

Synchronous motors and generators for air energy storage applications



ABB's high voltage synchronous motors and generators offer market-leading efficiency, enabling air energy storage solutions to achieve their environmental goals while keeping costs under control. Choosing synchronous rather than induction motors to drive compressors rated over 10 MW can provide significant energy savings.

ABB works closely with major compressor OEMs to optimize motor-compressor packages, and our synchronous generators can be customized to match their specific application.

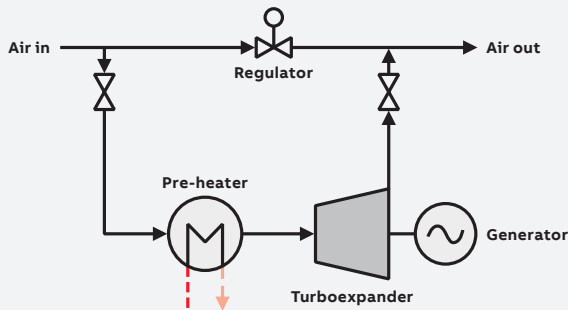
Air energy storage solutions are classified as either Compressed Air Energy Storage (CAES) or Liquid Air Energy Storage (LAES).

Compressed Air Energy Storage is a commercially available large-scale solution for storing electricity in power grids. CAES is an energy storage system that compresses air during off-peak hours for release during peak demand, generating electricity through an expander. It uses electricity during off-peak hours to compress and store ambient air under pressure in subterranean reservoirs, such as caverns and salt mines. When power is needed, the compressed air is drawn through an expander which drives a generator. Thermal storage or peaker plants can also be incorporated to improve efficiency.

Liquid Air Energy Storage is an economical, long-term solution for storing excess and off-peak energy. LAES plants can provide large-scale storage with hundreds of megawatts of output. By utilizing industrial waste heat or cold, these plants enhance system efficiency. LAES stores energy by compressing, liquefying, and storing air in insulated tanks during off-peak times. When demand rises, the air is evaporated, expanded, and heated to generate power. The technology has versatile applications, including transmission and distribution optimization, peak shaving, and intraday arbitrage, and the solutions can be installed almost anywhere.

High efficiency saves energy

With their high efficiency, ABB synchronous motors help reduce operation costs and carbon emissions. For compressor applications rated over 10 MW, selecting a synchronous rather than an induction motor can deliver energy savings totaling up to 1.75 GWh per MW of rated power over the motor's entire 20-year operating lifetime.



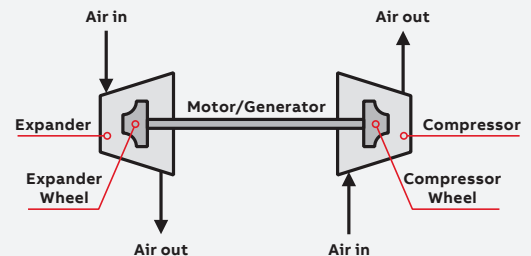
Schematic view of an expander driving a generator.

Optimized motor-compressor packages

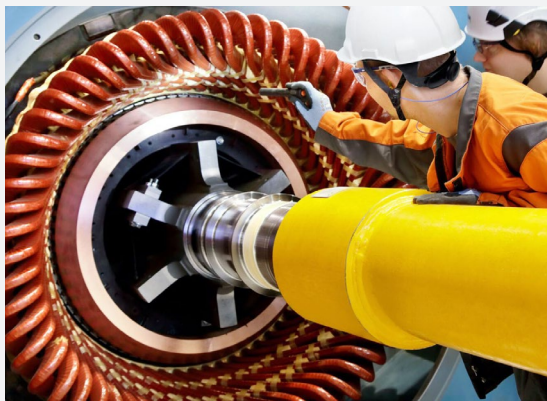
ABB collaborates with leading compressor manufacturers to optimize motor-compressor packages while ensuring compliance with industry standards such as IEC, NEMA and CSA. Our motors can meet your requirements, including DOL or VSD supply, power up to 75 MW, voltages up to 15 kV, and ambient temperatures ranging from $-50\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$ ($-58\text{ }^{\circ}\text{F}$ to $+140\text{ }^{\circ}\text{F}$). Motors are also available with different protection types (Ex ec, Ex p, Class I Div 2/Zone 2) and cooling methods (IC616, IC81W). Shaft heights range from 710 to 1400. ABB's reliable HV synchronous motors are widely used across many different industries, including marine, oil and gas, water, chemicals, air separation, metals, mining, and pulp and paper. For more information, please visit the ABB synchronous motors website.

ABB synchronous generators are often used for on-demand power generation, especially in emergency situations or in areas without reliable grid access. The generators can be effectively coupled with expanders, and particularly with turboexpanders to achieve high system efficiency. In a turboexpander, the expansion of high-pressure gas produces mechanical energy which is used to drive the generator and produce electricity. Some configurations recover heat from the generator and use it to offset the cooling effect of the turboexpander, further enhancing the overall efficiency of the system.

Our turbine generators can be customized to match your application and operating environment, and they run reliably in all conditions. The compact four-pole design allows for a smaller footprint and lower foundation costs where needed. We offer a full range of powers up to 80 MVA.



For improved systems efficiency, a combined motor/generator can be used, with one shaft end connected to the compressor, and one connected to the expander.



Global service network

Fast response is essential to minimize downtime in essential utilities like power plants. ABB meets this need with local support from 60 service centers and more than 150 authorized service providers around the world.

Main features

Power	Motors: 2 to 75 MW Generators: 2 to 80 MVA
Voltage	3 to 15 kV (higher on request)
Frequency	50 and 60 Hz
Standards	IEC, NEMA, CSA
Ambient temperature	-50 °C to +60 °C (-58 °F to +140 °F)
Hazardous area	Ex ec, Ex p, Class I Div 2 / Zone 2
Protection class	IP20 to IP56
Cooling	IC616, IC81W (more options available)



Outstanding benefits



High efficiency, all the way up to 99%, and beyond.



Increased flexibility through range of cooling options.



Reliable operation over a long lifetime, even in the toughest environments.



Enabling savings in operating costs, maintenance and energy consumption.



Manufactured from quality components, including highly reliable sleeve bearings.



Optimized plant output and low environmental impact.



4-pole design for high-speed, optimized performance.



Global support and service with ABB's extensive network.

For more information please visit:

new.abb.com/motors-generators



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