



***Your DJI Battery packs and general tips
Vers 2016-3.01***

A guide for DJI battery maintenance and general tips to help prolong and provide reasonable flight service :

You have just bought your first DJI Drone - with proper setup and care - you will be amazed at its video and photographic possibilities.

Let's go through various aspects of this new acquisition.

Many people new to Hobby Battery systems wonder how to treat these battery's. They are used to charging computers / mobile phones but when it comes to hobby battery's such as LiPo - the rules change.

DJI battery's, while they are supposedly intelligent batteries, fall short on various, but are designed to give even the newcomer a reasonable basis to maintain automatically the batteries.

I hope the following can dispel some of the myths and misinformation that has grown up around the DJI battery series. Note this is primarily aimed at the P3 battery's, but principles apply generally to all DJI packs. General principles of LiPo use and maintenance though are fairly universal and only adjusted here by DJI connecting a charge control board and telemetry circuitry to the pack.

But first we have to consider opening the box and putting into service the whole system.

New Purchase:

You open the box and in eagerness want to get out and there and fly ! Please don't. Please resist that urge. There are a few items you need to do first. *Note : Calibration is a debatable subject.*

- a) Have latest DJI GO to register with DJI to activate the Drone.
- b) Fully charged battery to ensure any updates / activation has sufficient battery power to complete.
- c) Checked level area for IMU calibration and identify a nice clean outside area for Compass calibration. I suggest taking a hand held compass outside... walk around and see where needle gets deflected - that is a spot you should stay away from. It could be pipes, cables, rebar etc. under the ground, overhead etc.

IMU calibration is a good item to complete - especially with unit cold - as the start-up time can be significantly reduced by calibrating your Drone in low temperature environment.

Compass Calibration is not normally required and many fly their DJI for years without ever carrying out again. (Should you get warning on start-up – then I suggest – Power down and move a few metres and Power up again. Often its purely a local effect and not the model gear).

Follow the DJI tutorials for initial setup and calibrations. YouTube search will point you directly.

Now you have setup your Drone. I will not go into flight as that is something that you should practice and develop your own skill at. Just note that it is worth once reasonably happy with GPS mode - to



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swap to ATTI mode and fly manually to get used to a less stable AC. This skill will save you later when things start to get out of hand.

Points to note :

- a) Never fly with a partial discharged battery.
- b) I strongly suggest that the default 10 day discharge setting of GO be changed to 2 - 3 days for start of auto-discharge. Plug in each battery and power up to ensure each battery has this setting programmed in.
- c) Do not deep discharge battery's every 20 flights or so - only do this rarely - as it accumulates damage to a LiPo. Even DJI themselves advise against it now. The claimed re-calibration is purely a mA in vs mA out counter in the battery control board. It can be useful to reset counter occasionally but it does not recover lost battery performance.
- d) Try not to fly into the low battery warning zone. I leave my warnings at default - 30% low and 10% critical. I plan to land with about 30 - 35% battery level - which gives me a good storage level to bench my battery's. It is not necessary to charge to 50% or more.
- e) Resist temptation to keep checking battery's - this resets auto discharge timer.
- f) If you plan to not fly for significant period - then charge battery's fully. Place into storage and leave them alone. After a couple of weeks - check levels. If down to 2 LED's - then charge again. Let auto discharge do its job. This way you will not enter hibernation mode and have any problems to use battery's months later.
- g) A lot of talk about battery temperature - LiPo battery's are fine from 10C upwards. For some reason DJI decided to program the system so that we need to have a 'warm' battery to fly. That is easily accomplished by placing battery inside your coat ... warmed in the car driving to site ... LiPo warming bags ... picnic bags with warmers in ... Many ways to accomplish this. It is a myth that you need to hover the AC if it is cold. If the AC powers up and takes off - that means battery is at working level and will fly. DJI AC do not fall out of sky for this !

Let us move on to after flight.

Battery's warm up when used. So it is good practice to allow the battery to cool before recharging.

Note that being a layered cell pack and inside a case - the inner cells will take longer to cool down.

If you are not planning on flying for a while - then refer to point f) above. Some will advise charging partially etc. But the easiest and best way is via f). Charge up and let auto-discharge do its work. Note that the LED's are representative of 25% increments... when flashing 12.5% - this means you are not that sure of what it really means when you see the LED's. But if you use the auto discharge system - you then know your battery's are being looked after. You just need to check every week or so.



