WingtraOne

Technical Specifications

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Carl Zeiss
Sonnar 2/35
T*

The all-in-one drone: large coverage, high resolution and accuracy

WingtraOne

Resolution	down to 0.7 cm/px (0.3 in/px) GSD
Accuracy	down to 1 cm (0.4 in) absolute accuracy
Coverage	400 ha at 3 cm/px (988 ac at 1.2 in/ px) GSD

WingtraOne drone offers broad coverage, brilliant resolution and high accuracy in one mapping device.

With such unprecedented functionality, WingtraOne can map a quarry the size of 240 American football fields in an hour's flight. The resolution of the final map allows to zoom in and see tiny details such as a coin lying on the ground. And what is best—it is possible to know the exact coordinates of the coin down to an absolute accuracy of 1 cm (0.4 in).

Hardware

Drone type	Tailsitter VTOL (Vertical take-off and landing)
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	99 Wh (a pair of batteries required)
Battery type	Li-ion, Smart battery technology, UN compliant
Radio link	8 km (5 mi), bi-directional antennas for optimal range
Onboard GPS	Double redundancy, using GPS, Glonass and ready for Galileo and Beidou
Dimensions of travel hardcase (optional)	141 × 74 × 26 cm, 16 kg (4.6 × 2.4 × 0.9 ft, 35 lb)

Software & Tablet

Flight planning & mission control software	WingtraPilot
Tablet (supplied)	Android tablet; pre-installed; ready-to-fly. Interfaces to Telemetry module (data link for automated drone control) and manual back-up controller
Updates	free

Operation

Operational cruise speed	16 m/s (35.8 mph)
Climb speed cruise	6.0 m/s (13.4 mph)
Wind resistance	up to 45 km/h (12 m/s, 28 mph) in cruise, up to 30 km/h (8 m/s, 18 mph) for landing
Maximum flight time	55 minutes
Min. space for take-off and landing	2 m × 2 m (6.6 ft × 6.6 ft)
Designed temperature range	-20° C to 50° C (-4° F to 122° F)
Tested and warranted temperature range	-10° C to 40° C (14° F to 104° F)
Max. altitude (a.m.s.l.)	3000 m (9800 ft)
Weather	No precipitation, resists light rain
Ground Control Points required	No (with PPK option)
Descent speed cruise	4.0 m/s (8.9 mph)
Climb and descent speed hover	6.0 m/s (13.4 mph) and 1.0 m/s (2.2 mph)
Auto-Landing accuracy	< 5 m (< 16 ft)

Results

Coverage at 120m (400ft) *	320 Ha (790 ac)
Max. coverage **	24 km² (9,2 mi²)
Minimal ground sampling distance ***	Down to 0.7 cm/px (0.3 inch/px)
Mapping accuracy with PPK (w/o GCPs)	+ Absolute accuracy (RMS): horizontal: down to 1 cm (0.4 in); vertical: down to 2 cm (0.8 in) + Relative accuracy: horizontal: down to 0.003 %
Mapping accuracy w/o PPK (w/o GCPs)	+ Absolute accuracy (RMS): 3 to 5 m (9.8 to 16.4 ft) + Relative accuracy: horizontal 0.15 %

Payloads

Payload flexibility	Yes, with a single USB-C connector
Power supply	by flight batteries (12 W)
Payload protection	Yes, fully integrated into WingtraOne and smooth vertical landing feature
Available cameras	+ Sony RX1RII / 35 mm lens, full-frame sensor, 42 MP, RGB + Sony QX1 20mm (optional 15 mm Voigtländer lens), APS-C sensor, 20 MP, RGB + Micasense Rededge, 5.5 mm, 5 × 1.2 MP, Multi-spectral camera + FLIR Duo Pro R640, 13 mm, 0.32 MP (thermal), 12 MP (visible), Thermal camera"

Telemetry / Remote Control

Frequency range Telemetry	Country Specific: EU 868 - 869 MHz US 902 - 928 MHz AUS 915 - 928 MHz CN 915 - 928 MHz
Transmission power Telemetry	< 27dBm****
Frequency range Remote Control	All countries 2.404 - 2.479 GHz
Transmission power Remote Control	< 20 dBm
Specified max. range telemetry	40 km (25 mi)
Tested max. range	8 km (5 mi)

* 2.8 cm/pixel (1.1 in/pixel), WingtraOne QX1 + 15 mm

** max. reconstructable area, 1950 m (6400 ft) flight altitude, WingtraOne RX1RII

*** For WingtraOne RX1RII. For WingtraOne QX1 1.4 cm/px (0.6 in/px) (depending on frontal overlap)

**** Country specific power settings according to local regulations

Technical Specifications Telemetry

WingtraOne Telemetry 868 MHz (EU)

