

# PSB 10000 4U Series

30 kW to 1.08 MW



Programmable  
Bi-Directional DC  
Power Supply

**INTEPRO**  
SYSTEMS

THE POWER TEST EXPERTS

# PSB 10000 4U Series

30 kW to 1.08 MW



## Product Overview



PSB 10000 4U

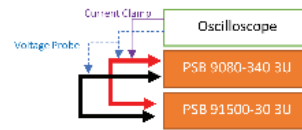
The PSB 10000 Series is a microprocessor controlled bi-directional supply that features two devices in one: an electronic DC load with energy recovery and an auto-ranging DC power supply. This allows for two-quadrant operation out of a powerful instrument that is efficient and easy to use. Combining the features of the ELR Series (DC Load) and the PSI Series (DC Supply) into one chassis can free up extra cabinet space and reduce generated heat all while recovering loaded energy back to your local mains. If you are looking at solutions for charge & discharge testing, the PSB 10000 Series can provide you with a quick ROI and can be easily integrated into existing test environments.

## Source or Sink - it's a smooth transition

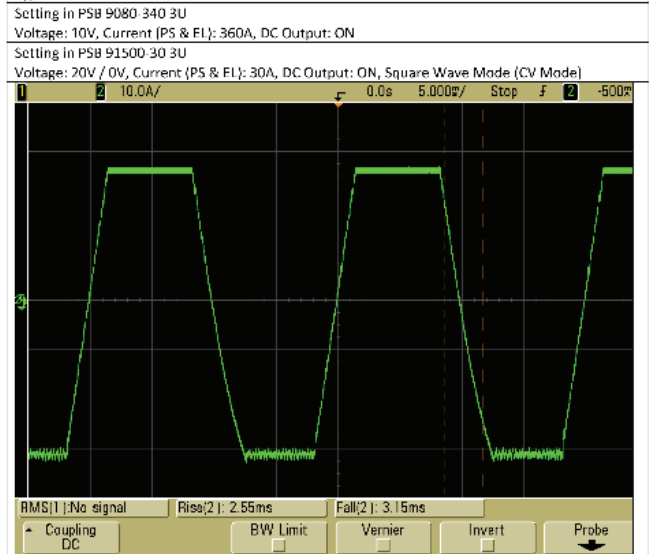
All PSBs act as a DC power source as well as a DC recycling load. They can be programmed to seamlessly switch between source and sink with no "off" time. When operating as the load, the device synchronizes with the 342 to 528 VAC 3-phase mains to recover upwards of 94% of the energy. When operating as a source, the unit has an efficiency up to 93% generating less heat in both modes. This provides further energy savings by reducing the cooling costs in the test environment.

DC voltages range from 0-60 V and 0-2000 V with sink and source DC currents ranging from 0-40 A and 0-1000 A. Output power ranges from 30kW to over 1MW. All connections are located on the rear panel.

