

**Battery Specifications**

**Model:UP-PW1245P1**

**Customer:PIE(PAISEU)**

**Application: Trickle Use**

**[Contents]**

- 1. Specifications for the rechargeable valve regulated lead-acid battery.*
- 2. Drawings.*
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Please return a copy of these specifications to PSBS {Panasonic Storage Battery (Shenyang) Co., Ltd.} with the customer's signature of approval.

Signature for Approval: \_\_\_\_\_ : Date \_\_\_\_\_

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Written by : \_\_\_\_\_ Checked by : \_\_\_\_\_

Zhangaijun : \_\_\_\_\_ Bai Chunyu : \_\_\_\_\_

*Zhangaijun* : \_\_\_\_\_ *Bai Chunyu* : \_\_\_\_\_ *Kuma Yoshifumi* : \_\_\_\_\_



**SPECIFICATIONS FOR THE RECHARGEABLE VALVE REGULATED LEAD-ACID BATTERY**  
**Model No. UP-PW1245P1**

### 1. Scope

These specifications pertain to Panasonic Storage Battery (Shenyang) Co.,Ltd.'s (PSBS`S) Rechargeable Valve Regulated Lead-Acid Battery, type UP-PW1245P1, hereafter referred to as the "battery" . This document only describes the performance of the battery. The price, delivery date and other matters should be dealt with in other mutual agreements.

### 2. Requirements

Voltage, capacity, mass and dimensions for this model are shown in Table1.

**Table 1 requirements**

<b>Model</b>	<b>UP-PW1245P1</b>
<b>Nominal Voltage</b>	<b>12V</b>
<b>Rated Capacity</b>	<b>45W/10 min rate/cell</b>
<b>Mass(approx.)</b>	<b>2.55 Kg</b>
<b>Dimensions</b>	<b>shown in the attached drawing</b>

### 3. Structure

The battery consists mainly of positive plates, negative plates, separators, electrolyte, valves, a container and a cover. The electrolyte is absorbed in both positive/negative plates and separators. Here a container and a cover meet the requirements of UL1778(UL94V-0).

### 4. Characteristics

The following characteristics are for the batteries, which are manufactured within 6 months.

#### 4.1 Capacity

If the battery is discharged at 2.25A to the end voltage of 10.5V per battery after a full charge, followed by standing of one hour at an ambient temperature of  $25 \pm 2^\circ\text{C}$ , the discharge duration time should exceed 170 minutes within the first 3 times of the charge and discharge cycles.

See Table 4 for the characteristic data when the battery is used under the condition of constant wattage load.

**Note:** Values shown in the table are reference data.

#### 4.2 Shelf life characteristics

The duration time should be more than 80 minutes when the battery, which has been stored at an ambient temperature of  $40 \pm 2^\circ\text{C}$  for 4 months, is then stored at an ambient temperature of  $25 \pm 2^\circ\text{C}$  for 24 hours and is then discharged at 2.25A to the end voltage of 10.5V per battery.

#### 4.3 Trickle life

If the battery is fully charged with a constant voltage charger with the controlled voltage of  $13.7 \pm 0.10\text{V}$  at an ambient temperature of  $25 \pm 2^\circ\text{C}$ , and every 3 months the battery is discharged at a constant current of 2.25A to 10.5V at an ambient temperature of  $25 \pm 2^\circ\text{C}$ , the battery shall have a trickle life of over 3 years with a discharge duration of over 1.5 hours.

**Note:** the expected life of the battery shall decrease by one-half with each rise in temperature of  $10^\circ\text{C}$ . In particular, the life of the battery will shorten remarkably at about  $40^\circ\text{C}$ . Therefore careful consideration must be taken not to use the battery at high temperature. Also, as mentioned in 4.3 above, the life of battery will vary depending on the charge/discharge conditions. For example, a non-flat current may shorten the life of the battery. Thus if special

charge and/or discharge methods not described in this specification will be used, please confirm the battery characteristics with the actual application equipment before designing the charger.

As the period of use of VRLA battery becomes longer, the run time of the battery gradually becomes shortened. While the battery reaches the end of life with the shortened run time, such phenomena as gradual decrease of electrolyte and corrosion of the positive grid occur inside of the battery. If the battery of this condition continues to be used, it may suffer from thermal runaway (a vicious circle of increasing charge current and rising temperature) and electrolyte leakage as its capacity reaches 0. We strongly recommend taking proper preventive measures such as replacing batteries before any of these phenomena are found. In addition, if the case is made of metal, please be sure that the battery is insulated against its metal case with acid-and heat-resistant insulating material so that the battery can not touch the metal case directly. If the battery continues to be used without proper replacement, or if it is not insulated properly, it may generate fire. In case you can not replace batteries for some serious reason, please take some other preventive actions such as stopping charging. Please see 'Recommended timing for battery replacement for backup applications' for more detailed information.

#### 4.4 Vibration Resistance Characteristics

Vibration resistance characteristics are tested such that a fully charged battery, being in a right side up position, is subjected to vibrations under the conditions given below. The battery is then checked visually for damage such as deformation or leakage of electrolyte, and checked electronically for existence of a short circuit or the terminal voltage being lower than the nominal voltage.

(1) Direction of vibration	Vertical
(2) Peak to peak Amplitude	4 mm
(3) Vibration Frequency	16.7Hz
(4) Duration of Vibration	Continuously for 1 hour
(5) Ambient temperature	25 ± 2°C

Note: The battery being tested must be firmly fixed on the vibration board.

