



# Songbird 150

## High-Precision Mapping Series

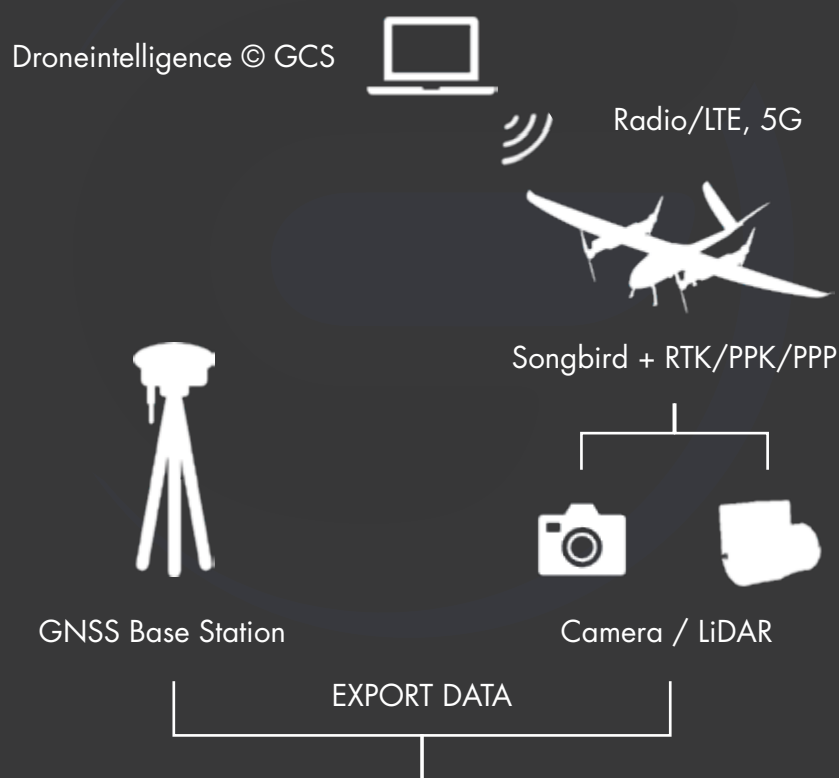
Germandrones develops innovative, reliable, industrial UAV hard- and software solutions "Made in Germany" for the best possible support of our customer's requirements.

# Germandrones Solution Provider

Our engineers have successfully developed innovative, reliable, industrial Unmanned Aerial Vehicle technology “Made in Germany” since 2016. Our VTOL-flagship “Songbird 150” is designed for the best possible support of our customer’s requirements. Based on the worldwide proven and reliable hardware concept we provide our clients complete solutions which lead to the best customer success ever.

An example is the Songbird 150 High-Precision Mapping Solution with everything needed to benefit from innovative technology immediately whether you are a surveyor, data analyst or farmer.

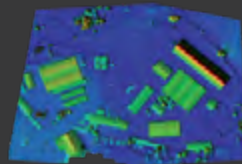
# HARDWARE



# SOFTWARE



Trajectory Calculation



Digital Surface Model



Orthomosaic



3D-Point Cloud

# TRAINING

Maintenance training



Drone Pilot training



Basic Data Processing training



Special courses

As a result of years of R&D the Songbird 150 can fly more than two hours with light-weighted payloads or even more than one hour with heavy ones (maximum payload weight available is 4.4kg), which makes it unique, versatile solution. With this solution Germandrones has proven to survey 500ha or more than 700 soccer fields in only one flight and less than 90 minutes with an absolute 3D accuracy below 3cm.





Vertical take-off fly  
wherever you want



Changeable payload



Electric power system for  
long endurance flights



120+ min flight time



Automatic flight with  
Droneintelligence © GCS



5 – 10min to assemble

## TECHNICAL SPECIFICATIONS

|                        |                             |
|------------------------|-----------------------------|
| Wingspan [cm]          | 2.98/3.12m                  |
| MTOM [kg]              | 14.0                        |
| Maximum Payload [kg]   | 4.4                         |
| Body Material          | Fiberglass/Carbon Composite |
| Working Speed [m/s]    | 17 – 32                     |
| Max. Flight time [min] |                             |
| - camera only          | more than 2 hours           |
| - max. payload         | 45                          |
| - typical              | 90                          |
| Range [km]             | 110 (depending on payload)  |
| Altitude [m]           |                             |
| - maximum              | 5,000                       |
| - at take-off          | 4,000                       |
| Wind Tolerance         |                             |
| - Start/Landing auto   | 7                           |
| - Start/Landing man.   | 11                          |
| - Fixed Wing Mode      | 15                          |
| Rain Tolerance         | moderate rain               |

