

Brochure

Marine generators

Proven generators for reliable power on board



We provide motors and generators, services and expertise to save energy and improve customers' processes over the total life cycle of our products, and beyond.

Full range of synchronous generators for marine applications

Whatever your marine generator needs – shaft generator or gen-set, low or high voltage, continuous or emergency duty – ABB has a proven, safe solution. We are the leader in diesel and gas engine application with over 45,000 MVA of power supplied, enabling us to deliver the optimum product on time and in budget.

ABB produces 50,000 marine motors and generators annually. We offer a full range of synchronous generators optimized to meet the highest marine requirements. Our low voltage standard series extends from 14 kVA up to 2430 kVA, and is complemented by modular generators covering the range 500–5000 kVA. Our high voltage generators are rated up to 50 MVA with voltages up to 15 kV. We also supply DC grid generators, low speed shaft generators and extend our offering to lower speed low voltage generators for diesel-electric systems.

From the Arctic to the Tropics

ABB has extensive experience in working with the marine sector – from panel builders, integrators and OEMs, to shipyards, ship owners and operators. A huge installed base of ABB generators is operating reliably in a wide range of vessel types, including cruisers, car and train ferries, ice breakers, multi-purpose tankers, LNG tankers, FPSOs, ice-going vessels, supply vessels, drilling rigs, and more. Our customers rely on ABB's full life cycle support and proven track record of on-time delivery.

Reliability and safety come first

At sea there is no room for failure. ABB generators feature vacuum pressure impregnation (VPI) of the windings, a technology which has proven itself for over 30 years in tens of thousands of motors and generators operating successfully all over the world. Our advanced insulation system exceeds strict marine requirements for on-board equipment and gives the windings superior strength to withstand vibration, and mechanical and electrical stresses. Together with our vast experience in a wide range of bearing constructions and special inclination testing, this results in high availability and trouble-free operation.

Application specific engineering

ABB marine generators are optimized using advanced techniques including 3D design. Vibration and mechanical noise, typical of piston engines, are efficiently reduced by FEM (finite element method) simulations, with the results made available to the engine supplier for use in their own design. Our long-standing working relationships with engine manufacturers and gen-set builders have given us the experience and tools needed to analyze the impacts of external torsional and linear vibrations. Our engineering can meet all performance design challenges – including reactance tuning and voltage drop withstand needed with other gen-sets and motors in island operating mode – ensuring reliable power production when it is most needed. Significant investments in R&D ensure that we maintain our position as a technology leader, also in the future.

Quality built in

Quality in ABB generators originates from our design, manufacturing processes and the materials we use. We source our purchases from reliable suppliers only and perform thorough testing in all phases of manufacturing. Our generators are built to IEC 60034 and they comply with all international classification standards like LRS, DNV, GL, BV, NK, KRS, RS, CCS, ABS, US Coast Guard and RINA. In addition to our own quality program using tools like FMEA, we follow the requirements of the ISO 9001, ISO 14001 and OHSAS 18001 quality, environmental and occupational health and safety standards. ABB's global organization and network of partners means you can count on us to provide the life cycle service and support you need – wherever in the world you need it – to minimize downtime and keep your business running.



Low voltage standard marine generators

ABB low voltage (LV) standard marine generators are specifically designed for marine diesel gen-sets in main, auxiliary or emergency power generation. They cover the power range 14–2430 kVA in frame sizes 180–450 with typical voltages of 380–480 V.

Application specific generators – short delivery times

ABB standard 4-pole generators have proven themselves in demanding marine applications. They enable short delivery times without compromising reliability. These open air cooled self-excited brushless generators feature a permanent magnet pole in the exciter stator, a built-in AVR and other optional accessories. There are two different mounting and bearing configurations and the large terminal box can accommodate a variety of optional accessories. The direction of the cable connection can also be selected.

