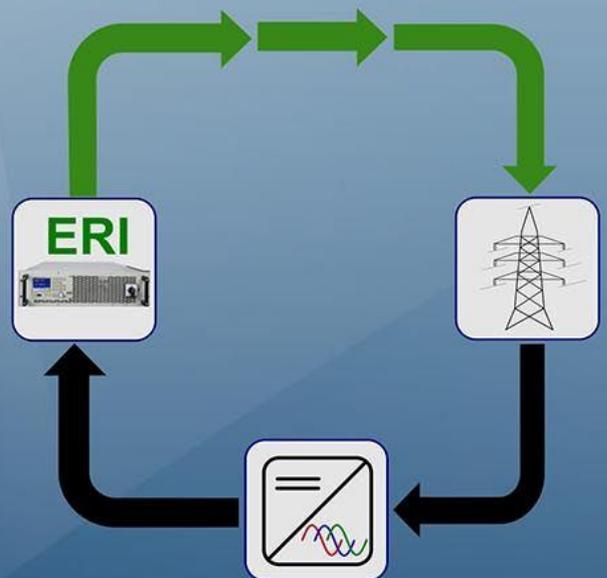


能量反馈式电子负载  
ERI 系列



**3,600 W to 10,800 W**  
**120 V to 800 V**  
**22.5 A to 330 A**



## 为什么要选购带有能量反馈的电子负载？

能量回收优于浪费热量

有利于环境保护

节约电能费用

生态型能源利用

改善实验室环境

减少空调使用

无风扇噪音



# Electronic Energy Recycling Load ERI Series



Interface Overview	
RS-232	X
USB	X
LAN	X
GPIB	O
CAN	X
Analog	X
Analog isolated	O

X Standard O Option /not available



- Energy feedback into the local power grid
- Low heat waste - silent - lab operation
- CC - CV - CR - CP - CCV - CVC mode
- Ethernet + USB + RS-232 + CAN + I/O Port as standard
- SCPI Programming with measurement function
- Dynamic loads with synchronized DAQ

- Data storage directly to USB mass storage device
- Adjustable protections for voltage and current
- Electronic protection
- Digital Input and programmable output
- Galvanically isolated fast I/O Port (optional)

**Description**

ERI Series Electronic Loads feed the consumed energy with an efficiency of up to 95 % back into the local power grid.

The devices offer an extensive variety of standard interfaces.

Apart from Ethernet, USB, RS-232 and a fast I/O Port there is a standard CAN interface.

GPIB can be installed as an option (ERI02).

Programming is done in SCPI with an extensive command syntax.

**Functions**

The units provide constant current, constant voltage, constant resistance and constant power mode.

In addition, protections for current and voltage can be set in any mode. Dynamic operation can be configured by up to 300 list point settings.

A data acquisition function allows to store measurement data on an external USB flash drive.

**Loading Capacity**

The type spectrum contains 3 power classes from 3,600 W to 10,800 W and input voltages of 120 V, 400 V and 800 V.

**Protections and Messages**

- Current protection
- Power protection
- Overtemperature protection
- Overvoltage indication
- Reverse polarity indication
- Protection of the GND lines at the I/O Port

**Cooling**

ERI loads recover the consumed energy instead of converting to thermal energy.

Thus, electricity costs are reduced and the environment is only slightly warmed. As a consequence, in many cases air-condition is unnecessary.

Energy recycling loads do not need powerful fans. That makes the devices acceptably quiet and therefore perfectly fit for laboratory operation.

**Interfaces**

The following interfaces are included as standard:

- Ethernet
- USB
- RS-232
- CAN
- I/O Port

LabVIEW driver is certified by National Instruments.

**I/O Port**

Standard I/O Port for the following functions:

- Load setting C and V
- Analog setting of C and V protections
- Load on-off
- Voltage monitor output
- Current monitor output
- Trigger input
- Trigger output
- Digital input
- Programmable control output

**Galvanically Isolated I/O Port**  
(Option ERI06)

For the galvanic isolation between the I/O Port and the load terminals the ERI06 option can be installed.

