kW	0...360 V	0...600 A	0.054...18 Ω	~ 187 kg	24 HE / U	33240612
EA-EL 9500-450 B 24U	18 kW	0...18 kW	0...18 kW	0...500 V	0...450 A	0.1...33.4 Ω	~ 187 kg	24 HE / U	33240613
EA-EL 9750-300 B 24U	18 kW	0...18 kW	0...18 kW	0...750 V	0...300 A	0.24...72 Ω	~ 187 kg	24 HE / U	33240614
EA-EL 9080-3060 B 24U	43.2 kW	0...27 kW	0...21.6 kW	0...80 V	0...3060 A	0.0025...0.833 Ω	~ 204 kg	24 HE / U	33240615
EA-EL 9200-1260 B 24U	36 kW	0...27 kW	0...21.6 kW	0...200 V	0...1260 A	0.0133...4.6666 Ω	~ 204 kg	24 HE / U	33240616
EA-EL 9360-720 B 24U	32.4 kW	0...27 kW	0...21.6 kW	0...360 V	0...720 A	0.045...15 Ω	~ 204 kg	24 HE / U	33240617
EA-EL 9500-540 B 24U	21.6 kW	0...21.6 kW	0...21.6 kW	0...500 V	0...540 A	0.0833...27.833 Ω	~ 204 kg	24 HE / U	33240618
EA-EL 9750-360 B 24U	21.6 kW	0...21.6 kW	0...21.6 kW	0...750 V	0...360 A	0.2...60 Ω	~ 204 kg	24 HE / U	33240619

(1 此为标准版的订购编号，带选项功能的则会不同 / Ordering number of the standard version, models with options will be different

EA-EL 9000 B 15U/24U 10.8 kW - 43.2 kW

技术参数	Technical Data	Series EA-EL 9000 B 15U & EA-EL 9000 B 24U / 系列	
交流：供电	AC: Supply		
- 电压	- Voltage	90...264 V, 1ph+N	
- 频率	- Frequency	45...66 Hz	
- 功率损耗	- Power consumption	最大 / max. 390 W - max. 780 W (依型号而定 / depending on model)	
直流：电压	DC: Voltage		
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value	
直流：电流	DC: Current		
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value	
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.1% / <0.1% of rated value	
- 10-90%斜率	- Slew rate 10-90%	<50 μ s	
直流：功率	DC: Power		
- 精确度	- Accuracy	<额定值的0.5% / <0.5% of rated value	
直流：内阻	DC: Resistance		
- 精确度	- Accuracy	$\leq$ 最大阻值的1% + 额定电流的0.3% / $\leq 1\% + 0.3\%$ of nominal current	
保护功能	Protection	OT, OVP, OPP, PF, OCP ⁽¹⁾	
污染等级	Degree of pollution	2	
保护等级	Protection class	1	
显示器与控制面板	Display and control panel	带触摸屏的彩色显示器 / Graphics display with touch panel	
数字接口	Digital interfaces		
- 内置	- Built-in	1x 通讯用B类USB端口 / 1x USB type B for communication	
- 插槽	- Slot	1x 更换内置模块用 / 1x for retrofittable plug-in modules	
模拟接口	Analog interface	内置, 15极D-Sub连接器, 电隔离 / Built in, 15-pole D-Sub (female), galvanically isolated	
- 信号范围	- Signal range	0...5 V 或 0...10 V (可转换) / 0...5 V or 0...10 V (switchable)	
- 输入脚	- Inputs	U, I, P, R, 远程开-关, 直流输出开-关, 内阻模式开-关 / U, I, P, R, Remote on-off, DC input on-off, resistance mode on-off	
- 输出脚	- Outputs	U, I, 过压, 报警, 参考电压 / U, I, overvoltage, alarms, reference voltage	
- U / I / P / R 精确度	- Accuracy U / I / P / R	0...10 V: <0.2%	0...5 V: <0.4%
串联操作	Series operation	否 / No	
并联操作	Parallel operation	否 / No	
制冷方式	Cooling	温控风扇 (可选: 水冷) / Temperature controlled fans (optional: water)	
环境温度	Ambient temperature	0...50 °C	
储存温度	Storage temperature	-20...70 °C	
相对湿度	Relative humidity	<80%, 无凝露 / non-condensing	
工作高度	Operation altitude	<2000 m	
后板端子	Terminals on rear		
- 直流输入	- DC input	螺丝端 / Screw terminal	
- 模拟接口	- Analog interface	15极Sub-D连接器 / Sub-D connector 15 pole	
- 数字接口	- Digital interfaces	模块插座 / Module socket USB	
尺寸 ⁽¹⁾ (宽 x 高 x 深)	Dimensions (W x H x D)	19" x 15 HE / U x 688 mm	19" x 24 HE / U x 688 mm

(1) 见第146页 / See page 146



EA-ELR 5000 320 W - 3200 W



可编程能量回馈式直流电子负载

Programmable electronic DC loads with energy recovery



EA-ELR 5000 Rack

U

I

P

OVP

OCP

OPP

OTP



19"

LAN

- 多通道直流负载
- 可将获得的直流能量转化并返回本地电网
- 可供能容纳10台负载模块的19" 6U机柜
- 输入功率级有：每个模块可达0...320 W
- 输入电压有：0...80 V或0...200 V
- 输入电流有：0...12 A或0...25 A
- 基于微控制器的数字化控制
- 双语TFT触摸屏（德/英）
- 序列发生器
- 内置Ethernet/LAN接口
- 支持SCPI指令语言与ModBus

- Multi-channel DC load
- Energy recovery of the supplied DC energy into the local grid
- 19" 6U rack for up to 10 separate load modules
- Input power ratings: up to 0...320 W per module
- Input voltages: 0...80 V or 0...200 V
- Input currents: 0...12 A or 0...25 A
- μ Controller based digital control
- Bilingual TFT touch panel (DE/EN)
- Sequence generator
- Ethernet/LAN interface built-in
- SCPI command language and ModBus RTU supported

概要

新系列EA-ELR 5000专门设计成可配置成多通道直流电子负载的。在一个19"的机柜系统内，可以安装10台功率为320 W的直流负载模块。每个模块可独立操作，但是要求机柜内安装能量转换的DC-AC逆变设备。模块还可扩展，可将模块的直流输入端并联起来。负载模块有两种输出电压，一个是80 V，一个是200 V。并且配有通用的调整模式：恒压(CV)，横流(CC)与恒功率(CP)。

能量返回功能可使产生的直流电同步转化成正弦波电流，然后返回给当地电网。这不仅摆脱了以前的热耗散问题，同时还节省了用电成本。彩色TFT触摸屏可直观地进行手动操作。

General

The new series EA-ELR 5000 was designed to configure a multi-channel electronic DC load. In a rack for 19" systems, up to ten DC load units with 320 W nominal power each can be installed. The modular units operate separately from each other, but require the rack as it contains the energy recovering DC-AC inverter. The modules are also extendable. Parallel connection on the DC inputs of the module is possible. The load modules come in two voltage variants, 80 V and 200 V, and incorporate the common regulation modes constant voltage (CV), constant current (CC) and constant power (CP).

The energy recovery function inverts the supplied DC energy into a synchronous sine current and feeds it back into the local grid. This reduces the usual heat dissipation to a minimum and saves energy costs at the same time. The colour TFT touch panel offers an intuitive kind of manual operation.

EA-ELR 5000 320 W - 3200 W

本产品标配一个以太网端口，从而可将负载产品轻易地集成到LAN产品的网络中。通过随附的Windows软件或者在LabView或其它IDE创建的客户定制应用可以从外部控制。另外还支持SCPI通讯协议与ModBus。

功率、电压和电流等级

本系列有两个负载型号。一款型号的输入电压最大为80 V DC，另一款为200 V。两款型号最大功率为320 W。因此80 V型号可以吸收电流25 A，而200 V则可吸收10 A。将10台这样的负载模块装入一单独的机柜内，可以组成最大3200 W的功率。

机械结构

装负载模块的机架为6U高，19“宽，深度为480 mm。适合放入不同尺寸的19“机柜。

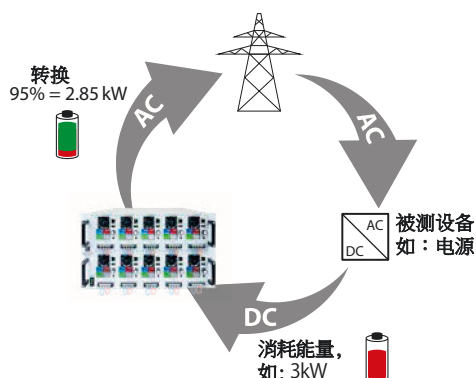
供电

本机架的操作电压为230 V AC ($\pm 10\%$)的，可匹配16 A 的墙插或类似插座。能量反馈功能要求电网上一直接有足够的设备，并且要消耗这返回的能量。可选择给电网装一监控设备“ENS”（见133页），该设备可拆卸且为模块式。如选择安装“ENS2”，电网将变成三相电（L1, L2, L3, N, PE）。

能量返回

本负载最主要的特点是其AC输入端，即电网连接端，它也可用作直流电返回的输出端，转换效率接近93%。这种能量转换方式有助于降低用电成本，且避免使用昂贵的制冷系统，因为普通电子负载使用过程中会将直流输入电量转化成热量，从而需要制冷系统进行冷却。

原理图如下：



此类回馈式负载不可用作发电。我们还有另外一个监控设备（自动隔离件，ENS），能加强对人体与设备的安全，特别是在运行此类隔离操作的时候。

不管用户是否装有此类监控设备，我们产品上都配有一简易无冗余关闭功能，遇到电网连线突然断开时会关闭产品。本产品可监控AC电压和频率，当超过功率上限或下限时，会自动关闭功率模块。

Equipped with an Ethernet port by default, the load units can be easily integrated into a network of LAN devices with a standard 1U 19" switch. External control is possible via an included Windows software or via custom applications created in LabView or other IDEs. The commonly known communication protocols SCPI and ModBus RTU are supported.

Power ratings, voltages, currents

There are two load models available. One for max. 80 V DC input voltage and one for max. 200 V. Both models have a max. power of 320 W, while the 80 V model can take up to 25 A and the 200 V can take up to 12 A. By installing up to 10 units of these load modules into a single rack it is possible to extend the power to 3200 W max.

Construction

The rack, which is used to hold the load modules, is designed with 19" width and 6U height, while having an installation depth of 480 mm. This makes it ideal for use in 19" cabinets of various sizes.

Supply

The rack can be operated on a fixed installation with 230 V AC ($\pm 10\%$) and 16 A fused. The recovery feature requires to always have sufficient devices on the grid to consume the backfed energy.

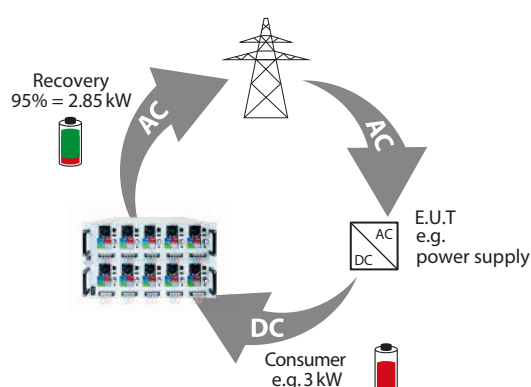
The grid connection can be equipped with a supervision unit "ENS2" (see page 133) which is optionally available, retrofittable and modular.

With this option installed, the grid connection will always be three-phase (L1, L2, L3, N, PE).

Energy recovery

The most important feature of these electronic loads is that the AC input, i.e. grid connection, is also used as output for the recovery of the supplied DC energy, which will be converted with an efficiency of approximately 93%. This way of energy recovery helps to lower energy costs and avoids expensive cooling systems, such as required for conventional electronic loads which convert the DC input energy into heat.

Principle view:



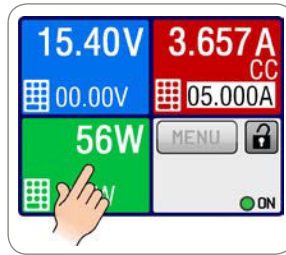
Operation of these recovering loads in terms of power generation is not intended. There is an additional supervision unit (automatic Insulation unit, ENS) available for optional installation and to achieve additional safety of persons and equipment, especially when running the so-called isolated operation.

Regardless of whether the user has installed that supervision unit or not, the devices feature a simple and non-redundant switch-off function for the case of an interruption in the grid connection cable. They supervise AC voltage and frequency and will automatically switch off the inverter block in case upper or lower limits are exceeded.



EA-ELR 5000 320 W - 3200 W**操作面板 (HMI)**

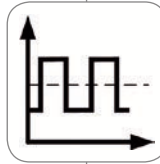
手动操作通过阻性触摸屏、两个旋钮与一个按钮来完成。这个彩色显示器能一次性显示所有设定与实际值。在人机界面也可完成整个设置，包括序列发生器的配置。

**Operation (HMI)**

Manual operation is done with a resistive touch panel, two rotary knobs and a pushbutton. The 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 the sequence generator.

序列发生器

本产品还有一个特别功能，就是数字式序列发生器。利用半自动序列块（最多100）可以控制负载产品。这些序列块由可编程的设定电压、电流与功率，再加上时间组成。发生器可以针对任何或所有设定值立刻描绘出一个方形波信号。

**Sequence generator**

A special feature is the digital sequence generator. It enables to control the load unit by semi-automatic sequence blocks (max. 100). Those blocks consist of programmable set values for voltage, current and power, plus a time value. The generator can apply a rectangular wave signal to any or all set values at once.

远程控制 & 连接

进行远程控制时，可使用模块上面前板默认配置的Ethernet/LAN端口。通过这个连接，用户可以使用SCPI语言或ModBus协议控制模块的所有功能。

Remote control & connectivity

For remote control, there is by default an Ethernet/LAN port available on the front of the modules. Via this configurable connection users can completely control all functions of the modules either via SCPI language or ModBus RTU protocol.

产品前方还有一个USB端口，用来插U盘，方便上传与保存序列，以便安装控制面板的固件升级文档。

An USB port, also located on the front side, is intended for USB flash drives in order to load and save sequences and to install firmware updates for the HMI, i.e. control panel.