Test Diagram



Typical current transition time

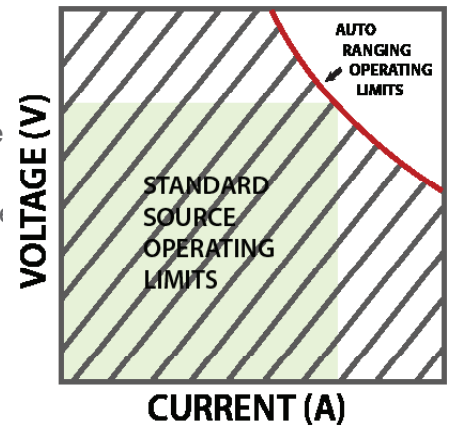


## Featured Benefits

- Wide range 342...528 V AC supply for operation on 380 V, 400 V or 480 V grids
- US 208 V models available
- Bidirectional device - power supply and electronic load in one
- Energy recovery with high efficiency
- Power rating: 30 kW (15 kW\*) per device, expandable up to 1920 kW
- Voltage ratings: 60 V up to 2000 V
- Current ratings: 40 A up to 1000 A
- Flexible, power regulated DC<->AC stage
- Various protection circuits (OVP, OCP, OPP, OTP)
- 5" TFT touch panel with display for values, status and notifications
- Remote sensing with automatic detection
- Galvanically isolated interfaces (USB, Ethernet, analog, slot)
- Integrated function generator
- Battery test, MPP tracking simulation, PV simulation according to EN 50530
- Optional, digital interface modules
- SCPI and ModBus command set
- LabView VIs and control software for Windows

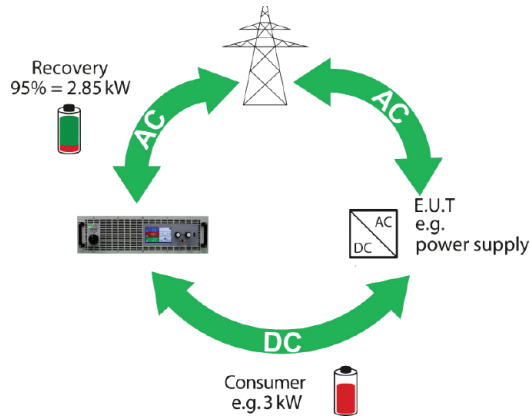
## Auto-ranging Power Stage

All models are equipped with a flexible auto-ranging, bi-directional power stage. As a result, each model can achieve higher output voltage at lower output current and vice versa, with the max output power being the limiting factor.



## Protective Features

For protection of connected equipment, user-defined thresholds for OVP, OCP and OPP are available. As soon as one of the thresholds is reached, the DC output is shut off and a status signal is generated on the display and sent via any connected interfaces. The device also features OTT, which will shut off the DC output if it overheats.

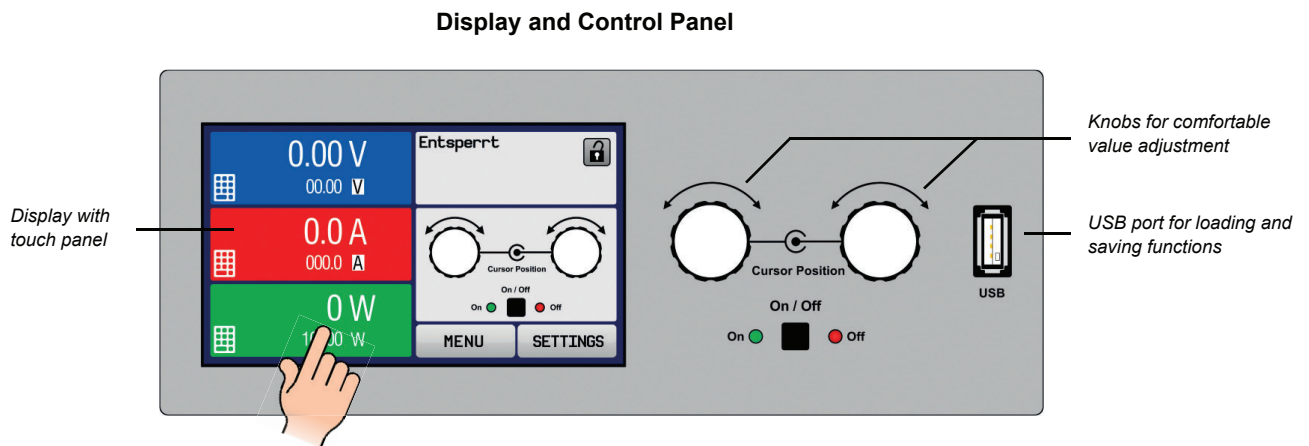


## Energy Recovery

The most innovative feature of the electronic load is that the AC input, i.e. grid connection, is also used to recover loaded DC energy at an efficiency of 95%. This method of energy recovery helps to lower operational costs and avoids the necessity for expensive cooling systems. Conventional electronic loads dissipate loaded DC energy into heat which needs to be accounted for in facilities management.

