Primary Lithium Batteries
GP · Battery Experts for over 50 years

The Singapore-listed GP Batteries International Limited is a member of Gold Peak Group in Hong Kong. It is one of the world’s major suppliers of primary and rechargeable batteries and Asia’s No. 1 consumer battery manufacturer (excluding Japan). Apart from retailing under the “GP” brand, it also supplies electronic manufacturers and major battery companies with an extensive range of battery products. The volume sales of GP alkaline battery, rechargeable battery and charger have been ranked No.1 in Hong Kong for 12 consecutive years (2004-2015).

R&D

GP has dedicated significant amount of resources and efforts each year to the R&D center for its construction, development of new products and introduction of advanced equipment. Our R&D center prides itself on various facilities, namely the professional trial-production workshops, performance test rooms, chemical labs and material analysis rooms.

Automation

In order to meet the increasing market demand, we have equipped ourselves with the cost-effective automated systems that enhance productivity and quality control. Factors such as distribution, parts procurement, labor and risks are thoroughly assessed in areas of our in-house production of tools, materials and technologies.

Quality

As an established brand, we speak with strong data and make continuous improvement practicing the Six Sigma philosophy. Factors/parameters that could affect product quality are hence prevented by data automation. Not to mention we also possess world-class inspection equipment exclusive to the battery industry such as AAS (Atomic Absorption Spectroscopy), UV-VIS (UV-Visible Spectrometry) and EDXRF (Energy Dispersive X-Ray Fluorescence).
Battery Experts

Product Compliance

As a major brand in consumer batteries, GP Batteries adheres to strict safety and complies with the highest international safety standards.

GP Batteries’ IEC62133-certified NiMH batteries and Lithium-ion offer quick market penetration into 53 Certification Body scheme participating countries*.

GP Batteries manufactured 4 out of 8 brands worldwide of certified primary 9V brands against UL217 specifically for Smoke Alarm application.

GP Batteries is amongst the First batch of Lithium-ion battery brands that obtained voluntary CQC mark in China, as well as UR, BIS, and MC marks in the USA, India and Malaysia to respectively cater business needs more efficiently.

With UN38.3 certification, all GP Lithium-ion batteries are easily transported by air and sea to 5 continents*.

* Subject to national deviation, additional tests may be needed.
Laboratory Services

China and Singapore

GP Batteries’ quality assurance centers, located strategically in China, Singapore and Hong Kong, provide full range R&D facilities for quality and safety assurance.

Both China and Singapore laboratories are well-recognized by more than 90 international regions under International Laboratory Accreditation Cooperation-Mutual Recognition Agreement (ILAC-MRA).

China (Dongguan) - Chemical & Calibration Laboratory

- CNAS (China National Accreditation Service for Conformity Assessment) Accreditation

- Testing scope
  - 2002/95/EC (RoHS Directive)
  - 2006/66/EC (Battery & Accumulator Directive)

Battery Performance Test in Singapore

- SAC-SINGLAS (Singapore Laboratory Accreditation Scheme) Accreditation

- Testing scope
  - IEC 60086-1
  - IEC 60086-2
  - IEC 60086-5

Hong Kong Science Park

The Hong Kong laboratory, the first in Hong Kong, is the only 1 out of 6 certified to UL WTDP (Witnessed Test Data Program); it is also the only 1 out of 5 CTF (Customers’ Testing Facilities - Stage 1) approved facilities in the China and Hong Kong region*.

UL Data Acceptance Program

- WTDP (Witnessed Testing Data Program)
  - UL1642
  - UL2054
  - UL62133
  - UN38.3

IEC Manufacturer’s Testing Laboratory

- CTF (Customer’s Testing Facilities (CTF) - Stage 1)
  - IEC62133

Reliability Test for Benchmarking

- Test conditions to be agreed with clients

* Record as at end 2016.
System Certification

In order to meet the increasing market demand, we make continuous improvement to ensure our Management System excellence for our stakeholders and clients. GP Batteries is certified against ISO9001, ISO14001, OHSAS18001, SA8000, as well as the highlighted below:

Global Security Verification (GSV)
Safety matters. Our GSV certified supply chain security excellence ensuring our trade with our clients are secure, protect against terrorist acts, and to combat illegal trafficking.