应用到LabView IDE时，我们给Ethernet常用接口提供即用版(VIs)。通过通讯协议文档还可支持其它IDE与接口。可上传和存储文档。

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

选项

- 配16端口的标准以太网交换机，适合装入19“机架

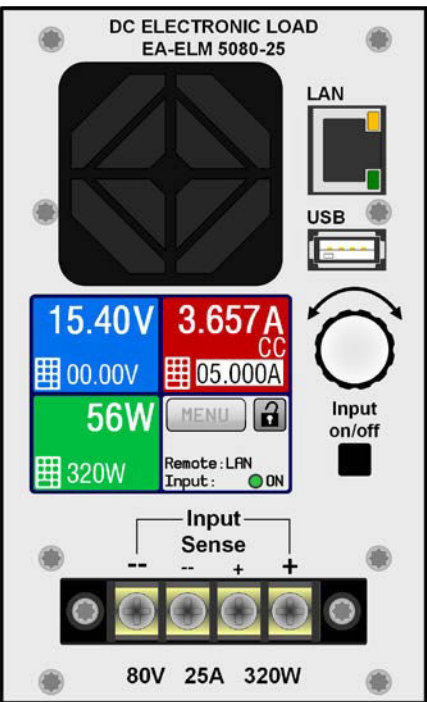
Options

- Standard Ethernet switch with 16 ports for 19" rack mount

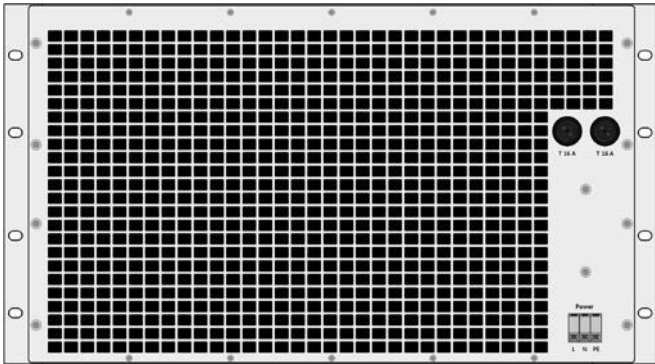
技术参数	Technical Data	EA-ELR 5000 Rack
交流：供电	AC: Supply	
- 电压	- Voltage	230 V AC, ±10%
- 频率	- Frequency	45...65 Hz
- 效率	- Efficiency	≥92%
制冷方式	Cooling	
- 类型	- Kind	温控风扇 / Temperature controlled fans
- 工作温度	- Operation temperature	0...50 °C
- 储存温度	- Storage temperature	-20...70 °C
- 保护等级	Protection class	1
- 污染等级	Degree of pollution	2
端子	Terminals	
- 交流连接端	- AC connection	螺丝端，3位，16 A，带保险丝 / Screw terminal, 3 pole, 16 A, fused
机械结构	Mechanics	
- 每个机架可安装的负载模块	- Load modules per rack	多达10台 / Up to 10
- 机架重量	- Weight of rack	12.25 kg
- 全部装满后机架重量	- Weight of fully equipped rack	35.8 kg
- 机架尺寸 (宽 x 高 x 深)	- Dimensions of rack (W x H x D)	19" x 6HE / 6U x 500 mm
订购编号	Ordering number	33130336

EA-ELR 5000 320 W - 3200 W

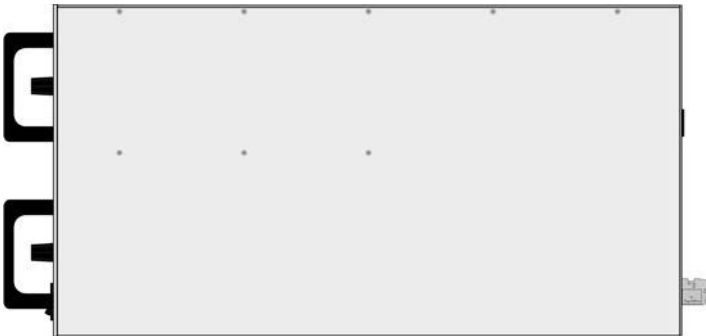
技术参数	Technical Data	EA-ELM 5080-25	EA-ELM 5200-12
直流：电压	DC: Voltage		
- 额定电压&范围	- Rated voltage & range	0...80 V	0...200 V
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value	
直流：电流	DC: Current		
- 额定电压&范围	- Rated voltage & range	0...25 A	0...12 A
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value	
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.05% / <0.05% of rated value	
直流：功率	DC: Power		
- 额定电压&范围	- Rated voltage & range	0...320 W	0...320 W
- 精确度	- Accuracy	<额定值的1% / <1% of rated value	
显示器与控制面板	Display / control panel	带触摸屏的图形显示器 / Graphics display with touch panel	
数字接口	Digital interfaces		
- 内置（前板）	- Built-in (front side)	1x U盘用A类USB端口 / 1x USB type A for USB flash drives 1x 以太网卡 / Ethernet	
制冷方式	Cooling	温控风扇 / Temperature controlled fans	
环境温度	Ambient temperature	0...50 °C	
储存温度	Storage temperature	-20...70 °C	
端子	Terminals		
- 直流输入	- DC input	螺丝端 / Screw terminal	
- 感测	- Sense	螺丝端 / Screw terminal	
- 其它	- Other	Ethernet, USB	
机械结构	Mechanics		
- 重量	- Weight	2.35 kg	
- 尺寸(宽 x 高 x 深)	- Dimensions (W x H x D)	81 x 132,5 x 310 mm	
订购编号	Ordering number	33220430	33220431



带控制面板的负载模块前视图 /
Front view of the load module with control panel



后视图 / Rear view



侧视图 / Side view

EA-ELR 9000 3.1 kW - 10.5 kW



可编程能量回馈式直流电子负载

Programmable electronic DC loads with energy recovery



EA-ELR 9200-210



- 可接1相，2相或3相电压使用（欧标和美标都有）
- 可将直流电量返回到本地电网
- 直流输入端为电隔离结构
- 每台产品的输入功率高达10.5 kW，还可扩展至168 kW
- 输入电压高达1500 V
- 每台产品的输入电流能高达510 A
- 基于FPGA数字式控制
- 多语言TFT触摸屏
- 用户配置文档，真实函数发生器
- 电隔离
- 并联用主-从总线
- 前板有额外的USB端口，适合使用外置U盘
- 可选数字式即插即用型接口，或安装IEEE/GPIB端口
- 支持SCPI指令语言
- 可选自动隔离设⁽¹⁾

- For 1-, 2- or 3-phase supply (European and US models available)
- Energy recovery of the supplied DC energy into the local grid
- Galvanically isolated DC input
- Input power ratings up to 10.5 kW per unit, expandable to 168 kW
- Input voltages up to 1500 V
- Input currents up to 510 A per unit
- FPGA based digital control
- Multilingual TFT touch panel
- User profiles, true function generator
- Galvanically isolated
- Master-slave bus for parallel connection
- Extra USB port on the front for USB stick
- Optional, digital, plug & play interfaces or alternatively installed IEEE/GPIB port
- SCPI command language supported
- Optional automatic Insulation unit⁽¹⁾

概要

新系列直流电子负载具有将能量返回市电的功能，称为EA-ELR 9000，为不同的用途，输出新的额定电压、电流与功率。

这些产品具有四个常用调节模式：恒压、恒流、恒功率和恒阻。基于FPGA的控制电路带来了更多新的功能，如函数发生器，模拟非线性内阻的基于表格格式的调整电路。

General

The new series of electronic DC loads with energy recovery to mains, called EA-ELR 9000, offers new voltage, current and power ratings for a multitude of applications.

These devices incorporate the four common regulation modes constant voltage, constant current, constant power and constant resistance. The FPGA based control circuit provides additional features, such as a function generator, a table based regulation circuit for the simulation of non-linear internal resistances.

1) 前德文名叫：ENS

1) Former german name: ENS

EA-ELR 9000 3.1 kW - 10.5 kW

能量返回功能可使产生的直流电同步转化成正弦波电流，然后返回给当地电网。这不仅摆脱了以前的热耗散问题，同时还节省了用电成本。其彩色TFT触摸屏为用户提供一个不同于其他产品的直观手操媒介。

经模拟或数字接口控制的反应时间已由FPGA控制硬件得到很好的改善。

多台产品并联时，可经主-从总线组成一个更大的系统，此时实际值会被累加，设定值则会均衡分布。

功率、电压和电流等级

本系列有0...80 V DC至0...1500 V DC输出电压的产品型号，还有一款输入电流高达510 A的型号。本系列有三个功率级别，分别为3.5 kW，7 kW或10.5 kW（此为欧版，美版请参考规格参数表），单机外壳仅3U高。还可组合到机柜内扩展至高达168 kW（或更大）的功率，并形成更大的总电流。按照客户要求，能组成更大功率的系统。

供电

3.5 kW的欧版型号配230 V (L - N)单相电使用，而7 kW的则需两相电，10.5 kW的则需三相电。

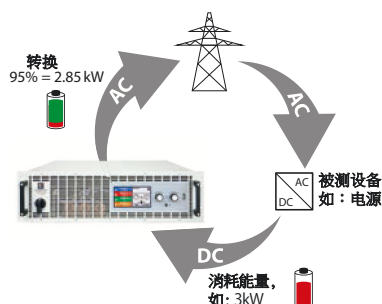
美版型号统一在208 V (L-L) 下工作，可提供3.1 kW、6.2 kW 或 9.3 kW功率。

欧版型号230 V 的供电电网连接端，可以安装一监控设备（AIU, ENS），该设备为模块式的，可拆卸。

如选择安装“ENS2”，电网将变成三相电（L1, L2, L3, N, PE）供给每个型号。

能量返回

本负载最主要的特点是其AC输入端，即电网连接端，也可用作直流电返回的输出端，转换效率接近93%。这种能量转换方式有助于降低用电成本，且避免使用昂贵的制冷系统，因为普通电子负载使用过程中会将直流输入电量转化成热量，从而需要制冷系统进行冷却。下面为其原理示意图：



此类回馈式负载不可用作发电。我们还有另外一个监控设备（自动隔离件，ENS），能加强对人体与设备的安全，特别是在运行此类隔离操作的时候。不管用户是否装有此类监控设备，我们产品上都配有一简易无冗余关闭功能，遇到电网连线突然断开时会关闭产品。本产品可监控AC电压和频率，当超过功率上限或下限时，会自动关闭功率模块。

The energy recovery function converts the supplied DC energy into a synchronous sine current and feeds it back into the local grid. This eliminates the usual heat dissipation to a minimum and saves energy costs at the same time. The large colour TFT touch panel offers a different and intuitive kind of manual operation, compared to other devices.

Response times for the control via analog or digital interfaces have been improved by the FPGA controlled hardware.

In parallel operation of multiple devices, a master-slave bus is used to connect the units to a bigger system where the actual values are totalled 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...1500 V DC. Input currents up to 510 A with only one unit are available. The series offers three power classes with 3.5 kW, 7 kW or 10.5 kW (EU models, for US model see techn. specs) in only 3U for single devices, which can be extended up to 168 kW (in cabinets for a significantly high total current. Upon request, even higher total power can be realised.

Supply

EU models with 3.5 kW are intended for use with 1-phase mains supplies of 230 V (L-N), while 7 kW models require a 2-phase and 10.5 kW models a 3-phase supply.

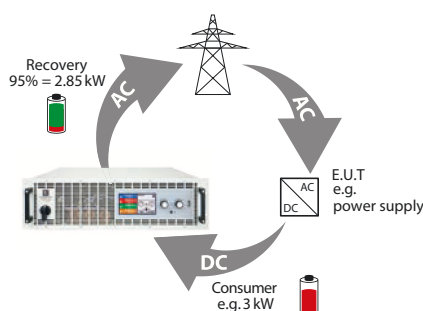
US models work with 208 V (L-L) and offer 3.1 kW, 6.2 kW or 9.3 kW power.

The grid connection of european models for 230 V supply can be equipped with a supervision unit (AIU, ENS) which is optionally available, retrofittable and modular.

With option „ENS2“ installed, the grid connection will become three-phase (L1, L2, L3, N, PE) for every model.

Energy recovery

The most important feature of these electronic loads is that the AC input, i.e. grid connection, is also used as output for the recovery of the supplied DC energy, which will be converted with an efficiency of approximately 93%. This way of energy recovery helps to lower energy costs and avoids expensive cooling systems, such as they are required for conventional electronic loads which convert the DC input energy into heat. Principle view:



Operation of these recovering loads in terms of power generation is not intended. There is an additional supervision unit (automatic Insulation unit, ENS) available for optional installation and to achieve additional safety of persons and equipment, especially when running the so-called isolated operation. Regardless of whether the user has installed that supervision unit or not, the devices feature a simple and non-redundant switch-off function for the case of an interruption in the grid connection cable. The device supervises AC voltage and frequency and will automatically switch off the power stages in case upper or lower limits are exceeded.

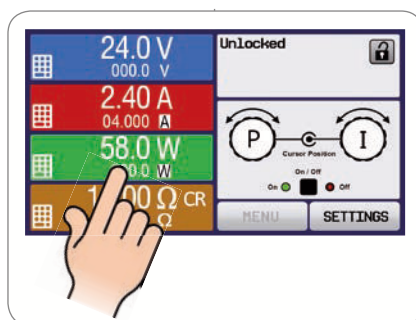
EA-ELR 9000 3.1 kW - 10.5 kW



操作面板 (HMI)

手动操作通过阻性触摸屏、两个旋钮与一个按钮来完成。这个彩色显示器能一次性显示所有设定与实际值。在人机界面也可完成整个设置，包括函数发生器（方波，三角波，正弦波等）的配置。

显示器有多种语言可选（德文，英文，俄文，中文）。



Operation (HMI)

Manual operation is done with a Gorilla glass 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).

函数发生器与表格控制

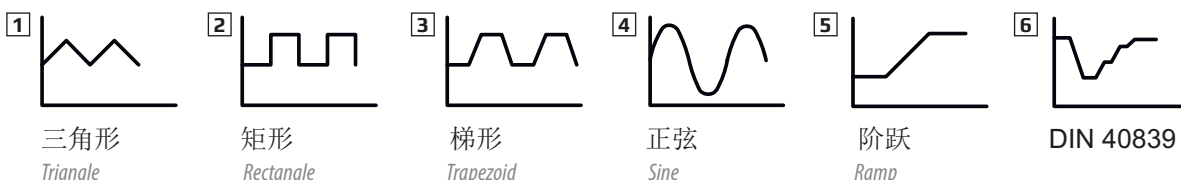
本产品还具有基于FPGA的数字函数与任意发生器。它可控制和运行用户定制的负载配置文档，并产生任意顺序的正弦、方形、锯齿形以及跳跃型函数。

通过3276个有效点数自由编程的数值表，能实时嵌入到控制电路中，然后可重现非线性内阻，如：电池或LED灯条中的内阻。

Function generator and table control

A special feature is the comfortable, FPGA based, digital function and arbitrary generator. It enables to control and run user-customisable load profiles and can generate sine, square, saw tooth and ramp functions in arbitrary order.

With a freely programmable, digital value table of 3276 points, which is embedded in the control circuit, the devices can reproduce non-linear internal resistances, such as those of batteries or LED chains.



Share-Bus-共享总线

产品后板有一个模拟连接端子叫“Share Bus”，用来均衡多台类似产品并联时的电流，如：本系列的负载产品与EA-ELR 9000系列并联。

还可通过此端子连接EA-PSI 9000，EA-PS 9000与EA-PSE 9000系列电源，以便组建两象限系统。该系统专门利用源-沉原理进行测试用途。

电池测试

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)。

用EA Power Control测试期间，由电脑记录的数据，可以CSV格式导出Excel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，还可设定一可调极限值，当电池电压低时停止测试，或者停止可调最大测试期。

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两个接口端口（1x模拟，1xUSB）。也可选择可插拔式数字接口模块（指定插槽）进行扩展。

产品上还有一个接口模块插槽，可给所有型号装上一个三路接口（3W选项，见下文），为产品后板提供1xGPIB/IEEE，1xUSB，1x模拟端口。

应用到LabView IDE时，用户可以结合USB，RS232，GPIB，Ethernet使用即用版(VIs)。通过通讯协议文档还可支持其它IDE与接口。

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, EA-PS 9000 and EA-PSE 9000. This system is dedicated for testing purposes using the source-sink principle.

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 an adjustable maximum test period.

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).

Alternatively to the interface modules slot, all models can be equipped with a three-way interface (option 3W, see below), which then offers 1x GPIB/IEEE, 1x USB and 1x Analog on the rear side of the device.

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.