### 5. Usage Conditions

#### 5.1 Discharge

Discharge current range	0.45A to 27.0A
Temperature range	-15°C to 50°C
Recommended cut-off voltage	Shown in Table 2

Table 2 Recommended cut-off Voltage

Discharge Current	Recommended Cut-off Voltage
Below 1.8A	10.5V
1.8A to 4.5A	10.2V
4.5A to 9.0A	9.90V
9.0A to 18.0A	9.30V
18.0A to 27.0A	8.70V

Do not allow the batteries to discharge below the recommended cut-off voltage.

#### 5.2 Charge

Current limited, constant voltage charge

Initial charge current for trickle use	less than 1.1A
Temperature range	0°C to 40°C
Charge voltage	shown in Table 3

<b>Ambient Temperature</b>	<b>Charge Voltage(a) Trickle Type</b>
0°C	14.00 to 14.20V
25°C	13.60 to 13.80V
40°C	13.30 to 13.50V

**Notes:**

- (a) Charge voltage refers to the voltage remaining at the end of charge.  
 (b) When the initial charging current is bigger than 1.1A, please consult us.

**5.3 Ambient Temperature Range of Storage**

The ambient temperature range of storage shall be -15 to 40°C. But for the short-time (about 0.5month) storage, temperature range shall be -40 to 60°C. Also, for the long-time (about 12 months) storage, temperature range is desirably shall be -15 to 25°C.

**6. Limited Warranty**

(In condition of other detailed contracts on this made with PSBS, please base on that.)

The following limitations apply to PSBS`S warranty:

- (1) The battery is covered by warranty for a period of 1 year from the date of delivery from PSBS if defective materials or production mistakes originating from PSBS are the cause of any battery problem.
  - (2) PSBS will repair or replace batteries which are not conforming to the specification while PSBS is not responsible for the charges of recycle of the nonconforming batteries and installation of new batteries.
  - (3) The warranty does not apply if the problem has been caused by one of the following:
    - (a) The battery has been used for purposes not specified by PSBS; or
    - (b) The battery has been modified in any way.
  - (4) If the cause of the problem is not clear, PSBS reserves the right to investigate the actual application in which the battery was subjected.
- Please keep the next “Precautions in handling the Rechargeable Valve Regulated Lead-Acid Batteries”, to get full performances and operate them safety.
  - Making design especially recycle symbol will be changed by individual country recycle circumstances such as law and/or voluntary. If you intend to export this battery another country, please consult Panasonic sales person.

