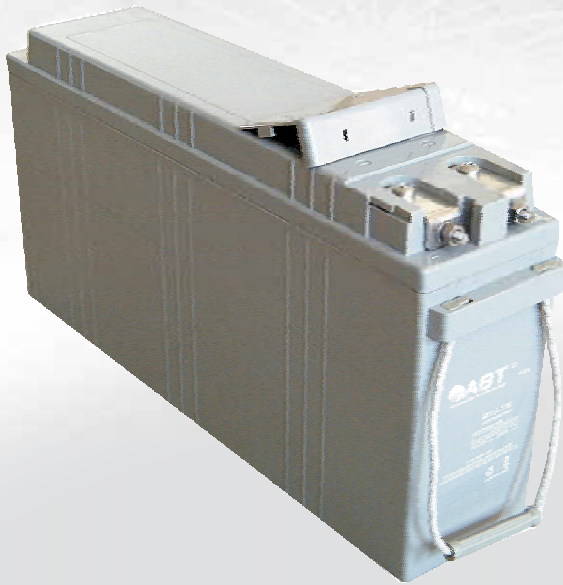




VALVE-REGULATED  
SEALED LEAD  
ACID BATTERY



## **FTJ** Series

High Performance  
Front Terminal Gel Type  
**Product Guide**

Advanced Battery Technology

# Contents

Introduction . . . . .	01
Technical Features . . . . .	01
Certification . . . . .	03
Applications . . . . .	03
Standards . . . . .	03
General Specifications . . . . .	03
Technology . . . . .	04
Performance Data . . . . .	05
Operating Instructions and Guidelines . . . . .	07
Installation, Commissioning and Maintenance . . . . .	09

## Introduction

ABT-FTJ series are VRLA Gel technology front terminal design , with venting gaz pipe and venting collection system placed in the front of battery container, reduction of space, convenient for inspection, maintenance and installation, widely applied in telecommunication, power supply system, emerge storage, UPS and EPS system, etc. This series can be specially applied to international standard footprint 19", 23" rack or cabinet.

## Technical Features

- **Plate**

Based on our research on corrosion level, we improve the technology of grid alloy, and lead paste formula additive ,during manufacturing process the high temperature and high humidity solidify, and increase the content of  $4\text{PbO}\cdot\text{PbSO}_4\cdot\text{H}_2\text{O}$  which improve the binding ability of active substance and grid pasting, avoiding early capacity loss due to barrier layer between active substance and grid paste.

- **External characteristics**

The container is narrow rectangle design, and terminals are cylinder type with copper insert located in the front of the container for convenient installation.  
Reserved central exhaust gas collection system, release the generated gas out of the battery.

- **Structure characteristics**

Narrow rectangle design with  $2 \times 3$  cell structure, plate parallel container, efficient heat dispersion.

- **Gel electrolyte**

Fumed Silica used for Gel electrolyte ensuring even distribution inside battery and no acid stratification.

High electrolyte design ensures a proper internal gel electrolyte filling between plates and separators, and inside containers, give perfect heat dispersion and prevent thermal runaway caused by water loss, and the gel electrolyte protects active materials from shedding.

- **Special separator**

PVC-SiO<sub>2</sub> micro-porous separator ensures low internal resistance, high porosity, intense absorption of gel electrolyte and long cyclic life.

- **Patented relief valve**

Multi-fold vent system, comprised of proprietary gel-specialized low-pressure safety valve with acid filtering and flash arrester, minimizes bulging and prevents flashback explosion from external ignition source.

- **Long service life**

The grid is made of lead-calcium-tin alloy which has effect against corrosion effect, and provide good gas recombination technology.

Low density of gel electrolyte decelerate corrosion of plate grids.

Plates cured by high-temperature and high-moisture process forming long life  $4\text{PbO}\cdot\text{PbSO}_4\cdot\text{H}_2\text{O}$  crystal

- **Deep discharge performance**

With excellent anti-deep discharge performance, the battery can be connected in load after 100% discharge and recover the original capacity after 4 weeks.

Strong recharge recovering ability after battery deep discharge, excellent long cyclic endurance performance.