ISO26000 Social Responsibility
We speak as a global excellence brands, we value the relationship with our society and environment. Our social responsibility performance is certified against ISO 26000 which proved our promises to the welfare of society and environment.

ISO17025
Our China and Singapore laboratories are certified against ISO17025 – the general requirement for the competence of testing and calibration laboratories to offer the most reliable service to our clients.

Awards

GP stands for excellence, and its track record is impressive. GP’s unwavering adherence to high standards has brought recognition from various entities.

Asia Quality Best Practice Award:
Handed out by the International Six Sigma Council, the gold award celebrates GP being top in quality improvement.

MAKE (Most Admired Knowledge Enterprise) Award:
The award names organizations which out-perform their peers by above average growth in intellectual capital and wealth creation.
GP Primary Lithium Manganese Batteries

GP Primary Lithium Manganese Dioxide (LiMnO₂) batteries offer numerous advantages over other conventional primary battery systems. The unique features include high energy density, stable discharge platform, outstanding performance at extremely low temperature, wide operating temperature range (-40°C to +60°C), superior safety design including built-in PTC, specific crimp design for leakage proof, and low self discharge rate of less than 1% per year.

Our complete product range offers ideal battery options for both user-replaceable, and maintenance-free devices, especially amid the growing demand of IoT, Home Security, and Tracking applications.

Security devices such as Smoke Detectors and Sensor Products do require highly reliable performance over an extended operation period under extreme ambient conditions. The state-of-art spiral cell construction design of GP Primary Lithium Cylindrical batteries meet the usage needs regardless applications demanding high drain or low drain discharge. GP is the unanimous solution for maintenance-free security products.

By adopting the advanced Japanese technology and fully automatic production processes, GP Primary Lithium Batteries are produced under highly consistent Japanese quality control and strict standard. Our manufacturing plant is ISO9001 and ISO14001 accredited. As an expert in battery technology and the world’s leading battery manufacturer, GP ensures our high standard of performance and quality are committed to meet the demands of the large and diversified market.
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10  Lithium Cylindrical
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18  Precautions for Battery Handling
GP Primary Lithium Cylindrical Batteries

The spiral cell construction of GP Primary Lithium Cylindrical Batteries (e.g. GPCR-V9, GPCR123A etc.) enlarges the facing area of the positive and negative electrodes, providing high power for high discharge current applications.

PTC device: A PTC (Positive Temperature Coefficient) device is installed to protect the battery from external short circuit.

Positive cap with safety vent: The burst-proof safety vent prevents excessive internal pressure build-up under abusive conditions.

GP Primary Lithium 9V Batteries

GP Primary Lithium 9V Battery (GPCR-V9) is consisted of 3 pieces of GP Primary Lithium Cylindrical Batteries (GPCR14250)

GP Primary Lithium Coin Batteries

Cross sectional drawing of GP Primary Lithium Coin Batteries
Major Features

- 10 years service life in smoke detectors
- Up to 5 times longer lasting than ordinary alkaline batteries
- Spiral construction results in
  • Low internal impedance
  • High discharge current
- Design for safety
  • Built-in PTC (Positive Temperature Coefficient) to protect batteries from external short circuit
  • Burst-proof venting holes which allows safe release of the battery internal pressure
- Leakage proof crimping technique
- Wide operational temperature range of -40°C to +60°C with excellent discharge performance at extremely low temperatures
- Excellent storability with low self discharge rate at less than 1% per year
- Environmentally friendlier
  • Electrolyte contains no lithium perchlorate
- Comply with UL and UN38.3 safety standards

Major Applications

General Applications
Smoke detectors, security devices, medical equipment, carbon monoxide alarms, explosion gas alarms, meters (gas/electric/water), metal detectors, wireless transmitters, electronic toll collection system, etc.