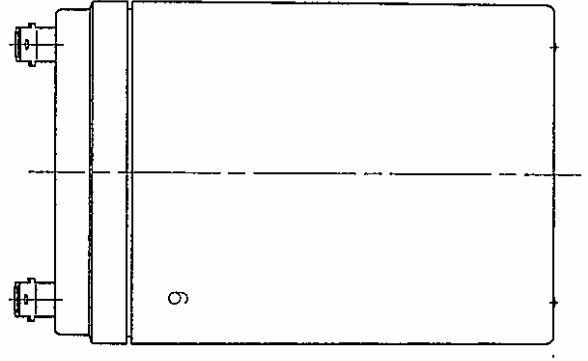
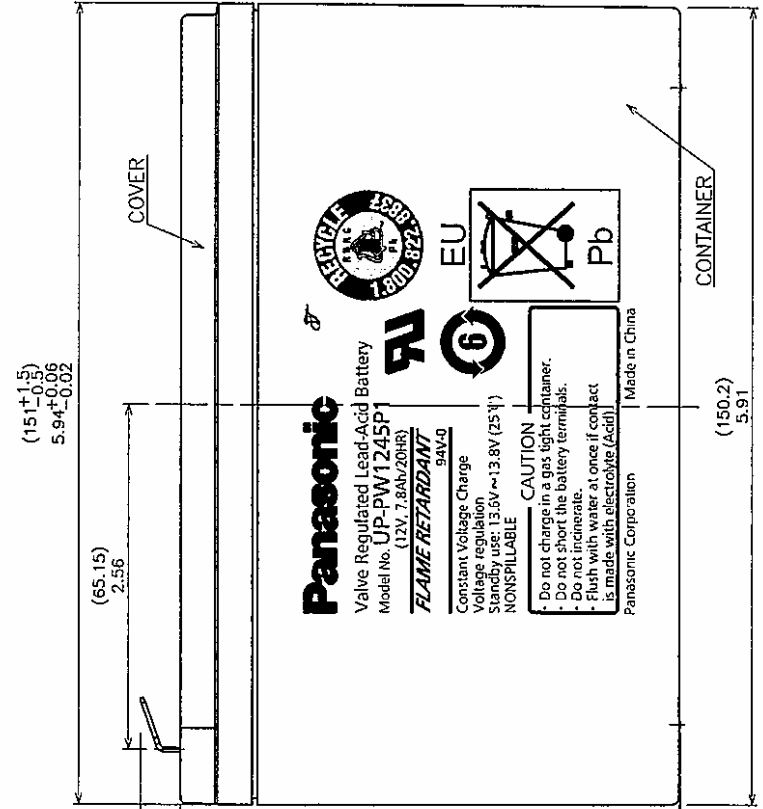
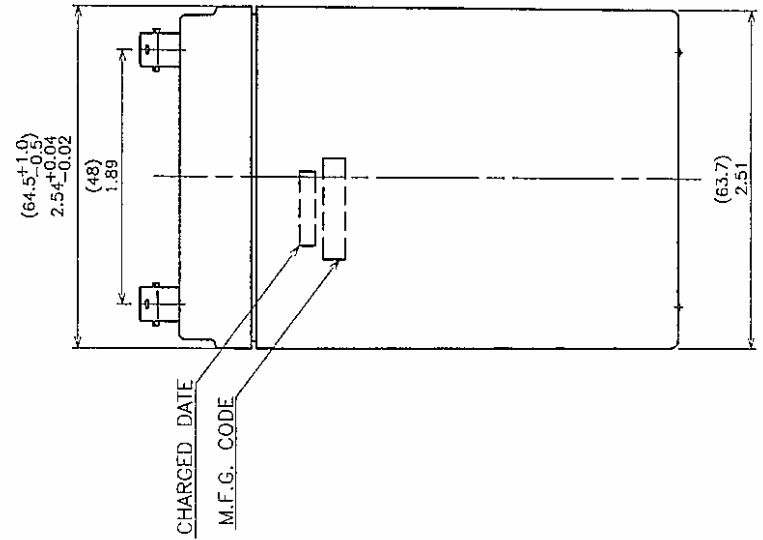
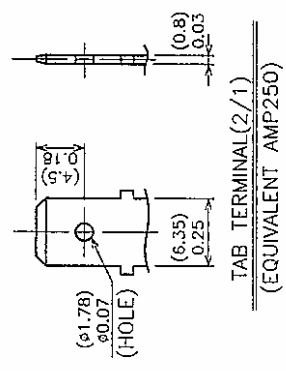
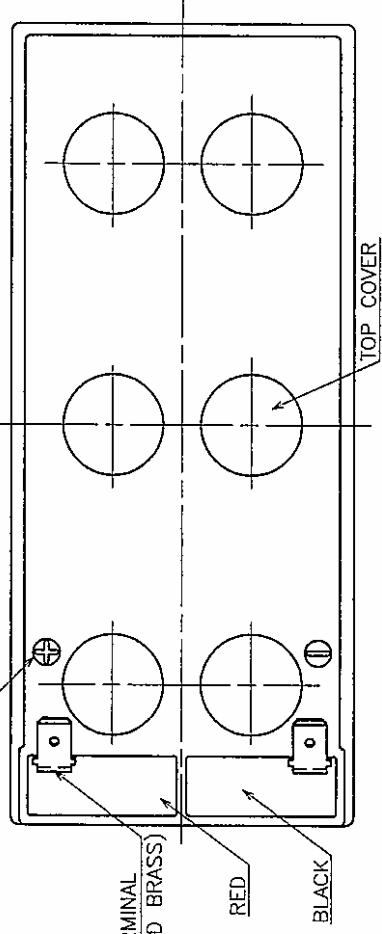
**Table 4 Typical Watt Table for UP-PW1245 at 25°C**

<b>Cut-off V</b>	<b>5min</b>	<b>10min</b>	<b>15min</b>	<b>20min</b>	<b>30min</b>	<b>45min</b>	<b>1h</b>	<b>3h</b>	<b>5h</b>	<b>10h</b>	<b>20h</b>
9.6V	410	268	195	159	112	82.1	65.7	26.0	16.5	8.79	4.76
9.9V	400	263	194	158	112	81.6	65.7	25.9	16.4	8.75	4.75
10.2V	390	258	193	156	111	80.8	64.4	25.6	16.2	8.65	4.73
10.5V	360	246	187	151	110	78.7	63.0	25.7	16.1	8.62	4.72
10.8V	330	234	180	146	109	78.3	61.8	24.7	15.7	8.52	4.69

**Note:** The above characteristics data are average values obtained within three charge/discharge cycles.

The above data are average values, not guaranteed.

Compressed Air		Revision		Signed		Checked	
Tel: 81818181							
Sym:		Date:					






Sym	MSPW1245P1	Item or Code No.	Material & Size	ABS	qtL	Process	Remark
Scale	~	Designed	Drawn	Checked	Approved		
		Wangweili	Wangweili				
		Nov. 17 '14	Nov. 17 '14	Nov. 17 '14	Nov. 17 '14		
		Pan Bai Kuma		UP-PW1245P1			
		Name		OUTWARD DRAWING			
		No.		MSPW1245P1			

Commercial Tolerance	S/n.	Date	Revision	Signatures


FRAGILE


Charged Date Stamp  
(Color:Red) (One Side)