- **Low self-discharge rate**

Low self-discharge rate, average month rate  $\leq 2\%$ ;

Gel electrolyte with high purity; storage at ambient temperature 20°C for two years, the rest capacity remains more than 50%.

- **Reliable sealing performance**

Patented and time tested integrity terminal sealing of "O" ring, pressing nuts and secondary epoxy resin ensures leakage free operation.

Exceptional gas recombination performance, no acid leakage and gas emission in operation which provide the battery to be installed with equipment and in cabinet.

- **Broad working temperature range**

The operation temperature range is  $-20^{\circ}\text{C}\sim 55^{\circ}\text{C}$ , and the recommended optimal temperature is  $20^{\circ}\text{C}\sim 5^{\circ}\text{C}$ .

Extra electrolyte design ensures it can work in high temperature or over discharge condition, preventing dry up of the battery.

Thickened ABS(FV0 is optional) and cover are shock and vibration resistant, prevents leakage and container deformation



## Applications

- Telecommunication base station, exchange station.
- Dedicated telecommunication station for power system, military station.
- Data transmission and TV signal transmission
- EPS/UPS

## Certification

- CE
- UL
- GOST
- ISO9001
- ISO14001
- OHSAS18001

## Standards

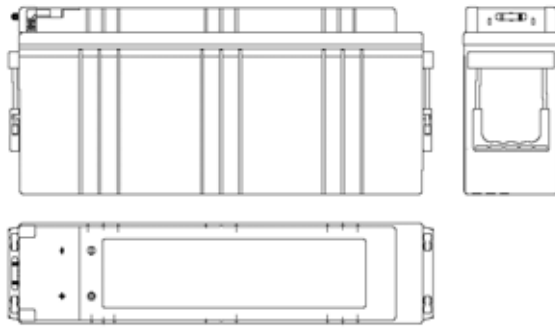
- IEC60896-21/22: 2004
- DIN43539-T5
- YD/T1360-2005

## General Specifications

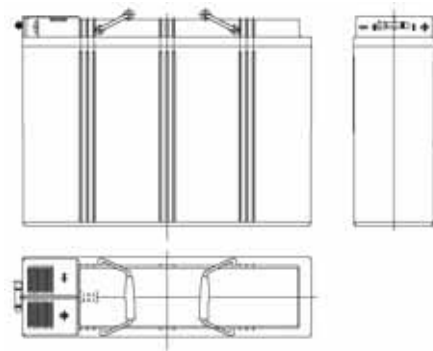
Battery Type	Nominal Voltage (V)	Nominal Capacity C <sub>20</sub> (Ah)	Dimension								Weight		Short circuit current(A)	Internal resistance (mΩ,20°C)	Terminal Type
			Length		Width		Height		Overall Height		Kg	Ibs			
			mm	inch	mm	inch	mm	inch	mm	inch					
6FTJ-100A	12	100	558	21.97	125	4.92	230	9.06	230	9.06	38.5	84.8	2100	4.800	FT-55
6FTJ-100B	12	100	395	15.55	110	4.33	288	11.34	288	11.34	34.5	75.99	2100	5.500	FT-57
6FTJ-125A	12	125	558	21.97	125	4.92	270	10.63	270	10.63	45.7	100.6	2500	4.370	FT-55
6FTJ-150A	12	150	546	21.50	125	4.92	311	12.24	311	12.24	53.7	118.2	3000	4.330	FT-55
6FTJ-150B	12	142	551	21.69	110	4.33	288	11.34	288	11.34	46.7	102.8	2700	4.330	FT-57

**Remarks:** Internal resistance value within the table above is measured with "HIOKI 3551 BATTERY HITESTER" resistance tester for the battery in fully charged state and at ambient temperature 20 ± 5°C.