Proven technology

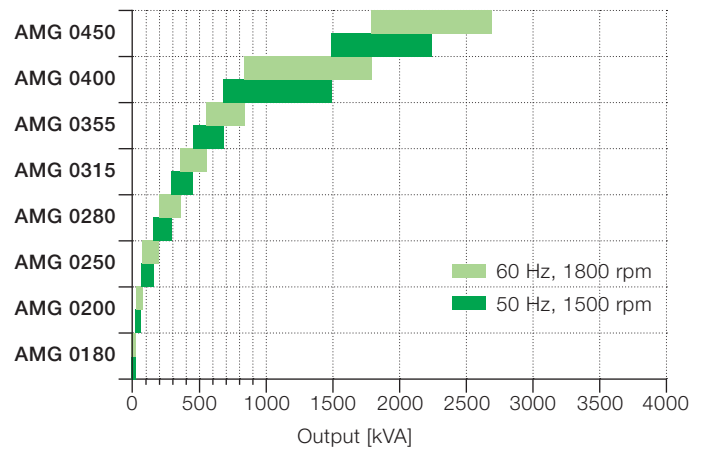
The excitation power in modern synchronous generators is supplied by an auxiliary winding. In the proven ABB brushless excitation system the secure voltage build up is ensured by a Permanent Magnet Insertion in the exciter stator.

Vacuum pressure impregnation (VPI) is used for both stator and rotor to protect from harsh environmental conditions.



Power range at different speeds

For outputs at 400, 450 or 690 V depending on the current and frequency (temperature rise class F, inlet cooling air 50°C, power factor 0.80)



Typical technical data for LV standard marine generators

Power range	14–2430 kVA
Voltage level	380–440 V at 50 Hz 415–480 V at 60 Hz
Speed range	1500 or 1800 rpm, (50 or 60 Hz), 4 pole
Frame size	180–450

- Power factor: 0.8
- Insulation class/Temperature rise: H/F or H/H
- Ambient Temperature: 0 ... +45°C (up to 60°C with power derating)
- Mounting: IM2105, single bearing, SAE flange, coupling disc
IM1001, double bearings, one shaft extension
- Cooling/Protection: IC0A1/IP23 (IP 44 on request)
- Bearings: Single or two bearing configuration, sealed-for-life up to 400 frame, 450 frame with regreasable bearings
- Main connections: Large terminal box for easy access to the terminals and AVR, room for optional CTs
- Automatic voltage regulator: Analog type (digital as option)

Low voltage modular marine generators

ABB low voltage (LV) modular marine generators are tailor-made for diesel gen-sets or operation as shaft generators on board ships or offshore platforms. They cover the power range 500–5000 kVA in frame sizes 400–630 with typical voltages of 400–690 V.

Tailored solutions on time

ABB has the experience to deliver tailor-made generators for demanding marine applications on time and in budget. We can offer different bearing solutions for specific tilting requirements using either antifriction or sleeve bearings in single or double bearing arrangements. The direction of the cable connection, special feet heights and a variety of optional accessories can also be selected for modular generators.

Proven technology

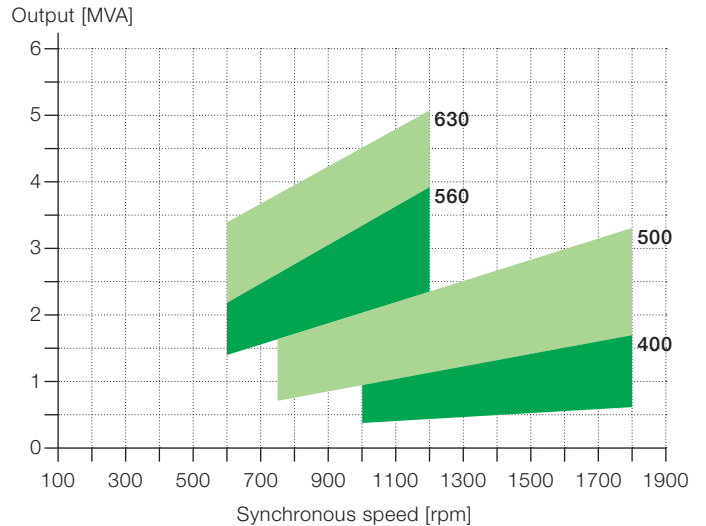
The excitation power in modern synchronous generators is supplied by an auxiliary winding. A separate PMG is also available as the excitation power source. In the proven ABB brushless excitation system the secure voltage build up is ensured by a Permanent Magnet Insertion in the exciter stator.

