

EL-AC

Electronic Load

AC Electronic Loads are power electronics devices that behave as an AC electrical load. While most electronic loads are dissipative, CINERGIA offers a comprehensive range of DC, AC and AC&DC full 4Q and full regenerative electronic loads.

FUNCTIONAL DESCRIPTION

Operation modes:

- Constant Current (CC)
- Constant Impedance (CI)
- Constant Power (CP)
- Automatic test from csv file

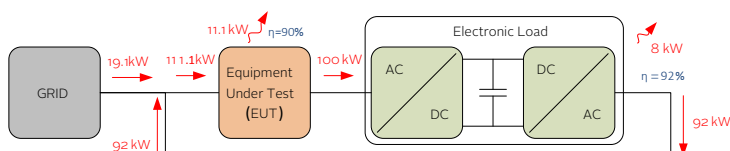
Applications:

R&D, production and reliability tests for applications requiring linear and non-linear AC loads.

Test of AC voltage sources, UPS, AC generators and electrical devices (as fuses, circuit breakers and connectors).

In Smartgrid applications it can be used to emulate domestic appliances, a house, a building as well as grid-coupled generators: PV and eolic plants, Energy Storage Systems, Electrical Vehicles, V2G-Vehicle to Grid and other AC distributed generators.

80% typical energy and power saving:



KEY FEATURES

7.5 kVA – 200 kVA

4 Quadrant Power Supply

Regenerative up to 100% rated power

Full 4Q: pure capacitive and inductive current

AC Output:

up to 230Arms per phase
25 to 277 Vrms, phase-neutral
10-400Hz

Independent configuration per channel:

- Fundamental current up to 400Hz
- Harmonics up to 780Hz
- Phase angle $(-1 < \cos \theta < 1)$
- Non-linear currents
- Crest factor < 3
- Active / Reactive Power

AC&DC version available

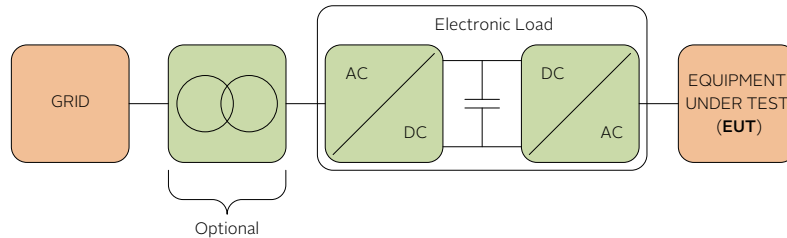
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CONCEPTUAL SCHEMATIC