## Battery structure and terminal layout

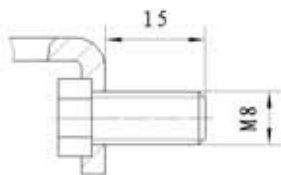


FTJ-A

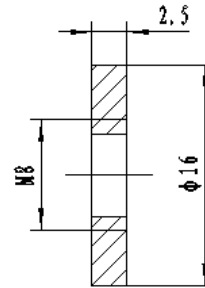


FTJ-B

## Terminals



Terminal FT-55

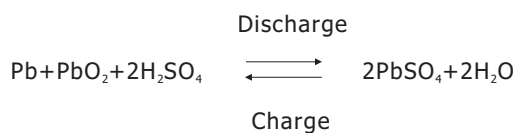


Terminal FT-57

## Technology

### Working and sealing principle

In the charge and discharge process of ABT-GEL battery, it occurs to below reaction in the battery inside



At the later stage of charging or over-charge condition, oxygen would be evolved from positive electrode and hydrogen would be evolved from negative electrode. The negative electrode is made of high pure lead-calcium alloy, which inhibit the hydrogen evolution. The battery apply special gel electrolyte technology, and the gel is with three dimensional net porous structure, and also with some tiny cracks as gas passage. The oxygen from positive electrode get to negative through the special gel and rapidly react with the spongy lead existing on the negative electrode and produce water. This process is called gas recombination and no water loss during it. The battery is sealed in this way and achieve maintenance free.

### Reaction in the process

1.  $\text{H}_2\text{O} \longrightarrow 2\text{H}^+ + 1/2\text{O}_2 + 2\text{e}^-$
2.  $\text{O}_2 + 2\text{H}_2\text{SO}_4 + 2\text{Pb} = 2\text{PbSO}_4 + 2\text{H}_2\text{O}$
3.  $\text{PbSO}_4 + 2\text{H}^+ + 2\text{e}^- \longrightarrow \text{Pb} + \text{H}_2\text{SO}_4$

## Performance Data

## Performance Data

Constant current discharge performance data for FTJ (A, 20°C)

Battery Type	End Voltage (V/cell)	Discharge time(min)													
		5min	10min	15min	20min	30min	45min	1h	1.5h	2h	3h	5h	8h	10h	20h
6FTJ-100A	1.60	271	197.7	153.9	129.1	94.3	73.9	55.0	42.8	32.8	24.0	18.4	11.9	9.5	5.0
	1.65	257	190.7	151.0	127.1	93.4	72.5	54.0	42.2	32.8	24.0	18.0	11.85	9.4	5.0
	1.70	242	180.8	148.0	124.2	92.3	70.3	54.0	41.6	32.8	24.0	17.4	11.83	9.4	5.0
	1.75	224	167.8	143.0	119.2	89.4	68.3	53.0	40.9	32.8	24.0	17.4	11.83	9.3	5.0
	1.80	192	153.0	134.1	111.2	84.4	65.8	52.0	39.7	31.8	23.0	17.0	11.8	9.0	4.8
6FTJ-100B	1.60	268.1	196.2	152.8	128.1	93.4	72.9	54.6	42.1	32.4	25.4	17.9	11.75	9.40	5.00
	1.65	255.2	189.6	149.3	125.5	92.7	70.5	54.2	41.5	32.4	25.3	17.6	11.72	9.35	5.00
	1.70	240.5	178.3	147.2	123.3	90.1	68.5	54.0	41.0	32.4	25.2	17.4	11.7	9.30	5.00
	1.75	221.3	161.4	141.8	117.5	87.9	67.1	52.5	39.7	32.4	25.0	17.1	11.68	9.20	5.00
	1.80	186.1	152.5	132.1	110.4	83.2	64.2	50.0	39.2	31.2	25.0	17.0	11.65	9.20	5.00
6FTJ-125A	1.60	339	247	192	161	118	92.4	68.8	53.5	41.0	30.0	23.0	23.75	11.9	6.3
	1.65	321	238	189	159	117	90.6	67.5	52.8	41.0	30.0	22.5	23.5	11.8	6.3
	1.70	303	226	185	155	115	87.9	67.5	52.0	41.0	30.0	21.8	23.2	11.8	6.3
	1.75	280	210	179	149	112	85.4	66.3	51.1	41.0	30.0	21.8	23.2	11.6	6.25
	1.80	240	191	168	139	106	82.3	65.0	49.6	39.8	28.8	21.3	23	11.3	6.0
6FTJ-150B	1.60	385	281	218	183	133	105	78.0	60.7	46.5	34.0	26.1	17.63	13.5	7.1
	1.65	365	270	215	180	132	103	76.5	59.8	46.5	34.0	25.5	17.52	13.3	7.1
	1.70	343	256	210	176	130	99.2	76.5	59.0	46.5	34.0	24.7	17.35	13.3	7.1
	1.75	318	238	203	169	127	96.4	75.1	58.0	46.5	34.0	24.7	17.15	13.2	7.1
	1.80	272	217	190	158	120	93.3	73.7	56.3	45.1	32.6	24.1	17.00	12.8	6.8
6FTJ-150A	1.60	407	297	231	194	141	111	82.5	64.2	49.2	36.0	27.6	17.8	14.3	7.5
	1.65	386	286	227	191	140	109	81.0	63.3	49.2	36.0	27.0	17.5	14.1	7.5
	1.70	363	271	222	186	138	105	81.0	62.4	49.2	36.0	26.1	17.2	14.1	7.5
	1.75	336	252	215	179	134	102	79.5	61.4	49.2	36.0	26.1	17.2	14.0	7.5
	1.80	288	230	201	167	127	98.7	78.0	59.6	47.7	34.5	25.5	17.0	13.5	7.2

