Battery System

Please read the instruction manual carefully before use for safety.

CAUTION

Specifications and appearance may be changed without prior notice for improvements.

Due to printing condition, actual product color can be different from the product image in this catalog.

Trademark

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From Energy Saving to Efficient energy use

In addition to “Energy Saving,” “Efficient Energy Use,” a method to effectively use limited energy, is another approach that is currently being widely embraced. Murata’s FORTELION battery system that enables cost and electricity charge reduction through proper use of electricity and automatic control is a system that contributes to “Efficient Energy Use” which enables long-term use even with high cycle use and instantaneous discharging and charging.

An energy storage system in high demand

It is assumed an energy storage system that grasps weather forecasts and customer electric power usage through technology such as AI, as well as one that performs discharging and charging at timely intervals, will become widespread. This approach would enable a reduction of electricity charges by peak cutting and peak shifting customer electricity demands, selling surplus energy of energy storage as VPP and demand response to the power market, and “Energy Saving” and “Efficient Energy Use” will subsequently become possible.

FORTELION is optimal for these kinds of solutions due to its low level of deterioration in capacity even through repeated discharging and charging.

Murata’s FORTELION Battery system

We make proposals from battery boards to containers based on customer needs.

Covering Various Regions from Power Generation, Power Transmission, Power Distribution, to Demands

- Power Generation
  - Output leveling of renewable energy
- Transmission & Distribution
  - Voltage Support
  - Frequency Adjustment
  - Ancillary Services
  - System Stabilization Measures
- Demand
  - Measures against Instantaneous Voltage Drop
  - Peak Cut / Peak Shift
  - Emergency Load Management
  - BCP Countermeasure

Solar power generation

Short Period Variation adjustment

By instantaneously discharging and charging to level power output that changes depending on the weather, power transmission Rate of change can be suppressed within ±2% / min.

Solar power generation

Supports stable power distribution to remote locations such as isolated islands.

UPS / Back Up

Enables continued and stable power distribution when power failures and instantaneous voltage drops occur due to disasters, and can be used to sustain production equipment and BCP measures. Since FORTELION is highly safe, it is suitable for installation in densely populated areas and indoors.
Secure Support from Installation to Maintenance

The FORTELION battery system largely reduces installation construction periods, and contributes to early discovery of defects and maintenance cost reduction.

**Greatly Reduces the Installation Period and Work Hours**

<table>
<thead>
<tr>
<th>Regular lithium-ion secondary batteries</th>
<th>Battery boards cannot be transported due to safety reasons. On-site insertion work is required.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components are sent by part</td>
<td>On-site insertion and installation</td>
</tr>
<tr>
<td>Adjustment (auxiliary charge)</td>
<td>Completed</td>
</tr>
</tbody>
</table>

| FORTELION                               | Since the highly safe FORTELION is equipped, transportation with the energy storage module inserted to the battery board is possible. |

| Insertion of energy storage modules, auxiliary charging, and other related work are done before shipment. | Only installation work and operability checks are done on site. |

**Construction period reduced by approximately 60%**

Cost savings*

Introduction Examples

**Off-grid (Australia)**
Stable power supply to remote regions
Effective use of solar power and electric generator power

Capacity : 57.6 kWh

**Semiconductor factory (Japan)**
Stable power distribution during occurrences of instantaneous voltage drops
Continuous power distribution during power failures

Capacity : 0.72 kWh

**Function for maintaining the safety and quality of the entire energy storage system**

- The BMU-HUB can be connected to up to 64 BMUs and can be used to monitor 2,048 energy storage modules in real time.
- In addition to cell temperature, cell voltage and charge/discharge current, the condition of each unit and communication between units are also monitored so that abnormalities in the energy storage system can be detected immediately.
- The values predicted for battery capacity deterioration can help us suggest various suitable services or perform predictive maintenance.
- Backup operation of the BMU is possible even in the case of malfunction, and energy storage modules can be replaced without stopping system operation.

Murata product comparison
"FORTELION," a Long-Life and Safe Battery System

Thanks to the stable crystalline structure made possible by employing olivine-type lithium iron phosphate as the cathode material, "FORTELION" is less vulnerable to breakage, less likely to catch fire, even if subjected to a large impact or significant pressure, and maintains a reliable battery performance even under intense workloads.

"FORTELION" is a lithium ion secondary battery with a cathode composed of olivine-type lithium iron phosphate, and has an expected life of 15 years or more with a high level of safety.

"FORTELION" is a word created by combining the Italian word “Forte (strong)” and Li-ion. This name incorporates the meaning of “stronger safety, stronger life, and stronger environmental performance” with compared to typical lithium ion batteries.

High Safety

Thanks to the stable crystalline structure made possible by employing olivine-type lithium iron phosphate as the cathode material, "FORTELION" is less vulnerable to breakage, less likely to catch fire, even if subjected to a large impact or significant pressure, and maintains a reliable battery performance even under intense workloads.

