The survey-grade mapping drone
<table>
<thead>
<tr>
<th>FLIGHTS TO DATE</th>
<th>FLIGHT HOURS</th>
<th>HA COVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>+380,000</td>
<td>+110,000</td>
<td>+19,000,000</td>
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</table>
### 3 reasons to choose the eBee RTK

<table>
<thead>
<tr>
<th>Survey-grade accuracy</th>
<th>Fully integrated workflow</th>
<th>Compatible with existing base stations</th>
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<tbody>
<tr>
<td>Absolute orthomosaic and digital surface model accuracy of down to 3 cm (1.2 in) without the need for GCPs – meaning less time in the field and high precision in even the most inaccessible areas.</td>
<td>The drone’s supplied eMotion ground control software connects to the base station and broadcasts correction data to the rover (the eBee RTK) – no additional logger or third-party software required.</td>
<td>The eBee RTK is compatible with most leading brands of base station and virtual reference station (VRS) networks, working seamlessly alongside your existing portfolio of instruments.</td>
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3 ways of working with the eBee RTK

01. Local base, known position:
   - Place your base station on a known position
   - Enter the base station’s coordinates and characteristics into eMotion
   - eMotion streams correction data to the drone via the ground modem

02. Local base, unknown position:
   - Position your base station in a convenient location
   - eMotion calculates your base’s approximate position
   - eMotion streams correction data to the drone via the ground modem
   - Correct your base’s position in post-processing to achieve a high level of absolute accuracy

03. Virtual reference station:
   - Configure your drone’s eMotion software to receive VRS/NTRIP correction data (internet connection and VRS/NTRIP subscription required)
   - eMotion streams correction data to the drone via the ground modem
We’ve performed around 100 flights with our senseFly drones in total. The eBee RTK has proved particularly well suited to topographic surveying along the coast due to its linear landing, ideal for landing on beaches, its survey grade accuracy and its wind resistance of up to 45 kilometres per hour.

Chris Drummond, Project Engineer/Drone Pilot, Water Research Laboratory, UNSW, Australia
senseFly’s acclaimed eMotion software makes it easy to plan, simulate and manage your mapping mission.

**Plan:** Import your preferred background map and define the region you want to cover. Then specify your required ground resolution (with a GSD of down to 1.5 cm) and image overlap. eMotion automatically generates a full flight plan, calculating the eBee RTK’s required altitude and displaying its projected trajectory.

To ensure your mission’s success eMotion includes a simulation mode. This virtual flight simulates wind strength and direction, allowing you to make any flight plan enhancements needed before launch.

**Configure:** If you know your base station’s coordinates, enter these into eMotion. If not, eMotion will calculate your base’s approximate position. Or configure eMotion to receive VRS/NTRIP corrections. eMotion then streams correction data to the eBee via its USB ground modem.

**Launch:** Shake the eBee RTK three times to start its motor, then throw it into the air. It flies, captures images and lands itself, while the artificial intelligence inside the eBee’s autopilot continuously analyses IMU and GPS data to optimise every aspect of its flight.

**Monitor:** Use eMotion to view the drone’s flight parameters, battery level and image acquisition progress in real time. Need to make an adjustment? Re-program the eBee’s flight plan and landing point during its flight.
We like that the eBee RTK is easy to transport, quick to set-up, the software is excellent and the RTK functionality works great. It’s just a good option for our style of work.

Ben Simpson, Managing Director, Survey Group, Australia
Create georeferenced maps & models

Use eMotion’s Flight Data Manager to pre-process, geotag and organise your flight’s images. Then import these into your professional image processing software of choice, such as Pix4Dmapper Pro, to create a range of valuable outputs.

Orthomosaics

In just a few clicks, you can transform the eBee’s high-resolution aerial images into a georeferenced orthomosaic raster (also known as an orthophoto).

Format(s): GeoTIFF (.tif), KML tiles (png/kml)

Example usage: Background maps, 2D measurements, cadastre, urban/infrastructure/transport planning, forestry, marketing

“We use an eBee for many different projects: mapping, road and railway projects, power lines, dam and construction projects, renewable energy and more. For us, it is the most effective drone on the market - the perfect blend of user-friendliness, quality, price, support, and software.”

Diner Yılmaz, General Director Artu Harita, Turkey
Digital Surface Models (DSMs)

The DSM is an essential component of the orthomosaic process. It displays a continuous surface, featuring the tops of objects and structures such as trees and buildings (inc. bare earth when nothing is obscuring it). Ground-based objects can also be removed to produce a digital terrain model (DTM).

