

Technology

Range of Qiangjun lead acid battery

1. RANGE OF QIANGJUN LEAD ACID BATTERY

1.1 GENERAL APPLICATION

Micro series

Micro series is rated at 20-hour discharge rate and has designed lifetime of 3-5 years. FM models are suitable for a wide range of general application, such as security, UPS emergency lightings.

Medium Macro series

Medium series (12V) and Macro (2V) are rated at 10-hour discharge rate and has long designed lifetime of 5-10 years in standby use. GFM models are suitable for much powerful applications, such as big UPS, telecommunication system, solar and wind energy system.

1.2 SPECIAL APPLICATION

High-rate Series

FMH series is high performance battery, specially designed for applications requiring high rate discharge and offers much improved power densities up to 50% more watts per kilo than general FM models when operated at the 10 minutes discharge rate.

Deep-cycle series

FMC series is specifically designed to suit the arduous requirements of cyclic applications allowing increased cycle life (at least double the cyclic life of general type)

Long-life series

CSM series is designed mainly for UPS and other applications with 8-year float life.

Gel series

GEL series is a hybrid battery with the combination of AGM and GEL technology, which has much better performance than ordinary AGM battery. Please contact us for more details.

2. Description of Qiangjun sealed lead acid battery

2 DESCRIPTION OF QIANGJUN SEALED LEAD ACID BATTERY

2.1 BATTERY PROPERTIES

QIANGJUN Sealed Lead Acid Battery (SLA battery) is an advanced and economic rechargeable battery. It has several

properties which differ from other type of batteries.

Maintenance Free-As it is valve-regulated and sealed glass-mat is utilized and acid is trapped inside,it is leakproof and refilling is not needed.

High Power-To Weight Ratio-QIANGJUN SLA batteries can provide much power in comparison to its weight. For example,6V and 12V MICRO series battery capacity ranges from 0.8AH to 20AH,weight ranges only from 0.3 to 6.4kgs.

No Memory Effect-Some batteries,say nickel-cadmium batteries,will become conditioned to provide less power after repetitious short usage discharge.

Long Service Life-Utilizing thick and massive lead calcium grids ensures that QIANGJUN SLA battery has a long service life.

High Discharge Rate –Since the internal resistance is low ,the battery can provide high rate of discharge

3.CHARGING CHARACTERISTICS

3.1 CHARGING METHODS

There are four charging methods:

3.1.1 Constant Voltage Charging

Charging at constant voltage is the most suitable and commonly used method for charging QIANGJUN batteries.The charger voltage must be stabilized in a narrow range and with a device to suppress the initial current to less than 0.3C.The initial current limitation can be accomplished by a constant-current regulator, a properly designed output-voltage from the power transformer,or by designing the overall impedance of the circuit (such as using a current regulating resistor). During the final stage of charge, the current decreases automatically. Fig 1 - 2 show constant voltage charger circuits provided with constant voltage function ,composed of transformers,transistors,silicon diodes IC's,etc.