Using this board prevents ground loops and allows loading of bipolar voltages with two loads and common analog control.

**Factory Calibration Certificate**  
(Option FCC-ERIx)

A Factory Calibration Certificate (FCC) can be supplied with the devices. The FCC meets the requirements according to DIN EN ISO 9000ff. This calibration certificate documents the traceability to national standards to illustrate the physical device in accordance with the international System of Units (SI).

The recommended calibration interval is 2 years.

## Mechanics / Terminals



### Mechanics

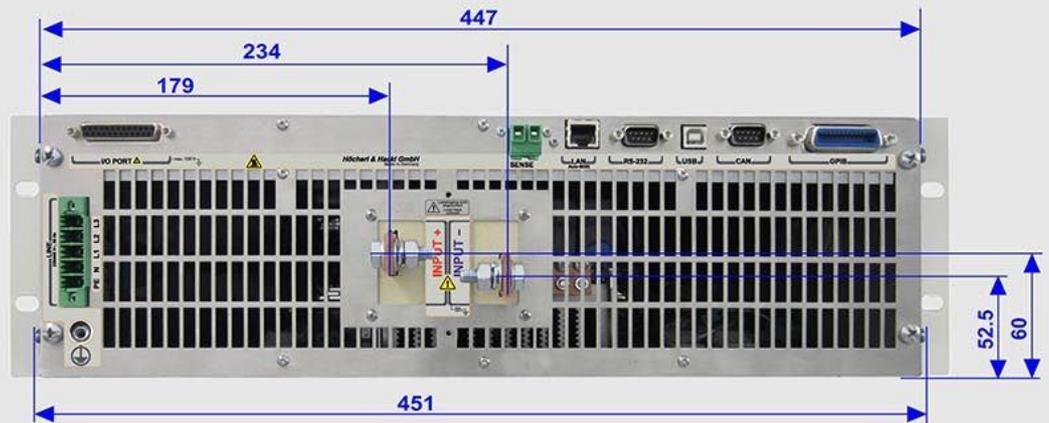
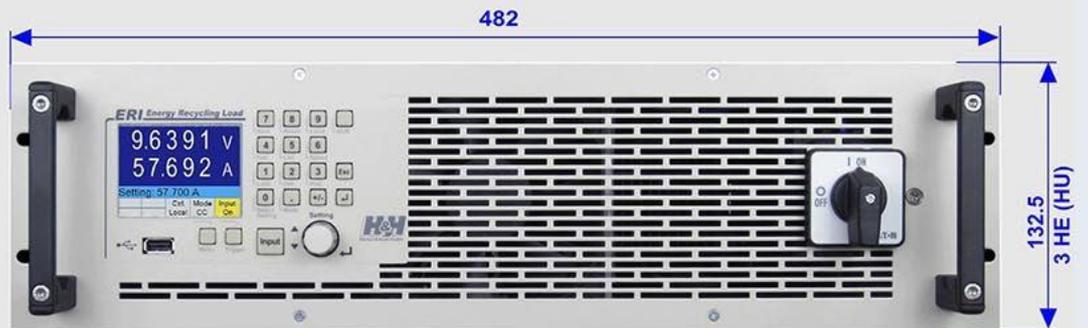
The ERI load has a sturdy 19" rack design and can also be used as a table-top device. No additional mounting kits are needed for 19" rack installation.

