



# DATASHEET EA-ELR 10000 3U

Programmable Electronic DC-Loads With Energy Recovery

© EA Elektro-Automatik in 2021, this information is subject to change without notice

# EA-ELR 10000 3U 5 KW - 10 KW - 15 KW

Programmable Electronic DC-Loads With Energy Recovery



### Features

- Wide range input, 208 V 480 V ±10 % 3ph AC
- Active Power-Factor-Correction, typical 0.99
- Regenerative with energy recovery into the grid
- Very high efficiency up to over 96 %
- High performance of up to 15 kW per unit
- Voltage from 0 80 V up to 0 2000 V
- Currents from 0 20 A up to 0 510 A
- Flexible power regulated DC input stages (autoranging)
- Regulation mode CV, CC, CP, CR with fast crossover
- Digital regulation, high resolution with 16bit ADCs and DACs, selection of control speed: Normal, Fast, Slow

- Color 5" TFT display with touch control and intuitive user interface
- Galvanically isolated Share-Bus for parallel operation of all power classes in the 10000 series
- Master-Slave-Bus for parallel operation of up to 64 units of all power classes in the 10000 series
- Integrated function generator with predefined curves
- Integrated battery test mode
- Photovoltaics test mode, MPPT
- Command languages and drivers: SCPI and ModBus, LabVIEW, IVI

# Build-in Interfaces

- USB
- Ethernet
- Analog
- USB Host
- Master-Slave-Bus
- Share-Bus

# **Optional Interfaces**

- CAN
- CANopen
- RS232
- Profibus
- EtherCAT
- Profinet, with one or two ports
- Modbus, with one or two ports
- Ethernet, with one or two ports

