PRIMUS POWER™

Carbon Free Cloud™

ENERGYPOD® 2

LONG DURATION ENERGY STORAGE

Multi-hour duration,

full power Multi-decade life

No electrode stack replacement

No fire risk

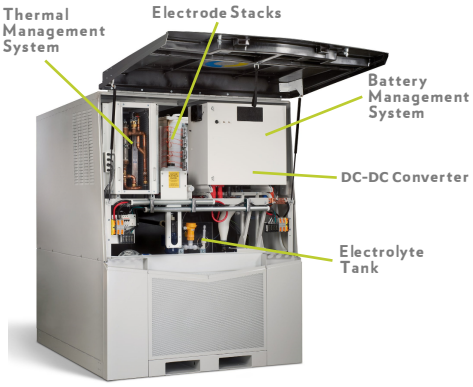
Scalable to multi-megawatt hours

5 FULL HOURS • **25** kW MODULES • **20** YEARS

ENERGYPOD® 2

Key Applications

- Peak shaving
- Bulk energy shifting
- Renewables integration
- Smart grid support
- Islanding/black start



Options

- Cold weather package
- Hot weather package
- Black start
- Hybrid flex flow
- Primus Energy Management System (PEMS)
- Multiple front cover color options

TECHNOLOGY

Battery type	Zinc bromide flow battery
Electrodes	Titanium
Cell architecture	No separator/membrane
Flow architecture	Single tank, single pump, single flow loop

PERFORMANCE

Rated power	25 kW
Rated discharge energy *At rated power*	125 kWh
EnergyPod efficiency *Roundtrip DC incl. auxiliaries at 25°C ambient*	70%
Depth of discharge	100%

PHYSICAL

Dimensions (W,D,H)	1.7 m x 2.0 m x 2.2 m
Mass	5100 kg (11250 lb)
Handling/transport	Forklift, pallet jack, crane, standard ISO shipping container

COMMUNICATIONS

Supported protocols	TCP/IP, Modbus over TCP/IP or RS485, DNP3, SCADA, Open ADR, CAN Open and OPC Server

ENVIRONMENTAL

Ambient temperature *With base package*	-10° C to 40°C
Ambient temperature *With optional cold and hot weather packages*	-30°C to 50°C
Humidity	Non-condensing
Enclosure	IP54/NEMA 3S
Seismic	California building code seismic zone 4

STANDARDS

Designed to comply with UL1973 (certification in process)

ENERGYPOD® 2

Built-in battery conditioning unit

- Equipped with a DC to DC converter to optimize the output voltage to the inverter
- Wide input and output voltage range
- High efficiency Silicon Carbide technology
- High switching frequency, low noise and compact

Building blocks

- EnergyPack: 1 to 4 EnergyPods in series
- EnergyFarm: unlimited parallel EnergyPacks
- Compatible with central inverter or string inverter configuration

Communication hierarchy

- Single point of communication between EnergyFarm(s) and Site controller or EMS

Grid tie/island capable

- Inverter agnostic
- Black start option
- Hybrid Flex Flow option
- PEMS (Primus Energy Management System) option

Hardware protections:

- Leak sensors
- Secondary containment
- Fast fuses after the stack and after the battery conditioning unit
- Over current and voltage
- Pressure sensor
- Auxiliary power breaker
- Software protections for charge and discharge limits
- Electrolyte and ambient temperature
- Operational feedback on pump, valves, contactors, etc.
- Fire suppression not required (non-flammable electrolyte)

ENERGYPOD 2 RATINGS

DC output voltage range of the BCU (Battery Conditioning Unit)	200–820 VDC
Number of EnergyPods in a EnergyPack: 1	200–820 VDC
Number of EnergyPods in a EnergyPack: 2	400–820 VDC
Number of EnergyPods in a EnergyPack: 3	575–820 VDC
Number of EnergyPods in a EnergyPack: 4	750–820 VDC
(These setpoints are adjustable through BMS)	
Max current	225 ADC
Refresh cycle power required per EnergyPod	500 Watts DC

AUXILIARY POWER

Type	3Phase plus ground, 50/60 Hz
Voltage range	200–240 VAC
Typical auxiliary power	1.50 kW
Standby power consumption	0.16 kW
Cold weather option power rating	3.25 kW
Hot weather option power rating	1.50 kW
Maximum auxiliary power consumption	5.00 kW

TRANSITION TIMES AT 25°C AMBIENT

From “idle” to “standby”	5 minutes
From “standby” to “charge” or “discharge”	< 1s (communication lag + power ramp)
From a “set power” to a new “set power” within charge or discharge	< 1s (communication lag + power ramp)
From a “set power” in charge to a “set power” in discharge or vise versa	< 1s (communication lag + power ramp)