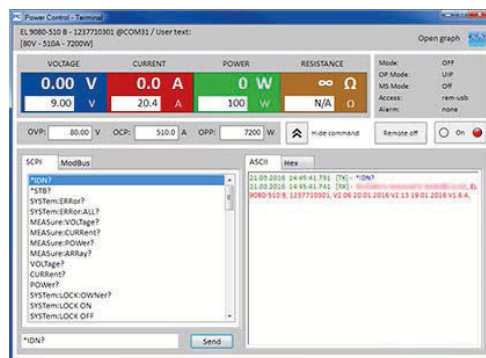
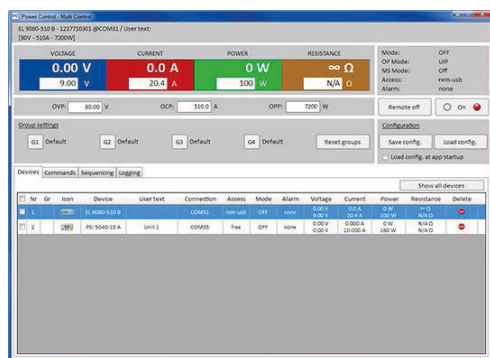
EA-ELR 9000 3.1 kW - 10.5 kW

Windows用户还可使用“EA Power Control”免费软件。它具有“排序”功能，通过CSV格式的半自动化表格控制产品。此表能代表简易的测试程序，可在MS Excel或其它CSV编辑器下创建与编写，然后导入软件工具内。

该软件利用“多功能控制”特性（需注册码，非免费），可一次性监控多达20台产品。更多信息见136页。

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.

This software also allows for the control of up to 20 units at once with an optional feature called “Multi Control” (licensed, not free of charge). See page 136 for more information.



可选项

- 可插拔、可替换的数字接口模块，适合CAN，CANopen，Ethernet（1个或2个端口），Profibus，ProfiNet（1个或2个端口），RS232，EtherCAT 或ModBus TCP。见第134页。
- 可选择带固定GPIO端口的三路接口（3W），代替可拆装接口模块的默认插槽。
- 自动隔离件，三相电（AIU/ENS，见第133页）

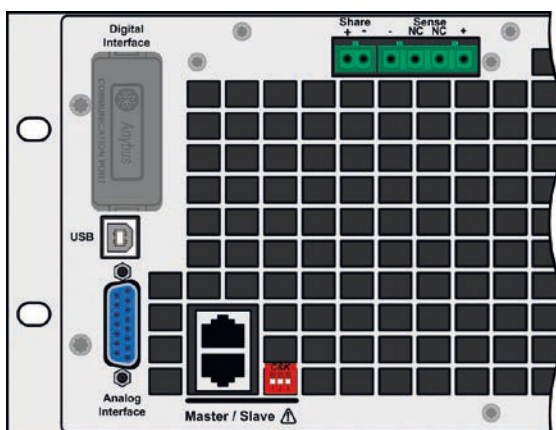
Options

- Pluggable and retrofittable, digital interface modules for CAN, CANopen, Ethernet (1 or 2 ports), Profibus, ProfiNet (1 or 2 ports), RS232, EtherCAT or ModBus TCP. See page 134.
- Three-way interface (3W) with a rigid GPIO port installed instead of the default slot for retrofittable interface modules
- Automatic Insulation unit, 3-phase (AIU / ENS, see page 133)

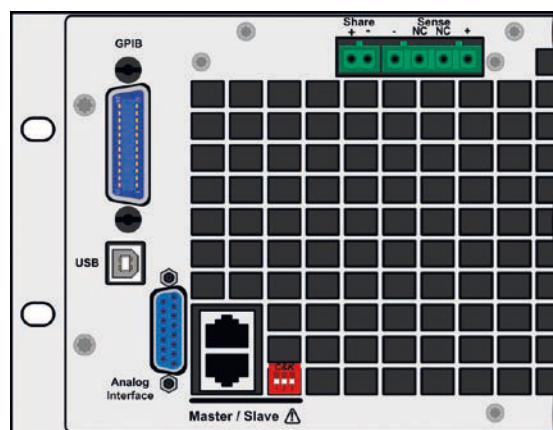
数字接口模块



Digital interface modules



标准型号的后板连接器 /
Rear connectors of the standard models



带3W选项型号的后板连接器 /
Rear connectors of models with option 3W

EA-ELR 9000 3.1 kW - 10.5 kW

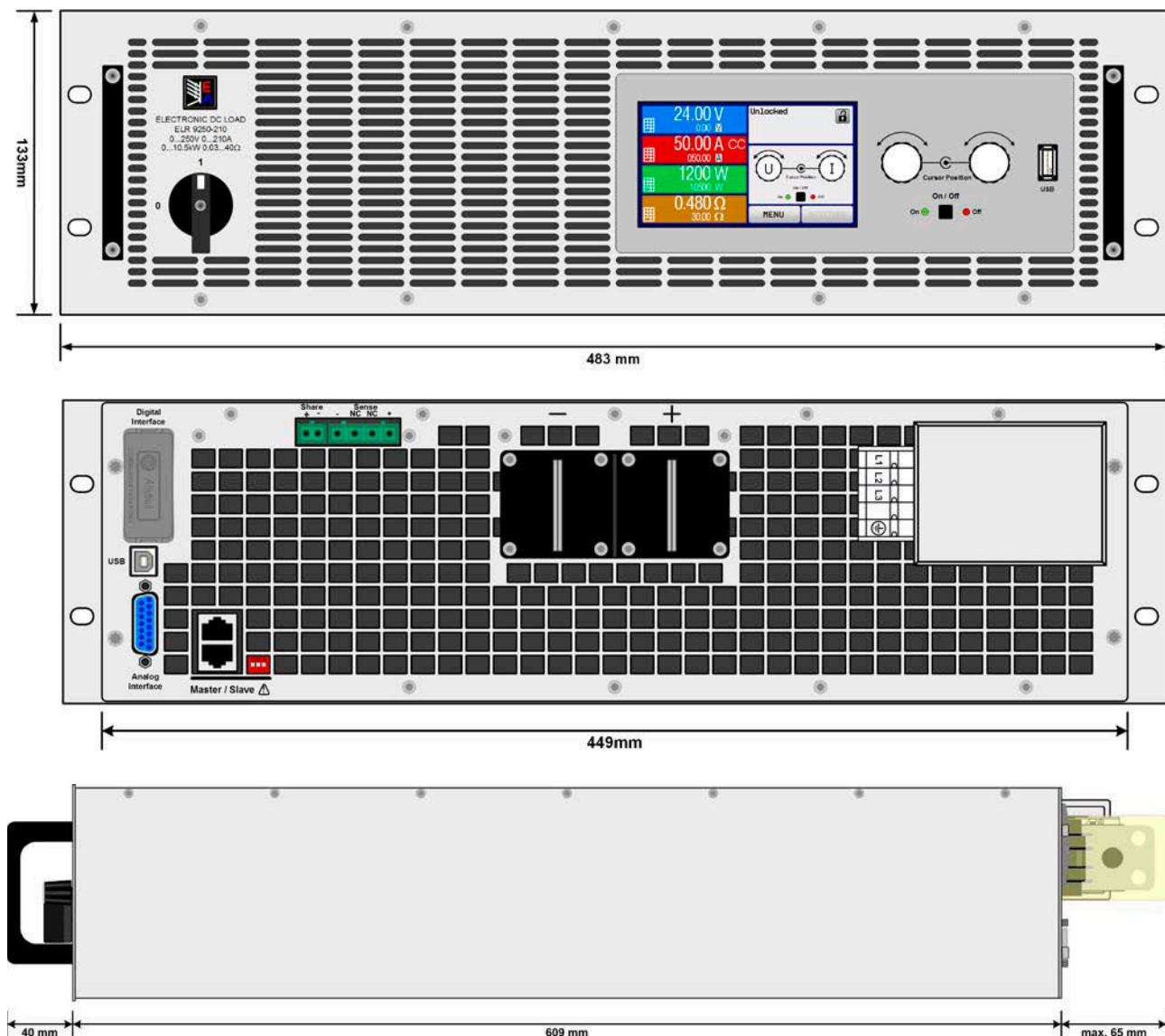


技术参数	Technical Data	Series EA-ELR 9000 / 系列
交流：供电	AC: Supply	
- 电压（欧版）	- voltage (European models)	230 V L->N, +10%/-15%, 1ph-3ph+N
- 电压（美版）	- voltage (US models)	208 V L->L, ±10%, 45...66 Hz, 2ph-3ph
- 功率因素（PFC）	- Frequency	>0.99
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.3% / <0.3% of rated value
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.4% / <0.4% of rated value
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.15% / <0.15% of rated value
- 10-90% 上升时间	- Rise time 10-90%	<50 μ s
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的1.5% / <1.5% of rated value
直流：内阻	DC: Resistance	
- 精确度	- Accuracy	≤最大阻值的1% + 额定电流的0.3% / ≤1% of max. resistance + 0.3% of nominal current
显示器与控制面板	Display and control panel	带触摸屏的彩色显示器 / Graphics display with touch panel
数字接口	Digital interfaces	
- 内置（前板）	- Built-in	1x 通讯用B类USB端口 / 1x USB type B for communication 1x GPIB (3W选项功能用) / 1x GPIB (optional with option 3W)
- 插槽	- Slot	1x 内置可拆装模块（仅针对标准型号） / 1x for retrofittable plug-in modules (standard models only)
模拟接口	Analog interface	内置，15极D-Sub连接器，电隔离 / Built-in, 15-pole D-Sub (female), galvanically isolated
- 信号范围	- Signal range	0...5 V 或 0...10 V (可转换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U, I, P, R, 远程开-关, 直流输出开-关, 内阻模式开-关 / U, I, P, R, Remote on-off, DC input on-off, resistance mode on-off
- 输出脚	- Output	U, I, 过压, 报警, 参考电压 / U, I, overvoltage, alarms, reference voltage
- U / I / P / R 精确度	- Accuracy U / I / P / R	0...10 V: <0.1% 0...5 V: <0.2%
制冷方式	Cooling	温控风扇 / Temperature controlled fans
环境温度	Ambient temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
后板端子	Terminals on rear	
- 直流输入	- DC input	螺丝端 / Screw terminal
- 共享总线&感测	- Share Bus & Sense	2&4位插头连接器 / Plug connector 2 pole & 4 pole
- 模拟接口	- Analog interface	15极Sub-D连接器 / Sub-D connector 15 pole
- 数字接口	- Digital interfaces	50位模块插座或24位的GPIB, USB / Module socket 50 pole or GPIB 24pole, USB
尺寸(宽 x 高 x 深)	Dimensions (W x H x D)	19" x 3 HE/U x 609 mm

EA-ELR 9000 3.1 kW - 10.5 kW

型号	功率 (EU)	功率 (US)	电压	电流	内阻	效率	重量	订购编号 ⁽¹⁾	
								EU	US
Model	Power (EU)	Power (US)	Voltage	Current	Resistance	Efficiency	Weight	Ordering number ⁽¹⁾	
								EU	US
EA-ELR 9080-170	0...3.5 kW	0...3.1 kW	0...80 V	0...170 A	0.01...12 Ω	92.5%	17 kg	33200401	33208401
EA-ELR 9250-70	0...3.5 kW	0...3.1 kW	0...250 V	0...70 A	0.09...120 Ω	93.5%	17 kg	33200402	33208402
EA-ELR 9500-30	0...3.5 kW	0...3.1 kW	0...500 V	0...30 A	0.42...480 Ω	94.5%	17 kg	33200403	33208403
EA-ELR 9750-22	0...3.5 kW	0...3.1 kW	0...750 V	0...22 A	0.8...1100 Ω	94.5%	17 kg	33200404	33208404
EA-ELR 9080-340	0...7 kW	0...6.2 kW	0...80 V	0...340 A	0.005...6 Ω	92.5%	24 kg	33200405	33208405
EA-ELR 9250-140	0...7 kW	0...6.2 kW	0...250 V	0...140 A	0.04...60 Ω	93.5%	24 kg	33200406	33208406
EA-ELR 9500-60	0...7 kW	0...6.2 kW	0...500 V	0...60 A	0.21...240 Ω	94.5%	24 kg	33200407	33208407
EA-ELR 9750-44	0...7 kW	0...6.2 kW	0...750 V	0...44 A	0.43...550 Ω	94.5%	24 kg	33200408	33208408
EA-ELR 91000-30	0...7 kW	0...6.2 kW	0...1000 V	0...30 A	0.83...950 Ω	94.5%	24 kg	33200409	33208409
EA-ELR 9080-510	0...10.5 kW	0...9.3 kW	0...80 V	0...510 A	0.003...4 Ω	92.5%	31 kg	33200410	33208410
EA-ELR 9250-210	0...10.5 kW	0...9.3 kW	0...250 V	0...210 A	0.03...40 Ω	93.5%	31 kg	33200411	33208411
EA-ELR 9500-90	0...10.5 kW	0...9.3 kW	0...500 V	0...90 A	0.14...160 Ω	94.5%	31 kg	33200412	33208412
EA-ELR 9750-66	0...10.5 kW	0...9.3 kW	0...750 V	0...66 A	0.29...360 Ω	94.5%	31 kg	33200413	33208413
EA-ELR 91500-30	0...10.5 kW	0...9.3 kW	0...1500 V	0...30 A	1.2...1450 Ω	94.5%	31 kg	33200414	33208414

(1) 为标准版型号的订购编号，带3W选项的则不同 / Ordering number of the base version, models with option 3W installed have different ordering numbers



EA-ELR 9000 HP 5 kW - 15 kW



可编程能量回馈式直流电子负载

Programmable electronic DC loads with energy recovery



EA-ELR 9200-210 HP



- 宽范围的交流输入电压：342...528 V
- 可将直流电量返回到本地电网
- 直流输入端为电隔离结构
- 每台产品的输入功率高达15 kW，还可扩展至480 kW
- 输入电压高达1500 V
- 每台产品的输入电流能高达510 A
- 基于FPGA数字式控制
- 多语言TFT触摸屏
- 用户配置文档，真实函数发生器
- 电隔离
- 并联用主-从总线
- 前板有额外的USB端口，适合插外置U盘
- 可选数字式即插即用型接口，或选择安装IEEE/GPIB端口
- 支持SCPI指令语言& ModBus RTU
- 支持LabView

- AC wide range input 342-528 V
- Energy recovery of the supplied DC energy into the local grid
- Galvanically isolated DC input
- Input power ratings up to 15 kW per unit, expandable to 480 kW
- Input voltages up to 1500 V
- Input currents up to 510 A per unit
- FPGA based digital control
- Multilingual TFT touch panel
- User profiles, true function generator
- Galvanically isolated
- Master-slave bus for parallel connection
- Extra USB port on the front for USB stick
- Optional, digital, plug & play interfaces or alternatively installed IEEE/GPIB port
- SCPI command language & ModBus RTU
- LabView support

概要

这一款新的能量返回式直流电子负载，称为EA-ELR 9000 HP，是EA-ELR 9000系列的延伸版。其宽范围的交流输入电压可以连接380 V，400 V或480 V三相电的工业电网。

而且所有型号都可供应更大功率级别，并增加了360 V新的电压等级。一些高电压型号的绝缘性能也有很大改善。

General

The new series of electronic DC loads with energy recovery to mains, called EA-ELR 9000 HP, is an enhancement of the favored series EA-ELR 9000. It offers wider AC input range for the operation on industrial grids with 380V, 400 V or 480 V three-phase supply.

Furthermore, all models offer a higher power rating and there is a new voltage class with 360 V. The insulation of some high voltage models has also been improved.