Fig.1

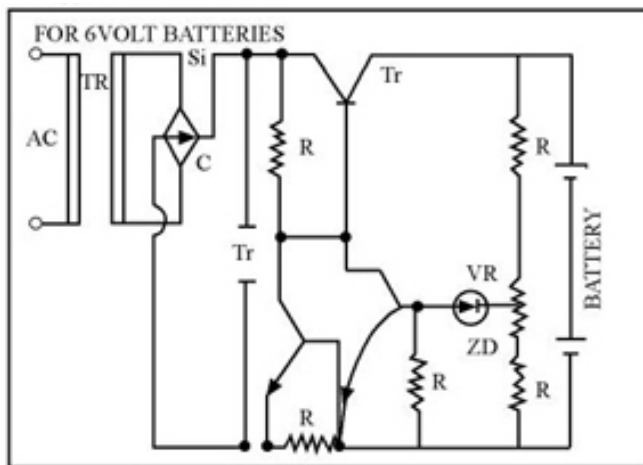
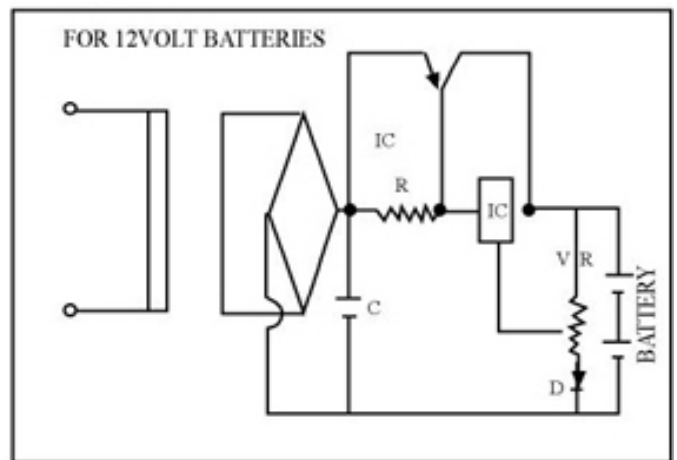


Fig.2



Notes: It is desirable for the charger to be temperature compensated. For more details. Please refer to section 3.6

3.1.2 Constant Current Charging

It is an effective method for supplementary charge of many batteries at one time in series during storage, but the charging time must be strictly controlled . It is because if the charging is continued at the same rate for an extended period of time after the battery reaches a fully-charge state , battery voltage rises excessively , water decomposes , heat generates , and a severe overcharge may occur .It can result in a heavy damage to the battery . For a maximized life , it is not recommended to repeatedly use constant current charging for refreshing batteries.

3.1.3 Taper-current Charging

In this system, the charging current drops gradually as the charging proceeds, It shall be accompanied by using a power transformer with a secondary voltage which is considerably higher than the battery voltage and suitably high-resistance in the circuit for current limitation. A charging cut-off circuit should be incorporated in the charger to prevent overcharge. It can then be utilized for industrial uses for charging multiple numbers of batteries and for trickle charging system.

4.DISCHARGE CHARCTERISTICS

4.1 DISCHARGE CHARCTERISTICS AT DIFFERENT DISCHARGE RATE

The capacity of the battery depends on the discharge rate being used, QIANGJUN battery with the capacity less than 24AH (named Micro series) is rated at 20 hour discharge rate defined as the nominal capacity or 100% capacity point, while QIANGJUN battery with the capacity of 24AH or higher (named Medium & Macro series) are rate at 10 hour discharge rate. The cut-off voltage is 1.75 per Cell.

Fig.7 Discharge Characteristic Curves
(at various at 20 °/68 °F for Micro series battery)

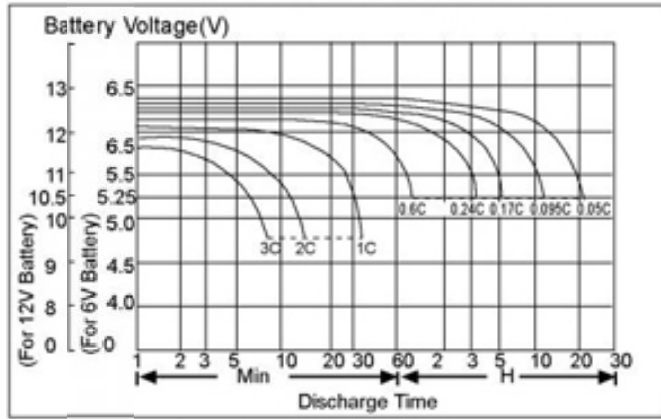


Fig.7 Discharge Characteristic Curves
(at various at 20 °/68 °F for Micro series battery)