|                         |                                                                                               |
|-------------------------|-----------------------------------------------------------------------------------------------|
| Propulsion              | 4 electric motors, tilt mechanism                                                             |
| Radio Control           | 433MHz, 2.4GHz                                                                                |
| Telemetry comand        | 68 – 900MHz, 433MHz, LTE / 5G                                                                 |
| Safety Features         | Return to launch / Position hold / Land immediately / Land at defined places                  |
| Video Features          | Set Loiter Points / Go to location / Point to location / Follow target / Go to the coordinate |
| Flight Controller       | PixHawk Cube / PX4 Stack                                                                      |
| Ground Control Software | Germandrones, own development                                                                 |

## IN THE BOX

- Songbird 150
- Payload with different sensors
- Droneintelligence © Ground Control Software by Germandrones
- Data processing software
- Individual training

## PAYLOAD OPTIONS

The Payload integration kits are designed to make our customer experience as simple as possible. Replacement of interchangeable payloads needs only a few minutes in field conditions.



### Sony Alpha 7

Spectral Channels: RGB

GSD: 2.8cm/px @100m AGL  
(Sensor resolution: 24MP, f: 21mm)



### Phase One

Spectral Channels: RGB

GSD: 1,5cm/px @100m AGL  
(Sensor resolution: 50MP, f: 35mm)

GSD: 1cm/px @100m AGL  
(Sensor resolution: 100MP, f: 35mm)



### Flir Vue Pro 640

Spectral Channels: thermal infrared 7.5 – 13.5µm

GSD: 10cm/px @50m AGL  
(Sensor resolution: 640 x 512px, f: 9mm)



### LiDAR Surveyor Ultra

Spectral Channels: LiDAR Resolution

3cm system accuracy @90m AGL



### MicaSense Altum-PT

Spectral Channels: Blue, Green, Red , Red Edge, Near-IR

FLIR LWIR thermal infrared 7.5 – 13.5um radiometrically calibrated

GSD (Multispectral): 5.28cm/px @120m (each sensor size 3.2MP)

GSD (Thermal): 33.5cm/px @120m (sensor size 320 × 256 )

GSD (Panchromatic): 2.49cm @120m (sensor size 12MP)



### Agrowing ALPHA 7RXXX SEXTUPLE

Spectral Channels: 405; 430; 450; 490; 525; 550;  
560; 570; 630; 650; 686; 710; 735; 850

GSD: 2cm/px @120m AGL

(Sensor resolution: 8MP per each band)



