

BE

Battery Emulator

A Battery Emulator is a power electronics equipment that behaves as a real battery pack. CINERGIA's BE is based on a regenerative power DC supply. When emulating a battery charge, the energy will be injected back to the electrical grid consuming a sinusoidal current with unity power factor and low harmonic distortion. Using a BE will save space in the laboratory, avoiding safety issues of real batteries and allow a high flexibility in the tests.

FUNCTIONAL DESCRIPTION

Operation modes:

- Constant Voltage (CV)
- Static
- Dynamic

Three DC channels:

- The three channels can be controlled independently, allowing different battery emulation
- The three channels can be controlled in parallel, emulating the same battery and providing 3 times the current

Static mode: the emulated battery voltage will depend on the open-circuit voltage and internal charge and discharge resistances.

Dynamic mode: the emulated battery voltage will depend, additionally, on the SOC and the rate of discharge.

KEY FEATURES

6.75 – 160 kW

2 Quadrant Power Supply

Regenerative up to 100% rated power

1 channel Output:
0 to 750V, 0 to ±690A

3 channels Output:
0 to 750V, 0 to ±230A/ch

CV, Static, and Dynamic modes

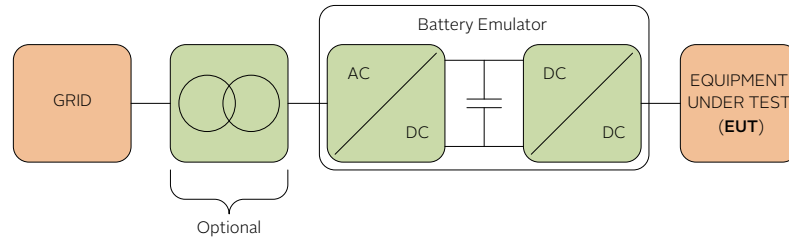


CINERGIA

Pere IV 29-35, 5è 1ª
08018 BARCELONA
www.cinergia.coop
cinergia@cinergia.coop
T. +34 934 864 358

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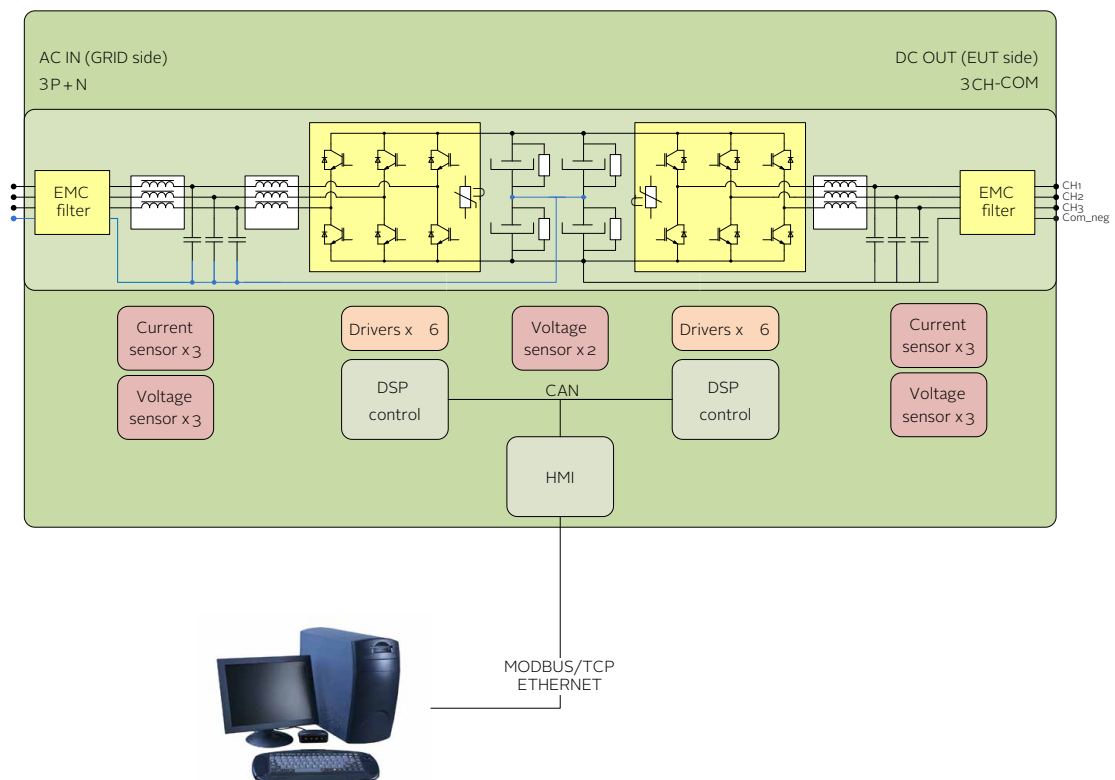
CONCEPTUAL SCHEMATIC



