WingtraOne drone

Technical specifications

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01 Why Wingtra? 1

02 Accuracy FAQ* 2

03 Technical specifications WingtraOne 3
- Hardware
- **Flying in wind***
- Operations
- **Flight time, coverage and job time***
- Results
- Software & tablet
- Data link
- Battery
- Battery charger

04 Technical specifications cameras 10
- Available cameras
- RGB cameras
- Specialty cameras

* Blue sections in this brochure will help you understand the intricacies of drone operations, and how the environment and mission architecture influence drone performance and output. We therefore recommend that you read them carefully. With any arising questions, please contact Wingtra at **support@wingtra.com**

Why Wingtra?

Down to 1 cm (0.4 in) absolute accuracy

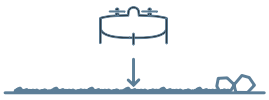
With a full-frame 42 MP Sony RX1R II camera and a multi-frequency PPK GNSS receiver, WingtraOne delivers best-in-class absolute accuracy down to 1 cm (0.4 in).

> **This level of accuracy is achievable under optimal conditions, on hard surfaces, using a well-established base station or correction data from CORS network. The results can be validated with high-accuracy checkpoints. See Accuracy FAQ on the following page for more details.**

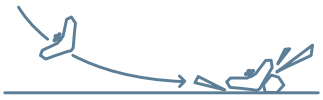
Take off and land vertically (VTOL)

Fly everywhere and avoid damaging your drone in belly landings. WingtraOne is able to take off and land like a helicopter and fly like a fixed-wing aircraft.

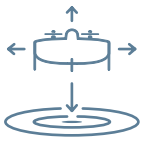
VTOL vs. fixed-wing



Each landing is safe even on gravel over many landings



Drone deteriorates with each landing and risks breaking on rocky terrain



Piloting easy like with a multicopter

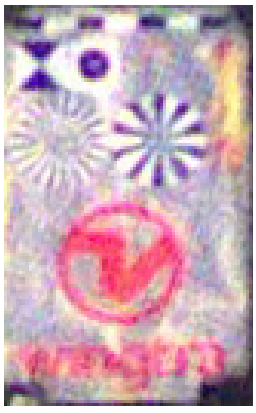
Fixed-wing piloting skills needed

42 MP and 0.7 cm (0.3 in) / px GSD

Best image quality in the industry for the highest map quality and accuracy.

Best possible GSD

Sony RX1R II 42 MP camera (with a WingtraOne drone)
GSD: 0.7 cm (0.3 in) / px



Other 20 MP camera
GSD: 2.55 cm (1 in) / px

Save time

In one flight, WingtraOne can map almost 2x more than a conventional fixed-wing drone and approximately 10 to 14x more than multicopter drones.

Same GSD of 1.2 cm (0.5 in) / px

WingtraOne RX1R II 42 MP
Coverage
110 ha (272 ac)
Altitude
93 m (305 ft)

Other fixed-wing drones 20 MP
Coverage
70 ha (173 ac)
Altitude
57 m (187 ft)

Multicopters 20 MP
Coverage
8 ha (20 ac)
Altitude
44 m (144 ft)

Accuracy FAQ

Wondering about Wingtra's 1 cm (0.4 in) absolute accuracy and how the results were validated? Below you will find a summary of the most frequently asked questions we get related to accuracy. To get the full picture, please read Wingtra's accuracy white paper available at wingtra.com/drone-survey-accuracy

What equipment was used to perform the survey?
WingtraOne PPK drone with a 42 MP Sony RX1R II camera.

Did you use GCPs for processing?
No, we did not use GCPs for processing as photogrammetry software is sensitive to the accuracy and distribution of GCPs, i.e., they can introduce tensions in the block adjustment.

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Targets on the ground with known locations are called either ground control points (GCPs), when used for georeferencing, or checkpoints, when used only to validate accuracy after georeferencing. We used checkpoints, which have no influence on the outputs (point clouds, orthomosaics, etc.).

How exactly did you validate the accuracy?
We performed two independent tests in the US and Switzerland. In Switzerland, we used a set of five checkpoints from the Institute of Geodesy and Photogrammetry at ETH Zurich. For research purposes, the institute defined the locations of these points within 2 mm (0.08 in) horizontal and 4 mm (0.16 in) vertical accuracy. Their accuracy is based on a high-accuracy network combining total stations and static long-time GNSS measurements. These measurements are then integrated into a stochastic model that takes into account the accuracy of each device **(Januth, T. (2017), chapter three*).**

In the US (Phoenix), Wingtra used two **HiPer V GNSS** antennas from Topcon. One was set up as a base station and was logging for around three hours. The second was set up as a rover using the correction data from the local base to measure the nine checkpoints. Due to the small baseline between the rover and the base station the coordinates were defined at a subcentimeter level relative to the base.