Module name	WingtraOne Telemetry 868
Serial number	WOT.868.v00
Main function	Telemetry connection for remote operation
Frequency range	868-869 MHz
Frequency tolerance	< 0.1 ppm
Occupied bandwidth	25 kHz
Transmitting power	< 27 dBm
Spurious emission limits	< -30 dBm (not fully tested)
Operation mode	FHSS (Frequency Hopping Spread Spectrum)
Modulation mode	GFSK (Gaussian Frequency Shift Keying)
Specified max. range	40 km (25 mi)
Typical max. range	1.5 to 8 km (0.9 to 5 mi)
Typical bandwidth	128 kb/s

WingtraOne Telemetry 900 MHz (US)

Module name	WingtraOne Telemetry 900
Serial number	WOT.900.v02
Main function	Telemetry connection for remote operation
Frequency range	902-928 MHz
Frequency tolerance	< 0.1 ppm
Occupied bandwidth	500 kHz
Transmitting power	< 27 dBm
Spurious emission limits	< -30 dBm (not fully tested)
Operation mode	FHSS (Frequency Hopping Spread Spectrum)
Modulation mode	GFSK (Gaussian Frequency Shift Keying)
Specified max. range	40 km (25 mi)
Typical max. range	1.5 to 8 km (0.9 to 5 mi)
Typical bandwidth	128 kb/s

WingtraOne Telemetry 915 MHz (world)

Module name	WingtraOne Telemetry 900
Serial number	WOT.900.v15
Main function	Telemetry connection for remote operation
Frequency range	915-928 MHz
Frequency tolerance	< 0.1 ppm
Occupied bandwidth	325 kHz
Transmitting power	< 27 dBm
Spurious emission limits	< -30 dBm (not fully tested)
Operation mode	FHSS (Frequency Hopping Spread Spectrum)
Modulation mode	GFSK (Gaussian Frequency Shift Keying)
Specified max. range	40 km (25 mi)
Typical max. range	1.5-8 km (0.9-5 mi)
Typical bandwidth	128 kb/s

Technical Specifications Remote Control

WingtraOne Remote Control

Module Name	FRSky Taranis
Serial number	X9D Plus
Main function	Remote Control for manual control of WingtraOne
Frequency range	2.404-2.479 GHz
Frequency tolerance	< 0.1 ppm
Channel separation	0.300 MHz
Number of used channels	47
Transmitting power	< 20 dBm
Spurious emission Llimits	< 40 dBuV/m
Operation mode	FHSS (Frequency Hopping Spread Spectrum)
Modulation mode	2-FSK (Frequency Shift Keying)
Typical max. range	1.5-8 km (0.9-5 mi)
FCC-ID	XYFX91216DK

Technical Specifications Battery

Product details

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
State of charge indicator	Integrated 5 level SoC indicator
Smart charging	Auto cell balancing

Technical Specification

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 dimension	80 × 60 × 75 mm (3.15 × 2.36 × 2.95 in)
Battery weight	604 g (1.3 lb)
Operating temperature	10° C-50° C (50° F-122°F), discharge
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

Technical Specifications Battery Charger

Product details

Module name	Wingtra Charger
Charger type	Dual AC/DC Lithium Ion Charger

Technical specification

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)
Operating temperature	10° C - 50° C (50° F - 122°F)

Modular WingtraOne payloads: RGB and specialty cameras

WingtraOne can be equipped with a range of cameras and lenses for diverse aerial surveying applications. The payloads are easy to swap, so one drone can be used for different use cases.

In addition, smooth vertical landings of the WingtraOne drone protect the expensive cameras even in rough and complicated environments.