### Software

EA-Power Control

# Technical data

AchquitSelectionVerlageSelectionRequerySelectionRequerySelectionReversion <th>General specifications</th> <th></th>	General specifications	
Frequency     45.66 Hz       Power factor     >0.90       Leakage current     >0.90       Oeword tage cutegory     2       Pollution degree     >0.005 K 50.010% load, constant input whage and constant temperature)       Eader regulation CV     >0.005 K 50.010% load, constant input whage, constant temperature)       Eader regulation CV     >0.005 K 50.010% load, constant input whage, constant input whage, load and temperature)       Temperature coefficient CV     >0.005 K 50.010% load, constant input whage, and constant temperature)       Compensation (Remote Sense)     >0.001% K 50 km/s 40 km 20.0% main water sense mup)       Constantion (Remote Sense)     >0.001% K 50 km/s 40 km 20.0% main instant input valage, constant input valage, indication (Remote Sense)       Eader regulation CC     >0.001% K 50 km/s 40 km 20.0% main instant input valage, indication (Remote Sense)       Eader regulation CC     >0.001% K 50 km/s 40 km 20.0% main input valage, and constant temperature)       Load regulation CC     >0.001% K 50 km/s 40 km 20.0% main input valage, and constant temperature)       Load regulation CC     >0.001% K 50 km/s 40 km 20.0% main input valage, and constant temperature)       Load regulation CC     >0.001% K 50 km/s 40 km 20.0% main input valage, and constant temperature)       Load regulation CC     >0.001% K 50 km/s 40 km 20.0% main	AC Input	
Power factor     >0.99       Leakage current     <5 m A	Voltage, Phases	208 V / 380 V / 400 V / 480 V ±10%, 3ph AC (208 V 3ph AC with Derating to 3 / 6 / 9 kW)
Leakage current     <5 mÅ	Frequency	45 - 66 Hz
Overvoltage category     2       Pollution degree     2       DC Output static        Load regulation CV     =0.05% FS (0:100% load, constant input voltage, and constant temperature)       Line regulation CV     =0.01% FS (208 v - 400 VAC ±10% input voltage, constant input voltage, load and temperature)       Stability CV     =0.01% FS (208 v - 400 VAC ±10% input voltage, constant input voltage, load and temperature)       Temperature coefficient CV     =0.01% FS (0:00 W - 400 VAC ±10% input voltage, constant input voltage, load and temperature)       Compensation (Remote Sense)     =5% Usuma       Load regulation CC     =0.01% FS (0:00 W - 400 VAC ±10% input voltage, constant input voltage, load and temperature)       Line regulation CC     =0.01% FS (0:00 W - 400 VAC ±10% input voltage, constant input voltage, load and temperature)       Load regulation CC     =0.01% FS (0:00 W - 400 VAC ±10% input voltage, constant input voltage, load and temperature)       Load regulation CR     =0.02% FS (0:00 W - 400 VAC ±10% input voltage, constant input voltage, load and temperature)       Load regulation CR     =0.02% FS (0:00 W - 400 VAC ±10% input voltage, constant input voltage, load and temperature)       Load regulation CR     =0.02% FS (0:00 W - 400 VAC ±10% input voltage, constant input voltage, load and temperature)       Load regulation CR     =0.02% FS (0:00 W - 400 VAC ±10% inpu	Power factor	>0.99
Pollution degree     2       DC Output static     5       Load regulation CV     50.5% FS (0:100% load, constant input voltage and constant temperature)       Inter regulation CV     50.01% FS (0:08 V - 480 V AC 10% input voltage, constant lang and constant temperature)       Stability CV     50.02% FS (0:ve 8hrs interval following 30 minutes warm up, constant input voltage, load and temperature)       Compensation (Remote Sens)     55% lummai       Load regulation CV     50.01% FS (0:08 V - 480 V AC 10% input voltage, constant temperature)       Load regulation CC     50.31% FS (0:08 V - 480 V AC 10% input voltage, constant temperature)       Load regulation CC     50.01% FS (0:08 V - 480 V AC 10% input voltage, constant temperature)       Load regulation CC     50.01% FS (0:08 V - 480 V AC 10% input voltage, constant temperature)       Load regulation CR     50.02% FS (0:00% indiad, constant input voltage, constant temperature)       Load regulation CR     50.02% FS (0:00% indiad, constant input voltage, constant temperature)       Load regulation CR     50.03% FS (0:10% indiad, constant input voltage, constant temperature)       Load regulation CR     50.03% FS (0:10% indiad, constant input voltage, constant temperature)       Load regulation CR     50.03% FS (0:10% indiad, constant input voltage, constant temperature)       Load regulation CR	Leakage current	<5 mA
DC Output static     Image: Control of Control control control of Control control control contro	Overvoltage category	2
Load regulation CV     s0.05%, FS (0: 100% load, constant input voltage, constant load and constant temperature)       Stability CV     s0.05%, FS (0:e0 8hrs interval following 30 minutes warm-up, constant input voltage, load and temperature)       Compensation (Remote Sense)     s5%, Univeral       Load regulation CC     s0.01%, FS (0:e0 8hrs interval following 30 minutes warm up, constant input voltage, load and temperature)       Load regulation CC     s0.01%, FS (0:e0 V-480 VA 2:10% input voltage, constant temperature)       Load regulation CC     s0.01%, FS (0:e0 V-480 VA 2:10% input voltage, constant temperature)       Stability CC     s0.01%, FS (0:e0 V-480 VA 2:10% input voltage, constant temperature)       Stability CC     s0.02%, FS (0:e0 ethis interval following 30 minutes warm up, constant input voltage, load and temperature)       Load regulation CR     s0.03%, FS (0:100% load, constant input voltage and constant temperature)       Load regulation CR     s0.03%, FS (0:100% load, constant input voltage and constant temperature)       Load regulation CR     s0.03%, FS (0:100% load, constant input voltage and constant temperature)       Load regulation CR     s0.03%, FS (0:100% load, constant input voltage and constant temperature)       Load regulation CR     s0.03%, FS (0:100% load, constant input voltage and constant temperature)       Over     Deverourent protection adjustable, 0:110% lucesse <t< td=""><td>Pollution degree</td><td>2</td></t<>	Pollution degree	2
Line regulation CV     ±0.01% FS (208 V - 480 V AC ±10% input voltage, constant load and constant temperature)       Stability CV     ±0.02% FS (0xer 38ns interval following 30 minutes warm-up, constant input voltage, load and temperature)       Compensation (Remote Sense)     ±35% Unjmath       Load regulation CC     ±0.01% FS (0x + 480 V AC ±10% input voltage and constant temperature)       Load regulation CC     ±0.01% FS (0x + 480 V AC ±10% input voltage, constant load and constant temperature)       Stability CC     ±0.01% FS (0x + 480 V AC ±10% input voltage, constant load and constant temperature)       Stability CC     ±0.01% FS (0x + 480 V AC ±10% input voltage, constant load and constant temperature)       Stability CC     ±0.01% FS (0x + 480 V AC ±10% input voltage, constant load and constant temperature)       Load regulation CC     ±0.01% FS (0x + 480 V AC ±10% input voltage, constant load and constant temperature)       Load regulation CR     ±0.03% FS (0x = 0% restriction adjustable, 0 = 100% load, constant input voltage and constant temperature)       Load regulation CR     ±0.3% FS + 0 = 10% load, constant input voltage and constant temperature)       Load regulation CR     ±0.3% FS + 0 = 10% load, constant input voltage and constant temperature)       OP     Overvoltage protection adjustable, 0 = 110% load, constant input voltage, constant input voltage, indicated constant temperature)       OP     Overoprotex	DC Output static	
Stability CV     =0.02% FS (over 8trs interval following 30 minutes warm-up, constant input voltage, load and tempenature)       Compensation (Remote Sess)     =55% Usemual       Load regulation CC     =0.1% FS (0.0% 10% load, constant input voltage, constant temperature)       Stability CC     =0.01% FS (0.0% load, constant input voltage, constant temperature)       Stability CC     =0.02% FS (0.0% 8trs interval following 30 minutes warm-up, constant input voltage, load and temperature)       Stability CC     =0.03% FS (0.0% load, constant input voltage and constant temperature)       Load regulation CP     =0.03% FS (0.100% load, constant input voltage and constant temperature)       Load regulation CR     =0.03% FS (0.100% load, constant input voltage and constant temperature)       Load regulation CR     =0.03% FS (0.100% load, constant input voltage and constant temperature)       Load regulation CR     =0.3% FS (0.100% load, constant input voltage and constant temperature)       Load regulation CR     =0.3% FS (0.100% load, constant input voltage and constant temperature)       Load regulation CR     =0.3% FS (0.100% load, constant input voltage and constant temperature)       Load regulation CR     =0.3% FS (0.100% load, constant input voltage and constant temperature)       OVEN     Vervoritage protection adjustable, 0.110% huemal       CD4     Vervorent protection adjustable,	Load regulation CV	≤0.05% FS (0 - 100% load, constant input voltage and constant temperature)
Temperature coefficient CV     =30ppm/*C (Following 30 minutes warm up)       Compensation (Remote Sense)     =5% Uummal       Load regulation CC     =0.1% FS (0: 100% load, constant input voltage, constant temperature)       Stability CC     =0.01% FS (208 V 40 ± 10% input voltage, constant input voltage, load and temperature)       Stability CC     =0.02% FS (0: erb ris inteed allowing 30 minutes warm-up, constant input voltage, load and temperature)       Load regulation CP     =0.3% FS (0: 100% load, constant input voltage and constant temperature)       Load regulation CR     =0.3% FS (0: 100% load, constant input voltage and constant temperature)       Protective functions     =0.3% FS (0: 100% load, constant input voltage and constant temperature)       Protective functions     =0.9vervoltage protection adjustable, 0: 110% load, constant input voltage and constant temperature)       OVP     Overument protection adjustable, 0: 110% load, constant input voltage and constant temperature)       DVP     Overument protection adjustable, 0: 110% load, constant input voltage and constant temperature)       Rise time 10: 90% cV     ≤20 ms       Fail time 90: 10% CV     ≤20 ms       Fail time 90: 10% CC     ≤10 ms       Statiution     =0.3% FS       Current     =0.05% FS       Current     =0.3% FS	Line regulation CV	$\leq$ 0.01% FS (208 V - 480 V AC $\pm$ 10% input voltage, constant load and constant temperature)
