



ENPACK

BEYOND BATTERIES

CONTAINERIZED SOLUTION

1MW-1MWhr 1200V @ 0.05C

ENP-1M-1200V-0.05C-X-X-X-20



Version-1 Revision-1
Release Date: 17/12/2024



Introduction

The containerized system generally consists of an electrostatic, graphene-based energy storage system that represents the latest in innovative solid-state LDES. Included are: monitoring system, a battery management unit, an energy storage converter, and an isolation transformer integrated in a 20-foot container. Also included are a dedicated air conditioning unit (needed only for AC electronics) and a precautionary fire safety system. The system is “turnkey” with everything needed and in place for seamless commissioning. This data sheet is for a 1MWh/1MW project, but each project is custom-configured and will come with a customized data sheet.

Scope of work

The scope of work of the proposed container system under design consideration is to support Grid tied Solar hybrid application with a DC load of $\leq 50\text{KW}$. Total Storage Capacity will be 1MWhr 1200Vdc @ 0.05C. Transformer will be used to provide output Voltage Vac 208/3P.

	Value
Load (KW)	≤ 50
Storage Capacity (MWhr)	1
Total Backup Time (Hrs)	~20
External MPPT (KW)	200

Features



Integrated Design

- A complete system:
- DC storage
 - Power conversion system
 - Safeties, racks, cabling
 - Fire suppression HVAC
 - Comms, internal lighting, auxiliary power and enclosure



Modular & Flexible

- Modular design provides ease of scalability
- Hot swappable modules allow the system to stay on while the single string is swapped



Smart Monitoring

- Fast state monitoring and fault-recording identification
- Integrated module performance
- Cloud-enabled remote monitoring OR self-contained monitoring on-board

