



Battery Maintenance Guide for DJI Enterprise Drones

Introduction:

This document serves as a guide to highlight best practices for Intelligent Flight Batteries for DJI Enterprise Drones including maintenance and handling. This document does not replace the need to read and follow the guidelines within the entire user manual and supplementary documentation provided on the downloads page of the associated DJI Enterprise product pages including the battery safety guidelines which are linked to within this document.

Outline:

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- Battery Safety Guides

Battery Care and Maintenance:

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Battery Information

Battery Specs

Battery Type	Drone	Capacity/ Energy	Operating Temperature for Drone	Charging Temperature	Charging Time from 0% to 100%	Self Heating
TB60	M300RTK	5935mAh, 274.2Wh	-4 to 122°F -20 to 50°C	41° to 104°F 5 to 40°C	220V 60 min 110V 70 min	Yes
TB55	M200 Series V2 & V1	7660mAh, 174.6Wh	-4° to 122°F -20 to 50°C	41° to 104°F 5 to 40°C	144 min	Yes
TB50	M200 Series V1	4280 mAh, 97.58Wh	-4° to 113°F -20 to 45°C	41° to 104°F 5 to 40°C	90 min	Yes
M2 Ent.	Mavic 2 Enterprise	3850mAh, 59.29Wh	14° to 104°F -10 to 40°C	41° to 104°F 5 to 40°C	90 min	Yes
P4	Phantom 4: RTK, Multispectral, Pro V2	5870mAh, 89.2Wh	32° to 104°F 0 to 40°C	41° to 104°F 5 to 40°C	70 min	No

Operating Temperature: External temperature the drone is rated to operate within which takes into account the batteries.

Charging Temperature: Internal temperature of the battery acceptable for charging. May vary due to temperature.

All of the above batteries are rated for 200 cycles, it is not recommended to continue use after this cycle count has been reached. For more information please continue reading this guide.



Official Documentation for DJI Enterprise Batteries:

Documentation is available at the following links which can also be found on the related products downloads page.

TB60 Batteries (Matrice 300RTK):

- Maintenance Manual:
https://dl.djicdn.com/downloads/matrice-300/20200507/M300_RTK_Maintenance_Manual_v1.0_EN.pdf
- Battery Safety Guide:
https://dl.djicdn.com/downloads/matrice-300/20200507/M300_RTK_Intelligent_Flight_Battery_Safety_Guidelines.pdf

TB55 Batteries (M200 V2 Series & M200 V1 Series):

- Battery Safety Guide:
https://dl.djicdn.com/downloads/m200_v2/20200610/Matrice+200+Series+V2+Intelligent+Flight+Battery+Safety+Guidelines+v1.2+20200610.pdf

TB50 Batteries (M200 V1 Series):

- Battery Safety Guide:
<https://dl.djicdn.com/downloads/M200/20190131/Matrice+200+series+intelligent+flight+battery+safety+guidelines+v1.2+multi.pdf>

Phantom 4 Batteries (Phantom 4 RTK, Phantom 4 Pro, P4 Multispectral)

- Battery Safety Guide:
https://dl.djicdn.com/downloads/phantom_4_pro/20170125/flight+battery+safety+guidelines/Phantom+4+Series+Intelligent+Flight+Battery+Safety+Guidelines+Eu.pdf

Mavic 2 Batteries (Mavic 2 Enterprise)

- Battery Safety Guide:
https://dl.djicdn.com/downloads/Mavic_2/20180823/Mavic_2_Intelligent_Flight_Battery_Safety_Guidelines_EN.pdf