What measurement of accuracy were you using?
We used root mean square error (RMSE) on five (ETH) and nine (Phoenix) checkpoints and measured not just for one but over 14 flights.

Is this accuracy valid for every point of the point cloud?
Due to the variable quality of photogrammetry, we can only qualify validated control points to achieve this level of accuracy and not all points in the point cloud. Some individual points might have varying accuracy which can be observed as noise in the point cloud (e.g. over asphalt or close to water).

What GSD is your accuracy based on?
0.8 cm (0.3 in)

How are you extracting the position of the checkpoints? Orthophoto, point cloud, DEM, or a mixture of the above?
Checkpoints are manually measured in the aerial triangulation, and are part of the tie points (= coarse point clouds). This is the common method based on the usual SfM software.

Is this accuracy claim with respect to a global or local CRS?
All calculations have been done in WGS84 and CH1903+, the latter being local but derived from CHTR95 and ETRS89, which are global.

Is this accuracy claim valid for height, plan or 3D?
The 1 cm (0.4 in) accuracy claim refers to horizontal accuracy. As known from GPS technology and photogrammetry algorithms, the vertical accuracy lies between two and three times the horizontal accuracy.

Where can I get more details?
You can read the white paper and download the raw data at **wingtra.com/drone-survey-accuracy**. Or contact us at **support@wingtra.com** for further questions.

* Januth, T. (2017) "Robot validation with the QDaedalus system: Integration of a robot in a global reference frame". Master Thesis, HES-SO, Yverdon, Switzerland.

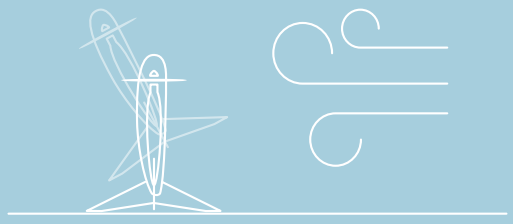
Technical specifications WingtraOne

Hardware

Drone type	Tailsitter vertical take-off and landing (VTOL)
Max. take-off weight	4.5 kg (9.9 lb)
Weight (empty)	3.7 kg (8.1 lb)
Max. payload weight	800 g (1.8 lb)
Wingspan	125 cm (4.1 ft)
Dimensions of WingtraOne	125 × 68 × 12 cm (4.1 × 2.2 × 0.4 ft) (without middlestand)
Dimensions of pilot box	57 × 37 × 20 cm, 8.6 kg (1.8 × 1.2 × 1.0 ft, 19 lb)
Battery capacity	Two 99 Wh batteries (a pair of batteries required)
Battery type	Li-ion, smart battery technology, UN3481 compliant
Radio link	Bi-directional 10 km (6 mi) in direct line of sight, keep in mind that obstacles reduce the range
Onboard GPS	Redundant, using GPS, Glonass and ready for Galileo and Beidou Frequencies range: 1561,098 MHz / 1575,42 MHz / 1602,00 MHz
Dimensions of travel hardcase (optional)	137 x 67 x 23 cm (54 x 26 x 9 in)
Weight of travel hardcase including the drone	18.6 kg (41 lb)

Flying in wind

We do not recommend flying WingtraOne in sustained winds higher than 8 m/s (19 mph) measured on the ground. The system can handle sustained winds of up to 12 m/s (27 mph) and will return to home in even stronger wind. To understand how wind might impact drone behavior consider that:



- Flight time might be compromised (see the detailed flight time section on the next page).
- Data quality can be reduced. However, the WingtraOne drone is more stable in wind than other fixed-wing drones in its class due to its heavier weight and stronger motors.
- Landing can be more tricky. Strong winds and uneven ground can cause the WingtraOne to tip over. Generally this is not a problem and damages rarely occur. The landings are still very accurate and predictable compared to belly landings. In calm conditions, WingtraOne lands smoothly on its tail.

