DILABS

M A R S S

MOBILE & AERIAL REMOTE SENSING SYSTEM

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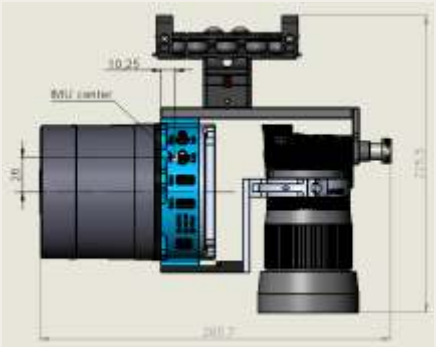
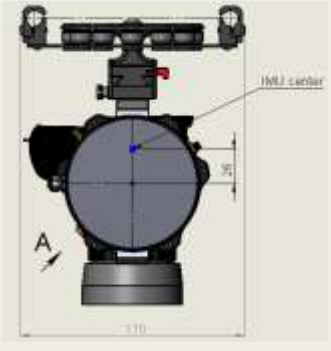
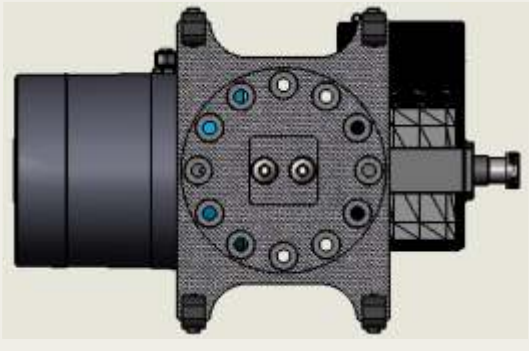
The Mobile & Aerial Remote Sensing System - MARSS is designed by Dilabs Systems as a cost-effective solution for extremely accurate Remote Sensing applications. MARSS utilizes a high-performance GPS-Aided Inertial Navigation System (INS), WiFi module and a Data Logger, integrated into one compact and light-weight enclosure. MARSS can be used with any commercially available LiDARs like Velodyne, Quanergy, Ouster, Livox etc.

MARSS is a lighter/sleeker LiDAR Payload solution for Aerial and Mobile Survey and Mapping applications. This is a complete end to end highly accurate plug & play LiDAR Payload solution which includesLiDAR, IMU/INS, Novatel GNSS Post Processing Software, Point Cloud Software, and Software for LIDAR calibration/LIDAR and INS bore sighting. Typical applications - Greenfield Mapping, Highway Mapping, Urban Mapping, Construction Monitoring, Slope Stability (Airport, Dams, Railway Tunnels), Energy (Powerline, Solar & Wind), Forestry, Plant Inspection (Power Plant, Gas Processing Units), etc.

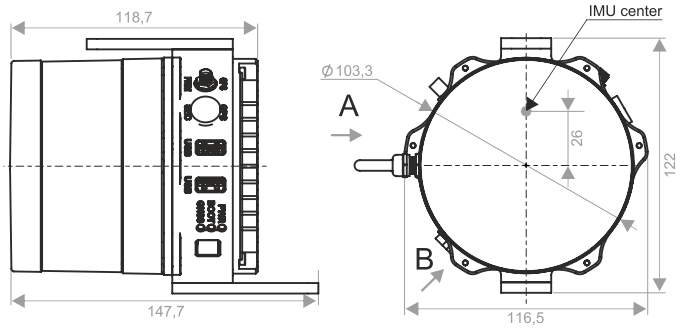
LASER	VELODYNE VLP-32C
Measurement Speed	Single Return Mode: ~600,000 points per second / Dual Return Mode: ~1,200,000 points per second
Measurement Range	200 M
Field of View	180° when mounted on UAV & 360° when mounted on a Ground Vehicle
Laser Class	CLASS 1 per IEC 60825-1:2014
CAMERA	Sony Alpha A6000 Mirrorless Digital Camera with Sigma 30mm f/1.4 DC DN Contemporary Lens for Sony E
INS/IMU Model	Inertial Labs: INS-B-OEM
INS Specifications	GNSS: 555 channels
	GNSS accuracy (PPK mode) = 0.5 cm
	GNSS update rate: 20 Hz (Novatel OEM719 GNSS receiver)
IMU update rate	2000 Hz
	Heading accuracy (post-processed): 0.03 deg
	Roll/Pitch accuracy (post-processed): 0.006 deg
Accuracy	X,Y Axis = <5 cm
	Z Axis = <20cm
Type of Recorded Data	GNSS Data for PPK, GNSS Time-stamped INS & IMU data, GNSS time-stamped LIDAR scans, GNSS Time-stamps for Camera
Input Voltage	9-36 VDC
Nominal power consumption	30 Watts
Weight with Laser only	1880 gms
Weight with both Laser & Camera	2690 gms
Typical Survey & Mapping Applications	Urban, Forrest,Highway,Agriculture, Power Lines,Mining,etc



