ELR 9000 HP Series

5 kW to 15 kW

CE

Electronic DC Loads with Energy Recovery

INTEPRO SYSTEMS

THE POWER TEST EXPERTS

www.InteproATE.com

ELR 9000 HP Series

5 kW to 15 kW

ELR 9000 HP

Product Overview

The ELR 9000 HP Series is a Regenerative DC Load designed to provide high performance in an efficient, compact chassis. Optimizing a combination of the latest digital and analog technologies, its modular architecture and robust standard features enables us to deliver a product that helps increase your profitability.

The ELR 9000 HP offers industry-leading power density, 5, 10 or 15kW of DC loading can be achieved via a single 3U chassis. The HP, or High-Power, version of the ELR also accepts 360-528 VAC Input - increasing its overall versatility.

When compared to conventional loads, the ELR 9000 HP Series saves money and improve the work environment in multiple ways. Instead of dissipating energy as heat that then must be removed from the environment with air conditioning, the ELR synchronizes and regenerates the energy back to the mains. A byproduct or recovering 90+ percent of the load energy, the ELR requires very little cooling, significantly reducing the fan acoustic noise. Normal conversations can be had in rooms with ELR loads.

Four modes of operation (CV, CC, CP, CR) with standard waveforms and an arbitrary function generator highlight the standard features of this robust design. Complex waveforms can be program using a table-base regulation circuit to simulate non-linear resistance.

Applications

With an energy recovery of >90%, the ELR 9000 HP is an ideal load for all power conversion applications not requiring fast load steps. The ELR 9000 HP offers features that make testing more effortless and streamlined. The built-in Battery Test function is ideal for charge-discharge testing. Energy recovery comes in handy for burn-in or EOL/Production Testing.

Our products and systems are designed by engineers, for engineers. We take pride in making your testing faster/more rapid, economical and simpler without having to sacrifice performance.

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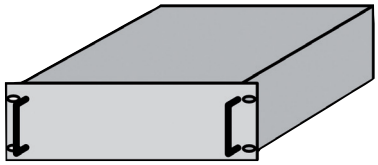
Featured Benefits

- *Energy recovery of the supplied DC energy into the local or public grid*
- *Galvanically isolated DC input*
- *AC connection: 360-528 V, 2- or 3-phase*
- *Input power ratings up to 15 kW per chassis*
- *Expandable to 480kW*
- *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*



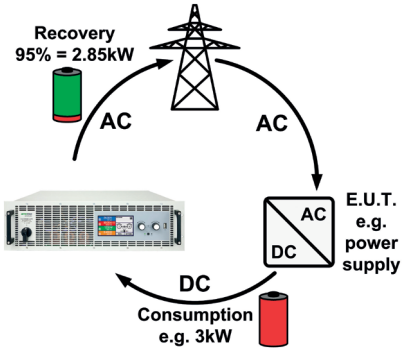
Enclosure

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 9000 HP series is its ability to recover nearly 95% of the DC load energy to the AC grid connection. Recovering the loaded energy reduces not only the energy for the test but the cooling of the environment required when the energy is dissipated as heat by conventional air or water-cooled loads.



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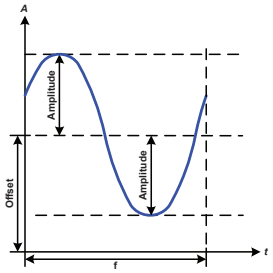
Integrated Function Generator

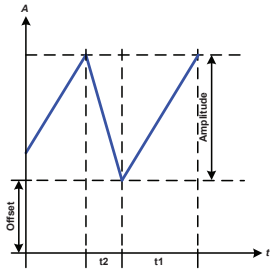
An integrated function generator is able to create various non-linear load conditions based on 4096 data points and and apply these to the set values of voltage, current, resistance and power.