Measured on ground*	Surface wind**	Tipping expectations
0-5 m/s (0-11 mph)	0-7 m/s (0-16 mph)	Tippings rarely occur
5-8 m/s (11-18 mph)	7-10 m/s (16-22 mph)	Tippings can occur
> 8 m/s (> 18 mph)	> 10 m/s (> 22 mph)	Not recommended to fly

Operation

Flight speed	Operational cruise speed Climb / sink cruise Climb / sink hover	16 m/s (35.8 mph) 6 / 3 m/s (13.4 / 6.7 mph) 6 / 2.5 m/s (13.4 / 5.6 mph)
Wind resistance	Up to 8 m/s (18 mph) wind speeds; 8 m/s (18 mph) wind speed measured on the ground corresponds to approximately 10 m/s (22 mph) surface wind	
Maximum flight time	Up to 59 min See next page or **knowledge.wingtra.com/flight-time** for what flight time to expect in different flying conditions	
Temperature	-10 to +40 °C (14 to 104 °F)	
Max. take-off altitude above sea level	2500 m (8200 ft); with high-altitude propellers it is possible to take off from up to 4800 m (15,700 ft) and fly up to 5000 m (16,400 ft) AMSL	
Weather	IP54, not recommended to fly in fog, rain and snow	
Ground control points required	No (with PPK option); using 3 checkpoints to verify the accuracy is recommended	
Auto-landing accuracy	< 5 m (< 16 ft)	

* As measured with the wind measurement tool from the pilot box—approximately 2 m (7 ft) above the ground (raise the tool above your head to measure; do not stand close to large objects like buildings or trees)

** As referenced in most weather forecasts—approx 10-20 m (33-66 ft) above the ground

Flight time, coverage and job time

WingtraOne's maximum tested flight time is 59 minutes. However, the flight time of any drone is influenced by many factors, so it will not be uniform throughout different missions. Coverage and job time are also influenced by more factors than just flight time, namely flight speed and the payload.

Flight time

Payload
Using a heavier payload reduces flight time. For example, when switching from the QX1 20MP camera with a 20 mm lens and no PPK module to the heavy RX1R II camera with a PPK module, the flight time reduces from 59 minutes to 52 minutes. However, at 3 cm (1.2 in)/px GSD, the RX1R II covers 400 ha (988 ac) in 52 minutes, whereas the QX1 camera covers 310 ha (766 ac) in 59 minutes. So even though the flight time is shorter with the RX1R II, you get your job done faster.

Altitude above sea level
As the air gets thinner with increasing altitude above sea level, drone flight time is reduced. However, the coverage you get during the flight time, still highly depends on the payload you use at respective altitude. For example, the RX1R II camera with PPK module covers 350 ha (865 ac) in 40 minutes at 2000 m (6562 ft) above sea level (with 3 cm (1.2 in)/px GSD). In contrast, the QX1 camera would cover less when flying for 59 minutes at sea level. So even though flight time is shorter of the RX1R II, you can acquire more data.

Transition height
Because the WingtraOne uses significantly more energy while hovering, the transition altitude affects flight time. A higher transition altitude will result in a reduced flight time.

Wind
In stronger winds, drones consume more energy while flying and landing, which means missions will end up with shorter flight times.

Temperature
As temperature influences air density, it impacts flight time directly. Generally, higher temperatures mean lower flight times.

Payload and PPK option	Take-off altitude above sea level	Max. flight time	Cruise speed	Max coverage at GSD 3 cm/px (1.2 in/px)	Max coverage at 120 m / 400 ft
QX1 / 20 mm no PPK	0-500 m 0-1640 ft	59 min	16 m/s 36 mph	310 Ha 766 ac	270 Ha / GSD 2.6 cm/px 667 ac / GSD 1.0 in/px
QX1 / 20 mm no PPK	2000 m 6560 ft	47 min	18 m/s 40 mph	270 Ha 667 ac	240 Ha / GSD 2.6 cm/px 593 ac / GSD 1.0 in/px
RX1R II + PPK	0-500 m 0-1640 ft	52 min	16 m/s 36 mph	400 Ha 988 ac	210 Ha / GSD 1.5 cm/px 519 ac / GSD 0.6 in/px
RX1R II + PPK	2000 m 6560 ft	40 min	18 m/s 40 mph	350 Ha 865 ac	180 Ha / GSD 1.5 cm/px 445 ac / GSD 0.6 in/px

Reference conditions: one flight, 20 m (66 ft) transition altitude, 1.2 km (0.7 mi) farthest distance from home, < 1 m/s (2.2 mph) wind, 15°C (59°F) air temperature, 60% side overlap, standard propellers. For more details, visit knowledge.wingtra.com/flight-time

