

# 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<sub>AC</sub>至264 V<sub>AC</sub>的输入电压范围内使用。1.5 kW型号在输入电压<150 V<sub>AC</sub>时，输出功率降至1 kW。3 kW型号在输入电压<205 V<sub>AC</sub>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  $\leq 10 s$ )
- 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.

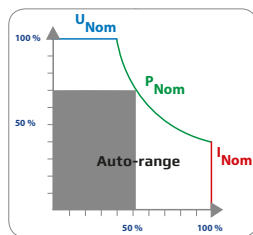
### AC input

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<sub>AC</sub> up to 264 V<sub>AC</sub>. With the 1.5 kW models, the output power is automatically reduced to 1 kW if the supply voltage is <150 V<sub>AC</sub> and with the 3 kW models is reduced to 2.5 kW at <205 V<sub>AC</sub>.

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### 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。

### 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 power ratings between 0...1000 W and 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.

### 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 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

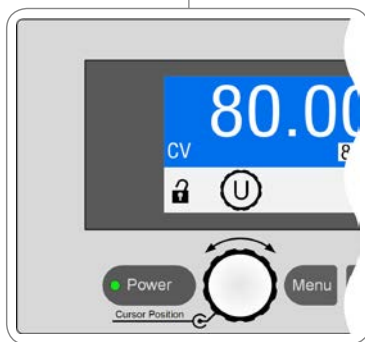
For protection of the equipment connected, it is possible to set an overvoltage protection threshold (OVP), as well as one for overcurrent (OCP) and overpower (OPP).

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.

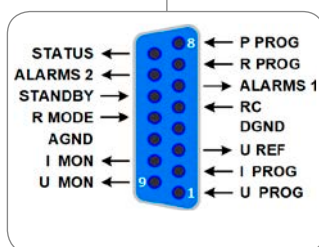
With this, information about the actual output values and set values of voltage and current, the actual control state (CV, CC, CP) and other statuses, as well as alarms and settings of the setup menu are clearly displayed.

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.



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## 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。