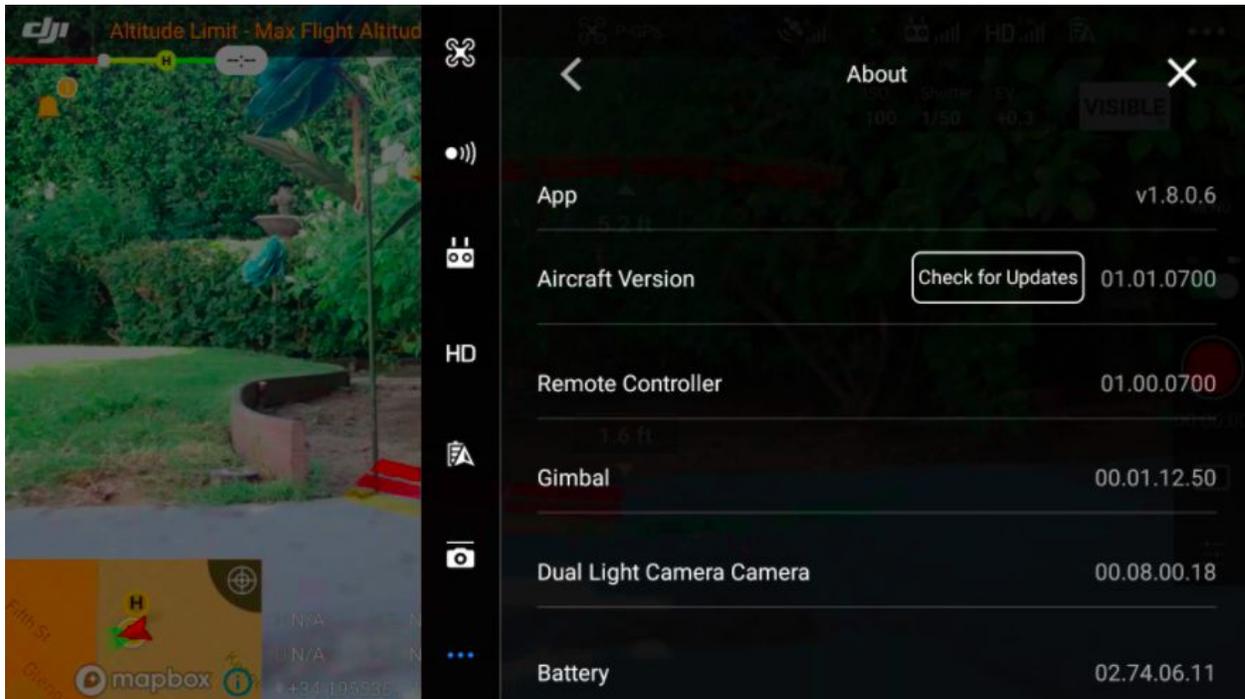
Battery Care and Maintenance

Battery Firmware

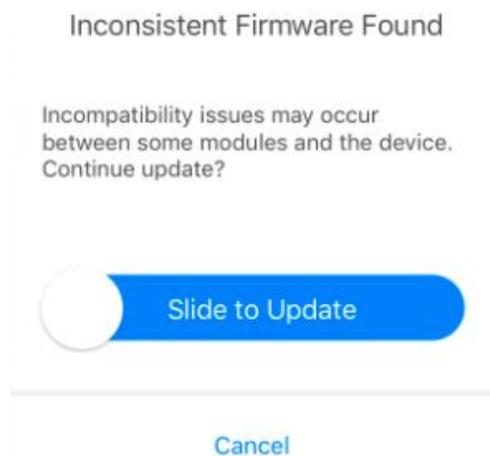
You should always have your batteries on the same firmware version as your aircraft, and both ideally on the latest official firmware. For drones with dual-battery design, both batteries need to be on the same firmware version otherwise you cannot take off. You can find the latest official firmware by navigating to the product page on the DJI website, going to the Downloads section, and viewing the Release Notes. Within the Release Notes, you can see the latest firmware versions.

The screenshot shows the DJI website's Downloads page for the Matrice 300 RTK. The browser address bar shows dji.com/matrice-300/downloads. The page has a navigation menu with 'Downloads' highlighted. The main content is organized into sections: 'Softwares & Drivers', 'Firmware', and 'Manuals'. Under 'Softwares & Drivers', there is a section for 'DJI Assistant 2 For Matrice' with links for 'Mac Version V2.0.13' (2020-08-24) and 'Windows Version V2.0.13' (2020-08-24). Below this is a link for 'DJI Assistant 2 For Matrice Release Notes V2.0.13' (2020-08-24). Under 'Firmware', there is a link for 'Zenmuse Z30 Firmware V01.00.07.10' (2020-09-08). Under 'Manuals', there are two links: 'MTRICE 300 RTK Release Notes v1.0' (2020-08-24) and 'MTRICE 300 RTK Maintenance Manual v1.0' (2020-05-07). The 'MTRICE 300 RTK Release Notes v1.0' link is highlighted with a red box.

To confirm your aircraft and battery are on the latest firmware you can open the DJI Pilot app, go into your manual flight camera view, click on the three dots in the top right, then the three dots in the side menu, scroll down to the “About” option, and click to view current firmware versions. You can also connect your mobile device (Smart Controller, Crystal Sky, etc...) to the internet and when you turn on the aircraft and open the Pilot app you will be notified of any necessary updates.



If you are updating your aircraft using DJI Assistant 2 or the DJI mobile app, the battery that is powering the aircraft will be updated if the firmware update includes a battery update or if the battery firmware is not on the latest version. Assuming there was a battery update as part of the firmware update, when you place a non-updated battery into the drone you will get a notification stating inconsistent firmware and allowing you to update the battery based on the aircraft's current firmware. In this case, no additional connections to the internet or DJI Assistant 2 are required for this battery update with an already updated aircraft.



You can also update the firmware of your TB60 batteries (used with the M300 RTK), by placing them in the BS60 Battery Station and connecting the Smart Controller Enterprise to the battery



station. Up to 8 batteries can be updated at once in the health management system of the Pilot App.

