



Advanced Test Equipment Rentals
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ELR 9000 Series

3.5 kW to 10.5 kW



**Electronic DC
Loads with Energy
Recovery**

INTEPRO
SYSTEMS

THE POWER TEST EXPERTS

ELR 9000 Series

3.5 kW to 10.5 kW



Product Overview



ELR9000



The new series of electronic DC loads with energy recovery to mains, called 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 like a function generator, a table based regulation circuit for the simulation of non-linear internal resistances.

The energy recovery function converts the supplied DC energy into a synchronous sine current and feeds it back into the local or public grid. This eliminates the usual heat dissipation to a minimum and saves energy costs at the same time. The large LCD touch panel offers a modern and intuitive user interface.

The ELR offers four operating modes, Constant Voltage (CV), Constant Current (CC), Constant Power (CP) and Constant Resistance (CR).

Response times for the control via analog or digital interfaces have been improved by the DSP controlled hardware.

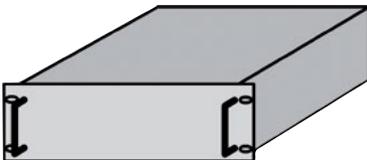
In parallel operation of multiple devices, a master-slave bus is used to connect the chassis to a create high power system where the actual values are totalled and the set values distributed.

Featured Benefits

- Energy recovery of the supplied DC energy into the local or public grid
- Galvanically isolated DC input
- Input power ratings up to 10.5 kW per chassis
- Expandable to 105 kW or more
- Input voltages up to 1500 V
- Input currents up to 510 A per chassis
- FPGA/DSP based digital control
- Multilingual TFT touch panel
- User profiles, true function generator
- Analog interface and USB interface built-in
- 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 isolation unit ⁽¹⁾

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 chassis are available. The series offers three power classes with 3.5 kW, 7 kW or 10.5 kW in only 3U for single devices, which can be extended up to 105 kW (or higher) in cabinets for a significantly high total current. Contact us for higher power solutions.



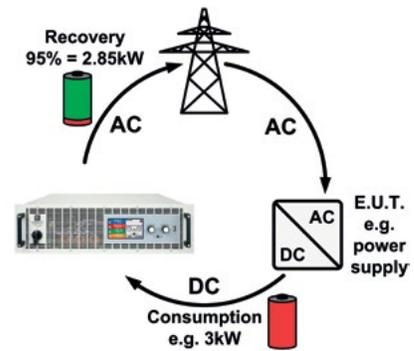
Enclosure

Construction

All models are built in 19" wide rack enclosures with 3U height and 24" depth, which makes them ideal for use in 19" cabinets of various sizes.

Energy Recovery

The most important feature of the ELR series is that the AC input, i.e. grid connection, is also used as the output for the recovery of supplied DC energy with approximately 95% efficiency. Recovering the loaded energy reduces energy costs and avoids expensive cooling systems that are commonly required for conventional air-cooled and water-cooled loads that dissipate energy in the form of heat.

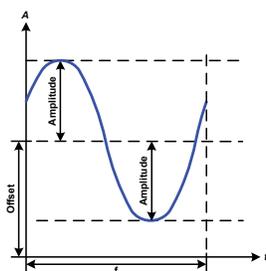


Integrated Function Generator

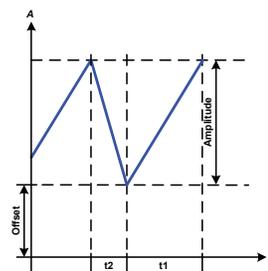
An integrated function generator is able to create various non-linear load conditions based on 4096 data points and apply these to the set value of voltage or current.

Available functions:

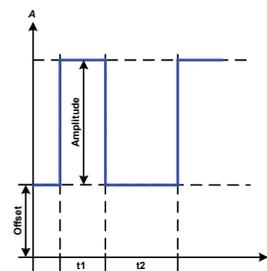
Function	Short Description
Sine	Sine wave generation with adjustable amplitude, offset and frequency
Triangle	Triangular wave signal generation with adjustable amplitude, offset, gain and decay times
Rectangular	Rectangular wave signal generation with adjustable amplitude, offset and duty cycle
Trapezoid	Trapezoidal wave signal generation with adjustable amplitude, offset, rise time, pulse time, fall time, idle time
DIN 40839	Simulated automobile engine start curve according to DIN 40839 / EN ISO 7637, split into 5 curve sequences, each with a start voltage, final voltage and time
Arbitrary	Generation of a process with up to 100 freely configurable steps, each with a start and end value (AC/DC), start and end frequency, phase angle and total duration
Ramp	Generation of a linear rise or fall ramp with start and end values and time before and after the ramp
UI-IU	Table (.csv) with values for U or I, uploaded from a USB flash drive