High Drain Applications
Stun guns, military applications

Performance Characteristics

10-year Service Life in Smoke Detectors
Voltage characteristics remain stable even for a long period of discharge, greatly improving the reliability of the ionisation-type smoke detector that uses GP Lithium 9V battery (GPCR-V9). Such smoke detector is also maintenance free (battery replacement is seldom required).

Lightweight, High Voltage and High Energy Density
GP Lithium 9V battery (GPCR-V9) lasts 5 times longer than Alkaline batteries.

Excellent Temperature Characteristics
GP Lithium 9V battery (GPCR-V9) outperforms competition by demonstrating much longer operating time and stable performance over a wide temperature range of -40°C to +60°C.
Lithium Cylindrical

Major Features

1. Spiral construction results in
   • Low internal impedance
   • High discharge current

2. Design for safety
   • Build-in PTC (Positive Temperature Coefficient) to protect batteries from external short circuit
   • Burst-proof venting holes which allows safe release of the battery internal pressure

3. Leakage proof crimping technique

4. Wide operational temperate range of -40°C to + 60 °C
   with excellent discharge performance at extremely low temperatures

5. Excellent storability with low self discharge rate at less than 1% per year

6. Environmentally friendlier
   • Electrolyte contains no lithium perchlorate

7. Comply with UL and UN38.3 safety standards

Major Applications

IoT, home security, asset tracking, cameras, flashlights, medical equipment, meters (gas/electric/water) and electronic guns, etc.

Performance Characteristics

Outstanding Low Drain Discharge Performance at Various Temperature

CR123A shows superior low drain discharge performance especially at low temperature.

Excellent Pulse Discharge Capacity at Room Temperature and -20°C

The outstanding high pulse discharge capacity of GPCR123A remains strong at room temperature and extremely low temperature.
Lithium CR2/3A

Major Features

1. Wide operational temperature range of -40°C to +60°C
2. Build-in PTC (Positive Temperature Coefficient) to protect batteries from external short circuit
3. Low discharge rate at less than 1% per year
4. Comply with UL & UN38.3 safety standards

Major Applications

Smoke detector, sensors, home security products and measurement equipment, etc.

Performance Characteristics

![Graph 1: Test Condition: 10mA Continuous Discharge to 2.0V](image1)

![Graph 2: Test Condition: 2mA Continuous Discharge to 2.0V](image2)

![Graph 3: Test Condition: 100Ω pulse discharge at 23°C](image3)

![Graph 4: Test Condition: 100Ω pulse discharge resistance at 23°C](image4)

Test Condition: 10mA Continuous Discharge to 2.0V

CR2/3A 23℃ 10mA 24hr/day to 2.0V

Test Condition: 2mA Continuous Discharge to 2.0V

CR2/3A 2mA 24hr to 2.0V (23℃)

Test Condition: 100Ω pulse discharge at 23℃

Test Condition: 100Ω pulse discharge resistance at 23℃
Lithium Coin

**Major Features**

1. High volumetric energy density
2. Flat discharge voltage
3. Leakage proof crimping technique
4. Wide range of operating temperature from -10°C to +60°C
5. Excellent storability with low self discharge rate at less than 1% per year
6. Comply with UL and UN38.3 safety standards

**Major Applications**

Calculators, car key, FA instruments (measuring instruments, onboard microcomputers, sensors), electronic thermometer, IC cards, IC tags, memory back-up, greeting cards, time pieces, remote control, portable games, etc.

**Performance Characteristics**

GPCR2032 provides longer operating hours at different loading discharges.