### Terminals

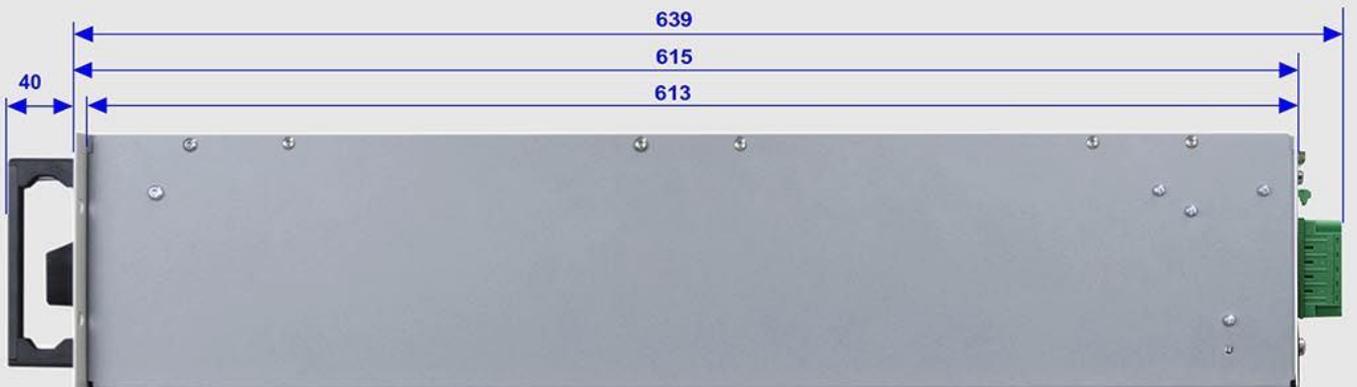
All connections are located at the rear side. The current terminals are designed as solid copper bars.

### Safety

Covers are supplied as touch protection for units operating with dangerous contact voltages.



All dimensions in mm

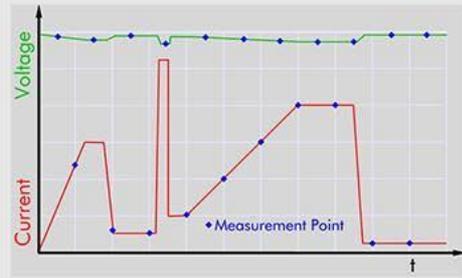


# Data Acquisition / Dynamic Functions / Tools

## Data Acquisition

The standard Data Acquisition function expands the possibilities of the device by the following items:

- Storing measurement data to external USB flash drive (timestamp, voltage and current)
- Fast synchronized data logging with internal data memory for waveform generation (timestamp, voltage and current)



Example: Data logging with constant sampling rate

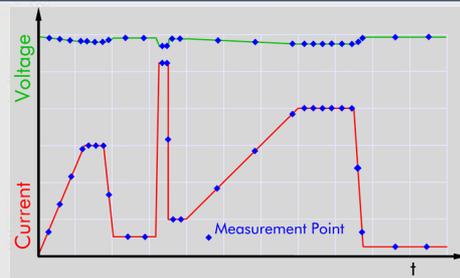
## Dynamic Function

In CC, CV, CR and CP mode, complex load profiles can be realized by List function. 300 load levels with a corresponding ramp and dwell time can be generated.

## Settings Memory

To permanently save device settings 2 user memories are available.

Furthermore, the last settings at power off can be reloaded when the load is powered on. At power on the Electronic Load can either set reset values, the last active settings at power off or setting memory 1 or 2.



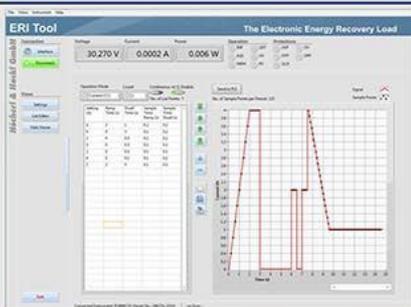
Example: Waveform generated by List function with synchronized recording of measured values of time, voltage and current.