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Battery storage and Hibernation

LiPo storage is recommended at between 3.7 and 3.85V per cell. This is the same whether LiPo High Voltage versions as the P3 are (4.35v per cell) or standard LiPo (4.2v per cell). This corresponds to anywhere from about 25 to 60% charge level. Battery technicians that I have spoken to, advise storage in the lower range long term, but higher range short term to reduce charge time when needed. The DJI defaults to about 55 – 60% auto level and then slows significantly to the battery's own self discharge rate. This is an extremely low rate and can take years to discharge. But occasionally a battery may discharge till the circuitry shuts it off to try to save the cells. This is called Hibernation.

If your battery drops into Hibernation – you will not be able to charge or use the battery. You will then have to utilise a routine to attempt to revive the battery. Please note that this is not always successful and can require multiple attempts. If multiple attempts fail – then the battery is unusable.

Here is how to attempt :

Hibernation ...

If a DJI (P3) battery is left too long - it can self discharge slowly to a level that the board shuts off and the power button basically does not switch it on correctly. Placing on charger does not correct it either.

Therefore the following is the way to possibly resurrect without dismantling the pack :

1. Have at hand genuine DJI charger.
2. Switch on battery by the usual long + short press. Ignore lights and lack of action.
3. DO NOT DO ANYTHING ELSE except place the battery aside for 5 minutes. Any lights or whatever should during that time go out.
4. DO NOT TOUCH POWER BUTTON - now plug in charger
5. Ignore what you see - just leave charger plugged in.

You may be lucky that shortly after it wakes up - but often it can take hour or even most of the day to suddenly wake up and start charging ... you MUST LEAVE IT ALONE DURING THIS.

If it does not wake up after being connected for most of the day .. you could try again repeatedly - ensuring you observe the sequence above .. but probably its past its useful phase. It is possible to open up the battery and charge direct to the battery bypassing the board - but I do not advise this unless you are well experienced in LiPo's the risk of fire or 'event' is too great.

Disposal of Batterys :

This applies to all batteries in fact as they contain chemicals that are not accepted in normal trash and should not end up in Landfill or other common disposal sites. Most towns in many countries



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have disposal facilities for batteries. With respect to LiPo - it is not a good idea to place in the boxes often seen inside shops. Please only use the battery disposal facilities that are external.

Normal LiPo's can be discharged fully by lightbulb and then leads twisted together. But DJI batteries have a control board that prevents discharge lower than ~3V per cell. The board shuts down at that level. What you will need to do is basically pop the front panel of the battery and access the main battery power leads underneath. Simple croc clip a suitable lightbulb and let it drain the battery. I suggest a pair of car lamps in series to carry the load.

You will read suggestions of Saltwater bucket - this is actually not a good way to discharge the pack as initially you get discharge, but as the pack gets to low charge state - the Saltwater resistance overcomes discharge and it slows significantly, in fact can near stop.

If you are unable to discharge the pack - then it is best to approach a model shop or other facility that deals in batteries for their help.

Summary :

- 1) Always fly on a fully charged battery and land when your battery level is around 30%.
- 2) Have auto discharge set to 2 - 3 days maximum and plug in every battery you have to AC to make sure battery FW is updated to this setting.
- 2) Let your battery cool down before charging—somewhere around 30 minutes or until it is around room temperature.
- 3) If you fly and land to 30% - after about one week - charge your battery fully and let auto-discharge do its job to avoid battery entering Hibernation mode. Check each week or so for level and recharge if it falls below 2 LED's and let auto discharge work again.
- 4) Always top up charge before flight if battery stands for more than one day after charging. At high charged levels you will need to switch on battery, then plug in charger to make sure top-up occurs.
- 5) Do not throw old battery in the trash - dispose of responsibly at proper location.
- 6) If you are testing or updating Drone – it is a good idea to have a fan blowing cool air toward camera and gimbal as these can get hot while sitting still. Another way is to use a Notebook cooling pad.

I accept that this may disagree with some people's views on the matter - but I base my suggestions on many years of LiPo use and a significant period of DJI ownership. My battery's perform ... and keep performing.

I wish all good flights and long battery life.

Nigel