Generators and Motors
Industry leading technology and engineered solutions
BRUSH is a premier OEM of generators with more than 130 years of industry leading design innovation and technology development. With over 4,000 units delivered, the robust design of BRUSH generators ensures high reliability and availability in even the most extreme climatic conditions and hazardous atmospheres.

With decades-long operating profiles BRUSH customers can rely on timely technical and engineering assistance through its “Service 24” support team.

### Output Range

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<th>Generators</th>
<th>4 Pole Air Cooled Generators</th>
<th>Mobile &amp; Trailer Mounted Generators</th>
<th>2 Pole Air Cooled Generators</th>
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<th>2 Pole Combined Cooled Generators</th>
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<tr>
<td>Voltage</td>
<td>Up to 15 kV</td>
<td>Up to 18 kV</td>
<td>Up to 20 kV</td>
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<td>15 to 24 kV</td>
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<tr>
<td>Excitation</td>
<td>Brushless or Static</td>
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<td>Static or Shaft Mounted Exciter</td>
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<tr>
<td>Insulation</td>
<td>Class F</td>
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<tr>
<td>Frequency</td>
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<tr>
<td>Output</td>
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<tr>
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### Specifications

- **Voltage:**
  - Up to 15 kV
  - Up to 18 kV
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- **Excitation:**
  - Brushless or Static
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  - Class F
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  - Aeroderivative Gas Turbine / Heavy Frame Gas Turbine / Steam Turbine
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  - Aeroderivative Gas Turbine / Heavy Frame Gas Turbine / Steam Turbine
  - Heavy Frame Gas Turbine / Steam Turbine
- **Design Standards:**
  - IEC & IEEE Compliant
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Generator Design

BRUSH designs and manufactures pioneering technical generator solutions to meet the demands of extreme climates, hazardous atmospheres and regulated urban locations.

Our generators can be driven by steam or gas turbines and are specified by leading industrialists and EPC contractors world-wide.

BRUSH 2 pole and 4 pole generators are installed in over 130 countries and operate in public utility, cogeneration, CHP, industrial and offshore applications.

All generator, motor and cubicle projects are designed in-house, mixing long-term experience with innovative ideas to ensure all designs meet the full customer specification.

Simulation, modelling and 3D design tools alongside optimised design programs allow all parameters to be considered and the best solution is put forward to meet the customer needs.

With a manufacturing capability from intricate electronic circuits to massive fabrications, BRUSH has the experience and skills to handle total engineering projects in-house, from concept, through design and manufacture, to final installation, commissioning and ongoing lifecycle support.

Every product has built its own track record of proven reliable operation, in some of the world’s harshest environments.

BRUSH has more experience in the use of gas turbines for power generation than any other generator manufacturer in the world.

Our success is down to continually meeting the changing requirements of gas turbines through evolving the product, coupled with competitive prices and keen deliveries.

BRUSH’s market leading and world record holding technology is available to all our customers.
4 Pole Air Cooled Generators

With over 750 active installations, the time-proven BRUSH 4 pole air cooled generator range built in European ISO accredited sites are specified by leading industrialists, EPCs and facility operators.

BRUSH’s 4 pole air cooled generators can be driven by gas or steam turbines with an output range of 3 to 65 MVA. They are the ideal solution for turbines, when a gearbox is required.

Our depth of knowledge allows us to provide optimised product selections for standard applications and fully customised solutions to meet any complex customer requirement.

Operation in extreme climatic conditions (low temperature), hazardous atmospheres, strictly regulated noise levels for urban locations and high rotational inertia are some of the demanding requirements that BRUSH’s 4 pole generator range can meet and exceed.
Mobile & Trailer Mounted Generators

BRUSH has been at the forefront of the trailer mounted market since their introduction in 1995. 2 pole generator design technology has improved, but the key focus of the product has not shifted. Power: where you want it, when you need it.

BRUSH has an outstanding history of producing low weight, minimal footprint trailer mounted generators. These generators are truly mobile and are operated across some of the harshest environments and most remote parts of the globe.

Typically driven by aeroderivative gas turbines a maximum output of 65MVA is now available.

Ultra-lightweight solutions are available for applications demanding the lowest possible weight.
2 Pole Air Cooled Generators

With close to 200 GW of installed capacity, customers and installations worldwide and offerings for all common turbine frames, the BRUSH range is proven, extensive and covers an output range of 10 to 350 MVA.

The extent of BRUSH’s product range is matched only by our knowledge and experience.

These generators are driven by aeroderivative gas turbines, heavy frame gas turbines, steam turbines, and expanders. With frames and designs, specifically optimised to be paired with all common turbines/drives.

Bespoke designs, tailored to a variety of turbine and environmental applications, allows BRUSH to offer a product specifically suited to exacting site requirements.

Above 200 MVA BRUSH 2 pole air cooled generators compete with what are typically hydrogen cooled machines. A BRUSH air cooled generator is a safer and simpler alternative to the complex and costly hydrogen cooled units historically used.