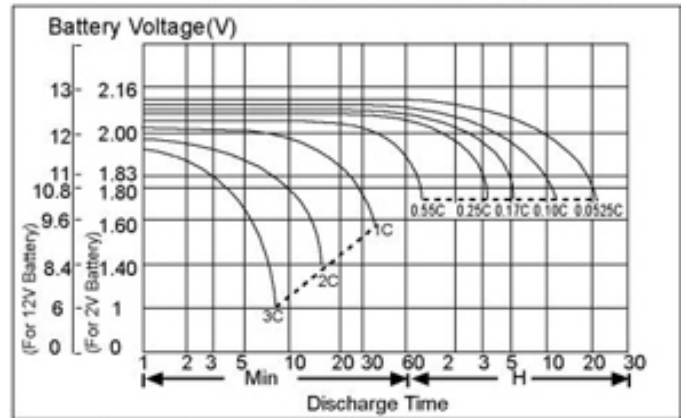


Fig.7 ~ Fig.8 show the discharge performance at various discharge rates. When the loading on the battery is increased the available capacity drops.

5.STORAGE

5.1 SELF DISCHARGE

Fig.11. Self discharge characteristics

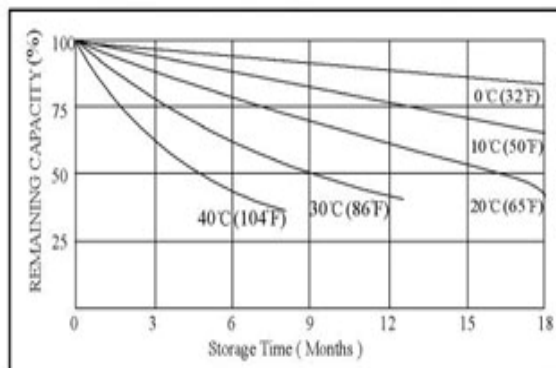


Fig.11 shows the relation between the storage time at various temperature and the remaining capacity.

Self-discharge rate of QIANGJUN battery is approximately 3% per month when batteries are stored at an ambient temperature of 20° (68° F). The self-discharge rate varies with temperature.

5.2 SHELF LIFE

Shelf life is the life of a battery when stored in the unused condition. Generally, lead sulphate is formed on the negative plates which is referred to as “sulphation” when lead acid battery is stored in a discharged condition for an extended period of time. Higher temperature will accelerate sulphation. Since the lead sulphate acts as insulator, sulphation decreases the battery charge acceptance.

Table 3. Shelf life at various temperature

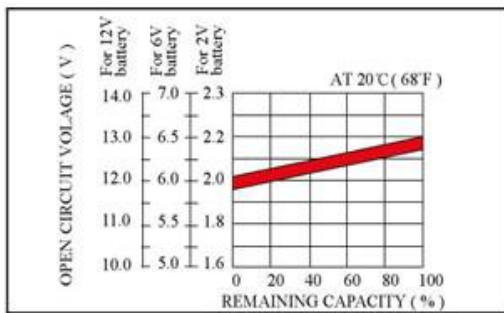
Temperature	Shelf life
0°C (32°F) to 20°C (68°F)	12 months
21°C (70°F) to 30°C (86°F)	9 months
31°C (88°F) to 40°C (104°F)	5 months
41°C (108°F) to 50°C (122°F)	2.5 months

Table 3 shows that battery shelf life will be reduced when stored at higher temperature.

Limited use (a few days) at temperature outside the ranges recommended above will adversely affect the service life. Prolonged use of batteries at elevated temperatures will reduce the shelf life expectancy. Batteries should be kept in a cool and dry place like 20 -30 .

5.3 REMAINING CAPACITY MEASUREMENT (BY OPEN CIRCUIT VOLTAGE)

Fig.12 Open circuit voltage Vs Remaining capacity



The approximate remaining capacity of QIANGJUN battery can be empirically determined from Fig.12.