Compensation (Remote Sense)     s5% Unemail       Load regulation CC     s0.1% FS (20 - 100% load, constant input voltage and constant temperature)       Stability CC     s0.0% FS (208 - 480 V AC ±10% input voltage, constant input voltage, load and temperature)       Stability CC     s0.0% FS (208 - 480 V AC ±10% input voltage, constant input voltage, load and temperature)       Stability CC     s0.0% FS (0 - 100% load, constant input voltage and constant temperature)       Load regulation CP     s0.3% FS (0 - 100% load, constant input voltage and constant temperature)       Load regulation CP     s0.3% FS + 0.1% FS current (0 - 100% load, constant input voltage and constant temperature)       Protective functions     vervoltage protection adjustable, 0 - 110% Unemail       OCP     Overvoltage protection adjustable, 0 - 110% Inemail       OCP     Overpower protection adjustable, 0 - 110% Inemail       OPP     Overpower protection, output shuts down in case of insufficient cooling       Drue     s20 ms       Fall time 0 - 90% CV     s20 ms       Fall time 0 - 10% CC     s10 ms       Fall time 90 - 10% CC     s10 ms       Fall time 90 - 10% CC     s10 ms       Current     s0.5% FS       Current     s0.5% FS       Current	Stability CV	≤0.02% FS (Over 8hrs interval following 30 minutes warm-up, constant input voltage, load and temperature)
Load regulation CC     \$0.1% FS (0 · 100% load, constant input voltage and constant temperature)       Line regulation CC     \$0.0% FS (208 V · 480 V AC ±10% input voltage, constant temperature)       Stability CC     \$0.0% FS (208 V · 480 V AC ±10% input voltage, constant temperature)       Stability CC     \$0.0% FS (208 V · 480 V AC ±10% input voltage, constant input voltage, load and temperature)       Load regulation CP     \$0.3% FS (0 · 100% load, constant input voltage and constant temperature)       Load regulation CP     \$0.3% FS (0 · 100% load, constant input voltage and constant temperature)       Load regulation CP     \$0.3% FS (- 100% load, constant input voltage and constant temperature)       Load regulation CP     \$0.3% FS (- 100% load, constant input voltage and constant temperature)       Load regulation CP     \$0.3% FS (- 100% load, constant input voltage and constant temperature)       Protective functions     \$0.3% FS (- 100% load, constant input voltage and constant temperature)       OVP     Overvortage protection adjustable, 0 - 110% Unservital       OUP     Overprover protection adjustable, 0 - 110% Unservital       OP     Overprover protection adjustable, 0 - 110% Unservital       To overtemperature protection, autput shuts down in case of insufficient cooling       DT     Overprover protection adjustable, 0 - 110% Unservital       Fall time 90	Temperature coefficient CV	≤30ppm/°C (Following 30 minutes warm up)
Line regulation CC     s0.01% FS (208 V - 460 V AC ±10% input voltage, constant load and constant temperature)       Stability CC     s0.02% FS (0xer 8hrs interval following 30 minutes warm-up, constant input voltage, load and temperature)       Load regulation CP     s0.3% FS (0 - 100% load, constant input voltage and constant temperature)       Load regulation CP     s0.3% FS (0 - 100% load, constant input voltage and constant temperature)       Load regulation CP     s0.3% FS -0.1% FS current (0 - 100% load, constant input voltage and constant temperature)       Protective functions        OVP     Overvoltage protection adjustable, 0 - 110% load, constant input voltage and constant temperature)       OVP     Overcourrent protection adjustable, 0 - 110% load, constant input voltage and constant temperature)       OVP     Overcourrent protection adjustable, 0 - 110% loomaal       OP     Overcourrent protection adjustable, 0 - 110% load, constant input voltage and constant temperature)       OVP     Overcourrent protection adjustable, 0 - 110% loomaal       OT     Stomaal       Oterpo to Stoma     Stomaal       Stol	Compensation (Remote Sense)	≤5% U <sub>Nominal</sub>
Stability CC s0.02% FS (0xer 8hrs interval following 30 minutes warm-up, constant input voltage, load and temperature)   Temperature coefficient CC s50ppm/°C (Following 30 minutes warm up)   Load regulation CP s0.3% FS (0 - 100% load, constant input voltage and constant temperature)   Protective functions voltage protection adjustable, 0 - 110% load, constant temperature)   OVP Overcourrent protection adjustable, 0 - 110% load, constant input voltage and constant temperature)   OVP Overcourrent protection adjustable, 0 - 110% load, constant input voltage and constant temperature)   OVP Overcourrent protection adjustable, 0 - 110% load, constant input voltage and constant temperature)   OVP Overcourrent protection adjustable, 0 - 110% load, constant input voltage and constant temperature)   OVP Overcourrent protection adjustable, 0 - 110% load, constant input voltage and constant temperature)   OVP Overcourrent protection adjustable, 0 - 110% load, constant input voltage and constant temperature)   OVP Overcourrent protection adjustable, 0 - 110% load, constant input voltage ad constant input voltage   OUP Overcourrent protection adjustable, 0 - 110% load, constant input voltage ad constant input voltage	Load regulation CC	≤0.1% FS (0 - 100% load, constant input voltage and constant temperature)
Temperature coefficient CC     s50ppm/*C (Following 30 minutes warm up)       Load regulation CP     s0.3% FS (0 - 100% load, constant input voltage and constant temperature)       Load regulation CR     s0.3% FS + 0.1% FS current (0 - 100% load, constant input voltage and constant temperature)       Protective functions        OVP     Overvoltage protection adjustable, 0 - 110% locmmal       OCP     Overourrent protection adjustable, 0 - 110% locmmal       OPP     Overourrent protection adjustable, 0 - 110% locmmal       OPP     Overourrent protection adjustable, 0 - 110% locmmal       OT     Overpower protection adjustable, 0 - 110% locmmal       DT     Overpower protection adjustable, 0 - 110% locmmal       DS     20 ms       Fall time 90 - 10% CC     s10 ms	Line regulation CC	≤0.01% FS (208 V - 480 V AC ±10% input voltage, constant load and constant temperature)
Load regulation CP     s0.3% FS (0.100% load, constant input voltage and constant temperature)       Load regulation CR     s0.3% FS + 0.1% FS current (0.100% load, constant input voltage and constant temperature)       Protective functions        OVP     Overvoltage protection adjustable, 0.110% Unimited       OCP     Overcurrent protection adjustable, 0.110% Unimited       OPP     Overcourrent protection adjustable, 0.110% Unimited       OT     Overpower protection, output shuts down in case of insufficient cooling       DC Output dynamic     s20 ms       Fail time 90 - 10% CV     s20 ms       Fail time 90 - 10% CC     s10 ms       Fail time 90 - 10% CC     s10 ms       Fail time 90 - 10% CC     s10 ms       Voltage     s0.05% FS       Current     s0.05% FS       Current     s0.05% FS       Current     s0.05% FS       Current     s0.05% FS       Coluput to case (PE)     2500 Vrms       DC Output to case (PE)     Depending on the model, see model table       DC Output to lnterfaces     1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)       Interfaces digitat     subst for data acquisition	Stability CC	≤0.02% FS (Over 8hrs interval following 30 minutes warm-up, constant input voltage, load and temperature)
Load regulation CR     40.3% FS + 0.1% FS current (0 - 100% load, constant input voltage and constant temperature)       Protective functions     0       0VP     0 vervoltage protection adjustable, 0 - 110% luminad       0CP     0 vercurrent protection adjustable, 0 - 110% luminad       0PP     0 vertemperature protection adjustable, 0 - 110% luminad       0T     0 vertemperature protection, output shuts down in case of insufficient cooling       DCutput dynamic     vertemperature protection, output shuts down in case of insufficient cooling       D Cutput dynamic     s20 ms       Fall time 90 - 10% CV     s20 ms       Fall time 90 - 10% CC     s10 ms       Fall time 90 - 10% CC     s10 ms       Fall time 90 - 10% CC     s10 ms       Current     s0.5% FS       Current     s0.1% FS       Voltage     s0.05% FS       Current     s750 Vrms (1 Minute), creepage distance >8 mm       A Cliput to Case (PE)     Depending on the model, see model table       DC Output to case (PE)     Depending on the model, see model table       DC Output to case (PE)     Depending on the model, see model table       Dut to tacase (Gigital     USB, Ethernet (100 MBit) for communication 1x USB Host for	Temperature coefficient CC	≤50ppm/°C (Following 30 minutes warm up)
Protective functions     Vervoltage protection adjustable, 0 - 110% Uxenneal       OVP     Overcurrent protection adjustable, 0 - 110% Ixenneal       OPP     Overpower protection adjustable, 0 - 110% Ixenneal       OT     Overtemperature protection, output shuts down in case of insufficient cooling       DCUput dynamic     Example       Rise time 10 - 90% CV     \$20 ms       Fall time 90 - 10% CC     \$10 ms       Full time 90 - 10% CC     \$10 ms       Current     \$0.5% FS       Current     \$0.5% FS       Current     \$250 Vrms       DC Output to case (PE)     Depending on the model, see model table       DC Output to case (PE)     Depending on the model, see model table       DC Output to Interfaces digital	Load regulation CP	≤0.3% FS (0 - 100% load, constant input voltage and constant temperature)
OVP     Overvoltage protection adjustable, 0 - 110% Uncrined       OCP     Overcurrent protection adjustable, 0 - 110% Insented       OPP     Overpower protection adjustable, 0 - 110% Insented       OT     Overtemperature protection, output shuts down in case of insufficient cooling       DC Output dynamic     State time 10 - 90% CV     \$20 ms       Fall time 90 - 10% CV     \$20 ms     \$10 ms       Fall time 90 - 10% CC     \$10 ms     \$10 ms       Fall time 90 - 10% CC     \$10 ms     \$10 ms       Fall time 90 - 10% CC     \$10 ms     \$10 ms       Voltage     \$0.5% FS     \$10 ms       Current     \$0.1% FS     \$10 ms       Instation     \$2500 Vrms     \$10 ms       AC Input to DC Output     \$750 Vrms (1 Minute), creepage distance >8 mm     \$10 ms       AC Input to DC Output     \$750 Vrms (1 Minute), creepage distance >8 mm     \$100 V D C (Model up to 360 V output)       DC Output to case (PE)     Depending on the model, see model table     \$100 V D C (Model up to 360 V output), 1500 V DC (Model from 500 V output)       Interfaces digital     USB, Ethernet (100 MBit) for communication 1X USB Host for data acquisition     \$10 USB, Ethernet (100 MBit) for Communication 1X USB Host for data acquisi	Load regulation CR	≤0.3% FS + 0.1% FS current (0 - 100% load, constant input voltage and constant temperature)