## 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

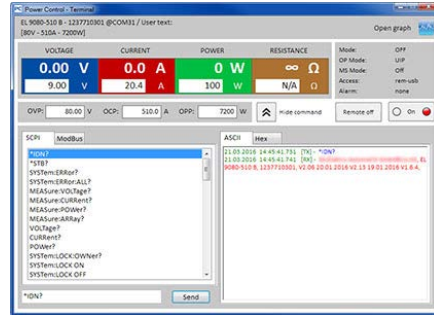
## Digital interfaces

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

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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
- ±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% $\Delta I_{DC}$ 的负载调整率	- Load regulation 1-100% $\Delta I_{DC}$	<额定值的0.15% / <0.15% of rated value
- ±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 <sup>(1)</sup>
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 <sup>(2)</sup>	- Weight <sup>(2)</sup>	12 kg      15 kg
- 尺寸(宽 高 深) <sup>(3)</sup>	- Dimensions (W H D) <sup>(3)</sup>	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 <sup>(2)</sup>	I的纹波 <sup>(2)</sup>	编程 <sup>(1)</sup>		订购编号 <sup>(3)</sup>
Model	Voltage	Current	Power	Efficiency	Ripple U <sup>(2)</sup>	Ripple I <sup>(2)</sup>	U (typ.)	I (typ.)	Ordering number <sup>(3)</sup>
PS 9040-40 2U	0...40 V	0...40 A	0...1000 W	≤92%	114 mV <sub>pp</sub> / 8 mV <sub>RMS</sub>	3.7 mA <sub>RMS</sub>	~1.5 mV	~1.5 mA	06230219
PS 9080-40 2U	0...80 V	0...40 A	0...1000 W	≤92%	114 mV <sub>pp</sub> / 8 mV <sub>RMS</sub>	3.7 mA <sub>RMS</sub>	~3 mV	~1.5 mA	06230204
PS 9200-15 2U	0...200 V	0...15 A	0...1000 W	≤93%	164 mV <sub>pp</sub> / 34 mV <sub>RMS</sub>	2.2 mA <sub>RMS</sub>	~7.6 mV	~0.6 mA	06230205
PS 9360-10 2U	0...360 V	0...10 A	0...1000 W	≤93%	210 mV <sub>pp</sub> / 59 mV <sub>RMS</sub>	1.6 mA <sub>RMS</sub>	~13.7 mV	~0.4 mA	06230206
PS 9500-06 2U	0...500 V	0...6 A	0...1000 W	≤93%	190 mV <sub>pp</sub> / 48 mV <sub>RMS</sub>	0.5 mA <sub>RMS</sub>	~19 mV	~0.23 mA	06230207
PS 9750-04 2U	0...750 V	0...4 A	0...1000 W	≤93%	212 mV <sub>pp</sub> / 60 mV <sub>RMS</sub>	0.3 mA <sub>RMS</sub>	~28.6 mV	~0.15 mA	06230208
PS 9040-60 2U	0...40 V	0...60 A	0...1500 W	≤92%	114 mV <sub>pp</sub> / 8 mV <sub>RMS</sub>	5.6 mA <sub>RMS</sub>	~1.5 mV	~2.3 mA	06230220
PS 9080-60 2U	0...80 V	0...60 A	0...1500 W	≤92%	114 mV <sub>pp</sub> / 8 mV <sub>RMS</sub>	5.6 mA <sub>RMS</sub>	~3 mV	~2.3 mA	06230209
PS 9200-25 2U	0...200 V	0...25 A	0...1500 W	≤93%	164 mV <sub>pp</sub> / 34 mV <sub>RMS</sub>	3.3 mA <sub>RMS</sub>	~7.6 mV	~1 mA	06230210
PS 9360-15 2U	0...360 V	0...15 A	0...1500 W	≤93%	210 mV <sub>pp</sub> / 59 mV <sub>RMS</sub>	2.4 mA <sub>RMS</sub>	~13.7 mV	~0.6 mA	06230211
PS 9500-10 2U	0...500 V	0...10 A	0...1500 W	≤93%	190 mV <sub>pp</sub> / 48 mV <sub>RMS</sub>	0.7 mA <sub>RMS</sub>	~19 mV	~0.4 mA	06230212
PS 9750-06 2U	0...750 V	0...6 A	0...1500 W	≤93%	212 mV <sub>pp</sub> / 60 mV <sub>RMS</sub>	0.5 mA <sub>RMS</sub>	~28.6 mV	~0.23 mA	06230213
PS 9040-120 2U	0...40 V	0...120 A	0...3000 W	≤92%	114 mV <sub>pp</sub> / 8 mV <sub>RMS</sub>	11 mA <sub>RMS</sub>	~3 mV	~4.6 mA	06230221
PS 9080-120 2U	0...80 V	0...120 A	0...3000 W	≤92%	114 mV <sub>pp</sub> / 8 mV <sub>RMS</sub>	11 mA <sub>RMS</sub>	~1.5 mV	~4.6 mA	06230214
PS 9200-50 2U	0...200 V	0...50 A	0...3000 W	≤93%	164 mV <sub>pp</sub> / 34 mV <sub>RMS</sub>	6.5 mA <sub>RMS</sub>	~7.6 mV	~1.9 mA	06230215
PS 9360-30 2U	0...360 V	0...30 A	0...3000 W	≤93%	210 mV <sub>pp</sub> / 59 mV <sub>RMS</sub>	5 mA <sub>RMS</sub>	~13.7 mV	~1.2 mA	06230216
PS 9500-20 2U	0...500 V	0...20 A	0...3000 W	≤93%	190 mV <sub>pp</sub> / 48 mV <sub>RMS</sub>	1.5 mA <sub>RMS</sub>	~19 mV	~0.8 mA	06230217
PS 9750-12 2U	0...750 V	0...12 A	0...3000 W	≤93%	212 mV <sub>pp</sub> / 60 mV <sub>RMS</sub>	0.9 mA <sub>RMS</sub>	~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

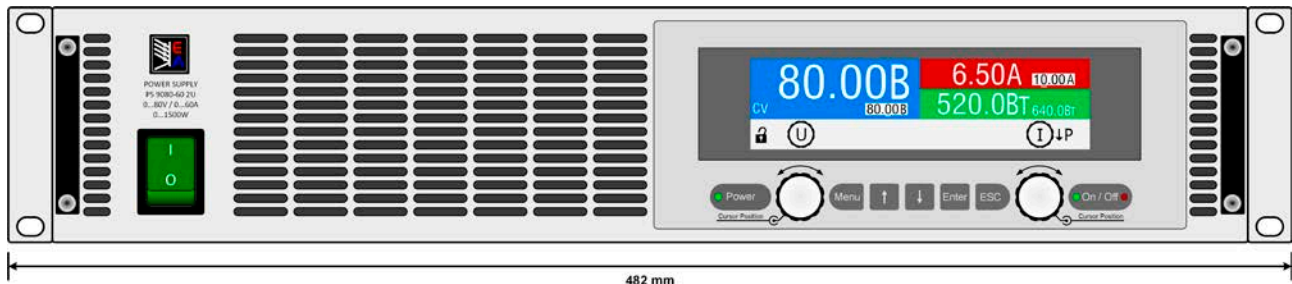
(2) RMS值: 在BWL 300 kHz时测量的LF值, PP值: 在BWL 20MHz时测量的HF值 / RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

