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Powering up

In 1896 the first battery was marketed for consumer use by then National Carbon Company (now Energizer): the 1.5V Columbia dry cell, which measured 6" long (more than 15cm).

Fortunately, today batteries are much smaller and the user has many more options when it comes to powering his portable devices. The most common are single-use and rechargeable cell batteries, powerbanks, and solar chargers.

These are measured in voltage (V) and milliampere hours (mAh) – voltage being the output from the battery, ampere the speed of the electrical current, and mAh a general indication of how long the battery will last.

Charge via USB

Outdoor and sport participants often take electronic devices with them, for example lights, fitness wrist bands, cell phones, GPS devices, MP3 players, etc. If your customer plans to be away from a wall socket for a considerable length of time, he might want to invest in a charging device to be able to recharge some of his items while he's out.

When you recommend a USB charging device you'll want to keep these points in mind:

- Length of trip: a powerbank will work fine for a weekend trip. If your customer plans to be away from electrical sockets for a lengthy time solar panels might serve him better – once a powerbank is drained your customer can't use it until he charges it again.
- How much mAh needed: add up the mAh for the devices he'll want to power and ask him how often he might need to charge them – the more he'll use the device, the more often it'll need charging. Multiply the two numbers and you'll have a rough idea of how much mAh he needs.
 - Compare the mAh of the powerbank with this number to get an idea of the powerbank capacity that he'll need. Transferring energy from one battery to another is not 100% electrically efficient (e.g. you can't power a 1 000mAh device twice off a 2 000mAh charging device) – the formula is an indication of the minimum requirements and work as a starting point from which to find the right charging device.
 - Vice versa, if he has a powerbank and wants to know how many times he'll be able to charge a device, divide the powerbank's mAh by the device's – this gives a rough estimate, for the same reason as the previous point.

Our cut-out-and-keep series to assist retailers with product knowledge

Words: Carin Hardisty. Compiled with the help of Richard Turkington of Ram Mountaineering, and websites <http://batteryuniversity.com>, www.belkin.com, <https://lenpenzo.com>, <https://www.rei.com>, and <https://sciencing.com>.



- How quickly will it charge? The powerbank's amperage (A) value will tell you – amperage measures the strength of the electrical current, so the higher the amperage, the faster the charging.
 - Keep in mind that not all devices are equal when it comes to charging. A tablet will, for example, need a higher amperage than a cellphone, so it will charge slower than a cell on the same amp.
- The output (volts) from the charging device must be the same as the input requirement for the electronic device – if it's lower it'll drain the power instead of powering it.
 - Your customer can find the voltage requirement for his device in the owner's manual. It's also usually indicated on the

wall outlet charger that comes with the device.

- 3.7V: devices such as a GPS or MP3 player.
- 5V: smartphone with a USB input, e-readers or tablets.

Powerbanks, solar chargers and internal rechargeable batteries charge the electronic device via USB cables (and they themselves can also be charged via USB).

Therefore, in addition to investing in the power device itself, your customer will also need a USB cable to connect the USB charger with the item that needs charging. Make sure that the end that goes into the device is the right type (e.g. micro or mini USB, USB C, lightning cable, etc.).

The same applies when recharging the recharging device, which can be charged from anything with a USB output, for example a computer, wall unit, car charger, etc.

The quality of the cable also affects the performance – a higher quality cable will protect from overheating and power surges

Powerbanks

Powerbanks are convenient, and many are small enough to carry in a pocket. The bigger the powerbank, the more charge it holds.

Their prices have also been getting lower over the years, but your customer will quite likely still have to part with a few hundred rands – remind him that it's also an investment in future use as he won't need to buy another power source for quite some time.

Bigger powerbanks have two USB outputs, which allows two devices to be charged at once.

- Some devices have one port that can charge faster than the other.
- Others that have two ports share the power over the two (full power to the one port when one device is connected, and half the power to each port if more than one device is charging).

Solar chargers

A solar panel converts power from the sun into battery power, which is stored either in an internal or a separate battery.

- An internal battery creates a convenient all-in-one power solution.
- An independent battery gives more flexibility as the user can just take the charged battery with him and leave the solar panel at home or camp.

The solar panel itself doesn't always have a way to regulate the flow of elec- **To p38**



Powering up cont. from p37

tricity, so it's not recommended that your customer charge his device off the panel, but only off the battery it charges (whether internal or external).

In addition to being able to charge electric devices, the battery on a solar panel can also be used to recharge powerbanks, for example. It is therefore a good option for long trips.

A solar panel can have a stationary set up, for example at camp, or can be strapped to something (e.g. backpack, tent, bike, etc.), to charge its batteries while the user is on foot. The effectiveness of this will be determined by how much sun shines on the charger — it won't be effective when hiking under trees, for example.

• If your customer will strap his solar panel to something, have a look at the attachment options.

Panels are rated in watts: the higher the number, the more electricity is generated. To convert watt hours (Wh) to mAh, use the following: $(\text{Wh}/\text{volts}) \times 1000 = \text{mAh}$.