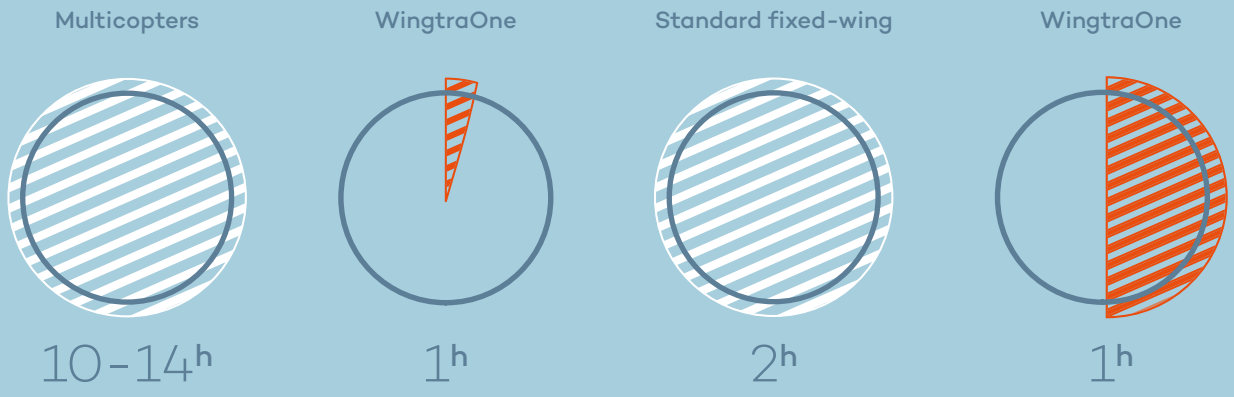
Coverage

Coverage is the area of the ground you are mapping in a single flight. For most applications, coverage per flight is much more important than flight time. It is influenced by resolution, flight altitude, sensor size and side/front overlaps.

The RX1R II camera can cover more area at 3 cm (1.2 in)/px GSD in 40 minutes than the QX1 camera in 59 min. On the other hand, if you have to fly at 120 m (400 ft), the QX1 covers more area than the RX1R II, but it also gives you a lower 2.6 cm (1 in)/px GSD compared to the 1.5 cm (0.6 in)/px GSD of the RX1R II. So picking the right configuration for your use case and environment is at utmost importance.

Job time

At the end of the day, it is not about flight time, but rather about how fast you can acquire data on a given area. Compared to multicopters, the WingtraOne can acquire data up to 14x faster. Compared to most fixed-wings it's twice as fast. In many cases, the right camera and settings can get you the data you need faster, even if the flight time might be shorter.



Data capture time comparison between multicopter drones and WingtraOne. Up to 14 times faster means that a one-hour data capture job in the field with a WingtraOne equals 10 to 14 hours in the field with a multicopter.

Data capture time comparison between standard fixed-wing drones and WingtraOne. Up to 2 times faster means that a one-hour data capture job in the field with a WingtraOne equals 2 hours in the field with a standard fixed-wing drone.

Results

Max. expected coverage in one flight at 120 m (400 ft) altitude above take-off point*	QX1 + 20 mm RX1R II	270 ha (667 ac) 210 ha (519 ac)	2.6 cm (1.0 in)/px GSD 1.5 cm (0.6 in)/px GSD
Max. expected coverage in one flight at 3 cm/px (1.2 in/px) GSD*	QX1 + 20 mm RX1R II	310 ha (766 ac)) 400 ha (988 ac)	141 m (463 ft) altitude 234 m (768 ft) altitude
Lowest possible GSD	0.7 cm (0.3 in)/px at 55 m (180 ft) altitude with the Sony RX1R II 1.4 cm (0.55 in)/px at 65.8 m (216 ft) altitude with the Sony QX1		
Mapping accuracy with PPK (w/o GCPs)	+ Absolute accuracy (RMS) with RX1R II + Relative accuracy	horizontal: down to 1 cm (0.4 in); vertical: down to 2 cm (0.8 in) horizontal: down to 0.003 %	
Mapping accuracy w/o PPK (w/o GCPs)	+ Absolute accuracy (RMS) + Relative accuracy	3 to 5 m (9.8 to 16.4 ft) horizontal 0.15 %	

Software & tablet

Flight planning & mission control software	WingtraPilot
Tablet (supplied)	Rugged Samsung Galaxy Tab Active 2, water and dust resistant, MIL-STD-810-certified, pre-installed; interfaces to telemetry module and manual back-up controller

