RTK

eBee

senseFly

The **survey-grade mapping** drone

senseFly

a Parrot company


+380,000
FLIGHTS TO DATE
+110,000
FLIGHT HOURS
+19,000,000
HA COVERAGE
RTK
eBee
RTK
senseFly

3 reasons to choose the eBee RTK

Survey-grade accuracy

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.

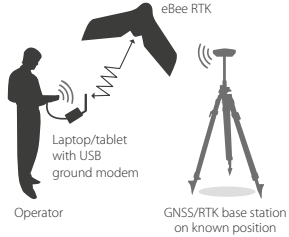
Fully integrated workflow

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.

Compatible with existing base stations

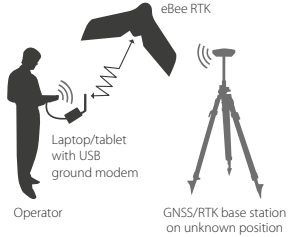
The eBee RTK is compatible with most leading brands of base station and virtual reference station (VRS) networks, working seamlessly alongside your existing portfolio of instruments.

3 ways of working with the eBee RTK



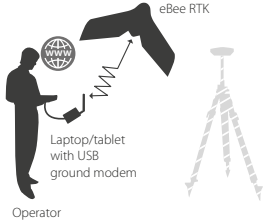
01. Local base, known position:

- 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

Plan & control your flight

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.

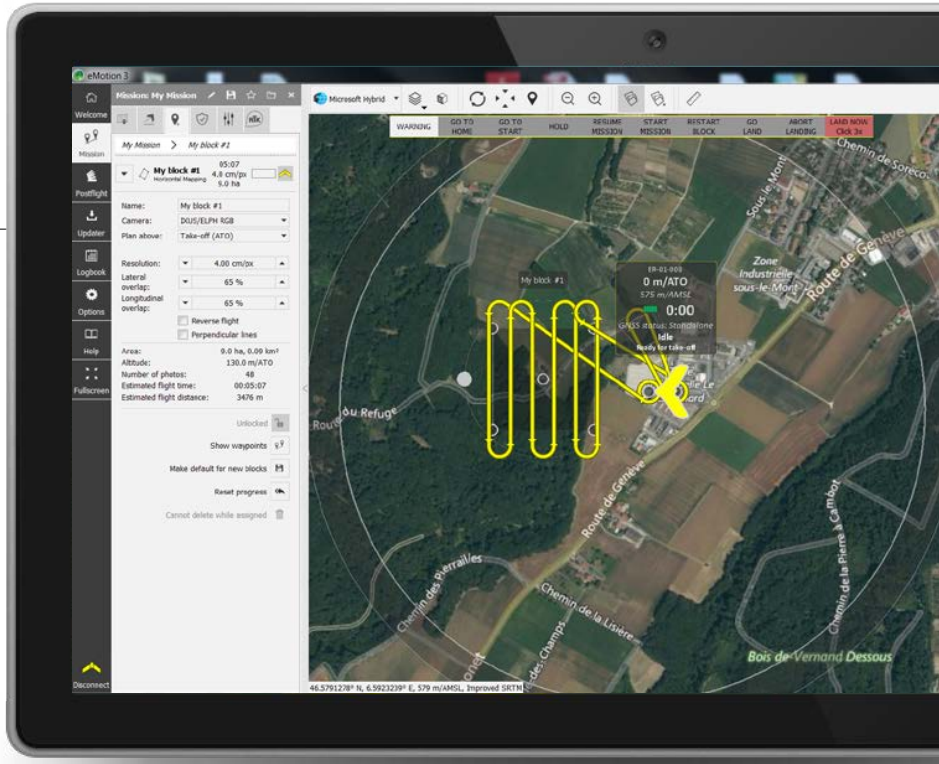
Launch: Shake the eBee RTK three times to start its motor, then throw it into the air. It flies, captures images and lands itself, while the artificial intelligence inside the eBee's autopilot continuously analyses IMU and GPS data to optimise every aspect of its flight.

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.

