PG-SERIES
LONG LIFE BATTERIES

POWER SONIC
PG-SERIES

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Power-Sonic has more than 39 years of battery industry experience and today our batteries are sold in more than 70 countries world-wide. Since our inception in 1970, our focus has been the design, manufacture and marketing of rechargeable batteries, specifically:

- Sealed lead-acid (SLA), also called valve regulated lead-acid (VRLA) batteries
- Powersport batteries
- Sealed nickel-cadmium (NiCd) and nickel-metal hydride (NiMH) batteries
- NiCd and NiMH configured packs (cell assemblies)
- Battery Chargers

Our products are widely used in an ever broadening range of electronic and industrial applications. Our batteries continue to be used wherever cost effective and reliable DC power is required, be it as the principal power or standby power source.

Our aim is the ongoing improvement of our existing products, coupled with the development of new tailored products, to meet the ever increasing needs for stand alone power. Our advanced engineering techniques and state-of-the-art manufacturing processes ensure that we remain on the cutting edge of battery technology. These skills, coupled with our selection of the finest raw materials, allow us to produce batteries combining superior performance and value.

Providing our customers with reliable, yet economical, products is the cornerstone of our mission.

PG-Series Specifications

Tolerances are +/- 2mm.

Model	Nominal Voltage (V)	Rated Capacity (A.H.)			Length		Width		Height		Ht. Over Terminal		Weight		Standard Terminals
		10-hr.	5-hr.	1-hr.	in.	mm	in	mm	in	mm	in	mm	lbs.	kgs.	
PG-6V210 FR*	6	210.0	180.5	126.0	12.70	323	7.00	178	8.98	228	9.21	234	71.6	32.5	T11
PG-12V28 FR*	12	28.0	25.5	18.6	6.56	167	6.96	177	4.92	125	4.92	125	18.5	8.4	T12
PG-12V35 FR*	12	35.0	32.5	27.0	7.72	196	5.10	130	6.22	158	6.97	177	24.5	11.1	T6
PG-12V42 FR*	12	42.0	36.0	25.2	7.76	197	6.50	165	6.69	170	6.14	156	32.0	14.5	T6
PG-12V55 FR*	12	56.0	47.5	33.0	8.98	228	5.39	137	8.27	210	8.50	216	36.0	16.4	T6
PG-12V65 FR*	12	65.0	56.0	39.0	13.70	348	6.57	167	7.00	178	6.26	159	47.0	21.3	T6
PG-12V75 FR*	12	75.0	64.5	45.0	13.70	348	6.57	167	7.00	178	6.46	164	51.0	23.1	T6
PG-12V75T FR*	12	75.0	64.5	45.0	10.24	260	6.61	168	8.27	210	8.51	216	55.0	24.9	T6
PG-12V92 FR*	12	92.0	79.0	55.2	12.05	306	6.61	168	8.27	210	8.51	216	61.0	27.7	T6
PG-12V103 FR*	12	103.0	88.5	61.8	13.00	330	6.80	173	8.35	212	8.66	220	70.0	31.8	T11
PG-12V120 FR*	12	124.0	106.5	74.4	16.14	410	6.97	177	8.86	225	8.30	211	81.5	37.0	T11
PG-12V140 FR*	12	144.0	120.5	84.0	13.50	345	6.73	171	10.79	274	11.02	280	99.0	44.9	T11
PG-12V150 FR*	12	153.0	131.5	91.8	19.09	485	6.70	170	9.53	242	8.82	224	103.3	46.7	T11
PG-12V200 FR*	12	210.0	180.5	126.0	20.55	522	9.45	240	8.58	218	8.82	224	144.0	65.3	T11

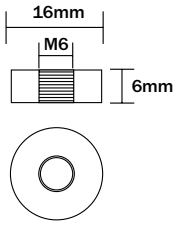
* FR: UL94 V-0 flame retardant case & cover

All data subject to change without notice.

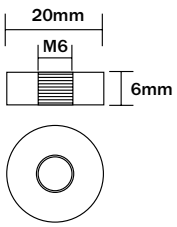
All battery specification sheets and/or our technical manual are available for download at: www.power-sonic.com.

