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Meidensha Corporation

To members of the media

Meiden to market an inverter for storage batteries with Virtual Synchronous Generator Function

Meidensha Corporation (Meiden) plans in fiscal 2023 to commercialize an inverter for storage batteries that has a Virtual Synchronous Generator Function (VSG-PCS). This is aimed at increasing the use of renewable energy.

The product, with a rated capacity of 600kVA, harnesses technology that was jointly developed by Meiden and TEPCO Power Grid, Inc. Meiden will be the first Japanese manufacturer to market a VSG-PCS that uses a grid forming method (GFM), according to a Meiden study.

<Usage>

The device is designed to complement the decline in inertia force^{*1}—essential for the stable operation of an electrical system—which occurs as the ratio of renewable energy increases in the total power sources. It thus contributes to the proliferation of renewable energy.

◆ Stabilizing small-scale power grids in remote islands and other locations

As the ratio of renewable energy sources in the total power sources increases, the inertia force in the power grid declines, compromising its frequency stability. Using this system prevents a situation where there is a lack of inertia force, thus making the energy supply system more robust.

<Background for product development>

Japan is promoting an energy mix that effectively combines power generation methods to attain carbon neutrality. If the ratio of renewable energy sources increases in the power grid, the synchronous generators used in thermal power plants will decrease in terms of relative numbers, resulting in a decline in inertia force in the entire power grid. This will destabilize the electricity system in the event of a disturbance.

To address the problem, Meiden and TEPCO Power Grid have developed a power

conditioning technology to supply inertia force and synchronization force^{*2}, or virtual synchronous generator function. Meiden has already completed the functional verification of a prototype model equipped with this function.

*1: Inertia force: The force to maintain the level of frequency in the power grid. The greater the inertia force, the fewer frequency fluctuations (in range and speed) it is likely to have when there is an uneven balance between the supply and demand of electricity

*2: Synchronization force: The force to recover the original state when there is a disruption to the synchronous state, in which synchronous generators are operated in parallel

<Features of VSG-PCS>

1. Capable of supplying levels of inertia force and synchronization force equivalent to conventional synchronous generators.
2. Adopts the grid forming method (GFM), making it possible for VSG-PCS to act as the sole power supply source in the power grid. It can also be operated in parallel with other voltage sources such as generators.
3. Has a current surge suppression function, making it possible to deal with current surges caused by accidents and other factors in the grid. (Joint patent granted for Meiden and TEPCO Power Grid)

An inverter can endure only a small volume of current surge, so it is necessary to limit the output current in the event of an accident in the power grid. Lower current volume due to an accident has negative impacts in the sensitivity of protective relay installed in the conventional power grid. The VSG-PCS system, however, can supply the maximum current during the time of an accident within the inverter's endurance limit of current surge volume. This minimizes impacts on the sensitivity of the protective relay.

Meiden will help to create a more affluent society by adequately responding to the market needs and by supplying products and systems that can reduce environmental impacts and help to create a low-carbon or decarbonized society.

<Specifications>

Category		Specifications
Capacity		600kVA
Utility frequency insulating transformer in the interconnected grid		Available
Direct current	Maximum allowable voltage	750V
	Operating voltage range	432-745V
Alternating current	Rated output voltage	6,600V (3,300V type is also available)
	Rated output current	52.5A
	Rated frequency	50/60Hz
	Phases	Three-phase, three-wire type

<Reference>

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“Development of Inverters for Energy Storage System with Virtual Synchronous Generator (VSG-PCS)”

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