Available functions:

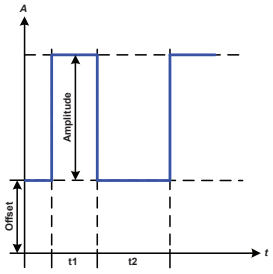
Function	Short Description
Sine	Sine wave generation with adjustable amplitude, offset and frequency
Triangle	Triangular wave signal generation with adjustable amplitude, offset, gain and decay times
Rectangular	Rectangular wave signal generation with adjustable amplitude, offset and duty cycle
Trapezoid	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



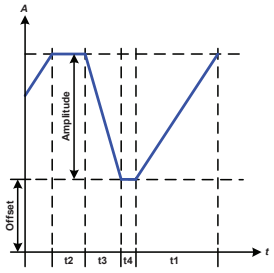
Sine



Triangle

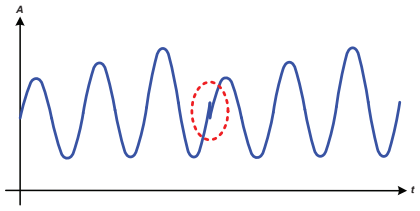


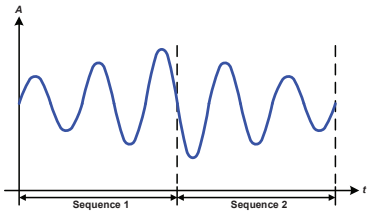
Rectangle

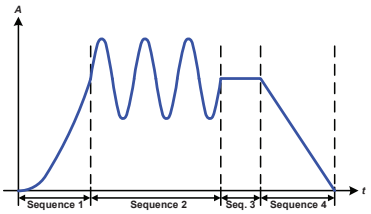


Trapezoid

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.







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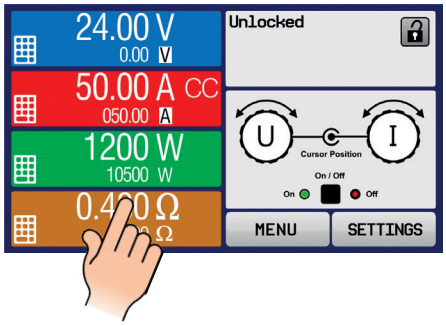
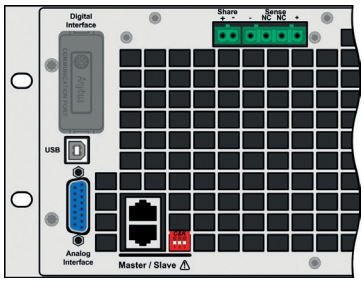
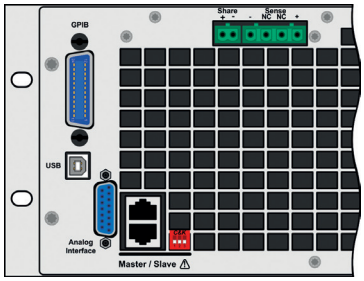
Operation (HMI)

Direct control of the unit is done via a Gorilla-Glass display, two rotary knobs and a pushbutton. The full-collor display shows all relevant set and actual values at a glance. You can setup your test or configure advanced waveforms from the front panel.





Rear connectors of the standard models
Image 1



Rear connectors of models with option 3W
Image 2

Remote Control & Connectivity

The ELR 9000 HP comes standard with two interface ports (1x analog, 1x USB) on the rear of the device. A variety of optional interfaces including CAN, Ethernet and others can be added using the digital interface slot (dedicated). These cards are field pluggable and easily retrofitted.

Alternatively, all models can be equipped with a three-way interface (option 3W, see image 2), which then offers 1x GPIB/ IEEE, 1x USB and 1x Analog on the rear side of the device.

A front side USB port is intended for portable drives to load save functions and user profiles.

For system implementation, Intepro offers its PowerStar software for simple fill-in-the-blank control of the loads, NI LabView IDE drivers. All drivers and Virtual Instrument Panels work with all the interfaces.

Options

Digital, Pluggable and Retrofitable 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

Software

In addition to the ability to thrive in many software environments, the ELR 9000 HP works best with Intepro's PowerStar Test Suite. PowerStar is a truly hardware-independent architecture that allows the user to easily swap out equipment in test benches to address obsolescence or changes to standards/ requirements – without having to re-write the test programs. PowerStar features "Program without Coding" ™ that utilizes a simple drag and drop utility that enables users to create complicated, custom test scripts or select from a vast library of built in routines. All these features drive efficiency as less time setting up your test means more time for actual testing.

