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Meidensha Corporation

**Meiden completes development of new power conditioning system for lithium ion batteries to help create a decarbonized society and better respond to power demand**

Against the backdrop of increasing use of renewable energy, Meidensha Corporation (Meiden) has developed a power conditioning system (PCS) for lithium-ion batteries that can control the transfer of electricity to and from storage batteries, power grids, and consumer loads. The system was launched on the market in February 2023.



PCS for lithium-ion batteries.

**<Background of PCS development>**

As a manufacturer of PCSs for large storage batteries, Meiden has a long history of operating PCSs in combination with storage batteries made by various manufacturers. Meiden has installed PCSs at approximately 140 sites since 1996. Meiden is capable of handling the entire process of designing, manufacturing and providing maintenance for PCSs.

The increasing use of renewable energy is the key to achieving a decarbonized society, which in Japan depends on the ability to achieve frequency control and maintain a balance of power demand and supply. This is crucial to stabilizing the power grid. In April 2021, Japan introduced the Balancing Market, where general electricity

transmission and distribution utilities adjust power supply and demand. In the market, Tertiary 2 (response time within 45 minutes) became a transaction option to deal with fluctuations in the output of renewable energy in fiscal 2021, and the Tertiary 1 option (response time within 15 minutes) began in fiscal 2022. In addition, the transaction for the Primary option (response time within 10 seconds) is scheduled to start in fiscal 2024. High technological requirements must therefore be met for a power storage system that is designed to balance supply and demand.

The PCS for lithium-ion batteries that Meiden has developed is equipped with functions enabling adaptation to the Balancing Market system while operating in tandem with external systems owned by utilities. The device also has another function that allows the battery to operate independent of the power grid during blackouts -- a feature that helps to realize a business continuity plan (BCP). If more electricity users introduce power storage systems equipped with the PCS in combination with a self-consumption type solar power generation system, realizing a decarbonized society will be facilitated.

#### **<Features of Meiden's PCS for lithium-ion batteries>**

##### **■ Capable of storing and discharging power on external command**

The PCS will store and discharge power based on commands from an external control system when it is used to adjust the supply and demand in the Balancing Market. It will also meet the requirement of the Primary option that a PCS must have an exclusive line of control to store and discharge to respond to fluctuations in the output line of the PCS.

##### **■ One integrated unit comprising the PCS, controller, power receiving component and transformer for other power sources (6.6kV)**

The rated capacity of the PCS is between 700kVA and 2,100kVA. The 6.6kV component for receiving electric power is integrated, making it easier to connect to high-voltage power distribution grids such as power storage stations.

##### **■ Excellent functions for electricity users**

###### **● BCP-related function: Operating independently of the power grid during blackouts**

The PCS is capable of supplying power from the power storage system to facilities used in emergencies, as stipulated in BCPs, even during blackouts caused by trouble and accidents in the power grid. This feature ensures smooth business continuity for electricity users.

###### **● Function to operate on schedule: Load-leveling by EMS (energy**

**management system) for storage battery and management of battery SOC (state of charge)**

The PCS can automatically operate under ordinary conditions, including load-levering operations while managing battery SOC, by setting the storage and discharge patterns with the EMS for storage batteries.

- **Function to store surplus power from solar power generation**

The PCS allows electricity users that install self-consumption type solar power generators to store surplus power during reverse power flow, a phenomenon caused by reduced power demand on weekends and national holidays, etc.

The stored power can be used during peak hours when users are encouraged to cut power usage or during blackouts while continuing their business operations.

- **VSG Function**

Meiden is currently developing a new model of PCS for lithium-ion batteries equipped with a virtual synchronous generator (VSG)\* function, which can help make renewable energy a mainstay power source. This is necessary, as the high ratio of renewable energy as a power source in power grids (at remote islands, microgrids and major power grids) in the future will reduce the number of synchronous generators, such as thermal power generators. This could compromise the stability of the power grid, and even the supply of power. The PCS for power storage equipped with a function of virtual inertia (tendency to continue in its existing state of rest or motion) will complement the actual inertia of the power grid, thereby contributing to stable and flexible power grids.

Meiden plans to equip the VSG function with the PCS in fiscal 2025.

Meiden is dedicated to helping to achieve a more affluent society by providing products and systems that meet the market's need for reducing environmental impacts and promoting a low carbon/decarbonized society.

\*VSG function: Technology to virtually equip inertia, which is a property of synchronous generators. It has been developed jointly by Meiden and TEPCO Power Grid, Inc.