EA-ELR 9000 HP 5 kW - 15 kW

能量返回功能可使产生的直流电同步转化成正弦波电流，然后返回给当地电网。这不仅摆脱了以前的热耗散问题，同时还节省了用电成本。其彩色TFT触摸屏为用户提供一个不同于其他产品的直观手操媒介。

经模拟或数字接口控制的反应时间已由FPGA控制硬件得到很好的改善。

多台产品并联时，可经主-从总线组成一个更大的系统，此时实际值会被累加，设定值则会均衡分布。

功率、电压和电流等级

本系列有0...80 V DC至0...1500 V DC输出电压的产品型号，还有一款输入电流高达510 A的型号。本系列有三个功率级别，分别为5 kW，10 kW或15 kW，单机外壳仅3U高。还可扩展至高达240 kW（组合到机柜形成更大的总电流）。

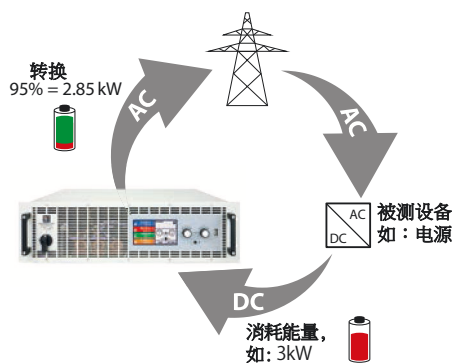
供电

所有型号都需接上不带N导线的供电端上，这在工业电网都很典型。本系列产品可接342-528 V的宽范围交流输入电压，完全覆盖380 V至480 V之间的供电电压。

能量返回

本负载最主要的特点是其AC输入端，即电网连接端，也可用作直流电返回的输出端，转换效率高达95%。这种能量转换方式有助于降低用电成本，且避免使用昂贵的制冷系统，因为普通电子负载使用过程中会将直流输入电量转化成热量，从而需要制冷系统进行冷却。

下面为其原理示意图：



此类回馈式负载不可用作发电。还提供能监控能量返回公共电网的电网保护装置，它同时还可达到保护人生安全与设备本身的目的，特别是在运行所谓的隔离操作时。但是该装置需要N导线。

不管用户是否装此类监控设备，我们产品上都配有一简易无冗余关闭功能，遇到电网连线突然断开时会关闭产品。本产品可监控AC电压和频率，当超过功率上限或下限时，会自动关闭功率模块。

The energy recovery function converts the supplied DC energy into a synchronous sine current and feeds it back into the local grid. This eliminates the usual heat dissipation to a minimum and saves energy costs at the same time. The large colour TFT touch panel offers a different and intuitive kind of manual operation, compared to other devices.

Response times for the control via analog or digital interfaces have been improved by the FPGA controlled hardware.

In parallel operation of multiple devices, a master-slave bus is used to connect the units to a bigger system where the actual values are totalled 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...1500 V DC. Input currents up to 510 A with only one unit are available. The series offers three power classes with 5 kW, 10 kW or 15 kW in only 3U for single devices, which can be extended up to 240 kW (in cabinets for a significantly high total current).

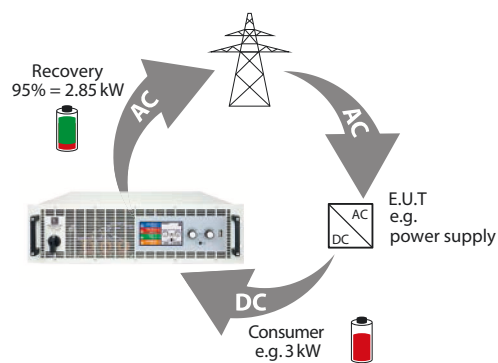
Supply

All models require a 2-phase or 3-phase mains supplies without N conductor, as typical in the industrial grids. The device offer a wide range AC input with 342 - 528 V, which can even cover supply voltages between 380 V and 480 V.

Energy recovery

The most important feature of these electronic loads is that the AC input, i.e. grid connection, is also used as output for the recovery of the supplied DC energy, which will be converted with an efficiency of up to 95%. This way of energy recovery helps to lower energy costs and avoids expensive cooling systems, such as they are required for conventional electronic loads which convert the DC input energy into heat.

Principle view:



Operation of these recovering loads in terms of power generation is not intended. Grid protection devices, which could supervise the feedback of energy into the public grid, are available for optional installation and are intended to achieve additional safety of persons and equipment, especially when running the so-called isolated operation. But such a device would also require the N conductor.

Regardless of whether the user has installed that supervision unit or not, the devices feature a simple and non-redundant switch-off function for the case of an interruption in the grid connection cable. The device supervises AC voltage and frequency and will automatically switch off the power stages in case upper or lower limits are exceeded.



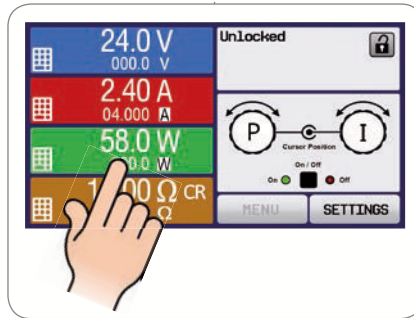
EA-ELR 9000 HP 5 kW - 15 kW



操作面板 (HMI)

手动操作通过阻性触摸屏、两个旋钮与一个按钮来完成。这个彩色显示器能一次性显示所有设定与实际值。在人机界面也可完成整个设置，包括函数发生器（方波，三角波，正弦波等）的配置。

显示器有多种语言可选（德文，英文，俄文，中文）。



Operation (HMI)

Manual operation is done with a Gorilla glass 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).

函数发生器与表格控制

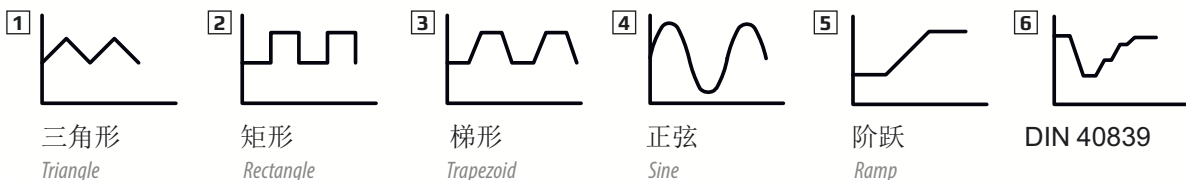
本产品还具有基于FPGA的数字函数与任意发生器。它可控制和运行用户定制的负载配置文档，并产生任意顺序的正弦、方形、锯齿形以及跳跃型函数。

通过3276个有效点数自由编程的数值表，能实时嵌入到控制电路中，然后可重现非线性内阻，如：电池或LED灯条中的内阻。

Function generator and table control

A special feature is the comfortable, FPGA based, digital function and arbitrary generator. It enables to control and run user-customisable load profiles and can generate sine, square, saw tooth and ramp functions in arbitrary order.

With a freely programmable, digital value table of 3276 points, which is embedded in the control circuit, the devices can reproduce non-linear internal resistances, such as those of batteries or LED chains.



Share-Bus-共享总线

产品后板有一个模拟连接端子叫“Share Bus”，用来均衡本系列多台同型号产品并联时的电流。还可通过此端子连接EA-PSI 9000 WR或EA-PSI 9000 WR Slave系列电源，以便组建两象限系统。该系统专门利用源-沉原理进行测试用途。

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 identical units of this series in parallel connection.

It can also be used to build a two-quadrants system in connection with power supplies of series EA-PSI 9000 WR or EA-PSI 9000 WR Slave. This system is dedicated for testing purposes using the source-sink principle.

电池测试

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)。

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 show 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 an adjustable maximum test period.

例如使用EAPC软件测试期间由电脑记录的数据，可以CSV格式导出到Excel表，并在微软Excel或类似工具下进行分析，还可形成可视化的放电图。关于更详细的设置，还可设定一可调极限值，当电池电压低时停止测试，或者停止可调最大测试期。

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两个接口端口（1x模拟，1xUSB）。也可选择可插拔式数字接口模块（指定插槽）进行扩展。

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).

Alternatively to the interface modules slot, all models can be equipped with a three-way interface (Option 3W, see below), which then offers 1x GPIB/IEEE, 1x USB and 1x Analog on the rear side of the device.

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

产品上还有一个接口模块插槽，所有型号都可安装一个三路接口（3W选项，见下文），为产品后板提供1xGPIB/IEEE，1xUSB，1x模拟端口。应用到LabView IDE时，用户可以结合USB，RS232，GPIB，Ethernet使用即用版(VIs)。通过通讯协议文档还可支持其它IDE与接口。

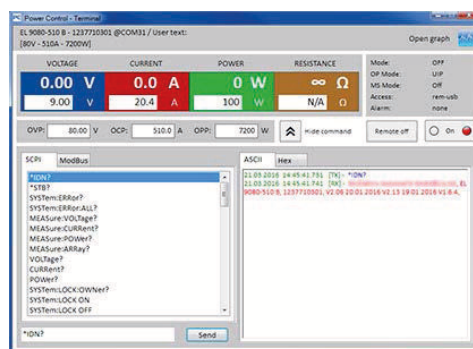
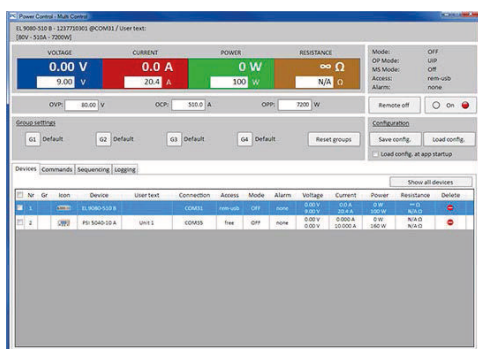
EA-ELR 9000 HP 5 kW - 15 kW

Windows用户还可使用“EA Power Control”免费软件。它具有“排序”功能，通过CSV格式的半自动化表格控制产品。此表能代表简易的测试程序，可在MS Excel或其它CSV编辑器下创建与编写，然后导入软件工具内。

该软件利用“多功能控制”特性（需注册码，非免费），可一次性监控多达20台产品。更多信息见136页。

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.

This software also allows for the control of up to 20 units at once with an optional feature called “Multi Control” (licensed, not free of charge). See page 136 for more information.



可选项

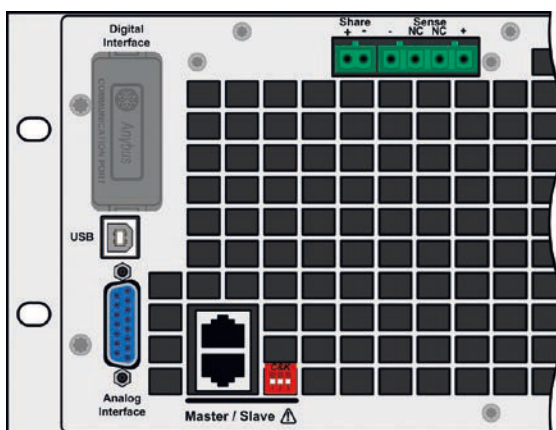
- 可插拔、可替换的数字接口模块，适合CAN，CANopen，Ethernet（1个或2个端口），Profibus，ProfiNet（1个或2个端口），RS232，EtherCAT 或ModBus TCP。见第134页。
- 可选择带固定GPIB端口的三路接口（3W），代替可拆装接口模块的默认插槽。

Options

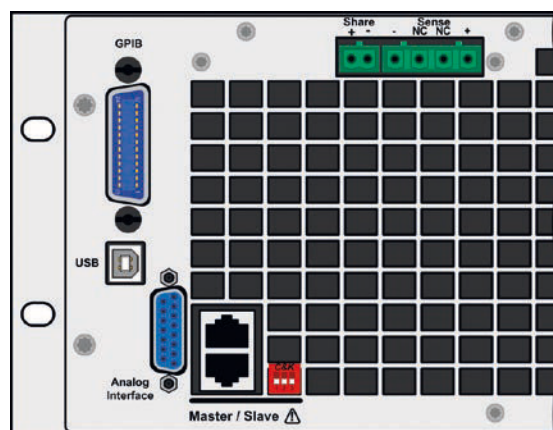
- Pluggable and retrofittable, digital interface modules for CAN, CANopen, Ethernet (1 or 2 ports), Profibus, ProfiNet (1 or 2 ports), RS232, EtherCAT or ModBus TCP. See page 134.
- Three-way interface (3W) with a rigid GPIB port installed instead of the default slot for retrofittable interface modules