High input / output

6C discharge and 3C charge is possible. This makes these batteries ideal for the instantaneous voltage drop countermeasures and backup power that are important in the event of natural disasters, and applications where power is required such as stabilization of renewable energy.

Cobalt free

The use of cathodes mainly composed of iron poses fewer resource constraints and is environmentally friendly.

Long Life (Calendar)

* Expected life of 15 years or more

Capacity deterioration becomes more gradual over time.

(A film forms on the anode.)

Self-discharge is also extremely low (a few percent per year) compared to lead batteries.

Long Life (Cycle)

The crystalline structure is solid and stable, so capacity deterioration does not accelerate even with repeated charging/discharging.

*70% capacity maintained over 15,000 charge/discharge cycles, DOD100% (room temperature 23°C)

Deterioration does not accelerate even in the float charging condition (the condition when stored with charging voltage applied).

Certification and international standard

First Lithium Ion Secondary Battery in Japan to obtain fire protection certification

First in Japan to obtain the international standard (UL9540A) report

UL 9540A

Energy Storage System acquires World’s First U.S. Safety Standards Certification to ‘UL Subject 1973’ from UL

UL Project: #5277318

UL Project: #5307232

Contribution of SDGs

Murata contributes to realize a safe and highly disaster resistant sustainable society with the long-life and safe "FORTELION."

7. AFFORDABLE AND CLEAN ENERGY

Ensure access to affordable, reliable, sustainable and modern energy

9. INDUSTRIES, INNOVATION AND INFRASTRUCTURE

Build resilient infrastructure, promote sustainable industrialization and foster innovation

11. SUSTAINABLE CITIES AND COMMUNITIES

Make cities inclusive, safe, resilient and sustainable
FORTELIION™ has high safety and long life characteristics
New battery module achieving high output performance

Features

- FORTELIION™ inside
- High safety : High thermal stability
  No thermal runaway
- Long life : 15 years expected life time
- High accuracy life time prediction
- 19 inch rack mountable

Applications

- Equipment for voltage sag / drop
- UPS
- Smoothing of load fluctuation

Industries

- Factory (Semiconductor, chemical, food, etc)
- Hospitals
- Office / commercial building

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# Fortelion Battery Module

## 2.1kWh Battery Module

<table>
<thead>
<tr>
<th>IJ1101M</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Capacity</td>
<td>2.1kWh (42.0Ah)</td>
</tr>
<tr>
<td>Rated Capacity</td>
<td>2.0kWh (39.5Ah)</td>
</tr>
<tr>
<td>Nominal Voltage</td>
<td>51.2V</td>
</tr>
<tr>
<td>Maximum Discharge Current</td>
<td>50A</td>
</tr>
<tr>
<td>Charge Voltage</td>
<td>56.0V</td>
</tr>
<tr>
<td>Maximum Charge Current</td>
<td>40A</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-20°C~45°C (Recommended: Store at room temperature)</td>
</tr>
<tr>
<td>Operating Ambient Temperature</td>
<td>Discharge: -20°C<del>50°C, Charge: 0°C</del>45°C</td>
</tr>
<tr>
<td>Weight</td>
<td>27kg</td>
</tr>
<tr>
<td>Dimensions</td>
<td>W215×H160×D522 (mm)</td>
</tr>
<tr>
<td>Safety Standard</td>
<td>UL1973/FCC Part15/UL9540A report received</td>
</tr>
</tbody>
</table>

## Control Equipment

### BMU (Battery Management Unit)

<table>
<thead>
<tr>
<th>IJ8101C</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Voltage Range</td>
<td>300~1000V</td>
</tr>
<tr>
<td>Operating Current Range</td>
<td>0~100A</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-20°C~65°C (Recommended: Store at room temperature)</td>
</tr>
<tr>
<td>Operating Ambient Temperature</td>
<td>-20°C~50°C (Recommended: Store at room temperature)</td>
</tr>
<tr>
<td>Communication Interface</td>
<td>RS232C/RS485C</td>
</tr>
<tr>
<td>Weight</td>
<td>14kg</td>
</tr>
<tr>
<td>Dimensions</td>
<td>W320×H120×D500 (mm)</td>
</tr>
</tbody>
</table>

*It is certified along with IJ1101M.

*UL 1973 is certified for maximum of 90 A.

### BMU-HUB (BMU's Upper System)

<table>
<thead>
<tr>
<th>IJ1101K</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>DC12V, DC24~60V</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-20°C~65°C (Recommended: Store at room temperature)</td>
</tr>
<tr>
<td>Operating Ambient Temperature</td>
<td>-20°C~60°C (Recommended: Store at room temperature)</td>
</tr>
<tr>
<td>Weight</td>
<td>3.4kg</td>
</tr>
<tr>
<td>Dimensions</td>
<td>W320×H120×D300 (mm)</td>
</tr>
<tr>
<td>Purpose</td>
<td>Interface unit to connect IJ8101C for utility</td>
</tr>
<tr>
<td>Safety Standard</td>
<td>FCC Part15 Class B</td>
</tr>
</tbody>
</table>

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