Technical Information

5 kW	Model HP				
	ELR 9080-170	ELR 9200-70	ELR 9360-40	ELR 9500-30	ELR 9750-20
AC supply					
Voltage	342...528 V				
Phases	2ph, PE				
Frequency	50/60 Hz ±10%				
Efficiency (2	≤ 92.5%	≤ 93.5%	≤ 93.5%	≤ 94.5%	≤ 94.5%
DC Input					
Max. input voltage U_{Max}	80 V	200 V	360 V	500 V	750 V
Max. input power P_{Max}	5 kW	5 kW	5 kW	5 kW	5 kW
Max. input current I_{Max}	170 A	70 A	40 A	30 A	20 A
Overvoltage protection range	0...1.1 * U_{Max}	0...1.1 * U_{Max}	0...1.1 * U_{Max}	0...1.1 * U_{Max}	0...1.1 * U_{Max}
Overcurrent protection range	0...1.1 * I_{Max}	0...1.1 * I_{Max}	0...1.1 * I_{Max}	0...1.1 * I_{Max}	0...1.1 * I_{Max}
Overpower protection range	0...1.1 * P_{Max}	0...1.1 * P_{Max}	0...1.1 * P_{Max}	0...1.1 * P_{Max}	0...1.1 * P_{Max}
Max. allowed input voltage	1.2 * U_{Nom}	1.2 * U_{Nom}	1.2 * U_{Nom}	1.2 * U_{Nom}	1.2 * U_{Nom}
Min. input voltage for I_{Max}	0.73 V	2.3 V	2.3 V	4.6 V	6.8 V
Input capacitance	ca. 770 µF	ca. 310 µF	ca. 310 µF	ca. 98 µF	ca. 60 µF
Temperature coefficient for set values Δ / K	Voltage / current: 100 ppm				
Voltage regulation					
Adjustment range	0...81.6 V	0...204 V	0...367.2 V	0...510 V	0...765 V
Stability at ΔI	< 0.05% U_{Max}	< 0.05% U_{Max}	< 0.05% U_{Max}	< 0.05% U_{Max}	< 0.05% U_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 0.1% U_{Max}	< 0.1% U_{Max}	< 0.1% U_{Max}	< 0.1% U_{Max}	< 0.1% U_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*				
Display: Accuracy (3	≤ 0.2%				
Remote sensing compensation	max. 5% U_{Max}				
Current regulation					
Adjustment range	0...173.4 A	0...71.4 A	0...40.8 A	0...30.6 A	0...20.4 A
Stability at ΔU	< 0.15% I_{Max}	< 0,15% I_{Nenn}	< 0,15% I_{Nenn}	< 0.15% I_{Max}	< 0.15% I_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 0.2% I_{Max}	< 0.2% I_{Max}	< 0.2% I_{Max}	< 0.2% I_{Max}	< 0.2% I_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*				
Display: Accuracy (3	≤0.2%				
Compensation 10-90% ΔU_{DC}	< 0.6 ms	< 0.6 ms	< 0.6 ms	< 0.6 ms	< 0.6 ms
Power regulation					
Adjustment range	0…5100 W	0…5100 W	0…5100 W	0…5100 W	0…5100 W
Stability at ΔI / ΔU	< 0.75% P_{Max}	< 0.75% P_{Max}	< 0.75% P_{Max}	< 0.75% P_{Max}	< 0.75% P_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 1% P_{Max}	< 1% P_{Max}	< 1% P_{Max}	< 1% P_{Max}	< 1% P_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*				
Display: Accuracy (3	≤ 0.2%				
Resistance regulation					
Adjustment range	0.02…25 Ω	0.1…150 Ω	0.3...520 Ω	0.5…1000 Ω	1.2…2200 Ω
Accuracy (4 (@23±5°C / 73±9°F)	≤1% of max. resistance ± 0.3% of rated current				
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*				