数字接口模块

Digital interface modules



标准型号的后板连接器 /
Rear connectors of the standard models



带3W选项型号的后板连接器 /
Rear connectors of models with option 3W

EA-ELR 9000 HP 5 kW - 15 kW

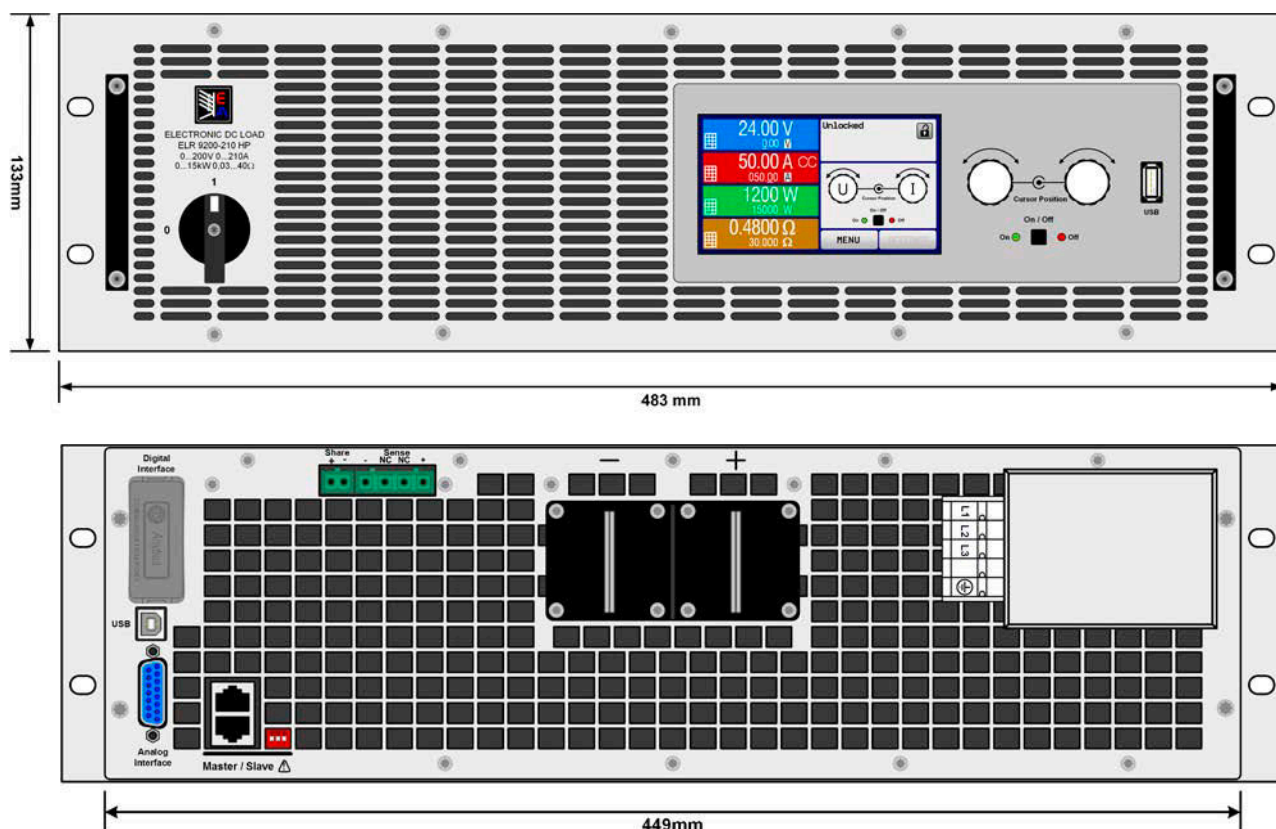


技术参数	Technical Data	Series EA-ELR 9000 HP / 系列
交流：供电	AC: Supply	
- 电压	- voltage	342...528 V, 2ph-3ph
- 频率	- Frequency	45...66 Hz
直流：电压	DC: Voltage	
- 精确度	- Accuracy	<额定值的0.1% / <0.1% of rated value
直流：电流	DC: Current	
- 精确度	- Accuracy	<额定值的0.2% / <0.2% of rated value
- 1-100% ΔU_{DC} 的负载调整率	- Load regulation 1-100% ΔU_{DC}	<额定值的0.15% / <0.15% of rated value
- 10-90% 上升时间	- Rise time 10-90%	<50 μ s
直流：功率	DC: Power	
- 精确度	- Accuracy	<额定值的1% / <1% of rated value
直流：内阻	DC: Resistance	
- 精确度	- Accuracy	$\leq$ 最大阻值的1% + 额定电流的0.3% / $\leq 1\%$ of max. resistance + 0.3% of nominal current
显示器与控制面板	Display and control panel	带触摸屏的彩色显示器 / Graphics display with touch panel
数字接口	Digital interfaces	
- 内置	- Built-in	1x 通讯用B类USB端口 / 1x USB type B for communication 1x GPIB (3W选项功能用) / 1x GPIB (optional with option 3W)
- 插槽	- Slot	1x 内置可拆装模块（仅针对标准型号） / 1x for retrofittable plug-in modules (standard models only)
模拟接口	Analog interface	内置，电隔离 / Built-in, galvanically isolated
- 信号范围	- Signal range	0...5 V 或 0...10 V (可切换) / 0...5 V or 0...10 V (switchable)
- 输入脚	- Inputs	U, I, P, R, 远程开-关, 直流输出开-关, 内阻模式开-关 / U, I, P, R, Remote on-off, DC input on-off, resistance mode on-off
- 输出脚	- Output	U, I, 过压, 报警, 参考电压 / U, I, overvoltage, alarms, reference voltage
- U / I / P / R 精确度	- Accuracy U / I / P / R	0...10 V: <0.1% 0...5 V: <0.2%
制冷方式	Cooling	温控风扇（可选：水冷） / Temperature controlled fans (optional: water)
环境温度	Ambient temperature	0...50 °C
储存温度	Storage temperature	-20...70 °C
后板端子	Terminals on rear	
- 直流输入	- DC input	螺丝端 / Screw terminal
- 共享总线&感测	- Share Bus & Sense	2&4位插头连接器 / Plug connector 2 pole & 4 pole
- 模拟接口	- Analog interface	15极Sub-D连接器 / Sub-D connector 15 pole
- 数字接口	- Digital interfaces	50位模块插座或24位的GPIB, USB / Module socket 50 pole or GPIB 24pole, USB
尺寸(宽 x 高 x 深)	Dimensions (W x H x D)	19" x 3 HE/U x 670 mm

EA-ELR 9000 HP 5 kW - 15 kW

型号	功率	电压	电流	内阻	效率	重量	订购编号 ⁽¹⁾
Model	Power	Voltage	Current	Resistance	Efficiency	Weight	Ordering number ⁽¹⁾
EA-ELR 9080-170 HP	0...5 kW	0...80 V	0...170 A	0.02...25 Ω	92.5%	~18 kg	33200435
EA-ELR 9200-70 HP	0...5 kW	0...200 V	0...70 A	0.1...150 Ω	93.5%	~18 kg	33200436
EA-ELR 9360-40 HP	0...5 kW	0...360 V	0...40 A	0.3...520 Ω	93.5%	~18 kg	33200437
EA-ELR 9500-30 HP	0...5 kW	0...500 V	0...30 A	0.5...1000 Ω	94.5%	~18 kg	33200438
EA-ELR 9750-20 HP	0...5 kW	0...750 V	0...20 A	1.28...2200 Ω	94.5%	~18 kg	33200439
EA-ELR 9080-340 HP	0...10 kW	0...80 V	0...340 A	0.01...13 Ω	92.5%	~25 kg	33200440
EA-ELR 9200-140 HP	0...10 kW	0...200 V	0...140 A	0.05...75 Ω	93.5%	~25 kg	33200441
EA-ELR 9360-40 HP	0...10 kW	0...360 V	0...80 A	0.15...260 Ω	93.5%	~25 kg	33200442
EA-ELR 9500-60 HP	0...10 kW	0...500 V	0...60 A	0.25...500 Ω	94.5%	~25 kg	33200443
EA-ELR 9750-40 HP	0...10 kW	0...750 V	0...40 A	0.6...1100 Ω	94.5%	~25 kg	33200444
EA-ELR 9080-510 HP	0...15 kW	0...80 V	0...510 A	0.006...10 Ω	92.5%	~32 kg	33200446
EA-ELR 9200-210 HP	0...15 kW	0...200 V	0...210 A	0.033...50 Ω	93.5%	~32 kg	33200447
EA-ELR 9360-40 HP	0...15 kW	0...360 V	0...120 A	0.1...180 Ω	93.5%	~32 kg	33200448
EA-ELR 9500-90 HP	0...15 kW	0...500 V	0...90 A	0.16...340 Ω	94.5%	~32 kg	33200449
EA-ELR 9750-60 HP	0...15 kW	0...750 V	0...60 A	0.4...740 Ω	94.5%	~32 kg	33200450
EA-ELR 91000-40 HP	0...15 kW	0...1000 V	0...40 A	0.8...1300 Ω	94.5%	~32 kg	33200451
EA-ELR 91500-30 HP	0...15 kW	0...1500 V	0...30 A	2.5...3000 Ω	94.5%	~32 kg	33200452

(1) 为标准版型号的订购编号，带3W选项的则不同 / Ordering number of the base version, models with option 3W installed have different ordering numbers



EA-ELR 9000 HP Slave 15 kW



EA-ELR 9000 HP系列从机负载模块 Slave loads modules for series EA-ELR 9000 HP



EA-ELR 9200-210 HP Slave

一般信息

EA-ELR 9000 HP Slave系列可以快速匹配EA-ELR 9000 HP系列选定型号，来扩大功率。其目的就是，通过并联与主-从操作，最多组合32台，从而获得一个高达480 kW的直流电子负载系统。其技术规格都与EA-ELR 9000 HP系列几乎一模一样，除了几个连接端子外。

操作与配置

扩展后的控制面板精简到剩下几个必要部件。为配合手动操作、状态指示与配置，配有少数几个LED灯，一个按钮，以及一个USB端口。本系列经前板USB端口可通过软件配置，比如EA Power Control (见 136页)。

主-从系统

主-从系统的配置简易又快捷。将从机模块与主机装在一起，比如在一19“机柜内。将产品连至交流供电端，并联他们的直流输出（连线或铜条），再经主-从总线与共享总线连接起来。主机上的操作仅为启动主从操作，然后整个系统将按照通电的机器数量自己配置，并准备好供用户使用或者软件操作。

General

The so-called “slave module” of series EA-ELR 9000 HP Slave are available for quick and cost saving power extension of 15 kW models of series EA-ELR 9000 HP. Their purpose is to run in parallel connection and master-slave operation of up to 32 units in total, in order to achieve DC power supply systems with power ratings of up to 480 kW. The technical specifications are almost identical to EA-ELR 9000 HP series, except for the available connectors.

Handling and configuration

The usual control panel has been reduced to the absolute necessary. For manual handling, status indication and configuration it offers a few LEDs, a pushbutton and an USB port. The devices are configured with software through the front USB port, for example with EA Power Control (see page 136).

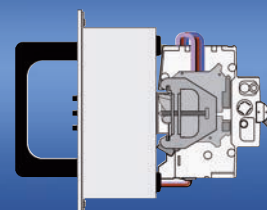
Master-slave system

Configuring a master-slave system is very quick and easy. The slave modules and the master unit are installed together, for example in a 19” cabinet. Then they are connected to the AC supply and paralleled on their DC inputs (cables or copper bars), plus also linked via master-slave bus and Share bus. The only thing to do on the master is to enable master-slave and the system will self-configure to the number of powered units and represent itself to the user or a control software accordingly.

型号	功率	电压	电流	重量	适用于	尺寸 (宽 x 高 x 深)	订购编号
Model	Power	Voltage	Current	Weight	Suitable for	Dimensions (W x H x D)	Ordering number
EA-ELR 9080-510 HP Slave	0...15000 W	0...80 V	0...510 A	~ 32 kg	EA-ELR 9080-510 HP	483 mm x 3 HE / 3 U x 670 mm	33290446
EA-ELR 9200-210 HP Slave	0...15000 W	0...200 V	0...210 A	~ 32 kg	EA-ELR 9200-210 HP	483 mm x 3 HE / 3 U x 670 mm	33290447
EA-ELR 9360-120 HP Slave	0...15000 W	0...360 V	0...120 A	~ 32 kg	EA-ELR 9360-120 HP	483 mm x 3 HE / 3 U x 670 mm	33290448
EA-ELR 9500-90 HP Slave	0...15000 W	0...500 V	0...90 A	~ 32 kg	EA-ELR 9500-90 HP	483 mm x 3 HE / 3 U x 670 mm	33290449
EA-ELR 9750-60 HP Slave	0...15000 W	0...750 V	0...60 A	~ 32 kg	EA-ELR 9750-60 HP	483 mm x 3 HE / 3 U x 670 mm	33290450
EA-ELR 91000-40 HP Slave	0...15000 W	0...1000 V	0...40 A	~ 32 kg	EA-ELR 91000-40 HP	483 mm x 3 HE / 3 U x 670 mm	33290451
EA-ELR 91500-30 HP Slave	0...15000 W	0...1500 V	0...30 A	~ 32 kg	EA-ELR 91500-30 HP	483 mm x 3 HE / 3 U x 670 mm	33290452

回馈式电子负载用AIU模块

AIU module for recovering electronic DC loads



- 可改装，安装简易
- 3U模块适合装入19"机柜或机架内
- 可配也可不配接触器
- 符合VDE AR 4105德国标准
- 同时也符合CEI 0-21意大利标准
- 多语言用户界面（德语，英语，意大利语）

概要

按照欧洲标准或对于本土供电公司的规定，若运行能量回馈式设备时，如：太阳能电池板，有回馈功能的电子负载，要求安装一自动隔离器（AIU，前称：ENS）。

EA-ENS2是**ELR 9000**与**ELR 5000**系列能量回馈式电子负载的一个可选配件。

此类设备的安装通常只在隔离操作下运行电子负载时才需求，因为此时返回的电量比消耗的要多。**ENS2**会监控电量返回时交流电网电压、频率与相位角度的变化，如果监测到的参数不符，它会自动将回馈式设备与电网断开。

如果接上同等能量消耗设备进行正常操作，即：消耗的能量等同于或大于回馈能量，则可省略此隔离设备。

自动隔离设备一般都会检测三相电的所有相位。

各款型号

本产品有两个型号。**EA-ENS2 10.5 kW** 给一台功率在**10.5 kW**以下的电子负载用，比如来自**ELR 9000**的型号，或者返回电流在**16 A**以下的产品。另外一款则适合两台或两台以上**ELR**系列并联操作。与**ENS2**模块连接所需的接触片不随货提供，因为它需定制以符合特定条件，并由当地电工安装。

- Retrofittable, simple installation
- 3U module for installation in 19" cabinets or racks
- With or without included contactors
- According to german standard VDE AR 4105
- Also according to italian standard CEI 0-21
- Multi-language user interface (GER, ENG, ITA)

General

According to european standards or provisions of local electricity supply companies it can be necessary to install an automatic Insulation unit (AIU, former name: ENS) when operating energy recovery devices, such as solar panels or electronic loads with feedback.

The **EA-ENS2** is an optional accessory for the electronic loads of series **EA-ELR 9000** and **EA-ELR 5000**.

Installing such a device is usually required only when running the electronic load in so-called isolated operation, where the recovered energy is higher than that consumed. The ENS2 supervises the energy recovery regarding AC grid voltage, frequency and phase angle and automatically cuts the back-feeding device from the grid, in case the supervised parameters are not met.

For normal operation with a balanced energy consumption, i.e. consumed energy is equal or bigger than the recovered energy, such an AIU can be omitted.

The automatic Insulation unit always supervises all three phases of a three-phase supply.

Variants

There are two models available. Model **EA-ENS2 10.5 kW** is intended for the use with one electronic load device of up to 10.5 kW power, for example from series **EA-ELR 9000**, or up to 16 A recovered current. The other model is for any other situation where two or more ELR units are operating in parallel. The required contactors, which have to be used in connection with the AIU module, are not included in the version **EA-ENS2** and are usually specified to meet the given situation and installed by an electrician on location.

技术参数	Technical Data	EA-ENS2	EA-ENS2 10.5 kW
交流：电网电压	AC: Grid voltage	230 V AC (L-N) bzw. 400 V AC (L-L)	230 V AC (L-N) bzw. 400 V AC (L-L)
交流：电网频率	AC: Grid frequency	50 Hz	50 Hz
交流：电网相位	AC: Phases	3	3
标准	Standards	VDE AR 4105, CEI 0-21	VDE AR 4105, CEI 0-21
是否装接触器？	Contactors installed?	-	2 (16 A)
尺寸（宽x高）	Dimensions (WxH)	19" x 3 HE/3U	19" x 3 HE/3U
安装深度	Installation depth	127 mm	127 mm
重量	Weight	2.3 kg	2.7 kg
订购编号	Ordering number	33200499	33200498





数字接口模块 Digital interface modules



EA-IF-AB Series

- 可拆装，安装简便（即插即用）
- 经产品设置菜单可轻松配置
- 高达2500 V的隔离耐压

概要

IF-AB系列为可插拔式数字接口模块，适用于自2012年生产带模块插槽的产品系列，如：EA-ELR 9000，EA-PSE 9000与EA-PSI 9000系列以及更多O B，同样也会适用到将来的可编程电源或电子负载上。

LabView与编程语言

我们还给RS232与Ethernet这类接口提供即用型LabView-VIs软件。其它接口还可集成到任何控制应用内。通讯协议是完全开放的，存储在文件内。用户可将其集成到任何一种虚拟编程语言中。

软件与驱动程序

随产品会附有一U盘，里面存储了一些文档、驱动程序与软件。

RS232

- 型号: IF-AB-RS232(订购编号: 35400101)
- 转换速度: 最大115200 Bd
- D-Sub型9针公座，调制解调器连接用
- SCPI与ModBus RTU协议

CANopen

- 型号: IF-AB-CANO(订购编号: 35400100)
- 转换速度: 最大1 MBit/s
- 基本CANopen-Slave
- 自动波特率
- 含EDS (电子数据表)文档
- 1x Sub-D型9针公座



- Retrofittable, simple installation (plug 'n play)
- Easy configuration via a setup menu on the device
- Galvanic Insulation up to 2500 V

General

Series EA-IF-AB offers a set of pluggable, digital interface modules for all series since 2012 which feature a module slot, such as EA-ELR 9000, EA-PSE 9000, EA-PSI 9000 and more, as well as upcoming series of programmable power supplies or electronic loads, which feature a suitable slot.

LabView and programming languages

Ready-to-use LabView VIs for interfaces w/ type RS232 and Ethernet are included. The other interfaces can be integrated into any kind of control application. The communication protocol is open and included in the documentation. Thus it can be integrated in virtually any programming language.

Software and drivers

The devices of the series which can host these modules are delivered with an USB stick which includes documentation, drivers and software.