Panels are available in different sizes and stiffness:

- The bigger the panel, the more sunlight it collects and the faster it converts it to power (doesn't have to stand or be exposed to sun for as long as a smaller panel).
 - Big panels are better for low-intensity light, for example on cloudy days.
- Smaller panels are easier to transport, but take longer to charge.
- Panels are either rigid or semi-flexible, where the latter can be folded or rolled up for easier transport and can usually open up to a greater surface area than rigid models.

Single-use and rechargeable cell batteries

Some devices run only on battery cells (the most commonly used are AA and AAA). In some instances, devices can take both rechargeable and single use types, but in others only one can be used. Your customer should consult the device to make sure, before he damages it.

Single-use: these batteries can be stored for several years.

- Higher output than nickel-based rechargeables (see below).
- Available in alkaline or lithium (not the same as lithium ion):
 - Alkaline: for low to medium drain devices.
 - Lower voltage than lithium batteries (1.5V).
 - Cheaper than lithium batteries.
 - Lithium: for medium to high drain devices.
 - Higher voltage than alkaline (3V), which means a longer life, but makes it more expensive than alkaline.
 - Because of the high voltage it can be too powerful for certain devices. Your customer should consult the device's manual to make sure he doesn't damage it.
 - If your customer plans to fly with a device that uses lithium batteries, he needs to consult the airline provider's rules: some don't allow you to fly with them, while others restrict where you can pack them.

Rechargeable: for devices that have a medium to high power draw.

- More environmentally-friendly than single-use batteries since it doesn't get thrown away as often.
- Initially more expensive, but if he has devices that require frequent battery change your customer will save money over time since he can simply recharge his batteries instead of buying more.
- There are four different types of rechargeable cell batteries:
 - Nickel-based: NiMH (nickel-metal hydride) and NiCad (nickel-cadmium) are both 1.2V.
 - NiMH performs better than NiCad and doesn't have toxic heavy metals, which NiCad does (and therefore has to be disposed of in a specific manner).
 - Lithium Ion (Li-ion): 3.7V output.
 - Good for products that drain a lot of

power.

- Can go unused for a long time without losing charge.
- The most expensive of the four.
- Rechargeable alkaline: not to be confused with regular alkalines that cannot be recharged.
 - Costs less than NiMH and NiCads.
 - Doesn't require special recycling.
 - Low long-term performance.
- Rechargeable cell batteries require a charger. Remember to find out if your customer already has one or needs to buy one still.
 - A good charger will monitor and control the charging process — some even shut down when charging is finished.
 - A bad one can shorten the life span of rechargeable batteries, because it works too quickly and heats the batteries, damaging them over time.
 - Most chargers can only take one type of battery, so your customer should pay special attention: the NiMH charger can also charge NiCad batteries, but NiCad, Li-ion and alkaline chargers are restricted to their specific types of batteries.

Disposing of batteries

Batteries are made of chemicals, among other things, such as lead, cadmium, zinc, lithium and mercury that can leak into the ground if its casing corrodes, which causes soil and water pollution if they are simply thrown away with general household waste.

The best is therefore to recycle them. Not only is it good for the environment, but it also means less raw materials need to be made as they can be re-used. There are several companies in South Africa that recycle batteries.

If your customer insists on throwing batteries away in his general household waste, he should still keep the following in mind:

- Don't dispose large numbers of alkaline batteries in one go.
- Don't throw away rechargeable batteries in household waste.

NB: disposing of batteries in fire can lead to explosions.

Black Diamond recharges the way it looks at powering lights

BLACK DIAMOND is focusing on battery conservation to give the user more usage time. Certain headlamps, for example, switch on initially at 70% power output instead of full power, but they can be adjusted to full as needed.

Some of its lanterns and headlamps can also act as powerbanks. The Apollo and Moji Charging Station lanterns each have a built-in battery, but they can also run normal AA batteries as a backup option. The built-in battery not only powers the lantern, but it doubles as a powerbank that the user can use to charge other rechargeable items such as a phone, headlamp, GPS, etc.

Its rechargeable Sprinter, Iota and Revolt headlamps are aimed at runners:

- Revolt, for a full night run, provides 300lm and can last for around 30 hours on either alkaline or its internal batteries. It can also take rechargeable batteries, but the user will only get around six hours on them because of the difference in voltage (alkaline's 1.5V vs rechargeable's 1.2V).
- Iota is lightweight (56g) with 150 lumen (lm) output that will work well for trail runners.
- Sprinter (200lm) is designed for road runners: it has a red light on the back of the head, which allows the runner to be seen better by vehicles in low light or night time conditions. Stride might look like a headlamp, but it's actually designed as a safety device: it has three modes each in red and white light (fast and

slow strobes and a solid light), and is worn on the back of the head to alert passing vehicles in low light. It's also exceptionally lightweight. It can slide onto a standard headlamp strap, a backpack strap, dog's collar, etc.

The Icon headlamp — marketed at the more serious athlete — now has a brand new optional add-on: a rechargeable battery pack that the user can strap under a jacket or inside his backpack to keep the battery warm. The colder the battery, the lower its performance, so it's important to keep it in a warm place when possible. It only arrived at Ram Mountaineering, the local Black Diamond distributor, at the end of April so this should be an exciting new item for your customers.