Vacuum pressure impregnation (VPI) is used for both stator and rotor to protect from harsh environmental conditions. Special form wound windings – normally used in high voltage generators – are also available for ABB modular LV generators as an option.



Power range at different speeds

For outputs at 400, 450 or 690 V depending on the current and frequency (temperature rise class F, inlet cooling air 50°C, power factor 0.80)



Typical technical data for LV modular marine generators

Power range	500–5000 kVA
Voltage level	400 V at 50 Hz
	450 V or 690 V at 60 Hz
Speed range	600–1800 rpm / 4–10 poles
Frame size	400–630

- Power factor: 0.8
- Insulation class/Temperature rise: H/F or H/H
- Ambient Temperature: 0 ... +45°C (up to 60°C with power derating)
- Mounting: IM1101, IM1305, IM2401, designed to match the engine
- Cooling/Protection: IC0A1/IP23 (open air cooled) or IC8A1W7/IP44, (closed circuit water cooled, max +38°C) emergency cooling as an open machine
- Bearings: Antifriction or sleeve bearing, single or double bearing
- Main connections: Terminal space integrated into generator top module, including transformers for measurement and protection, main cable entry from either side
- Automatic voltage regulator: Several types of digital or analog AVR's available, integrated into the top module or delivered as a separate item

High voltage marine generators

ABB high voltage (HV) marine generators are custom designed for diesel gen-sets or operation as shaft generators on board ships or offshore platforms. They cover the power range up to 50 MVA in frame sizes 500–2500 with voltages up to 15 kV (50/60 Hz).

Over 1700 state-of-the-art HV synchronous generators are operating on a wide range of vessel types, including cruisers, car and train ferries, ice-breakers, multi-purpose tankers, LNG tankers, FPSOs, ice-going vessels, supply vessels and drilling rigs.

Customized solutions on time

We have the experience to deliver highly customized ABB generators for demanding marine applications on time and in budget. We can offer different bearing solutions for specific tilting requirements using either sleeve or antifriction bearings in rigid flange mounted or pedestal bearing constructions.

When supplied for gen-set use, the generators are always dimensioned according to customer specifications. The reactance levels are matched with the short-circuit capability of the switchboard and voltage variations requirements. In shaft generator applications, these generators can be either direct driven or coupled through a gearbox.

Proven technology

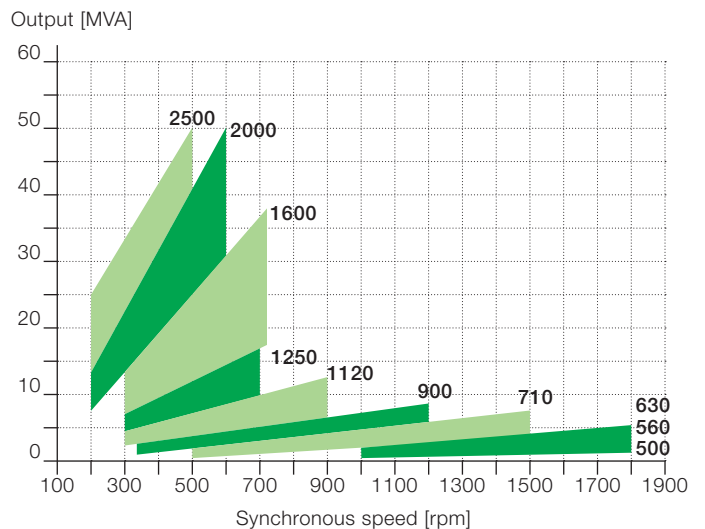
The high voltage generators use the special ABB shunt boost excitation system, which takes the excitation power from the line voltage through a voltage transformer (also used for measurement for the AVR). In a short circuit the excitation

power is taken from the current transformers. Permanent magnet insertion is used in the exciter to ensure the secure voltage build up. A separate PMG is also available as the excitation power source.

