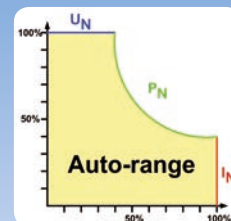




EA-PSI 9000 DT 320 W - 1500 W

低噪音实验室直流电源 / LOW NOISE LABORATORY DC POWER SUPPLIES



Low Noise

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：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
- 功率自动调整输出*
- 有过压保护 (OVP)
- 有过温保护 (OT)
- 触摸屏显示器显示所有数值、状态与提示信息
- 隔离模拟接口
 - 通过 0...10 V或0...5 V电压可对U / I / P / R编程
 - 通过 0...10 V或0...5 V电压可监控U / I
- 内置USB端口与以太网端口 (电隔离)
- 内置函数发生器
- 光伏阵列模拟
- 内阻模拟与调节
- 低噪音
- 带提手与斜撑架的桌面式外壳
- 40 V型号符合SELV (EN 60950)
- 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，为用户提供友好、交互式操作理念，配有一系列标准功能。输出参数，监控功能与其它设定的排布整齐且舒服。

所有输出参数的监控功能可以减少测试设备，几乎不需安装外部监控硬件与软件。

控制面板上配有两个旋钮，一个按钮，两个 LED 灯。触摸屏为彩显屏，上面显示所有重要数值与状态，用户仅通过手指的几次接触就能方便地操作它。

若集成到半自动与远程控制测试台与自动化系统，本产品的后板还有一组接口（模拟与数字）。

- 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*
- Overvoltage protection (OVP)
- Overtemperature protection (OT)
- Intuitive touch panel with display for all values, status and functions
- Galvanically isolated analog interface with
 - U / I / P / R programmable via 0...10 V or 0...5 V
 - U / I monitoring via 0...10 V or 0...5 V
- USB port and Ethernet built in (galv. isolated)
- Integrated function generator
- Photovoltaic array simulation
- Internal resistance simulation and regulation
- Low noise
- Desktop enclosure with carrying handle and tilt stand
- 40 V models compliant to SELV (EN 60950)
- Discharge circuit ($U_{out} < 60 V$ in $\leq 10 s$)
- 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. 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.

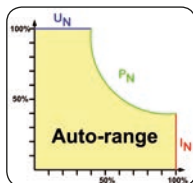


交流输入

本系列采用主动式功率因数校正，使产品在全世界范围内都适用，输入电压为90 V_{AC}至264 V_{AC}。功率为1.5 kW的型号在输入电压低于150 V_{AC}时总输出功率将降至1 kW。

功率段自动分布

本系列所有型号的输出功率都可灵活调整。可在低电流时输出高电压，或在低电压时输出大电流，但总限定在最大额定输出功率的范围内。这些型号的最大设定功率也可调。因此，仅用一台产品却能应用于广范围的应用中。



直流输出

本系列有多款不同型号，可选择0...40 V和0...750 V输出电压，0...4 A和0...60 A输出电流，320 W和0...1500 W输出功率的型号。

因此不论通过手动还是远程控制（模拟或数字接口），都可对0%至100%之间的电流、电压与功率连续调节。输出端位于产品前面板。

与其他电源系列相比，PSI 9000 DT系列还有一额外的内置输出滤波器，它使产品纹波减至更低，所以直流输出电压的噪音也很低。

放电电路

额定输出电压为200 V或以上的产品对其输出电容配有一放电电路。在空载或带很小负载的情况下，它能保证危险的输出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身安全有危险的极限电压。

保护功能 (OVP)

为保护连接负载，可设定一过压保护极限值(OVP)，以及过流保护极限值(OCP)与过功率保护极限值(OPP)。

若因故达到这些极限值，直流输出立即被关断，显示器和模拟接口发出一状态信号。

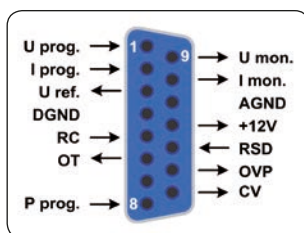
还有一过温保护功能，当产品过热时也会关闭直流输出。

远程感测

远程感测输入端可直接连到负载设备，以补偿连线上的压降。如果输入端已接上负载，本电源会自动检测并调整输出电压，以确保负载获得准确所需的电压值。

内置模拟接口

内置模拟接口位于产品后面板。它提供有模拟接口输入脚，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。模拟输出端接上0 V...10 V或0 V...5 V电压，可监控输出电压与电流。此外，还有几个输入脚和输出脚，用来控制和监控产品状态。



AC Input

The equipment uses an active **Power Factor Correction** to enable using it worldwide 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 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 sense input can be connected directly to the load in order to compensate voltage drops along the cables. If the sense 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.