RBG Cameras

	Sony RX1RII **The highest quality payload for 1 cm (0.4 in) accuracy and 1 cm/px (0.4 in/px) GSD**	**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	Ultra-high quality, best coverage to GSD ratio, sub-cm GSD	High image quality, flexible lens options	Ultra-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)
GSD Range	0.7-25 cm/px 0.28-9.8 in/px	1.4-25 cm/px 0.55-9.8 in/px	1.4-25 cm/px 0.55-9.8 in/px
Coverage at Lowest GSD*	100 ha (at 0.7 cm/px) at 57 m flight altitude 247 ac (at 1.18 in/px) at 188 ft flight altitude	150 ha (at 1.4 cm/px) at 66 m flight altitude 370 ac (at 0.55 in/px) at 218 ft flight altitude	130 ha (at 1.4 cm/px) at 50 m flight altitude 320 ac (at 0.55 in/px) at 164 ft flight altitude
Coverage at 120m/ 394 feet*	210 ha (at 1.5 cm/px) 520 ac (at 0.61 in/px)	270 ha (at 2.6 cm/px) 670 ac (at 1.0 in/px)	320 ha (at 3.4 cm/px) 790 ac(at 1.3 in/px)

Technical specifications of RGB cameras

	Sony RX1RII	Sony QX1 + SEL20F28	Sony QX1 + Voigtländer 15mm
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)
mega pixel	42.4	19.8	19.8
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 equivalent (at 35mm)	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	1.7 s	1.7 s
Minimal trigger distance	9.6 m (31 ft)	27.2 m (89 ft)	27.2 m (89 ft)

GSD overview RGB cameras

	Sony RX1RII	Sony QX1 + SEL20F28	Sony QX1 + Voigtländer 15mm
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)
Flight altitude	54.6 m (179 ft)	65.8 m (216 ft)	49.4 m (162 ft)
Max. frontal overlap	74%	46%	46%
Max. coverage*	90 ha (230 ac)	150 ha (380 ac)	130 ha (330 ac)
1.5 cm/px GSD	1.5 cm/px (0.59 in/px)	1.5 cm/px (0.59 in/px)	1.5 cm/px (0.59 in/px)
Flight altitude	117 m (384 ft)	70.6 m (231 ft)	52.9 m (174 ft)
Max. frontal overlap	88%	50%	50%
Max. coverage*	210 ha (520 ac)	160 ha (400 ac)	140 ha (350 ac)
3.0 cm/px GSD	3 cm/px (1.18 in/px)	3 cm/px (1.18 in/px)	3 cm/px (1.18 in/px)
Flight altitude	234 m (768 ft)	141.1 m (463 ft)	105.8 m (347 ft)
Max. frontal overlap	94%	75%	75%
Max. coverage*	400 ha (990 ac)	310 ha (770 ac)	280 ha (700 ac)
6.0 cm/px GSD	6 cm/px (2.36 in/px)	6 cm/px (2.36 in/px)	6 cm/px (2.36 in/px)
Flight altitude	468 m (1535 ft)	282.2 m (926 ft)	211.7 m (694 ft)
Max. frontal overlap	95%	87%	87%
Max. coverage*	780 ha (1930 ac)	610 ha (1510 ac)	550 ha (1360 ac)
8.0 cm/px GSD	8 cm/px (3.15 in/px)	8 cm/px (3.15 in/px)	8 cm/px (3.15 in/px)
Flight altitude	624 m (2050 ft)	376.3 m (1230 ft)	282.2 m (930 ft)
Max. frontal overlap	95%	91%	91%
Max. coverage*	1020 ha (2530 ac)	800 ha (1980 ac)	730 ha (1810 ac)
highest possible GSD**	25 cm/px (9.8 in/px)	25 cm/px (9.8 in/px)	25 cm/px (9.8 in/px)
Flight altitude	1950 m (6400 ft)	1176 m (3860 ft)	882 m (2890 ft)
Max. frontal overlap	95%	95%	95%
Max. coverage*	2700 ha (6680 ac)	2240 ha (5540 ac)	2040 ha (5050 ac)
GSD at 120 m flight altitude	1.5 cm/px (0.61 in/px)	2.6 cm/px (1 in/px)	3.4 cm/px (1.34 in/px)
Flight altitude	120 m (394 ft)	120 m (394 ft)	120 m (394 ft)
Max. frontal overlap	88%	71%	78%
Max. coverage*	210 ha (520 ac)	270 ha (670 ac)	320 ha (800 ac)

* at 60% side overlap

** limited by maximum flight altitude (at 2500 m above home)

Specialty Cameras

	MicaSense RedEdge-M **Multispectral payload for precision farming, forestry and environmental research**	**FLIR Duo Pro** **Payload for thermal mapping and monitoring**
Technical specification	5.5 mm lens, 5 individual custom sensors, multispectral	13 mm, thermal (7.5–13.5 µm) and visible spectrum
Main quality features	High quality multispectral images	High precision thermal images and high resolution visible mapping
Camera weight (incl. mount)	325 g (0.72 lb)	425 g (0.94 lb)
GSD Range	6.7-50 cm/px (2.6-20 in/px)	6.5-320 cm/px (2.5-127.0 in/px), thermal 1.3-66.0 cm/px (0.5-26 in/px), visible
Coverage at Lowest GSD*	160 ha (at 6.8 cm/px) at 98 m flight altitude 395 ac (at 2.62 in/px) at 321 ft flight altitude	80 ha (at 6.5 cm/px thermal) at 50 m flight altitude 200 ac (at 2.55 in/px) at 164 ft flight altitude
Coverage at 120m/ 394 feet*	200 ha (at 8.2 cm/px) 490 ac (at 3.2 in/px)	190 ha (at 15.5 cm/px thermal) 469 ac (at 6.1 in/px thermal)