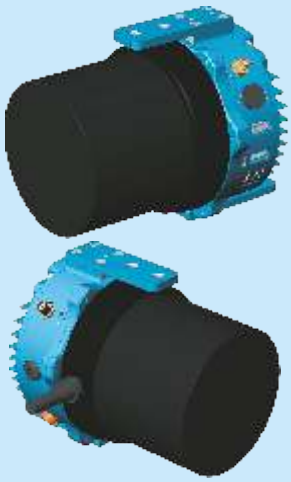


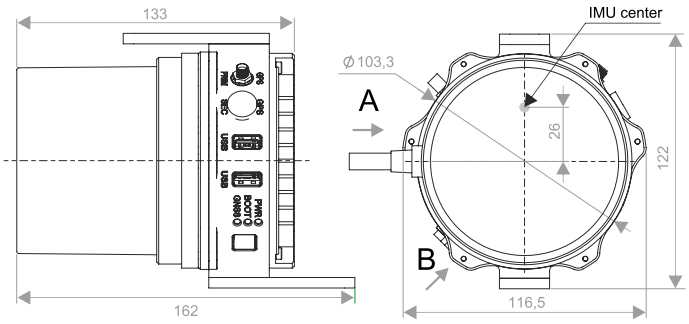


MARSS WITH VELODYNE

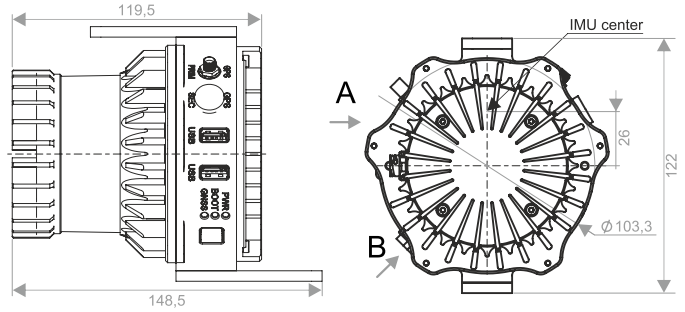


MARSS WITH QUANERGY

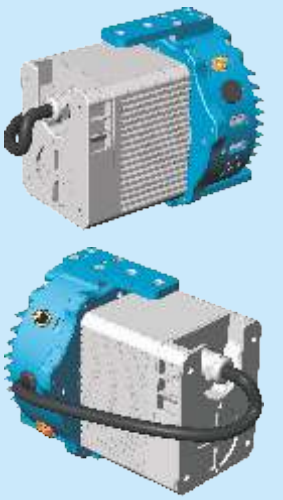


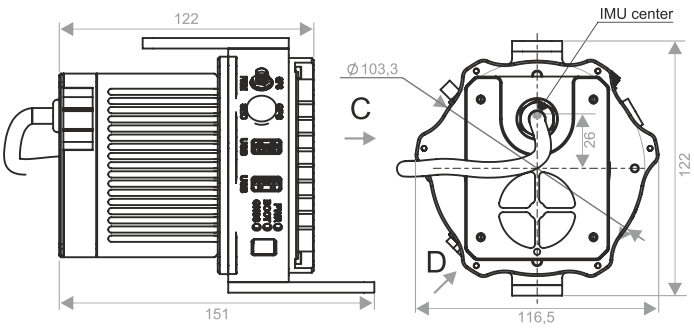


MARSS WITH OUSTER



MARSS WITH LIVOX





WHAT IS LIDAR

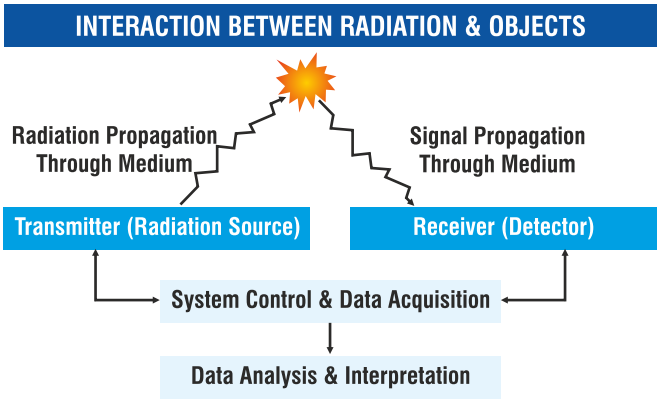
LIDAR, which stands for Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth. These light pulses-combined with other data recorded by the airborne or ground system-generate precise, three-dimensional information about the shape of the target objects.

The four basics components of a LiDAR Payload are:

- The LiDAR unit itself, which emits pulses of light, when mounted to a Aerial Vehicle or Land Vehicle scanning a predefined swath below or around it.
- A GPS receiver tracking the unit's x,y,z coordinates.
- An Inertial Measurement Unit (IMU) that tracks the orientation of the unit in space to achieve accurate elevation measurements.
- A computer that records all transmitted data.

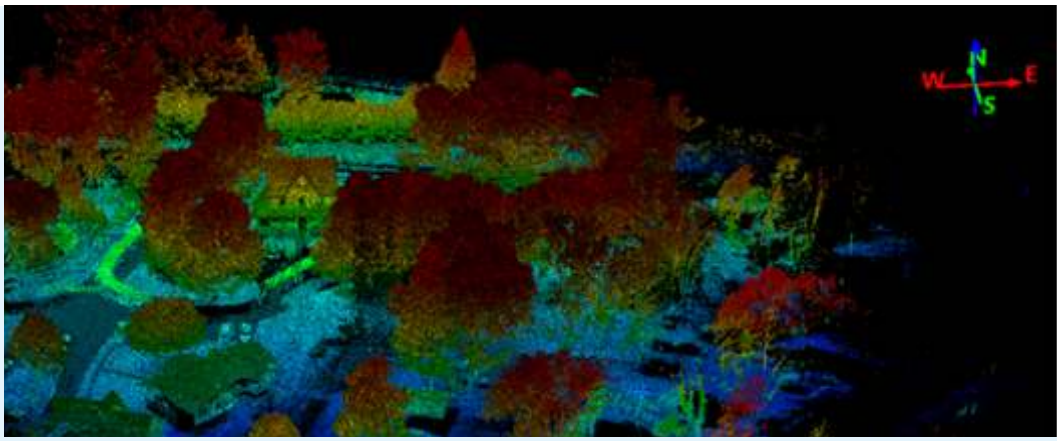
WORKING PRINCIPLE:

The LiDAR instrument fires rapid pulses of laser light at a surface, some at up to 150,000 pulses per second. A sensor on the instrument measures the amount of time it takes for each pulse to bounce back. Light moves at a constant and known speed so the LiDAR instrument can calculate the distance between itself and the target with high accuracy.