5 kW	Model HP				
	ELR 9080-170	ELR 9200-70	ELR 9360-40	ELR 9500-30	ELR 9750-20
Analog interface [a]					
Set value inputs	U, I, P, R				
Actual value output	U, I				
Control signals	DC input on/off, remote control on/off, R mode on/off				
Status signals	CV, OVP, OT				
Galvanic isolation to the device	max. 1500 V DC				
Sample rate (set value inputs)	500 Hz				
Insulation	Allowed potential shift (floating voltage) on the DC input:				
Input (DC) to enclosure	±400 V DC	±725 V DC	±725 V DC	±1500 V DC	±1500 V DC
Input (AC) to input (DC)	±400 V DC	±1000 V DC	±1000 V DC	±1800 V DC	±1800 V DC
Environment					
Cooling	Temperature controlled fans				
Ambient temperature	0..50 °C (32...122°F)				
Storage temperature	-20...70 °C (-4...158°F)				
Digital interfaces					
Featured	1x USB-B for communication, 1x USB-A for functions and logging, 1x Master-slave bus, 1x GPIB (optional)				
Interface modules slot [b]	optional: CANopen, Profibus, Profinet, RS232, CAN, Ethernet, ModBus TCP, EtherCAT				
Galvanic isolation to the device	max. 1500 V DC				
Terminals					
Rear side	Share Bus, DC input, AC input/output, remote sensing, analog interface, USB-B, master-slave bus, Interface module slot				
Front side	USB-A				
Dimensions					
Enclosure (WxHxD)	19“ x 3U x 668 mm (26.3”)				
Total (WxHxD)	483 mm x 133 mm x 775 mm (19” x 5.2” x 30.5”)				
Standards	EN 61010-1:2011-07, EN 50160:2011-02 (grid class 2), EN 61000-6-2:2016-05, EN 61000-6-3:2011-09 (radiation class B)				
Weight	~18 kg (39.7 lb)	~18 kg (39.7 lb)	~18 kg (39.7 lb)	~18 kg (39.7 lb)	~18 kg (39.7 lb)
Article number [c]	33200435	33200436	33200437	33200438	33200439

(1 Related to the nominal values, the accuracy defines the maximum deviation between an adjusted values and the true (actual) value.
Example: a 80 V model has min. 0.3% voltage accuracy, that is 240 mV. When adjusting the voltage to 5 V, the actual value is allowed to differ max. 240 mV, which means it might be between 4.76 V and 5.24 V.
(2 Typical value at 100% input voltage and 100% power
(3 Set values as in the display or as data readable via digital interfaces are more accurate than the corresponding value on the DC input. Their accuracy subtracts from the general accuracy. For actual values it is vice versa. There the display accuracy adds to the general accuracy, so the error (i.e. deviation) will be higher.
4) Already includes the accuracy of the displayed actual resistance

(a For technical specifications of the analog interface see *User Manual*
(b Only in the standard version
(c Article number of the standard version, devices with options will have a different number