OCP     Overcurrent protection adjustable, 0 - 110% hormal       OPP     Overpower protection adjustable, 0 - 110% hormal       OT     Overtemperature protection, output shuts down in case of insufficient cooling       DC Output dynamic     Example of the state of the	Protective functions	
OPP     Overpower protection adjustable, 0 - 110% P <sub>keminal</sub> OT     Overpower protection, output shuts down in case of insufficient cooling       DC Output dynamic     Example at the protection, output shuts down in case of insufficient cooling       Rise time 10 - 90% CV     ≤20 ms       Fall time 90 - 10% CV     ≤20 ms       Fall time 90 - 10% CC     ≤10 ms       Fall time 90 - 10% CC     ≤10 ms       Fall time 90 - 10% CC     ≤10 ms       Voltage     s0.05% FS       Current     s0.1% FS       Current     s0.1% FS       AC Input to Co Utput     3750 Vrms (1 Minute), creepage distance >8 mm       AC Input to case (PE)     Depending on the model, see model table       DC Output to case (PE)     Depending on the model, see model table       DC Output to Interfaces     USB, Ethernet (100 MBit) for communication 1x USB Host for data acquisition       Built-in, galvanically isolated     USB, Ethernet (100 MBit) for communication 1x USB Host for data acquisition       Optional, galvanically isolated     CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet	OVP	Overvoltage protection adjustable, 0 - 110% U <sub>Nominal</sub>
OT     Overtemperature protection, output shuts down in case of insufficient cooling       DC Output dynamic     Normal Status	OCP	Overcurrent protection adjustable, 0 - 110% I <sub>Nominal</sub>
DC Output dynamic     Rise time 10 - 90% CV   ≤20 ms     Fall time 90 - 10% CV   ≤20 ms     Rise time 10 - 90% CC   ≤10 ms     Fall time 90 - 10% CC   ≤10 ms     Display accuracy      Voltage   ≤0.05% FS     Current   ≤0.1% FS     Display to DC Output   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to DC Output   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to case (PE)   Depending on the model, see model table     DC Output to lnterfaces   1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)     Interfaces digital   USS, Ethernet (100 MBit) for communication 1x USB Host for data acquisition     Optional, galvanically isolated   CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet     Interfaces analog   Canone RS232, ModBus TCP, Profibus, EtherCAT, Ethernet	OPP	Overpower protection adjustable, 0 - 110% P <sub>Nominal</sub>
Rise time 10 - 90% CV   ≤20 ms     Fall time 90 - 10% CV   ≤20 ms     Rise time 10 - 90% CC   ≤10 ms     Fall time 90 - 10% CC   ≤10 ms     Display accuracy      Voltage   ≤0.05% FS     Current   ≤0.1% FS     Insulation      AC Input to DC Output   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to case (PE)   Depending on the model, see model table     DC Output to laterfaces   1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)     Interfaces digital   USB, Ethernet (100 MBit) for communication 1x USB Host for data acquisition     Optional, galvanically isolated   CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet	OT	Overtemperature protection, output shuts down in case of insufficient cooling
Fall time 90 - 10% CV   ≤20 ms     Rise time 10 - 90% CC   ≤10 ms     Fall time 90 - 10% CC   ≤10 ms     Display accuracy      Voltage   ≤0.05% FS     Current   ≤0.1% FS     Insulation      AC Input to DC Output   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to DC Output   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to case (PE)   Depending on the model, see model table     DC Output to case (PE)   Depending on the model, see model table     DC Output to Interfaces   1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)     Interfaces digital      Built-in, galvanically isolated   CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet     Interfaces analog	DC Output dynamic	
Rise time 10 - 90% CC   ≤10 ms     Fall time 90 - 10% CC   ≤10 ms     Display accuracy      Voltage   ≤0.05% FS     Current   ≤0.1% FS     Insulation      AC Input to DC Output   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to Co Coutput   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to case (PE)   2500 Vrms     DC Output to case (PE)   Depending on the model, see model table     DC Output to Interfaces   1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)     Interfaces digital   USB, Ethernet (100 MBit) for communication 1x USB Host for data acquisition     Optional, galvanically isolated   CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet     Interfaces analog   Lister Categee Catege	Rise time 10 - 90% CV	≤20 ms
Fall time 90 - 10% CC   ≤10 ms     Display accuracy      Voltage   ≤0.05% FS     Current   ≤0.1% FS     Insulation      AC Input to DC Output   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to case (PE)   2500 Vrms     DC Output to case (PE)   Depending on the model, see model table     DC Output to Interfaces   1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)     Interfaces digital   USB, Ethernet (100 MBit) for communication 1x USB Host for data acquisition     Optional, galvanically isolated   CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet     Interfaces analog	Fall time 90 - 10% CV	≤20 ms
Display accuracyImage: Constant of the second	Rise time 10 - 90% CC	≤10 ms
Voltage≤0.05% FSCurrent≤0.1% FSInsulationAC Input to DC Output3750 Vrms (1 Minute), creepage distance >8 mmAC Input to case (PE)2500 VrmsDC Output to case (PE)Depending on the model, see model tableDC Output to Interfaces1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)Interfaces digitalUSB, Ethernet (100 MBit) for communication 1x USB Host for data acquisitionOptional, galvanically isolatedCAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, EthernetInterfaces analog	Fall time 90 - 10% CC	≤10 ms
Current   ≤0.1% FS     Insulation   AC Input to DC Output   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to case (PE)   2500 Vrms     DC Output to case (PE)   Depending on the model, see model table     DC Output to Interfaces   1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)     Interfaces digital   USB, Ethernet (100 MBit) for communication 1x USB Host for data acquisition     Optional, galvanically isolated   CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet     Interfaces analog	Display accuracy	
Insulation     AC Input to DC Output   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to case (PE)   2500 Vrms     DC Output to case (PE)   Depending on the model, see model table     DC Output to Interfaces   1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)     Interfaces digital   VISB, Ethernet (100 MBit) for communication 1x USB Host for data acquisition     Optional, galvanically isolated   CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet     Interfaces analog   VISB	Voltage	≤0.05% FS
AC Input to DC Output   3750 Vrms (1 Minute), creepage distance >8 mm     AC Input to case (PE)   2500 Vrms     DC Output to case (PE)   Depending on the model, see model table     DC Output to Interfaces   1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)     Interfaces digital   USB, Ethernet (100 MBit) for communication 1x USB Host for data acquisition     Optional, galvanically isolated   CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet     Interfaces analog   USB	Current	≤0.1% FS
AC Input to case (PE)2500 VrmsDC Output to case (PE)Depending on the model, see model tableDC Output to Interfaces1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)Interfaces digitalBuilt-in, galvanically isolatedUSB, Ethernet (100 MBit) for communication 1x USB Host for data acquisitionOptional, galvanically isolatedCAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, EthernetInterfaces analog	Insulation	
DC Output to case (PE)   Depending on the model, see model table     DC Output to Interfaces   1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)     Interfaces digital   USB, Ethernet (100 MBit) for communication 1x USB Host for data acquisition     Optional, galvanically isolated   CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet     Interfaces analog   Ethernet (100 MBit) for COMPUTING (Model from 500 V OUTPUT)	AC Input to DC Output	3750 Vrms (1 Minute), creepage distance >8 mm
DC Output to Interfaces1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)Interfaces digitalUSB, Ethernet (100 MBit) for communication 1x USB Host for data acquisitionOptional, galvanically isolatedCAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, EthernetInterfaces analog	AC Input to case (PE)	2500 Vrms
Interfaces digitalUSB, Ethernet (100 MBit) for communication 1x USB Host for data acquisitionOptional, galvanically isolatedCAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, EthernetInterfaces analog	DC Output to case (PE)	Depending on the model, see model table
Built-in, galvanically isolatedUSB, Ethernet (100 MBit) for communication 1x USB Host for data acquisitionOptional, galvanically isolatedCAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, EthernetInterfaces analog	DC Output to Interfaces	1000 V DC (Model up to 360 V output), 1500 V DC (Model from 500 V output)
Built-in, gaivanically isolated 1x USB Host for data acquisition   Optional, galvanically isolated CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet   Interfaces analog CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet	Interfaces digital	
Interfaces analog	Built-in, galvanically isolated	
-	Optional, galvanically isolated	CAN, CANopen, RS232, ModBus TCP, Profinet, Profibus, EtherCAT, Ethernet
Built-in, galvanically isolated 15-pole D-Sub	Interfaces analog	
	Built-in, galvanically isolated	15-pole D-Sub
Signal range 0 - 10 V or 0 - 5 V (switchable)	Signal range	0 - 10 V or 0 - 5 V (switchable)
Inputs U, I, P, R, remote control on/off, DC output on/off, resistance mode on/off	Inputs	U, I, P, R, remote control on/off, DC output on/off, resistance mode on/off
Outputs Monitor U and I, alarms, reference voltage, status DC, status CV/CC	Outputs	Monitor U and I, alarms, reference voltage, status DC, status CV/CC
Accuracy U / I / P / R 0 - 10 V ≤0.2%, 0 - 5 V ≤0.4%	Accuracy U / I / P / R	0 - 10 V ≤0.2%, 0 - 5 V ≤0.4%
Device configuration	Device configuration	
Parallel operation Up to 64 units of any power class in series 10000, with Master-Slave-Bus and Share-Bus	Parallel operation	Up to 64 units of any power class in series 10000, with Master-Slave-Bus and Share-Bus