Panasonic®

Valve Regulated Lead-Acid Battery

UP-PW1245P1 

UP-PW1236P1 

Panasonic Corporation  
Made in China





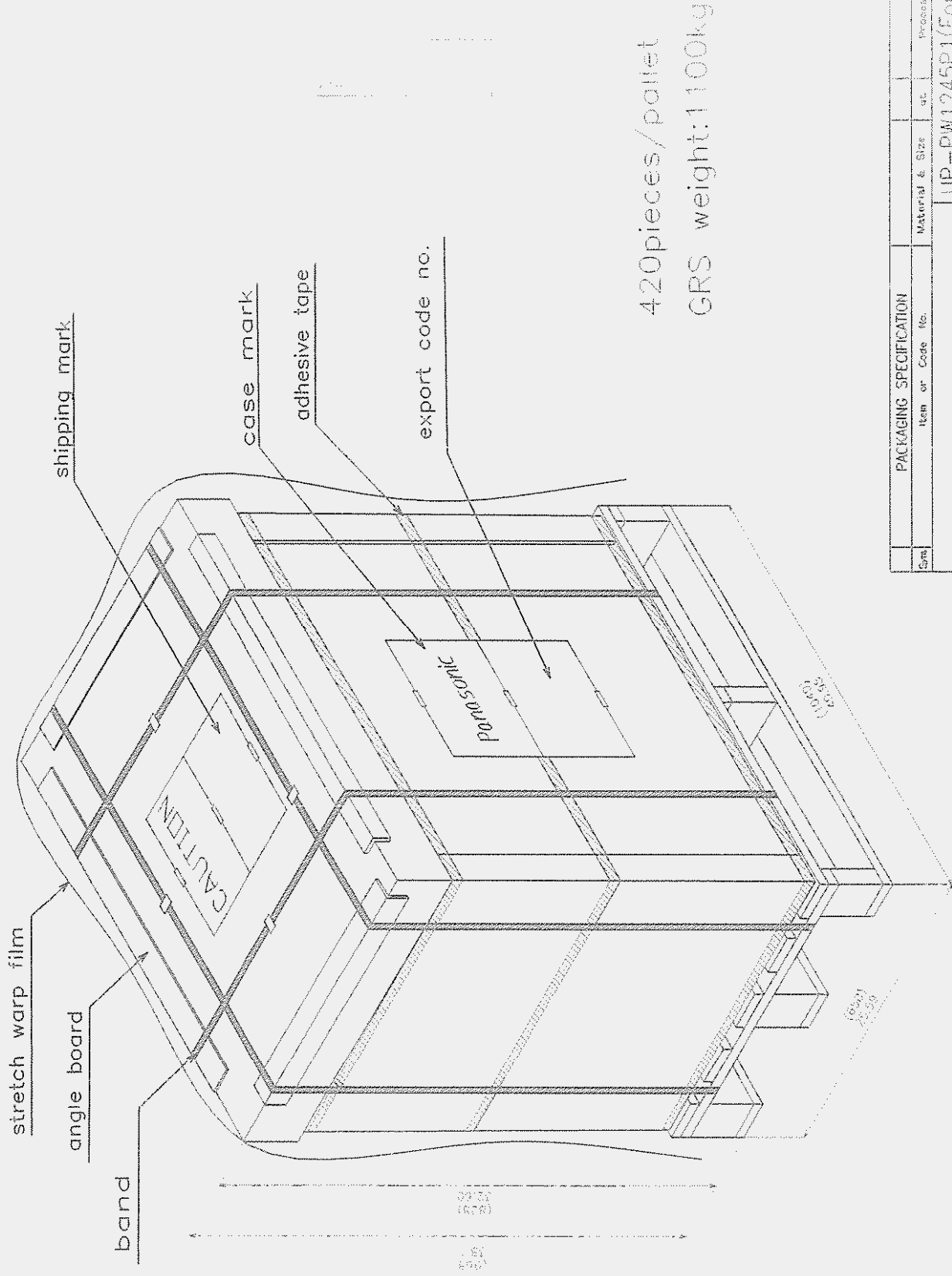
Panasonic®

Valve Regulated Lead-Acid Battery

NONSPILLABLE 420PCS

S/n.	Item or Code No.	Material & Size	Qty.	Process
	OUTER CARTON		1/430	
UP--PW1245P1				
Sub	Designed	Drawn	Checked	Approved
N	Hayaoie	Hayaoie	Jing	CBM
	Feb-21-12	Feb-21-12	Feb-21-12	Feb-21-12
Name		No.		
OUTER CARTON		CR1PW1245P1ZH-E		

Commercial Tolerance	Syn.	Date	Revision	Process



420pieces/pallet  
GRS weight:1100kg

PACKAGING SPECIFICATION		Material & Size		Process	
Syn.	Item or Code No.				
		UP-PW1245P1(For PIE)			
Name		PACKING SPECIFICATION			
No.		PPPW1245PIE-E			
Scale	Designed	Drawn	Checked	Approved	Approved
N	Huyang	Huyang	J109	LBULL	
1:1	18.12.13	18.12.13	18.12.13	18.12.13	18.12.13

## Precautions for handling the Rechargeable Valve Regulated Lead Acid Batteries

This document should be read in its entirety and its content fully understood before handling or using Panasonic rechargeable valve regulated lead-acid batteries. If there are any questions, please contact Panasonic (the address, phone number, and facsimile number are listed below). Please keep this document always available. Due to the potential energy stored in the batteries, improper handling or use of the batteries without understanding this document may result in bodily injury caused by electrolyte leakage, heat generation, or explosion.

\*Panasonic Storage Battery (Shenyang) Co., Ltd.

No.17 Hunhe 20Th Street, Shenyang Economic & Technical Development  
Zone, Shenyang, China (110142)  
Phone: 86-24-25818921 Fax: 86-24-62786201

\*All descriptions are subject to modification without notice.

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### Degree of damage

(1) “Danger”

When the batteries are handled or used improperly, death or severe injury shall occur.

(2) “Warning”

When the batteries are handled or used improperly, death or severe injury may occur, and sight injury or loss of products often occurs.

(3) “Caution”

When the batteries are handled or used improperly, slight injury may occur and damage to the batteries and equipment may occur.

(4) “Request”

When the batteries are handled or used improperly, damage to their quality or performance may occur.