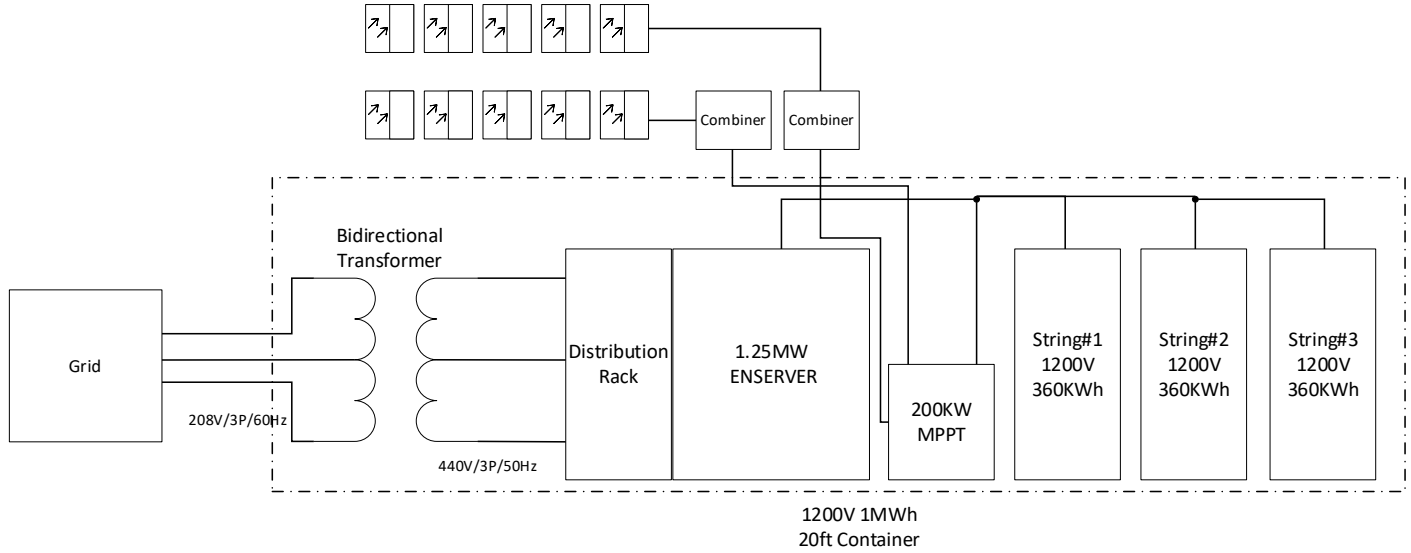


Safe & Reliable

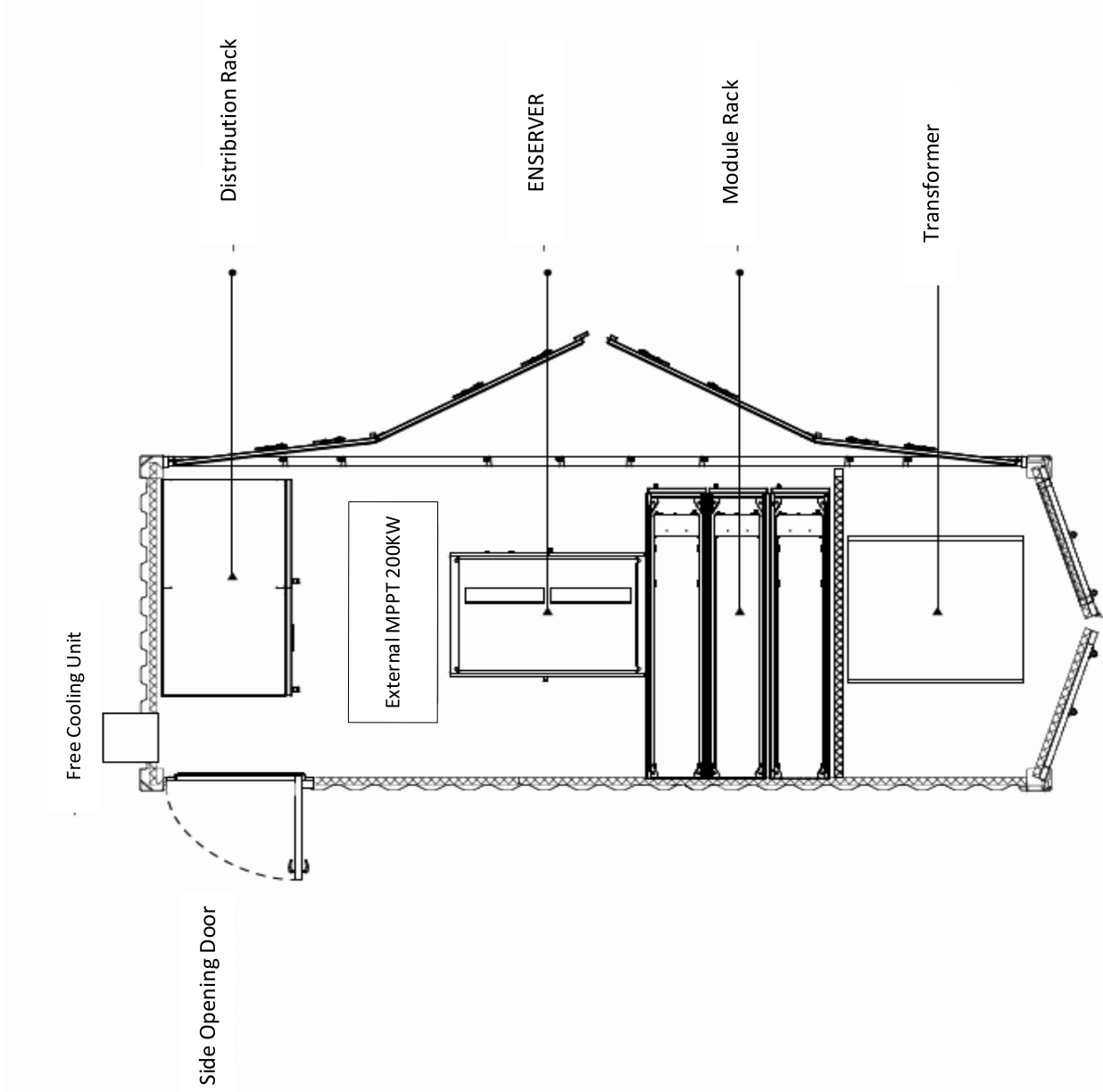
- No thermal runaway = low fire risk.
- Fire safety equipment is included in AC container as a precaution.
- Monitoring down to cell-level
- Non-combustible
- Built-in redundancy