10 kW	Model HP				
	ELR 9080-340	ELR 9200-140	ELR 9360-80	ELR 9500-60	ELR 9750-40
AC supply					
Voltage	342...528 V				
Phases	3ph, PE				
Frequency	50/60 Hz ±10%				
Efficiency (2	≤ 92.5%	≤ 93.5%	≤ 93.5%	≤ 94.5%	≤ 94.5%
DC Input					
Max. input voltage U_{Max}	80 V	200 V	360 V	500 V	750 V
Max. input power P_{Max}	10 kW	10 kW	10 kW	10 kW	10 kW
Max. input current I_{Max}	340 A	140 A	80 A	60 A	40 A
Overvoltage protection range	0...1.1 * U_{Max}	0...1.1 * U_{Max}	0...1.1 * U_{Max}	0...1.1 * U_{Max}	0...1.1 * U_{Max}
Overcurrent protection range	0...1.1 * I_{Max}	0...1.1 * I_{Max}	0...1.1 * I_{Max}	0...1.1 * I_{Max}	0...1.1 * I_{Max}
Overpower protection range	0...1.1 * P_{Max}	0...1.1 * P_{Max}	0...1.1 * P_{Max}	0...1.1 * P_{Max}	0...1.1 * P_{Max}
Max. allowed input voltage	1.2 * U_{Nom}	1.2 * U_{Nom}	1.2 * U_{Nom}	1.2 * U_{Nom}	1.2 * U_{Nom}
Min. input voltage for I_{Max}	0.73 V	2.3 V	2.3 V	4.6 V	6.9 V
Input capacitance	ca. 1540 µF	ca. 620 µF	ca. 620 µF	ca. 196 µF	ca. 120 µF
Temperature coefficient for set values Δ / K	Voltage / current: 100 ppm				
Voltage regulation					
Adjustment range	0...81.6 V	0...204 V	0...367.2 V	0...510 V	0...765 V
Stability at ΔI	< 0.05% U_{Max}	< 0.05% U_{Max}	< 0.05% U_{Max}	< 0.05% U_{Max}	< 0.05% U_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 0.1% U_{Max}	< 0.1% U_{Max}	< 0.1% U_{Max}	< 0.1% U_{Max}	< 0.1% U_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*				
Display: Accuracy (3	≤ 0.2%				
Remote sensing compensation	max. 5% U_{Max}				
Current regulation					
Adjustment range	0...346.8 A	0...142.8 A	0...81.6 A	0...61.2 A	0...40.8 A
Stability at ΔU	< 0.15% I_{Max}	< 0.15% I_{Max}	< 0.15% I_{Max}	< 0.15% I_{Max}	< 0.15% I_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 0.2% I_{Max}	< 0.2% I_{Max}	< 0.2% I_{Max}	< 0.2% I_{Max}	< 0.2% I_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*				
Display: Accuracy (3	≤ 0.2%				
Compensation 10-90% ΔU_{DC}	< 0.6 ms	< 0.6 ms	< 0.6 ms	< 0.6 ms	< 0.6 ms
Power regulation					
Adjustment range	0…10200 W	0…10200 W	0…10200 W	0…10200 W	0…10200 W
Stability at ΔI / ΔU	< 0.75% P_{Max}	< 0.75% P_{Max}	< 0.75% P_{Max}	< 0.75% P_{Max}	< 0.75% P_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 1% P_{Max}	< 1% P_{Max}	< 1% P_{Max}	< 1% P_{Max}	< 1% P_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*				
Display: Accuracy (3	≤ 0.2%				
Resistance regulation					
Adjustment range	0.01…13 Ω	0.05…75 Ω	0.15...260 Ω	0.25…500 Ω	0.6…1100 Ω
Accuracy (4 (@23±5°C / 73±9°F)	≤1% of max. resistance ± 0.3% of rated current				
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*				

10 kW	Model HP				
	ELR 9080-340	ELR 9200-140	ELR 9360-80	ELR 9500-60	ELR 9750-40
Analog interface (a					
Set value inputs	U, I, P, R				
Actual value output	U, I				
Control signals	DC input on/off, remote control on/off, R mode on/off				
Status signals	CV, OVP, OT				
Galvanic isolation to the device	max. 1500 V DC				
Sample rate (set value inputs)	500 Hz				
Insulation	Allowed potential shift (floating voltage) on the DC input:				
Input (DC) to enclosure	±400 V DC	±725 V DC	±725 V DC	±1500 V DC	±1500 V DC
Input (AC) to input (DC)	±400 V DC	±1000 V DC	±1000 V DC	±1800 V DC	±1800 V DC
Environment					
Cooling	Temperature controlled fans				
Ambient temperature	0..50 °C (32...122°F)				
Storage temperature	-20...70 °C (-4...158°F)				
Digital interfaces					
Featured	1x USB-B for communication, 1x USB-A for functions and logging, 1x Master-slave bus, 1x GPIB (optional)				
Interface modules slot (b	optional: CANopen, Profibus, Profinet, RS232, CAN, Ethernet, ModBus TCP, EtherCAT				
Galvanic isolation to the device	max. 1500 V DC				
Terminals					
Rear side	Share Bus, DC input, AC input/output, remote sensing, analog interface, USB-B, master-slave bus, Interface module slot				
Front side	USB-A				
Dimensions					
Enclosure (WxHxD)	19“ x 3U x 668 mm (26.3”)				
Total (WxHxD)	483 mm x 133 mm x 775 mm (19” x 5.2” x 30.5”)				
Standards	EN 61010-1:2011-07, EN 50160:2011-02 (grid class 2), EN 61000-6-2:2016-05, EN 61000-6-3:2011-09 (radiation class B)				
Weight	~25 kg (55.1 lb)	~25 kg (55.1 lb)	~25 kg (55.1 lb)	~25 kg (55.1 lb)	~25 kg (55.1 lb)
Article number (c	33200440	33200441	33200442	33200443	33200444