(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

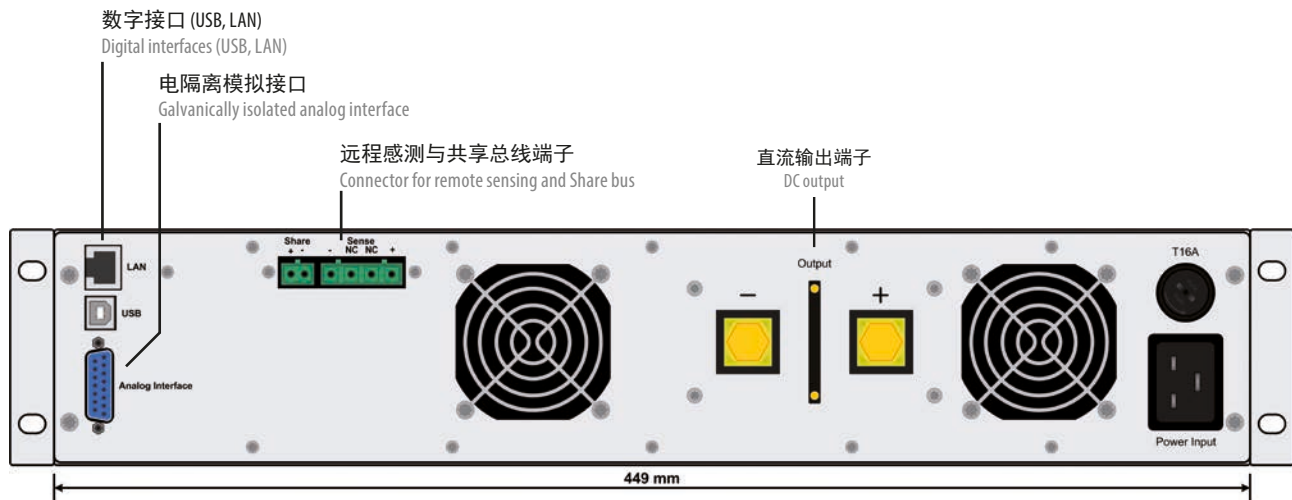
产品图片

Product views



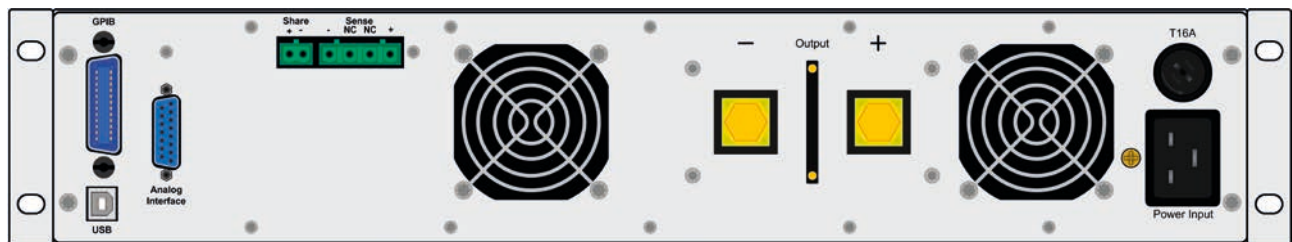
前视图

Front view



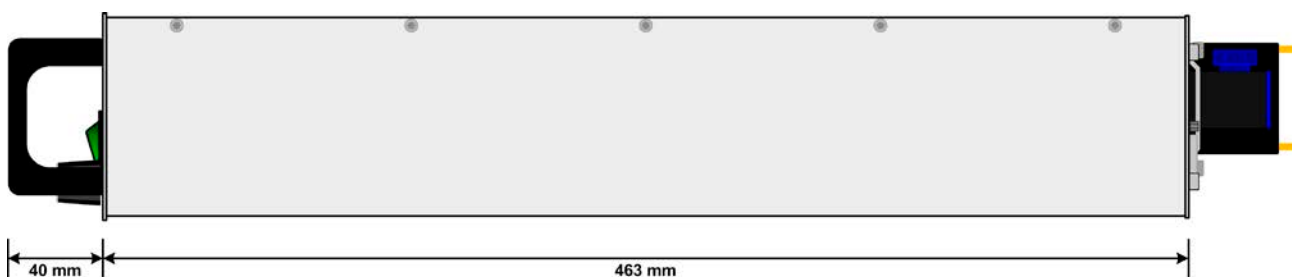
标准版后视图

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