Note (1): Improper handling and use of the batteries may cause dangerous conditions to arise. All precautions should be taken to prevent any harmful effects from the use of the batteries.

Note (2): “Severe injury” as a result of improper handling or use of the batteries may include but are not limited to loss of eyesight, injury/burn/electric shock/fracture of a bone/poisoning with after effect, or injury that requires long-term medical treatment. “Slight injury” covers such conditions as burns or electric shock that do not require long-term medical treatment. Damage to products is defined as extensive damage to a house, a house hold effects, a livestock, or pets.

Note (3): “Requests” are meant to prevent a decrease in the quality or the performance of the batteries.



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  6. Maintenance
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  8. Storage
  9. Disposal and Recycling
  10. Recommended timing for battery replacement for backup applications
  11. The battery of environmental protection using time limit about UPS
  12. The name of venomous and hazardous substances or elements and their contents
- 

## 1. Environments and conditions

### Danger

(1) Do not put the batteries into airtight containers or bags. The batteries tend to generate inflammable gas upon excess charge, which may cause an explosion if enclosed in an airtight container.

### Warning

(1) The batteries must be charged using the specified charger or by maintaining the charging conditions indicated by Panasonic. If the batteries are charged under conditions other than those specified by Panasonic, they may leak, generate excessive heat, or explode.

(2) When using the batteries in medical equipment, incorporate a back-up system other than the main battery in the event of power failure.

(3) Insert insulation that is resistant to heat and sulfuric acid between the batteries and any metallic housing. Failure to do so may cause the batteries to smoke or burn in case of electrolyte leakage.

(4) Do not place the batteries near a device that may generate sparks (such as a switch or fuse) and do not place the batteries close to fire. The batteries may generate an inflammable gas when charged excessively that may ignite upon contact with a spark or they may burn or explode due to sparks or fire.

### Caution

(1) Use or store the batteries in the temperature range specified below:

Discharge (operating an application): 5°F ~122°F (-15°C ~50°C)

Charge: 32°F ~104°F (0°C ~40°C) Storage: 5°F ~104°F (-15°C ~40°C)

Temperatures above or below those recommended could result in damage or deformity of the batteries.

(2) Avoid placing batteries near a heat-generating device (such as a transformer) which may

cause the batteries to generate excessive heat, leak or explode.

(3) Do not allow the batteries to be exposed to rain or seawater. If the battery terminals should get wet, they may corrode.

(4) Do not use or store the batteries in a car under the blazing sun, in direct sunlight. To do so may cause the batteries to leak, generate excessive heat, or explode.

(5) Do not use or store the batteries in a dusty place as dust may cause them to short between their terminals. When using the batteries in a dusty place, check them periodically.

(6) In application requiring more than one battery, first connect the batteries together and then connect the batteries to the charger or the load. Be careful to connect the (+) pole of the batteries to the (+) terminal of either the charger or the load. Improperly connecting the batteries, or load may cause an explosion or fire to occur. In some cases, bodily injury may occur.

(7) When handling the batteries, wear steel-tipped shoes to prevent possible injury to the feet if the batteries are accidentally dropped.

### Request

(1) Dropping a battery may cause a strong physical shock that may damage the performance of the battery.

(2) Confirm the life of the batteries using the real load and charger. Differences in the charging and the discharging conditions may cause a big difference in the life of the batteries.

## 2. Installation

### Danger

(1) Tools such as wrenches used to install the batteries should be insulated. Bare metal tools may cause an abnormal short circuit accident to occur resulting in bodily injury, damage to the batteries, explosion or fire.

(2) Do not install the batteries in a room without ventilation. The batteries tend to generate an inflammable gas upon excess charge resulting in an explosion or fire if the room is closed.

### Warning

(1) Do not contact any plastic or resin (\*) which contains the migrating plasticizer with the batteries. Furthermore, avoid using organic solvents such as thinner, gasoline, lamp oil, benzine and liquid detergent to clean the batteries. The use of any of above materials may cause the containers and/or the covers (ABS resin) of the batteries to crack and leak. There may be possibilities for the batteries to generate fire in the worst case. Need to make sure the use of material will not cause the containers and/or the covers (ABS resin) of the batteries to crack due to the migration of plasticizer within the material by asking the manufacturer of the material if necessary.

(\*) Examples for plastic or resin which should be avoided using;

Vinyl chloride, Oily rubber.

Examples for plastic or resin which is proper for the use;

Polyolefin resin such as polypropylene, polyethylene.

(2) Always use such as rubber gloves when handling batteries with the voltages higher than 45 volts in order to prevent severe bodily injury from occurring.

(3) Do not install the batteries in areas where they may come in contact with water. If the batteries come in contact with water, an electric shock or fire may occur.

### Caution

(1) During unpacking, handle the batteries carefully and check for cracks, breakage, or electrolyte leakage. Failure to handle carefully may result in damage due to physical shock.

(2) When the batteries are being mounted in the equipment, consider the best position for easy checking, maintenance and replace ability. In addition, the batteries should be located in the lowest part of the equipment as possible. The rechargeable Valve Regulated Lead-Acid Batteries, mentioned in this document, are designed for use in any position, but charging the batteries in the upside-down position should be avoided. When these batteries are charged excessively in the upside-down position, leakage of electrolyte from the rubber vents may occur.

The upside-down is shown on the left side of the next drawings. In this upside-down position, the mark “Panasonic” on the battery is turned upside-down. The drawings are only for explanation of the battery’s position; therefore these are not equal to the real appearance of the battery that the specifications describe.