RS232

- Type: EA-IF-AB-RS232 (Ord. No. 35400101)
- Transfer speed: max. 115200 Bd
- D-sub, male, 9-pole for null modem cable
- SCPI and ModBus RTU protocol

CANopen

- Type: EA-IF-AB-CANO (Ord. No. 35400100)
- Transfer speed: max. 1 MBit/s
- Basic CANopen slave
- Auto-baud
- EDS (Electronic Data Sheet) included
- 1x D-Sub socket, male, 9-pole

EA-IF-AB

Profibus

- 型号: IF-AB-PBUS (订购编号: 35400103)
- 转换速度: 最大12 MBit/s
- 全DPV1-Slave
- 含GSD(Generic Station Device)文档
- 1x D-Sub型9针母座



Profibus

- Type: EA-IF-AB-PBUS (Ord. No. 35400103)
- Transfer speed: max. 12 MBit/s
- Full DPV1 slave
- GSD (Generic Station Device) file included
- 1x D-Sub socket, female, 9-pole

ProfiNet 1 port / 2 port

- 型号: IF-AB-PNET1P (订购编号: 35400105)
- 型号: IF-AB-PNET2P (订购编号: 35400110)
- 转换速度: 100 MBit/s, 全双向
- 含GSDML
- 1x RJ45, 8针插座(1P)
- 2x RJ45, 8针插座, 带以太网开关(2P)



ProfiNet 1 port / 2 port

- Type: EA-IF-AB-PNET1P (Ord. No. 35400105)
- Type: EA-IF-AB-PNET2P (Ord. No. 35400110)
- Transfer speed: 100 MBit/s, full duplex
- GSDML included
- 1x RJ45 socket, 8-pole (1P)
- 2x RJ45 socket 8-pole, with Ethernet switch (2P)

Ethernet 1 port / 2 port

- 型号: IF-AB-ETH1P (订购编号: 35400104)
- 型号: IF-AB-ETH2P (订购编号: 35400108)
- 转换速度: 10/100 MBit/s
- 透明插座
- 1x RJ45, 8针插座(1P)
- 2x RJ45, 8针插座, 带以太网开关(2P)



Ethernet 1 port / 2 port

- Type: EA-IF-AB-ETH1P (Ord. No. 35400104)
- Type: EA-IF-AB-ETH2P (Ord. No. 35400108)
- Transfer speed: 10/100 MBit/s
- Transparent socket
- 1x RJ45 socket, 8-pole (1P)
- 2x RJ45 socket 8-pole, with Ethernet switch (2P)

ModBus-TCP 1 port / 2 port

- 型号: IF-AB-MBUS1P(订购编号: 35400107)
- 型号: IF-AB-MBUS2P(订购编号: 35400109)
- 转换速度: 10/100 MBit/s
- 256个字节进/出
- ModBus TCP协议
- 1x RJ45, 8针插座(1P)
- 2x RJ45, 8针插座, 带以太网开关(2P)



ModBus TCP 1 port / 2 port

- Type: EA-IF-AB-MBUS1P (Ord. No. 35400107)
- Type: EA-IF-AB-MBUS2P (Ord. No. 35400109)
- Transfer speed: 10/100 MBit/s
- 256 Bytes in/out
- ModBus TCP protocol
- 1x RJ45 socket, 8-pole (1P)
- 2x RJ45 socket 8-pole, with Ethernet switch (2P)

CAN

- 型号: IF-AB-CAN (订购编号: 35400111)
- 转换速度: 最快1 MBit/s
- CAN标准插头2.0 A与2.0 B兼容
- 1x D-Sub 9针插座, 公插



CAN

- Type: EA-IF-AB-CAN (Ord. No. 35400111)
- Transfer speed: max. 1 MBit/s
- CAN standard 2.0 A and 2.0 B compatible
- 1x D-Sub socket, male, 9-pole

EtherCAT

- 型号: IF-AB-ECT (订购编号: 35400112)
- 基本EtherCAT-Slave
- CANopen协议 (CoE)
- PDOs 与 SDO
- 本机上带诊断LED灯



EtherCAT

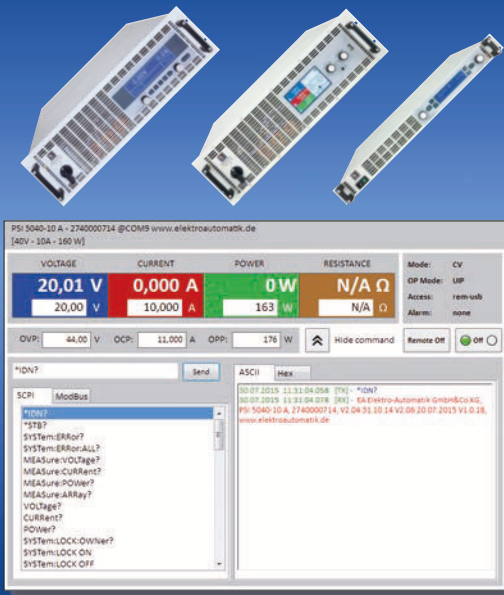
- Type: EA-IF-AB-ECT (Ord. No. 35400112)
- Basic EtherCAT slave
- CANopen protocol (CoE)
- PDOs and SDO
- Diagnostic LEDs on the body





电子负载与电源用软件

Software for electronic loads and power supplies



EA Power Control (EAPC)是一款基于Windows操作的图形控制界面，适用于自2012年生产的且支持ModBus-RTU协议的产品系列。它对电源与电子负载的支持方式一样，也可与USB和以太网数字接口配合操作。

EAPC支持下列产品系列（日期：2017年11月）：

- EA-ELR 5000, EA-ELR 9000
- EA-EL 9000 DT, EA-EL 9000 T
- EA-EL 9000 B, EA-EL 9000 B HP, EA-EL 9000 B 15U / 24U
- EA-PSI 9000 DT
- EA-PSI 5000, EA-PS 5000
- EA-PS 9000 1U / 2U / 3U
- EA-PSE 9000 3U
- EA-PSI 9000 2U / 3U / 15U / 24U
- EA-PS 9000 T
- EA-PSB 9000
- EA-PS 3000 C / EA-EL 3000 B

2017年11月更新的免费版，会随所有上述产品系列一同发货，它可使用户在分开的视窗下手动控制与监控多达10台产品，也可直接输入指令(SCPI 与 ModBus RTU)，进行半自动表格控制排序，以及数据记录-称为记录。

收费版软件还有下列功能可解锁：

- “多功能控制”可在一个视窗下同时控制并监控多达20台产品，还有函数发生器与排序&数据记录的远程控制。
- “图形”在以图表形式描绘实际值与设定值。
- 函数发生器的远程控制，只有特定几个系列才有。它含所有系列的所有函数。

还可选择为支持的产品系列安装隔间更新软件。

The Windows software **EA Power Control (EAPC)** is a graphical control interface for all recent device series since 2012 which support the ModBus RTU protocol. It supports power supply devices the same way as electronic loads and can be used with the digital interfaces USB and Ethernet.

Following device series are supported by EAPC: (date: November, 2017)

- EA-ELR 5000, EA-ELR 9000
- EA-EL 9000 DT, EA-EL 9000 T
- EA-EL 9000 B, EA-EL 9000 B HP, EA-EL 9000 B 15U / 24U
- EA-PSI 9000 DT
- EA-PSI 5000, EA-PS 5000
- EA-PS 9000 1U / 2U / 3U
- EA-PSE 9000 3U
- EA-PSI 9000 2U / 3U / 15U / 24U
- EA-PS 9000 T

With date November, 2017 the free version of the software, which is shipped with all of the listed series, offers manual control and monitoring of up to 10 devices in separate windows, direct input of commands (SCPI and ModBus RTU), the semi-automatic table control **Sequencing** and a data recording feature named **Logging**.

Further, not free-of-charge features can be unlocked:

- “**Multi Control**” allows for the control and monitoring of up to 20 units at once in one window, combined with the remote control of the function generator and sequencing & logging
- The “**Graph**” visualises actual and set values graphically
- Remote control of the function generator, as featured with selected series. It includes all functions of all series.

There is furthermore the option to install firmware updates for the supported device series.

EA Power Control iOS App

手机版
Tablet version



A

B

C

D

E

预计2018年第一季度发布的苹果iOS应用 **EA Power Control** (EAPC) 是专为运行iOS10或更新版的苹果iPad而设计的图形控制界面。这个APP将支持自2012年发布的多数电源与电子负载系列，只要能经内置或可选以太网接口将其集成到以太网网络中。iPad可以连到同一网络，从而查找到相关产品。

此EAPC将支持下列产品系列：

- EA-ELR 5000, EA-ELR 9000
- EA-EL 9000 DT, EA-EL 9000 T
- EA-EL 9000 B, EA-EL 9000 B HP, EA-EL 9000 B 15U / 24U
- EA-PSI 9000 DT
- EA-PSI 5000
- EA-PS 9000 1U / 2U / 3U
- EA-PSE 9000 3U
- EA-PSI 9000 2U / 3U / 15U / 24U
- EA-PS 9000 T
- EA-PSB 9000
- EA-PS 3000 C / EA-EL 3000 B

此APP可以处理手动控制、监控、指令(SCPI 与 ModBus RTU)的直接输入，进行半自动表格控制“排序”，以及数据记录-称为“记录”。执行这些功能的所需文档可以导入，或者通过常用的共享服务，如：共享文档，云服务或电子邮件，从表格导出。可以随时查看、控制网络中的其中一台设备，还能随时切换到其它设备。

在App商店可下载免费标准版。2018年还会提供一个跟完全解锁的Windows版具有差不多功能的Pro版，比如：它也有可视化“图标”，函数发生器的远程控制，含电池测试与光伏测试函数，以及“多台控制”。后者还能在平板界面处理多达20台产品，能进行平行控制多台或所有设备，进行数值的设定，或者“排序”与“数据记录”。

Scheduled to be released in first quarter of 2018, the new Apple iOS application **EA Power Control** (EAPC) will be a graphical control interface for Apple iPads running iOS version 10 or newer. The app will support most power supply and electronic load series released since 2012, as long as they can be integrated into an Ethernet network via a built-in or optionally available Ethernet interface. The iPad would then be connected to the same network in order to find the devices.

Following device series are supported by EAPC:

- EA-ELR 5000, EA-ELR 9000
- EA-EL 9000 DT, EA-EL 9000 T
- EA-EL 9000 B, EA-EL 9000 B HP, EA-EL 9000 B 15U / 24U
- EA-PSI 9000 DT
- EA-PSI 5000
- EA-PS 9000 1U / 2U / 3U
- EA-PSE 9000 3U
- EA-PSI 9000 2U / 3U / 15U / 24U
- EA-PS 9000 T
- EA-PSB 9000
- EA-PS 3000 C / EA-EL 3000 B

The app will offer manual control, monitoring, direct input of commands (SCPI and ModBus RTU), the semi-automatic table control “**Sequencing**” and a data recording feature called “**Logging**”. The files required for these features can be imported to and exported from the table using the common Share services, such as Files, iCloud or eMail. One out of x units in the network can be viewed and controlled, while switching to other units is easily done at any time.

The standard version will be available in the App Store free of charge. Coming up in 2018, there will be a Pro version with almost the same features as the fully unlocked Windows version of EA Power Control, such as the visualising “**Graph**”, the remote control of the function generator (featured in many series), which includes a battery test and also photovoltaics test function, and “**Multi Control**”. The latter offers the possibility to handle up to 20 units at once on the tablet screen, with functions for parallel control, value setting or “**Sequencing**” and “**Logging**” of some or all units.

Option CAB (机柜 / Cabinets)



47U高的19" 机柜套件

19" cabinets as kit in up to 42U



90 - 150 kW系统 / 90 - 150 kW System



450 kW系统 / 450 kW System

概要

按客户规格，可组建总功率高达90 kW至480 kW的机柜系统，且符合EN/IEC 60204-1:2006，供有两种标准的机柜尺寸24 U至42 U，适合以下19"外壳的电源和电子负载系列：

- EA- PSI 9000 3U / EA- PSI 9000 WR 3U
- EA- PS 9000 3U
- EA- PSE 9000 3U
- EA- EL 9000 B
- EA- ELR 9000 / EA- ELR 9000 HP
- EA- PSB 9000

还可按客户需求，可以安装到其它尺寸（高度/深度）的机柜内，或者混合组合的机柜系统。

配置

此类机柜通常按客户规格预先配置好。根据机柜类型与设置，每个机柜最多可装10台产品。一般是直流端并联在一起，但是也可以基于直流输出端或直流输入端将系统配置成可以单独使用每一台机器的形式（多通道供电源或吸收源）。还可将并联组或混合产品型号，组装在一个机柜内，形成供电-吸收系统。

一个系统基本由机柜，交流端与直流总线（一般为铜条）组成。

General

Cabinet systems with a total power rating of 90 kW to 480 kW, built to customer specification, also compliant to EN/IEC 60204-1:2006, are available in the two standard sizes 24 U and 42 U, made for following power supply or electronic load series with 19" enclosure:

- EA-PSI 9000 3U / EA-PSI 9000 WR 3U
- EA- PS 9000 3U
- EA- PSE 9000 3U
- EA- EL 9000 B
- EA- ELR 9000 / EA-ELR 9000 HP
- EA-PSB 9000

Configurations for other cabinet sizes (height/depth), as well as mixed installation of devices upon request.

Configuration

The cabinets are always preconfigured according the customer's specification. Depending on the cabinet type and setup, up to 10 units can be equipped per system. **Parallel connection** of the DC side is default, but it is also possible to configure the system to use all units separately (**multi-channel** source or sink), regarding their DC output or DC input. It is furthermore possible to build groups of parallel units or mixed device types to have a **source-sink** system within one cabinet.

A base system consists of the cabinet, AC terminal and DC bus (usually copper bars).

Option CAB (机柜 / Cabinets)

与市电的连接

电源组机柜，回馈式电子负载机柜或者两种设备的混合机柜上都有单相或三相电网连接端。根据产生的交流电电流，也可提供带电源线与**CEE plug** (16 A, 32 A 或 63 A)插头的机柜。

标准的电子负载仅需很小的交流电流，因此一般只提供标准的电源线。

多机柜系统

可以将三个全装满产品的机柜并联起来运行，从而获得高达**450 kW**的总功率。但每个机柜限定最大电流为**900 A**，总电流为**2700 A**。意思是并非所有产品型号都能组成**450 kW**的系统。本系统包含所有连到机柜直流总线，以及共享总线与主-从端子的连线。

直流端的连接

默认情况下，**DC**连接端（或直流总线端）通过铜条与高压连接线将机柜内所有产品并联在一起，组成高压系统。直流总线可直接连接到螺丝端。多机柜系统方案将有至多三个直流总线，经连接线把机柜与机柜并联。

功率

根据基础系统、配置以及所选型号，每个机柜可组成高达**180 kW**的总功率。多机柜系统则可达到，单机柜的总电流最大为**900 A**，总系统的总电流高达**2700 A**。其它配置则可以让每个机柜达到**6120 A**。

安规标准与TÜV认证

可按客户要求，将所供机柜依照**IEC/EN 60204-1:2006+A1+A10**标准组建。甚至还可执行深度**TÜV** 认证测试，并提供书面测试报告，或者对完全组建好的机柜执行现场测试（技术检测与目检），并做一份证书。

安规标准

机柜结构可以确保人身的高度安全。比如，对可能出现高压的直流总线上安装保护盖。

对于其它情况与额外的安全需求，还可安装**紧急关闭系统**，遇到紧急情况它能将整个机柜与市电切断。打开机柜后门时，既可以通过**开关**手动断电，或者通过**门触器（内锁回路）**切断。

软件支持

机柜系统还支持**EA Power Control**软件（见页面136），不论它是否配置了主-从。该软件可以监控和控制多台产品，以及记录数据。

对于客户特定应用与软件项目，还有**LabView VIs**软件，经**USB**或**以太网**端口可以快速应用到系统主机上。

Grid connection

Cabinets for power supplies, recuperating electronic loads or mixed system of both device types feature a one-phase or **three-phase** power grid connection terminal. Depending on the resulting AC supply current, a cabinet can also be delivered with a supply cable and **CEE plug** (16 A, 32 A or 63 A). Standard electronic loads, which only require small AC currents, are usually delivered with a **standard mains cord**.