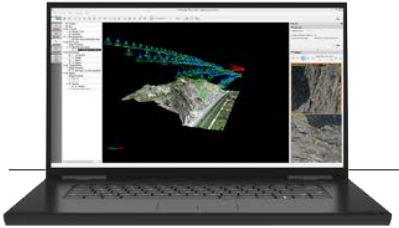
The eBee RTK is built with safety firmly in mind, from its ultra-light, shock-absorbent construction to its numerous embedded safety features. eMotion also includes a 3D flight planning feature. This uses real-world elevation data when setting the altitude of a flight's waypoints (shown above), for the most consistent ground resolution possible and the highest level of aircraft safety.

> *"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



Process

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.

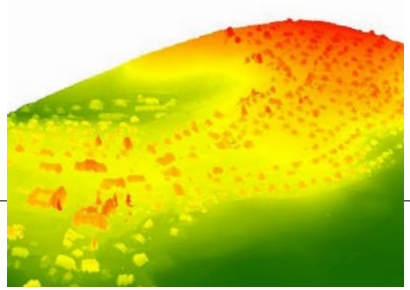
Orthomosaics

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 orthomosaicing 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).

Format(s):	GeoTIFF (.tif)
Example usage:	Flood plain analysis, sunlight/ signal coverage assessment, GIS applications, spatial analysis

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.

Format(s):	las, laz, ply, ascii
Typical usage:	3D line & surface area measurement, volumetric calculation (i.e. stockpiles)

Drone vs LiDAR point clouds: http://goo.gl/T1DA5b

Other common outputs:

INDEX MAP
GeoTIFF (.tif), shp

3D MESH WITH TEXTURE
Wavefront (obj)

CONTOUR LINES
dxf, shp

GOOGLE MAPS
KML tiles (png/kml)

Outputs compatible with:

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

Fully automated
- Create your flight plan
- Hand-launch (no catapult required)
- Flies, acquires images & lands itself

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

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

"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.*

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

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!

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)

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

Supplied*

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) / pixe
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

Resolution	640 x 512 pixels
Ground resolution at 75 m (246 ft)	14 cm (5.5 in) / pixel
Scene temperature	-40 °C to 160 °C (-40 °F to 320 °F)
Temperature resolution	0.1 °C (0.2 °F)
Temperature calibration	Automatic, in-flight
Output formats	TIFF images + MP4 video
Weight	Approx. 134 g (4.7 oz)
Operating altitude	75 - 150 m (246 - 492 ft)

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.

Technical features

Resolution	12 MP
Ground resolution at 100 m (328 ft)	3.5 cm (1.4 in) / pixel
Senseor size	7.44 x 5.58 mm
Pixel pitch	1.86 µm
Output formats	JPEG and/or RAW

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.

Technical features

Resolution	12 MP
Ground resolution at 100 m (328 ft)	3.5 cm (1.4 in) / pixel
Senseor size	7.44 x 5.58 mm
Pixel pitch	1.86 µm
Output formats	JPEG and/or RAW

About senseFly

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.

eBee Plus
Aerial efficiency, photogrammetric accuracy

eBee SQ
The advanced agricultural drone

albris
The intelligent mapping & inspection drone

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

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 km^2 (3 mi^2)**
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.*

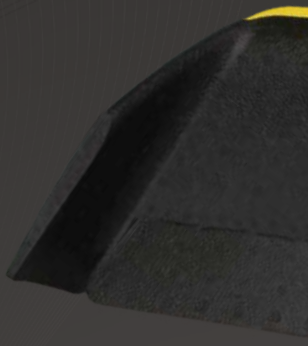
*** based on the following test conditions: target ground resolution of 30 cm (11.8 in) / pixel, no wind, moderate weather temp. (18 °C/64.4 °F), new fully charged battery, flight altitude of 1,000 m (3,280 ft) above ground level, take off at approx. sea level, take-off point in centre of desired coverage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

**** depends upon environmental conditions (light, wind, surface type).*

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)

EN



senseFly
a Parrot company

For eBee RTK updates
subscribe to our newsletter at
www.sensefly.com