Common applications include power utilities, offshore oil & gas, FPSO’s, petrochemical and refining, geothermal, and industrial cogeneration, amongst others.
Synchronous Condensers
Absorb & supply reactive power

With the increase of inductive loads from the implementation of emerging disruptive power generation technology, management of reactive power will become less of a passive activity and more of a core business need.

Stabilisation of the grid is essential to safeguard the security of our energy needs.

A BRUSH synchronous condenser is an effective alternative to supply or absorb reactive power when compared to static var compensators.

BRUSH synchronous condensers designs are based on the BRUSH 2 pole and 4 pole air cooled generator ranges which encompasses engineering innovations developed over many decades. They can be finely tuned to meet specific site or customer requirements much like the 2 pole and 4 pole ranges.
2 Pole Combined Cooled Generators

When output requirements exceed that of air cooled and hydrogen cooled generators, BRUSH offers a range of combined cooled units.

Since the first combined cooled unit was produced in 1966, the BRUSH combined cooled generators producing over 20 GW of power.

The increased cooling performance of the hydrogen cooled rotor and water cooled stator bars, allows for very high unit capacities and efficiencies.

For these units, typically driven by steam turbines, but also heavy frame gas turbines, a maximum output of 1,250 MVA is available. Maximum power output from a small envelope, with full life cycle support is available as for all types of BRUSH generators.
Line and Neutral Cubicles
A great optional extra

A wealth of experience within the power generation industry ensures BRUSH can provide an engineered, bespoke solution to meet your termination requirements for both new build and retrofit generators.

A dedicated Engineering, Manufacturing and Test team is on standby to supply cubicles up to 10,000 A. BRUSH cubicles can be free-standing or mounted from the generator, to minimise the overall footprint.

BRUSH generators are optionally provided with a line side cubicle, freeing up space in the switchgear package. The star point and neutral earthing (grounding) equipment can be accommodated in a neutral cubicle.

In addition to cubicles for new generators, BRUSH is able to provide terminal cubicles for existing generators, both for those manufactured by BRUSH and for those manufactured by others.
Motors
Complete range of engineering services and support

BRUSH has extensive experience in the design, manufacture, service and repair of a broad range of motors. Regardless of the original equipment manufacturer BRUSH can provide a complete range of engineering services to support the customer’s needs.

**BRUSH currently offer 3 types:**
- 2 Pole Synchronous AC motors
- Subsea motors
- Traction motors (including low speed motors up to 6.5MW)

**2 Pole Synchronous AC Motors**
Based on the extremely successful and reliable DAX generator range, the BRUSH MAX motor range can be fully customised to meet customer specifications. As with our range of DAX generators, the typical operating benefits of the MAX motors are:
- Low maintenance
- High reliability
- More than 30 years expected operating life

Repair and upgrade projects are divided into two phases.

**Phase 1:** A full inspection and detailed inspection report. The motor, during this phase, is dismantled, checked and cleaned. Ex motors, upon arrival, are tested.

**Phase 2:** The machine is overhauled. Various parts of the machine are replaced and after equalising of the nominal rotor speed, the motor is remounted. An extensive test is conducted on the motor before it is shipped including:
- Measurement of vibrations according to IEC 60034-14
- Measurement of the temperature of the bearings
- Electrical measurement of resistance values and Polarization Index (PI) values
- High voltage test according to IEC 60034-1 standards (required for ex-machines)

The BRUSH motor range can be fully customised to meet customer specifications.
**Subsea Motors**

BRUSH is a leader in its field, with almost 40 years’ experience in the design and development of underwater motors and in the dredging industry.

The BRUSH underwater AC motors are designed to completely satisfy the requirements of our customers. Special attention is given to the development of a strong, robust motor with the following qualities:

- Low maintenance
- High reliability
- More than 30 years expected operating life
- Adjustable speed, power and torque by means of a frequency converter

**Specifications:** BRUSH underwater motors are filled with oil so that the bearings do not need to be re-greased. The lubricated motor prevents condensation from entering the motor.

The motors are delivered with bearings that withstand applied pump pressure and designed to function for at least 30,000 operating hours. Cooling of the motor is possible naturally or by means of forced cooling from the surrounding seawater.

The following instruments are available:

- Stator temperature measurement
- Bearing temperature measurement
- Oil temperature measurement
- Tachometer (redundant)
- Differential pressure gauge seawater/oil

Other available options:

- Interchangeable shaft
- Factory load test
- Water leakage detection in connecting bushings

**Traction Motors**

BRUSH has several years’ experience and extensive knowledge in the manufacturing and overhaul of motors for trains, metros and buses.

BRUSH is committed to the maintenance and repair of all traction motors regardless of brand.

Our specialised software and well-trained staff ensure the best traction motor possible for your technical specifications.

Our experience and proven quality have made BRUSH a trusted supplier of new motors for various public transport companies.
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