EA-PSI 9000 3U 3.3 kW - 15 kW

Programmable high efficiency DC Power supplies

EA-PSI 9200-210 3U

U | I | P | R | OVP | OCP | OPP | OTP | 19" | MS | USB | Option: | IFAB | IEEE | WC

- **Multi-phase supply for 400 V_{AC} (EU models) or 208 V_{AC} (US models)**
- **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 and USB port**
- **Integrated true function generator**
- **Photovoltaic array simulation, including EN 50530**
- **Internal resistance simulation and regulation**
- **40 V models compliant to SELV (EN 60950)**
- **Discharge circuit (Uout < 60 V in ≤ 10 s)**
- **EMC TÜV approved for EN 61010 Class B**
- **Optional, digital interface modules or alternatively installed GPIB port**
- **SCPI command set and ModBus RTU (optionally: TCP) support**

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.
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.

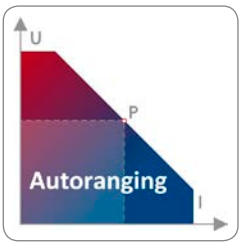
AC supply

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 (european models) or 188 V up to 229 V AC (US models).

EA-PSI 9000 3U 3.3 kW - 15 kW

Autoranging power stage

All models are equipped with a flexible autoranging 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.



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 DC output terminal is located on 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

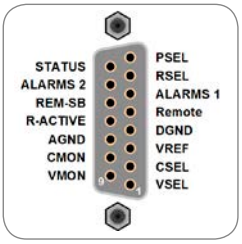
For protection of the equipment connected, it is possible to set an overvoltage protection threshold (OVP), as well as one for overcurrent (OCP) and overpower (OPP).
As soon as one of these thresholds is reached for any reason, the DC output will be immediately shut off and a status signal will be generated on the display and via the interfaces. There is furthermore an overtemperature protection, which will shut off the DC output if the device overheats.

Remote sensing

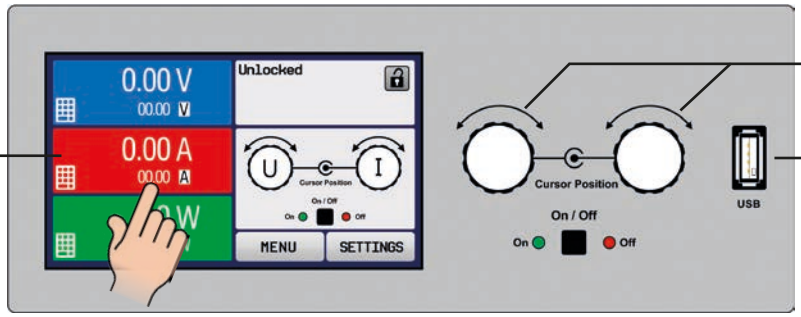
The standard sensing input can be connected directly to the load in order to compensate voltage drops along the power cables up to a certain level. If the sensing input is connected to the load, the power supply will adjust the output voltage automatically to make ensure the accurate required voltage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

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.



Display and control panel



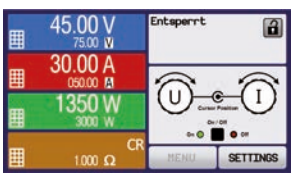
Set values and actual values of output voltage, output current and output power are clearly represented on the graphic display. The color TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger tip.
Set values of voltage, current, power or resistance (internal resistance simulation) can be adjusted using the rotary knobs or entered directly via a numeric pad. To prevent unintentional operations, all operation controls can be locked.

Multi-language HMI

English

Russian

Chinese

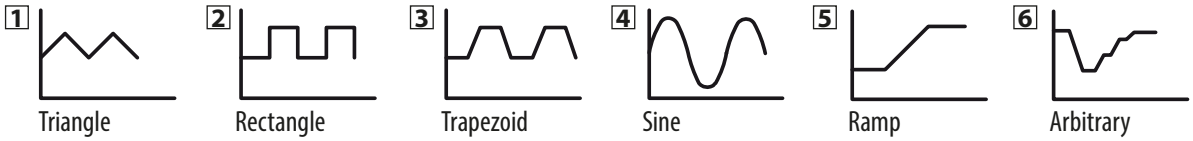


German

EA-PSI 9000 3U 3.3 kW - 15 kW

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.