BACK-TO-BACK TOPOLOGY

The converter is formed by a grid-side Active Rectifier and an output DCDC converter sharing a DC-link. The Active Rectifier allows sinusoidal current consumption with low harmonic distortion and unity power factor. The DCDC converter generates three independent DC voltages controlling the voltage, current or power.

TECHNICAL DIAGRAM



AC Input is connected to the grid (neutral connection is required). Galvanic isolation is recommended.

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

- Three independent 2Q channels
- One 2Q channel (3 times rated current)

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USER INTERFACE

Local 3.2" Touchscreen panel

Local control port:

- 1 analog input 0-10V
- 3 analog outputs 0-10V
- 4 digital inputs
- 3 relay outputs
- 1 Emergency stop

Note: all inputs/outputs are isolated

Communications port:

LAN Ethernet with Modbus/TCP protocol.

Optional communications:

RS485, RS232, CAN, LabView

CABINET

Cooling

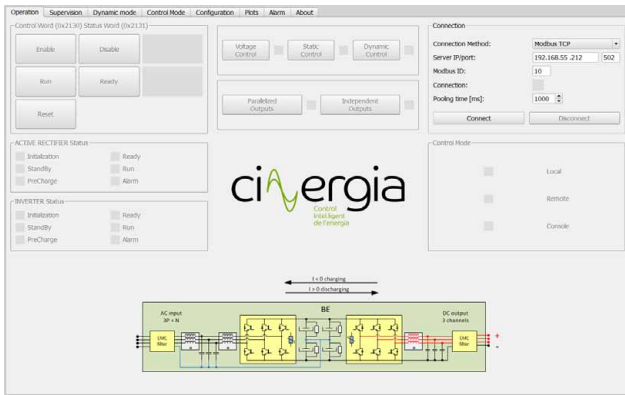
The power supply is air-cooled internally.

Mechanical housing

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

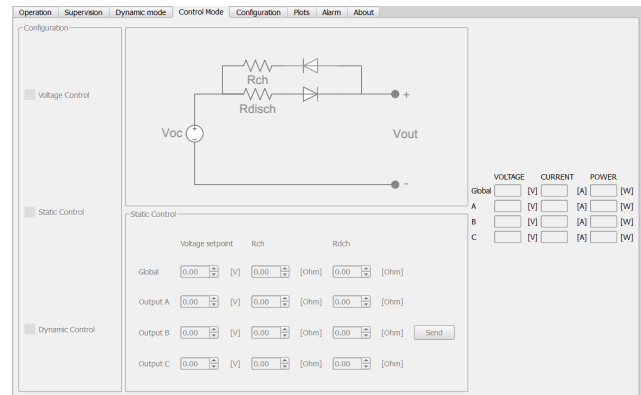
SOFTWARE INTERFACE

Windows 7 user interface for remote operation and data acquisition.



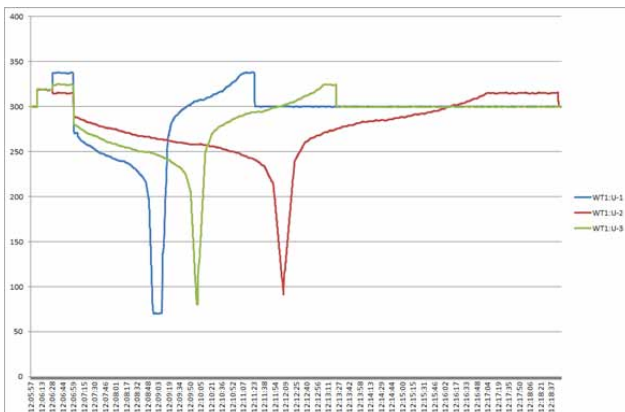
STATIC MODE

The battery is emulated through a simplified model based on fixed V_{oc} and charge/discharge resistors.