(1 Related to the nominal values, the accuracy defines the maximum deviation between an adjusted values and the true (actual) value.
Example: a 80 V model has min. 0.3% voltage accuracy, that is 240 mV. When adjusting the voltage to 5 V, the actual value is allowed to differ max. 240 mV, which means it might be between 4.76 V and 5.24 V.
(2 Typical value at 100% input voltage and 100% power
(3 Set values as in the display or as data readable via digital interfaces are more accurate than the corresponding value on the DC input. Their accuracy subtracts from the general accuracy. For actual values it is vice versa. There the display accuracy adds to the general accuracy, so the error (i.e. deviation) will be higher.
4) Already includes the accuracy of the displayed actual resistance

(a For technical specifications of the analog interface see *User Manual*
(b Only in the standard version
(c Article number of the standard version, devices with options will have a different number

15 kW	Model HP			
	ELR 9080-510	ELR 9200-210	ELR 9360-120	ELR 9500-90
AC supply				
Voltage	342...528 V			
Phases	3ph, PE			
Frequency	50/60 Hz ±10%			
Efficiency (2	≤ 94.5%	≤ 93.5%	≤ 93.5%	≤ 94.5%
DC Input				
Max. input voltage U_{Max}	80 V	200 V	360 V	500 V
Max. input power P_{Max}	15 kW	15 kW	15 kW	15 kW
Max. input current I_{Max}	510 A	210 A	120 A	90 A
Overvoltage protection range	0...1.1 * U_{Max}	0...1.1 * U_{Max}	0...1.1 * U_{Max}	0...1.1 * U_{Max}
Overcurrent protection range	0...1.1 * I_{Max}	0...1.1 * I_{Max}	0...1.1 * I_{Max}	0...1.1 * I_{Max}
Overpower protection range	0...1.1 * P_{Max}	0...1.1 * P_{Max}	0...1.1 * P_{Max}	0...1.1 * P_{Max}
Max. allowed input voltage	1.2 * U_{Nom}	1.2 * U_{Nom}	1.2 * U_{Nom}	1.2 * U_{Nom}
Min. input voltage for I_{Max}	0.73 V	2.3 V	2.3 V	4.6 V
Input capacitance	ca. 2310 µF	ca. 930 µF	ca. 930 µF	ca. 294 µF
Temperature coefficient for set values Δ / K	Voltage / current: 100 ppm			
Voltage regulation				
Adjustment range	0...81.6 V	0...204 V	0...367.2 V	0...510 V
Stability at ΔI	< 0.05% U_{Max}	< 0.05% U_{Max}	< 0.05% U_{Max}	< 0.05% U_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 0.1% U_{Max}	< 0.1% U_{Max}	< 0.1% U_{Max}	< 0.1% U_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*			
Display: Accuracy (3	≤0.2%			
Remote sensing compensation	max. 5% U_{Max}			
Current regulation				
Adjustment range	0...520.2 A	0...214.2 A	0...122.4 A	0...91.8 A
Stability at ΔU	< 0.15% I_{Max}	< 0.15% I_{Max}	< 0.15% I_{Max}	< 0.15% I_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 0.2% I_{Max}	< 0.2% I_{Max}	< 0.2% I_{Max}	< 0.2% I_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*			
Display: Accuracy (3	≤0.2%			
Compensation 10-90% ΔU_{DC}	< 0.6 ms	< 0.6 ms	< 0.6 ms	< 0.6 ms
Power regulation				
Adjustment range	0…15300 W	0…15300 W	0…15300 W	0…15300 W
Stability at ΔI / ΔU	< 0.75% P_{Max}	< 0.75% P_{Max}	< 0.75% P_{Max}	< 0.75% P_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 1% P_{Max}	< 1% P_{Max}	< 1% P_{Max}	< 1% P_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*			
Display: Accuracy (3	≤0.2%			
Resistance regulation				
Adjustment range	0.006…10 Ω	0.033…50 Ω	0.1...180 Ω	0.16…340 Ω
Accuracy (4 (@23±5°C / 73±9°F)	≤1% of max. resistance ± 0.3% of rated current			
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*			

