

Amber Kinetics M32

The Industry’s Only Long-Duration Kinetic Energy Storage System (KESS)—Enabling Highly Efficient Industrial and Commercial Applications

A Booming Energy Storage Market

The global energy storage market is vast and growing. Driven by increased penetration of intermittent renewable power and the decarbonization of grids, annual installations are projected to increase from 6 GW in 2017 to over 40 GW by 2022. Storage is necessary to integrate energy resources and provide the types of ancillary services historically provided by conventional power plants. The versatility of storage—capturing excess renewable generation during off-peak hours and discharging during peak hours—enables utilities to satisfy Renewable Portfolio Standard (RPS) mandates and avoid costly Transmission and Distribution (T&D) upgrades and investments, with savings passed through to rate payers.

Key Benefits

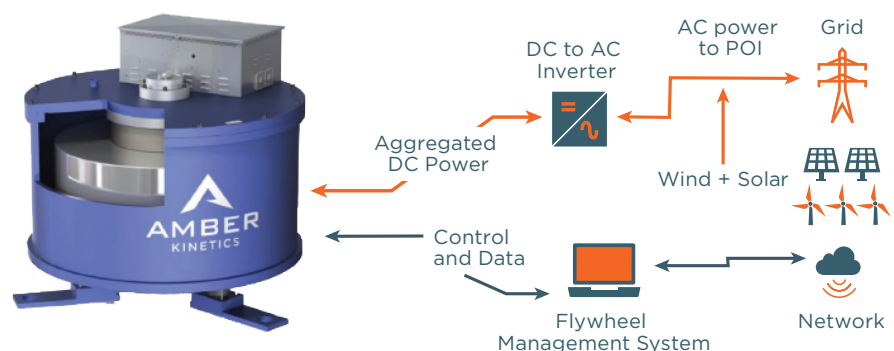
- No degradation allows for **Unlimited Daily Cycling**
- High modularity equates to **High Availability** at site level
- Low O&M cost drives **Excellent Financial Performance**

Advantages Over Chemical Batteries

- >86% round trip efficiency (DC)
- No daily cycling limitations
- No degradation over time
- No HVAC required
- Operates in hot and cold environments (-20C to 50C)
- Fast response time (<1 second)
- Recyclable all-steel design
- Lower O&M cost
- 30-year design life
- 10-year manufacturer warranty

Product Overview

The **Amber Kinetics M32** (8kW,32kWh) is the first commercialized four-hour discharge duration Kinetic Energy Storage System (KESS) powered by advanced flywheel technology that stores 32 kWh of energy in a two-ton steel rotor. When grouped together, similar to solar PV panels, the individual flywheels can be scaled up to tens or even hundreds of megawatts. Amber Kinetics has engineered a flywheel to meet the energy storage needs of the modern grid—at a lower cost and higher efficiency than gas-peakers or pumped hydro.



Application and Use Cases*

Technology solution providers can integrate the M32 for multiple applications that may satisfy their customer needs. The M32 can be scaled up to tens or hundreds of megawatts for grid connected or grid forming applications.



Microgrids

- Capacity
- Energy Firming



Utility / IPP “Front of the Meter”

- Capacity/Demand Reduction
- Energy Arbitrage
- Ancillary Services
- T&D Deferral
- Solar + Storage



Commercial/Industrial “Behind the Meter”

- Demand Reduction
- Energy Firming

M32 Product Details (Preliminary)

Performance	
Nameplate Energy Capacity (DC)	32 kWh
Nameplate Power Capacity (DC)	8 kW
Discharge Duration	4 hours (min.)
Efficiency (DC)	>86% (Round Trip includes Self Discharge)
Cycle Design Life	11,000 cycles (no daily cycling limitations)**
GHG Emissions	None
Environmental	
Temperature (operating & idle)	-20C to 50C
Humidity	100% condensing
Electrical***	
DC Input-Output Voltage	550 Vdc - 750 Vdc
Self Discharge	<100 W****
Auxiliary Discharge (120-240Vac)	<55 W (coasting), <140 W (active)*****
Full Power Response Time	<1 second
Approved Inverters	Ideal Power 30C. Sinexcel under development. Contact Amber Kinetics for others.
Mechanical	
Dimensions (housing)	52" x 54" (h x d), includes electronics housing
Installation	Below grade
System Weight	10,500 lbs
Communications	Compatible with Internet-based SCADA system using DNP3 protocol or script-based dispatch. Modbus protocol under development.
Standards Compliance	
Australia/New Zealand	AS/NZS 3820:2009 and AS/NZS CISPR 11:2011, Class A emission levels.

* Customers should partner with project developer/solutions developers to customize these applications.

** Amber Kinetics offers a limited warranty of system for 10 years after purchase date.

*** Assuming installation, use and maintenance of system in compliance with the Amber Kinetics Installation and User Manual. Failure to comply will result in decreased performance. All specifications are based on Amber Kinetics standard test protocol during charge/discharge cycles.

**** Average over charge/discharge cycle.

***** Average over SOC range.

About Amber Kinetics

Amber Kinetics is the industry-leader in manufacturing grid-scale kinetic energy storage systems (KESS). As the only provider of long-duration flywheel energy storage, Amber Kinetics extends the duration and efficiency of flywheels from minutes to hours—resulting in safe, economical and reliable energy storage.



U.S. Headquarters

32920 Alvarado Niles Rd, #250 Union City, CA 94587

Philippines Headquarters

2nd Floor Corporate Business Centre, 151 Paseo De Roxas, Makati City, Philippines 1223

Australia Headquarters

79 Broadway, Nedlands, WA, 6009, Australia

amberkinetics.com