Point clouds

These comprise millions of individual points, each featuring X, Y, Z coordinates and an RGB value. Can also be classified for more specific analysis using classes such as ground, buildings and vegetation. A LiDAR-like output, except in the presence of ground-obscuring vegetation, point clouds are most often used for geometric and CAD-based work.

Outputs compatible with:

- Esri ArcGIS
- QGI5
- Inpho
- Erdas Imagine
- RealWorks
- Maptek
- 3DReshaper
- Surpac
- Mapbox
- GlobalMapper
- Autodesk
- StereoCAD
- Google Maps
- MicroStation
- Quick Terrain
- Agisoft
- ccViewer
- & many more

Example usage:
- Flood plain analysis, sunlight/signal coverage assessment, GIS applications, spatial analysis
- 3D line & surface area measurement, volumetric calculation (i.e. stockpiles)

Drone vs LiDAR point clouds: http://goo.gl/T1DA5b
Fully automated
• Create your flight plan
• Hand-launch (no catapult required)
• Flies, acquires images & lands itself

Green technology
• Low-noise brushless electric motor
• Rechargeable lithium-polymer battery
• Safe rear-facing propeller

Optimal range
• Up to 40 min flight time
• Maximum flight coverage of 8 km² (3 mi²)*

"Our eBee RTK projects, including a 30-mile corridor for California High Speed Rail, have yielded phenomenal quality, accuracy and ROI. Our costs were approximately 50% compared to using manned aircraft and we cut our delivery times by more than half."

Marc A. Cañas, GISP, Vice President, J.L. Patterson & Associates, Inc., USA

"The eBee has given me the best R.O.I. of any surveying tool I own."

Prof. Tosa Ninkov PhD, Owner, GeoGIS Consultants, Serbia

* Based on the following test conditions: target ground resolution of 30 cm (11.8 in) / pixel, no wind, moderate weather temp. (18 °C/64.4 °F), new fully charged battery, flight altitude of 1,000 m (3,280 ft) above ground level, take-off at approx. sea level, take-off point in centre of desired coverage area.
18.2 MP still camera
• Fully controlled by eBee’s autopilot
• Automatic image acquisition & geotagging
• GSD of down to 1.5 cm per pixel
• Multiple additional camera options available (inc. thermal)

GNSS RTK antenna & receiver
• L1/L2, GPS & GLONASS
• Onboard RTK corrections at 20 Hz
• Receives corrections at 1 Hz from most leading brands of base station & VRS networks
• Absolute X, Y, Z accuracy down to 3 cm / 5 cm
• No ground control points required!

2.4 GHz radio link
• Communicates with eMotion via USB ground modem
• Approx. 3 km (1.86 mile) range

Super lightweight
• Ultra-light EPP foam body & wings
• 0.73 kg (1.61 lb) take-off weight
• Less kinetic energy than a kicked football
**Cameras**

**WX RGB**

Like all eBee cameras, this 18.2 MP model has been adapted so that it can be controlled by the drone’s autopilot. It acquires regular image data in the visible spectrum and its exposure parameters are set automatically.

**Technical features**

- **Resolution**: 18.2 MP
- **Ground resolution at 100 m (328 ft)**: 2.75 cm (1 in) / pixel
- **Sensor size**: 6.16 x 4.63 mm
- **Pixel pitch**: 1.26 μm
- **Image format**: JPEG

**senseFly S.O.D.A.**

The senseFly S.O.D.A. is the first camera to be designed for professional drone photogrammetry. It captures amazingly sharp aerial RGB images, across a range of light conditions, allowing you to produce detailed, vivid orthomosaics and highly precise digital surface models.

**Technical features**

- **Resolution**: 20 MP
- **Ground resolution at 122 m (400 ft)**: 2.9 cm (1.1 in) / pixel
- **Sensor size**: 1-inch (2.54 cm)
- **Pixel pitch**: 2.33 μm
- **Image format**: JPEG or JPEG + DNG

*optional in Turkey.*
thermoMAP

thermoMAP is a thermal infrared camera, featuring an integrated shutter for in-flight radiometric calibration. It can capture thermal video and still images, allowing you to create thermal maps of a site (for example, to assess a mine’s water distribution or to check the functionality of photovoltaic panels).

