routescene®
beyond the point

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Technical specification for your turnkey UAV LiDAR solution

The Routescene® survey-grade 3D mapping solution is an integrated system ready for immediate use.

Literally the only extras you need are a UAV and batteries to conduct an aerial survey OR a car and roof rack to perform a ground survey. It's that quick and simple.

Beyond the point...
What is included in the Routescene® solution?

This robustly engineered, turnkey solution combines hardware, software and workflow. All the complex integration is complete so you have a practical system ready for use.

The hardware includes the Routescene LidarPod®. Lightweight and compact, the system is designed specifically for use on Unmanned Aerial Vehicles (UAVs). The system can also be used on vehicles, with our specially designed mounting kit, to perform ground surveys.

Proven. Reliable. Provides fast results.

What is included in the Routescene UAV solution

- 1 x Routescene LidarPod®
- 1 x Routescene Ground Station
- 1 x UAV Mounting Kit
- 1 x Routescene LidarViewer Pro software license
- 1 x QA Monitor real-time in-flight web interface
- 1 x dummy LidarPod and antennae for practice purposes
- 1 x Routescene Survey Operating Procedures
- 1 x LidarPod / LidarViewer User Manual
- One year warranty
- 1st year maintenance included (firmware and software updates)
- 1st year technical support is included when you purchase the recommended training

PLUS

- 2 x Pelican cases for transportation
- 1 x GNSS Ground Station antenna plus tripod
- 1 x Radio Ground Station antenna plus tripod
- 2 x GNSS UAV antennae
- 1 x Radio UAV antenna
- Cables for power, antennae and data plus spare cables
- Wi-Fi adapter for smartphone/tablet control
- Comprehensive toolkit and tape measure

Revolutionising surveying

Component parts of the Routescene UAV solution

What is included in the Routescene Vehicle upgrade

Upgrade your Routescene UAV solution with the following to use the system on vehicles:

- 1 x High resolution Odometer
- 1 x Vehicle frame
- 2 x roofrack mounting brackets complete with advanced wire coil suspension
- 2 x GNSS vehicle antennae + cables
- 1 x firmware LidarPod upgrade to support the Odometer
- 1 x firmware LidarPod upgrade to support third party GNSS corrections

STRONGLY RECOMMENDED

2 day training course to cover the operation of the LidarPod and LidarViewer.

Training is essential so you know how to get optimal results from your hardware and software and achieve a quicker return on your investment.

Technical details of the Routescene LidarPod®

The Routescene LidarPod contains all you need to collect precise survey data, quality control the data in real-time and create a very dense and accurate georeferenced point cloud. The internal firmware controls the sensors, parses the raw data and transmits data samples to the Routescene Ground Station, it also manages and monitors power consumption of the LidarPod.

Weight: Complete payload under 2.8 kg including LidarPod, GNSS antennae, cables and UAV mounting kit
Dimensions: 320 mm length x 100 mm diameter
Construction: Carbon fiber aerodynamic protective housing with IP67 rated connectors

External power

- Switchable power from UAV to Ground supply
- Supply Voltage: 12-50 vDC, 56 W max, 28 W typical
- Operating temperature: -10° to +40° C

Velodyne HDL-32e

A true 3D LiDAR scanner that delivers unsurpassed resolution.

- Two discrete returns (strongest and last return) and useable in either single or dual return mode
- 32 laser sensors/ detector pairs
- Class I eye safe
- Infra-red 905 nm wavelength
- Time of flight distance measurement with intensity
- 5-20 Hz user selectable frame rate
- 700,000 3D points per second

Range: Maximum up to 100 m, recommended 80 m
Range accuracy: <20 mm
Field of View: 360° vertical and 41° horizontal
Angular separation between lasers: 1.33°
Environmental Protection: IP67

Storage

Onboard solid state data storage enabling 12 hours of data to be collected, plenty of capacity for a long vehicle survey.