Data link and RC system

	Data link	**RC system**
Module name	WingtraOne Telemetry 2.4	FrSky Taranis X9D Plus
Main function	Telemetry connection for remote operation	Pilot inputs
Frequency range telemetry	2.4016-2.4776 GHz	2.405-2.474 GHz
Occupied bandwidth	6.0MHz	69.0 MHz
Operation mode	FHSS (Frequency Hopping Spread Spectrum)	
Typical datarate	57.6 kb/s	
Transmission power (EIRP)	19,8 dBm	19,5 dBm
Tested max. range	10 km (6 mi) indirect line of sight, keep in mind that obstacles reduce the range	
Channel spacing	1,0Mhz	1,5 Mhz
Number of channels	76	47
Channel bandwidth	Low400kHz High280kHz	Low 450 kHz High 200 kHz
Method of modulation	GFSK	2-FSK

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In case of many obstacles in the visual line of sight or BVLOS missions, you can increase connection loss timeout parameter on WingtraPilot. It defines the maximum time a connection loss of telemetry is tolerated until a mission is aborted. Therefore the missions will be able to continue even if there is no

* Reference conditions: 20 m (66 ft) transition altitude, 1.2 km (0.75 mi) farthest distance from home, < 1m/s (2 mph) wind, 15°C (59°F) air temperature, 60% side overlap; max. take-off altitude — 500 m (1640 ft) above sea level

Battery

Module name	Wingtra Battery 2
Trade name	Lithium-ion battery
Model number	10.00342.02
Battery capacity	99 Wh (a pair of batteries required)
Battery type	Li-ion, smart battery technology, UN compliant ; suitable for carry-on luggage
State-of-charge indicator	Integrated 5 level SoC indicator
Smart charging	Auto cell balancing
Rated energy content	99 Wh
Nominal voltage	14.4 V
Rated charge	7.5 A, 16.8 V cutoff
Rated discharge	35 A, 12 V cutoff
Cell type	Samsung_INR_18650_25R
Configuration	4s 3p configuration
Charging time	1 h
Max. continuous discharge	35 A
Battery dimensions	80 × 60 × 75 mm (3.15 × 2.36 × 2.95 in)
Battery weight	604 g (1.3 lb)
Operating temperature (take-off)	10° C-40° C (50° F-104°F)
Operating temperature (in-flight)	10° C-60° C (50° F-140°F) The drone will automatically return to home in case the maximum battery temperature is exceeded during flight.
Storage temperature (90% capacity recovery)	0° C-25° C (32° F-77°F)
Shock protection	yes
Overvoltage protection	yes
Undervoltage protection	yes
Temperture protection	yes
Short circuit protection	yes
Material safety data sheet (MSDS)	Available on request

Battery charger

Module name	Wingtra Charger
Charger type	Dual AC/DC lithium-ion charger
Input voltage AC	110-120 V / 220-240 V (manual switch), 50 / 60Hz
Input power AC	350 W
Input voltage DC	11 - 18 V (optional, e.g. for charging from car)
Input power DC	300 W (reduced power possible)
Modes	Charge / Storage / Balance
Charging cylce	Standard lithium-ion CC-CV cycle
Charging time	1 h
Max. charge current	7.5 A
Charge end voltage	16.4 V (4.1 V per cell)
Max. discharge current	0.6 A
Discharge end voltage	3.7 V (30 % charge)
Addtional outputs	USB 5V / 2.1 A
Dimensions	190 × 140 × 70 mm (7.5 × 5.5 × 2.75 in)
Weight	1170 g (2.6 lb)

Technical specifications cameras

Available cameras

Modular payloads	Yes, with a single USB-C connector
Power supply	Flight batteries (13 W)
Payload protection	Yes, fully integrated into WingtraOne via smooth vertical landing feature
Payloads	+ Sony RX1R II / 35 mm lens, full-frame sensor, 42 MP, RGB + Sony QX1 20 mm (optional 15 mm Voigtländer lens), APS-C sensor, 20 MP, RGB + MicaSense RedEdge-MX, 5.5 mm, 5 x 1.2 MP, multi-spectral camera + MicaSense Altum, 8 mm, 5 x 3.2 MP, multi-spectral and thermal infrared