 $\ensuremath{\textcircled{\sc b}}$  EA Elektro-Automatik in 2021, this information is subject to change without notice

General specifications			
Safety and EMC			
Safety	EN 61010-1 IEC 61010-1 UL 61010-1 CSA C22.2 No 61010-1 BS EN 61010-1		
EMC	EN 55011, class B CISPR 11, class B FCC 47 CFR Part 15B, Unintentional Ra EN 61326-1 include tests according to - EN 61000-4-2 - EN 61000-4-3 - EN 61000-4-5 - EN 61000-4-6		
Safety protection class	1		
Ingress Protection	IP20		
Environmental conditions			
Operating temperature	0 - 50 °C		
Storage temperature	-20 - 70 °C		
Humidity	≤80% RH, non-condensing		
Altitude	≤2000 m (≤6600 ft)		
Mechanical construction			
Cooling	Forced air flow from front to rear, temp	perature controlled fans	
Dimensions (W x H x D)	19" x 3U x 668 mm (Enclosure only, no	t over all)	
Weight	18.0 kg (40 lb) 5 kW unit	25.4 kg (56 lb) 10 kW unit	32.8 kg (72 lb) 15 kW unit

Technical specifications	ELR 10080-170	ELR 10200-70	ELR 10360-40	ELR 10500-30	ELR 10750-20
DC Output					
Voltage range	0 - 80 V	0-200 V	0 - 360 V	0 - 500 V	0 - 750 V
Ripple rms CV	≤10 mV BW 300 kHz	≤40 mV BW 300 kHz	≤55 mV BW 300 kHz	≤70 mV BW 300 kHz	≤200 mV BW 300 kHz
Ripple and noise p-p CV	≤100 mV BW 20 MHz	≤300 mV BW 20 MHz	≤320 mV BW 20 MHz	≤350 mV BW 20 MHz	≤800 mV BW 20 MHz
U <sub>Min</sub> for I <sub>Max</sub> (Sink)	<0.5 V	<2.0 V	<2.0 V	<2.2 V	<2.2 V
Current range	0 - 170 A	0 - 70 A	0 - 40 A	0 - 30 A	0 - 20 A
Power range	0 - 5000 W				
Resistance range	0.016 Ω - 26 Ω	0.1 Ω - 160 Ω	0.3 Ω - 520 Ω	0.6 Ω - 1000 Ω	1.2 Ω - 2200 Ω
Output capacity	7790 µF	2520 µF	393 µF	180 µF	180 µF
Efficiency up to	94.5% *1	94.5% *1	95.5% *1	95.5% *1	95.5% *1
Insulation					
Negative DC pole <-> PE	±600 V DC	±1000 V DC	±1000 V DC	±1500 V DC	±1500 V DC
Positive DC pole <-> PE	+600 V DC	+1000 V DC	+1000 V DC	+2000 V DC	+2000 V DC
Article number	33200828	33200829	33200830	33200831	33200832

