

EAC-ACS-4Q

GRID-TIED 4 QUADRANT POWER SUPPLIES



POSITIVE PROBLEM SOLVING **+ =**

The EAC-ACS-4Q is a modern power system with full 4 quadrant operation in just 11U of height. Each output phase has individually programmable test parameters.

The system's active neutral string allows for any single phase or asymmetric condition to be accurately simulated. This all in one integrated approach provides users with an unrivalled flexibility to test almost any AC or DC power equipment. The combined approach provides a significant reduction of power losses when compared to existing linear systems. EAC-ACS-4Q systems use state of the art multilevel double inverter technology.

- + Mains Regeneration of AC or DC Sink Energy
- + Outputs up to 1MVA in Parallel
- + Adjustable Test Parameters
- + Frequencies up to 1000Hz
- + Grid Simulation Software
- + 4 Quadrant Operation

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FURTHER DETAILS

When load testing excess sink energy is regenerated back to the 3 phase mains and synchronised back to the grid. This approach saves significant energy costs. Systems are liquid cooled with an additional external liquid to air heat exchanger optional.

Systems are modular and can be retrospectively expanded at any time. Power outputs of up to 1MVA are possible when EAC-ACS-4Q systems are connected in parallel. Analogue and USB interfaces are provided as standard, with Ethernet optionally available via an external USB to Ethernet converter.

Output frequencies range up to 1000Hz, making the EAC-ACS-4Q ideal for aerospace related power applications. The 4 quadrant capability also makes the EAC-ACS-4Q ideal for compliance testing of solar or wind driven equipment.

Operation as a grid simulator or as a 3 phase full 4 quadrant voltage amplifier are both possible. The EAC-ACS-4Q forms an electronic circuit emulating the grid, allowing users to adjust a variety of parameters to test behaviour and response of equipment. Application specific GUIs are available which emulate standard or user defined test algorithms. Test data can be recorded, edited and replicated where necessary. Previous test data can also be imported.

The bidirectional DC capability of the system also makes it ideal for the testing of battery packs and electric drives. Specialised programs for EMC characterisation are also available.

Full cabinet and flight case integrations are available on request. Where possible, modifications can be made to enhance the mechanical and thermal specifications of the system to meet a specific application. Non-standard AC input voltages can also be specified. If you have a non-standard requirement then contact ETPS today.

SELECTION TABLE

Part Number	Maximum Power	Voltage Range	Current Range	Dimensions (W x H x D)
EAC-ACS-4Q-30	30kVA	3 x 0 to 305Vrms (L - N)	3 x 0 to ± 43A	19" x 11U x 634mm*
EAC-ACS-4Q-50	50kVA	3 x 0 to 305Vrms (L - N)	3 x 0 to ± 72A	19" x 11U x 634mm*

*A full cabinet integration service is available on request

OPTIONS

CODE	DESCRIPTION
/GRIDSIM	GUI simulating grid characteristics with adjustable parameters
/ETH	Ethernet interface via an external USB to Ethernet converter
/LAE-5-400	Additional 4U liquid to air heat exchange module with 380 - 480VAC input for cooling of the power stage
/LAE-5-230	Additional 4U liquid to air heat exchange module with 100 - 240VAC input for cooling of the power stage
/LAE-5-24	Additional 4U liquid to air heat exchange module with 24VDC input for cooling of the power stage