## DRONEINTELLIGENCE © GROUND CONTROL SOFTWARE

### Professional flight planning software

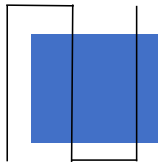
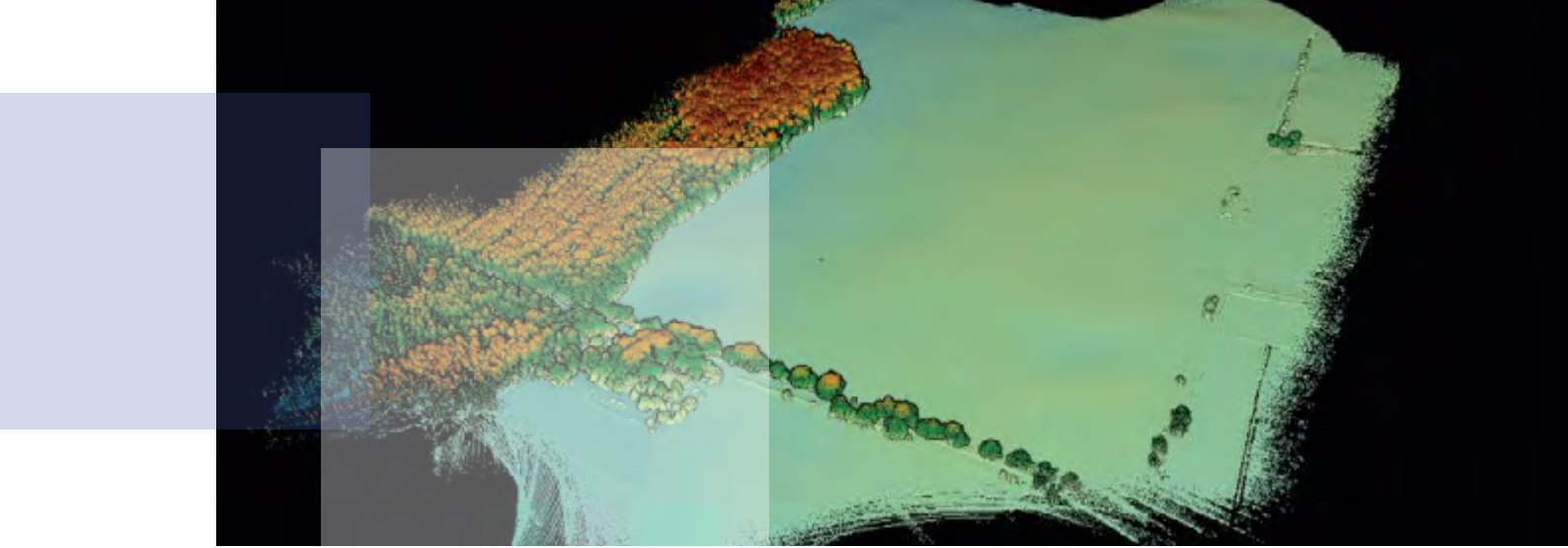
We designed our flight planning software to make mapping easy and multifunctional at the same time. It has everything essential for professional mapping and is still easy to use.

Our customers should do only a few simple steps, like set the area of interest and basic input parameters for the flight, and then optimal route planning including terrain information will be done automatically.

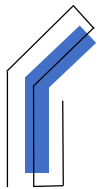
An opportunity to use SRTM data (Shuttle Radar Topography Mission) helps to choose the best flight parameters directly in the software. It is possible to use it either for the terrain follow mode or to check the elevation changes so that the best take-off point can be chosen and dangerous zones will be avoided.

For the increasing demand of BVLOS-flights (beyond visual line of sight), we integrated and successfully tested the use of ADS-B/FLARM technology to operate in cooperation with manned air traffic including operation in controlled air space via our Droneintelligence © GCS.

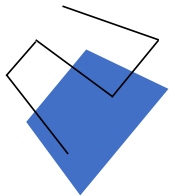
Ongoing development of our software in conjunction with our hard- and software maintenance concept allows our clients to use the extending range of safety features, flight mission applications and payloads.



Area mapping



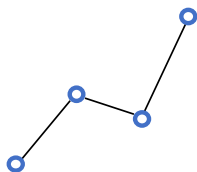
Corridor mapping



Terrain follow mode



Boundry import



Waypoint missions



## ACCURATE GEOTAGGING

The Songbird 150 High-Precision Mapping Solution is designed to provide centimetre-level data accuracy with no compromises. Due to clients requests, we integrated two of the most popular GNSS solutions on the market.

Each Songbird can be equipped either with a high-performance Global Navigation Satellite System (GNSS)-inertial solution with dual IMUs ("APX-20 UAV") or by a single board GNSS-inertial solution ("APX-15 UAV"). Both variants are powered by technology from the market leader Trimble. Our customers are thus able to use the best market solution.

The highly accurate post-processed position and orientation solutions are used for direct georeferencing of cameras, lidars and other sensors.

There is also an option for our clients to bundle the Songbird 150 High-Precision Mapping with the solutions from Klau Geomatics which uses industry-leading NovAtel GNSS hardware at the core of its products.

It additionally provides our clients with the benefit of using PPP services to receive sufficient accuracy even without information from GNSS base stations.