Terminal Configurations

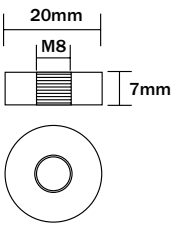
T6 Terminal
Threaded insert - 6mm STUD



T8 Terminal
Threaded insert - 6mm STUD



T11 Terminal
Threaded insert - 8mm STUD



Features

Sealed/Maintenance-Free
Valve-regulated, spill-proof construction allows trouble-free, safe operation in any position. The sealed system eliminates electrolyte checking and refilling. Gases generated during charge are recombined in a unique “oxygen cycle”.

Long Service Life
Thick plate design based on sturdy lead-calcium grids and advanced paste technology provide design lives of up to 10 years in standby applications.

AGM Technology
Absorbent Glass Mat technology, in tandem with one-way pressure relief valves, result in efficient gas recombination and safety of operation even in severe over-charge or over discharge situations.

Low Internal Resistance
Superb high-rate discharge and charge characteristics, achieved through advanced separator technology and plate composition, ensure reliable and stable performance critical in UPS and telecom applications.

Low Self-Discharge
High purity lead, in conjunction with lead-calcium alloy grids, account for excellent shelf-life characteristics permitting storage for extended periods of time at 68°F (20°C) or below.

Non-Spillable Design - Ease of Handling
Proven VRLA technology guarantees trouble-free operation and “non-restricted article” status for surface and air transportation under DOT (CFR-49) and IATA (A67) regulations.

Rugged Construction
High-impact resistant ABS plastic (UL94 V-0 flame retardant) used for case and cover. High internal compression ratios and innovative inter-cell weld technology impart resistance to shock, vibration, chemicals and heat.

Designed-In Reliability
Cutting-edge manufacturing and process control, combined with strict quality assurance procedures, guarantee consistent and dependable performance.

Typical applications for the PG-Series batteries include:

Standby Power
- Communications & Telecom Systems
- UPS - Uninterruptible Power Supplies
- Marine & Power Station Applications
- Back-Up for Security & Lighting Systems
- Access Control Devices
- Elevators

Primary Power
- Remote Monitoring
- Remote Area Power Generation
- Personal Transport Vehicles
- Geophysical Instruments & Power Tools
- Solar-Powered Systems
- Remote Access Devices
- Robotics

Battery Capacity

The capacity of a battery is the total amount of electrical energy available from a fully charged cell. Its value depends on the discharge current, the temperature during discharge, the final (cut-off) voltage and the history of the battery.

Capacity, expressed in ampere-hours (AH), is the product of the current discharged and the length of discharge time. Battery capacity varies according to the discharge rate being used. Capacity increases when discharge current is less than the 10-hr. rate and decreases when the load current is higher.

The rated capacity of a Power-Sonic PG-Series battery is measured by its performance over 10 hours of constant current discharge at 68°F (20°C) to a final (cut-off) voltage of 1.75 volts per cell.

Discharge Current	Final Voltage
0.05C to 0.10C	1.70V/cell
0.10C to 0.30C	1.75V/cell
0.30C to 0.50C	1.70V/cell
0.50C to 2.0C	1.60V/cell
2.00C and above	1.37V/cell

Table 1 : Cut-off Voltage

Proper battery selection for a specific application can be made from the discharge curves shown for each model if the required time and current load are known.

More detailed technical information can be obtained from our Technical Manual, which is available for download from our website at www.power-sonic.com.

POWER-SONIC PG-SERIES

Discharge Characteristics

Battery voltage decreases during discharge. The discharge curves in Figure 1 illustrate this for different discharge rates. “C” is the rated capacity of a battery. The discharge curves may be used for battery selection. It is advisable, however, to review the selection on the basis of graphs of individual data sheets.