TYPES OF SURVEY & MAPPING:

AERIAL SURVEY & MAPPING:



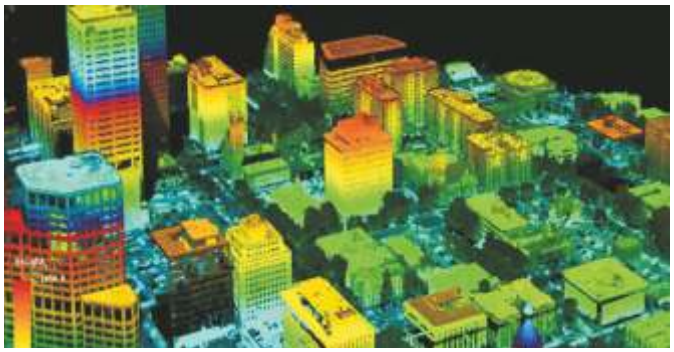
The LiDAR system pulses a laser beam onto a mirror and projects it downward from an aerial platform, usually a Multi-copter, VTOL, fixed-wing airplane or a helicopter. The beam is scanned from side to side as the aircraft flies over the survey area, measuring between 20,000 to 150,000 points per second or higher based on the choice of the LASER. When the laser beam hits an object it is reflected back to the mirror. The time interval between the pulse leaving the airborne platform and its return to the LiDAR sensor is measured.

Following the LiDAR mission, the data is post-processed and the LiDAR time-interval measurements from the pulse being sent to the return pulse being received are converted to distance and corrected to the aerial platform's onboard GPS receiver, IMU, and ground-based GPS stations. The GPS accurately determines the platform's position in terms of latitude; longitude and altitude which are also known as the x, y and z coordinates.

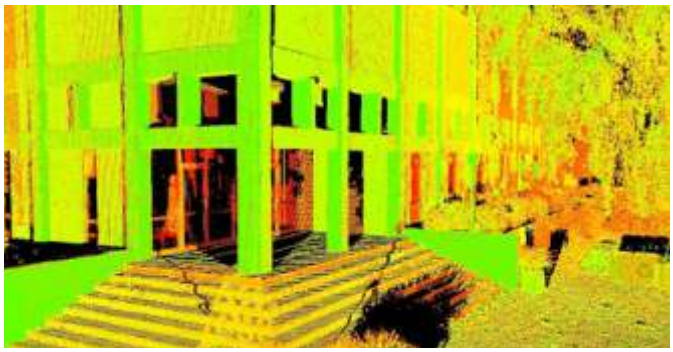
MOBILE SURVEY & MAPPING:

The working principle is similar to Aerial application, the only difference being the LiDAR Payload is mounted on a ground vehicle. The pulsed laser beam is reflected from objects such as building fronts, lamp posts, vegetation, cars and even people. The return pulses are recorded and the distance between the sensor and the object is calculated.

