Kokam Rack System (KRS)
Customer-Centered Solution

NMC High Power Type						
Model Name	Indoor	KRIS-H-2-222	KRIS-H-3-333	KRIS-H-4-444	KRIS-H-5-555	KRIS-H-6-666
	Outdoor	KROS-H-2-222	KROS-H-3-333	KROS-H-4-444	KROS-H-5-555	KROS-H-6-666
Installed Capacity (kWh)		222	333	444	555	666
Max. Power	Discharge (kW)	888	1,332	1,776	2,220	2,664
	Charge (kW)	888	1,332	1,776	2,220	2,664
System Configuration		2 Racks connected in parallel	3 Racks connected in parallel	4 Racks connected in parallel	5 Racks connected in parallel	6 Racks connected in parallel
DC Efficiency		> 97% [Round trip, @1C-rate]				
DC Voltage		660V ~ 832V				
Ambient Operating Temperature Range	Indoor	20 ~ 30℃				
	Outdoor	-20 ~ 40℃				
Enclosure Details	Indoor	IP20				
	Outdoor	IP54				

NMC High Energy Type						
Model Name	Indoor	KRIS-H-2-294	KRIS-H-3-441	KRIS-H-4-588	KRIS-H-5-735	KRIS-H-6-882
	Outdoor	KROS-H-2-294	KROS-H-3-441	KROS-H-4-588	KROS-H-5-735	KROS-H-6-882
Installed Capacity (kWh)		294	441	588	735	882
Max. Power	Discharge (kW)	588	882	1,176	1,470	1,764
	Charge (kW)	294	441	588	735	882
System Configuration		2 Racks connected in parallel	3 Racks connected in parallel	4 Racks connected in parallel	5 Racks connected in parallel	6 Racks connected in parallel
DC Efficiency		> 97% [Round trip, @0.5C-rate]				
DC Voltage		660V ~ 832V				
Ambient Operating Temperature Range	Indoor	20 ~ 30℃				
	Outdoor	-20 ~ 40℃				
Enclosure Details	Indoor	IP20				
	Outdoor	IP54				

NMC High Power Type						
Model Name	Indoor	KRIS-H-2-266	KRIS-H-3-399	KRIS-H-4-532	KRIS-H-5-665	KRIS-H-6-798
	Outdoor	KROS-H-2-266	KROS-H-3-399	KROS-H-4-532	KROS-H-5-665	KROS-H-6-798
Installed Capacity (kWh)		266	399	532	665	798
Max. Power	Discharge (kW)	1,064	1,596	2,128	2,660	3,192
	Charge (kW)	1,064	1,596	2,128	2,660	3,192
System Configuration		2 Racks connected in parallel	3 Racks connected in parallel	4 Racks connected in parallel	5 Racks connected in parallel	6 Racks connected in parallel
DC Efficiency		> 97% [Round trip, @1C-rate]				
DC Voltage		792V ~ 998V				
Ambient Operating Temperature Range	Indoor	20 ~ 30℃				
	Outdoor	-20 ~ 40℃				
Enclosure Details	Indoor	IP20				
	Outdoor	IP54				

- A Battery System maybe composed of up to 30 Racks.
- Kokam recommends the use of a System BMS and a DC Distributional Panel with the Battery System.

NMC High Energy Type						
Model Name	Indoor	KRIS-H-2-352	KRIS-H-3-528	KRIS-H-4-704	KRIS-H-5-880	KRIS-H-6-1,056
	Outdoor	KROS-H-2-352	KROS-H-3-528	KROS-H-4-704	KROS-H-5-880	KROS-H-6-1,056
Installed Capacity (kWh)		352	528	704	880	1,056
Max. Power	Discharge (kW)	704	1,056	1,408	1,760	2,112
	Charge (kW)	352	528	704	880	1,056
System Configuration		2 Racks connected in parallel	3 Racks connected in parallel	4 Racks connected in parallel	5 Racks connected in parallel	6 Racks connected in parallel
DC Efficiency		> 97% [Round trip, @0.5C-rate]				
DC Voltage		792V ~ 998V				
Ambient Operating Temperature Range	Indoor	20 ~ 30℃				
	Outdoor	-20 ~ 40℃				
Enclosure Details	Indoor	IP20				
	Outdoor	IP54				