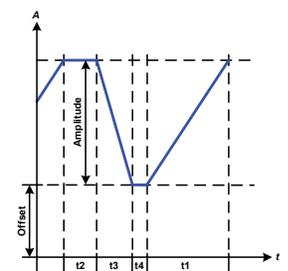
Sine



Triangle

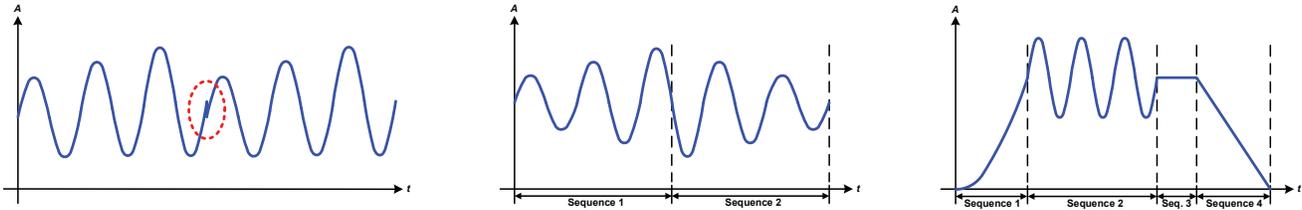


Rectangle



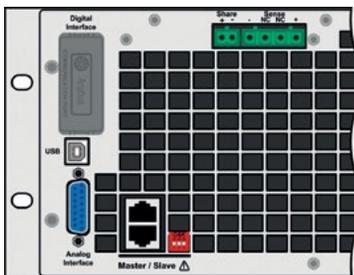
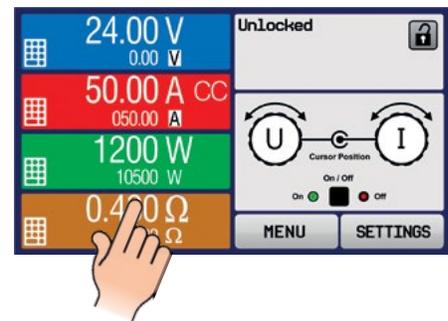
Trapezoid

By linking together a number of differently configured sequences, complex progressions can be created. Smart configuration of the arbitrary generator can be used to match triangular, sine, rectangular or trapezoidal wave functions and thus, e.g. a sequence of rectangular waves with differing amplitudes or duty cycles could be produced.

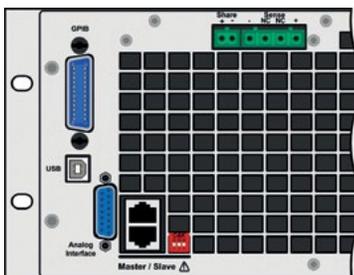


Operation (HMI)

Manual operation is done with a resistive touchpanel, two rotary knobs and a pushbutton. The large blue 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.



Rear connectors of the standard models



Rear connectors of models with option 3W

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, all Slave 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.

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

For the implementation into the LabView IDE we offer ready-to-use components (VIs) to be used with the interfaces types USB, RS232, GPIB and Ethernet. Other IDEs and interfaces are supported by documentation about the communication protocol.