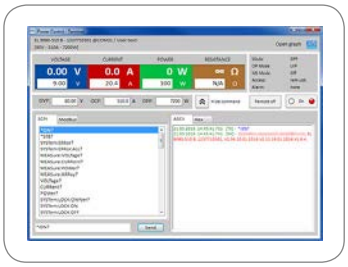


Addition to the standard functions, which are all based upon a so-called arbitrary generator, this base generator is accessible for the creation and execution of complex sets of functions, separated into up to 99 sequences. Those can be used for testing purposes in development and production. The sequences can be loaded from and saved to a standard USB stick via the USB port on the front panel, making it easy to change between different test sequences.
There is furthermore an 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 param-eters. It also supports the European standard EN 50530.

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). Alternatively to the standard models, there are specific slave models available. See page 27.

Control software



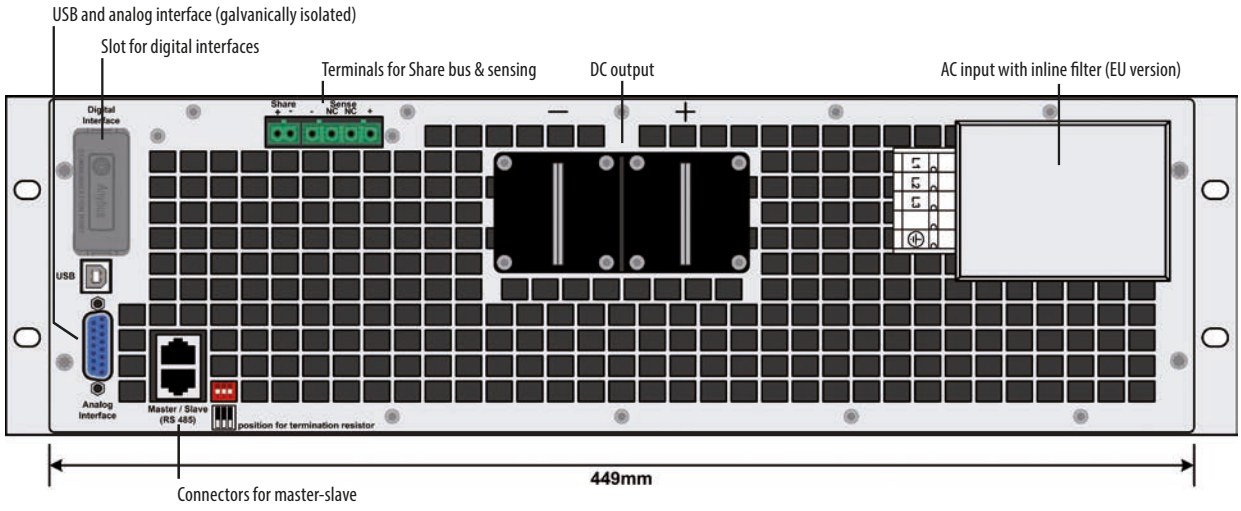
Included with the device is a control software for Windows PC, which allows for the remote control of multiple identical or even different types of devices. It has a clear interface for all set and actual values, a direct input mode for SCPI and ModBus RTU commands, a firmware update feature and the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

Options

- Digital interface modules for RS232, CAN, CANopen, ModBus TCP, Profibus, Profinet/IO, EtherCAT or Ethernet. Also see page 108.
- Three-way interface (3W) with a rigid GPIB port installed instead of the default slot for retrofittable interface modules
- High Speed ramping (see page 116) *
- Water cooling (upon request, also see page 117)