Both the stator and rigid salient pole rotor use reliable ABB form wound windings and vacuum pressure impregnation to withstand all mechanical and electrical stresses during operation and to protect from harsh environmental conditions. The HV generators also feature an additional protective varnish as standard.

Maximum outputs at different speeds

For outputs at 6 kV/50 Hz
(temperature rise class F, inlet cooling air 50°C, power factor 0.80)



Typical technical data for HV marine generators

Power range	up to 50 MVA
Voltage level	up to 15 kV, 50/60 Hz
Speed range	500–1800 rpm, (4–30 poles)
Frame size	500–2500

- Power factor: 0.8
- Insulation class/Temperature rise: F/F
- Ambient Temperature: 0 ... +45°C
- Mounting: IM1101, IM 1305, IM7301
- Cooling/Protection: IC8A1W7/IP 44 (closed circuit water cooled, max +38°C), emergency cooling as an open machine
- Bearings: Sleeve or antifriction bearings
- Main connections: Terminal space integrated into generator top module, including transformers for excitation and protection, main cable entry from either side
- Automatic voltage regulator: Several digital type AVRs available, mounted on a plate or in the cabinet



Life cycle services and support

From pre-purchase to migration and upgrades

ABB offers a complete portfolio of services to ensure trouble-free operation and long product lifetimes. These services cover the entire life cycle, from pre-purchase advice, through installation, maintenance and spare parts, to migration and upgrades. Local support is provided through a global network of ABB service centers and certified partners.

The service organization uses its broad experience in generator applications to support customers' efforts to maximize availability and reliability, and optimize process performance.

Pre-purchase

ABB's front-end sales organization is equipped with advanced tools to help customers quickly and efficiently select, configure and optimize the right generator and services for their application with full support from the experts of global R&D, service and the manufacturing units.

Installation and Commissioning

ABB generators are designed for easy installation and commissioning. ABB can provide certified engineers with extensive experience for the supervision of installation and commissioning. Their know-how ensures faster start-up times and trouble-free operation. Professional installation and commissioning represent an investment in availability and reliability over the entire life cycle.

Spare Parts

Although ABB's generators range from small standard products to large tailor-made units, we are able to offer spare parts and support for all generators throughout the product life cycle. Spare parts are available either as separate components or in packages tailored to the generator design.

Maintenance and Field Services

ABB offers life cycle management plans and standardized preventive maintenance products tailored for each life cycle phase. The recommended maintenance program consists of four levels spaced over the lifetime. Site surveys can be performed to determine repair, maintenance and spare parts needs if there is insufficient information on the current status of the equipment.

Repair and Refurbishment

ABB provides worldwide manufacturer support for all ABB generators as well as other brands. Specialist teams are standing by to deliver a full range of local support in

case of emergency. ABB's global service organization includes local sales and service contacts, the site service specialist network and certified workshops worldwide.

Engineering and Consulting

ABB's experts can provide a broad range of technical support. Available services include energy efficiency and reliability appraisals, advanced condition and performance assessments and technical studies. Engineering and consulting primarily aim at optimizing on-site generator life cycle maintenance practices for reduced costs.

Condition Monitoring and Diagnosis

ABB's unique services deliver early warnings of developing problems before failures occur. The required data can be collected by an engineer during a site visit or by means of remote monitoring solutions. The services focus on critical areas like the bearings, rotor winding, stator winding insulation and overall mechanical condition.

Migration and Upgrades

ABB offers life cycle audits to recommend the most appropriate migration paths and upgrades. Component upgrades are available on a turnkey basis to deliver improved efficiency, reliability and safety. Older generators can be upgraded with completely new designs. ABB can supply a direct replacement generator for the original unit.

Training

ABB's product and service training courses take a practical approach. The training ranges from standard courses to specially tailored programs to suit customer requirements.

Specialized Support

ABB generators are designed for fast repairs and maintenance, in many cases on site. Specialized support for customers is offered through a global services organization. Local units worldwide provide major and minor repairs as well as overhauls and reconditioning.

Service contracts

ABB offers tailor-made service contracts to fit every customer's service needs. The service contract combines the whole service product portfolio and ABB's 120 years of experience to deploy the optimal service practices.

Contact us

www.abb.com/motors&generators

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