



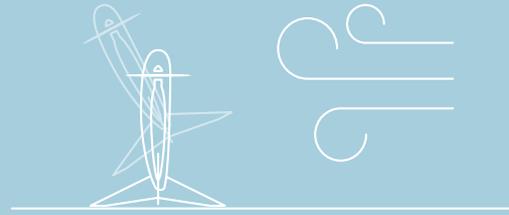
# Technical specifications WingtraOne

## Hardware

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

<b>Flight speed</b>	Operational cruise speed	16 m/s (35.8 mph)
	Climb / sink cruise	6 / 3 m/s (13.4 / 6.7 mph)
	Climb / sink hover	6 / 2.5 m/s (13.4 / 5.6 mph)
<b>Wind resistance</b>	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	
<b>Maximum flight time</b>	Up to 59 min See next page or <a href="https://knowledge.wingtra.com/flight-time">knowledge.wingtra.com/flight-time</a> for what flight time to expect in different flying conditions	
<b>Temperature</b>	-10 to +40 °C (14 to 104 °F)	
<b>Max. take-off altitude above sea level</b>	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	
<b>Weather</b>	IP54, not recommended to fly in fog, rain and snow	
<b>Ground control points required</b>	No (with PPK option); using 3 checkpoints to verify the accuracy is recommended	
<b>Auto-landing accuracy</b>	< 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](https://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

<b>Max. expected coverage in one flight at 120 m (400 ft) altitude above take-off point*</b>	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
<b>Max. expected coverage in one flight at 3 cm/px (1.2 in/px) GSD*</b>	QX1 + 20 mm RX1R II	310 ha (766 ac) 400 ha (988 ac)	141 m (463 ft) altitude 234 m (768 ft) altitude
<b>Lowest possible GSD</b>	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		
<b>Mapping accuracy with PPK (w/o GCPs)</b>	+ 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 %	
<b>Mapping accuracy w/o PPK (w/o GCPs)</b>	+ Absolute accuracy (RMS) + Relative accuracy	3 to 5 m (9.8 to 16.4 ft) horizontal 0.15 %	

## Software & tablet

<b>Flight planning &amp; mission control software</b>	WingtraPilot
<b>Tablet (supplied)</b>	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
<b>Module name</b>	WingtraOne Telemetry 2.4	FrSky Taranis X9D Plus
<b>Main function</b>	Telemetry connection for remote operation	Pilot inputs
<b>Frequency range telemetry</b>	2.4016-2.4776 GHz	2.405-2.474 GHz
<b>Occupied bandwidth</b>	6.0MHz	690 MHz
<b>Operation mode</b>	FHSS (Frequency Hopping Spread Spectrum)	
<b>Typical datarate</b>	57.6 kb/s	
<b>Transmission power (EIRP)</b>	19.8 dBm	19.5 dBm
<b>Tested max. range</b>	10 km (6 mi) indirect line of sight, keep in mind that obstacles reduce the range	
<b>Channel spacing</b>	1.0Mhz	1.5 Mhz
<b>Number of channels</b>	76	47
<b>Channel bandwidth</b>	Low400kHz High280kHz	Low 450 kHz High 200 kHz
<b>Method of modulation</b>	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

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

## Battery charger

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