Single Line Diagram



Container Layout



Container Overview

No.	Item	Description	Qty.
1	20ft Container, High Cube, Side Door open		1
2	ENCAP Modules	15KWHr 50V	72
3	Module Rack		3
4	CCTV Camera		1
5	Industrial Wifi Router		1
6	Surface Light	18W White	3
7	T&T Infrared Motion Sensor	Roof Mounted	1
8	Emergency Exit Light		1
9	Fire Ball		1
10	Fire Extinguisher	Dry Powder	1
11	Automatic Fire Suppression System	Direct Module	1
12	Heat Detector	Wireless	1
13	Main Controller		1
14	Sub Controller		2
15	Contact Box		2
16	Smart Alarm Controller		1
17	Industrial PC	19"	1
18	Monitoring Rack		1
19	Free Cooling Unit		1
20	Climate control		1
21	ENSERVER	1.25MW	1
22	MPPT Charger	200KW	1
23	Aux Inverter		1
24	Aux Storage Module		1

Container Specifications

PERFORMANCE	
Total Energy	1MWhr
DC CONTAINER	
Voltage (Nominal)	1200Vdc
Maximum Charge Voltage	1344Vdc (Adjustable)
Discharge Cut-Off Voltage	1152Vdc (Adjustable)
Maximum Continuous Charge Current	38A (0.05C)
Maximum Continuous Discharge Current	44A (0.05C)
SMARTFEATURES	
Monitoring Data	Temperature, Total Voltage, Current and Energy
Communication and Connectivity	CANBUS
Alarm	Audible alarms in the event of Over/under-Voltage, Over-Current, Over Temperature
ENVIRONMENTAL SPECIFICATIONS	
Cell Operating Temperature	-30 °C to 70 °C
Operating Humidity	Non-Condensing
SAFETY PERFORMANCE	
Over/under voltage	Hardware protection, DC line will be disconnected
Over Current	Hardware protection, DC line will be disconnected
Over temperature	Hardware protection, DC line will be disconnected
COMPLIANCE INFORMATION	
EN55032:2015, EN55024:2010, EN61000-4-2:2009, EN61000, EN61000-4-2:2009, EN61000, EN61000:2008+A2:2010	

ENSERVER 1.25MW



MODEL 1.25MW	
AC (ON-GRID)	
Apparent power	1375kVA
Rated power	1250kW
Rated Output voltage	660V
Rated current	1203A
Voltage range	360V-440V
Rated frequency	50/60Hz
Frequency range	45~55/55~65Hz
THDI	<3%
PF	0.99 at rated power
Adjustable Range of Reactive Power	(-105% to 105%)
DC Side	
Number of DC input	8
Voltage Range	1000 - 1500 Vdc
Max DC Current	1440A

ENP-1M-1200V-0.05C-X-X-X-20



GENERAL INFORMATION	
Maximum efficiency	99.00%
Protection degree	IP54
Operating temperature	-30°C~+60°C
Cooling method	Smart Fan
Relative humidity	0-95% non-condensing
Maximum altitude	4000m
Dimension mm	1300W×2300H×1300D
Weight	<=1500kg
Grid Support	L/HVRT, Active power Control, Reactive power Control, power Slope Control
COMMUNICATION	
Display	Touch screen
Communication With BMS	RS485/CAN

ENCAP Module 15 KWHr 50V

FEATURES

1. EFFICIENT

- Highly Efficient: > 95% RTE (Round Trip Efficiency)
- 100% DOD (Depth of Discharge)
- 500,000 Cell Life Cycles

2. SAFE & RELIABLE

- Wide Operating Temperature Range
- Deployable in Various Environments including High Altitudes
- No Thermal Runaway Risk



SERVICE LIFE	
Cells Projected Cycle Life ²	500,000 cycles
Cells Projected Calendar Life ³	25 years
Module Projected Shelf Life ⁴	10 years
Warehousing	Can be stored at any SOC without affecting cycle life

Rack for Modules



Features

- 24 x 15 KWHrs Modules can be installed in each Rack
- One Contactor Box can also be installed in each Rack

CONTACTOR BOX



Features

- Short circuit protection
- High current Charge/Discharge Protection
- DC bypass for overload current >20A
- Manual bypass breaker for maintenance purposes