TECHNICAL DATA

GENERAL	
AC Line Voltage	3 × 360-528 VAC
Line Frequency	50Hz ± 0.5Hz for UK (48 - 62Hz possible)
Mains Connection Type	3L + PE (no neutral)
Input Current	3 × 54 Arms (30kVA modules), 3 × 85 Arms (50kVA modules)
Powerfactor	0 - 1 (at nominal power)
EMC Emissions and Immunity	EN 61000-6-4 & EN 61000-6-2
LVD for Power Installations	EN50178
Connection Type	3L + N + PE
Frequency Range (Fundamental Wave)	0 - 1000 Hz (see operational diagram)
Frequency (P _{MAX})	16 - 1000 Hz (see operational diagram)
Voltage Slew Rate	≤4V / μs
Voltage Slew Rate (10 - 90% step of full scale)	≤100μs
Harmonic Distortion at 50Hz	≤0.1% (linear), ≤0.8% (non-linear)
Modulation Bandwidth	5kHz
DC Offset	≤10mV
DC Operation	Bidirectional, 20A per phase
Overvoltage Protection	Programmable
Overcurrent Protection	Programmable
Short Circuit Protection	Continued short circuit allowed
Internal Diagnostics	Line input conditions, internal current conditions, temperature conditions, processor idle time, system configuration, system communication, sensor signals, power semiconductor temperatures, power conditions
ReGen Mode	Grid-off as required for feedback to public grid according to EN50438 & VDE 0126
Overload Capability (up to 10s Every 600s)	150% (see operational diagram)
Overload Capability (up to 1s Every 60s)	200% (see operational diagram)
Operating Modes	Four quadrant simulator mode, four quadrant amplifier mode & hardware in loop mode
Static Accuracy Voltage	<1.5V
Static Accuracy Frequency	1mHz
Static Accuracy Phase Angle	1°
Setpoint Resolution Voltage	0.25V
Setpoint Resolution Frequency	1mHz
Setpoint Resolution Phase	1°
Measurement Precision Voltage	± 0.7%
Measurement Precision Current	± 1.4%
Standard Interfaces	Analogue & USB
USB Isolation to Electronics and Earth	125Vrms
Optional Interfaces	Ethernet via an external USB to Ethernet converter
Control Port Input Functions (Amplifier Mode)	Voltage setting (for L1, L2, L3): 0 - 100%, -10v to +10V, time delay input to output typically 25μs
Trigger Port	Input 1 (start) TTL; output (programmable) TTL
Control Port Output Functions (Analogue Outputs)	Configurable for any phase voltage or current
Safety Interfaces	The energy transmission between the line side and the load side will be disconnected via integrated safety relays. The interface provides a connection to an external safety circuit
Efficiency	Up to 90%
Noise	<74dB at 1m
Operating Temperature	5 to 40°C
Storage Temperature	-18 to 75°C
Relative Air Humidity	0 to 95%
Cooling	Liquid cooled (optional liquid to air heat exchanger)
Weight	150kg
Ingress Protection (According to 60529)	Basic construction to IP20; mounted in cabinet up to IP54
Liquid Cooling: Internal Heat Sink Material	Aluminium
Liquid Cooling: Inlet/Outlet on Rear Side Size	G ½"
Liquid Cooling: Liquid Temperature	15 to 50°C
Liquid Cooling: Flow	4 l/min [15°C] - 8 l/min [50°C]
Liquid Cooling: Pressure Max	≤4 bar

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/LAE OPTION SPECIFICATIONS

GENERAL SPECIFICATIONS

Heat Exchanger Material	Aluminium
Inlet / Outlet on Rear Size	G ½"
Storage Temperature ¹	-18 to 70°C
Cooling Air Temperature in Operation	0 to 40°C
Atmospheric Humidity	0 to 90%, non-condensing
Cooling Power ²	5kW at 20°C
Flow Rate [Max]	10 l/min
Pressure Difference $\Delta P = P_{OUT} - P_{IN}$	250mbar
Weight	25kg
Dimensions [W x H x D]	19" x 4U x 649mm

¹ With full filled ethylene glycol based coolant in a mixture of 30%

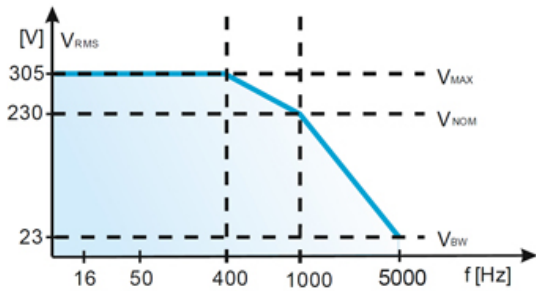
² Cooling power at ambient temperature

	/LAE-5-400	/LAE-5-230	/LAE-5-24
Line Voltage	380 - 480VAC	100 - 240VAC	24VDC
Voltage Tolerance	± 10%	± 10%	-10% / +0%
Line Frequency	42 - 62Hz	42 - 62Hz	N/A
Input Power	200VA	200VA	200W
Mains Connection Type	2*L + PE	L + N + PE	DC+, DC-, PE
Power Factor	≥0.98	≥0.98	1
Current	0.5A		
Leakage Current L to PE	<10mA		