15 kW	Model HP			
	ELR 9080-510	ELR 9200-210	ELR 9360-120	ELR 9500-90
Analog interface [a]				
Set value inputs	U, I, P, R			
Actual value output	U, I			
Control signals	DC input on/off, remote control on/off, R mode on/off			
Status signals	CV, OVP, OT			
Galvanic isolation to the device	max. 1500 V DC			
Sample rate (set value inputs)	500 Hz			
Insulation	Allowed potential shift (floating voltage) on the DC input:			
Input (DC) to enclosure	±400 V DC	±725 V DC	±725 V DC	±1500 V DC
Input (AC) to input (DC)	±400 V DC	±1000 V DC	±1000 V DC	±1800 V DC
Environment				
Cooling	Temperature controlled fans			
Ambient temperature	0..50 °C (32...122°F)			
Storage temperature	-20...70 °C (-4...158°F)			
Digital interfaces				
Featured	1x USB-B for communication, 1x USB-A for functions and logging, 1x Master-slave bus, 1x GPIB (optional)			
Interface modules slot [b]	optional: CANopen, Profibus, Profinet, RS232, CAN, Ethernet, ModBus TCP, EtherCAT			
Galvanic isolation to the device	max. 1500 V DC			
Terminals				
Rear side	Share Bus, DC input, AC input/output, remote sensing, analog interface, USB-B, master-slave bus, Interface module slot			
Front side	USB-A			
Dimensions				
Enclosure (WxHxD)	19“ x 3U x 668 mm (26.3”)			
Total (WxHxD)	483 mm x 133 mm x 775 mm (19” x 5.2” x 30.5”)			
Standards	EN 61010-1:2011-07, EN 50160:2011-02 (grid class 2), EN 61000-6-2:2016-05, EN 61000-6-3:2011-09 (radiation class B)			
Weight	~32 kg (70.5 lb)	~32 kg (70.5 lb)	~32 kg (70.5 lb)	~32 kg (70.5 lb)
Article number [c]	33200446	33200447	33200448	33200449

(1 Related to the nominal values, the accuracy defines the maximum deviation between an adjusted values and the true (actual) value.
Example: a 80 V model has min. 0.3% voltage accuracy, that is 240 mV. When adjusting the voltage to 5 V, the actual value is allowed to differ max. 240 mV, which means it might be between 4.76 V and 5.24 V.
(2 Typical value at 100% input voltage and 100% power
(3 Set values as in the display or as data readable via digital interfaces are more accurate than the corresponding value on the DC input. Their accuracy subtracts from the general accuracy. For actual values it is vice versa. There the display accuracy adds to the general accuracy, so the error (i.e. deviation) will be higher.
4) Already includes the accuracy of the displayed actual resistance

(a For technical specifications of the analog interface see *User Manual*
(b Only in the standard version
(c Article number of the standard version, devices with options will have a different number