![Discharge curve by loading 15K cut off 2.0V](image1)

![Discharge curve by loading 1K cut off 2.0V](image2)

![Discharge curve by loading 3K cut off 2.0V](image3)
GP Primary Lithium/Iron Disulfide (Li/FeS₂)
Lithium AA & AAA

Major Features

1. Suitable for power hungry / medical / professional devices
2. 40% lighter than Alkaline Battery
3. Performs well in extreme weather (-30°C to 60°C)
4. Built-in short-circuit safety protection
5. Long shelf life of 10 years

Major Applications

Photo flash, digital camera, medical devices, electronic games, battery-operated toys, shaves, GPS devices, portable lighting, etc.

Performance Characteristics

**AA**

**Application Tests (23±2°C)**

- PHOTO FLASH: 1000 mA, 10 s/min - 1 hr/day
- DIGITAL CAMERA: 1500/650 mW, 2 s/28 s - 5 m/hr

**Service (minutes)**

- Voltage (CCV): 0.9, 1.1, 1.3, 1.5, 1.7

**Service (hours)**

- Voltage (CCV): 0.8, 1.0, 1.2, 1.4, 1.6

**Application Tests (23±2°C)**

- PORTABLE LIGHTING: 3.3 ohm LIF
- TOY: 3.9 ohm 1hr/day

**Cycles**

- Voltage (CCV): 0.8, 1.0, 1.2, 1.4, 1.6

**Application Tests (23±2°C)**

- DIGITAL STILL CAMERA: 1.2 W 2s/0.65 W 28s, 15T/hr

**Voltage (CCV)**

- 0, 50, 100, 150, 200, 250 cycles

**Audio Remote**

- ELECTRONIC GAME/DIGITAL AUDIO
- REMOTE

**Remote**

- 24 ohm 15s/m, 8hr/day

**Remote**

- 24 ohm 15s/m, 8hr/day
## Specifications

### Lithium Cylindrical

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Dimension (mm)</th>
<th>Voltage</th>
<th>Weight</th>
<th>Cross Reference</th>
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<td>Height</td>
<td>(V)</td>
<td>(g)</td>
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<td>3.0</td>
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<td>CR123A</td>
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<td>34.5</td>
<td>3.0</td>
<td>17</td>
</tr>
<tr>
<td>CR2/3A</td>
<td>16.8</td>
<td>34.5</td>
<td>3.0</td>
<td>17</td>
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<tr>
<td>CR-P2</td>
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Operating temperature: -40°C to +60°C

### Lithium 9V

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Operating temperature: -40°C to +60°C

### Lithium AA & AAA

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<th>Model No.</th>
<th>Dimension (mm)</th>
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<td>(V)</td>
<td>(g)</td>
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Operating temperature: -30°C to +60°C

### Lithium Coin

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<th>Dimension (mm)</th>
<th>Voltage</th>
<th>Weight</th>
<th>Cross Reference</th>
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<td>Diameter</td>
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<td>(V)</td>
<td>(g)</td>
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Operating temperature: -10°C to +60°C
Specifications

Lithium Battery with Tags/Connector

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<tr>
<th>Tag/Connector Description</th>
<th>Model</th>
<th>Capacity(mAh)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>Spec</th>
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<td>J.S.T. PHR-2</td>
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</table>

Lead Wire: UL1007 AWG#24
Housing: J.S.T. PHR-2
# Application Table for GP Primary Lithium Cylindrical

