GE
Grid Solutions

F35-72.5kV GIS

Gas-Insulated Substations For Wind Turbines

Handling more power while reducing energy losses

Governments worldwide promote renewable energies. More and more powerful windfarms are gradually moving into deeper waters, further from shore. F35-72.5kV GIS enables to double the voltage compared with medium voltage technologies. Energy from a wider area can be handled by a single platform using 66 kV AC, and reducing energy losses.

A compact HV substation fitted in the windturbine

A whole F35-72.5 kV gas-insulated substation fits into the most advanced and powerful wind turbines towers.

Withstand to harsh environment

F35-72.5kV GIS is designed to cope with the saline environment, the high shocks and accelerations at every stage from construction, transport, installation and commissioning, and with offshore violent weather.

Short installation time

Full modules are assembled, cabled, tested in factory and transported as ready-to-plug-in components.

Expert condition monitoring system

The BWatch condition monitoring system monitors the gas density and provides with trends to anticipate and plan maintenance operations.

Key Features

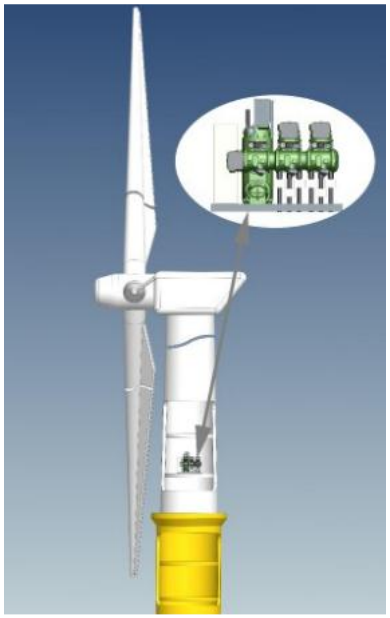
- The HV substation is integrated in the wind turbine tower or in the transition piece
- Easy HV cable connection with T-connector (based on EN50180/EN50181 and future EN 50673) or standard plugin type IEC 62271-209
- Remote operation with digital monitoring and control
- Extensive experience in offshore GIS since 2005

Imagination at work

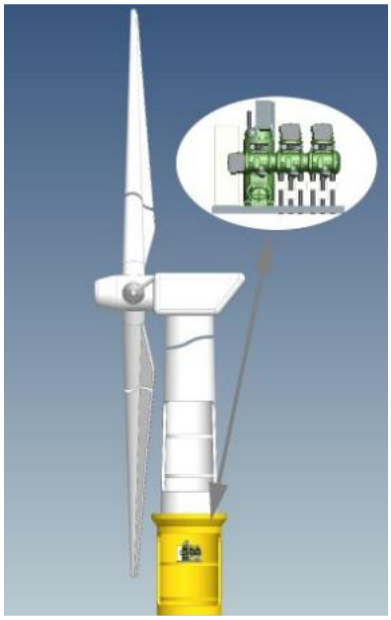
Main Components

- The design is modular and accommodates **all types of configurations or single-line-diagrams.**
- The circuit-breaker **safely interrupts high capacitive current on cables** -a specific feature of wind-farms- with no risk of non-disruptive discharge.
- The system, fitted with disconnecting circuit-breakers and make-proof earthing switches, provides a **high resilience to misoperations**.
- The operation of make-proof earthing switches is secured by capacitive sensors providing a voltage presence indication on the cable entries.
- The three-phase power voltage transformer enables to provide **emergency power supply**.
- **Efficient cable connection** with the latest T-connector design, Type F (based on EN50180/EN50181 and future EN 50673).
- The local control cubicle integrates **all protection and control systems with digital communication**.

Several Implementation Choices



GIS in turbine tower

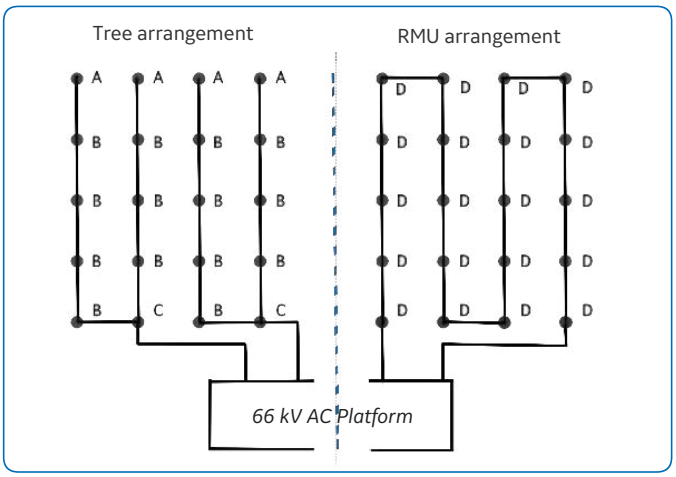


GIS in transition piece

GIS split between tower and transition piece

GE Has Implemented Over 180 Offshore GIS Bays Since 2005

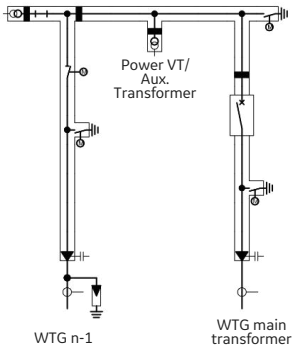
Wind Farms In Tree Arrangement Or In Ring Main Unit Arrangement

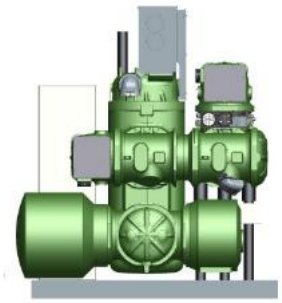


GIS Configurations In Tree Arrangement

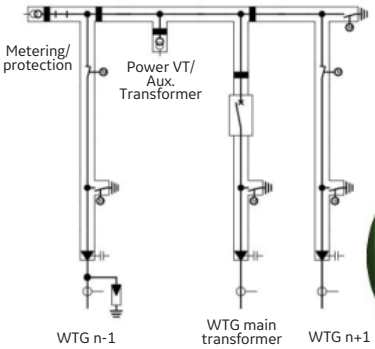
Examples of configurations with power voltage transformer. Other configurations available on request.
Caption for schemes below: WTG means Wind Turbine Generator.