\*1 100% Power and 100% Output voltage

Technical specifications	ELR 10080-340	ELR 10200-140	ELR 10360-80	ELR 10500-60	ELR 10750-40
DC Output					
Voltage range	0 - 80 V	0-200 V	0 - 360 V	0 - 500 V	0 - 750 V
Ripple rms CV	≤10 mV BW 300 kHz	≤40 mV BW 300 kHz	≤55 mV BW 300 kHz	≤70 mV BW 300 kHz	≤200 mV BW 300 kHz
Ripple and noise p-p CV	≤100 mV BW 20 MHz	≤300 mV BW 20 MHz	≤320 mV BW 20 MHz	≤350 mV BW 20 MHz	≤800 mV BW 20 MHz
U <sub>Min</sub> for I <sub>Max</sub> (Sink)	<0.5 V	<2.0 V	<2.0 V	<2.2 V	<2.2 V
Current range	0 - 340 A	0 - 140 A	0 - 80 A	0 - 60 A	0 - 40 A
Power range	0 - 10000 W				
Resistance range	0.008 Ω - 13 Ω	0.05 Ω - 80 Ω	0.15 Ω - 260 Ω	0.3 Ω - 500 Ω	0.6 Ω - 1100 Ω
Output capacity	15980 μF	5040 µF	786 µF	360 µF	360 µF
Efficiency up to	94.5% *1	94.5% *1	95.5% *1	95.5% *1	95.5% *1
Insulation					
Negative DC pole <-> PE	±600 V DC	±1000 V DC	±1000 V DC	±1500 V DC	±1500 V DC
Positive DC pole <-> PE	+600 V DC	+1000 V DC	+1000 V DC	+2000 V DC	+2000 V DC
Article number	33200833	33200834	33200835	33200836	33200837

\*1 100% Power and 100% Output voltage

Technical specifications	ELR 11000-30	ELR 11500-20
DC Output		
Voltage range	0 - 1000 V	0 - 1500 V
Ripple rms CV	≤200 mV BW 300 kHz	≤400 mV BW 300 kHz
Ripple and noise p-p CV	≤1000 mV BW 20 MHz	≤2000 mV BW 20 MHz
U <sub>Min</sub> for I <sub>Max</sub> (Sink)	<4.0 V	<4.0 V
Current range	0 - 30 A	0 - 20 A
Power range	0 - 10000 W	0 - 10000 W
Resistance range	1.2 Ω - 2000 Ω	2.6 Ω - 4500 Ω
Output capacity	90 µF	90 µF
Efficiency up to	95.5% *1	95.5% *1
Insulation		
Negative DC pole <-> PE	±1500 V DC	±1500 V DC
Positive DC pole <-> PE	+2000 V DC	+2000 V DC
Article number	33200838	33200839

\*1 100% Power and 100% Output voltage

Technical specifications	ELR 10080-510	ELR 10200-210	ELR 10360-120	ELR 10500-90	ELR 10750-60
DC Input					
Voltage range	0 - 80 V	0 -200 V	0 - 360 V	0 - 500 V	0 - 750 V
Ripple rms CV	≤10 mV BW 300 kHz	≤40 mV BW 300 kHz	≤55 mV BW 300 kHz	≤70 mV BW 300 kHz	≤200 mV BW 300 kHz
Ripple and noise p-p CV	≤100 mV BW 20 MHz	≤300 mV BW 20 MHz	≤320 mV BW 20 MHz	≤350 mV BW 20 MHz	≤800 mV BW 20 MHz
U <sub>Min</sub> for I <sub>Max</sub> (Sink)	<0.5 V	<2.0 V	<2.0 V	<2.2 V	<2.2 V
Current range	0 - 510 A	0 - 210 A	0 - 120 A	0 - 90 A	0 - 60 A
Power range	0 - 15000 W				
Resistance range	0.006 Ω - 9 Ω	0.03 Ω - 50 Ω	0.1 Ω - 180 Ω	0.2 Ω - 330 Ω	0.4 Ω - 750 Ω
Output capacity	23970 µF	7560 μF	1179 μF	540 µF	540 µF
Efficiency up to	94.5% *1	94.5% *1	95.5% *1	95.5% *1	95.5% *1
Insulation					
Negative DC pole <-> PE	±600 V DC	±1000 V DC	±1000 V DC	±1500 V DC	±1500 V DC
Positive DC pole <-> PE	+600 V DC	+1000 V DC	+1000 V DC	+2000 V DC	+2000 V DC
Article number	33200820	33200821	33200822	33200823	33200824

\*1 100% Power and 100% Output voltage

Technical specifications	ELR 11000-40	ELR 11500-30	ELR 12000-20
DC Input			
Voltage range	0 - 1000 V	0 - 1500 V	0 - 2000 V
Ripple rms CV	≤300 mV BW 300 kHz	≤400 mV BW 300 kHz	≤400 mV BW 300 kHz
Ripple and noise p-p CV	≤1600 mV BW 20 MHz	≤2400 mV BW 20 MHz	≤2400 mV BW 20 MHz
U <sub>Min</sub> for I <sub>Max</sub> (Sink)	<5.2 V	<5.2 V	<5.2 V
Current range	0 - 40 A	0 - 30 A	0 - 20 A
Power range	0 - 15000 W	0 - 15000 W	0 - 15000 W
Resistance range	0.8 Ω - 1300 Ω	1.8 Ω - 3000 Ω	1.7 Ω - 2700 Ω
Output capacity	131 µF	60 µF	60 µF
Efficiency up to	95.5% *1	95.5% *1	95.5% *1
Insulation			
Negative DC pole <-> PE	±1500 V DC	±1500 V DC	±1500 V DC
Positive DC pole <-> PE	+2000 V DC	+2000 V DC	+2000 V DC
Article number	33200825	33200826	33200827

\*1 100% Power and 100% Output voltage

#### General

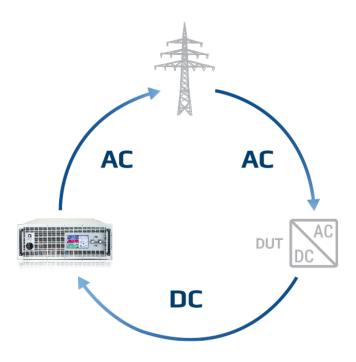
The device series from EA Elektro-Automatik ELR 10000 are programmable electronic loads. The device is regenerative and feeds the energy back into the local grid with an efficiency up to over 96%. The ELR 10000 series includes single and three phase units, which, together with the wide input range, allows use with practically all global mains voltages. The DC voltage and current are directed by the application and the spectrum ranges from 0 - 80 V to 0 - 2000 V and from 0 - 6 A up to 0 - 1000 A in a single device. The DC-Input operates as a flexible input stage with a constant power characteristic (autoranging), and a wide voltage, current and power range. To achieve higher power and current all units are equipped with a master-slave bus. This enables up to 64 parallel connected devices to be combined into one system which can provide a load up to 1920 W and 64000 A. Such a system works as a single unit and can use different power classes, only the voltage class must remain constant. In this way a user can construct a 75 kW system from two 30 kW and one 15 kW devices from the ELR 10000 range. Furthermore, typical laboratory functionality is provided. This includes an extensive function generator, alarm and warning management, assorted interfaces and ports, software solutions and many more functions.