6 · SERVICE LIFE

6.1 CYCLE SERVICE LIFE

The most important factor is the depth of discharge which has a reverse effect on cycle service life.

Fig.13 Effects on DOD on cyclic life.

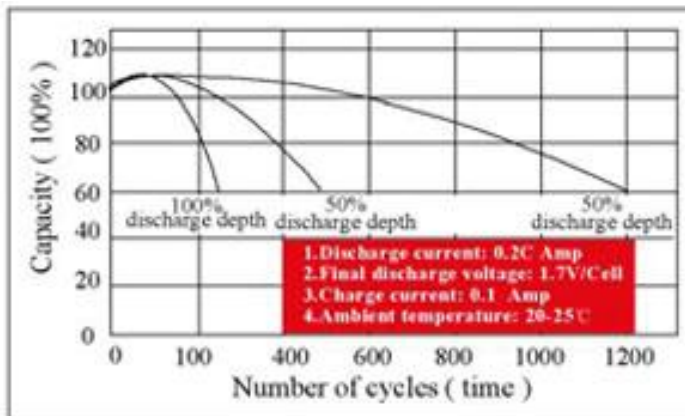


Fig.13 shows the effects of depth of discharge on cyclic life.

The discharge capacity has the trend to increase in the initial stage of the cycle and it reaches the maximum at

6.2 TRICKLE/FLOAT SERVICE LIFE

Fig.14 shows temperature effect on float life of Micro series . QIANGJUN battery is designed to operate in float / standby use up to 5 years on the basis of accelerated tests. Fig.15 shows temperature effect on accelerated float service life of Medium Macro, CSM series designed to operate for up to 10 years at 20 on the basis of accelerated tests.

Fig.14 Float service life of FM series

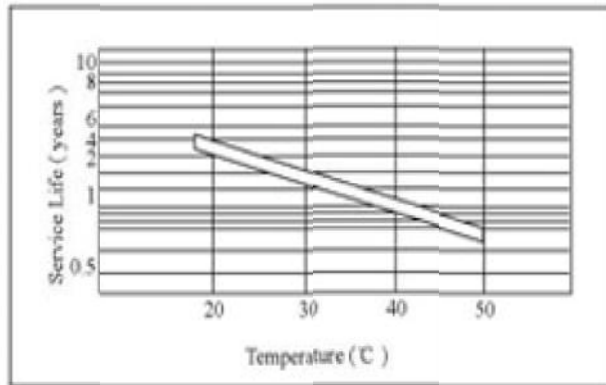
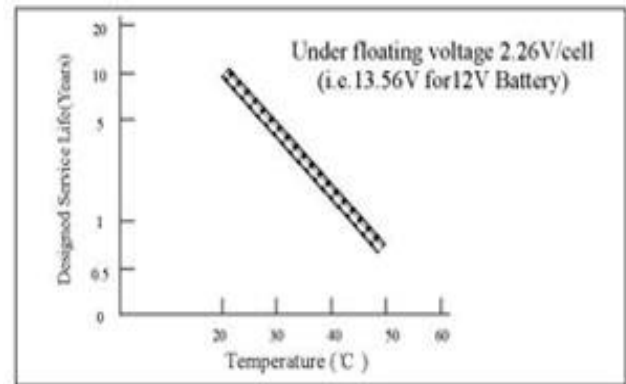
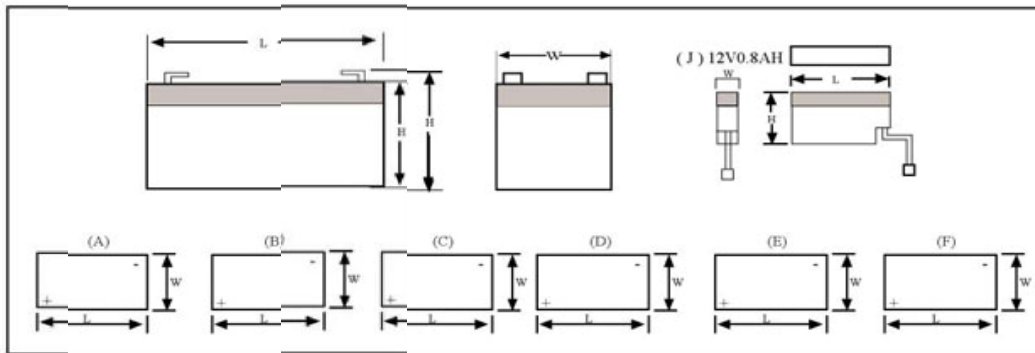