<table>
<thead>
<tr>
<th>Applications</th>
<th>Lithium 9V</th>
<th>Lithium Cylindrical</th>
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</thead>
<tbody>
<tr>
<td>Internet of Things (IoT)</td>
<td>●</td>
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<tr>
<td>Sensors</td>
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<tr>
<td>Home Security Systems</td>
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<tr>
<td>Access Control Systems</td>
<td>●</td>
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</tr>
<tr>
<td>Asset Tag/Tracker</td>
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<td>●</td>
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<tr>
<td>Data Logger (Wireless, Weather)</td>
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<td>●</td>
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<tr>
<td>Military Application</td>
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<tr>
<td>Automatic Faucet</td>
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<td>Carbon monoxide</td>
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<tr>
<td>Wireless Transmitters</td>
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<tr>
<td>Cameras (Conventional/Digital/Instant)</td>
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<tr>
<td>Medical Equipment &amp; Application</td>
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<td>Meters (Gas/Electric/Water)</td>
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<tr>
<td>Photo Flash</td>
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## Specifications

### Application Table for GP Primary Lithium Coin

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Precautions for Battery Handling

1. Do not charge. When this battery is charged, gas is generated inside and raises internal pressure, resulting in fire, heat generation, leakage or bursting.

2. Do not dispose of in fire, disassemble or heat in any way, it will damage the insulation materials and the safety vent resulting in fire, heat generation, leakage or bursting.

3. Insert batteries properly. Keep polarities in the correct position aligning + and − correctly for ALL batteries to avoid leakage or bursting.

4. Do not short-circuit. If the + and − come into contact with metal objects, short circuiting occurs resulting in heat generation or bursting. When carrying or storing batteries, avoid direct contact with metal objects such as bracelets or key chains by putting them in a separate bag.

5. Keep away from children. Consult a doctor IMMEDIATELY if a battery or leaked liquid is swallowed.

6. If leakage or strange smell occurs, keep batteries well away from fire from fire to prevent ignition of leaked electrolyte.

7. Do not solder. It will damage the insulation materials resulting in fire, heat generation, leakage or bursting.

8. Do not force-discharge. When a battery is force-discharged by an external power source, the voltage drops to 0 or less (reversal voltage) and gas is generated inside the battery. This may cause fire, heat generation, leakage or bursting.

9. If leaked liquid gets into the eyes, wash IMMEDIATELY with plenty of clean water and consult a doctor.

10. Do not use different types of batteries nor new and used batteries together. Doing so can cause heat generation, leakage or bursting.

11. Do not apply strong force or handle roughly to avoid heat generation, leakage or bursting.

12. Do not use nor keep batteries in direct sunlight nor high-temperature areas. Doing so may cause heat generation, leakage or bursting.

13. Do not wash nor place batteries in water as this may cause heat generation.

14. Read the instruction manual. Take note of all precautions carefully before use. Make sure these batteries are appropriate for your equipment.

15. Storage precautions. Keep batteries away from direct sunlight, excess humidity and high temperature areas as this can cause dangerous heat generation.

16. For proper disposal and transportation follow local authority guidelines and regulations.

17. Battery shall not be punctured, crushed, disassembled, or stored beyond the maximum temperature range specified on the data sheet.

18. Do not use if there is any sign of leakage or deformation. Read the Material Safety data Sheet (MSDS) for precautions and leakage handling directions.

19. Switch off the device immediately once the battery from the device after its temperature is cooled down to normal.

20. Only use the battery for the applications which it is designed for.

21. The warning labels must be read and all the safety precautions must be followed.

22. In case of battery fire incident refer to MSDS for control instructions.

23. While installing the battery pack in the device, ensure the pack is installed in the right position and away from the heat sources in the device, in order to avoid any damage caused to the battery pack.

24. Adopt a battery pack mechanism to prevent battery pack from being ejected, if the device is suffered from a drop of any physical impact.
SALES AND MARKETING OFFICES

SOUTH EAST ASIA
GP Battery Marketing (Singapore) Pte Ltd
55 Ayer Rajah Crescent #03-03
Singapore 139949
Tel: (65) 6559 9780
Fax: (65) 6559 9761
Email: gpbms@gpbatteries.com.sg

CHINA
GP International (Shenzhen) Ltd.
Rm B, 32/F International Trade Commercial Building
No. 3005 Nanhui Road
Shenzhen, China (Postal Code 518000)
Tel: (86) 755-6186-2233