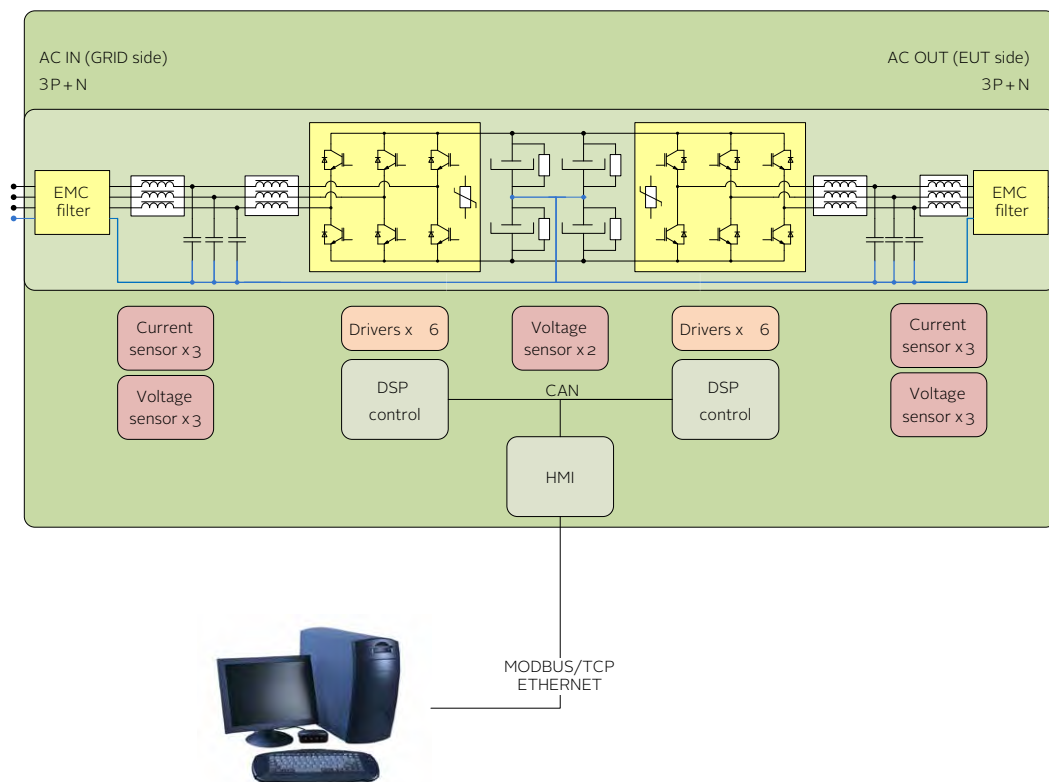


BACK-TO-BACK TOPOLOGY

The equipment is formed by two IGBT-based power stages: a grid-side Active Rectifier producing sinusoidal currents with low harmonic distortion and close to unity power factor; and an output side AC Inverter generating three independent AC currents with programmable amplitude, phase angle and harmonic content by using a digital resonant control algorithm.

Thanks to the bidirectionality of this topology the test energy can be injected back to the grid.

TECHNICAL DIAGRAM OF EL-AC



AC Input is connected to the grid (neutral wire or DYN isolation transformer is required)

AC Output is connected to the Equipment Under Test (EUT) and can be used as:

- Three-phase AC Wye load (balanced or unbalanced)
- Three independent Single-phase AC systems (different voltage/frequency is possible)
- One parallelized Single-phase AC system (3 times rated current per phase)

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FUNCTIONALITIES

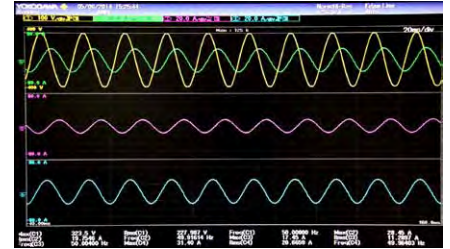
Resistive load



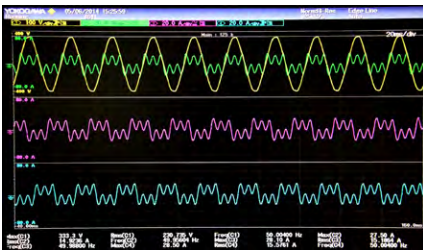
Pure capacitive load



Pure inductive load



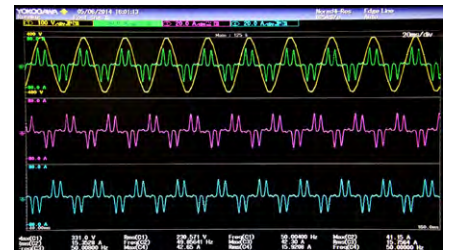
Harmonics



Single-phase rectifier



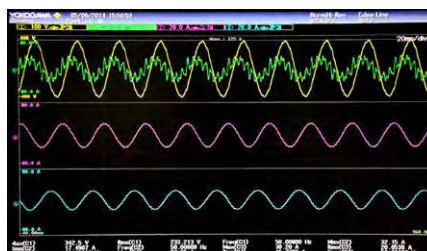
Three-phase rectifier



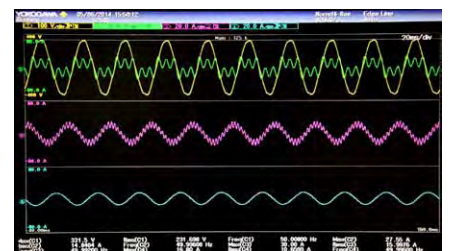
Phase delay



Phase delay + harmonics



Independent phase control



In previous oscilloscope captures: AC source under test (yellow), EL currents phase A, B and C (green, magenta, blue)

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USER INTERFACE

Local 3.2" Touchscreen panel

Remote Control port:

LAN Ethernet with Modbus/TCP protocol.

