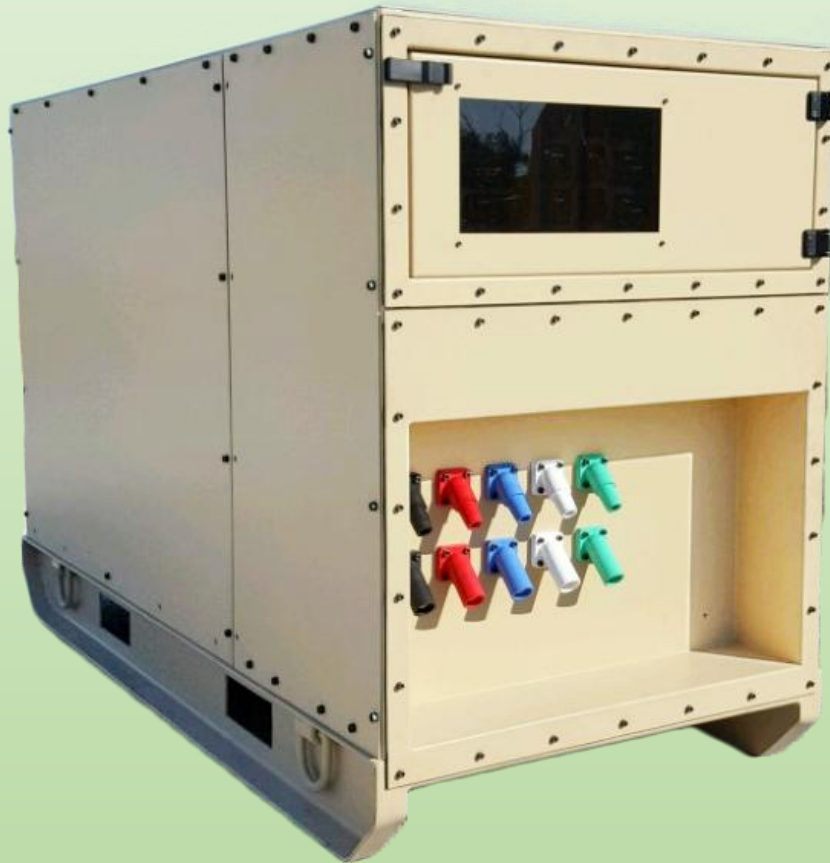




ESU-60/30



- ✓ *Ultra Low THD*
- ✓ *3 Phase 120/208 or 1 phase 120/240*
- ✓ *Fuel Savings of >25%*
- ✓ *Dramatic Emissions Reduction*
- ✓ *Easy to Use Interface*

Energy Storage Unit (ESU)

UPS & GENERATOR HYBRIDIZATION

The Generator Hybridization System (GHS) is used to operate a generator in the most efficient way possible. The power from the generator runs through the unit, and the control system keeps the generator operating at maximum efficiency, storing extra energy when the generator is producing more than the load, and discharging the battery when extra power is needed. This greatly reduces the time the generator runs, leading to savings in fuel consumption and reduced emissions. The UPS mode allows ESU to back up critical power load.

General Specifications

Specification		Units
Storage Capacity	30	KWh
Rated Power Output	0-60	kW
Rated Generator Power	10,30,60	kW
AC Generator Input Voltage	3 ϕ 120/208 1 ϕ 120/240V	VAC

Options for multiple 30-50kwhr battery banks and MPPT PV inputs

AC Output Power Specifications

Specification	Min	Nom	Max	Units
Rated Output Voltage (3 ϕ)	115.2/199.6	120/208	124.8/216.3	VAC
Rated Output Power	-60		60	kW
Frequency	58.2	60	61.8	Hz

Energy Storage Specifications

Specification	Min	Nom	Max	Units
Charge Time (at 60kw input)	30			min
Battery Capacity (per module)	30	33		kWh
Pack Voltage (per module)	270	414	486	VDC
Pack Current	-160	-80/80	160	A
Cycles (at 2C charge/discharge rate)	10,000	15,000		cycles
Depth of Discharge			95	%
Chemistry				Lithium Titanate (LTO)

Environmental Specifications

Specification	Min	Nom	Max	Units
Temperature	0*		50	C
Cooling			Liquid Cooled	
Rated Max Elevation			6000	Ft

*Can be operated below this temperature at reduced power

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Specifications subject to change without notice, contact Pacific Energy for updated information.