### Technical features

<table>
<thead>
<tr>
<th>Feature</th>
<th>S110 NIR</th>
<th>S110 RE</th>
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<tbody>
<tr>
<td>Resolution</td>
<td>12 MP</td>
<td>12 MP</td>
</tr>
<tr>
<td>Ground resolution at 100 m (328 ft)</td>
<td>3.5 cm (1.4 in) / pixel</td>
<td>3.5 cm (1.4 in) / pixel</td>
</tr>
<tr>
<td>Sensor size</td>
<td>7.44 x 5.58 mm</td>
<td>7.44 x 5.58 mm</td>
</tr>
<tr>
<td>Pixel pitch</td>
<td>1.86 µm</td>
<td>1.86 µm</td>
</tr>
<tr>
<td>Output formats</td>
<td>JPEG and/or RAW</td>
<td>JPEG and/or RAW</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 134 g (4.7 oz)</td>
<td>Approx. 134 g (4.7 oz)</td>
</tr>
<tr>
<td>Operating altitude</td>
<td>75 - 150 m (246 - 492 ft)</td>
<td>75 - 150 m (246 - 492 ft)</td>
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S110 NIR

Like all eBee Ag cameras, this customised 12 MP model has been adapted so that it can be controlled by the drone’s autopilot. It acquires image data in the near infrared (NIR) band, the region where high plant reflectance occurs. Its exposure parameters can be set manually and its RAW files are fully supported by the eBee Ag’s software.

S110 RE

Unlike the NIR camera above, the 12 MP S110 RE acquires data in the red edge band, the region where a plant’s reflectance changes from low to high. The S110 RE’s exposure parameters can also be set manually and its RAW files are fully supported by the eBee Ag’s software.
At senseFly, we believe in using technology to make work safer and more efficient. Our proven drone solutions simplify the collection and analysis of geospatial data, allowing professionals in surveying, agriculture, engineering and humanitarian aid to make better decisions, faster.

senseFly was founded in 2009 and quickly became the leader in mapping drones. The company is a commercial drone subsidiary of Parrot Group. For more information, go to www.sensefly.com.

Where can you buy your eBee?
Visit www.sensefly.com/about/where-to-buy to locate your nearest distributor.
Package contents:

- eBee RTK body (inc. all electronics & built-in autopilot)
- Pair of detachable wings
- WX still camera (inc. SD card, battery, USB cable & charger)
- GNSS antenna
- 2.4 GHz USB radio modem for data link (inc. USB cable)
- Two lithium-polymer battery packs & charger
- Spare propeller
- Carry case with foam protection
- Remote control & accessories (for safety pilots)
- User manual
- eMotion software download key (accessible via my.senseFly at no extra cost)

HARDWARE

- Wingspan: 96 cm (37.8 in)
- Weight (inc. supplied camera & battery): Approx. 0.73 kg (1.61 lb)
- Motor: Low-noise, brushless, electric
- Radio link range: Up to 3 km (1.86 miles)
- Detachable wings: Yes
- Camera (supplied): WX RGB (18.2 MP)
- Cameras (optional): senseFly S.O.D.A., thermoMAP, S110 NIR/RE
- Accessories (optional): Radio tracker, backpack, camera protection kit

SOFTWARE

- Flight planning & control software (supplied): eMotion
- Image processing software (optional): Pix4Dmapper Pro

OPERATION

- Automatic 3D flight planning: Yes
- Cruise speed: 40-90 km/h (11-25 m/s or 25-56 mph)
- Wind resistance: Up to 45 km/h (12 m/s or 28 mph)
- Maximum flight time: 40 minutes
- Maximum coverage (single flight): 8 km² (3 mi²)**
- Automatic landing: Linear landing with ~ 5 m (16.4 ft) accuracy
- Multi-drone operation: Yes
- Ground control points (GCPs) required: No
- Oblique imagery: 0 to -50°

RESULTS

- Ground sampling distance (GSD): Down to 1.5 cm (0.6 in) / pixel***
- Absolute horizontal/vertical accuracy (w/GCPs): No GCPs required
- Absolute horizontal/vertical accuracy (no GCPs): Down to 3 cm (1.2 in) / 5 cm (2 in)

*optional in Turkey.

** based on the following test conditions: target ground resolution of 30 cm (11.8 in) / pixel, no wind, moderate weather temp. (18 °C/64.4 °F), new fully charged battery, flight altitude of 1,000 m (3,280 ft) above ground level, take off at approx. sea level, take-off point in centre of desired coverage area.

*** depends upon environmental conditions (light, wind, surface type).
For eBee RTK updates subscribe to our newsletter at www.sensefly.com