Battery Charging

Always use a DJI approved charger. DJI takes no responsibility if a battery is charged using a non-DJI charger. DJI batteries are built to communicate with DJI chargers.

One issue with third-party chargers is their charge rate can be greater than 1C. Though the battery is charged faster, a charge rate $>1C$ will reduce the service life of the battery and cause damage to the cells due to excessive internal temperatures and/or lithium-plating. You can calculate the charge rate for a charger by dividing the amps output from the charger by the capacity of the battery. For example, with the DJI Mavic 2 Enterprise Battery Charger = $(3.41A/3.85A = .88C)$. Third-party chargers may also damage the terminals of the batteries as well due to improper alignment, safeguards, and guides.

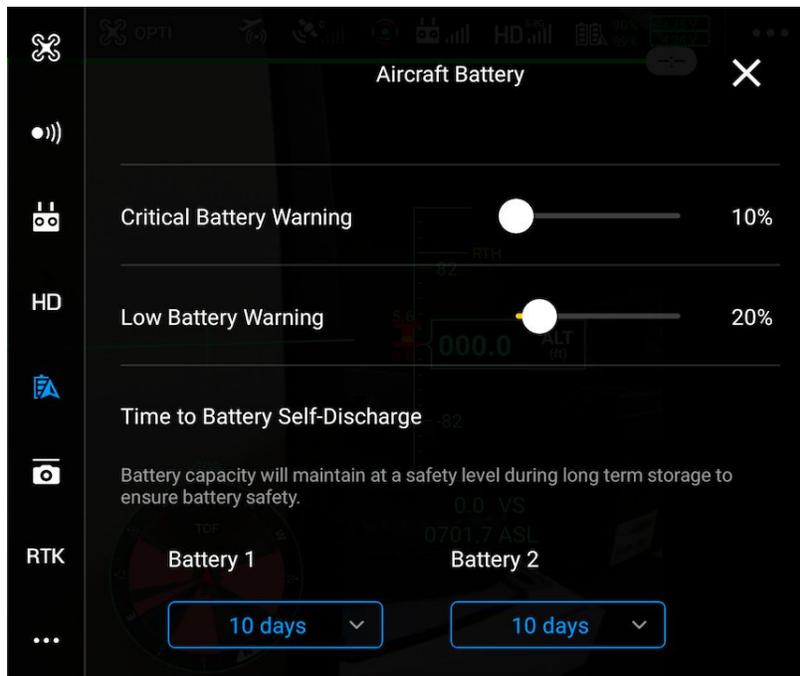
There is protection built into DJI chargers and batteries in regards to making sure batteries are not charged at incorrect temperatures. We cannot guarantee this feature will work with third-party chargers. In some situations, it is critical to get batteries charged as soon as they are at an acceptable internal temperature, and with a DJI charger it is ok to place a battery on the charger after a flight as long as the charger and battery are placed in a well-ventilated area (i.e. not covered or heated). If the charging need is not immediate, it is best practice to allow the battery to cool down before placing it on the charger.

The intelligent flight batteries are designed to stop charging when full. However, it is best practice to monitor the charging progress and disconnect the batteries when fully charged.

Battery Storage

The ideal storage temperature for DJI batteries is between 71.6°F and 86°F (22°C to 30°C). Though this may not always be possible, it is important to avoid habits such as storing batteries in vehicles that will routinely get very hot or very cold and are outside the recommended storage temperature. Always store batteries in a well-ventilated place away from direct sunlight and heat sources. Remove batteries from drones when storing. Do not allow batteries to get wet. Storing batteries at a proper temperature can help minimize non-recoverable capacity loss.

DJI Intelligent Batteries automatically discharge to protect the integrity of the battery cells. In most cases, you can set a time from 1 to 10 days in the app for the batteries to start self-discharging themselves down to 60%. If there is no option present in the app the battery will default to 10 days. If a battery is below 40-60% it should be charged until it reaches this range for storage.



For users who require batteries to always be at 100%, it must be understood that this will negatively affect the life and performance of lithium-ion batteries. When a battery is at 100% it places stress onto the cells and leaving that stress on the cells will accelerate a decrease in the batteries' capacity and operational life cycle.

We understand some operators such as public safety agencies are required to maintain their drones and batteries in 'ready to fly' condition at all times but do encourage teams to explore options for charging in the field to potentially allow the storage of some batteries at 60% instead of 100%. If the decision is made to keep a battery at 100%, it can be stopped from discharging by pressing the power button on the battery. This causes the battery to exit the idle state and resets the time to battery self-discharge to the previously defined time period i.e. 10 days.

Battery Handling

Take care not to drop batteries even when they are inside cases. Do not stack heavy items on top of lithium-ion batteries or cases containing lithium-ion batteries. This can damage the casing surrounding the battery cells which can lead to a short circuit.