# Performance Data

Constant power Discharge performance data for FTJ (W/cell, 20°C)

Battery Type	End Voltage (V/cell)	Discharge time(min)													
		5min	10min	15min	20min	30min	45min	1h	1.5h	2h	3h	5h	8h	10h	20h
6FTJ-100A	1.60	479	359	281	236	177	133	102	79.1	61.9	44.9	30.4	23.02	18.1	9.6
	1.65	445	345	275	233	175	132	100	78.5	61.9	44.9	30.4	22.84	17.8	9.6
	1.70	407	326	266	229	173	130	100	77.7	61.9	44.9	30.4	22.84	17.8	9.6
	1.75	375	302	258	220	169	127	98.1	77.0	61.9	44.9	30.4	22.78	17.7	9.6
	1.80	349	276	246	206	161	123	96.7	75.2	60.3	43.7	28.8	21.9	17.3	9.4
6FTJ-100B	1.60	475.2	354.1	279.2	234.8	175.3	132.8	100.8	78.7	61.5	44.5	30.3	22.92	18.0	9.50
	1.65	441.5	340.2	272.4	231.6	174.7	130.2	99.5	78.3	61.2	44.3	30.1	22.72	17.8	9.50
	1.70	405.0	321.7	263.7	224.8	172.3	129.0	99.0	77.0	61.0	44.0	30.0	22.62	17.7	9.50
	1.75	372.6	300.2	254.3	218.5	167.2	126.4	97.5	76.0	60.8	43.9	29.8	22.42	17.5	9.50
	1.80	345.1	272.4	243.1	205.4	160.6	120.8	96.9	74.8	60.3	43.5	28.5	21.66	17.1	9.30
6FTJ-125A	1.60	599	449	351	295	221	166	128	98.9	77.4	56.1	38.0	28.76	22.6	12.0
	1.65	556	431	344	291	219	165	125	98.1	77.4	56.1	38.0	28.58	22.3	12.0
	1.70	509	408	333	286	216	163	125	97.1	77.4	56.1	38.0	28.58	22.3	12.0
	1.75	469	378	323	275	211	159	123	96.3	77.4	56.1	38.0	28.46	22.1	12.0
	1.80	436	345	308	258	201	154	121	94.0	75.4	54.6	36.0	27.36	21.6	11.8
6FTJ-150B	1.60	679	509	399	335	251	189	145	112	87.8	63.7	43.1	32.66	25.7	13.6
	1.65	631	490	390	331	249	187	142	112	87.8	63.7	43.1	32.36	25.2	13.6
	1.70	577	462	377	325	246	184	142	111	87.8	63.7	43.1	32.36	25.2	13.6
	1.75	532	428	366	312	240	180	139	110	87.8	63.7	43.1	32.3	25.1	13.6
	1.80	495	391	349	292	229	175	137	107	85.5	62.0	40.8	31.08	24.6	13.3
6FTJ-150A	1.60	719	539	422	354	266	200	153	119	92.9	67.4	45.6	34.56	27.2	14.4
	1.65	668	518	413	350	263	198	150	118	92.9	67.4	45.6	34.26	26.7	14.4
	1.70	611	489	399	344	260	195	150	117	92.9	67.4	45.6	34.26	26.7	14.4
	1.75	563	453	387	330	254	191	147	116	92.9	67.4	45.6	34.2	26.6	14.4
	1.80	524	414	369	309	242	185	145	113	90.5	65.6	43.2	32.88	26.0	14.1