## Software Tool

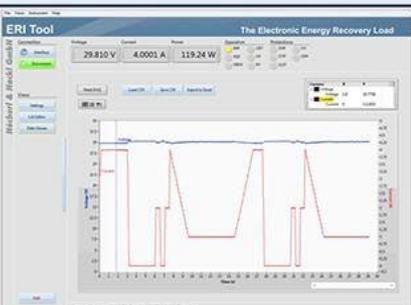
The ERI Tool is a graphical software tool to control the ERI series Electronic Loads. The user can choose different functions with the aid of the navigation bar.

The most important load settings are done in the Main Menu ("Settings"). Several graphical widgets inform the user about the measurements and the current device status. Further on, a data logging function can be activated in the Main Menu.



## List Editor

The list editor is used to create dynamic load profiles for current, voltage, resistance, or power with the corresponding ramp and dwell times. Additionally, a synchronous sampling rate for current and voltage measurements can be individually set for each interpolation point. The generated list profile can be sent directly to the load via one of the data interfaces or saved to a data storage for further processing.



## Data Viewer

Measurement values of the internal DAQ memory can be exported from the Electronic Load and displayed as a diagram with the aid of the "Data Viewer". The measurement data can also be saved on a data storage as a \*.CSV file for further processing.



## Model Overview 3,600 W ... 10,800 W DC

Model (order number)	ERI3612	ERI3640	ERI3680
Maximum input voltage	120 V	400 V	800 V
Current	110 A	45 A	22.5 A
Continuous power	3,600 W	3,600 W	3,600 W
Voltage setting	0 ... 120 V	0 ... 400 V	0 ... 800 V
Current setting	0 ... 110 A	0 ... 45 A	0 ... 22.5 A
Resistance setting	18.8 mΩ ... 11.731 Ω	44.4 mΩ ... 95.58 Ω	88.9 mΩ ... 382 Ω
Power setting	0 ... 3,600 W	0 ... 3,600 W	0 ... 3,600 W
Rise/fall time <sup>1)</sup>	200 μs	200 μs	200 μs
Input capacity	350 μF	200 μF	150 μF
Minimum input voltage <sup>2)</sup>	3 V	3 V	3 V
Mains <sup>3)</sup>	230 VAC L->N / 50 Hz	230 VAC L->N / 50 Hz	230 VAC L->N / 50 Hz
Power consumption <sup>4)</sup>	35 VA	55 VA	75 VA
Efficiency <sup>5)</sup>	95 %	90 %	90 %
Maximum Noise <sup>6)</sup>	55 dB(A)	57 dB(A)	60 dB(A)
Load terminals <sup>7)</sup>	FKS20/4-SM8	FKS20/4-SM8	FKS20/4-SM8
Weight	17 kg	17 kg	17 kg
Housing <sup>8)</sup> W x H x D (mm) Height / installation depth (mm)	482 x 133 x 679 19", 3 HU / 637	482 x 133 x 679 19", 3 HU / 637	482 x 133 x 679 19", 3 HU / 637

Model (order number)	ERI7212	ERI7240	ERI7280
Maximum input voltage	120 V	400 V	800 V
Current	220 A	90 A	45 A
Continuous power	7,200 W	7,200 W	7,200 W
Voltage setting	0 ... 120 V	0 ... 400 V	0 ... 800 V
Current setting	0 ... 220 A	0 ... 90 A	0 ... 45 A
Resistance setting	9.09 mΩ ... 5.865 Ω	22.2 mΩ ... 47.79 Ω	44.4 mΩ ... 191 Ω
Power setting	0 ... 7,200 W	0 ... 7,200 W	0 ... 7,200 W
Rise/fall time <sup>1)</sup>	200 μs	200 μs	200 μs
Input capacity	700 μF	400 μ	300 μF
Minimum input voltage <sup>2)</sup>	3 V	3 V	3 V
Mains <sup>3)</sup>	400 VAC L->L / 50 Hz	400 VAC L->L / 50 Hz	400 VAC L->L / 50 Hz
Power consumption <sup>4)</sup>	35 VA	55 VA	75 VA
Efficiency <sup>5)</sup>	95 %	90 %	90 %
Maximum Noise <sup>6)</sup>	60 dB(A)	62 dB(A)	64 dB(A)
Load terminals <sup>7)</sup>	FKS20/4-SM8	FKS20/4-SM8	FKS20/4-SM8
Weight	28 kg	28 kg	28 kg
Housing <sup>8)</sup> W x H x D (mm) Height / installation depth (mm)	482 x 133 x 679 19", 3 HU / 637	482 x 133 x 679 19", 3 HU / 637	482 x 133 x 679 19", 3 HU / 637