Digital IO port:

- 4 digital inputs
- 3 relay outputs
- 1 Emergency stop

Optional analog port:

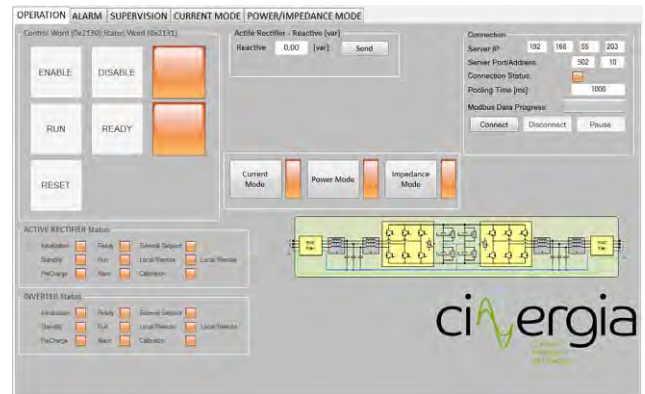
- 1 analog input 0-10V
- 3 analog outputs 0-10V

Optional communications:

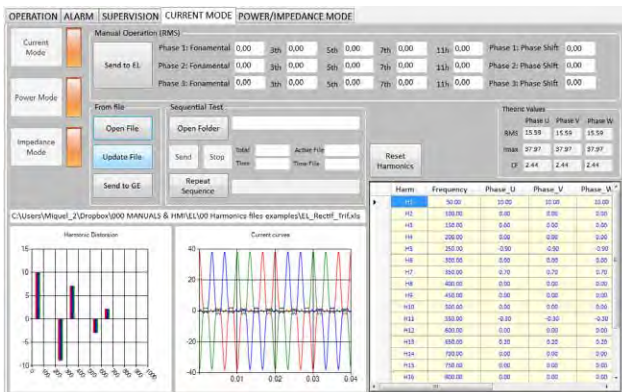
RS485, RS232, CAN, LabView

SOFTWARE FEATURES

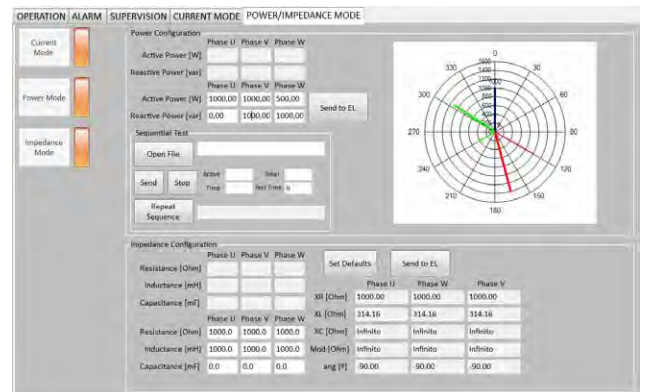
Windows 7/10 user interface for remote operation and data acquisition.



Configuration of harmonics



Configuration of disturbances



Cooling

The power supply is air-cooled internally.

Mechanical housing

The power supplies are housed in compact cabinets with wheels up to 120kVA for easier transportation.

Options

- Galvanic Isolation
- Isolation monitor
- Low Current Ripple
- High Voltage (up to 295Vrms, p-n)
- Analog Input/Output Port
- RS485, RS232, CAN
- Labview drivers