Multi-cabinet systems

It is possible to connect and run up to three fully equipped cabinets in parallel, achieving a total power of **up to 450 kW**, but with the limitation of a max. current of 900 A per cabinet and 2700 A in total. It means that not all device models are eligible for a 450 kW system. The system includes all cables required to connect the DC bus of the cabinet, as well as those for Share bus and master-slave.

DC connection

By default, the DC connection (or DC bus) connects all units in parallel with coppers bars resp. additional high voltage cables for high voltage systems. The DC bus is directly accessible on screw points.

The multi-cabinet solutions can have up to three DC buses which are connected in parallel from cabinet to cabinet via cables.

Power and current ratings

Depending on the base system, its configuration and the selected device models, a total power of up to 180 kW per cabinet can be achieved. The multi-cabinet systems with up to 450 kW are available in max. 900 A total current per cabinet or up to 2700 A max. total current per system. Other configurations allow for up to 6120 A per cabinet.

Standards & TÜV approval

The cabinets can be manufactured according to **IEC/EN 60204-1:2006+A1+A10** upon request. There is furthermore the option to have the TÜV perform an extensive approval test including a written test report, or to have them perform an on-location test on the finalised cabinet (technical and visual inspection), resulting in a conformity certificate.

Safety

The construction of the cabinets ensures high safety for persons. This is, for example, achieved by protective covers being installed on the DC bus by default, because there high voltage can be present.

For other situations and additional safety, the cabinets can be equipped with an **emergency off system** which can cut off the entire cabinet from AC supply in case of an emergency. The cut-off is either initiated manually with a **switch** or by door contacts (**interlock loop**) when opening the cabinet rear doors.

Software support

The cabinet systems are supported by the software **EA Power Control** (see page 136), no matter if configured for master-slave or not. This software can monitor and control the unit(s), as well as record data.

For custom applications and software projects, there are **LabView VIs** available, which allow for fast implementation of the system master device via **USB** or **Ethernet**.



Option CAB (Cabinets / 可选件： 机柜)



配套系统

基本上机柜系统一般由一个机柜、一至十台产品以及连线组成。但是还有其它更多选择，可见下表。可根据应用需求选择机柜系统。所需总功率决定使用产品的数量，而产品数量决定机柜的高度。大电流会增加铜条的尺寸和重量，高电压则必须使用高压连接线，用于直流端之间的连接。紧急关闭电路至少需要一个接触器，具有电网保护的系統至少需两个接触器。

Kit system

Basically, the cabinet system consists of a cabinet, one thru ten units and cabling. But there are various options available, see tables below. The cabinet system is selected according to the requirements of the application. The expected total power determines the number of units while the number of units determines the height of the cabinet. High currents will increase the size and weight of the copper bars, high voltages will force the use of high voltage cables which are combined on the DC connection terminal. Emergency-off circuits require at least one contactor, system with grid protection already at least two contactors.

机柜

Cabinets

技术参数		基本系统 1 / Base system 1		基本系统 2 / Base system 2			
型号	Type	EA		Rittal TS8			
宽度	Width	600 mm		600 mm			
深度	Depth	1000 mm		1000 mm			
3P供电端连接	Supply connection 3P	三相电端子 / Three-phase terminal		三相电端子 / Three-phase terminal			
3P供电电压	Supply voltage 3P	400 V AC		400 V AC			
1P供电端连接	Supply connection 1P	带IEC端子的电源线 / IEC mains cord		-			
1P供电电压	Supply voltage 1P	230 V AC		-			
机柜高度(U)	Height cabinet (U)	15	24	38	42	3x 42	47
可连接的最多数量	Number of max. devices	3	6	8	10	30	12
可达到的最大功率 ⁽¹⁾	Maximum achievable power ⁽²⁾	45 kW	90 kW	120 kW	150 kW	450 kW	180 kW

(1) 取决于单台产品的额定功率 / Depending on the nominal power of the single devices

零配件

Components

类别 / Category	描述	Description
机械件 / Mechanics	轮子套件120 mm (2个固定, 2个可滑动) 3U或6U机柜的上盖, 可当前板或后板用, 有带通风槽或无通风槽的版本	Wheel set 125 mm (2x fixed, 2x steerable) Cover panel 3U or 6U, for front or rear use, with or without air ventilation slots
输入保险丝 / Input fuses	三相输入断路器, 16 A/32 A/63 A, K型	Input breaker 3-phase, for 16 A/32 A/63 A, characteristic K
电网连接 / Grid connection	400 V CEE插头, 最大16 A/32 A/63 A, 三相输入用, 或多个Schuko电源排插 (电子负载用)	CEE plug 400 V, max. 16 A/32 A/63 A, for 3-phase input or multi Schuko power strip for electronic loads
安全部件 / Safety	紧急开关 (表面安装件), 带旋扭并/或外部接触器, 也带接触器加辅助电源	Emergency off switch (surface mount), with knob and/or ext. contact, also with contactor plus aux. power supply
直流端连接 / DC connection	铜条或高压线	Copper bars or high voltage cables
水冷 / Water cooling	带水龙头, 端口的水冷用整套套件, 代替风冷系统	Complete set with tap, ports and hoses for water cooling connection instead of air cooling
远程控制 / Remote control	模拟接口用隔离放大器, 1个通道	Galvanic Insulation amplifier for analog interface, 1-4 channels
	模拟接口用主-从连线	Master-slave wiring for analog interface
	数字接口卡, 带电线, 比如CAN	Digital interface cards, installed & wired (for example CAN)
共享总线放大器 / Share Bus amplifier	并联两个或三个机柜时用, 在主从操作下最多只能连接32台产品	For parallel connection of two or three cabinets and max. 32 devices in master-slave operation
电网连接 / Grid connection	带接触器的监控设备, 当运行能量反馈式负载产品时, 用其监控电网质量	Supervision unit with contactors, used to monitor grid quality when running energy recovering load devices
隔离保护 / Isolation guard	对未接地系统监控直流与外壳见的绝缘阻值	Monitor for the isolation resistance between DC and enclosure in unearthed systems

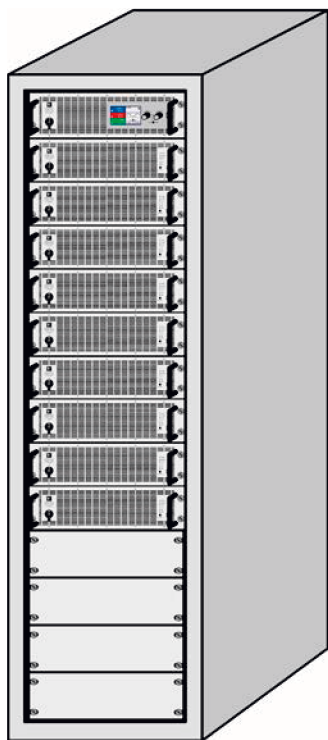
提示: 按要求还可供机柜组装用其它部件, 如通风系统, 玻璃门等

Note: further components for cabinets, such as exhaust systems, glass doors etc. are available upon request

Option CAB (Cabinets / 可选件：机柜)

配置范例⁽¹⁾

Example configurations⁽¹⁾

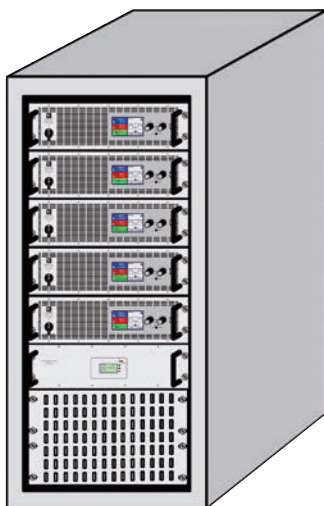


例 1:

这个42U机柜，由10台3U高的电源组合而成，如PSI 9000 3U系列。每台机的最大功率为15 kW，则整个机柜的总功率将可达150 kW。可获得高达5100 A的大电流，能应用于电镀或焊接领域。

Example 1:

42U cabinet, equipped with 10 units of power supplies in 3U height, for example PSI 9000 3U series. With a maximum of 15 kW per unit, the cabinet has a total power of 150 kW. High currents of up to 5100 A can be used for electroplating or welding.

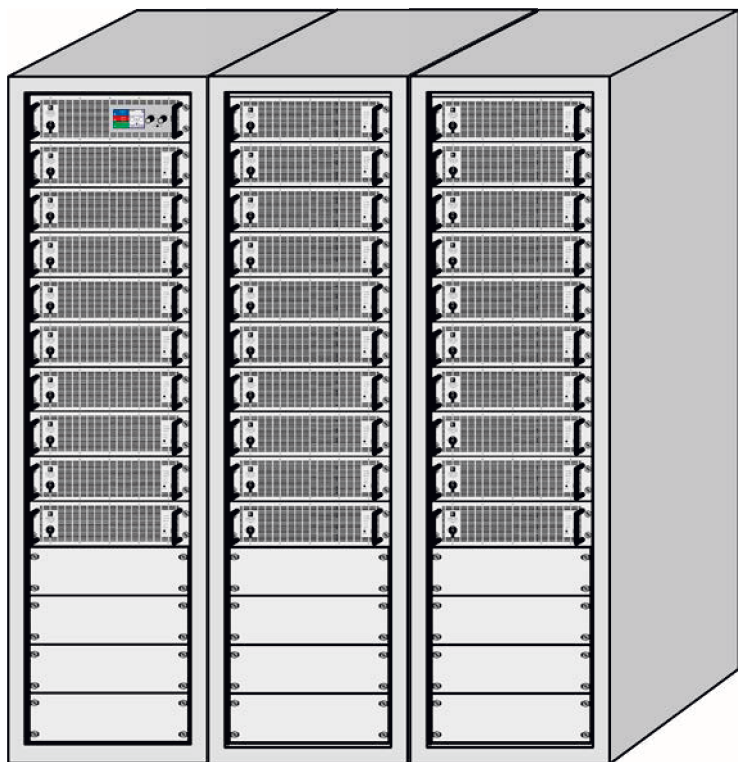


例 2:

这个24U机柜，由5台3U高的ELR 9000电子负载组合而成。每台机的最大输入功率为10.5 kW，则整个机柜的总功率可达52.5 kW。可获得高达2050 A的大电流，能应用于大容量电池的测试或其它高性能的电源产品上。

Example 2:

24U cabinet, equipped with 5 units of electronic loads ELR 9000 in 3U height, plus an automatic insulation unit. With up to 10.5 kW input power per unit, the cabinet can take a total power of max 52.5 kW. High currents of up to 2050 A can be used to test high capacity batteries or other high performance power sources.



例 3:

一个由三个机柜组成的450 kW系统，每个机柜内装10台产品。所有者30台产品都并联，且只有一台是带显示器与控制面板的主机，其它机器都为从机。系统的配置、控制与操作全部都在主机上完成，且会向用户显示相应的设定值，实际值与状态。假设系统内安装的全部为EA-PSI 9500-9 3U与EA-PSI 9500-90 3U Slave，则额定总值为500 V，2700 A与450 kW。

Example 3:

450 kW system, consisting of three cabinets with 10 units each. All 30 units are connected in parallel, while there is one master unit with display and control panel and all other units are slave devices. Configuration, control and handling of the system is all done at the master which in regard of set values, actual values and status would represent itself to the user accordingly. Given, the system would be equipped with all EA-PSI 9500-90 3U resp. EA-PSI 9500-3U Slave, it would have the ratings 500 V, 2700 A and 450 kW.

⁽¹⁾ 42U机柜中12U以下的空间都是用来内部连线，装保险与接触器用 /
The lower 12 U of the 42 U cabinets are used for internal wiring, fuses and contactors

Option CAB (Cabinets / 可选件：机柜)



应用举例

Example applications

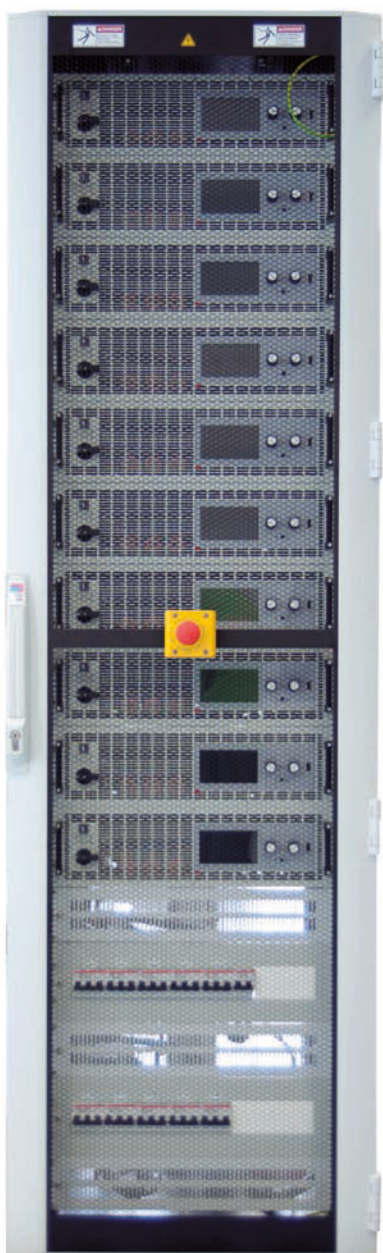
A

B

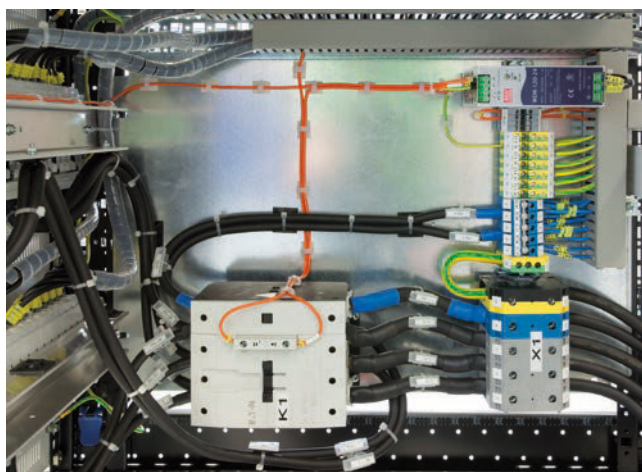
C

D

E



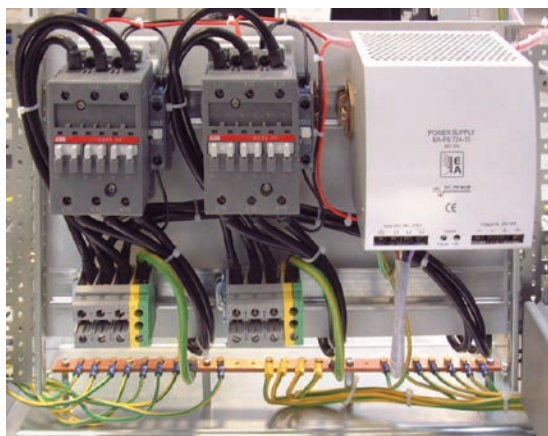
带紧急关闭装置的42U机柜，内配10x ELR 9000 /
42U cabinet with emergency off and 10x ELR 9000