Model (order number)	ERI10812	ERI10840	ERI10880
Maximum input voltage	120 V	400 V	800 V
Current	330 A	135 A	67.5 A
Continuous power	10,800 W	10,800 W	10,800 W
Voltage setting	0 ... 120 V	0 ... 400 V	0 ... 800 V
Current setting	0 ... 330 A	0 ... 135 A	0 ... 67.5 A
Resistance setting	6.06 mΩ ... 3.910 Ω	14.8 mΩ ... 31.86 Ω	29.6 mΩ ... 127 Ω
Power setting	0 ... 10,800 W	0 ... 10,800 W	0 ... 10,800 W
Rise/fall time <sup>1)</sup>	200 μs	200 μs	200 μs
Input capacity	1050 μF	600 μF	450 μF
Minimum input voltage <sup>2)</sup>	3 V	3 V	3 V
Mains <sup>3)</sup>	400 VAC L->L / 50 Hz	400 VAC L->L / 50 Hz	400 VAC L->L / 50 Hz
Power consumption <sup>4)</sup>	35 VA	55 VA	75 VA
Efficiency <sup>5)</sup>	95 %	90 %	90 %
Maximum Noise <sup>6)</sup>	60 dB(A)	62 dB(A)	64 dB(A)
Load terminals <sup>7)</sup>	FKS20/4-SM8	FKS20/4-SM8	FKS20/4-SM8
Weight	37 kg	37 kg	37 kg
Housing <sup>8)</sup> W x H x D (mm) Height / installation depth (mm)	482 x 133 x 679 19", 3 HU / 637	482 x 133 x 679 19", 3 HU / 637	482 x 133 x 679 19", 3 HU / 637

1) Rise and fall times are defined of 10 ... 90 % and 90 ... 10 % of the maximum current (current mode FAST, tolerance ±20 %). Rise and fall time at speed „medium“: ca. 500 μs, „slow“: ca. 5 ms

2) Minimum input voltage for maximum load current  
3) 230 / 400 VAC +10 % -15 %, 50Hz  
1-phase at 3.6 kW  
2-phase at 7.2 kW  
3-phase at 10.8 kW

4) Power consumption in idle operation (without load current)  
5) Maximum achievable efficiency  
6) Measured at the from in distance of 1 m

7) Flat copper bar 20 x 4 mm vertically installed with screw M8  
8) Greatest width and depth without wiring 1 HU = 44.45 mm