GNSS fused Inertial Navigation System (INS)

A state of the art integrated Real-Time Kinematic (RTK) GNSS and INS that provides accurate position, velocity, acceleration and orientation under the most demanding conditions. The dual antenna RTK GNSS solution ensures that we can achieve the highest accuracy possible for the lowest weight. This sensor combines a multi channel GNSS receiver, magnetometers and a pressure sensor, together with a temperature calibrated Inertial Motion Unit (IMU) containing the accelerometers and gyroscopes. These are coupled in a sophisticated fusion algorithm to deliver accurate and reliable navigation and orientation information.

The triple frequency GNSS receiver provides up to 1 cm accurate positioning. Supports all of the current satellite navigation systems including GPS, GLONASS, GALILEO and can be upgraded to include BeiDou. It also supports the Omnistar service for hassle free high accuracy positioning.

Horizontal Position Accuracy (with RTK): 0.008 m
Vertical Position Accuracy (with RTK): 0.015 m
Roll and Pitch Accuracy: 0.15°
Heading Accuracy: 0.07° (with 2 m GNSS antenna spacing)
Internal Filter Rate: 1000 Hz
Output Data rate: up to 100 Hz

Radio Telemetry

Dual channel UHF data link to provide remote control for the LidarPod, transmit RTK GPS corrections to the LidarPod and enable sampled sensor data to be transmitted back to the Ground Station for Status and Quality Assurance purposes.

Operating Frequency: User configurable between 403 and 470 MHz
Transmitter Power: User configurable between 100 mW, 200 mW, 500 mW and 1 W
Channel bandwidth: 25 kHz

Configurable radio frequency: To ensure that the LidarPod can operate legally within your country, the radio frequency is configurable and can be set to a unique channel. A radio licence may be required in certain countries.

Accuracy

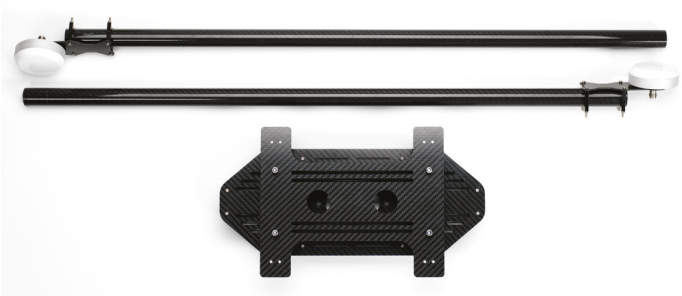
Accuracy depends on the flying height of the UAV, the distance to an object and the angle of incidence of the laser beam at any given point. The LidarPod INS sensor has an angular error which means that the accuracy diminishes with increasing distance.

- Absolute position accuracy of 0.04 at 20 m range
- Absolute position accuracy of 0.06 at 40 m range
- The relative accuracy within a single scanner frame is 30mm (dependent on range).

UAV mounting kit

The LidarPod is UAV agnostic and will fit on any rotary UAV that can take a payload of 3 kg. Our carbon fiber vibration damping mounting kit for the LidarPod is lightweight. Specially designed and tested for ease of use and to reduce vibration from the UAV, the mounting kit includes an equipment plate which is compatible with 12 mm diameter UAV equipment rails, the 2 rails being 160 mm apart. The equipment plate includes quick release clamps for easy deployment.

Mounting kit weight: 0.6 kg



Technical details of the Routescene Ground Station

For the Routescene UAV solution the Ground Station is an essential component of the package.

The Ground Station ensures RTK GNSS corrections are transmitted to the LidarPod and quality assurance and status information is transmitted to QA Monitor, the real-time in-flight data monitoring software.

The Ground Station supports L1, L2 and L5 frequencies and monitors all the GPS, GLONASS, GALILEO and BeiDou satellites. This delivers the quickest and most reliable RTK initializations for 10 – 20 mm positioning.

The Ground Station is robust, lightweight and portable made from carbon fiber.

The Ground Station can also be used as a stand alone GNSS RTK base station to transmit corrections to a compatible rover.