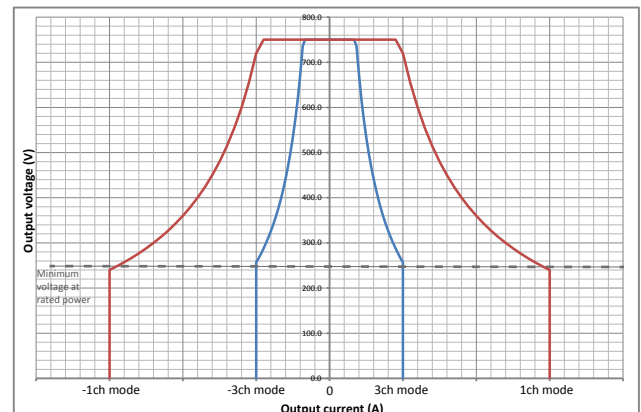


DYNAMIC MODE

A model based on battery manufacturer data allows realistic voltage and SOC behaviour.



OPERATION AREA: 1/3 CHANNELS



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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 %
AC Current		10A-290Arms
Frequency		48-62Hz
THDi	(at rated power)	<3%
Power Factor	Typical	≥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)		
DC Voltage	Channel-Com_neg Channel-Channel	0-750V -750 to 750V
Minimum voltage	at rated power [†]	220V
DC Current	1 channel output 3 channels output Bipolar output	0 to ±690A 0 to ±230A/ch 0 to ±230A
Modes of operation		
	Range	Resolution Ripple
Constant Voltage	0-100%	<±0.1% <1%
Static	0-±100%	<±0.1% <1%
Dynamic	0-±100%	<±0.1% <1%
Response time	Rated resistance load	1-5ms (10-90%)
General		
Measurements	Input Voltage (Vrms) and Current (Irms)	
	Input and Output Power	
	Output Voltage and Current	
	Temperatures	
User interface	3,2" Touchscreen	
	Local Control port: 1 analog input, 3 analog outputs, 4 inputs, 3 relays	
	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	

[†] Below minimum voltage the power is derated due to the current limitation. See operation area for further detail

All specifications are subject to change without notice.

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MODELS

REFERENCE	RATED		RATED CURRENT		WEIGHT kg	DIMENSIONS DxWxH (mm)
	kVA	kW	3channels / 0-750V	1channel / 0-750V		
BE7.5	7.5	6.75	±10A	±30A	100	770x450x1100
BE10	10	9	±15A	±45A	100	
BE15	15	13.5	±20A	±60A	102	
BE20	20	18	±25A	±75A	105	
BE30	30	27	±40A	±120A	150	
BE40	40	36	±50A	±150A	175	
BE50	50	45	±65A	±195A	185	
BE60	60	54	±80A	±240A	185	880x590x1320
BE80	80	72	±105A	±315A	265	
BE100	100	90	±130A	±390A	290	
BE120	120	108	±130A	±390A	290	
BE160	160	128	±155A	±465A	540	850x900x2000
BE200	200	160	±185A	±555A	550	

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GALVANIC ISOLATION (optional)

REFERENCE	RECOMMENDED CIRCUIT BREAKER	WEIGHT kg	DIMENSIONS DxWxH (mm)
IT7.5	Type D - 25A	67	Inside the cabinet
IT10	Type D - 32A	94	
IT15	Type D - 50A	125	
IT20	Type D - 63A	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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OPTIONS

Galvanic Isolation
Isolation monitor
Isolated analog inputs
RS485, RS232, CAN
Labview drivers

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Caltest Instruments Ltd
4 Riverside Business Centre
Walnut Tree Close
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Surrey GU1 4UG
United Kingdom

Tel: +44 (0) 1483 302 700

Fax: +44 (0) 1483 300 562

sales@caltest.co.uk

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