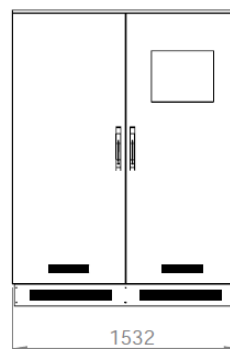
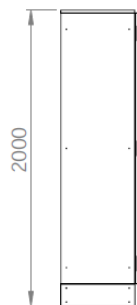
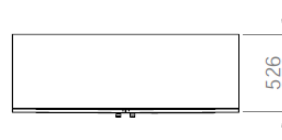
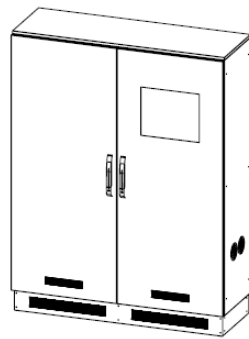
ENCONTROLLER



Features

- Input 220Vac
- String Charge and Discharge Control
- Independent string communication control
- Modules Over voltage, High current and High Temperature Protection

Monitoring & Distribution



Monitoring Rack

Features

1. Embedded NVR
2. 19-inch Industrial PC for monitoring
3. Industrial Wi-Fi router

Embedded NVR DS-7600 Series



Features

1. 4 channel PoE IP camera port
2. Support for 8MP recording and playback
3. Support for 4K video output
4. 1 SATA interface to connect 10TB Hard drive
5. Support for VCA detection alarm
6. Compatible with 3rd party IP camera
7. Support Hikvision ANPR Solution

Fan-less Industrial PC



PERFORMANCE SPECIFICATIONS

Size	19 inches
Resolution	1280 x 800
Color	Chroma 16.7M
Brightness	300 CD/m ²
Response Time	6.5ms
Screen Type	Resistive Touch Screen
Resolution	500DPI

Industrial Wi-fi Router



Stable and Reliable

1. Industrial design, metal enclosure, protection class IP30
2. Wide input voltage DC9-36V, with reverse polarity protection
3. ESD, Surge, EFT/Burst protection
4. Hardware and software watchdog, multi-layer link detection mechanism make it self-recovery from unexpected failure and guarantee reliable communication between remote devices and data center
5. Provides comprehensive security protections for sensitive business data, including secure VPN transmission, firewall against network attacks

Flexible Networking

1. Supports 2G/3G/4G network all over the world, supports APN/VPDN private network access
2. Supports automatic detection of cellular network, 4G/3G/2G mode automatic switching
3. Supports fail over between 4G and WAN, ensures automatic switch to alternative back-up connection, effectively ensuring uninterrupted data transmission
4. Supports 2.4GHz WiFi, scaling more devices access, support wired and wireless connecting Internet
5. Compatible with 5.8GHz WiFi (optional)

PERFORMANCE SPECIFICATIONS		
Cellular Interface	Antenna	2xSMA-K
	SIM card	1 x (3V & 1.8V) Standard 2FF SIM, drawer-type sim card slots
Ethernet		1 x WAN port, 10/100 Mbps, compliance with IEEE 802.3, supports auto MDI/MDIX, 1.5KV network isolation transformer protection
		4 x LAN ports, 10/100Mbps, compliance with IEEE 802.3, IEEE 802.3u standards, supports auto MDI/MDIX, 1.5KV network isolation transformer protection
Indicators	LED	<p>PWR: red, always on after powered on</p> <p>Work: green, blinking when the router is ready and working properly</p> <p>WLAN: green, always solid on when WiFi is enabled and working properly</p> <p>USR: user defined.</p> <p>Net indicator:</p> <p>Red always on after connected to 2G network</p> <p>Green always on after connected to 3G network</p> <p>Orange always on after connected to 4G network</p> <p>Signal strength: 3 solid bars, strongest signal</p>
Terminal block	Pinout	<p>V+, V-: 2cores terminal power supply socket, built-in power supply phase-reversal protection</p> <p>GND: ground terminal</p> <p>Tx/B:RS-232/RS485 pin (set up by software)</p> <p>Rx/A:RS-232/RS485 pin (set up by software)</p> <p>DI:2 x Digital input, passive switch</p> <p>DO:2 x Digital open collector output, max output-36V,300mA</p> <p>COM: common terminal, use in conjunction with DOs</p>