## Display and Control Panel

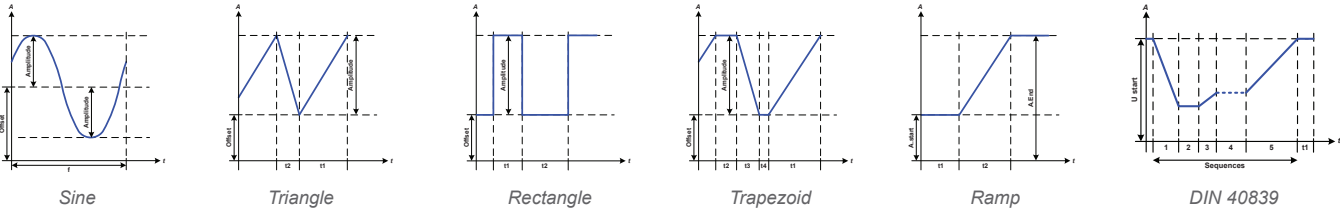
Set values and actual values of input & output voltage / current / power are clearly represented on the graphic display. The color TFT screen is touch sensitive and can be intuitively used to control all functions of the device with just a finger. Set values of voltage, current, power or resistance can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



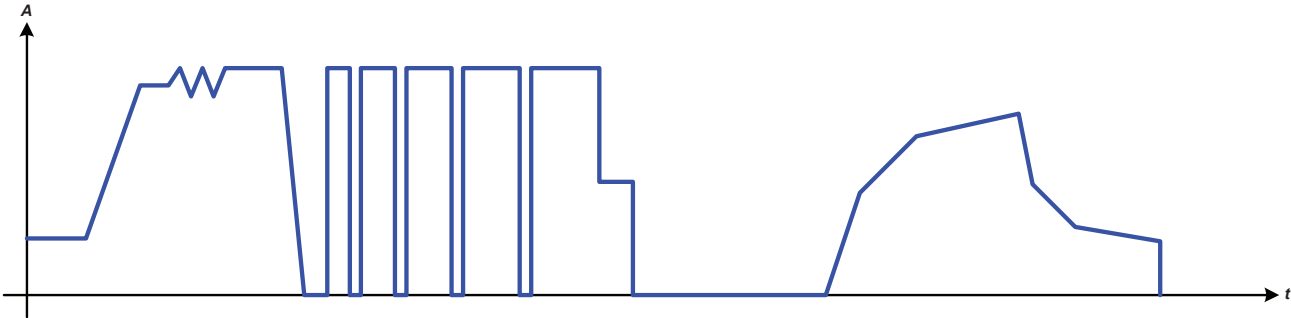
# Function Generator

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.

Additionally to the standard functions, which are all based upon an 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 sequence points 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 realized with the arbitrary generator. The function can be created on the device or externally and then loaded or saved:



# Master-Slave

All models feature a digital master-slave bus by default. It can be used to connect up to 36 units of identical models in parallel operation to a bigger system with totals formation of the actual value of voltage, current, and power. Configuration of the master-slave system paralleling can be achieved via local operator interface or remotely.



## Analog Interface

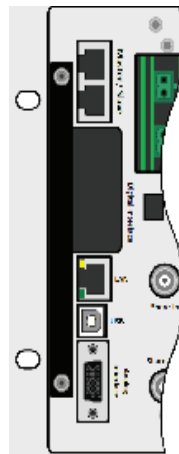
There is a galvanically isolated analog interface terminal, located on the rear of the device. It offers analog inputs to set voltage, current, power and resistance from 0-100% through control voltages of 0V - 10V or 0V - 5V. Several inputs and outputs are available for controlling and monitoring the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

## 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, CANopen, Modbus TCP, Profibus, Profinet/IO, Devicenet. 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 minimal to zero configuration.