RGB cameras



Camera name	Sony RX1R II The highest quality payload for 1 cm (0.4 in) accuracy	Sony QX1 Professional payload for surveying	Sony QX1 15 mm (0.6 in) A high quality payload for 3D reconstruction
Technical specification	35 mm lens, full-frame sensor, 42 MP	20 mm lens, APS-C sensor, 20 MP	15 mm Voigtländer lens, APS-C sensor, 20 MP
Main quality features	Highest accuracy, best coverage to GSD ratio, sub-cm GSD	High image quality, flexible lens options	High quality, largest coverage at limited flight altitude, flexible lens options
Camera weight (incl. mount)	575 g (1.27 lb)	330 g (0.73 lb)	600 g (1.32 lb)
Lowest possible GSD	0.7 cm/px 0.28 in/px	1.4 cm/px 0.55 in/px	1.4 cm/px 0.55 in/px
Maximum coverage at lowest GSD	Up to 100 ha (247 ac) at 57 m (188 ft) flight altitude	Up to 150 ha (370 ac) at 66 m (218 ft) flight altitude	Up to 130 ha (320 ac) at 50 m (164 ft) flight altitude
Maximum coverage at 120 m (394 ft)	Up to 210 ha (520 ac) at 1.5 cm (0.6 in)/px GSD	Up to 270 ha (670 ac) at 2.6 cm (1 in)/px GSD	Up to 320 ha (790 ac) at 3.4 cm (1.3 in)/px GSD
Sensor type	Full frame	APS-C	APS-C
Sensor size x	35.9 mm (1.41 in)	23.2 mm (0.91 in)	23.2 mm (0.91 in)
Sensor size y	24 mm (0.94 in)	15.4 mm (0.61 in)	15.4 mm (0.61 in)
Shutter type	Leaf shutter	Focal plane	Focal plane
Pixel in x	8000	5456	5456
Pixel in y	5320	3632	3632
Focal length of lens	35 mm (1.38 in)	20 mm (0.79 in)	15 mm (0.59 in)
Focal length (35 mm equivalent)	35 mm (1.38 in)	30 mm (1.18 in)	22.6 mm (0.89 in)
Veritcal angle of view	37.8°	42.1°	54.3°
Horizontal angle of view	54.3°	60.2°	75.4°
Minimal trigger time	0.6 s	1.4 s	1.4 s
Minimal trigger distance	9.6 m (31 ft)	21.6 m (71 ft)	21.6 m (71 ft)

GSD overview RGB cameras

	Sony RX1RII	Sony QX1 + SEL20F28	Sony QX1 + Voigtländer 15mm
GSD at 120 m flight altitude	1.5 cm (0.61 in)/px	2.6 cm (1 in)/px	2.6 cm (1 in)/px
Flight altitude	120 m (394 ft)	120 m (394 ft)	120 m (394 ft)
Max. frontal overlap	88%	77%	77%
Max. coverage*	210 ha (520 ac)	270 ha (670 ac)	270 ha (670 ac)
Lowest possible GSD	0.7 cm (0.28 in)/px	1.4 cm (0.55 in)/px	1.4 cm (0.55 in)/px
Flight altitude	55 m (179 ft)	66 m (216 ft)	66 m (216 ft)
Max. frontal overlap	74%	57.%	57.%
Max. coverage*	90 ha (230 ac)	150 ha (380 ac)	150 ha (380 ac)
1.5 cm/px GSD	1.5 cm (0.59 in)/px	1.5 cm (0.59 in)/px	1.5 cm/px (0.59 in/px)
Flight altitude	117 m (384 ft)	71 m (231 ft)	71 m (231 ft)
Max. frontal overlap	88%	60%	60%
Max. coverage*	210 ha (520 ac)	160 ha (400 ac)	160 ha (400 ac)
3.0 cm/px GSD	3 cm (1.18 in)/px	3 cm (1.18 in)/px	3 cm (1.18 in)/px
Flight altitude	234 m (768 ft)	141 m (463 ft)	141 m (463 ft)
Max. frontal overlap	94%	80%	80%
Max. coverage*	400 ha (990 ac)	310 ha (770 ac)	310 ha (770 ac)
6.0 cm/px GSD	6 cm/px (2.36 in/px)	6 cm (2.36 in)/px	6 cm (2.36 in)/px
Flight altitude	468 m (1535 ft)	282 m (926 ft)	282 m (926 ft)
Max. frontal overlap	95%	90%	90%
Max. coverage*	780 ha (1930 ac)	610 ha (1510 ac)	610 ha (1510 ac)
8.0 cm/px GSD	8 cm(3.15 in)/px	8 cm (3.15 in)/px	8 cm (3.15 in)/px
Flight altitude	624 m (2050 ft)	376 m (1230 ft)	376 m (1230 ft)
Max. frontal overlap	95%	93%	93%
Max. coverage*	1020 ha (2530 ac)	800 ha (1980 ac)	800 ha (1980 ac)
Highest possible GSD	25 cm (9.84 in)/px	25 cm (9.84 in)/px	25 cm (9.84 in)/px
Flight altitude	1950 m (6400 ft)	1176 m (3860 ft)	1176 m (3860 ft)
Max. frontal overlap	95%	95%	95%
Max. coverage*	2380 ha (5890 ac)	2240 ha (5540 ac)	2240 ha (5540 ac)