ENP-1M-1200V-0.05C-X-X-X-20



WiFi Interface	Standards & Frequency	IEEE802.11b/g/n, 2.4GHz, AP mode
	Data speed	IEEE802.11b/g, maximum 54 Mbps. IEEE802.11n, maximum 150Mbps
	Antenna	2xRP-SMA-K
	Transmission distance	80 meters by line of sight. Actual transmission distance depends on environment of the site.
Power Supply	Adapter	DC12V/1A
	Connector	DC Power Jack Barrel Type Female 5.5*2.1mm Round socket or industrial terminal block,reverse polarity protection
	Input voltage	DC9~36V
	Working power	Average 522mA/12V, Maximum 811mA/12V
Serial Interface	RS485/ RS232(alternative)	Industrial terminal block. Note: RS232 default.
	Baud rate(bps)	1200,2400,4800,9600,19200,38400,57600,115200,230400
	Data bits	8
	Stop bits	1,2
	Parity	NONE, ODD, EVEN
Physical Characteristics	Housing	Metal shell, IP30
	Dimensions	125.0*103.0*45.0mm
	Installation method	Ear mounting ,DIN-Rail mounting
	EMC	Static IEC61000-4-2, level 3

Fire Extinguisher Ceiling Mount



PERFORMANCE SPECIFICATIONS

Capacity	4Kg
Type	Ceiling Mounted
Extinguisher Agent	Dry Chemical Powder
Activation Time	10 to 20 Sec
Coverage Area	3 x 3 m
Test Pressure	35bar 30sec
Operating Pressure	15bar
Bulb Temperature	68 degree C

FREE COOLING UNIT



FEATURES

1. The CC3000 controller is based on latest technology within embedded microcontrollers.
2. The CC3000 is designed as a single board controller, including all connections needed for supporting free cooling products.
3. It has connection for two flexi box/DFC products, two motorized dampers and two dry contacts for start/stop signal to AC/DC air conditioner.
4. A dry contact for signal to heater unit is also provided.
5. 10 dry contacts for alarming, full configurable.
6. All connections are done with multi connectors using spring loaded terminations.
7. LAN connection is provided for remote monitoring and setup using SNMP protocol.
8. Embedded micro controller is a 32 bit Cortex M3 core.
9. User interface is designed with a 2,4 inch TFT color display.
10. Product configuration and firmware update can be done by use of standard SD card or SNMP over Ethernet / WEB GUI.
11. The CC3000 controller is enclosed in a special designed plastic enclosure, with UL rating 94-V0, dedicated for wall mount.
12. Control circuit is all low voltage and is designed according to EN/UL 60950.

ENP-1M-1200V-0.05C-X-X-X-20



PERFORMANCE SPECIFICATIONS	
Model Number	FB900-48V-G4
CAPACITY & PERFORMANCE	
Operational temperature range, min./max.	- 25 to + 55 °C
Cooling capacity at $\Delta t=10^{\circ}\text{C}$, 50/80%	4950 / 7210 W
Maximum cooling capacity at $\Delta t=10^{\circ}\text{C}$, 100%	8140 W
Airflow, maximum	2450 m ³ /h
Electrical connection	Phoenix PC 4/2-STF-7.62
Input voltage range	48VDC (42-57VDC) VDC
Power consumption 50/80/100%	78/239/366 W
Sound level, 50/80%, 3m distance*	47/56 dB(A)
Expected operation life	Min. years 10
*Sound power 50/80%	62/71 dB(A)
SHIPMENT, STORAGE & MOUNTING	
Unit dimensions (height×width×depth)	1260 x 512 x 518 mm
Net weight	45 kg
Storage relative humidity, min./max.	0 to 95 RH %
Storage temperature, min./max.	-40 to +80 °C
Mounting method	Wall-mounted
Filter	Item no. 077164
Filter type	Class Compact G4
Filter area	0.75 m ²
CONTROLLER DETAILS	
Communication interface	Ethernet SNMP
Mounting method	Wall-mounted
CERTIFICATIONS	
Protection according to EN 60529	IP class no.X5
Complies with standards	EN 60950

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