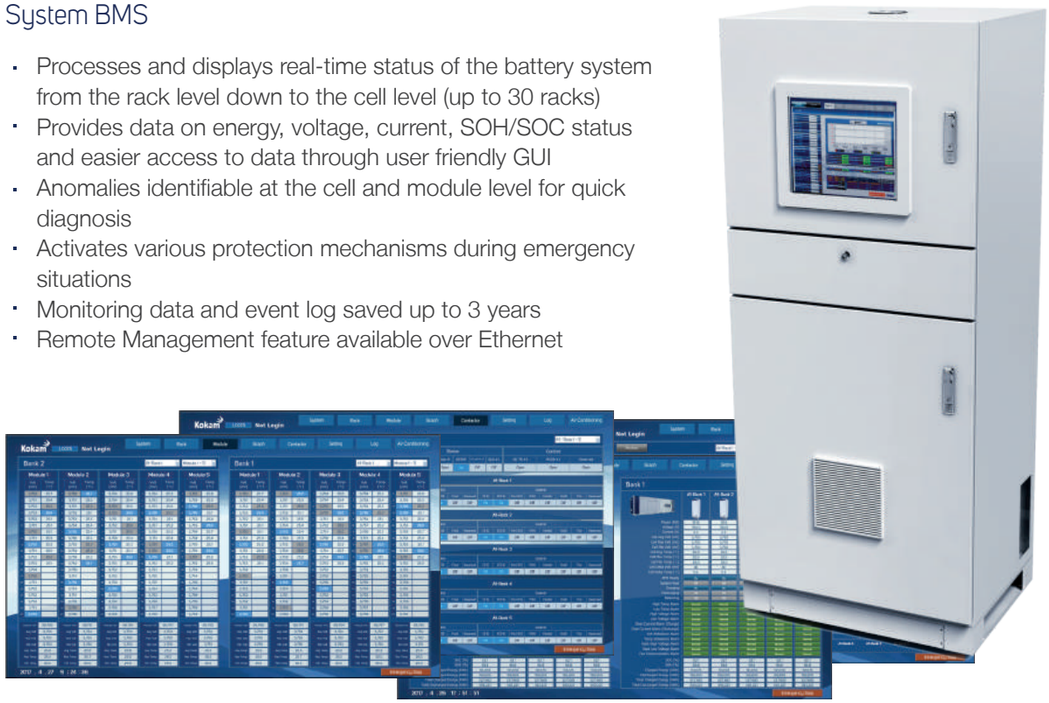
- A Battery System maybe composed of up to 30 Racks.
- Kokam recommends the use of a System BMS and a DC Distributional Panel with the Battery System.

BMS

Pioneer of premium battery

System BMS

- Processes and displays real-time status of the battery system from the rack level down to the cell level (up to 30 racks)
- Provides data on energy, voltage, current, SOH/SOC status and easier access to data through user friendly GUI
- Anomalies identifiable at the cell and module level for quick diagnosis
- Activates various protection mechanisms during emergency situations
- Monitoring data and event log saved up to 3 years
- Remote Management feature available over Ethernet



DC Panel

- Fuse and Breaker designed to protect the battery system against short circuit
- Fuse and Breaker status available through HMI

Bank Fuse & Circuit Breaker

- Prevents fire caused by overcurrent in the event of an external short circuit accident

Bank Insulation Design

- 100MΩ ↑ @ DC 500V (SPS-KBIA-10104-01 or IEC)

Battery Module

High-performance storage solutions

Meet various needs of customer's technical requirement

Kokam Battery Module (KBM) provides 2 kWh – 12kWh systems composed of Lithium-ion Polymer Batteries connected in series/parallel. With its flexible and modular design, Kokam's Battery Module (KBM) can be customized to meet various technical needs of customers.

Air Cooled Battery Pack

CE

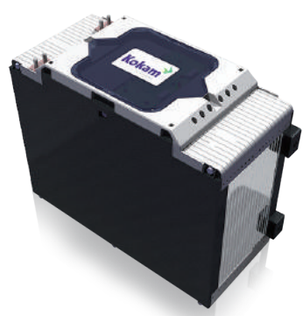
- Standardized module can be connected in series/parallel to create a system of 2.4 kWh to MWh-scale
- Each module is built in an independent tray which secures clearance between individual cells for ventilation
- The module provides cooling for electronic components and lowers thermal resistance
- Maintenance and replacement costs of components are minimal
- Application: ESS, Electric Vehicle, Industrial, Aerospace, Marine, Telecom, Military

