Precautions for Safe Use

To use the battery safely and properly, be sure to read the instruction manual before use.

⚠️ Danger

- For stationary batteries, ensure that the room is well ventilated so that the hydrogen concentration is 0.8% or less.
- Failure to do so may cause fire or explosion.
- Do not install the battery in a poorly-ventilated area where the hydrogen concentration becomes more than 0.8% or near open flame. Doing so may cause fire or explosion.

⚠️ Caution

- The service temperature range of the battery is from -15 to 45ºC. Using the battery outside this range may accelerate deterioration or cause the battery to freeze or overheat, resulting in damage or deformation.
- Do not use this battery where it is exposed to direct sunlight. Doing so may cause the parts of the battery to deteriorate.
- Do not expose the battery to water or seawater. Doing so may cause damage to the battery or fire, or cause the terminals or connecting plates to corrode.
- Do not use the battery near a heat source. Doing so may cause damage to the battery or cause the battery life to shorten.
- Do not use the battery in dusty areas. Doing so may cause a short-circuit.
- Charge the battery under the charging conditions recommended by Furukawa Battery. Failure to do so may result in insufficient charging, electrolyte leakage, temperature rise, explosion, deterioration in performance, or reduced service life.
- Ensure that the maximum discharge current is not exceeded for more than 1 minute for 3C10A or for more than 5 seconds for 6C10A. Failure to do so may cause damage to the battery.
- Periodically inspect the battery. If the results deviate from the standards specified in the instruction manual, follow the steps in the instruction manual. Using the battery with such deviations may cause damage to the battery, or burnout.

Contact Information

THE FURUKAWA BATTERY CO., LTD.
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240-0008 JAPAN
http://www.furukawadenchi.co.jp/
Furukawa long life battery suitable for cycle use

Furukawa has achieved a space-saving unit configuration with higher durability and longer life that is optimized for cycle use that alternately repeats battery charge and discharge.

** Longer cycle life **
Improved durability and longer cycle life achieved by highly corrosion-resistant alloy used in the positive electrode grid, higher density of active materials and the use of additives which suppress the softening of positive electrodes and active materials.

** Partial charge operation allowed **
Operation under partial state of charge (PSOC) allowed by superior charge acceptance (to conventional lead batteries) achieved by improved conductivity of the negative electrodes by new additives and higher conversion rate of lead sulfate to active materials.

** Multistage loading allowed **
Save installation space
Shorer time for installation
Easier maintenance
(Front placement of battery cell terminals)

Help from Furukawa for cycle use that will be more widely used in the next generation.

Wide cycle use coverage
Natural energy
(PV generation, wind power generation, etc.) systems
Electric power storage systems
(load leveling, peak cut)

Main Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>FCP-500</th>
<th>FCP-1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Voltage</td>
<td>2V</td>
<td>2V</td>
</tr>
<tr>
<td>Capacity (25°C)</td>
<td>0.1C10A discharge, 0.2C10A discharge, 0.4C10A discharge, 0.1C10A discharge, 0.2C10A discharge, 0.4C10A discharge, 0.1C10A discharge, 0.2C10A discharge, 0.4C10A discharge</td>
<td>500Ah</td>
</tr>
<tr>
<td>Capacity (5°C)</td>
<td>0.1C10A discharge, 0.2C10A discharge, 0.4C10A discharge, 0.1C10A discharge, 0.2C10A discharge, 0.4C10A discharge, 0.1C10A discharge, 0.2C10A discharge, 0.4C10A discharge</td>
<td>100Ah</td>
</tr>
<tr>
<td>Mono cell Dimensions (mm)</td>
<td>Height</td>
<td>508</td>
</tr>
<tr>
<td></td>
<td>Width</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>Length</td>
<td>166</td>
</tr>
<tr>
<td>mass (kg)</td>
<td>41</td>
<td>75</td>
</tr>
</tbody>
</table>

Main Performance

**Estimated life at 25°C**
- The Estimated life is not a guaranteed value.
- The total discharge electric quantity and usage period, which vary depending on the operation conditions and other factors, are not guaranteed values.

| Cycle no. (for company’s recommendation condition) | 4200 cycles (DOD 70%) |
| Estimated life | 14 years (100 cycles/year) |
| Above condition | Discharge within 0.25A; charge with multi-step charging or CV+CV |
| Charge Amount | 104% |
| Usage range as PSOC (e.g.) | SOC: 30-90% |
| Control voltage (e.g.) | 1.8V-2.35V/cell |
| Equalizing charge voltage | 2.45V/cell |
| Total discharge electric quantity | 2200Ah |

**Maximum current at continuous operation**
- Charge: 0.2C10A
- Discharge: 0.4C10A

**Operating temperature range**
- Charge: -0°C to 40°C
- Discharge: -45°C to -15°C
- Storage: -40°C to -10°C

※ DOD (Depth of discharge) ※ SOC (State of charge)
FCP-500  multi-unit battery combinations and outer dimensions (example)