Technical specifications of specialty cameras

	Micasense Rededge-M	FLIR Duo ProR 640 (thermal)	FLIR Duo Pro R 640 (visible)
Sensor type	5 individual sensors	thermal sensor	visible sensor
Sensor size x	4.8 mm (0.19 in)		
Sensor size y	3.6 mm (0.14 in)		
Mega pixel	5 × 1.22	0.32	12
Shutter type	electronic shutter	electronic shutter	electronic shutter
Pixel in x	1280	640	4000
Pixel in y	960	512	3000
Focal length of lens	5.5 mm (0.22 in)	13 mm (0.51 in)	
Focal length (35mm equivalent)	40 mm (1.57 in)		
Veritcal angle of view	36.2°	37°	45°
Horizontal angle of view	47.1°	45°	56°
Minimal trigger time	1 s	0.03 s	0.03 s
Minimal trigger distance	16 m (52 ft)	0.5 m (2 ft)	0.5 m

GSD overview of specialty cameras

	Micasense Rededge-M	FLIR Duo ProR 640 (thermal)***	FLIR Duo Pro R 640 (visible)***
Lowest possible GSD	6.7 cm/px (2.62 in/px)	6.5 cm/px (2.55 in/px)	1.3 cm/px (0.52 in/px)
Flight altitude	97.8 m (321 ft)	50 m (164 ft)	50 m (164 ft)
Max. frontal overlap	75%	98%	99%
Max. coverage*	160 ha (400 ac)	80 ha (200 ac)	80 ha (200 ac)
1.5 cm/px GSD	-	7.4 cm/px (2.9 in/px)	1.5 cm/px (0.6 in/px)
Flight altitude	-	57 m (187 ft)	57 m (187 ft)
Max. frontal overlap	-	99%	99%
Max. coverage*	-	90 ha (230 ac)	90 ha (230 ac)
3.0 cm/px GSD	-	14.8 cm/px (5.81 in/px)	3 cm/px (1.19 in/px)
Flight altitude	-	114 m (374 ft)	114 m (374 ft)
Max. frontal overlap	-	99%	99%
Max. coverage*	-	180 ha (450 ac)	180 ha (450 ac)
6.0 cm/px GSD	-	29.3 cm/px (11.52 in/px)	6 cm/px (2.37 in/px)
Flight altitude	-	226 m (741 ft)	226 m (741 ft)
Max. frontal overlap	-	95%	95%
Max. coverage*	-	350 ha (870 ac)	350 ha (870 ac)
8.0 cm/px GSD	8 cm/px (3.15 in/px)	38.8 cm/px (15.29 in/px)	8 cm/px (3.14 in/px)
Flight altitude	117.3 m (380 ft)	300 m (980 ft)	300 m (980 ft)
Max. frontal overlap	79%	95%	95%
Max. coverage*	190 ha (470 ac)	470 ha (1170 ac)	470 ha (1170 ac)
highest possible GSD**	50 cm/px (20 in/px)	323.6 cm/px (127.4 in/px)	66.5 cm/px (26.17 in/px)
Flight altitude	733 m (2410 ft)	2500 m (8200 ft)	2500 m (8200 ft)
Max. frontal overlap	95%	95%	95%
Max. coverage*	1130 ha (2800 ac)	2880 ha (7120 ac)	2880 ha (7120 ac)
GSD at 120 m flight altitude	8.2 cm/px (3.22 in/px)	15.5 cm/px (6.12 in/px)	3.2 cm/px (1.26 in/px)
Flight altitude	120 m (394 ft)	120 m (394 ft)	120 m (394 ft)
Max. frontal overlap	75%	95%	95%
Max. coverage*	200 ha (500 ac)	190 ha (470 ac)	190 ha (470 ac)

* at 60% side overlap

** limited by maximum flight altitude (at 2500 m above home)

*** Preliminary specifications, subject to change

NOTES


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

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