

Tools

DJI Drones for Mapping: DJI Phantom 4 Pro and the DJI Inspire 2



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There are lots of drones to choose from for mapping purposes, but a couple of stand-outs from DJI are the Phantom 4 Pro and the Inspire 2. They both provide excellent flight times and they also have mechanical shutters. This is important to eliminate the geometric distortions inherent with electronic rolling shutters, which are typical in less expensive drones with built-in or custom cameras. They both can be flown for mapping type missions using DJI's new Ground Station Pro application for iPad. The new app has lots of features that are perfect for collecting imagery for photogrammetric use. They are quite different in price and size however, so how do you choose?



Figure 1 - Phantom 4 Pro

Phantom 4 Pro

The Phantom 4 Pro sells for \$1499, and includes an integrated gimbal and 20MP camera. The camera uses a fixed focal length lens with a 35mm-equivalent focal length of 24mm. This is very good for mapping, since it gives good sized-footprints on the ground, while not being so wide as to introduce

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significant perspective distortions. At the FAA 400-foot ceiling, the ground coverage is 600' x 400', with a ground sample distance (GSD) of 1.3 inches.

The Phantom uses a single 5870 mAh battery. Flights times of up to 30 minutes are achievable under ideal conditions. For a typical mapping mission, this should provide coverage of over 100 acres, while still maintaining a conservative battery safety margin. Extra batteries can be purchased for \$169 each for flying larger areas.



Figure 2 - Inspire 2

Inspire 2

The Inspire 2 sells for \$2999, but includes only a built-in low-resolution FPV (first person view) camera. The primary camera is purchased separately. As an option, the same 20MP sensor and focal length used in the Phantom 4 Pro are available in a camera/gimbal combination, the X4S, for \$599. The Inspire 2, with the X4S, supports flight times of up to 27 minutes, similar to the Phantom 4 Pro. Due to its larger size however, the Inspire 2 requires two flight batteries, which are \$318 per pair.

The added cost does provide some additional advantages. The Inspire 2 uses batteries with a built-in self-heating system, which can be advantageous during cold weather, as temperatures below 50°F can significantly decrease flight times. The added mass of the Inspire 2 will also add to its stability in gusty wind conditions.

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Versatility, is another big advantage of the Inspire 2. The Inspire 2 has a retractable landing gear, and to make use of that, the camera supports user-controlled pointing in both the pitch and yaw axes, as opposed to the Phantom 4 Pro, which is limited to pitch only. Camera control can also be via a second operator (with optional 2nd controller). While not required for mapping use, these capabilities do make the Inspire 2 an excellent choice for inspection tasks, or other general aerial photography uses. Finally, the Inspire 2 also supports use of the X5S camera, which uses a larger sensor. Although the sensor resolution is approximately the same as the X4S, the larger sensor provides an extra stop of sensitivity, which extends the usable range of lighting conditions.

Conclusion

If you're trying to get started for a minimum cost, the Phantom 4 Pro is an excellent choice. If you have the extra to spend, the Inspire 2 certainly provides some additional advantages, as outlined above, particularly with its potential for inspection type uses.