Built-in analog interface

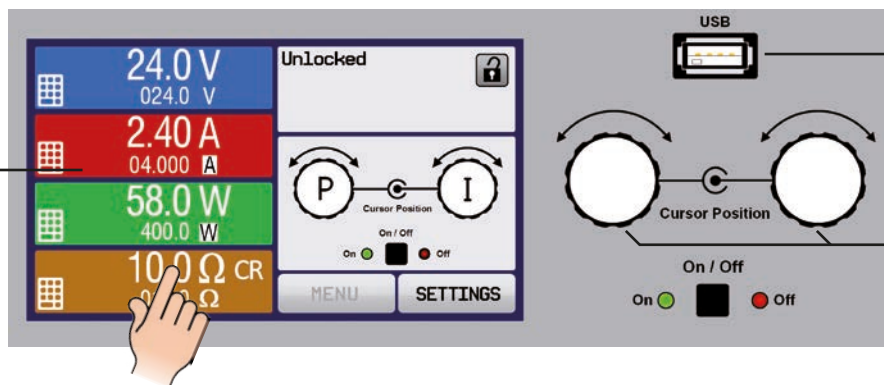
There is a galvanically isolated analog interface terminal, located on the rear of the device. It offers analog inputs to set voltage, current and power from 0...100% through control voltages of 0 V...10 V or 0 V...5 V. To monitor the output voltage and current, there are analog outputs with voltage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



显示器与控制面板

Display and control panel

触摸屏显示器
Display with touch panel



上传与保存函数用
USB端口
USB port for loading and
saving functions

数值调节用旋钮
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彩屏上。彩色的TFT屏幕为触摸式，用手指能控制产品所有功能。

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.

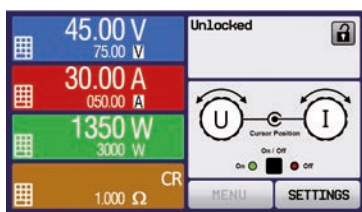
通过旋钮，或者数字键盘直接输入参数，也可调节设定电压、电流、功率或阻止（内阻模拟）。

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



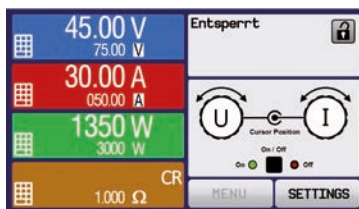
英文 / English



中文 / Chinese



俄文 / Russian



德文 / German

函数发生器

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

Function manager

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.

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

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



三角形
Triangle



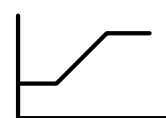
矩形
Rectangle



梯形
Trapezoid



正弦
Sine



阶跃式
Ramp



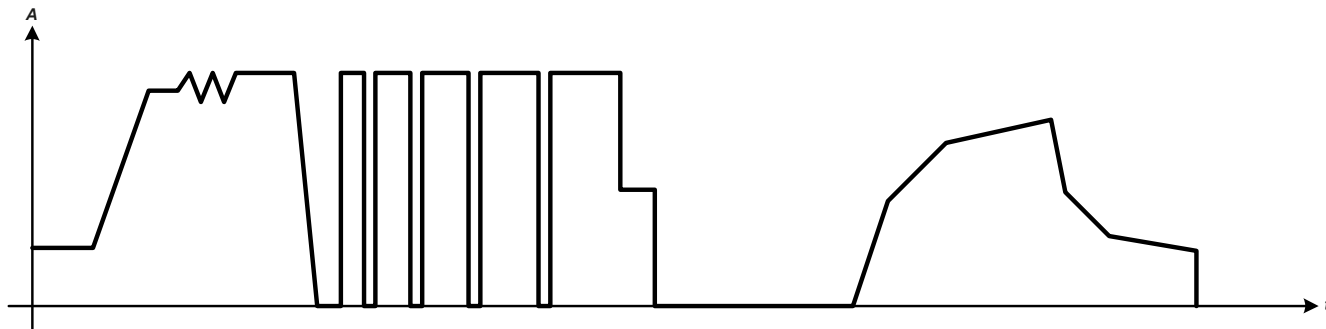
DIN 40839



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

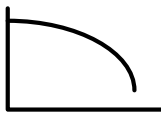
通过产品前板的USB端口可以从标准的U盘上传序列或者存储序列，从而可在不同的测试序列间变换。

我们可以虚构一个复杂函数的例子（40个序列），假设它在任意发生器下实践。可以在产品上创建该函数，也可从外部上传或保存：



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

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



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.

输出值的预设

在不影响输出状态的条件下可预设输出状态，这些参数也显示于显示器上，于实际值的下方。

用户通过该功能可预设期望的电压、电流和功率值。用旋钮完成，或者直接从触摸屏上输入。有五个用户配置文档供用户选择，只需激活另外一个不同的配置文档，就可在常用设定值间轻易转换。

监控功能

本系列所有型号都具有电压与电流曲线监控功能。可以对其进行配置，以便监控过压与过流，或者欠压与欠流。其反馈形式，可通过下面几种可选形式来通知：

- 仅显示信号，即使错误仍然存在，也不影响输出
- 警告信息一直存在，错误移除后必须确认该信息方可
- 报警信息将关断输出

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。有一个界面显示所有设定值与实际值，SCPI与ModBus指令的直接输入模式，固件升级功能，以及被命名为“排序”的半自动化控制表格。

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 of this series offer supervision features for voltage and current steps. The supervision is configurable to monitor voltage or current over- and undershooting. 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

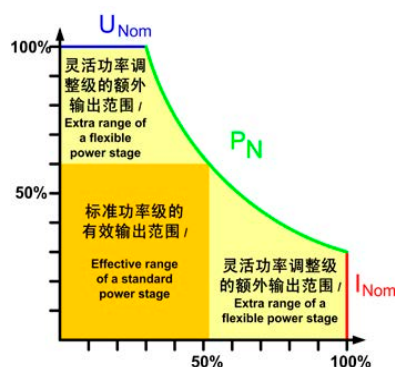
Control software

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 commands, a firmware update feature and the semi-automatic table control named "Sequencing".



