



# Siemens Hydrogen-Cooled Generators with Water-Cooled Stator Windings

SGen-3000W series with ratings from 600 up to 1,270 MVA



SGen5-3000W at Ulrich Hartmann Combined Cycle Power Plant in Irsching (Bavaria, Germany)

The SGen-3000W series of hydrogen-cooled, two-pole generators with water cooled stator windings is part of Siemens Generator (SGen™) product line, with ratings up to 1,270 MVA for steam and combined cycle applications.

Cooling performance is greatly improved through the use of hydrogen-cooled gas in place of air as coolant for the rotor winding and stator core. At the same time, frictional losses are significantly lower, thus improving overall generator efficiency.

An increased output of per unit volume of stator-winding active material is possible because of the higher thermal conductivity and specific heat of water. It is this advantage of water that makes it possible to build generators for higher ratings than possible using air or hydrogen as the cooling medium for the stator winding components.

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**1** Four vertical independent heat exchangers are used on the turbine drive end of the generator for cooling of the hydrogen.

**2** A single multi-stage blower at the turbine end of the generator circulates the hydrogen gas for cooling of the rotor, stator core and frame components.

**3** Mechanically decoupled stator end winding system ensures maximum rigidity and flexibility for cyclic thermal expansion.

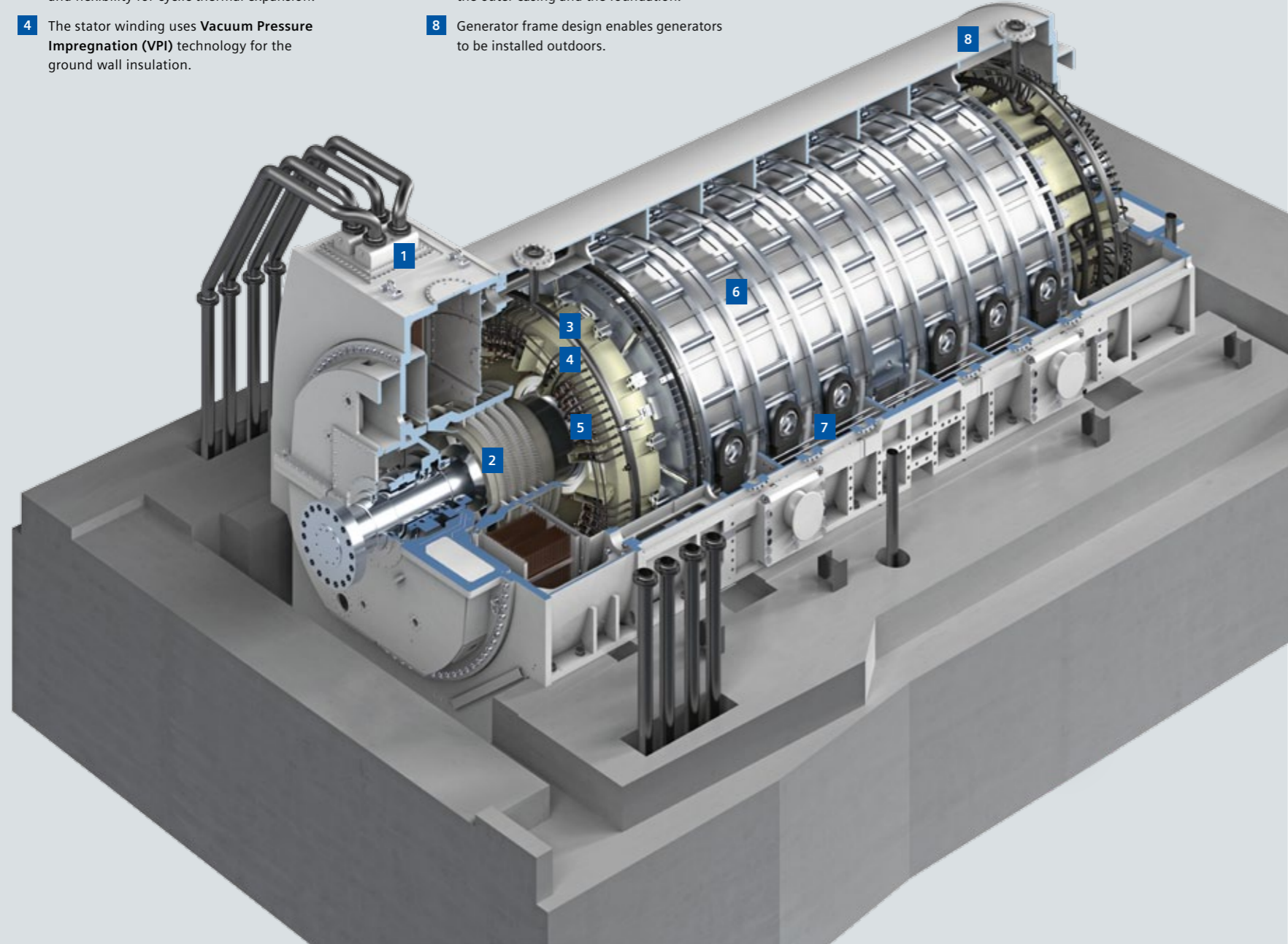
**4** The stator winding uses Vacuum Pressure Impregnation (VPI) technology for the ground wall insulation.

**5** Rotor winding is axially, directly cooled by hydrogen flowing through each turn of the winding.

**6** Laminated stator core is cooled directly by hydrogen flowing through axial ventilation paths in the length of the stator core.

**7** The stator core is flexibly supported in the outer casing by spring assemblies. This prevents vibrations from impacting the outer casing and the foundation.

**8** Generator frame design enables generators to be installed outdoors.



### Customer Benefits

- Efficiency up to 99%
- Uniform temperature profile promotes reliability
- Simplified installation
- Design based on field-proven generator component designs
- Proven design obviate obstruction of stator winding cooling ducts
- Welded junctions prevent circuit ring from corrosion

Technical data					
Frequency	Model	Power factor	Apparent power	Efficiency	Terminal voltage
50 Hz	SGen5-3000W	0.85	675 MVA to 940 MVA	up to 99%	15 kV to 21 kV
60 Hz	SGen6-3000W	0.85	600 MVA to 1,270 MVA	up to 99%	16 kV to 27 kV

Coolant	Hydrogen gas at 4 to 6 bar (gauge) / water cooled stator windings
Design	In accordance with IEC and ANSI Standards and EU Directives
Thermal classification	Class F insulation system
Type of enclosure	IP64 (IEC60034); suitable for outdoor installation
Excitation	Static or brushless
Transport dimensions	Suitable for rail transport in most countries

# The SGen-3000W Series: References

Our SGen-3000W series exceeds an availability of 99% and counts with almost 2 million operating hours which have earned Siemens a flawless reputation in the field of reliable power generation steam and gas turbine applications. Therefore, the following references are only a few examples to illustrate the vast potentials of the SGen-3000W generator series.

	Ulrich Hartmann Combined Cycle Power Plant, Irsching (Bavaria, Germany)	Longview Steam Power Plant, West Virginia (USA)	Waigaoqiao III Steam Power Plant, Shanghai (China)
			
<b>Performance</b>			
Net plant output:	561 MW	695 MW	1000 MW
Commercial operation:	2011	2012	2008
<b>Major components</b>			
Generator:	1x SGen5-3000W	1x SGen6-3000W	1x SGen5-3000W
Steam turbine:	1x SST5-5000	1x SST6-6000	2x SST5-6000
Gas turbine:	1x SGT5-8000H		

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