Weight: 1.3 kg
Dimensions: 220 x 195 x 55 mm

Supply Voltage: 12 – 24 v, 12 W

GNSS receiver

220 Channels:

- GPS: L1 C/A, L2 E, L2 C. L5
- GLONASS: L1, L2 C/A, L3 CDMA
- Galileo: E1, E5 A, E5 B
- QZSS: L1 C/A, L1 SAIF, L2 C, L5
- SBAS: L1 C/A, L5

High precision multiple correlator for GNSS pseudo-range measurements

- Unfiltered, unsmoothed pseudo-range measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
- Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- Up to 20 Hz raw measurement and position outputs

Radio Telemetry

Operating Frequency: User configurable between 403 and 470 MHz
Transmitter Power: User configurable between 100 mW, 200 mW, 500 mW and 1 W
Channel bandwidth: 25 kHz

Product conformity

The Routescene LidarPod and Ground Station are available for use in any country worldwide. The products are non-ITAR (International Traffic in Arms Regulations) rated so they are not subjected to export controls.

The LidarPod and Ground Station have been independently CE and FCC certified to ensure they are compliant to electrical and radio transmission standards.

PROVEN PRODUCT

Beyond the point...
Software

LidarViewer Pro

A Microsoft Windows 10 application offering powerful filters to reduce, manage, and analyze the huge volumes of point cloud data. Supplied with a Filter Development Toolkit to create your own filters to further improve the workflow. Filters to export to ASCII, LAS, LAZ and to convert the pointcloud to the OSGB co-ordinate system are included.

Recommended PC hardware: 8 Gb graphics card, Solid State Disk (SSD), 32 Gb RAM.

Real-time in-flight QA Monitor software

For immediate and continuous real-time in-flight data monitoring, this web based app gives you confidence in the data you are collecting while you are collecting it.

Accessed using a web browser from a mobile device or laptop which has a Wi-Fi connection, QA Monitor receives and displays real-time Status and Quality Assurance data from the LidarPod via the Wi-Fi access point on the Ground Station.

- Windows 7 or 8, Apple OS X, Linux with a modern web browser
- Android or Windows Phone or Apple iPad or iPhone
- Connection to the Ground Station via Wi-Fi, USB or Ethernet

Technical details of the Routescene Vehicle upgrade

To maximize the use of your Routescene UAV solution and provide flexibility we have developed a Vehicle upgrade.

The Vehicle upgrade includes the following component parts to transform the UAV system into a completely operational Mobile Mapping System:

Odometer

Vehicle odometer which clamps onto one of the rear wheels of the vehicle. The Odometer supplies up to 4000 pulses per second to enable accurate distance travelled and velocity to be calculated. This information will augment the GPS\INS solution considerably and will reduce the drift in urban canyons.

- Odometer adaptor plates for 4, 5 and 6 nut wheels
- Adaptor plate bolts to accept 19,20 and 21 mm wheel hexagonal nuts
- Firmware upgrade to support the Odometer

RTK corrections

Firmware upgrade to support third party RTK GNSS corrections*.

In the event that using the Routescene Ground Station is not feasible, perhaps because of the range at which you are working and obstructions that will block a radio signal, then the firmware upgrade enables RTK corrections to be supplied by a third party service, via GPRS or satellite connection.

**Receiver hardware and / or the service subscription is not included.*

Vehicle support frame

- A lightweight and modular support frame that can be easily be shipped
- The support frame can be mounted on the roofrack of any vehicle
- The support frame is isolated from vehicle vibrations using an advanced method of shock mounts
- Total frame length is 2 m, supplied in 2 sections
- Triangular frame with 0.22 m sides

Do I need a Ground Station?

For the Routescene Vehicle LidarPod the Ground Station is optional as it depends on the most practical solution through which to receive the RTK GPS corrections: locally using the Routescene Ground Station, or via GPRS modem or satellite. Then there is always the option to post-process the position data and apply the RTK GPS corrections after the survey has been completed. For vehicle surveys when a ground station is not used, QA Monitor can be directly accessed using a USB connection between a laptop and the LidarPod.

Improved productivity

routescene®

Beyond the point...

At Routescene we're always looking beyond the point... using our knowledge and expertize to simplify everything for you.

From considered survey design and planning, precise data acquisition in the field, automated data processing to repeatable workflows, our aim is to bring you efficiency and improved productivity. This is at the core of our business across service delivery, health and safety, product development and performance. Accuracy and quality come as standard.

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