* 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

Technical Data	Series PSI 9000 3U	
AC: Supply		
- Voltage	European models: 340...460 V, 2ph/3ph US models: 188...229 V, 2ph/3ph	
- Frequency	45...66 Hz	
- Power factor	>0.99	
DC: Voltage		
- Accuracy	<0.1% of rated value	
- Load regulation 0-100%	<0.05% of rated value	
- Line regulation ±10% ΔU_{AC}	<0.02% of rated value	
- Regulation 10-100% load	<2 ms	
- Slew rate 10-90%	Max. 30 ms	
- Overvoltage protection	Adjustable, 0...110% U_{Nom}	
- No load discharge time on DC off	100% U to <60 V: less than 10 s	
DC: Current		
- Accuracy	<0.2% of rating	
- Load regulation 0-100% ΔU_{DC}	<0.15% of rated value	
- Line regulation ±10% ΔU_{AC}	<0.05% of rated value	
DC: Power		
- Accuracy	<1% of rated value	
Overvoltage category	2	
Protection	OT, OVP, OCP, OPP, PF (2	
Insulation 1		
- AC input to enclosure	2500 V DC	
- AC input to DC output	2500 V DC	
- DC output to enclosure (PE)	Depending on model, see tables	
Degree of pollution	2	
Protection class	1	
Display and panel	Graphics display with touch panel	
Digital interfaces		
- Built-in	1x USB type B for communication, 1x GPIB (optional with option 3W)	
- Slot	1x for retrofittable plug-in modules (standard models only)	
Analog interface	Built-in, 15 pole D-Sub (female), galvanically isolated	
- Signal range	0...5 V or 0...10 V (switchable)	
- Inputs	U, I, P, R, remote control on-off, DC output on-off, resistance mode on-off	
- Outputs	U, I, alarms, reference voltage, status	
- Accuracy U / I / P / R	0...10 V: <0.2%	0...5 V: <0.4%
Parallel operation	Yes, with true master-slave, up to 32 units	
Standards	EN 61326, IEC 1010, EN 61010 EMC TÜV approved according to IEC 61000-6-2:2005 and IEC 61000-6-3:2006 Class B	
Cooling	Temperature-controlled fans (optional: water)	
Operation temperature	0...50 °C	
Storage temperature	-20...70 °C	
Relative humidity	<80%, non-condensing	
Operation altitude	<2000 m (1.242 mi)	
Dimensions (W x H x D) (1	19" x 3U x 609 mm (24")	

(1 Enclosure only, not overall
(2 See page 118

EA-PSI 9000 3U 3.3 kW - 15 kW

Technical Data	PSI 9040-170 3U	PSI 9080-170 3U	PSI 9200-70 3U	PSI 9360-40 3U	PSI 9500-30 3U
Rated voltage & range	0...40 V	0...80 V	0...200 V	0...360 V	0...500 V
- 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}	<350 mV_{PP} / <70 mV_{RMS}
Insulation neg. DC pole <-> PE	±400 V DC	±400 V DC	±400 V DC	±400 V DC	±725 V DC
Insulation pos. DC pole <-> PE	±400 V DC	±400 V DC	±600 V DC	±600 V DC	±1000 V DC
Rated current & range	0...170 A	0...170 A	0...70 A	0...40 A	0...30 A
- Ripple (1	<80 mA_{RMS}	<80 mA_{RMS}	<22 mA_{RMS}	<18 mA_{RMS}	<16 mA_{RMS}
Rated power & range	0...3300 W	0...5000 W	0...5000 W	0...5000 W	0...5000 W
Efficiency	≈93%	≈93%	≈95%	≈93%	≈95.5%
Weight (2	≈17 kg (37.5 lb)	≈17 kg (37.5 lb)	≈17 kg (37.5 lb)	≈17 kg (37.5 lb)	≈17 kg (37.5 lb)
Ordering number EU model (3	06230350	06230351	06230352	06230353	06230354
Ordering number US model (3	06238350	06238351	06238352	06238353	06238354