Rear connectors of the standard models

Technical Data	Series PSB 10000 4U
<b>AC Supply</b>	
- Voltage / Phases	Standard models: 380 / 400 / 480 V, $\pm 10\%$ , 3ph / US 208 V models: 208 V, $\pm 10\%$ , 3ph
- Frequency	45-66 Hz
- Power factor	>0.99
<b>DC: Voltage</b>	
- Accuracy	$\leq 0.05\%$ of rated value
- Load regulation 0-100%	$\leq 0.05\%$ of rated value
- Line regulation $\pm 10\% \Delta U_{AC}$	$\leq 0.02\%$ of rated value
- Regulation 10-100% load	$\leq 1.5$ ms
- Slew rate of voltage (source) 10-90%	Max. 30 ms
- Slew rate of current (sink) 10-90%	<50 $\mu$ s
- Overvoltage protection	adjustable, 0...110% $U_{Nom}$
<b>DC: Current</b>	
- Accuracy	$\leq 0.1\%$ of rated value
- Load regulation 0-100% $\Delta U_{DC}$	$\leq 0.15\%$ of rated value
- Slew rate (sink) 10-90%	$\leq 1$ ms
<b>DC: Power</b>	
- Accuracy	$\leq 0.3\%$ of rated value
<b>DC: Resistance</b>	
- Accuracy	$\leq 0.3\%$ of max resistance + 0.1% of rated current
<b>Protection</b>	OT, OVP, OPP, PF, OCP, SF
<b>Isolation</b>	
- Output to enclosure (PE)	Depending on model, see tables
<b>Pollution degree</b>	2
<b>Protection class</b>	1
<b>Display / Control panel</b>	Graphics color display with touch panel
<b>Digital interfaces</b>	
- Built-in	1x USB and 1x Ethernet (100 MBit) for communication, galvanically isolated 1x USB type A for USB stick (data recording etc.)
- Slot	1x for retrofittable plug-in modules (CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT)
<b>Analog interface</b>	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%
<b>Parallel operation</b>	Yes, with master-slave bus, up to 64 units
<b>Standards</b>	EN 61010-1:2011-07, EN 50160:2011-02 Grid class 2 EN 61000-6-2:2016-05, EN 61000-6-3:2011-09 Class B
<b>Cooling</b>	Air (Temperature-controlled fans), optional: water
<b>Operation temperature</b>	0...50 °C (32...133 °F)
<b>Storage temperature</b>	-20...70 °C (-4...158 °F)
<b>Relative humidity</b>	$\leq 80\%$ , non-condensing
<b>Operation altitude</b>	$\leq 2000$ m (1.242 mi)
<b>Dimensions (W H D) <sup>(2)</sup></b>	19" x 4U x 670 mm (26.4")

(1 See page 13 of user manual

(2 Enclosure only, not overall



Technical Data	PSB 10060-1000 4U	PSB 10080-1000 4U	PSB 10200-420 4U
<b>Rated Voltage &amp; Range</b>	0...60 V	0...80 V	0...200 V
- Ripple (source mode) <sup>(1)</sup>	≤480 mV <sub>PP</sub> ≤37 mV <sub>RMS</sub>	<480 mV <sub>PP</sub> <37 mV <sub>RMS</sub>	<450 mV <sub>PP</sub> <60 mV <sub>RMS</sub>
<b>Isolation</b>			
- Negative DC output <-> PE	±500 V DC	±500 V DC	±725 V DC
- Positive DC output <-> PE	±600 V DC	±600 V DC	±1000 V DC
<b>Rated current &amp; range</b>	0...1000 A	0...1000 A	0...420 A
<b>Rated power (WR model)</b>	0...30 kW (0...15 kW (4))	0...30 kW (0...15 kW (4))	0...30 kW (0...15 kW (4))
<b>Efficiency of recovery</b>	~94%	~94%	~94.2%
<b>Weight <sup>(2)</sup></b>	≈ 50 kg (110 lb)	≈ 50 kg (110 lb)	≈ 50 kg (110 lb)