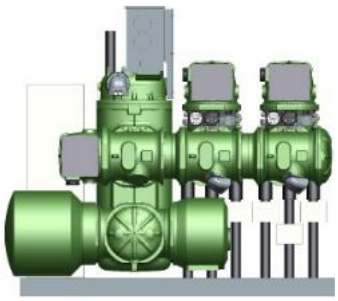
Configuration A – 1 Sea Cable



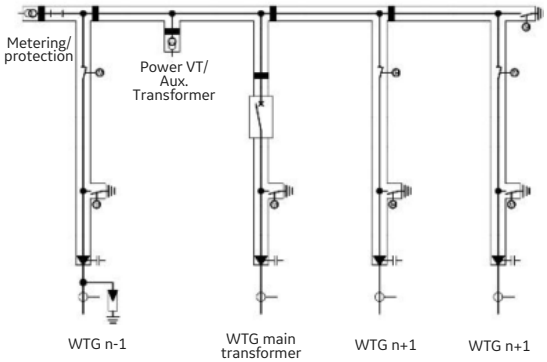


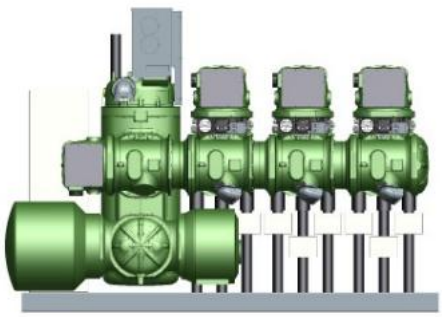
Configuration B – 2 Sea Cables



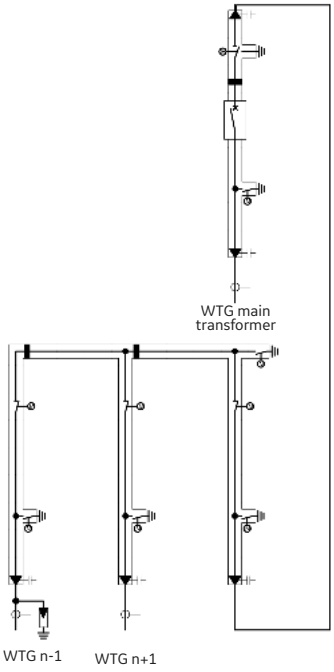


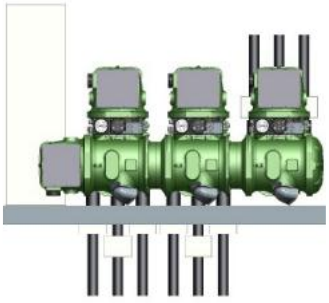
Configuration C – 3 Sea Cables





Configuration "B split"- 2 Sea Cables, GIS Split Between Tower And Transition Piece



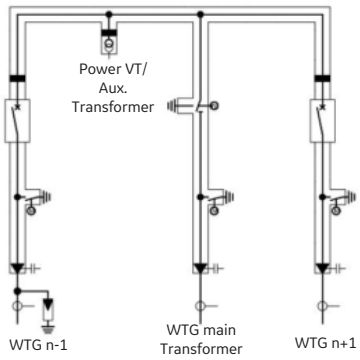


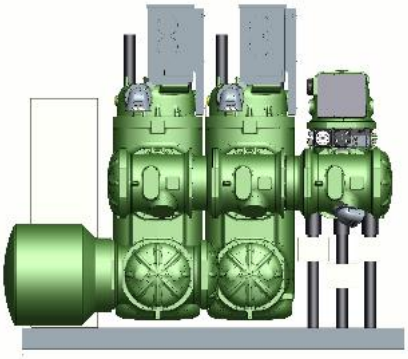
The HV Gas-Insulated Substation fits into the wind turbine.
The wind farm can handle more power while reducing energy losses.

GIS Configuration in Ring Main Unit (RMU) Arrangement

The RMU arrangement provides a higher availability of the network and consequently higher revenues.
It also improves the staff safety during maintenance operations since the modules can be perfectly isolated from the newtork.

Configuration D - RMU





Main Ratings

General Ratings		
Reference electrotechnical standards		IEC / IEEE
Voltage	kV	72.5
Withstand voltages		
Short-duration power-frequency, phase-to-earth / across isolating distance	kV	140 / 160
Lightning impulse, phase-to-earth / across isolating distance	kVp	325 / 375
Frequency	Hz	50 / 60
Continuous current	A	up to 2500
Short-time withstand current	kA	31.5
Peak withstand current	kAp	85
Duration of short-circuit	s	3
Installation		indoor/outdoor
Ambient temperature range	°C	down to -25 / up to +55
Circuit-Breaker Ratings		
First-pole-to-clear factor		1.5
Short-circuit breaking current	kA	31.5
Short-circuit making current	kAp	80 / 82
Operating sequence		O – 0.3 s – CO – 3 min – CO / CO – 15 s – CO
Drive type (three-phase)		pure-spring

For more information please contact
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Imagination at work