15 kW	Model HP		
	ELR 9750-60	ELR 91000-40	ELR 91500-30
AC supply			
Voltage	342...528 V		
Phases	3ph, PE		
Frequency	50/60 Hz ±10%		
Efficiency (2	≤ 94.5%	≤ 93.5%	≤ 94.5%
DC Input			
Max. input voltage U_{Max}	750 V	1000 V	1500 V
Max. input power P_{Max}	15 kW	15 kW	15 kW
Max. input current I_{Max}	60 A	40 A	30 A
Overvoltage protection range	0...1.1 * U_{Max}	0...1.1 * U_{Max}	0...1.1 * U_{Max}
Overcurrent protection range	0...1.1 * I_{Max}	0...1.1 * I_{Max}	0...1.1 * I_{Max}
Overpower protection range	0...1.1 * P_{Max}	0...1.1 * P_{Max}	0...1.1 * P_{Max}
Max. allowed input voltage	1.2 * U_{Nom}	1.2 * U_{Nom}	1.2 * U_{Nom}
Min. input voltage for I_{Max}	6.9 V	6.9 V	9.2 V
Input capacitance	ca. 180 µF	ca. 310 µF	ca. 33 µF
Temperature coefficient for set values Δ / K	Voltage / current: 100 ppm		
Voltage regulation			
Adjustment range	0...765 V	0...1101.6 V	0...1530 V
Stability at ΔI	< 0.05% U_{Max}	< 0.05% U_{Max}	< 0.05% U_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 0.1% U_{Max}	< 0.1% U_{Max}	< 0.1% U_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*		
Display: Accuracy (3	≤0.2%		
Remote sensing compensation	max. 5% U_{Max}		
Current regulation			
Adjustment range	0...61.2 A	0...40.8 A	0...30.6 A
Stability at ΔU	< 0.15% I_{Max}	< 0.15% I_{Max}	< 0.15% I_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 0.2% I_{Max}	< 0.2% I_{Max}	< 0.2% I_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*		
Display: Accuracy (3	≤0.2%		
Compensation 10-90% ΔU_{DC}	< 0.6 ms	< 0.6 ms	< 0.6 ms
Power regulation			
Adjustment range	0…15300 W	0…15300 W	0…15300 W
Stability at ΔI / ΔU	< 0.75% P_{Max}	< 0.75% P_{Max}	< 0.75% P_{Max}
Accuracy (1 (@23±5°C / 73±9°F)	< 1% P_{Max}	< 1% P_{Max}	< 1% P_{Max}
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*		
Display: Accuracy (3	≤0.2%		
Resistance regulation			
Adjustment range	0.4…740 Ω	0.8...1300 Ω	2.5…3000 Ω
Accuracy (4 (@23±5°C / 73±9°F)	≤1% of max. resistance ± 0.3% of rated current		
Display: Adjustment resolution	see section *„1.9.6.4. Resolution of the displayed values“*		

15 kW	Model HP		
	ELR 9750-60	ELR 91000-40	ELR 91500-30
Analog interface [a]			
Set value inputs	U, I, P, R		
Actual value output	U, I		
Control signals	DC input on/off, remote control on/off, R mode on/off		
Status signals	CV, OVP, OT		
Galvanic isolation to the device	max. 1500 V DC		
Sample rate (set value inputs)	500 Hz		
Insulation	Allowed potential shift (floating voltage) on the DC input:		
Input (DC) to enclosure	±1500 V DC	±1500 V DC	±1500 V DC
Input (AC) to input (DC)	±1800 V DC	±1800 V DC	±1800 V DC
Environment			
Cooling	Temperature controlled fans		
Ambient temperature	0..50 °C (32...122°F)		
Storage temperature	-20...70 °C (-4...158°F)		
Digital interfaces			
Featured	1x USB-B for communication, 1x USB-A for functions and logging, 1x Master-slave bus, 1x GPIB (optional)		
Interface modules slot [b]	optional: CANopen, Profibus, Profinet, RS232, CAN, Ethernet, ModBus TCP, EtherCAT		
Galvanic isolation to the device	max. 1500 V DC		
Terminals			
Rear side	Share Bus, DC input, AC input/output, remote sensing, analog interface, USB-B, master-slave bus, Interface module slot		
Front side	USB-A		
Dimensions			
Enclosure (WxHxD)	19“ x 3U x 669 mm (26.3”)		
Total (WxHxD)	483 mm x 133 mm x 775 mm (19” x 5.2” x 30.5”)		
Standards	EN 61010-1:2011-07, EN 50160:2011-02 (grid class 2), EN 61000-6-2:2016-05, EN 61000-6-3:2011-09 (radiation class B)		
Weight	~32 kg (70.5 lb)	~32 kg (70.5 lb)	~32 kg (70.5 lb)
Article number [c]	33200450	33200451	33200452

(1 Related to the nominal values, the accuracy defines the maximum deviation between an adjusted values and the true (actual) value.
Example: a 80 V model has min. 0.3% voltage accuracy, that is 240 mV. When adjusting the voltage to 5 V, the actual value is allowed to differ max. 240 mV, which means it might be between 4.76 V and 5.24 V.
(2 Typical value at 100% input voltage and 100% power
(3 Set values as in the display or as data readable via digital interfaces are more accurate than the corresponding value on the DC input. Their accuracy subtracts from the general accuracy. For actual values it is vice versa. There the display accuracy adds to the general accuracy, so the error (i.e. deviation) will be higher.
4) Already includes the accuracy of the displayed actual resistance

(a For technical specifications of the analog interface see *User Manual*
(b Only in the standard version
(c Article number of the standard version, devices with options will have a different number

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