## APX-20 UAV GNSS RECEIVER SPECIFICATIONS

Advanced Applanix IN-Fusion™ GNSS-Inertial integration technology

Dual IMU with solid-state MEMS inertial sensors with Applanix SmartCal™ compensation technology

Advanced Trimble Maxwell Custom GNSS survey technology

336 Channels

GPS: L1 C/A, L2C, L2E, L5

GLONASS: L1 C/A, L2 C/A, L3 CDMA8

BeiDou: B1, B2

Galileo1: E1, E5A, E5B, E5AltBOC

QZSS: L1 C/A, L1S, L1C, L2C, L5, LEX

SBAS: L1 C/A, L5

MSS L-band: Trimble RTX, OmniSTAR

Position

SPS 1.5 – 3.0m

RTK 2 – 5cm

PP-RTX 3 – 6cm

Post Processed 2 – 5cm



## OEM7700 GNSS RECEIVER SPECIFICATIONS

### Signal tracking

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GPS L1 C/A, L1C, L2C, L2P, L5

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GLONASS2 L1 C/A, L2 C/A, L2P, L3, L5

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Galileo3 E1, E5

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AltBOC, E5a, E5b, E6

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BeiDou B1I, B1C, B2I, B2a, B2b, B3I QZSS L1 C/A, L1C, L1S, L2C, L5, L6

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NavIC (IRNSS) L5 SBAS L1, L5 L-Band up to 5 channels

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### Horizontal position accuracy (RMS)

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Single point L1 1.5m

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Single point L1/L2 1.2m

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SBAS4 60cm

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DGPS 40cm

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TerraStar-L5 40cm

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TerraStar-C PRO5 2.5cm

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TerraStar-X5 2cm

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RTK 1cm + 1ppm

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Initialization time < 10s Initialization reliability > 99.9%

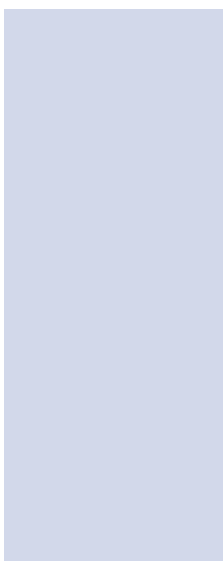
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## CONSULTING AND TRAINING

Our UAV-solutions are designed to generate maximum success for our clients on the base of optimal combination of the Songbird-VTOL with recommended payloads, software and trainings.

Pre consultancy to find the best equipment and operation procedures as well as after-sales services and maintenance are granted by experienced engineers and surveyors as well as by close partnerships with the leading suppliers of payloads and software.

We are happy when our customers are satisfied with the result. Our professional instructors can lead you through the entire implementation stages of UAV-technology in your existing company structure, even if you are missing any experience with this technology. Our mission is not only to produce one of the most reliable and productive VTOL-UAV, but also to create appreciably added values by the generated information for the clients' workflows.





# OUR TRAINING COURSES

## UAV Pilot training

EASA A2 Theory and Exam

Practical drone operation for BOS units

Songbird Advanced training:

- General UAS-Basics
- Introduction Songbird
- Droneintelligence © GCS application
- Training-Box and Simulator Sessions: Various Flight Modes, Designing a Simple Mission, Complex Missions, Emergency Actions, Return Home, Planning of Landing Approaches, Hands-On Exercises
- Songbird Specific Theory
- Practical Experience: Practice of Various Flight Modes with Training-UAV (Quadcopter, RC Plane...), Automatic Missions.
- Maintenance

## Basic Data processing trainings

Photogrammetry theory

Advanced mapping features

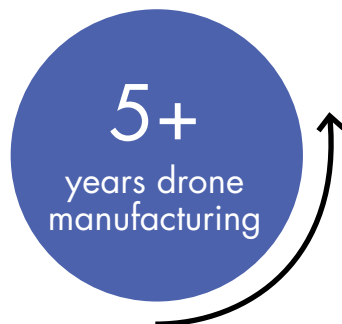
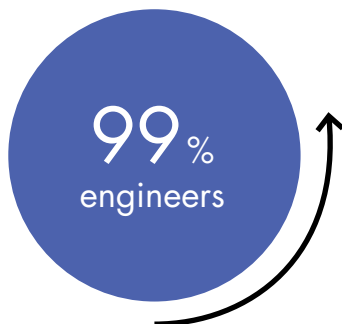
LiDAR data processing

## Special course

IR-Thermography with drones



**ISO 9001:2015  
CERTIFIED**



**Make it fly.**  
Safe and easy.



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