Can be used in the vertical position and the side-down position. (maximum angle of 90 degrees from the normal position).

(3) Do not carry the batteries by picking up them by their terminals or lead wires. To do so may damage the batteries.

(4) Be careful not to jolt the batteries as it may result in damage to them. **Especially under the condition of low temperature, with particular attention to operation**

(5) Be aware the batteries are relatively heavy compared to their volume. Not to be so may cause injury and/or lumbago.

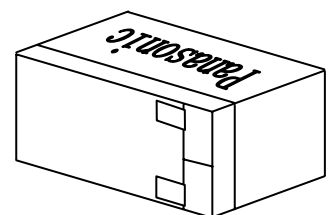
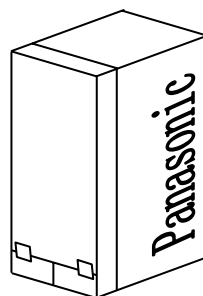
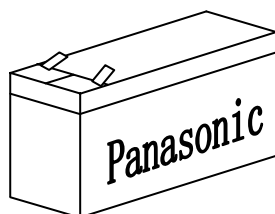
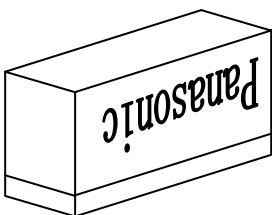
(6) Do not cover the batteries with plastic sheet as it may cause a fire or an explosion by conducting static electricity.

(Upside-down position)

(Normal position)

(Vertical position)

(Side-down position)



(7) Fasten the bolts and the nuts with the torque as shown below: Not to do so may cause the battery terminals to spark and/or break.

Bolt (Nut) Size			Fastening torque
Diameter	Pitch	Length	
M5(5mm)	0.8mm	15±1mm	1.96~2.94N • m
M6(6mm)	1.0mm	20±1mm	3.92~5.39N • m
M8(8mm)	1.25mm	20±1mm	7.84~9.80N • m
M10(10mm)	1.5mm	36±1mm	14.70~19.60N • m

(8) Place the necessary insulating covers over the terminals, the connecting bars, and bolts and nuts to prevent a dangerous electric shock.

(9) Please consult Panasonic prior to using the batteries in applications such as a motor bicycle, an engine driven lawn mower, etc., which may generate severe vibration.

(10) Fasten the batteries firmly to the equipment's to avoid the influence of vibration and/or physical shock. When the total product of equipments of battery installed in public、 normal capacity of batteries and the amount of container is more than 4800amp/cell,sometimes there are regulations in law about the ground structure as installing batteries and management benchmark of battery's equipments and so on.

### Request

(1) A certified technician should install the batteries.

## 3.Preparation prior to operation

### Danger

(1) Be sure to provide enough insulation around the lead wires and/or plates used between the batteries and the application. Insufficient insulation may cause an electric shock heat generating from a short circuit (or excess current) may result in an injury, burn, smoke or fire.

### Caution

(1) Do not plug the batteries directly into the outlet or the cigarette receptacle of a car without inserting a charger between the batteries and the outlet or the receptacle. To do so may cause electrolyte leakage, heat generation, or explosion of the battery.

(2) Turn off the circuit switch when the connections between the batteries and the charger/load are made.

(3) When using the batteries for the first time, check for rust, heat generation, or any other abnormalities. If found, do not use as it may cause electrolyte leakage, heat generation, or explosion.

### Request

(1) Since the batteries tend to lose a part of their capacity due to self-discharge during shipment and storage, recharge the batteries before you use them after purchase or long-term storage in order to restore their full capacity.

As following, there is relation between storage time and temperature without charging batteries:

Below 20°C :9 months

Below 20-30°C :6 months

Below 30-40°C: 3 months

Check for the following conditions before to recharge:

Charge method	Charging condition (at 77°F,25°C)
Constant voltage	<p>*Regulation range of the controlled voltage: 7.25V to 7.45V/6V battery, 14.5V to 14.9V/12V battery; Initial current:0.1CA to 0.4CA; Maximum charging time: 24hours.</p> <p>*Short-time charge is possible when several batteries of the same model, under the same storage conditions can be charged in series. Otherwise they can be charged separately.</p>
Constant current	<p>*Charging current:0.1CA *Charging time (hours) =[Amount of self-discharge (Ah)/0.1CA] X 120% Rough estimation of amount of self-discharge is as follows (for an example): When the storage ambient temperature is lower than 77°F (25°C), and storage time is known, assume the following amount of self-discharge: [5%/month] X storage months Multiply this by the rated capacity (at 20 hours rate) of the battery.</p> <p>*Regardless of the above calculation, the charge time for a refresh charge must be less than 12 hours.</p> <p>*When the storage ambient temperature is higher than 77°F (25°C), please consult Panasonic.</p>

#### 4.Unspecified use

##### Caution

(1) Do not place the batteries in an unspecified use or they may leak, generate heat, or explode.

#### 5.Methods of handle and operation

##### Danger

(1) Do not directly connect the positive and negative terminals with conductive materials such as a wire. Be careful while using a metal tool such as a wrench and/or carrying the batteries with metallic necklaces and hairpins to prevent a short circuit.

A short of the battery's terminals may cause heat generation, explosion or fire.

##### Warning

(1) Never dispose of the batteries in a fire as it may cause them to explode or generate a toxic gas.

