



Specification Sheet

GEMS Grid Controller & GEMS Rack

Wärtsilä Energy Storage's **GEMS Grid Controller** conducts intelligent grid control and optimised power management for microgrids of all sizes. It controls a diverse array of energy generation assets—solar, wind, energy storage, thermal—as well as hybrid power plants that combine multiple types of energy resources.

Advantages

Maturity – Developed and refined over decades, GEMS Grid Controller is managing microgrids across the world.

Hardware agnostic – GEMS Grid Controller supports a wide range of devices from major manufacturers of renewables, energy storage, and thermal generation equipment.

Future proof – Built upon a software-as-a-service architecture, GEMS Grid Controller can be extended with additional solutions, new applications, and communication channels to address new business challenges after commissioning.

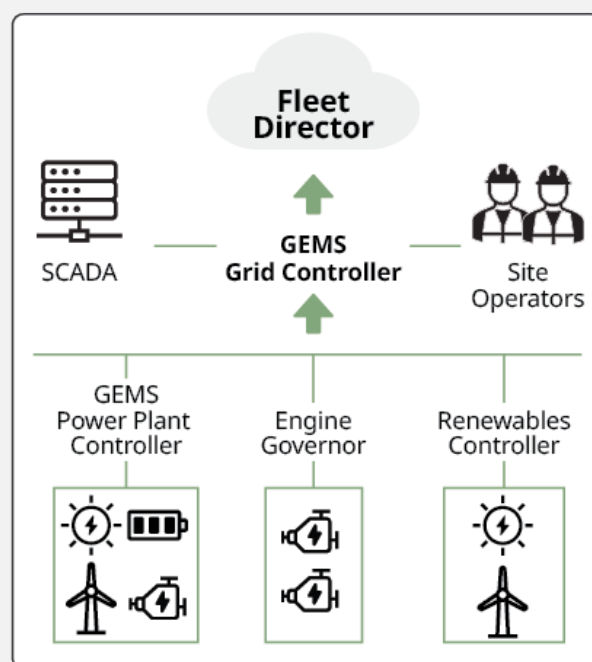
Intelligence – GEMS Grid Controller comes with rich solution libraries encompassing standalone microgrid, grid-tied microgrid, and black-starting operations. GEMS machine learning and rule engine technologies enable intelligent dispatch and forecasting to maximise microgrid performance and reduce fuel and maintenance costs.

Scalability – A single GEMS Grid Controller can support thousands of devices and GWh-scale sites.

Reliability

- Dual controllers, switches, and firewalls in hot standby with failover arrangement
- Remote software update capability via GEMS Fleet Director
- Controller performance monitoring

GEMS Grid Controller Connections



Equipment Support

GEMS Grid Controller is hardware agnostic. Over the years, Wärtsilä has qualified, tested, and integrated many energy generations, power measurement, and grid protection devices from major manufacturers into GEMS Grid Controller via a plug-and-play device driver architecture:

- Battery Management System (BMS) from all major vendors
- Power Conversion System (PCS) from all major vendors
- PV Inverters from all major vendors
- DC Combiners
- Wärtsilä engines
- Third party generators
- Wind farm controllers
- Microturbines
- Protection relays/switchgears
- Power meters
- Battery enclosure and battery balance of plant equipment
- HVACs

Cybersecurity

- GEMS Grid Controller is designed to IEC 62443-4 standards
- GEMS Grid Controller network adheres to the IEC 62443-3 standard
- SSL and IPSec VPN remote access support
- Security patch service available

Historical Data Retention

- Raw report-by-exception data retention: 2 weeks
- 1-minute downsampled data retention: 8 weeks

Customisation and Extension by GEMS Site Builder

- Power plant configuration
- SCADA interface configuration
- Rule Engine configuration
- User interface configuration
- Software version management
- Remote software update

Communication Media

- Ethernet
- Fiber optic
- Serial
- Wireless
- Analog and Digital I/O

Accessibilities

Web-based HMI for local Operator interface access
RESTful Web API and WebSocket Streaming API

- Data stream to GEMS Fleet Director in the cloud
- Support for all major control and data acquisition SCADA protocols including Modbus, DNP3, IEC61850, and OPC UA
- Each interface's data points are fully configurable based on plant composition and functions

Control Latency

<10 ms processing time

Supported Solutions

Island+ in combination with GEMS Grid Controller –
Our AI-based grid dispatch solution manages complex island grids involving hybrid generation solutions with engines, storage, and renewables.

See Wärtsilä solution specification sheets for additional details.

Related GEMS Products

- **Wärtsilä GEMS Power Plant Controller** software for generation asset control, local operation, monitoring, protection and data collection onsite installed in the GEMS Rack. GEMS Power Plant Controller and GEMS Grid Controller can be co-installed in the same GEMS Rack to work in unison.
- **Wärtsilä GEMS Fleet Director** for central fleet management from the cloud.
- **Wärtsilä GEMS Virtual Plant Emulator** for testing, commissioning preparation and training.

See GEMS product specification sheets for additional details.