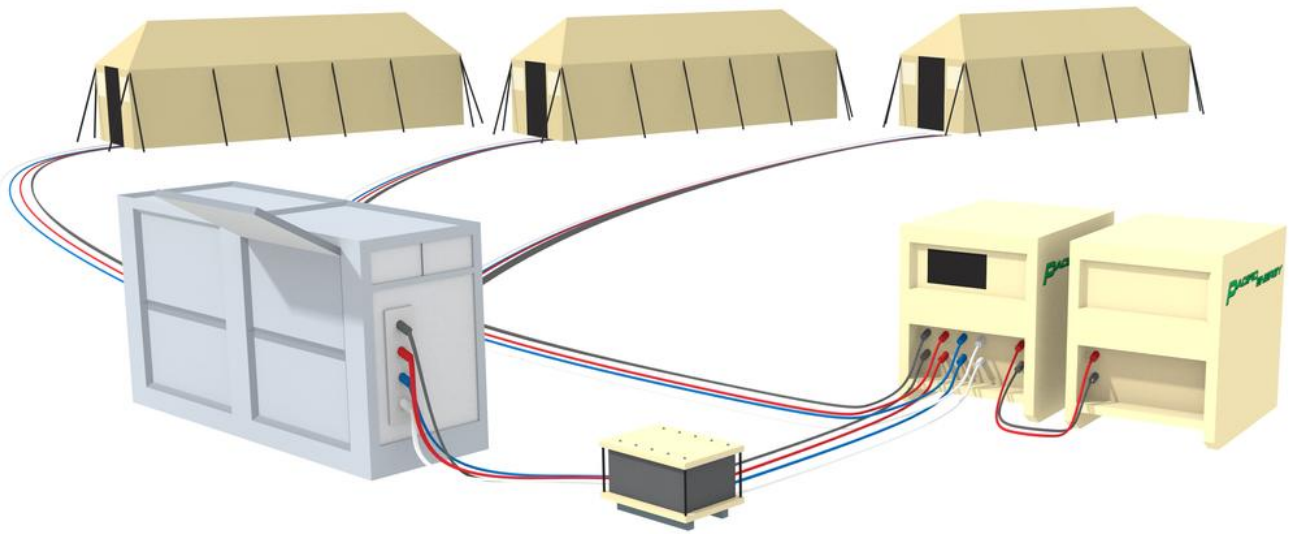
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System Operation

Specification	
Data Monitoring	Ethernet Port
Data Points	System State Voltages Currents Frequency Storage Capacity Remaining
Safety Features	Overvoltage Undervoltage Overcurrent Overtemperature Power Electronics Fault SoC Fault Communication Fault
Communication	TCP/IP

Testing Parameters

Variable	Value	Unit
Minimum Operational SoC	5	%
Minimum Fault SoC	3	%
Charge Recommended/Generator Turn On SoC	12	%
Maximum Operational SoC	95	%
Maximum Fault SoC	100	%
Minimum Battery Voltage	300	V
Maximum Battery Voltage	486	V
Maximum Battery Current	160	A



Application

The system consists of energy storage (1 or more battery packs depending on the application) and a power control unit. The ESU is designed to be hooked up in between the generator and the load. This allows the system to control the generator while still serving the load 100% of the time. ESU can be operated in either a Generator Hybridization mode (GHS mode) or a UPS mode

Generator hybridization, is to operate the generator in the most efficient way possible by operating the generator at or near its rated output. The operation would begin with a charging of the batteries. Once the batteries are fully charged, the generator would be turned off automatically and the load would be completely served by energy stored in the battery. This leads to fuel savings and results in clean, high quality power being delivered to the load. It also reduces noise and emissions by allowing the generator to run less often while providing reliable and efficient power.

UPS mode, is to operate in parallel with generators, to back up all critical power loads. The connection is the same for each mode however, in the UPS mode the battery is always at 100% capacity until loss of power from generating source.

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