

# eBrompton Tools

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## Tools

To make eBrompton convenient to use the bits and tools I would normally carry for on the road fixes and repairs needed to be able to attached to the bike so the bike is ready to go, no need to forgetting to grab the tool bag.

You don't have to carry tools of course, but over the years I have had to fix stuff such as broken chains, destroyed tubes needing wheel removal and discovering that I had forgotten to tighten something properly when doing some service. So I normally carry a basic tool kit.

Of course weight is an issue here, its easy to get carried away and carry tools you don't need and there is also the possibility that you do not have a tool you could need.

## The bare minimum to carry

For me the bare minimum to carry is a spare inner tube, puncture repair kit, tyre levers and a spanner to remove the wheels. This should be stored in or on the Brompton so its always there.

Fortunately Brompton designed in a storage area for the inner tube, the large diameter main frame tube.

## What other tools do we need ?

I will admit that in the past I have not bothered to check which tools I actually needed, often just having a set of allen keys, 6" and 4" adjustable spanners, flat and posidrive screwdrivers, chain rivet extractor. These tools would weigh around 421g.

Then of course the normal stuff for replacing tubes and repairing punctures.

The Brompton has two potential tool storage locations in the frame. The front half of the frame tube, by the hinge, has a volume of circa 0.087L and the rear part a volume of circa 0.371L. You can buy a Brompton tool kit that fits nicely in the short front part of the tube. The rear frame tube is often used to store a spare inner tube and spanner for the wheels.

Brompton do sell a rather nice looking toolkit for the Brompton that initially appears to be well designed and it fits neatly and out of sight inside the front of the main tube. The tools provided are; ratchet hex drive, allen keys, 2mm, 2.5mm, 3mm, 4mm, 5mm, 6mm, posidrive and flat screwdriver bits. There are 8mm, 10mm and 15mm ring spanners. Tyre levers and self adhesive puncture patches and sandpaper.



The ratchet driver is good, but it can be awkward using it to reach some fixings. So really a screwdriver handle or extension bit of some sort may be needed for the hex bits. The tyre levers are OK, but only just, I would still carry a large plastic one. The Brompton toolkit is £65 and weights 192g.

## Extra tools needed for Brompton tool kit

The Brompton toolkit does not provide all the tools you need, the ring spanners provided cannot be used on some of the Brompton nuts such as, the rear stop disk or brake spindle. So you would need to carry these extra tools;

15mm open ended spanner.

10mm open ended spanner.

8mm allen key bit.

Hex bit extender.

1.5mm Allen key.

Spoke key

Rivet extractor

The extra tools above weigh in at 108g

So with the Brompton toolkit route we end up with an all up weight of 300g.

## What tools does eBrompton need ?

eBrompton has already had most of the hex nuts replaced with lighter hollow allen key bolts in titanium. I went through eBrompton checking which tools were needed, it was these;

Allen keys, 2mm, 2.5mm, 3mm, 4mm, 5mm, 6mm, 8mm.

A standard Brompton rear cable pusher needs a 1.5mm allen key to secure the cable inner but the replacement Brompton pushers or barrel nut I used have a 2mm allen key.

Medium posi drive screw bit

15mm wrench, front and rear wheel.

15mm open wrench stop disk fixing (for the standard Brompton part)

10mm open wrench, rear brake and stop disk fixing (third party)

10mm wrench, rear rack stays.

8mm wrench, mudguard stays.

3.2mm spoke wrench, rear wheel.

3.5mm spoke wrench, front motor wheel.

Chain rivet extractor

**Note:** Brompton wheel nuts. On a non motor wheel the nuts are 15mm, which is the size spanner provided in the Brompton toolkit but thats intended for a non-electric Brompton. With a front motor wheel axle thats normally a M10 bolt you would normally need a 17mm wrench. If you hunt around you can find titanium M10 nuts that need a 15mm wrench, so the same spanner will do for the front and rear wheel nuts.

So if the Brompton tool kit is not ideal what are the alternatives ?

Are there any other multi tools that fit the bill or should you do it with selected individual tools ?

## Other Multi Tools

The problem with most multi tools is that they are probably not designed for your bike !

There are heaps of multi tools out there and whilst initially they look good and can be reassuringly expensive you do need to check that they actually have the tools needed for your bike and that you can actually reach all the fixings.

The Tern multi tool has most all of what we need for eBrompton, including the rivet extractor.



The tern tool has

Allen keys, 2mm, 2.5mm, 3mm, 4mm, 5mm, 6mm, 8mm.

