

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	$25 \pm 2^{\circ}\text{C}$

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	$-15^{\circ}\text{C}$ to $50^{\circ}\text{C}$
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	$0^{\circ}\text{C}$ to $40^{\circ}\text{C}$

Charge voltage		shown in Table 3
Table 3 Charge Voltage		
Ambient Temperature	Charge Voltage(a)	Trickle Type
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-VW1245 at 25°C**

Cut-off V	5min	10min	15min	20min	30min	45min	1h	3h	5h	10h	20h
9.6V	410	270	195	159	112	82.1	65.7	26.0	16.5	8.79	4.76
9.9V	400	263	194	158	111	81.6	65.1	25.9	16.4	8.75	4.75
10.2V	390	258	193	156	110	80.8	64.4	25.6	16.2	8.65	4.73
10.5V	360	246	187	151	109	78.7	63.0	25.2	16.1	8.62	4.72
10.8V	330	234	180	146	108	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.