<table>
<thead>
<tr>
<th>Combination</th>
<th>Cell (n)</th>
<th>FCP-500-12 unit (n)</th>
<th>Block (n)</th>
<th>Nominal voltage of combined batteries (V)</th>
<th>Weight capacity (Ah / 1018h)</th>
<th>Outer dimensions of combined battery (approx. mm)</th>
<th>Weight of combined battery (approx. kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-stack</td>
<td>36</td>
<td>6</td>
<td>1</td>
<td>72</td>
<td>500</td>
<td>1100 1161</td>
<td>1,710</td>
</tr>
<tr>
<td>5-stack 1 line side-by-side</td>
<td>72</td>
<td>12</td>
<td>2</td>
<td>144</td>
<td>500</td>
<td>1300 1141</td>
<td>3,420</td>
</tr>
<tr>
<td>5-stack 2 line back to back</td>
<td>72</td>
<td>12</td>
<td>2</td>
<td>144</td>
<td>500</td>
<td>1300 1141</td>
<td>3,500</td>
</tr>
</tbody>
</table>

Remarks:
- A block formed by a set of multiple units loaded.
- Standard blocks of ours are the six-stage loading (FCP-500)
  (Earthquake resistance: static horizontal acceleration is 1G or below, and static vertical acceleration is 0.5G or below.)
- External dimensions given in Tables are references for our standard products.
- Total heights do not include the terminals.
- Total heights include the channel base (100 mm)
- Blocks are separated by 250 mm in horizontal installation.
- For customized installation and capacity, contact us.

Diagram of combined multi-unit batteries

FCP-500 4 unit stacks

FCP-1000  multi-unit battery combinations and outer dimensions (example)

<table>
<thead>
<tr>
<th>Combination</th>
<th>Cell (n)</th>
<th>FCP-1000-12 unit (n)</th>
<th>Block (n)</th>
<th>Nominal voltage of combined batteries (V)</th>
<th>Weight capacity (Ah / 1018h)</th>
<th>Outer dimensions of combined battery (approx. mm)</th>
<th>Weight of combined battery (approx. kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-stack</td>
<td>24</td>
<td>4</td>
<td>1</td>
<td>48</td>
<td>500</td>
<td>900 1141</td>
<td>1,150</td>
</tr>
<tr>
<td>5-stack 1 line side-by-side</td>
<td>68</td>
<td>8</td>
<td>2</td>
<td>96</td>
<td>500</td>
<td>900 1141</td>
<td>2,300</td>
</tr>
<tr>
<td>5-stack 2 line back to back</td>
<td>68</td>
<td>8</td>
<td>2</td>
<td>96</td>
<td>500</td>
<td>900 1141</td>
<td>2,380</td>
</tr>
</tbody>
</table>

Remarks:
- A block formed by a set of multiple units loaded.
- Standard blocks of ours are the four-stage loading (FCP-1000)
  (Earthquake resistance: static horizontal acceleration is 1G or below, and static vertical acceleration is 0.5G or below.)
- External dimensions given in Tables are references for our standard products.
- Total heights do not include the terminals.
- Total heights include the channel base (100 mm)
- Blocks are separated by 250 mm in horizontal installation.
- For customized installation and capacity, contact us.

Diagram of combined multi-unit batteries

FCP-1000 4 unit stacks
Main Characteristics

Discharge characteristic (example)
(ambient temperature: 25°C)

Note) Discharge characteristics vary depending on the charging condition and other such factors. This characteristic graph is an example and does not guarantee the characteristics.

Relationship between depth of discharge and life

Note 1) Depth of discharge is the ratio for the 0.23CA capacity. Amount of charge is 104% to 100% of discharge.
Note 2) The battery life, which widely varies depending on the operating temperature, use, and other conditions, is not a guaranteed value.

Multi-step charging characteristic (example)

Multi-step charging condition:
Step 1: 0.2C ≤ A
Step 2: 0.1C ≤ A
Step 3: 0.05C ≤ A (change charging voltage: 2.40 V/cell)
Step 4: 0.02C ≤ A (Voltage is set to 2.45 V/cell; charged up to 104% the discharge volume)
Memo) Discharge before charging: 0.1C ≤ A x 7 h

Note 1) Charge characteristics vary depending on the condition of the battery.
Note 2) This characteristic graph is an example and does not guarantee the characteristics.

Continuous current/voltage charge characteristic (example)

Continuous current/voltage charge condition: Voltage is set to 2.45 V/cell; charged up to 104% the discharge volume with a maximum charge current of 0.1C ≤ A
Memo) Discharge before charging: 0.1C ≤ A x 7 h

Note 1) Charge characteristics vary depending on the condition of the battery.
Note 2) This graph is in case of FCP-1000.