Technical Data	PSB 10360-240 4U	PSB 10500-180 4U	PSB 10750-120 4U
<b>Rated Voltage &amp; Range</b>	0...360 V	0...500 V	0...750 V
- Ripple (source mode) <sup>(1)</sup>	≤480 mV <sub>PP</sub> ≤83 mV <sub>RMS</sub>	≤525 mV <sub>PP</sub> ≤105 mV <sub>RMS</sub>	≤1200 mV <sub>PP</sub> ≤300 mV <sub>RMS</sub>
<b>Isolation</b>			
- Negative DC output <-> PE	±1500 V DC	±1500 V DC	±1500 V DC
- Positive DC output <-> PE	±2000 V DC	±2000 V DC	±2000 V DC
<b>Rated current &amp; range</b>	0...240 A	0...180 A	0...120 A
<b>Rated power (WR model)</b>	0...30 kW (0...15 kW (4))	0...30 kW (0...15 kW (4))	0...30 kW (0...15 kW (4))
<b>Efficiency of recovery</b>	~94.6%	~95.3%	~95.5%
<b>Weight <sup>(2)</sup></b>	≈ 50 kg (110 lb)	≈ 50 kg (110 lb)	≈ 50 kg (110 lb)

Technical Data	PSB 11000-80 4U	PSB 11500-60 4U	PSB 12000-40 4U
<b>Rated Voltage &amp; Range</b>	0...1000 V	0...1500 V	0...2000 V
- Ripple (source mode) <sup>(1)</sup>	≤2400 mV <sub>PP</sub> ≤450 mV <sub>RMS</sub>	≤3600 mV <sub>PP</sub> ≤600 mV <sub>RMS</sub>	≤3600 mV <sub>PP</sub> ≤600 mV <sub>RMS</sub>
<b>Isolation</b>			
- Negative DC output <-> PE	±1500 V DC	±1500 V DC	±1500 V DC
- Positive DC output <-> PE	±2000 V DC	±2000 V DC	±2000 V DC
<b>Rated current &amp; range</b>	0...80 A	0...60 A	0...40 A
<b>Rated power (WR model)</b>	0...30 kW (0...15 kW (4))	0...30 kW (0...15 kW (4))	0...30 kW (0...15 kW (4))
<b>Efficiency of recovery</b>	~94.6	~95.3%	~95.5%
<b>Weight <sup>(2)</sup></b>	≈ 50 kg (110 lb)	≈ 50 kg (110 lb)	≈ 50 kg (110 lb)

(1) RMS value: measures at LF with BWL 300 kHz, PP value: measured at HF with BWL 20MHz

(2) Weight of standard version, models with options may vary

(3) Article number of the standard version, models with option 3W installed have different article numbers

## Contact Us

[sales@inteproate.com](mailto:sales@inteproate.com)

### Americas

Intepro Systems America, LP  
14662-E Franklin Ave  
Tustin, CA 92780  
Tel: 1 714 953 2686  
[sales@inteproate.com](mailto:sales@inteproate.com)  
[www.inteproate.com](http://www.inteproate.com)

[service@inteproate.com](mailto:service@inteproate.com)

### Europe & Africa

Intepro UK Ltd.  
9 Lakeside Business Park  
Swan Lane, Sandhurst Berkshire  
GU47 9DN / UK  
Tel: 44 012 5287 5600

[www.inteproate.com](http://www.inteproate.com)

### Asia & Oceania

Intepro Power Electronics  
(Shenzhen) Co., Ltd  
No. 828, Block 7,  
Fourth Industrial Area  
Nanyou, Nanshan District  
Shenzhen, China 518052  
Tel: 0086 755 86500020