Battery Use

Make sure the battery is fully charged before each flight.

Over-discharge can seriously damage the battery. Therefore, it is recommended to land the drone when the battery level is ~15% or greater to maximize the service life. If battery levels are depleted past ~15% please charge the battery as soon as possible.



For aircraft with a dual-battery design such as the M300 RTK and M200 Series, mark two batteries as a pair and continue using them as a pair (charge and discharge them together) to maximize the service life and ensure flight performance. Using this method the pairs will maintain very similar internal resistance.

In a low-temperature environment, the TB60, TB55, TB50, and M2E batteries have a self-heating feature. Once the battery is installed on the aircraft and the power is turned on, if the battery's temperature is low, it will automatically self-heat to keep the temperature at about 60.8°F to 68°F (16 °C to 20 °C). However, this self-heating will consume the battery power so the flight time will be reduced. Therefore, to maximize flight time or when using batteries without a self-heating feature such as the Phantom 4 models, it is suggested to heat the battery with an external heat source such as warm air inside a vehicle.

The self-heating function for equipped batteries can also be manually turned on by pressing and holding the power button (see below chart). This will keep the battery at an ideal temperature range for 30 minutes. The self-heating function can be turned off by holding the power button.

Battery Type	To Turn Manual Self-Heating On	To Turn Manual Self-Heating Off
TB60	Hold for 5 seconds	Hold for 5 seconds
TB55	Hold for 4 seconds	Hold for 2 seconds
TB50	Hold for 4 seconds	Hold for 2 seconds
M2E	Hold for 5 seconds	*Battery will maintain an ideal temperature for 20 minutes



Battery Maintenance

The steps below are critical to making sure your batteries are ready to go and are properly calibrated. Specifically, charging and discharging the battery ensures an accurate digital readout of battery percentage which is a vital metric when operating your drone. If this process is ignored the battery percentage margin of error will be amplified by continued operations.

Complete the following every 3 months or 50 cycles (whichever comes first)

1. Charge and discharge batteries per instructions below.
2. Make sure the cell voltage difference is less than 0.1V after the battery is fully charged and left stationary for 6 hours.
3. Make sure the battery is not swollen, leaky, or damaged. See section: "Battery Issues: Signs to Look For" below.
4. Clean battery terminals with a clean dry cloth and make sure they are clean.
5. Make sure battery firmware is updated to the latest version. See section: "Battery Care and Maintenance: Firmware"

Charge and Discharge Instructions:

1. Charge the battery to 100% and leave the battery stationary for more than 24 hours.
2. Install the battery into the aircraft. Fly the aircraft and when the remaining power level is less than 20%, land the aircraft and remove the battery.
3. Leave the battery stationary for more than six hours.
4. Check cell voltage.
5. Charge the battery to 100% power level.
6. Repeat the above steps 1-4.

Battery Retirement

Properly utilizing, handling, and storing batteries will ideally allow for 200 charging cycles before a battery should be taken out of service. Retirement of batteries based on a cycle count is a difficult gauge to go by as there is no standard as to what defines a cycle, for the case of a DJI battery it is any time the battery is charged. It is also important to look for any other issues that may be present (which we detail in the next section) when making a battery retirement decision.



Battery Issues

Signs to Look For

Batteries should be taken out of service and replaced under the following circumstances:

- Visibly swollen, leaking, or damaged (cracks, dents, etc...).
- Bent terminals (could cause a short circuit)
- There is an in-app notification/prompt regarding battery cell damage or over-discharge
- 200 cycles
- Battery error still exists after performing the standard charge and discharge operations twice continuously.
- Crash or hard impact.

Communicating with DJI

Reach out to our support team at support@dji.com with any battery issues. If your battery is within warranty (6 months and under 200 cycles) our team will provide instructions for replacement.

Battery Disposal

Step 1. Place the battery into the aircraft or use the battery to charge a mobile device via a Battery to Power Bank Adapter, discharging the battery until the battery turns off.

Step 2. Immerse the battery in saltwater with a concentration of 5% (for example, the mixture of 50 grams of salt and 1 kilogram of water) for 8 to 12 hours, to fully discharge the battery. Then the battery can be regarded as safe. **Saltwater must be used to immerse the battery. With tap water, the battery cannot be fully discharged and such operation may even cause a potential safety hazard.**

Note: If the battery is too swollen to be installed into the aircraft to be discharged, or it just cannot be turned on, please directly immerse the battery into saltwater with a concentration of 5% or so for 24 to 48 hours to get it fully discharged.

Step 3. After the battery is fully discharged, please dispose of the battery in accordance with local regulations regarding battery recycling and disposal in your area. DJI will take no responsibility for any accidents or issues caused by customers continuing to use a swollen battery.