技术参数	Technical Data	Series EA-PSI 9000 DT / 系列
AC输入电压	Input AC	
-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	Models / 1500 W型号: < 150 V AC 降至 / to P _{out max} 1000 W
DC输出电压	Output voltage DC	
-精确度	- Accuracy	<0.1%
-0-100% 的负载调整率	- Load regulation 0-100%	<0.05%
-±10% ΔU _{AC} 时的线性调整率	- Line regulation ±10% ΔU _{AC}	<0.02%
-负载从10%-100%调整需时	- Regulation 10-100% load	<2 ms
-负载从10-90%上升需时	- Rise time 10-90%	最长. 30 ms
-过压保护	- Overvoltage protection	可调, 范围为0...110% U _{nom} / Adjustable, 0...110% U _{nom}
输出电流	Output current	
-精确度	- Accuracy	<0.1%
-0-100% ΔU _{DC} 的负载调整率	- Load regulation 0-100% ΔU _{DC}	<0.15%
-±10% ΔU _{AC} 时的线性调整率	- Line regulation ±10% ΔU _{AC}	<0.05%
输出功率	Output power	
-精确度	- Accuracy	<1%
过压类别	Overvoltage category	2
保护功能	Protection	OT, OVP, OCP, OPP ⁽²⁾
隔离耐压	Isolation	
-输入对外壳	- Input to enclosure	2500 V DC
-输入对输出	- Input to output	2500 V DC
-输出对外壳	- 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	Pollution degree	2
保护级别	Protection class	1
模拟编程	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	- Input range	0...5 V 或 0...10 V (可转换) / 0...5 V or 0...10 V (switchable)
- U / I / P / R的精确度	- Accuracy U / I / P / R	0...10 V: <0.1% 0...5 V: <0.2%
串联操作	Series operation	可实现, 任意直流负极端对PE最大有400 V DC的电压转移 / Possible, with max. potential shift of 400 V DC of any DC minus against PE
并联操作	Parallel operation	经模拟接口可实现 / Possible, via analog interface
安全标准	Standards	EN 60950, EN 61326, EN 55022 等级 B / Class B
制冷	Cooling	风扇 / 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% 无凝结 / <80%, non-condensing
使用高度	Operation altitude	<2000 m
机械特征	Mechanics	
- 重量	- Weight	320 W - 650 W: ≈ 6.5 kg 1000 W - 1500 W: ≈ 7.5 kg
- 产品尺寸 (宽x高x长) ⁽¹⁾	- Dimensions (WxHxD) ⁽¹⁾	320 W - 650 W: 276x103x355 mm 1000 W - 1500 W: 276x103x415 mm

(1 仅为产品外壳主体尺寸 / Body only)



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 ⁽²⁾	编程 / Programming ⁽¹⁾			订购编号
Model	Voltage	Current	Power	Efficiency	Ripple U max.	Ripple I max.	U (typ.)	I (typ.)	P (typ.)	Ordering number
PSI 9040-20 DT	0...40 V	0...20 A	0...320 W	≤88%	12 mV _{pp} / 1.4 mV _{RMS}	2.2 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%	26 mV _{pp} / 3 mV _{RMS}	1.1 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%	43 mV _{pp} / 7 mV _{RMS}	0.4 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%	12 mV _{pp} / 1.4 mV _{RMS}	1.6 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%	14 mV _{pp} / 1.6 mV _{RMS}	1.2 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%	31 mV _{pp} / 5 mV _{RMS}	0.6 mA _{RMS}	7.6 mV	0.4 mA	0.024 W	06200505
PSI 9080-40 DT	0...80 V	0...40 A	0...1000 W	≤92%	6.8 mV _{pp} / 0.8 mV _{RMS}	1.8 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%	56 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%	94 mV _{pp} / 16 mV _{RMS}	2.7 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}	0.6 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%	58 mV _{pp} / 16 mV _{RMS}	0.4 mA _{RMS}	28.6 mV	0.2 mA	0.038 W	06200510
PSI 9080-60 DT	0...80 V	0...60 A	0...1500 W	≤92%	6.8 mV _{pp} / 0.8 mV _{RMS}	1.8 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%	56 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%	94 mV _{pp} / 16 mV _{RMS}	2.7 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}	0.6 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%	58 mV _{pp} / 16 mV _{RMS}	0.4 mA _{RMS}	28.6 mV	0.2 mA	0.057 W	06200515

(1) 可编程分辨率不含产品错误 / Programmable resolution disregarding device errors

(2) RMS值: 在BWL 300KHz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