# Operating Instructions and Guidelines

## 1 Discharge

End voltage with different discharge rate must be less than the specified value. Charge the battery as soon as possible after discharge.

In order to extend the service life, the depth of discharge should be less than 50% of the rated capacity. The discharge over 50%DOD is deep discharge and would shorten the service life.

## 2 Temperature

The operation temperature range is -20°C --55°C . All the performance data is measured at ambient temperature of 20°C . The optimal temperature is 20°C 5°C , extreme high temperature would shorten the service life and very low temperature would lower the capacity available. The highest acceptable temperature is 55°C .

## 3 Floating charge and Equalization Charge

**3.1** Floating charging operation is optimal for gel battery, battery has been in full charge ensuring battery maximum service life. The recommended battery floating charge voltage is 2.23~2.27 volts/cell at 20°C . The recharge time is about 24 to 36 hour.

Floating charge voltage shall be adjusted according to the ambient temperature, and temperature compensate coefficient for battery is -3.5mV/ °C / cell, the specifications is expressed by the following table.

Table Floating charge at different temperature

Ambient temperature(°C )	Floating charge(V/cell)
0	2. 33
10	2. 29
20	2. 25
25	2. 23
30	2. 22
35	2. 20

**3.2** The batteries need an equalization charge or supplemental charge in the following conditions:

- Supplemental charge battery after the installation of battery system and before the operation.
- The batteries are on shelf for six months.
- Floating operation for a long time or not discharge 40% C<sub>20</sub> plus, the batteries need an equalization charge regularly and the equalizing charge cycle are 6 months to one year.

We recommend the below method for equalizing charge or supplemental charge:

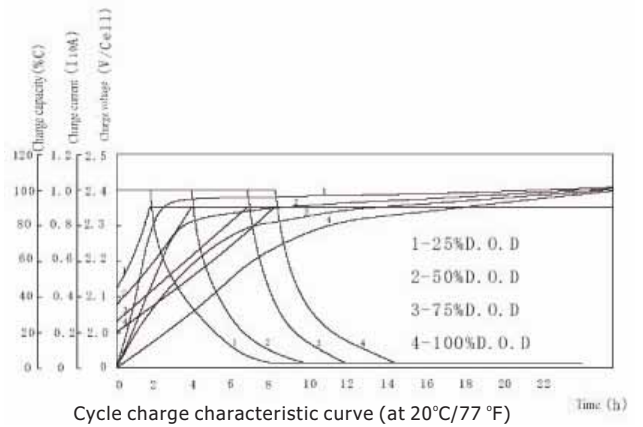
Charge with 2.35 Vpc and limited current 0.15C<sub>20</sub>(A) for 8 to 12 hours (non continuous charging is allowed).

Charge voltage shall be adjusted according to the ambient temperature, and temperature compensate coefficient for battery is -3.5mV/ °C / cell, the specifications is expressed by the following table.