* Reference conditions: 20 m (66 ft) transition altitude, 1.2 km (0.75 mi) farthest distance from home, < 1 m/s (2 mph) wind speed, 15°C (59°F) air temperature, 60% side overlap; take-off altitude < 500 m (1640 ft) above sea level

Specialty cameras

Camera name	MicaSense RedEdge-MX Advanced bundle for precision farming, forestry and environmental research	MicaSense Altum Synchronised multispectral & thermal sensors for water management, hot spot detection and environmental research	
Technical specification	5.5 mm lens, 5 individual custom sensors, multispectral	8 mm lens, 5 individual custom multispectral sensors + thermal band	
Main quality features	High quality multispectral images	Tightly synchronised high quality multispectral images with thermal imager	
Camera weight (incl. DSL 2 and cables)	325 g (0.72 lb)	501 g (1.10 lb)	
GSD range	6.7-50 cm (2.6-20 in)/px	3.4-50 cm (1.3-20 in)/px 5-band multispectral 54-800 cm (21-315 in)/px thermal	
Coverage at lowest GSD	120 ha at 6.7 cm/px at 98 m flight altitude 300 ac at 2.62 in/px at 321 ft flight altitude	90 ha at 3.4 cm/px at 80 m flight altitude 230 ac at 1.3 in /px at 260 ft flight altitude	
Coverage at 120m/ 394 feet	150 ha at 8.2 cm/px 380 ac at 3.2 in/px	130 ha at 5.1 cm/px 330 ac at 2.0 in/px	
Sensor type	**5 individual sensors**	**5 individual sensors**	**thermal sensor**
Sensor size x	4.8 mm (0.19 in)	7 mm (0.28 in)	1.9 mm (0.07 in)
Sensor size y	3.6 mm (0.14 in)	5.2 mm (0.2 in)	1.4 mm (0.06 in)
Mega pixel	5 × 1.22	5 × 3.2	0.02
Shutter type	Electronic shutter	Electronic shutter	Electronic shutter
Pixel in x	1280	2046	160
Pixel in y	960	1544	120
Focal length of lens	5.5 mm (0.22 in)	8 mm (0.31 in)	1.8 mm (0.07 in)
Focal length (35 mm equivalent)	40 mm (1.57 in)	40 mm (1.57 in)	32 mm (1.26 in)
Veritcal angle of view	36.2°	36°	44°
Horizontal angle of view	47.1°	47.3°	57°
Minimal trigger time	1 s	1.15 s	1.15 s
Minimal trigger distance	16 m (52 ft)	18.4 m (60 ft)	18.4 m (60 ft)

GSD overview of specialty cameras

	MicaSense RedEdge-MX	MicaSense Altum multi-spectral	MicaSense Altum thermal
GSD at 120 m flight altitude	8.2 cm (3.22 in)/px	5.1 cm (2.03 in)/px	81 cm (32.03 in)/px
Flight altitude	120 m (394 ft)	120 m (394 ft)	120 m (394 ft)
Max. frontal overlap	75%	77%	81%
Max. coverage*	150 ha (380 ac)	130 ha (330 ac)	130 ha (330 ac)
Lowest possible GSD	6.7 cm (2.62 in)/px	3.4 cm (1.34 in)/px	54 cm (21.41 in)/px
Flight altitude	98 m (321 ft)	80.1 m (263 ft)	80.1 m (263 ft)
Max. frontal overlap	75%	65%	72%
Max. coverage*	120 ha (300 ac)	90 ha (230 ac)	90 ha (230 ac)
8.0 cm/px GSD	8 cm (3.15 in)/px	8 cm (49.84 in)/px	126.6 cm (49.84 in)/px
Flight altitude	117 m (380 ft)	187 m (610 ft)	187 m (610 ft)
Max. frontal overlap	79%	85%	88%
Max. coverage*	150 ha (380 ac)	210 ha (520 ac)	210 ha (520 ac)
25.0 cm/px GSD	25 cm (9.84 in)/px	25 cm (155.75 in)/px	396 cm (155.75 in)/px
Flight altitude	367 m (1200 ft)	583 m (1910 ft)	583 m (1910 ft)
Max. frontal overlap	95%	95%	95%
Max. coverage*	450 ha (1120 ac)	620 ha (1540 ac)	620 ha (1540 ac)
Highest possible GSD	50 cm (19.69 in)/px	50.6 cm (19.92 in)/px	800 cm (314.96 in)/px
Flight altitude	733 m (2410 ft)	1180 m (3870 ft)	1180 m (3870 ft)
Max. frontal overlap	95%	95%	95%
Max. coverage*	850 ha (2110 ac)	1150 ha (2850 ac)	1150 ha (2850 ac)