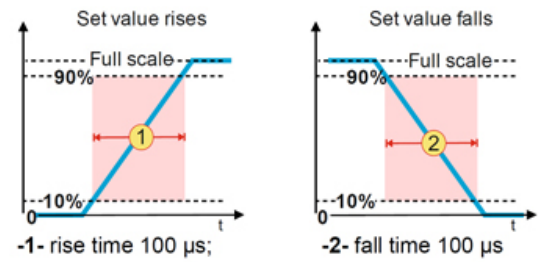


OPERATIONAL DIAGRAMS

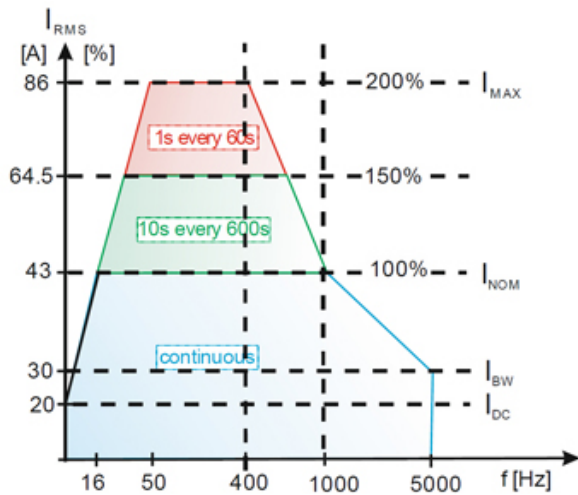
OUTPUT VOLTAGE VERSUS FREQUENCY



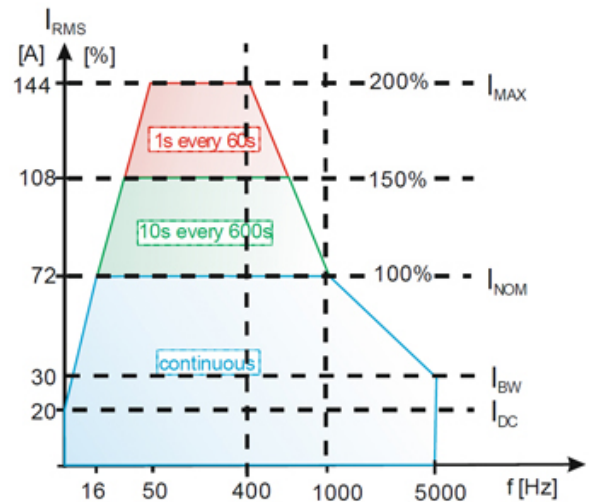
SLEW RATE AT A RESISTIVE LOAD



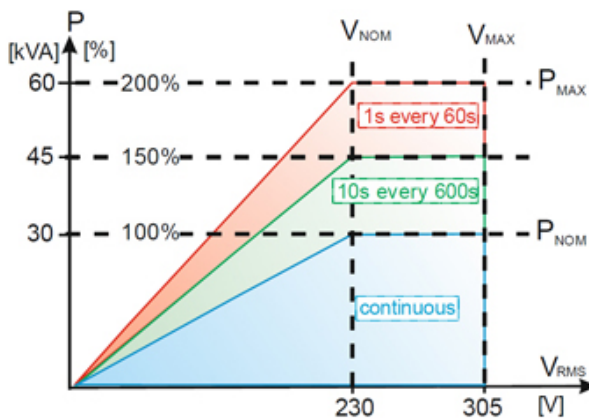
OVERLOADABILITY VERSUS FREQUENCY (30KVA MODULES)



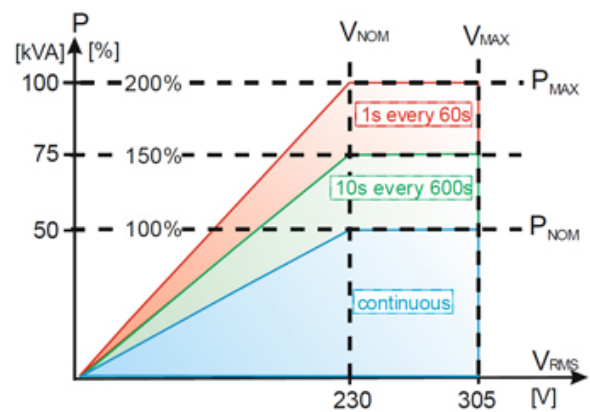
OVERLOADABILITY VERSUS FREQUENCY (50KVA MODULES)



OVERLOADABILITY VERSUS VOLTAGE (30KVA MODULES)



OVERLOADABILITY VERSUS VOLTAGE (50KVA MODULES)





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Tel: +44 (0) 1246 452909
Sales: 0800 612 95 75
sales@etps.co.uk
www.etps.co.uk

ETPS Ltd
Unit 14, The Bridge
Beresford Way, Chesterfield
S41 9FG



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