(2) Do not attempt to disassemble the batteries as it could cause leakage of sulfuric acid and body injure.

## Caution

- (1) To prevent accidents from happening, change any battery that is found to have an abnormality such as crack, deformity, or leakage. The batteries must be kept clean and free from dust to prevent loss of capacity or accident.
- (2) If any abnormality of the charge voltage or the discharge voltage is detected, replace the batteries with new ones.
- (3) Charging the batteries with an inverse polarity connection between the batteries and the charger could cause electrolyte leakage, heat generation, or a fire.
- (4) Do not solder directly on the batteries' terminal tabs. Soldering directly on the batteries' terminals may cause leakage of electrolyte. Consult Panasonic when soldering is necessary.
- (5) Avoid the use of the batteries differing in capacity, type, or history of use (charge/discharge operation). These differences could cause electrolyte leakage or heat generation.
- (6) Do not remove or scratch the outer tube of the battery or it may cause an electrolyte leakage or electrical leakage.
- (7) Do not allow the batteries to be subjected to any strong physical shocks or jolts while moving them. Treating the batteries roughly could cause leaks, heat generation, or explosion.
- (8) Do not charge the batteries beyond the amount of the time indicated in the specifications, or do not charge after the charge indication lamp indicates a full charge. Take the batteries off the charger if the charge is not finished after the specified charge time. Over-charging can cause leakage, heat generation, or explosions.
- (9) Children should be taught how to handle and use the batteries correctly.
- (10) Keep the batteries out of the reach of small children at all times.

## Request

(1) The cut-off voltage during discharge should vary depending on the discharge current. Do not discharge the batteries lower than the recommended cut-off voltage shown in Panasonic specifications or Panasonic technical handbooks. Recharging a battery which was, once discharged below the recommended cut-off voltage, may generate heat, resulting in the deformation of the battery or in condensation around the battery cover caused when moisture within the battery evaporates. In addition, the efficiency of the battery would eventually decrease.

Over-discharging a battery may result in reduced performance. Always recharge the batteries immediately after discharge even if the batteries were not discharged to the recommended cut-off voltage. If the batteries are not charged soon after discharge, the battery performance may be reduced due to the so-called "sulfation phenomena".

Note: the cut-off devices to prevent over-discharge should cut off all discharge current including any weak current.

- (2) Thoroughly study the charge methods and the conditions of the batteries before adopting other charge methods, which are not shown in the Panasonic specifications or the Panasonic technical handbook, for safety reason
- (3) Measure the total voltage of the batteries during trickle charge (or float charge), using a voltage meter with the accuracy of Class 0.5 (Japan Industrial Standard). If the total voltage of the batteries provide an indication deviating from the specified voltage range, be sure to investigate the cause. If the total voltage is lower than that specified, the batteries may lose their capacity because of a lack of sufficient charge. However, if the total voltage is higher than that specified, the batteries may lose their capacity by damage due to overcharge and

may suffer from “thermal run-away” and other accidents.

(4) Switch off the equipment after use to prevent loss of performance or shortened life of the batteries due to damage over-discharges.

(5) When storing the batteries, be sure to remove them from the equipment or disconnect them from the charger and the load to prevent over-discharge and loss of capacity. Before storing batteries, charge the batteries fully. Do not store batteries in a highly humid place to prevent rust from forming on the terminals.

## 6. Maintenance

### Warning

(1) When cleaning the batteries, use a soft damp cloth. A dry cloth may cause static electricity, which could result in a fire or explosion.

(2) Replace batteries with the new ones before the end of their useful life as determined in the specifications. When the batteries near the end of their life (50% state of their initial discharge duration time) will shorten remarkably. Finally the batteries will lose their available capacity by either drying out their electrolyte (causing increase in their internal resistance) or an internal short circuit. In such case, if the batteries go on charging, thermal runaway and/or leakage of electrolyte may occur. The batteries should be replaced before becoming in these states.

The expected life of the batteries (in trickle or float use) will decrease to half (50%) with each 18°F (10°C) rise in temperature above 77°F (25°C). In particular, the life of the batteries will be shortened remarkably at approximately 104°F (40°C). Accordingly, precautions are required to prevent the use of batteries at high temperatures.

### Caution

(1) Avoid using organic solvents such as thinner, gasoline, lamp oil or benzene and liquid detergent to clean the batteries. These substances may cause the battery containers to crack or leak.

### Request

(1) Keep the battery terminals clean in order to avoid interruption in the discharge and/or to maintain the charge.

## 7. Treatment at emergency

### Warning

(1) The batteries have toxic liquid-dilute sulfuric acid solution in them. If the acid comes into contact with skin or clothes, wash skin or cloth with lots of clean water to prevent scalding from occurring. If the acid should come into contact with the eyes, wash the eyes with lots of clean water and consult a physician immediately to prevent possible loss of sight.

### Caution

(1) Check the batteries visually for any sign of irregularities in appearance. If any damage exists such as cracks, deformation, leakage of electrolyte, or corrosion, the batteries must be replaced with the new ones. Irregularities in the batteries could result in bodily injury, electrolyte leakage, excessive heat generation or explosion, if used. Furthermore, make sure the batteries are clean and free from dirt and dust.