GPI International (Shenzhen) Ltd.
Room 1170, 11/F Jing Hope Plaza,
No. 88 Hua Chi Street, Suzhou Industrial Park,
Suzhou, China (Postal Code 215000)
Tel: (86) 512-8916 5270

GP Battery Marketing (Shanghai) Limited
Room 302, South Building,
No. 694 QuXi Road, Shanghai, China (Postal Code 200023)
Tel: (86) 21-6336 0966

TAIWAN
Gold Peak Industries (Taiwan) Limited Hsinchu office
No. 211, Section 2, Chung Cheng Road
Hukou, Hsinchu, 30343 Taiwan
Tel: (886) 3-5992711
Fax: (886) 3-5992827
Email: gpi@goldpeak.com

SOUTH KOREA
GP Battery Marketing (Korea) Limited
3/F, WhaDeok Building
319-11, Yangjae-Dong
Seocho-Gu, Seoul, South Korea
Tel: (82) 2-549 7188 / 549 7199
Fax: (82) 2-514 0623
Email: jh_baak@goldpeak.com
Website: www.gpbattery.co.kr

US & LATIN AMERICA
GP Batteries (Americas), Inc
OEM / Industrial Division
11245 West Bernardo Court, Suite 104,
San Diego, CA 92127, USA
Tel: (800) 268-3416 / (858) 674-6099
Fax: (858) 674-6496
Email: GPBA_Ind_Sales@goldpeak.com

EUROPE
GP Batteries Europe B.V.
Kaldenkerkerweg 20
5913 AE, Venlo, The Netherlands
Tel: (31) 077 3020044
Email: info@gpbatteries-europe.com
Website: www.gpbatteries-europe.com

GP Batteries (U.K.) Limited
Monument View
Chelston Business Park
Wellington, Somerset, TA21 9ND, UK
Tel: (44) 1823 660044
Fax: (44) 1823 665595
Email: sales@gpbatteries.co.uk
Website: www.gpbatteries.co.uk

GP Battery (Poland) Sp. z o.o.
Ul. Lopuszanska 36
02-220, Warszawa, Poland
Tel: (48) 22-500 9500 / 868 0490
Fax: (48) 22-846 7535
Email: pl_office@goldpeak.com
Website: pl.gpbatteries.com

GP Battery Marketing France SA
75, ZAE du Trou Grillon
92180 Saint Pierre du Perray, France
Tel: (33) 1 6989 6200
Fax: (33) 1 6989 6210
Email: info@gpbmfrance.fr
Website: www.gpbatteries.fr

GP Battery Marketing (Germany) GmbH
Prinzenallee 7
D-40549 Düsseldorf
Germany
Tel: (49) 211-5229540
Fax: (49) 211-52295454
Email: info@gpbatteries.de
Website: www.gpbatteries.de

GP Battery Marketing Italy S.r.l
Via. Alessandro Volta 3
20090 Assago (Mi), Italy
Tel: (39) 02-488 2512
Fax: (39) 02-488 2965
Email: info@gpbatteries.it
Website: www.gpbatteries.it

GPBM Nordic AB
Argonparkan 2 B
SE-431 53
Molndal, Sweden
Tel: (46) 31-799 1600
Fax: (46) 31-799 1601
Email: info@gpbmnordic.se
Website: www.gpbatteries.se

WORLDWIDE HEADQUARTERS
GPI International Limited
7/F, Building 16W, 16 Science Park West Avenue
Hong Kong Science Park, New Territories, Hong Kong
Tel: (852) 2484 3333
Fax: (852) 2480 5912
Email: gpi@goldpeak.com
Website: www.gpbatteries.com

7/F, Building 16W, 16 Science Park West Avenue
Hong Kong Science Park, New Territories, Hong Kong
Tel: (852) 2484 3333
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