Open ended spanners, 6mm, 8mm, 10mm and 15mm.

Spoke key, 3.2mm, 3.45mm, 4.0mm

Torx bit T25

Chain rivet extractor.

Screwdrivers, small philips and flat.

There are two improvised tyre levers, OK for removing tyres like the Continental Contact Urban but just not good enough for tyres like the Marathon Plus. The weight of the Tern tool without the self adhesive inner tube patches (I don't like them so don't carry them) is 178g.

The screwdriver bits on the Tern are naff. The lightest alternative solution I found was the hex bit holder below with the metal plate removed. It has large and small posidrive and flat screwdriver bits and weighs 30g, it even has a small LED light in it. It was worryingly expensive though, £3.



So with a 1.5mm allen key coming in at 1g, the weight of tools needed based on the Tern multitool approach is 209g, so a saving over the 91g of the Brompton toolkit approach.

The Tern 15mm open wrench (for the wheel nuts) is fine to use for the wheel nuts when you put its 8mm allen key bit into the black metal frame and you use the carry case as a cover. You could if your not happy with this (and do try it before you need to) carry a titanium 15mm wrench at a massive weight penalty of 24g.



## Individual tools.

You can build up a kit of the needed tools, but to get the weight close to the Tern setup you will need to use a 15mm Titanium wrench, shown above.

A 1.5mm allen key is needed for the grub screw that secures the gear inner wire on the chain pusher at the rear of eBrompton. Here a 1.5mm hex bit on something like the angled drive shown below can be used but then so can a standard plain allen key. So why use a hex bit when you can use a real allen key ? In a 1.5mm size the allen key is lighter than a hex bit too, by around 4g.

Most small hex bits weigh about 5g, which is around the weight of a 3mm allen key, so it makes sense, and its more convenient to use proper allen keys in the 1.5mm, 2mm, 2.5mm and 3mm sizes. Then use hex bits for 4mm, 5mm, 6mm and 8mm sizes. For instance even a short 8mm allen key weighs in at a hefty 17g whilst an 8mm hex bit is a mere 9g.

Something like a normal simple screwdriver handle could be good for the hex bits but they tend to be a bit big and heavy. The simple ratchet wrench as supplied with the Brompton kit is almost satisfactory but if you actually try to use it its awkward to impossible to reach some bolts where you really need to use a long allen key in a screwdriver fashion.

Sure a simple ratchet driver can make for quick work and is good and for workshop use. However we are building an embedded tool kit for use when out and about and hopefully we might never use it, so does it really need to be sleek and efficient or is 'it will do' good enough ?

I searched around and I found a simple holder for the drive bits, its a cross between a screwdriver type handle and an angled hex drive. It cost £3, weighs 52.7g. See the picture below.

A 3.2mm and 3.5mm spoke key is needed, the lightest I found was on Aliexpress, 24.6g.



Separate rivet extractors tend to be heavy, around 75g. There is a low cost, around £6, multi tool that is similar to the Tern multi tool that has a built in rivet extractor, and cut down this provides a rivet extractor that weighs in at 29g.

Compared to some multi tools most of the above mentioned set of individual tools is very low cost, so we can slash out on the decent 15mm wheel spanner that we need. The ‘substantial’ titanium one I found on Aliexpress costs £16 and it weighs in at 23.6g, it also has the 10mm spanner needed for the mudguard bolts, left on the picture below. An equivalent steel spanner of the same type would weigh around 50g.

We need to add in small open ended 8mm, 10mm and 15mm wrenches. Thin versions can be found very cheap on Aliexpress.

The total weigh of all these individual tools is 201g, lighter and cheaper than a toolkit based on the Tern tool.



## Tyre levers and dealing with punctures

I realise that a lot of multi tools have tyre levers built in, but they are metal. I am not that happy using steel tyre levers on aluminium rims to lever the bead off or on. Steel ones are OK to pop in the gap between tyre bead and rim when the primary levering has been done with a plastic lever.

There are many plastic tyre levers that are strong enough, even to cope with Marathon plus tyres and plastic ones is what I use, even in the workshop. If you have a multi tool that includes the levers then a plastic one is not lot more weight to carry, 13g each for the Schwalbe ones, but you can get away with just one.

The other stuff I would carry are; a spare tube, puncture repair kit and pump. Plus a small roll of PVC tape, a mini knife, a couple of velcro straps, chainlinks, Park Tool tyre boot a bit of nylon cord and of course a spare pair of reading folding glasses so I can see what I am doing. .