Technical Data	ELR 9000 Series
AC input	
- Input voltage 1-phase models	208VL-L, +/-10%, 45-66Hz
- Input voltage 2&3-phase models	400 V L-L, +10%/-15%, 45...66 Hz
- Power factor correction (PFC)	>0.99
DC input: Current	
- Accuracy	<0.4%
- Load regulation 0-100% ΔU_{DC}	<0.15%
- Line regulation $\pm 10\% \Delta U_{AC}$	<0.05%
- Response time 10-90% load step	<1.5 ms
DC input: Voltage	
- Accuracy	<0.3%
- Load regulation 0-100% current	<0.05%
- Line regulation $\pm 10\% \Delta U_{AC}$	<0.02%
DC input: Power	
- Accuracy	<1.5%
- Load regulation 0-100% $\Delta U/I_{DC}$	<0.3%
- Line regulation $\pm 10\% \Delta U_{AC}$	<0.05%
DC input: Resistance	
- Accuracy	<2%
- Load regulation 0-100% $\Delta U/I_{DC}$	<0.02%
- Line regulation $\pm 10\% \Delta U_{AC}$	<0.05%
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	
- Setting inputs U / I / P	0...10 V / 0...5 V
- Monitoring outputs U / I	0...10 V / 0...5 V
- Control signals	Remote on-off, Input on-off
- Status signals	Overvoltage / Overtemperature
- Reference voltage	10 V / 5 V
Cooling	Temperature controlled fans
- Operation temperature	0...50 °C
- Storage temperature	-20...70 °C
Terminals on rear panel	
- Load input	Screw terminal
- Share Bus & Sense	Plug connector 2 pole & 4 pole
- Analog interface	Sub-D connector 15 pole
- Digital interfaces	Module socket 50 pole or GPIB 24pole, USB

Model	Power	Voltage	Current	Resistance	Efficiency	Width / Depth ⁽¹⁾	Height	Weight	Article number ⁽²⁾
ELR 9080-170	0-3kW (208V) 0-3.5kW (400V)	0...80 V	0...170 A	0.01...12 Ω	92.5%	19" / 609 mm	3U	17 kg	33200401
ELR 9250-70	0-3kW (208V) 0-3.5kW (400V)	0...250 V	0...70 A	0.09...120 Ω	93.5%	19" / 609 mm	3U	17 kg	33200402
ELR 9500-30	0-3kW (208V) 0-3.5kW (400V)	0...500 V	0...30 A	0.42...480 Ω	94.5%	19" / 609 mm	3U	17 kg	33200403
ELR 9750-22	0-3kW (208V) 0-3.5kW (400V)	0...750 V	0...22 A	0.8...1100 Ω	94.5%	19" / 609 mm	3U	17 kg	33200404
ELR 9080-340	0-6kW (208V) 0-7kW (400V)	0...80 V	0...340 A	0.005...6 Ω	92.5%	19" / 609 mm	3U	24 kg	33200405
ELR 9250-140	0-6kW (208V) 0-7kW (400V)	0...250 V	0...140 A	0.04...60 Ω	93.5%	19" / 609 mm	3U	24 kg	33200406
ELR 9750-44	0-6kW (208V) 0-7kW (400V)	0...750 V	0...44 A	0.43...550 Ω	94.5%	19" / 609 mm	3U	24 kg	33200408
ELR 91000-30	0-6kW (208V) 0-7kW (400V)	0...1000 V	0...30 A	0.83...950 Ω	94.5%	19" / 609 mm	3U	24 kg	33200409
ELR 9080-510	0-9kW (208V) 0-10.5kW (400V)	0...80 V	0...510 A	0.003...4 Ω	92.5%	19" / 609 mm	3U	31 kg	33200410
ELR 9250-210	0-9kW (208V) 0-10.5kW (400V)	0...250 V	0...210 A	0.03...40 Ω	93.5%	19" / 609 mm	3U	31 kg	33200411
ELR 9500-90	0-9kW (208V) 0-10.5kW (400V)	0...500 V	0...90 A	0.14...160 Ω	94.5%	19" / 609 mm	3U	31 kg	33200412
ELR 9750-66	0-9kW (208V) 0-10.5kW (400V)	0...750 V	0...66 A	0.29...360 Ω	94.5%	19" / 609 mm	3U	31 kg	33200413
ELR 91500-30	0-9kW (208V) 0-10.5kW (400V)	0...1500 V	0...30 A	1.2...1450 Ω	94.5%	19" / 609 mm	3U	31 kg	33200414

(1 Enclosure only

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

Options

Digital, Pluggable and Retrofittable Interface Options	
IF-AB-RS232	RS232
IF-AB-PBUS	Profibus DPV1
IF-AB-CANO	CANopen
IF-AB-DNET	DeviceNet
IF-AB-MBUS1P	Modbus-TCP 1 Port
IF-AB-MBUS2P	Modbus-TCP 2 Port
IF-AB-ETH1P	Ethernet/IP 1 Port
IF-AB-ETH2P	Ethernet/IP 2 Port
IF-AB-PNET1P	Profinet-IO 1 Port
IF-AB-PNET2P	Profinet-IO 2 Port
Option 3	3-Way interface Analog/USB/GPIB



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