Table Equalizing voltage at different temperature

Ambient temperature(°C )	Equalizing charge(V/cell)
0	2. 45
10	2. 39
20	2. 35
25	2. 33
30	2. 31
35	2. 30
40	2.29

## 4 Cycle charge characteristic



FTJ	30%DOD	50%DOD	60%DOD	70%DOD	80%DOD	100%DOD
C <sub>10</sub>	1000	400	350	300	250	200
C <sub>20</sub>	850	360	310	270	220	170
C <sub>50</sub>	600	320	260	220	180	140
C <sub>100</sub>	400	280	220	180	140	100
C <sub>120</sub>	350	220	180	140	100	70

Cycle times at different DOD and different discharge rate

## Operating Instructions and Guidelines

### 5 Recharge

Battery should be recharged in time after discharge, the recommended charge methods are:

Charge the battery with constant current of less than  $0.2C_{20}$  (A) until the battery boost voltage reach  $2.33\sim 2.37Vpc$ , then charge battery with the constant voltage  $2.33\sim 2.37Vpc$  until the end of charge. Charge voltage shall be adjusted along with ambient temperature, the temperature compensate coefficient for battery is  $-3.5mV/^{\circ}C$  / cell.

Whether the batteries are fully charged can be decided according to any one of two standards as follows:

- Different discharge depth. Sufficient charging time varies according to the different discharge depth. Please note from the table below.
- Under constant voltage charge condition, the charge current value maintains the same during the last three hour when the battery reaches the final stage of charging.

Table charge time with different DOD

Discharge depth (%)	Constant current (A)	Time for constant voltage converting to constant voltage (h)	Constant voltage (V/cell)	Charging time (h)
20	$0.1C_{20}$	1.6	2.35	8
	$0.15C_{20}$	1.2	2.35	6
50	$0.1C_{20}$	4.3	2.35	14
	$0.15C_{20}$	3.3	2.35	12
80	$0.1C_{20}$	6.8	2.35	16
	$0.15C_{20}$	5.5	2.35	14
100	$0.1C_{20}$	8.7	2.35	18
	$0.15C_{20}$	6.8	2.35	16

### 6 Storage

GEL batteries should be stored in a dry, clean, and ventilated location. Since the batteries are fully charged, the recommended storage time is as follows:

- 6 months at ambient temperature no warmer than  $68^{\circ}F$  ( $20^{\circ}C$ )
- 3 months at  $86^{\circ}F$  ( $30^{\circ}C$ )
- 6 weeks at  $104^{\circ}F$  ( $40^{\circ}C$ )

The state of charge can be decided by the testing result of open circuit voltage after storage for 24 hours at  $20\pm 5^{\circ}C$ .

Table open circuit voltage

State of charge	Voltage(V/cell)
100%	$\geq 2.18$
80%	$\geq 2.16$
60%	$\geq 2.12$
40%	$\geq 2.10$
20%	$\geq 2.06$

The battery supplemental charge method during the storage is: charge battery with  $2.37V/cell$  for 8 to 12 hours.

It is necessary to limit the current, and the optimum limiting value is  $0.2C_{20}$  (A).

Testing of the open circuit with the storage battery can decide whether it shall be supplemental charged. If the voltage drops to  $2.10Vpc$ , the battery shall be supplemental charged in time.

Improper maintenance will shorten the battery service life or decrease the service performance.

## Installation, Commissioning and Maintenance

### Installation

The foundation shall be strong enough to back up load.

Batteries integrated in equipment should be compliance with the installation instructions, separately installed on rack and cabinets should be connected by bolts to the foundation.

Battery racks or cabinets should be properly installed according to instructions.

### Connecting

Before connecting, make a overall check of all the batteries and connectors to see whether there is hardware damage or manufacturing defects in order to guarantee the polarity are correct.

The charge equipments are in cut-off state and without loads, then connect the positive and negative terminals to chargers.

During the installation and transit of the battery, use insulated tools, gloves, aprons and safety glasses; do not touch connecting terminals and safety valve in transit.

Placing tools and conductive articles on the battery is strictly prohibited.

Maintain the connecting terminals clean and tighten the connectors as per required torque value.

### Commissioning

Assure battery operation in the clean environment.

At 20°C , charge the battery with 2.23~2.27Vpc for 16 to 24 hours, or with 2.33~2.37Vpc for 8 to 12 hours; charge voltage should be adjusted according to the ambient temperature.