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RANGE AND SPECIFICATIONS

MAGNITUDE		VALUE		
Power		7.5kVA-200kVA		
Input side (GRID side)				
AC Voltage	Rated	3x400Vrms+Neutral+Earth		
Voltage range		+15% / -20 %		
Rated AC Current	Depends on model (see table)	10-290Arms per phase		
Frequency		48-62Hz		
THDi	(at rated power)	<3%		
Power Factor	Typical at rated power	≥0.99		
	Configurable by user	0-1 (capacitive/inductive)		
Efficiency	(at rated power)	>92%		
Overload		125% for 10 min / 150% for 60 s		
Output side (EUT side)				
AC Voltage	Rated maximum, ch-neutral	25-277Vrms (10-100Hz) 25-210Vrms (101-200Hz) 25-150Vrms (201-400Hz)		
Rated AC Current ¹	Independent mode	10-230Arms per channel		
	Parallel mode	30-690Arms global		
Frequency	Fundamental current	10-400Hz		
Power factor	Configurable by user	0-1 (capacitive/inductive)		
Harmonic	Configurable by user	1st - 15th at 50Hz (except 8,10,12 & 14)		
		1st - 13th at 60Hz (except 8,10&12)		
		1st at 400Hz		
Harmonic content	Maximum %	1st-9th: 100% 11th: 50%, 13th-15th:10%		
Crest factor		<3		
Modes of operation		Range ²	Resolution ³	Ripple ³
Constant Current		0-±100%	<±0.1%	<1%
Constant Power		0-±100%	<±0.1%	<1%
Constant Impedance (R,L,C)		min.-100%	<±0.1%	<1%
General				
Measurements	Input Voltage (Vrms) and Current (Irms)			
	Input and Output Power			
	Output Voltage (Vrms) and Current (Irms)			
	Temperatures			
User interface	3.2" Touchscreen			
	Local Control port: 4 digital inputs, 3 relay outputs (Option for AIO)			
	Communication Port: Ethernet (Optionals: RS485, RS232, CAN)			
	Communication Protocol: Modbus/TCP			
Humidity	10-90% (Absolute maximum, without condensation)			
Temperature	5-35 °C (Absolute maximum)			
Cooling	Forced air			
Protections	Over Current, Over Voltage, Shortcircuit, Overtemperature			
Standards				
CE Marking				
Safety	EN-62040-1-2, EN-60950-1			
EMC	EMC: EN-62040-2			

¹ Rated AC Current depends on model (see table) and defines the maximum permanent current allowed. Minimum current is 0A.

² Range is related to rated values of each model as defined in table MODELS

³ Resolution and ripple are related to the FS of each model. Contact us for further information.

All specifications are subject to change without notice.

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EL-AC MODELS

REFERENCE	RATED		RATED CURRENT		WEIGHT kg	DIMENSIONS DxWxH (mm)
	kVA	kW	AC rms / phase Independent mode	AC rms/ global Parallel mode		
EL7.5-AC	7.5	6.75	10A	30A	150	770x450x1100
EL10-AC	10	9	15A	45A	150	
EL15-AC	15	13.5	20A	60A	150	
EL20-AC	20	18	25A	75A	150	
EL30-AC	30	27	40A	120A	150	
EL40-AC	40	36	50A	150A	185	
EL50-AC	50	45	65A	195A	185	
EL60-AC	60	54	80A	240A	185	880x590x1320
EL80-AC	80	72	105A	315A	265	
EL100-AC	100	90	130A	390A	290	
EL120-AC	120	108	155A	465A	290	850x900x2000
EL160-AC	160	128	185A	555A	540	
EL200-AC	200	160	230A	690A	550	

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GALVANIC ISOLATION (optional)

REFERENCE	RECOMMENDED CIRCUIT BREAKER	WEIGHT kg	DIMENSIONS DxWxH (mm)
IT7.5	Type C - 25A	145	Inside the cabinet
IT10	Type C - 25A	145	
IT15	Type C - 32A	145	
IT20	Type C - 40A	145	
IT30	Type D - 80A	174	595x415x708 (*)
IT40	Type D - 100A	217	789x490x865 (*)
IT50	Type D - 125A	280	
IT60	Type D - 160A	381	
IT80	Type D - 200A	435	964x684x1252 (*)
IT100	Type D - 250A	458	
IT120	Type D - 315A	514	
IT160	Type D - 400A	612	
IT200	Type D - 500A	753	1192x744x1430 (*)

(*) The transformer is delivered in a stand-alone cabinet IP23

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