#### **AC Connection**

The electronic loads in the ELR 10000 series are equipped with an active PFC which provides a high efficiency at a low energy consumption. Furthermore, the devices in this series provide a wide AC input voltage range. This extends from 1-phase 110/120 V up to 240 V AC mains supply and 3-phase 208 V to 380 V, 400 V and 480 V AC mains supply. The devices can be operated in the majority of global mains supply. They adjust automatically, without additional configuration, to the available supply. In a 110/120 V and 208 V AC grid a derating of the output power is set.

#### Energy recovering

The energy consumed in load mode is fed back into the connected mains supply with an efficiency of over 96 %. This reduces cost: as the energy is not converted to heat as in other loads, the energy costs are reduced. In addition, the devices generate less heat requiring less cost intensive air conditioning. One device is sufficient for the whole application, reducing investment and installation costs.



#### The principle of Energy recovering

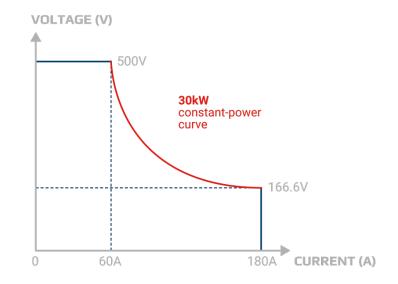
This demonstrates, based on an application, how a 'device under test' takes energy from the mains, converts it to DC and feeds that into an EA device. The electronic load ELR 10000 converts this energy back into an AC current and feeds it back into the mains..

#### DC Input

The input of the electronic load ELR 10000 with a DC voltage of 0 - 80 V up to 0 - 2000 V allows currents of 0 - 6 A up to 0 - 1000 A. The flexible input stages (autoranging) provide the user with a wide voltage, current and power range and hence a wider field of working than traditional power supplies.

#### **DC Connection**

Connection of the DC output is via a copper rail on the back side of the device. If a system with higher performance is required, the devices are simply connected in parallel. With minimal effort devices can be linked with the vertical copper rails. A cover for contact protection is provided.



#### The principle of autoranging

"Autoranging" is a term when a programmable DC Electronic Load automatically offers a wide input range of both, voltage and current, to maintain full power across a wide operation range. This type of solution allows the use of a single unit to address multiple voltage and current combinations.

#### Function generator

All models in the ELR 10000 series are equipped with a function generator. This allows waveforms such as sine, triangle, square or trapeze to be simply called up and applied to either the voltage or the current. A ramp function and a arbitrary generator allow voltage and current progression to be freely programmable. Test sequences for repeated tests can be saved and reloaded when needed, which saves time. A LUT allows IU and UI reference lines to be stored. For simulation of a photovoltaic system or fuel cells, adaptable tables are provided. With the standard PV characteristic curve (DIN EN 50530) various solar cells and many other technology parameters can be selected and set. In short, the user is supported by a multitude of useful functions.

#### Interfaces

As standard EA devices are fitted with the most important digital and analogue interfaces and ports which are galvanically isolated. These include an analogue interface which can be parameterised for input and output, control and monitoring, of 0 - 5 V or 0 - 10 V for voltage, current, power and resistance, assorted inputs and outputs as well as USB and ethernet ports. The following options which use a Plug & Play slot, complete the portfolio:

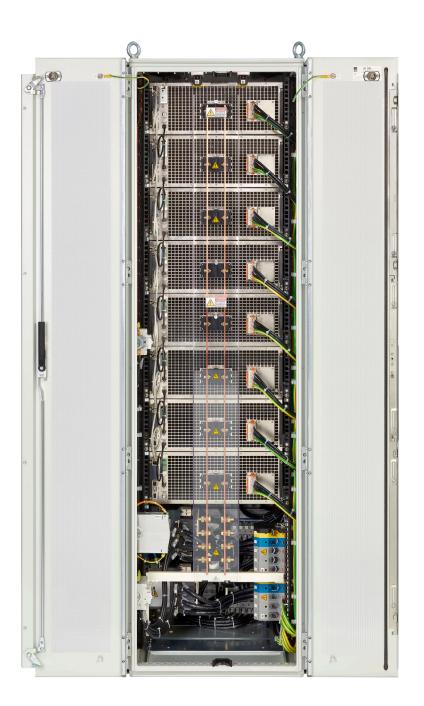
- CAN
- CANopen
- RS232
- Profibus
- EtherCAT
- Profinet, with one or two ports
- Modbus, with one or two ports
- Ethernet, with one or two ports

#### High performance systems

High power applications can be covered with high power systems of up to 1920 kW. These are achieved by using the outputs of many ELR 10000 devices, changing the copper rails to vertical, and connecting in parallel. Thus, a 19" cabinet with 42 U can provide a system with 240 kW occupying 0.6 m<sup>2</sup> floorspace. The master/slave bus enables up to 8 cabinets with a maximum of 64 units of 30 kW each to behave as one unit.

#### Master-Slave-Bus and Share-Bus

If the integral master-slave bus and share bus are used, a multi device system behaves as a single device. The masterslave bus and the share bus are simply connected to each device. With the master-slave bus the system data such as total power and total current are collected and shown in the master device. Warnings and alarms of the slave devices are shown clearly in the display. The share bus provides an equal load distribution to the individual devices.



#### Example representation

In this illustration you can see a fully assembled and wired 240 kW system

### **Application**

#### Battery test for electro mobility

A typical application for the bidirectional power supplies from EA Elektro-Automatik is the testing of the electrical characteristics of a battery. The wide application spectrum covers cell, module or pack tests, the determination of the SOH (State-of-Health) for a second life classification as well as the End-of-Line (EOL) test. These applications put many demands on power electronics which are fulfilled by the ELR 10000 range. The excellent features of this device range are: measurement of voltage and current with the required accuracy and performance, reproducibility and reliability of these data and the flexible usebility. Whether in an automated test system or in an integrated battery test, all possibilities are open to the user. Furthermore, the devices are clearly economical with efficiencies of 96% or more.

#### Fuel cell test

The devices in the ELR 10000 range may be used for testing the electrical features of fuel cells, fuel cell stacks and fuel cell systems. Here they generate highly accurate and reproducible results in all electrical modes. To test the resistance, performance, and active life of a fuel cell quickly and economically users can readily incorporate the devices into an automatic test system. The feedback capability guarantees high level of energy and cost efficiency. If higher currents are needed for testing a complete fuel cell system, then multiple devices can be connected in parallel in a master-slave system. Here high accuracy and performance are maintained.