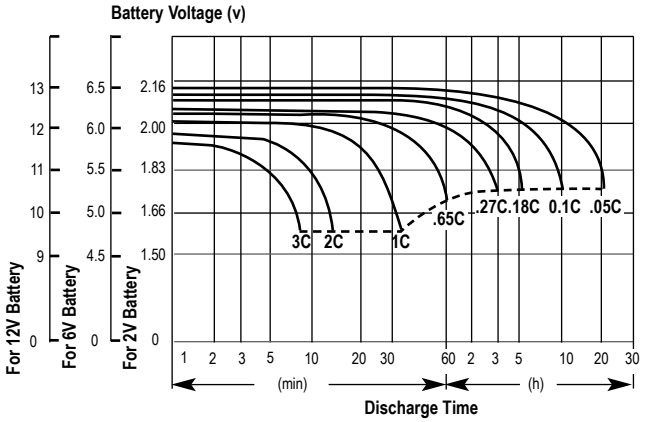


Figure 1: Discharge characteristic curves at various rates 77°F(25°C)

Open Circuit Voltage

Open circuit voltage varies according to ambient temperature and the remaining capacity of the battery. Generally, open circuit voltage is determined by the specific gravity of the electrolyte. Discharging the battery lowers the specific gravity. Consequently, it is possible to determine the approximate remaining capacity of a battery from the terminal voltage. The O.C.V of a Power-Sonic battery is 2.15V/cell when fully charged and 1.95V/cell when fully discharged.

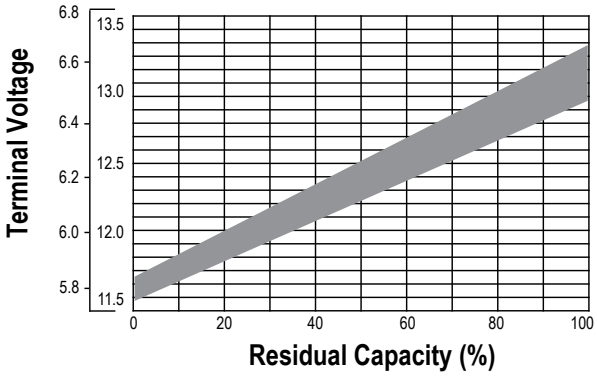


Figure 2: Open-circuit voltage characteristics

Cut-Off Voltage

Cut-off or ‘final’ discharge voltage is the battery terminal voltage under load, i.e. in a closed circuit, to which the battery is safely discharged to maximize battery life. The appropriate cut-off voltage varies according to the actual discharge current. As a rule of thumb, high amp. loads will tolerate a lower final discharge voltage than low amp. ones with longer run times. See Table 1.

Cyclic Use

The number of charge/discharge cycles depends on the capacity taken from the battery - a function of discharge rate and depth of discharge - operating temperature and the charging method.

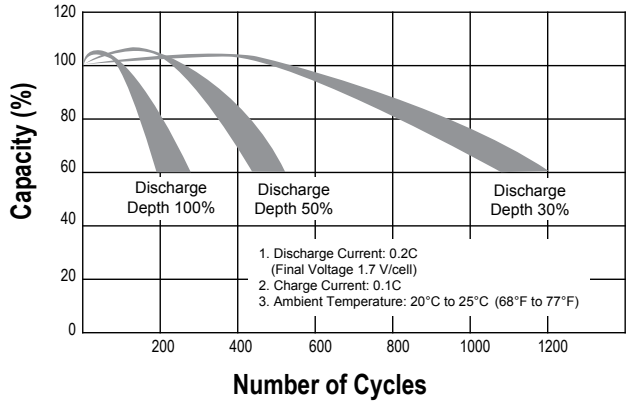


Figure 3: Depth of discharge vs. number of cycles

Figure 3 shows the relationship between depth of discharge and number of cycles, but also the capacity increases during the early cycles.

Standby Use

The float service life, or the life expectancy under continuous charge, depends on the frequency and depth of discharge, the charge voltage and the ambient temperature.

At a float voltage of 2.25-2.30 V/cell and an ambient temperature of 68-77°F (20-25°C), PG-Series 6V & 12V batteries are designed to yield a service life of up to 10 years before the capacity drops to about 60%.