COMMUNICATION

EnergyPod to EnergyPod	CAN
EnergyPack (BMS) to EnergyPack (BMS)	CAN
EMS and third party monitoring	Ethernet, CAN, Serial (RS485)
Inverter communication	Ethernet, serial RS485 and RS232
Remote monitoring	Cloud or local monitoring available

SITE PREPARATION

Ventilation *(for indoor applications)*	• Electrolyte headspace vent (located at top of enclosure) ducted to outdoors • TMS air flow 2,000 m^3/hr (1,200 ft^3/min)
Max foundation slope	0.5 degrees
Typical noise level	65 dB at 1 meter

See Site and System Preparation Specification (SSPS) for additional site related details

BMS (Battery Management System)

Features

- Measurements: voltage, current, power, temperature, pressure
- Accurate SOC reporting
- State of health reporting
- Available energy and charge/discharge power calculations
- Seamless EnergyPack management
- Real time data logging
- Battery conditioning unit (BCU) command and control
- Built in redundancy for Master BMS
- Time management: time to charge, time to discharge, time to completion of tasks and state transitions
- Charge dwell management
- Thermal management control and monitoring
- Carbon Free Cloud™ data storage and vizualization

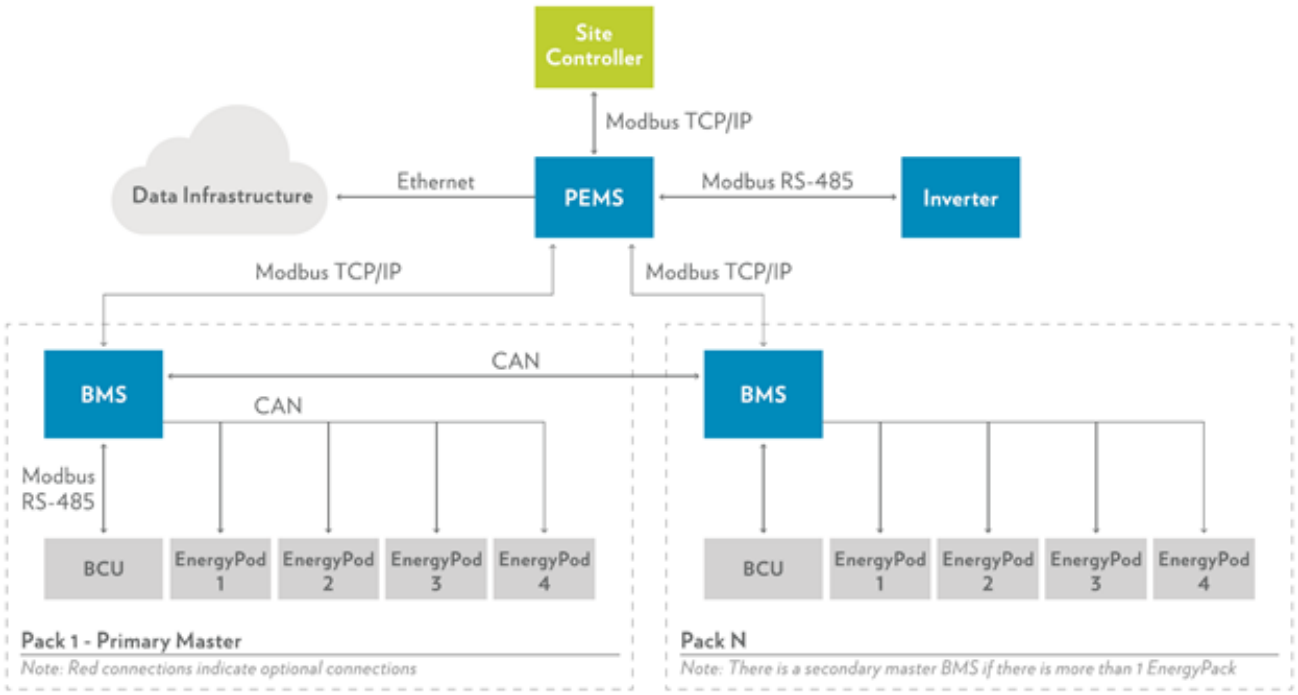
Real time monitoring and control

- Protection against over charging and discharging
- In-situ stack protection and cell monitoring
- Monitor leak sensors
- Electrolyte over temperature
- Automatic power management at the end of discharge independent of the inverter command
- Service scheduler and customer messaging
- Authentication and access control validation

PEMS (Primus Energy Management System)

Features

- Programmable scheduling for charge/discharge
- Inverter management
- EnergyFarm management and reporting
- EnergyFarm power management: load shedding, frequency regulation, VAR control
- Island or grid-tie operation with built in black start capability
- Fault reporting with automated notification via text or email
- Carbon Free Cloud™ data storage and vizualization



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