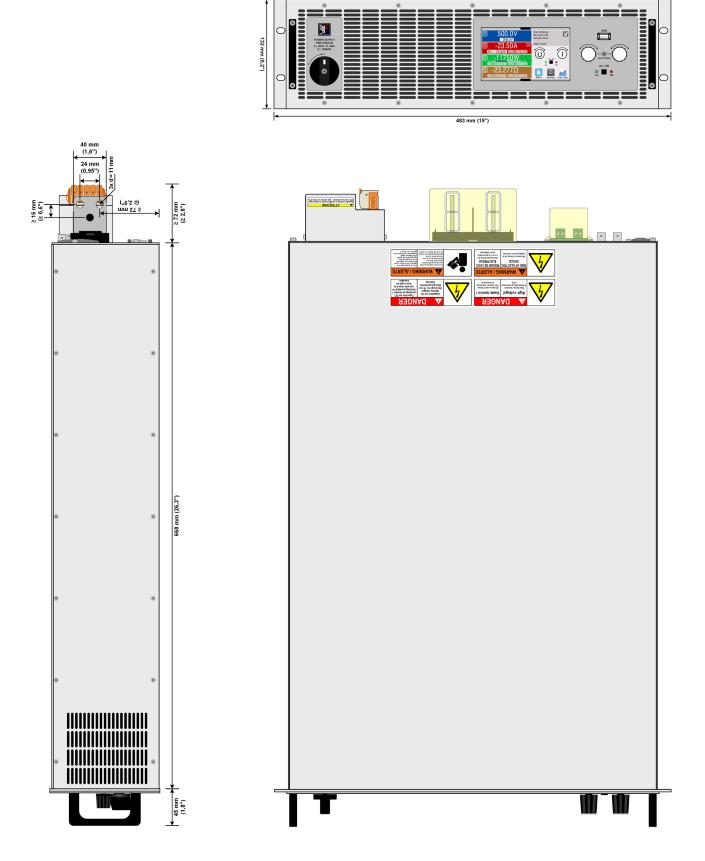
#### On-board charger test

In an on-board charger test (OBC) the electrical features must be tested under various conditions. This requires a flexible test system which also provides test data. With the sequencing and logging functions of the ELR 10000 devices test procedures allow data to be exported and saved. In this way applications can promptly generate reproducible test results based on dynamic and highly accurate set point and measurement data. To avoid competition between two separate control loops of the device under test (DUT) and the test device, the control frequency of the power supply is adjustable. The modes Normal, Fast and Slow allow the ELR 10000 devices to match the control characteristics of the on board charger.

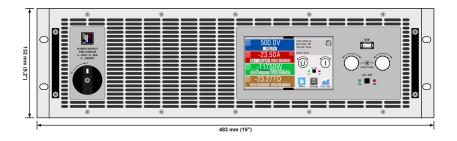
#### Battery recycling

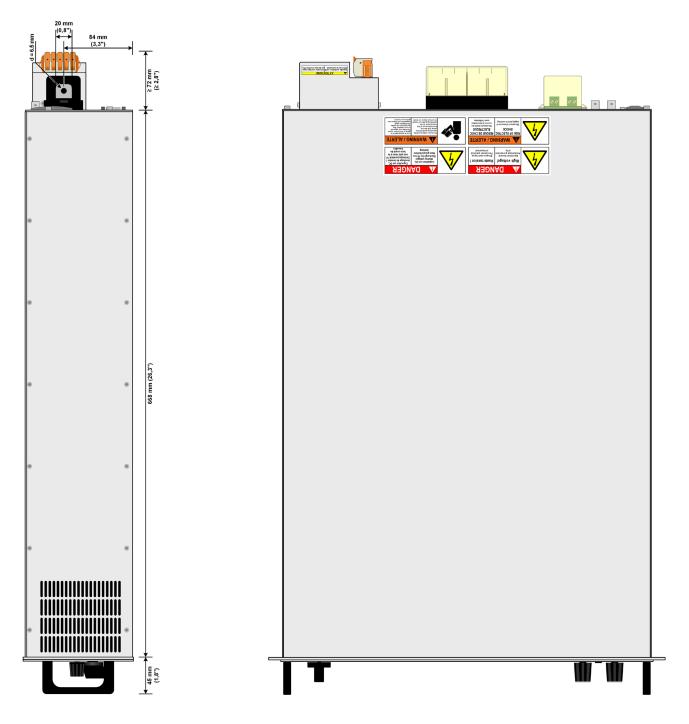
The bidirectional power supplies of the ELR 10000 range enable retired batteries from electric vehicles to be considered for a possible further use. Assessment of the battery pack starts with a State of Health (SOH) check to determine if a second life is feasible. This standard integral function can be initiated with one clic. If this check shows too little rest capacity, then the battery must be fully discharged before recycling. The autoranging of the devices guarantees the maximum possible total discharge though the high load current, even with voltages under 2 V. The mains feedback to the power grid at 96% efficiency makes this process highly cost effective.

# Outline drawing ELR 10000 3U $\leq$ 200 V

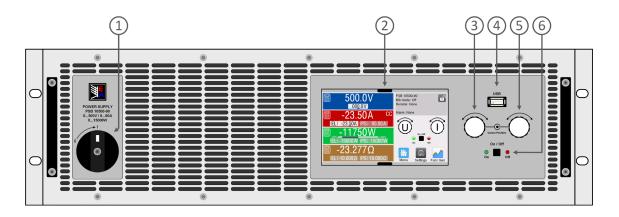


# Outline drawing ELR 10000 3U ≥360 V





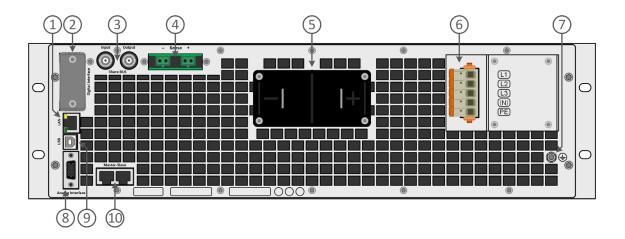
# Front panel description ELR 10000 3U



1. Main switch

- 2. TFT Control Interface, interactive operation and display
- 3. Rotary knob with push-button for settings and control
- 4. USB Host, use USB-stick for data logging and sequencing
- 5. Rotary knob with push-button for settings and control
- 6. On / Off push-button with LED status display

### Rear panel description ELR 10000 3U



1. Ethernet interface

- 2. Slot for Interfaces
- 3. Share-Bus Interface to set up a system for parallel connection
- 4. Output voltage Remote Sense input terminal
- 5. Output terminal, Copper busbar
- 6. Mains input terminal
- 7. Grounding connection screw (PE)
- 8. Connector (DB15 Female) for isolated analog program, monitor and other functions
- 9. USB interface
- 10. Master-Slave-Bus interface to set up a system for parallel connection

**EA Elektro-Automatik GmbH & Co. KG** Helmholtzstr. 31-37 41747 Viersen

Phone +49 2162 3785 - 0 Fax +49 2162 1623 - 0 ea1974@elektroautomatik.com



#### www.elektroautomatik.com