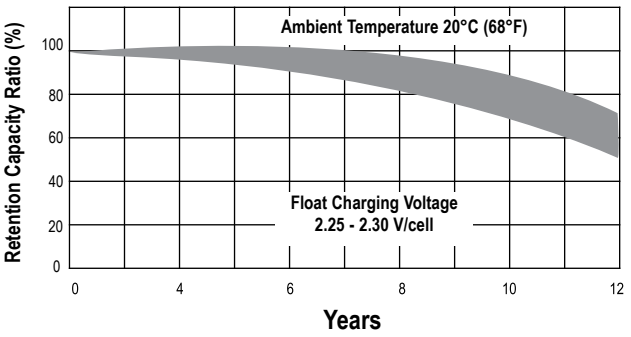


Figure 4: Life characteristics in standby use

The graph in Figure 5 shows life characteristics in float (standby) service for ambient temperatures ranging from 60-130°F (15-55°C).

If prevailing ambient temperatures are well above 68-77°F (20-25°C) the life expectancy of this type of battery in float service depends greatly on temperature compensated charging. The typical temperature coefficient is -3mV/cell/°C. The graph in Figure 5 is based on temperature compensated charging.

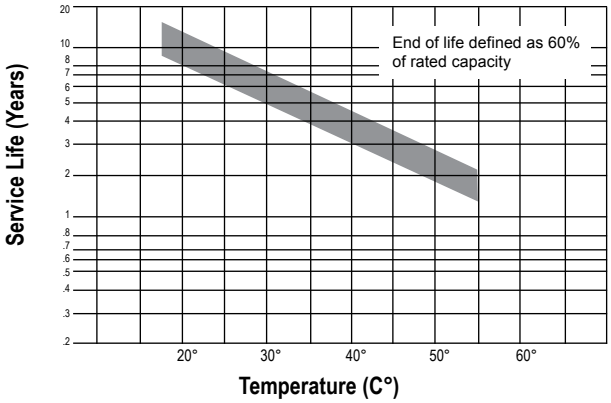


Figure 5: Service life at various ambient temperatures

Effects of Temperature

Actual capacity is a function of ambient temperature and rate of discharge. At 68°F (20°C) rated capacity is 100%. Above this temperature capacity increases, below it capacity decreases as temperature falls.

While raising ambient temperatures increases capacity, it also decreases useful service life. It is estimated that battery life is halved for each 18°F (10°C) above normal room temperature.

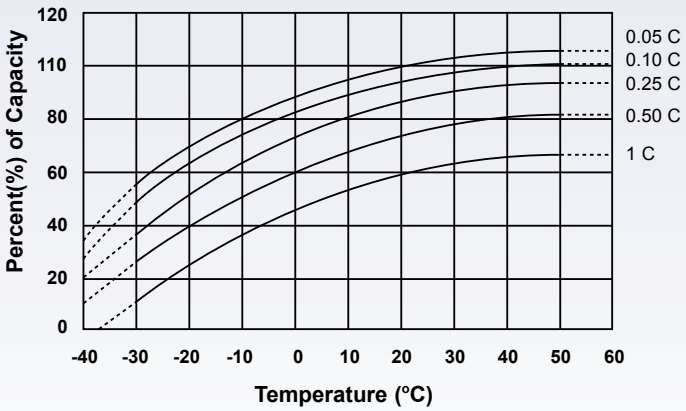


Figure 6: Effects of temperature on capacity

Shelf Life and Storage

Special alloy electrodes and high purity lead impart low self-discharge rates and, consequently, a long shelf life. The rate of self-discharge is approximately 3% per month when batteries are stored at 68°F (20°C). At low temperatures it is nearly negligible, at higher ones self-discharge increases.