Fig.15 Float service life of CSM and GFM series



7. TERMINAL POSITION



8. HANDLING PRECAUTIONS AND APPLICATION TIPS

8.1 INSTALLATION CAUTIONS

① Initial preparation before installation:

Verify no abnormalities on battery case (like crack or leakage).

② Free air space must be provided between each battery. Minimum space 5-10 mm (0.02-0.04 inch) is necessary.

③ Choose a proper mounting place:

-Away from heat source (such as a transformer). Otherwise, battery temperature will be raised and shorten battery life.

Optimal temperature is 20 ~ 68 °F

-Located in the lowest part of the equipment.

-Away from device that may cause sparks (such as switch or fuse) , because battery may generate inflammable gases during overcharge.

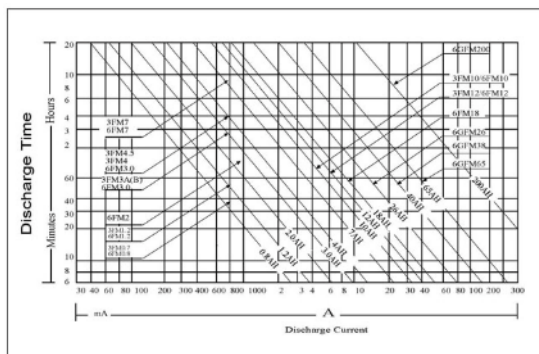
-Do not place near open flame.

-QIANGJUN battery is designed to be used in any position, but charging in upside-down position should be avoided. Otherwise,leakage of electrolyte from safety vents may occur during excessive charge.

Do not put batteries into airtight container (s) to release gas generated from excessive charge and avoid explosion.

- ④ Provide enough insulation in lead wires which connecting battery with the equipment.
- ⑤ Set the batteries firmly in the equipment. Otherwise, batteries may be damaged, or connection conductivity may be decreased due to shock . when batteries are used in vibration conditions, they shall be mounted in upright position and with proper cushion for protecting vibration.
- ⑥ For applications requiring more than one battery, first make the inter-battery connections properly, then connect the batteries to the charger or the load .Before connection, switch off the circuit of the charger / load. Be careful to connect the positive (+) battery terminal to the (+) pole of the load /charger. Wrong connection will result in explosion, fire and / or damage of the charger / loading equipment and the battery.
- ⑦ Pay attention to the high voltage when a large number of batteries are connected in series. Be sure to wear rubber gloves before installation or maintenance.
- ⑧ If 4 or more battery groups are to be used in parallel connection, consult us first.
- ⑨ Avoid mixed usage of batteries different in capacity, manufacturer, storage or charge / discharge conditions. Batteries may be damaged after cycles due to the difference in electrical characteristics.

9 CAPACITY SELECTION GUIDE



The below chart helps to have a rough idea for an initial selection of the minimum battery capacity .(in 20-hour rate) required for a specific discharge current and the required discharge time. You may find the specified current and time on the chart . The point where the current and time lines intersect in the chart with the diagonal capacity line is the minimum capacity required for your application . Our model number starting with “FM” for general applications are shown .Please note that the chart is shown as a general reference only . It is recommended that cyclic service life / float service life and the individual battery model specification

sheets shall be considered prior to final decision. Also,testing with your product shall shall not be neglected.