带两个独立紧急关闭接触器的交流输入面板 /
AC input panel with two separate emergency off contactors



带水冷装置的混合机柜系统 /
Mixed system with water cooling

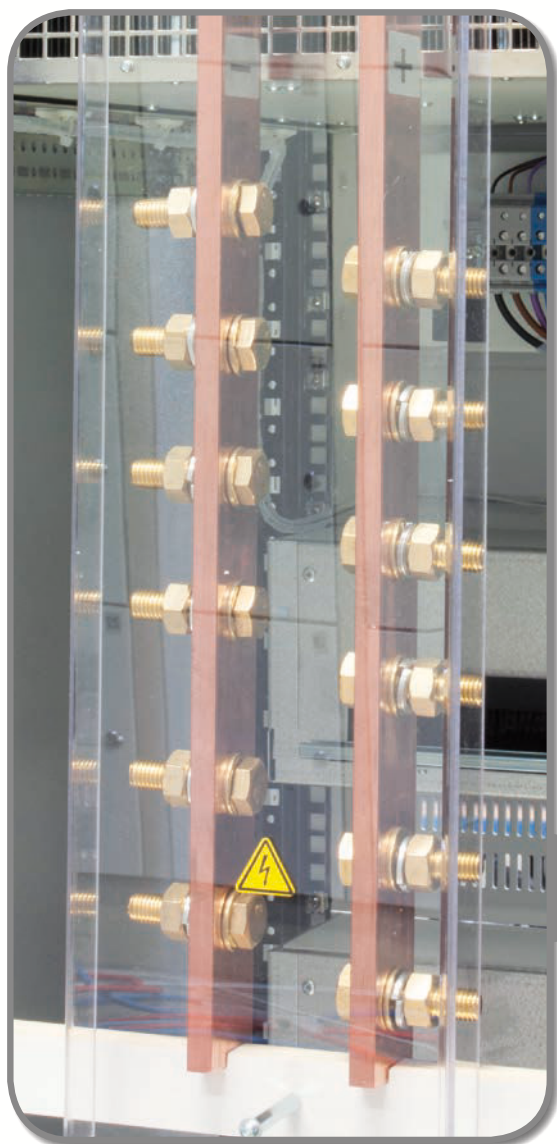


带自动隔离器接触片的交流输入面板 /
AC input panel with contactors of the automatic insulation unit

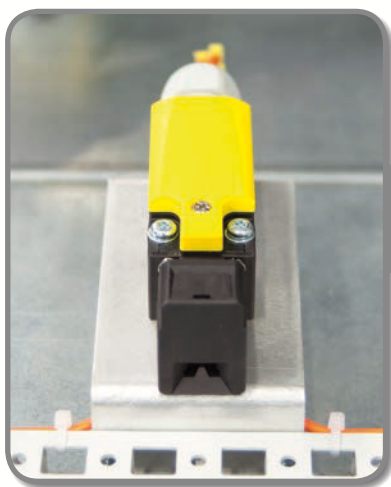


配断路保护器的交流输入面板 /
AC input panel with breakers

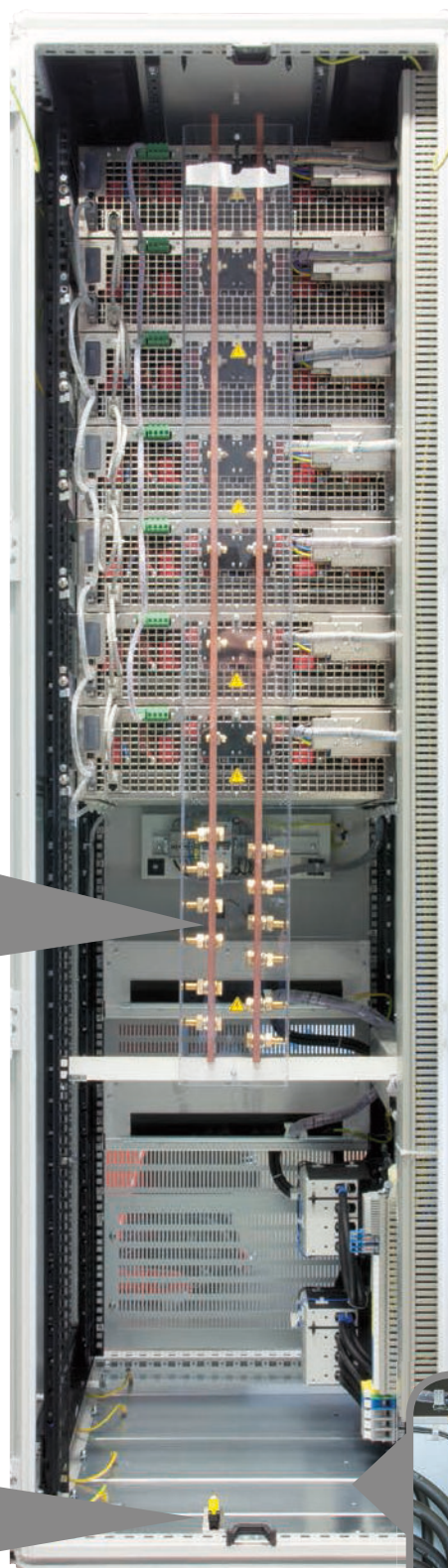
Option CAB (Cabinets / 可选件：机柜)



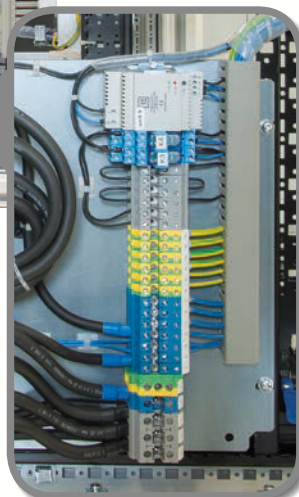
直流螺丝端 /
DC screw terminal



门触点(联锁) /
Door contact (Interlock)



交流输入螺丝端 /
AC input screw terminals

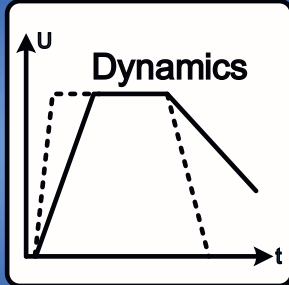


Option HS (高速跃变)



通过减少输出电容增加动态跃变

Increased dynamics by reduced output capacitance



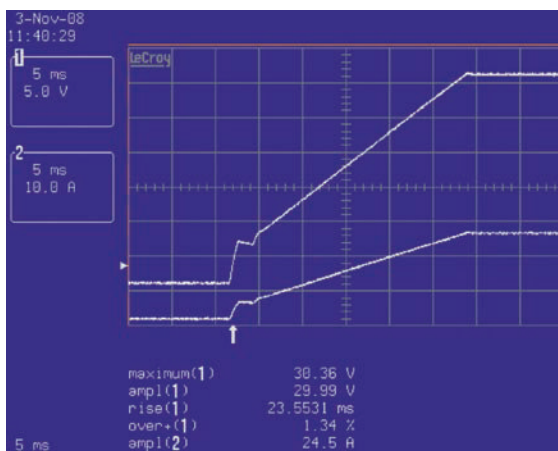
更优化的调整速度

为了在最短上升和下降时间内达到快速电压变化，可按客户需求在生产时减小直流输出端的滤波电容。

滤波量的减小，加上外部电子负载，可使输出电压在不到1 ms的时间内完成从0...100%上跃，在少于2 ms的时间从100...0%下降。根据电源型号的不同，所需最小的电容容量也会不同。

必须注意的是，减小滤波量会使输出纹波升高。该选项适用于每个应用。

下图为正常输出滤波量（左图）和减少滤波量（右图）的跃变时间的对比。



高速跃变适合下面产品系列：

- PSI 9000 2U
- PSI 9000 3U
- PS 9000 2U
- PS 9000 3U

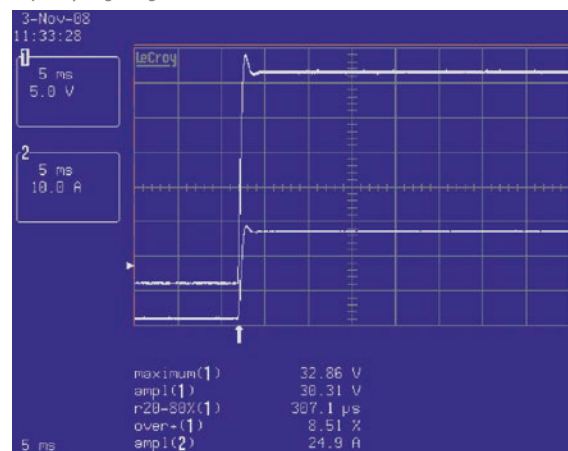
Improved regulation speed

In order to achieve rapid voltage changes with minimal ramp up and down times, the filter capacity on the DC output of certain power supply series can be reduced during production and upon request.

This reduction, combined with an external electronic load, can result in ramp-up times for 0-100% output voltage of less than 1 ms and ramp-down times for 100-0% of less than 2 ms. It depends on the power supply model and the minimum required capacity.

It has to be noted that a reduction in filter capacity results in a higher output ripple. The option is thus suitable for every kind of application.

Visualisation of the ramp time with normal (left figure) and reduced output capacity (right figure):



High-Speed is available for following series:

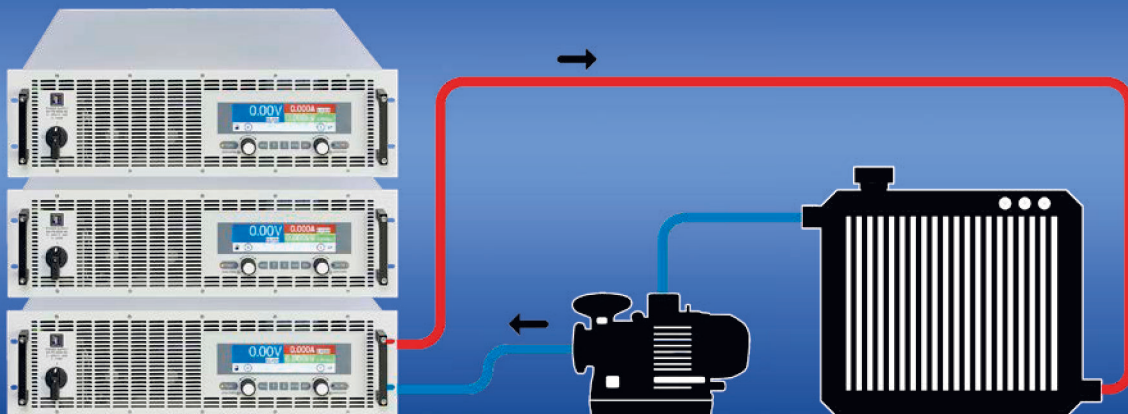
- PSI 9000 2U
- PSI 9000 3U
- PS 9000 2U
- PS 9000 3U

Option WC (Water cooling-水冷选项)



电子负载与电源用水冷选项

Water cooling for loads and power supplies



水冷选项

电子负载运行时会产生大量的热，而电源也会产生相当大的功耗。这类设备通常都配有温控风扇运行的空气冷却系统，应能使产品内部温度保持在允许范围内，但缺点是噪音很大。

另外，针对特定系列和型号，可在生产过程中为功率模块配一可选水冷块。冷却块有一内部铜管，在产品后部以水龙头的形式引出。

水冷选项允许产品在比平常更高的环境温度下运行，而不会由于过热而临时关闭。同时，水冷却系统的噪音要小得多。

下面这些系列可配上**水冷选项**。

- EA-PS 9000 3U
- EA-PSB 9000 3U
- EA-PSI 9000 3U
- EA-PSI 9000 15/24U
- EA-PSI 9000 WR 3U
- EA-EL 9000 B
- EA-EL 9000 B 15/24U
- EA-ELR 9000 HP

* 按需咨询价格与最小订购量。

Alternative cooling

Electronic loads can produce an immense amount of heat, while power supplies also produce a considerable power dissipation. Such devices are usually equipped with an air cooling system run by temperature controlled fan, which are supposed to keep internal temperature within the allowed range, but with the disadvantage of intense noise.

Alternatively, specific series and models can be equipped with an optional water cooling block for the power stages during production. The cooling block has an internal copper tube which is led out in form of water hose taps on the rear of the units.

The water cooling option allows to run the devices in even higher ambient temperatures than usual without the risk of temporary shutdowns due to overheating. At the same time, a water cooling system is much less noisy.

These series can be equipped with **option WC**:

- EA-PS 9000 3U
- EA-PSB 9000 3U
- EA-PSI 9000 3U
- EA-PSI 9000 15/24U
- EA-PSI 9000 WR 3U
- EA-EL 9000 B
- EA-EL 9000 B 15/24U
- EA-ELR 9000 HP

* Price and MOQ upon request.



函数发生器

部分电源与电子负载系列本机配备的函数发生器，为直流输入或输出电压与电流提供标准函数（如：正弦，方形）或特殊函数（DIN 40835，光伏，燃料电池）。还可调节多个参数，如：振幅，时间，频率等。

高速跃变

为了增加电压和电流的输出动态特性，可对产品内部进行永久变更，将输出容量减至最小值。该变更可使输出电压的上升和下降时间缩至最短，但同时会带来负面影响，即：电压和电流的纹波会增加。部分电源系列配备该功能。

OT/OTP

过温的简称。这是一个报警条件，指示出产品过热。在此条件下，功率端会暂时关闭，当产品冷却后自动恢复工作（正常工作）。然后报警指示会消失。

OCP

过流保护的简称。指示可调电流极限被超过，它会关闭直流输出或直流输入，而恒流极限仅能将输出电流限制到可调值。

OVP

过压保护的简称。指示可调电压极限被超过，它会关闭直流输出或输入，以便保护应用设备免受危险电压的损坏。

OPP

过功率保护的简称。它会将超过的（一般）功率极限值指示出来，通常会关闭直流输出或输入，以便保护应用设备被损坏。

PF

电源故障的简称。它表示产品AC输入部分故障，或者AC供电端过压或欠压。在此状态下，功率输入与输出端会关闭。

Function generator

The function generator, as included with certain series of power supplies and electronic loads, provides an option to apply a standard function (e.g. sine, square) or special functions (DIN 40835, photovoltaics, fuel cell) to the DC input resp. DC output value of voltage or current. It also offers to adjust various parameters, such as amplitude, time, frequency etc.

High speed ramping

Device internal and permanent modification where the output capacities are reduced to a minimum value in order to increase the dynamics of the output regarding voltage and current. With this optional modification, the rise and fall time of the output voltage minimizes significantly while at the same time the voltage and current ripples are increased, as a negative side effect. This option is available for selected power supply series.

OT/OTP

Short for overtemperature. This is an alarm condition, which indicates overheating of a device. In this condition the power stages are deactivated temporarily and will continue to work (usually) automatically after cooling down. Then the alarm indication will be erased.

OCP

Short for overcurrent protection. A feature that indicates the exceedance of an (usually) adjustable current threshold, which switches the DC output or DC input off, contrary to the constant current limitation which only limits the output current to the adjusted value.

OVP

Short for overvoltage protection. A feature that indicates the exceedance of an (usually) adjustable voltage threshold, which always switches the DC output or input off, in order to protect an application from dangerous voltage.

OPP

Short for overpower protection. A feature that indicates the exceedance of an (usually) adjustable power threshold, which always switches the DC output or input off, in order to protect an application from dangerous power consumption or supply.

PF

Short for power fail. A feature which signals the defect of the AC input part of a device or the condition of over- or undervoltage of AC supply. During this condition, the power output resp. input is shut off.

一级代理商



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