### Maintenance

Monthly maintenance:

- Measure and record the ambient temperature of the battery room, battery container and terminals.
- Check container, lid and terminal surface defects and temperature of each battery.
- Measure and record the total voltage and floating current of the battery system.
- Correct problems once found.

Quarterly Maintenance:

- Repeat every item of monthly inspection.
- Measure and record floating voltage of every on-line battery.

Annually Maintenance:

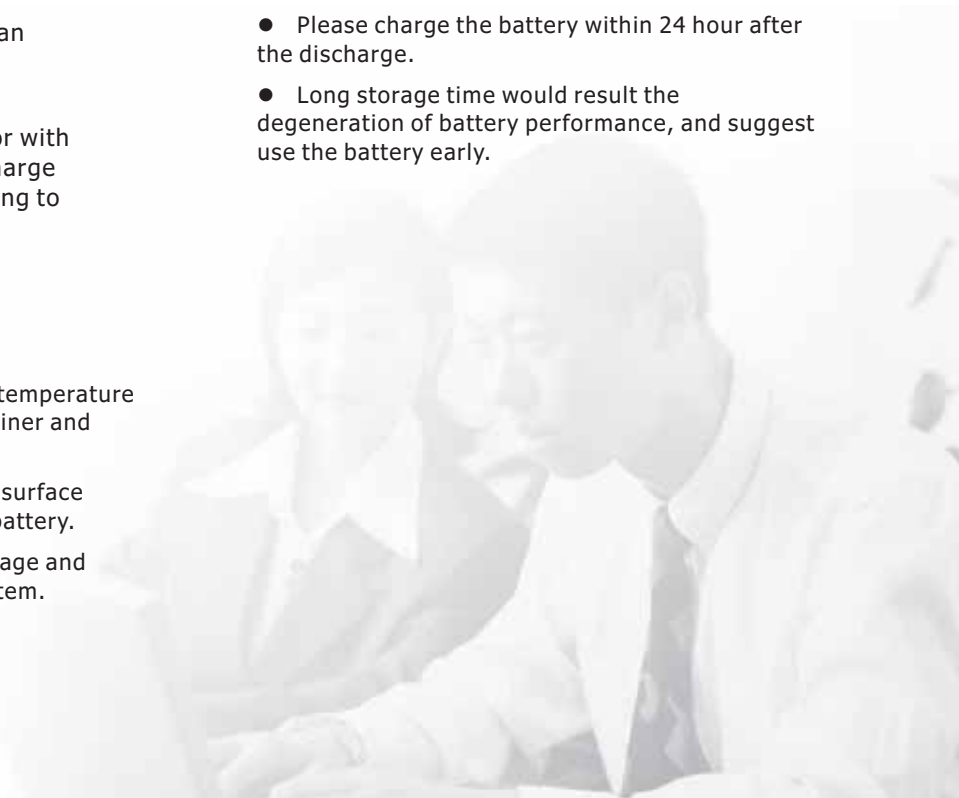
- Repeat quarterly maintenance and inspection.
- Check whether the connectors are loose or not.
- Check whether the safety valve is tight or not.
- Perform a discharge test to check the exact load every year and discharge 30~40% of the rated capacity.

Three-year Maintenance:

Carry out a capacity test( $C_{20}$ ) every three years and every year after six years' of operation. If the capacity of the battery is lower than 60% of the rated capacity, the battery should be replaced.

### Security Instruction

- Only professionals shall be allowed to open and maintain the battery with insulated tools; Any metal objects to be put on top of the battery shall be strictly prohibited.
- The battery should be stored and installed upright; upright down or on one side is prohibited.
- Please do not use any organic solvent to clean batteries.
- Please do not smoke or set out fire near batteries.
- Please do not remove the relief valve or put anything into the battery.
- Please charge the battery within 24 hour after the discharge.
- Long storage time would result the degeneration of battery performance, and suggest use the battery early.



ABT VRLA Battery:

**PowerLine/Thunder/Enduro/Sunwind/e-Trek/Gel**

## **ABT World Wide**

Our sales growth is due to a complete Global Network with Master distributors and Country managers who apply ABT commercial strategy and through Global Key Account.



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