ANSALDO ENERGIA
Power together

Hydrogenerators

Hydrogenerators offer low operating costs and limited maintenance solutions in the field of renewable energy. They can be coupled to Kaplan, Francis and Pelton turbines to produce energy by water flows.
Driven by a centenary experience in this business, dating back to the 1920s, and supported by constant product improvements over the years, Ansaldo Energia has a comprehensive range of hydrogenerators suitable for both new power plants and retrofit applications, depending on the type of water availability:

- generators for river flow (low/medium speed);
- generators for high-head plants (medium/high speed);
- motor-generators for pumped storage systems.

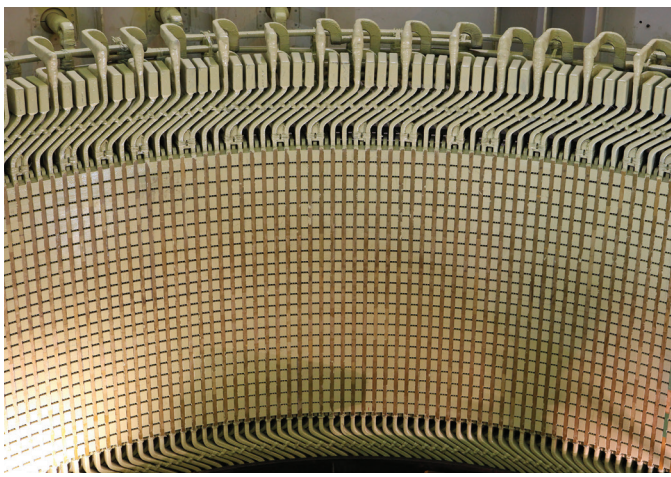
Our capabilities in supply, installation, post-sale assistance and service help our Customers to maximize the investment made in power plant construction. Worldwide experience in hydrogenerators as well as in turbogenerators, combined with advanced engineering tools and specific R&D programs, allows Ansaldo Energia to perform refurbishment, reconditioning, repair and repowering work on generators based on any technology.

Design features

Ansaldo Energia uses a tailor-made approach that starts with the planned plant design. The electromagnetic design defines the active parts of the machine. Design data, such as power output, voltage, speed, etc., identify the ideal configuration based on standard modules, and then the performance is maximized taking into account any transport, assembly or other constraint (if any) and analysing its electromagnetical, mechanical and thermal behavior by advanced computational tools.
In addition, hydrogenerators are designed to withstand the heaviest of operating conditions, frequent start and stop cycles and accidental operating conditions such as short circuits.
The heart of the generator is the stator winding, and the quality of the stator bar insulation is a decisive factor for machine reliability. The 4675 Resin Rich insulation system, which is derived from our turbogenerators, allows us to double the thermal conductivity of the insulation, compared with the previous generation, and to lower the thermal level of the stator bar, thus increasing the lifespan and reliability of the generator.
Our generators are designed with a redundant, closed-circuit cooling system. Based on the type of generator involved, axial fans with adjustable angle blades are used, or solutions with radial ventilation or electric fans for motor-generators which rotate in both directions. In the case of vertical hydrogenerators for very high vertical load (i.e. for Kaplan turbine), we can provide proven solutions with equalised thrust bearings and, if required, a self-pumping thrust collar.
These solutions are available in non driving end (NDE) thrust bearing configuration with a single-piece thrust collar, and in driving end (DE) thrust bearing configuration with a two piece thrust collar.

Quality, test and inspection

Ansaldo Energia's advanced quality system applies also to hydrogenerators, as well as to all our products, during any working phase: from design to manufacturing to factory test to on-site start up and commissioning, ensuring compliance with internal and international benchmark quality rules. In particular, workshop tests are performed according to IEC and IEEE standards.
Continuous online assessments and remote monitoring are available in order to provide the Customer with a machine report to estimate the hydrogenerator life cycle and to properly plan maintenance works.
The diagnostic instruments include the loop test (EL CID) stator core inter laminar fault test system, high voltage winding tests, stator winding on-line vibration monitoring and vibration measurement campaigns, the full range of Non Destructive Tests (NDTs), and alignment checks and dimensional checks with the help of digital contact-free instruments.



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Hydrogenerator performance

Frequency	Hz	50	60
Speed	rpm	62.5-1000	75-1200
Poles		6-96	6-96
Rated Voltage	kV	5-17	5-17
Power Range	MVA	10-420	10-420

- Mounting arrangement: vertical (IM8), horizontal (IM7)
- Method of cooling: IC8A1W7
- Protection degree: IP54
- Excitation: static or brushless
- Thermal insulation class: F
- Installation: pit or floor mounted
- Coupled to turbine: Pelton, Francis, Kaplan

Worldwide references: decades of experience

The fleet of hydrogenerators has been sold worldwide and has an excellent track record of availability, operational flexibility and durability.

Africa: Cameroon (5); Congo (8); Egypt (6); Ivory Coast (3); Mauritius (2); Sierra Leone (2); Sudan (5); Tunisia (1).

America: Argentina (26); Brazil (38); Chile (3); Colombia (11); Dominican Republic (2); Ecuador (6); Mexico (3); Nicaragua (2); Peru (10).

Asia: Indonesia (5); Philippines (3); Vietnam (2).

Europe: France (21); Greece (2); Italy (353); Spain (2); Turkey (4).

Middle East: Iran (3); Iraq (5).

533 Units
Total 26,800 MVA
(awarded since1950)

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