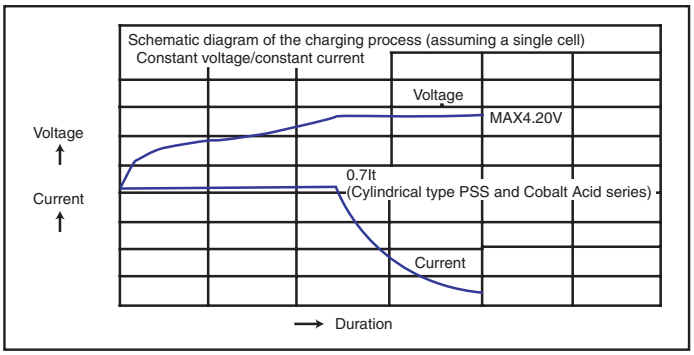
Notes and Precautions

• Safety Precautions for the Lithium Ion Batteries use and Designing Equipment.

In general, lithium ion batteries are used in battery-packs that contain both lithium ion batteries and battery safety circuits. Both items are sealed in a container made of a material such as resin so that the battery-pack cannot be easily disassembled.

1. Charging the Batteries

The “constant voltage/constant current ” method is used to charge lithium ion batteries. (See Figure below)



∗ It(A)=rated capacity(Ah)/1(h)

(1) Charge Voltage

The maximum voltage is 4.2 V x the number of cells connected in series.

(2) Charge Current

We recommend the following current.

NNP series Cylindrical type : 0.7 It (or 0.3 It for certain models) , Prismatic type : 0.7 It

PSS and Cobalt acid series Cylindrical type : 0.7 It , Prismatic type : 1.0 It (or 0.7 It for certain models)

When the voltage per cell is 2.9V or less, charge using a charge current of 0.1It or less.

(contact Panasonic for information regarding pulse charging.)

(3) Charge Temperature

The batteries should be charged at temperatures between 10°C and 45°C.

(4) Reverse-polarity Charging

Verify the polarity of the batteries before charging to insure that they are never charged with the polarity reversed.

2. Discharging the Batteries

(1) Discharge Current

The current should be maintained at 1.0 It or less (contact Panasonic if you plan to discharge the batteries with a current in excess of 1.0 It).

(2) Discharge Temperature

The batteries should be discharged at a temperature between -10°C and +60°C.

(contact Panasonic if you plan to discharge the batteries at temperatures less than -10°C.)

(3) Discharge Termination Voltage

NNP series 2.5V per cell (2.75V per cell in the case of 2 series or more)

PSS and Cobalt acid series 3.0V per cell

Avoid discharging at voltages less than these.

Overdischarge can damage the performance of the battery. Equip the unit with a mechanism to prevent overdischarge, especially in situations where the user may forget to turn the equipment off.

3. Equipment Design

(1) Installing Battery-Packs in the Equipment
To avoid damage to the battery-pack, make sure that the battery-pack is positioned away from heat sources in the equipment or in the battery charger.

(2) Mechanisms to Prevent Dropping
Be sure to use a battery-pack lock mechanism to prevent the battery-pack from being ejected when the equipment is dropped or receives a sudden impact.

(3) Preventing Short Circuits and Reversed Connections
Use a terminal structure that makes it unlikely that the terminals will be shorted by metallic necklaces, clips, hairpins, etc. Structure the battery and the terminals to the battery in such a way that the battery-pack cannot be put in backwards when installed in the charger or the equipment.

(4) Inclusion in Other Equipment
If the battery is built into other equipment, use caution to strictly avoid designing airtight battery compartments.

(5) Terminal Materials in the External Equipment
Use materials that are highly resistant to corrosion (such as nickel or nickel-coated copper). If contact resistance is an issue, we recommend that you use contact plating (such as gold plating) on the terminals.

4. Storing the Batteries

The batteries should be stored at room temperature, charged to about 30 to 50% of capacity.
We recommend that batteries be charged about once per year to prevent overdischarge.

5. Use of the Batteries

See the section on “Safety Precautions”

6. Other

(1) The Chemical Reaction
Because batteries utilize a chemical reaction they are actually considered a chemical product. As such, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.

(2) When exporting the batteries, they are likely to undergo the judgment on classification of strategic products according to the Export Trade Control Ordinance Please contact Panasonic.

7. Please Note

The performance and life expectancy of batteries depends heavily on how the batteries are used. In order to insure safety, be sure to consult with Panasonic in advance regarding battery charging and discharging specifications and equipment structures when designing equipment that includes these batteries.

Panasonic assumes no liability for problems that occur when the Notes and Precautions for use listed above are not followed.