## Technical Data ERI Series

Accuracy of setting	
	of the corresponding range
<b>Current</b>	±0.3 %
<b>Voltage</b>	±0.3 %
<b>Resolution</b>	14 bit
Accuracy of protections	
	of the corresponding range
<b>Overcurrent protection</b>	±0.5 %
<b>Undervoltage protection</b>	±0.5 %
<b>Resolution</b>	12 bit
Accuracy of measurement/display (in static CC, CR, CV mode)	
	of the corresponding range
<b>Voltage</b>	±0.1 %
<b>Current</b>	±0.3 %
<b>Resistance</b>	is calculated from voltage and current
<b>Power</b>	is calculated from voltage and current
<b>Resolution</b>	18 bit
<b>Sampling rate</b>	330 ms, not triggerable
Accuracy of measurement/display (in static CP mode and all dynamic modes)	
	of the corresponding range
<b>Voltage</b>	±0.3 %
<b>Current</b>	±0.5 %
<b>Resistance</b>	is calculated from voltage and current
<b>Power</b>	is calculated from voltage and current
<b>Resolution</b>	12 bit
<b>Sampling rate</b>	200 µs ... 800,000 s
Dynamic Function (LIST)	
<b>Number of load levels</b>	max. 300, with ramp time and dwell time setting
	min. max.
<b>Dwell time</b>	200 µs 800000 s
<b>Ramp time</b>	0 s 800000 s
<b>Resolution</b>	200 µs
<b>Accuracy of the setting times</b>	±0.02 %
Data acquisition	
To external flash drive	
<b>Sampling rate</b>	0.5 s, 1 s, 5 s, 10 s
<b>Measurement data</b>	time stamp, voltage, current
<b>Number of measurement points</b>	limited by flash drive memory size
<b>File format</b>	.CSV format
To internal memory	
<b>Sampling rate</b>	200 µs ... 800,000 s, Resolution 200 µs, synchronized with dynamic function
<b>Measurement data</b>	time stamp, voltage, current
<b>Number of measure-</b>	max. 8,000
Accuracy of analog control 0 ... 10 V for voltage, current	
	of the corresponding range
<b>Current</b>	±0.4 %
<b>Voltage</b>	±0.4 %
<b>Overcurrent Protection</b>	±1.4 %
<b>Undervoltage protection</b>	±1.4 %
Input resistance of analog inputs > 10 kΩ GND max. ±2 V with respect to negative load input *) *) 125 V with option ERI06	

Accuracy of analog measurement outputs 0 ... 10 V for voltage, current		
	of analog signal of real value	offset voltage
<b>Voltage</b>	±0.2 %	±15 mV
<b>Current</b>	±0.4 %	±15 mV
Minimum load 2 kΩ GND max. ±2 V with respect to negative load input *) *) 125 V with option ERI06		
I/O Port outputs and inputs		
<b>Outputs</b>	status load on - off status overload (OV, OCP, OPP, OTP) trigger output programmable output selectable, 3.3 V, 5 V, 12 V, or externally programmable up to 30 V	
<b>Inputs</b>	load on-off mode selection trigger input programmable input control input remote shut-down 3 ... 30 V	
<b>Input</b>		
<b>Input resistance</b>	>50 kΩ when load input is off Diode function at reverse polarity up to nominal current	
<b>Input capacity</b>	siehe Modellübersicht	
<b>Permissible operating voltage</b>	negative load input - housing 125 V DC	
<b>Power</b>	see model overview (at T <sub>A</sub> = 21 °C)	
<b>Derating</b>	-2 %/°C for T <sub>A</sub> > 21 °C	
Protection and monitoring		
<b>Protective devices</b>	overcurrent overpower overtemperature	
<b>Monitoring signals</b>	overvoltage indication undervoltage indication (if the input voltage is too low for the set current) reverse polarity indication	
Operating conditions		
<b>Operating temperature</b>	5 °C ... 40 °C	
<b>Cooling</b>	air-cooling	
<b>Mains voltage and power consumption</b>	see model overview	
Housing		
<b>Color</b>	front panel	RAL7032 (pebble grey)
	rear panel	Stainless steel
	top	RAL7037 (stone grey)
	Dimensions	see model overview
Safety and EMC		
<b>Protection</b>	IP20	
<b>Measuring category</b>	O (CAT I according to EN61010 Rev. 2004)	
<b>Electrical safety</b>	DIN EN 61010	
<b>EMC, CE marking</b>	DIN EN 55011 DIN EN 61326-1 DIN EN 61000-3-2 DIN EN 61000-3-3	
Available options		
<b>Data interface</b>	ERI02	GPIB Interface
<b>Hardware expansion</b> ERI06	Galvanically isolated I/O Port	
Kalibrierung		
	FCC-N-ERixx FCC-ERixx	Factory Calibration Certificate for new devices Factory Calibration Certificate