To maximize battery life and performance:

- Recharge after each use
- Do not store in a discharged state
- Store at 68°F (20°C) or lower
- Recharge every 6 months if not used

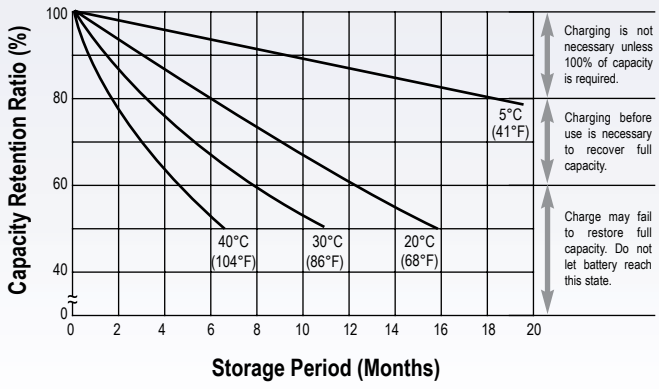


Figure 7: Shelf life and storage

Charging

Dependable performance and long service life depend upon correct charging. Faulty procedures or inadequate charging equipment, result in decreased battery life and/or unsatisfactory performance. The selection of suitable charging circuits and methods is as important as choosing the right battery for the application.

To charge a Power-Sonic battery, a DC voltage higher than the open-circuit voltage of 2.15 is applied to the terminals of the battery. Depending on the state of charge, the cell may temporarily be lower (after discharge) or higher (immediately after charging) than 2.15 V/cell.

Power-Sonic batteries may be charged by using any of the conventional charging techniques. To obtain maximum service life and capacity, along with acceptable recharge time and economy, constant voltage-current limited charging is recommended.

Constant Voltage Charging

Constant voltage - current limited charging is the recommended charging method for Power-Sonic batteries. Care must be taken to adhere to the charge voltage and initial charge current limits.

Constant Current Charging

It is generally not a recommended charge method. It is, however, an effective method for occasional boost-charging of batteries in series after extended storage or prior to a capacity verification. Charge time must be strictly controlled to avoid detrimental over-charge.

Taper Charging

This is the simplest, least expensive charging method. Either quasi-constant voltage or quasi-constant current characteristics can be built into the charger through combination of transformer, diode and resistance. Of the two, constant potential charging is preferable.

Float-Charge Applications

In this set-up the battery and the load are connected in parallel with the rectified power source. A constant voltage - current limited charger is recommended. Proper voltage is 2.25 - 2.30 V/cell at 77°F (25°C). Initial charge current should be limited to 0.3C amps (30% of rated capacity).

Supplemental Boost Charge

Batteries which have been in storage for extended periods of time will lose capacity due to their self-discharge characteristics. To restore full capacity and/or ensure that permanent capacity loss does not occur, a properly timed constant voltage type 'boost' charge is recommended. For storage temperatures of 68-86°F (20-30°C) such top-off charges should be applied every 6 months, at higher ambients, every 3 months. Avoid storage temperatures above 86°F (30°C), wherever possible.

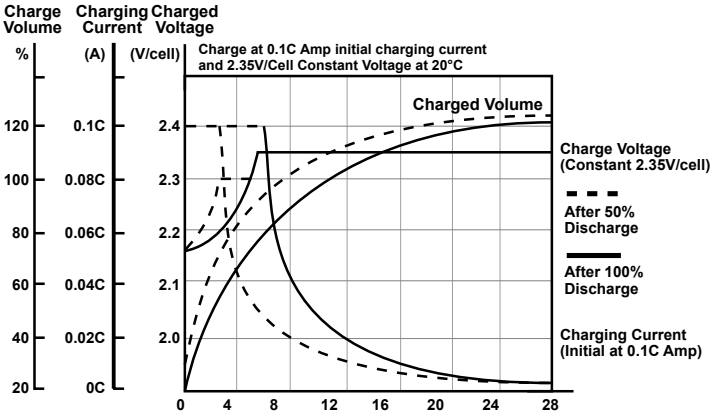


Figure 8: Charging characteristics in stand-by mode

Cyclic Applications

Cyclic use requires a fast charge time and protection against over-charge and over-discharge. Charge voltage should be 2.45 ± 0.05 V/cell at 77°F (25°C). Initial current should be limited to 0.2C.

