



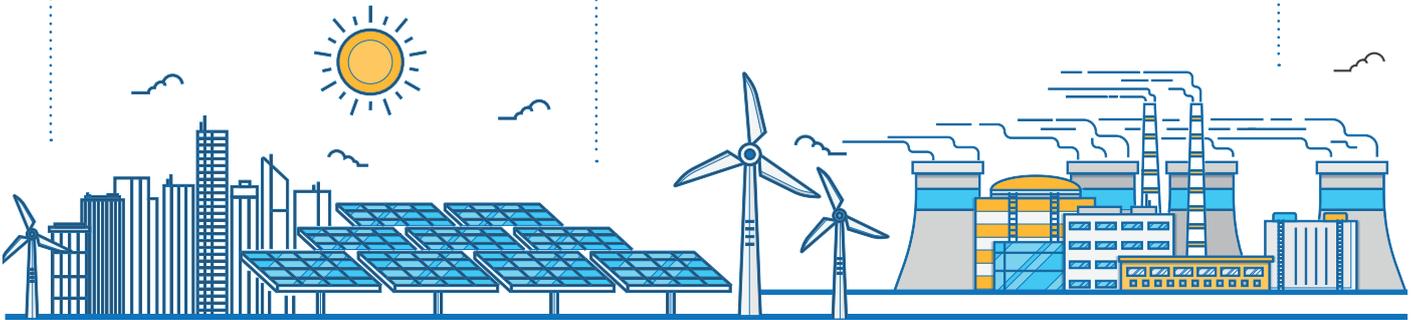
# Rotating Stabilisers

CO<sub>2</sub> free, high-inertia machines to help stabilise weak grids and enable higher penetration of renewable energy.

Growing renewable energy penetration can lead to more disturbances on the grid.

As variable clean power sources continue to be added to the grid, it will be necessary to provide additional stabilisation.

Evaluation of new technologies and applications can ensure both flexibility and grid stability.



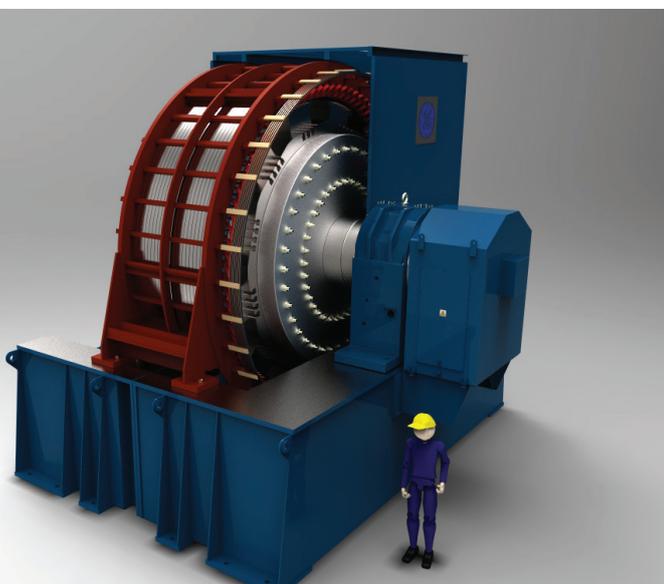
## Ensuring Grid Stability

Fossil fuel-based power generation has been around for decades, and traditionally, the continuous rotating mass of synchronous gas or coal powered generators inherently stabilise grid frequency. The advantage of coal, oil or gas power generation is that while it cannot be turned on or off easily as demand dictates, the rotating turbines and generators have a lot of built-in inertia. This means a long lead time to ramp up and down, even under fault conditions. The result is a more robust grid that makes managing trips or blackouts easier.

However, the increasing use of non-synchronous wind and solar energy is reducing the amount of synchronous generation on the grid and is changing the rules of dispatchable power. This possible

instability could lead to grid operators constraining renewable generation to ensure grid stability or having to run costly coal or gas power plants in reserve.

As the power generation landscape is being reinvented around renewable energy, so are national grid codes that define performance - especially in countries with weaker grid infrastructures - are changing in response to this new power generation mix. These grid codes specify the power quality of electricity that plant and grid technologies must deliver - both in normal operation and under fault conditions - and are now giving rise to a range of creative solutions such as GE's Rotating Stabiliser.



**The global energy mix is changing, with more clean renewable energy sources being added to the grid. The intermittency of renewable energy sources has raised clear challenges to grid integration and its stability.**

Leveraging our vast experience in rotating machine technology, GE's Rotating Stabiliser solution provides a CO<sub>2</sub> free and cost effective solution to replicate the synchronous inertia response provided by traditional thermal power generation.

## Rotating Stabilisers

GE's Rotating Stabilisers are high-inertia rotating machines that can support the grid network in delivering efficient and reliable synchronous inertia and can help stabilise frequency deviations by generating and absorbing reactive power.

Rotating Stabilisers can help reduce emissions and maintain grid performance by providing the same synchronous inertia as coal or gas power plants without the associated CO<sub>2</sub> emissions and high running costs. This flexible technology can be deployed as/when required by the system operator.

GE's Rotating Stabilisers have three operating modes:

- **Synchronous inertia support to the grid** with instantaneous response to change in grid frequency
- **Power factor correction** to provide continuous leading or lagging VARs
- **High power pulse generation** enabling a high-power pulse from a weak power source

## Typical Ratings

	Power (MVar)	Energy (MW-s)	Inertia (Kg-m <sup>2</sup> )	Speed (rpm)	Volts (kV)	Rotor mass (tonnes)	No load losses (kW)
<b>Horizontal Axis Machine</b>	65	450	355000	500	13.8	200	772
<b>Vertical Axis Machine</b>	200	2115	1416000	522	22.9	400	1670
<b>Example Synchronous Condenser</b>	50	75	4965	1500	11	28	355

The above table shows some typical example ratings. Rotating Stabiliser machine can be tailored to suit customer requirements.

## Extended Power Quality Offering

Our wide range of electrification solutions include motors, generators and power electronics-based turbine starting static frequency converters (SFC) and static excitation equipment (SEE), variable speed drive systems for power plant auxiliary systems, MVDC, power quality systems and automation and controls.



## Key Features and Benefits

### EXTENDED SYSTEM SERVICES

- The Rotating Stabiliser can provide several services including Synchronous Inertia Response (SIR), Steady/Dynamic Reactive Power, (SSRP/DRP) and an option for Fast Frequency Response (FFR) with larger converters.
- Supports the network grid when increasing non-synchronous penetration, and with wide scale distributed generation
- Similar grid support capabilities as a CCGT power station
- No grid disturbance with variable speed drive start

### PROVEN TECHNOLOGY

- Based upon mature hydro power generator technology to deliver high reliability and low maintenance

### CO-LOCATED DISTRIBUTED GENERATION

- Improve grid connection agreement and reduce overall costs
- Stability at point of non-synchronous generation
- Voltage support to enable more active power

### WORLDWIDE SERVICES SUPPORT

- Our focus on service keeps us actively engaged, both when things are going right, and when they are going wrong. With a comprehensive global network of experts, GE is positioned to provide the knowledge, experience and skills for your full range of industrial service requirements - helping to protect your assets and maximise productivity.



## About GE Power Conversion

GE's Power Conversion business, a business unit of GE Power, applies the science and systems of power conversion to help drive the electric transformation of the world's energy infrastructure. It does so by making and delivering advanced motor, drive and control technologies that evolve today's industrial processes for a cleaner, more productive future. Serving specialized sectors such as energy, marine, renewables and industry, through customized solutions and advanced technologies, GE Power Conversion partners with customers to maximize efficiency.

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