KBM 216 - 2.7kWh

KBM 255 - 3.8kWh

KBM 216 2P - 5.5kWh

KBM 255 2P - 11kWh



KBM 460 - 7.4kWh / 14.8kWh

Liquid Cooled Battery Pack

Powerful, relaible, long lasting battery solution

Key features

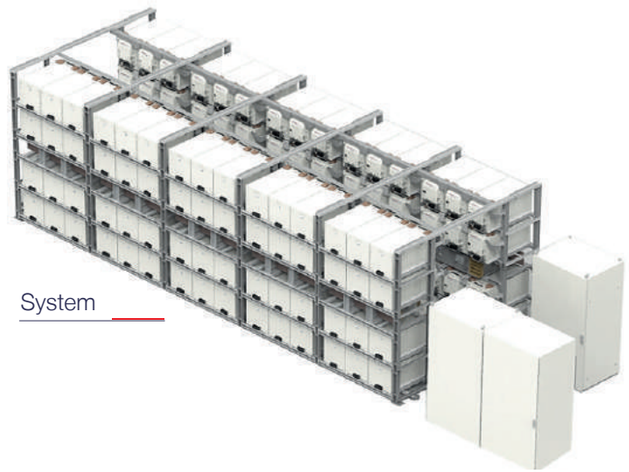
- High C-rate charge/discharge operation
- Long cycle life
- High flexibility to accommodate various voltage and capacity requirements
- IP 56 protection grade & Tolerance for harsh environmental conditions
- Liquid thermal control optimization
- Heat absorption and dissipation using water jackets between each cell
- Compliance to IEC standard and classification society rules
- Mechanical strength to meet shock, vibration and environmental requirements
- Able to accommodate various types of cells to increase the capacity: 70Ah, 75Ah, and 100Ah

Module

Connectable in Series in Parallel

The KOL Battery Module can be configured in various ways in order to accommodate the voltage and capacity requirements.
Due to its flexibility, the KOL Battery Module can be stored and installed in areas like confined spaces.

String



System

Revolutionary Lithium Ion Batteries for Transportation

The KOL Battery System is a safe and reliable liquid cooled lithium-ion battery solution,
developed to be used in marine and industrial EV applications

Depending on the technical requirements of the consumer, the KOL Module can be tailored to increase or decrease its capacity and/or voltage.

Item	Specification			Unit
Cell Model	SLPB135255255PR2	SLPB130255255P	SLPB130255255G1	
Cell Chemistry	NANO (NMC + LFP + LTO)	Ultra High Power NMC	High Energy NMC	
Cell Capacity	70	75	100	Ah
Configuration	2P20S			
Nominal Voltage	74		73.6	Vdc
Voltage Range	64 ~ 82.6			Vdc
Installed Energy	10.3	11.1	14.7	kWh
Conti. Charge	2 P-rate	2 P-rate	0.5 P-rate	P-rate
Max Charge (1cycle, <SOC 80%, BOL)	4 P-rate	4 P-rate	1 P-rate	
Conti. Discharge	3 P-rate	4 P-rate	0.5 P-rate	
Max discharge (1cycle)	5 P-rate	6 P-rate	2 P-rate	
Peak Discharge (60sec, >SOC 50%)	8 P-rate	10 P-rate	3 P-rate	
Size (W x D x H)	335 x 669 x 433			mm
Weight (Approx.)	125	123	122	kg
IP	56			

Customer-Centered Battery Solution

Depending on the technical requirements of the consumer,
the KOL Module can be tailored to increase or decrease its capacity and/or voltage.

System Certification

Kokam's KOL Battery Solution conforms to standards and its safety and performance have been tested and verified by 3rd party test facilities.

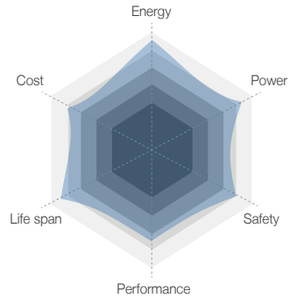
Test Types	Standards
Cell Test	IEC 62619
Battery System Test	IEC 62619
Capacity Validation	IEC 62620 6.3.1
Temperature	IEC 60068
Vibration	IEC 60068
Humidity	IEC 60068
Salinity	IEC 60068
Inclination	IEC 60092-504
Fire Retardant	IEC 60092-101 or 60696-11-5
EMI/EMC	IEC 61000-4 and CISPR 16-2

Lithium Ion Battery

The right choice for your business

Kokam sets about to solve the limitations associated with conventional Lithium Ion Battery technology, including cycle and calendar life, safety, recharge time, power delivery, and ability to operate in extreme temperatures. The performance and features of this technology surpass other existing battery capabilities in the market space today.

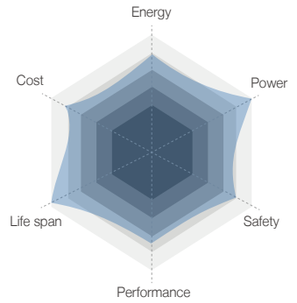
High Power	20 C-rate
High Energy Density	203 Wh/kg
Operating Temperature	-30 ~ 60 degC



High Energy NMC (Nickel Manganese Cobalt)

Advantages

- High energy density (ESS: ~ 203Wh/kg, UHE NMC: ~248Wh/kg):
  Up to 5.4MWh of batteries can be stored in a 40ft container
- More than 96% of high efficiency at 0.5C
- Competitive Price: The NMC cells have a comparative advantage in terms of price, considering it's superior performance, reliability and safety features.



High Power NMC

Advantages

- High C-rate up to 8C-rate discharging performance
- High C-rate up to 3C-rate charging performance
- Improved high power cycle life
- Up to 3MWh of batteries can be stored in a 40ft container
- Special coating applied to cathode to improve high power performance