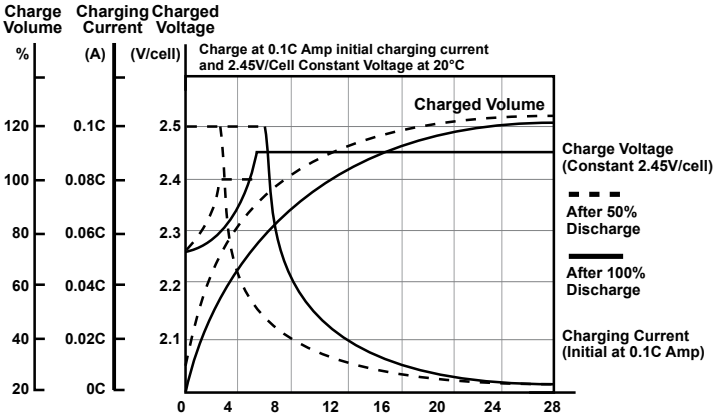


Figure 9: Charging characteristics in cycle charge mode

Temperature Compensation

Power-Sonic batteries perform well both at low and high temperatures. At low temperatures, however, charge efficiency is reduced; at temperatures above 113°F (45°C), charge efficiency increases so rapidly that there is a danger of thermal runaway if temperature compensation is not precise.

The effect of temperature on charge voltage is less critical in float applications than in cyclic use, where relatively high charge currents are applied for the purpose of short recharge times.

Temperature	Cyclic Use (V)	Float Use (V)
-40°F (-40°C)	2.85 – 2.95	2.38 – 2.43
-4°F (-20°C)	2.67 – 2.77	2.34 – 2.39
14°F (-10°C)	2.61 – 2.71	2.32 – 2.37
32°F (0°C)	2.55 – 2.65	2.30 – 2.35
50°F (10°C)	2.49 – 2.59	2.28 – 2.33
68°F (20°C)	2.43 – 2.53	2.26 – 2.31
77°F (25°C)	2.40 – 2.50	2.25 – 2.30
86°F (30°C)	2.37 – 2.47	2.24 – 2.29
104°F (40°C)	2.31 – 2.41	2.22 – 2.27
122°F (50°C)	2.25 – 2.35	2.20 – 2.25

Table 2: Recommended charge voltages for different temperatures.

Temperature effects should definitely be considered when designing or selecting a charging system. Temperature compensation is desirable in the charging circuit, especially when operating outside the range of 41-95°F (5-35°C). The temperature coefficient is -2mV/cell/ºC below 68°F (20°C) in float use and -6mV/cell/ ºC below 68°F (20°C) in cyclic use. For higher temperatures the charge voltage should be correspondingly decreased.

Quality is always #1

We employ IQC, PQC and ISO 9001 quality management systems to test materials, monitor manufacturing processes and evaluate finished products prior to shipment. All our batteries are 100% tested with advanced computer equipment prior to being released for sale.

Power-Sonic management and staff are committed to providing the best possible service to satisfy our customer's needs, and fulfill our undertaking to deliver top grade products on time and at a competitive price.

MH20845
Certificate of UL

CE
EMC tested
Germany
Certificate of CE

CNAB
Certificate of ISO9001

Our batteries meet international standards including JIS, DIN and IEC and have UL certification.

Corporate Headquarters and Domestic Sales
Power-Sonic Corporation • 7550 Panasonic Way • San Diego, CA 92154 • USA
Phone: (619) 661-2020 • Fax: (619) 661-3650
Email Sales: national-sales@power-sonic.com • Email Customer Service: customer-service@power-sonic.com

International Sales
Power-Sonic Corporation • P.O. Box 5242 • Redwood City, CA 94063 • USA
Phone: (650) 364-5001 • Fax: (650) 366-3662
Email Sales: battery@power-sonic.com

European Sales
Power-Sonic Europe, Ltd. • 3 Buckingham Square, Hurricane Way • Wickford, Essex SS11 8YQ • England
Phone: (1268) 560686 • Fax: (1268) 560902
Email Sales: sales@power-sonic.co.uk • Website: www.power-sonic.co.uk

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