* at 70% side overlap


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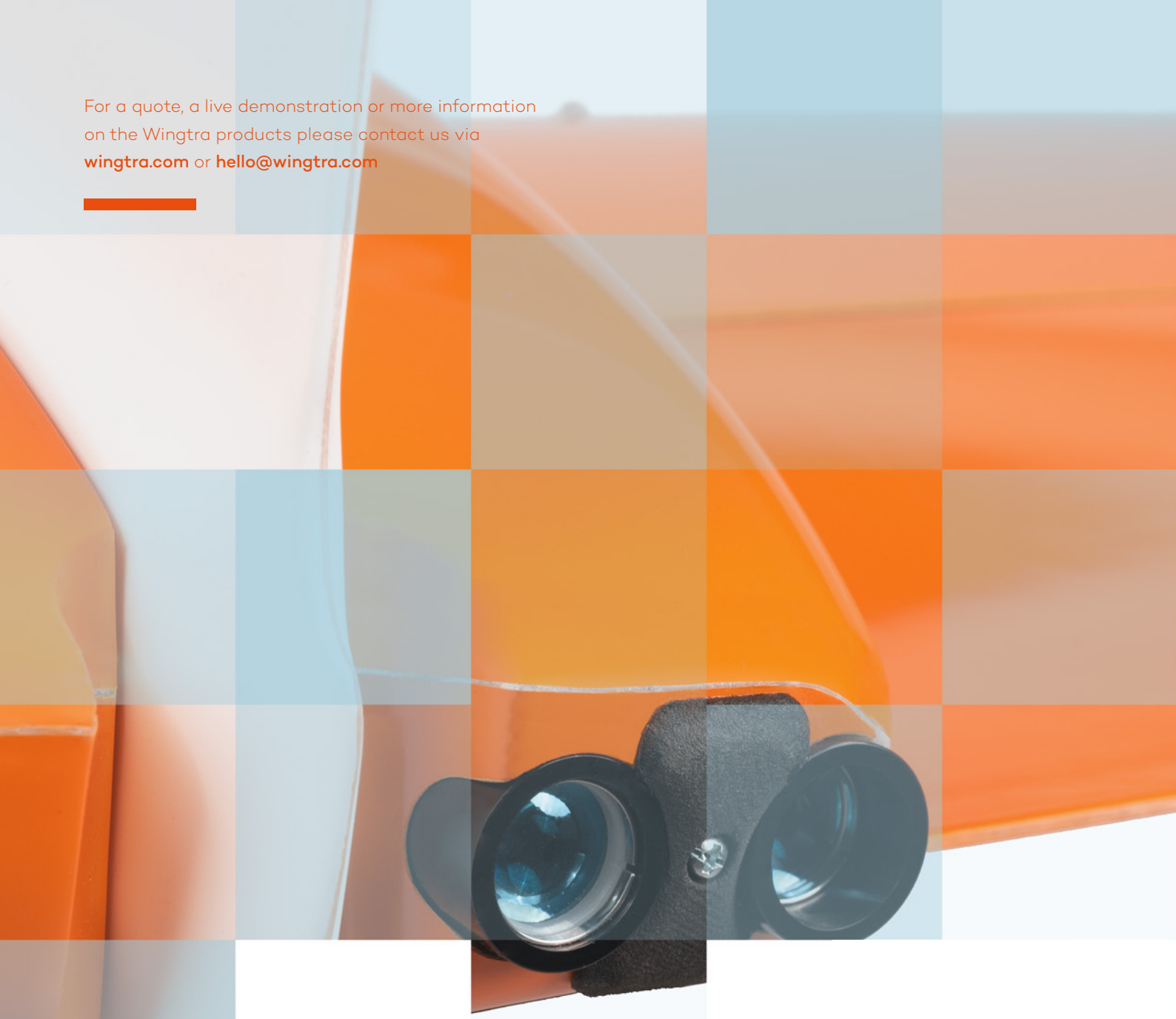
For a quote, a live demonstration or more information on the Wingtra products please contact us via **wingtra.com** or **hello@wingtra.com**



Wingtra AG

Giesshübelstrasse 40
8045 Zürich, Switzerland

hello@wingtra.com
wingtra.com