Technical Data	PSI 9750-20 3U	PSI 9040-340 3U	PSI 9040-510 3U	PSI 9080-340 3U	PSI 9200-140 3U
Rated voltage & range	0...750 V	0...40 V	0...40 V	0...80 V	0...200 V
- Ripple (1	<800 mV_{PP} / <200 mV_{RMS}	<320 mV_{PP} / <25 mV_{RMS}	<320 mV_{PP} / <25 mV_{RMS}	<320 mV_{PP} / <25 mV_{RMS}	<300 mV_{PP} / <40 mV_{RMS}
Insulation neg. DC pole <-> PE	±725 V DC	±400 V DC	±400 V DC	±400 V DC	±400 V DC
Insulation pos. DC pole <-> PE	±1000 V DC	±400 V DC	±400 V DC	±400 V DC	±600 V DC
Rated current & range	0...20 A	0...340 A	0...510 A	0...340 A	0...140 A
- Ripple (1	<16 mA_{RMS}	<160 mA_{RMS}	<120 mA_{RMS}	<160 mA_{RMS}	<44 mA_{RMS}
Rated power & range	0...5000 W	0...6600 W	0...10000 W	0...10000 W	0...10000 W
Efficiency	≈94%	≈93%	≈93%	≈93%	≈95%
Weight (2	≈17 kg (37.5 lb)	≈24 kg (52.9 lb)	≈30 kg (66.1 lb)	≈24 kg (52.9 lb)	≈24 kg (52.9 lb)
Ordering number EU model (3	06230355	06230356	06230363	06230357	06230358
Ordering number US model (3	06238355	06238356	06238363	06238357	06238358

Technical Data	PSI 9360-80 3U	PSI 9500-60 3U	PSI 9750-40 3U	PSI 91000-30 3U	PSI 9080-510 3U
Rated voltage & range	0...360 V	0...500 V	0...750 V	0...1000 V	0...80 V
- Ripple (1	<550 mV_{PP} / <65 mV_{RMS}	<350 mV_{PP} / <70 mV_{RMS}	<800 mV_{PP} / <200 mV_{RMS}	<1600 mV_{PP} / <350 mV_{RMS}	<320 mV_{PP} / <25 mV_{RMS}
Insulation neg. DC pole <-> PE	±400 V DC	±725 V DC	±725 V DC	±725 V DC	±400 V DC
Insulation pos. DC pole <-> PE	±600 V DC	±1000 V DC	±1000 V DC	±1000 V DC	±400 V DC
Rated current & range	0...80 A	0...60 A	0...40 A	0...30 A	0...510 A
- Ripple (1	<35 mA_{RMS}	<32 mA_{RMS}	<32 mA_{RMS}	<22 mA_{RMS}	<240 mA_{RMS}
Rated power & range	0...10000 W	0...10000 W	0...10000 W	0...10000 W	0...15000 W
Efficiency	≈93%	≈95%	≈94%	≈95%	≈93%
Weight (2	≈24 kg (52.9 lb)	≈24 kg (52.9 lb)	≈24 kg (52.9 lb)	≈24 kg (52.9 lb)	≈30 kg (66.1 lb)
Ordering number EU model (3	06230359	06230360	06230361	06230362	06230364
Ordering number US model (3	06238359	06238360	06238361	06238362	06238364

Technical Data	PSI 9360-120 3U	PSI 9500-90 3U	PSI 9750-60 3U	PSI 91000-40 3U	PSI 91500-30 3U
Rated voltage & range	0...360 V	0...500 V	0...750 V	0...1000 V	0...1500 V
- 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}
Insulation neg. DC pole <-> PE	±400 V DC	±725 V DC	±725 V DC	±725 V DC	±725 V DC
Insulation pos. DC pole <-> PE	±600 V DC	±1000 V DC	±1000 V DC	±1000 V DC	±1500 V DC
Rated current & range	0...120 A	0...90 A	0...60 A	0...40 A	0...30 A
- Ripple (1	<50 mA_{RMS}	<48 mA_{RMS}	<48 mA_{RMS}	<22 mA_{RMS}	<26 mA_{RMS}
Rated power & range	0...15000 W	0...15000 W	0...15000 W	0...15000 W	0...15000 W
Efficiency	≈93%	≈95%	≈94%	≈95%	≈95%
Weight (2	≈30 kg (66.1 lb)	≈30 kg (66.1 lb)	≈30 kg (66.1 lb)	≈30 kg (66.1 lb)	≈30 kg (66.1 lb)
Ordering number EU model (3	06230366	06230367	06230368	06230370	06230369
Ordering number US model (3	06238366	06238367	06238368	06238370	06238369

(1 RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz
(2 Weight of the base version, models with option(s) may vary
(3 Ordering number of the base version, models with option(s) installed have different ordering numbers