



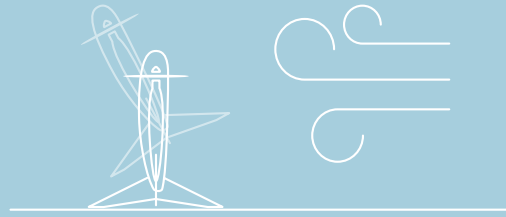
Technical specifications WingtraOne

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 × 67 × 23 cm (54 × 26 × 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.

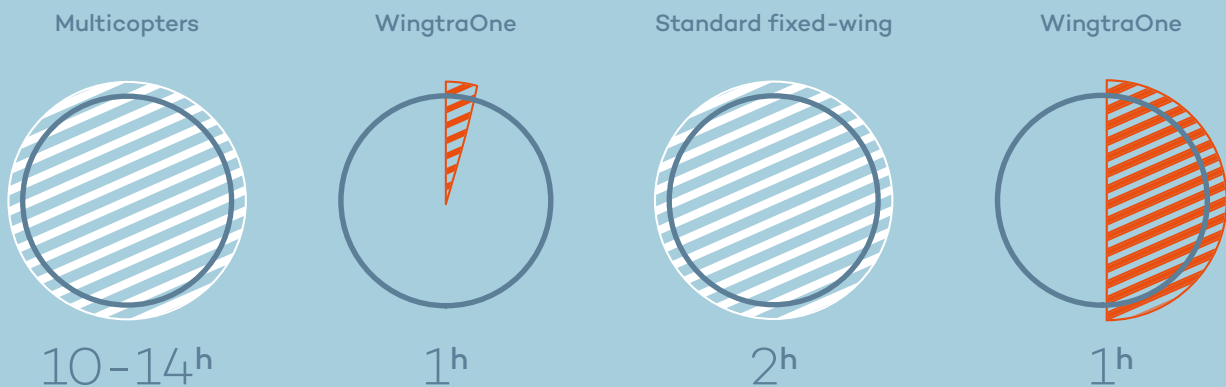
The RX1R II camera can cover more area at 3 cm (1.2 in)/px GSD in 40 minutes than the QX1 camera in 59 min. On the other hand, if you have to fly at 120 m (400 ft), the QX1 covers more area than the RX1R II, but it also gives you a lower 2.6 cm (1 in)/px GSD compared to the 1.5 cm (0.6 in)/px GSD of 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	690 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

i

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
Temperature 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 cycle	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	3.7V (30 % charge)
Additional outputs	USB 5V / 2.1 A
Dimensions	190 × 140 × 70 mm (7.5 × 5.5 × 2.75 in)
Weight	1170 g (2.6 lb)