## 8.Storage

## Caution

- (1) Store the batteries in a fixed position separate from metal or other conductive materials.
- (2) Keep the batteries from rainwater that could cause corrosion on the terminals of the batteries.
- (3) Keep the batteries right side up during transportation and do not give any abnormally strong shock and jolt to the batteries. Transporting the batteries in an abnormal position or handling them roughly could destroy the batteries or cause their characteristics to deteriorate.
- (4) When storing the batteries, be sure to remove them from the equipment or disconnect them from the charger and the load, then store them at room temperature or lower temperature. Do not store the batteries at direct sunlight, higher temperature or high humidity atmosphere. To do so cause the batteries short life, performance deterioration or corrosion on terminals.

## Request

- (1) Charge the batteries at least once every six months if they are stored at 77°F (25°C). Use the charge method specified in “3.Preparation prior to use”. The interval of this charge should be reduced to 50% by each 18°F (10°C) rise in temperature above 77°F (25°C).  
The self-discharge rate doubles for each 18°F (10°C) in temperature. If they are stored for a long time in a discharged state, their capacity may not recover even after charge. If the batteries are stored for more than a year at room temperature, the life of the batteries may be shortened.
- (2) Store the batteries starting from the fully charged state to prevent the life of the batteries being shortened.
- (3) Use the batteries as quickly as possible after receiving them as they gradually deteriorate even under proper storage conditions.

## 9. Disposal and Recycling

### Caution

- (1) Please write the information about battery recycling on the equipment, the package, the carton, the instruction manual, etc. in countries where legal or voluntary regulations on battery recycling are applicable.
- (2) Design the equipment such that exchange and disposal of the batteries can be undertaken easily.
- (3) Used batteries should be recycled, when returning used batteries, insulate their terminals using adhesive tape, etc, even used batteries still have electrical charge and an explosion or a fire may occur, if proper insulation is not given on the terminals of the used batteries.

## 10.Recommended timing for battery replacement for backup applications

### Why do I have to replace batteries?

As the period in use becomes longer, the run time gradually becomes shortened. When the runtime becomes shortened and its life comes to an end eventually, deterioration of the battery such as internal short circuit, poor electrolyte and positive grid corrosion results inside of the battery. If the battery continues to be used in this condition, the electrolyte leakage and/or thermal runaway may result in the battery while its capacity reaches 0. Before any of these phenomena is found, preventive measures such as replacing batteries should be taken.



## Without such preventive measures, what will happen?

If no preventive measures are taken, there may be a possibility of the battery to generate fire in the worst case. One of the mechanisms to generate fire is stage 1. positive electrode grid corrosion, 2. damaged on the battery case caused by its own expansion due to the corrosion, 3.electrolyte leakage, 4. generation of fire. Another is 1. positive electrode grid corrosion, 2.internal short-circuits due to the corrosion, 3. arch , 4. generation of fire.

In order to avoid the worst consequences, please make sure that your batteries are properly replaced at regular intervals. In case the battery can not be replaced for some reason, stop charging the battery immediately.

## How can I identify proper replacing intervals for my battery?

Please see the table for the proper intervals in replacing batteries.

Replacing timing differs depending on a temperature of the battery surface. The interval for replacement becomes shortened approximately half as much every time the temperature rises by 10°C (18°F). In identifying the specific replacing time for your specific battery, please refer to the ambient temperature of the battery.

### Intervals of replacement for VRLA battery

Type	Temperature of the battery surface	Recommended interval of replacement
LC-V/UP-V /LC-WTV	25°C	3 years
	30°C	2 years
	40°C	1 year
LC-P/UP-P/ LC-WTP	25°C	6 years
	30°C	4 years
	40°C	2 years
LC-Q	25°C	10 years
	30°C	7 years
	40°C	3.5 years

Note: The temperatures in the table are ambient temperatures of VRLA batteries.

If you keep charging the battery over the years in the table, the battery will lose the capacity and may generate fire. The numbers of the years in the table are different from its guaranteed battery life or expected battery life as an average life assumed through high temperature lab tests.

We recommend early battery replacement for backup operation even before the time show in the table has passed.




In case the battery continues to be used after its proper replacement timing because of negligence, we are not liable for any damaging consequences such as fire and smoke caused by the battery.

Please understand this and take proper preventive actions.

## 11.The battery of environmental protection using time limit about UPS

(1)Environmental protection using time limit is showed in table 3.It differs depending on a temperature of the battery surface, the environmental protection using time limit should be reduced to 50% by each 10°C (18°F) rise in temperature.

table3)

Battery series	Environmental protection using time limit	Mark of environmental protection
LC-V/UP-V	3 years	
LC-P/UP-P	6 years	
LC-Q	10 years	

※Note: The temperature of battery surface is below 25℃。

(2) As its life comes to an end eventually, please disposal them according to national regulations, don't disposal them as you like.

## 12.The name of venomous and hazardous substances or elements and their contents are showed in table 4.

table4)

Name of parts		venomous and hazardous substances or elements					
		(Pb)	(Hg)	(Cd)	(Cr(VI))	(PBB)	(PBDE)
Terminal	Tab terminal	○	○	○	○	○	○
	Pb terminal	×	○	○	○	○	○
Container		○	○	○	○	○	○
Substance inside of battery		×	○	○	○	○	○
<p>○:It means that in all the even material of parts, the content of venomous and hazardous substances are all below the limit to the requirement of quantity in GB/T26572</p> <p>×:It means that at least in one of the even material of parts ,the content of venomous and hazardous substances exceed the limit to the requirement of quantity in GB/T26572.</p>							

※Note: Upwards of 17Ah(20HR)batteries are applied for "Pb terminal"。