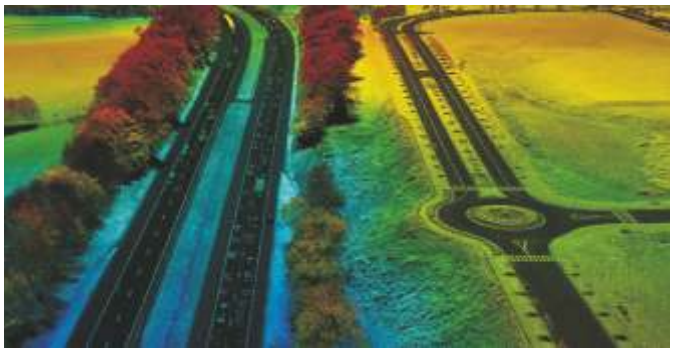
TYPICAL APPLICATIONS



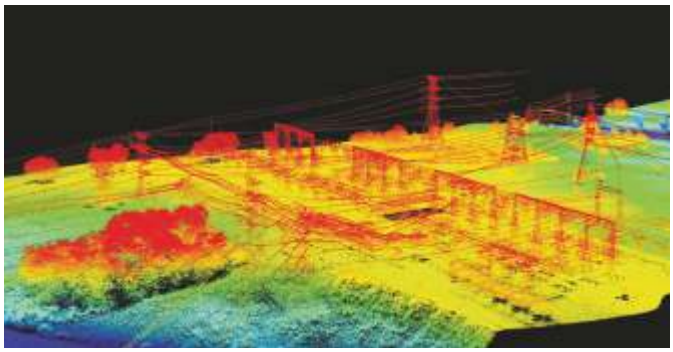
URBAN PLANNING



CONSTRUCTION INSPECTION & PLANNING

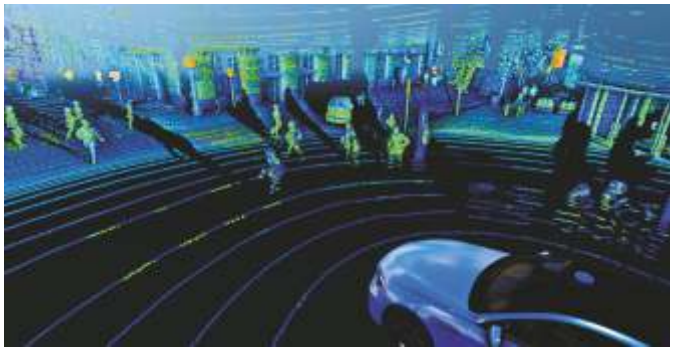


HIGHWAY MAPPING

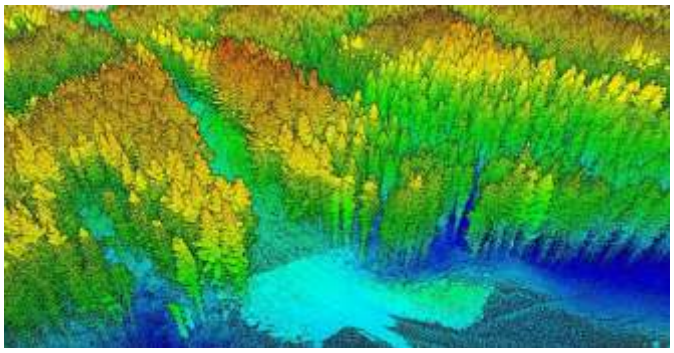


POWERLINE INSPECTION

AGRICULTURE MAPPING

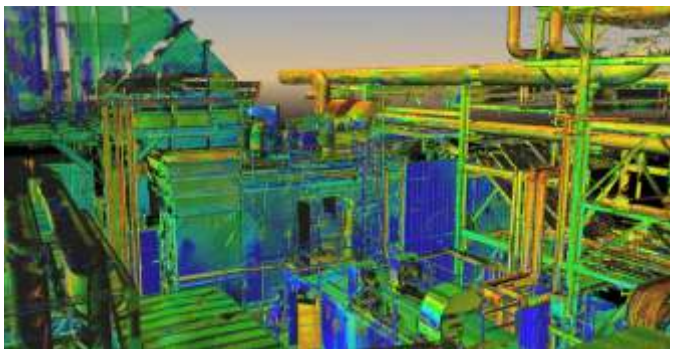


AUTOMATIC DRIVE ASSISTANCE SYSTEM

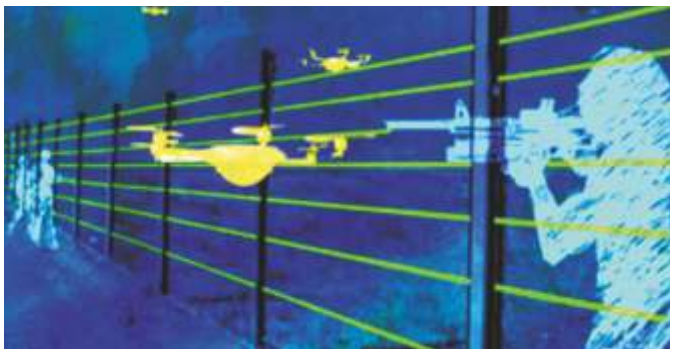


FOREST MAPPING

MINING



OIL & NATURAL GAS PLANT MAPPING & INSPECTION



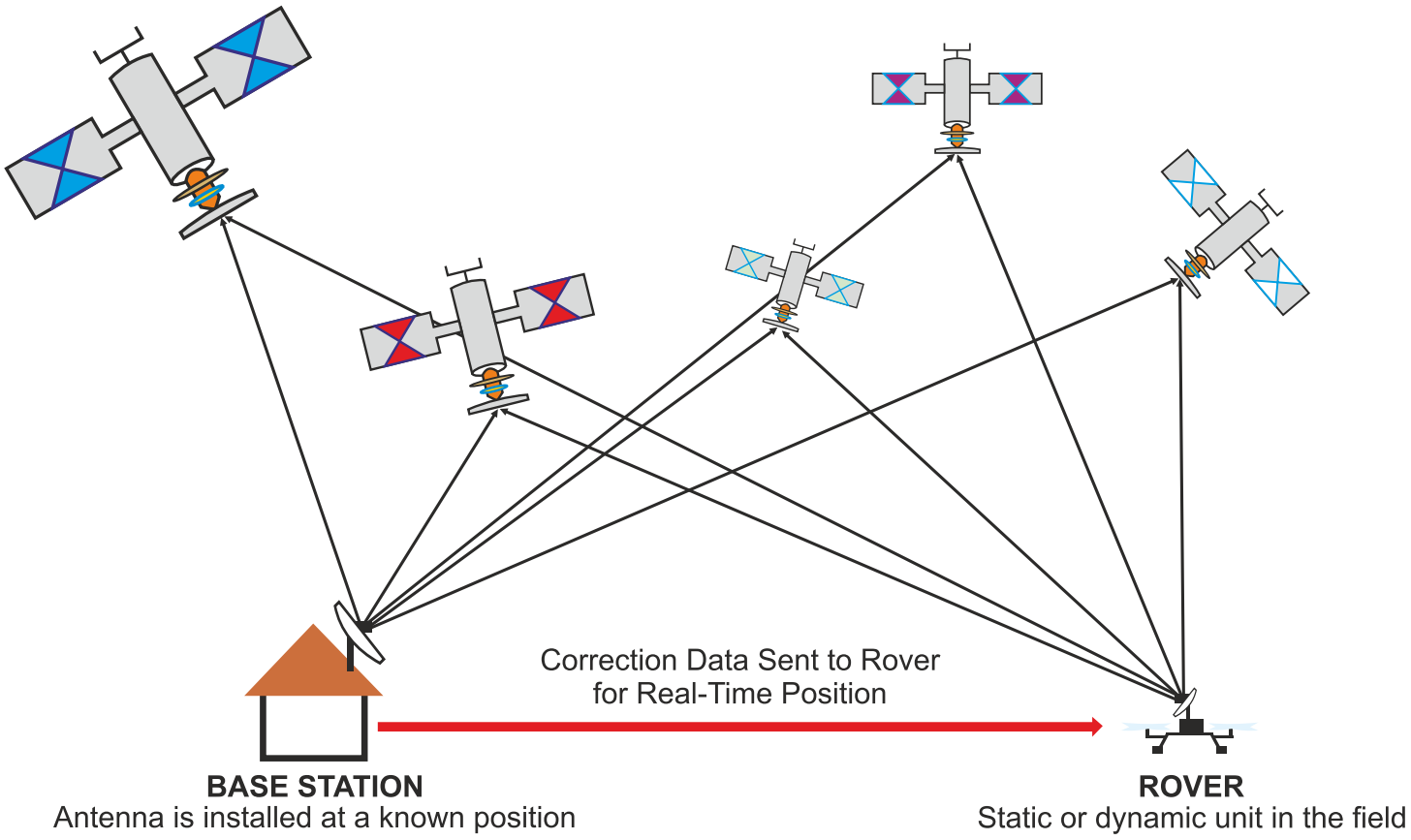
BORDER PATROLLING

BASE STATION

Another key component of the LiDAR Payload solution is the BASE STATION. The DILABS RTK & GPS Base Station is a supported GPS, GLONASS, GALILEO, QZSS, BEIDOU and L-Band Base Continuously Operating Reference Station, that determines accurate position for any application needing a reference station. When the device is fully operational, it uses its precise positioning system to monitor differences in its programmed position relative to position input that is being received from the GNSS. These differences are used to feed RTCM correction data to units nearby. With a long-range RTK baseline of up to 50 km with fast acquisition times you'll be able to expand your research area farther than ever before. Whether inside an office space, or set up outside, this IP67 rated device is designed to perform in versatile environments with immaculate performance. With 372 channels ready to be utilized at any point and the capability to be connected to up 60 satellites at once (L1/L2), you can be rest assured that a consistent connection is something we value.

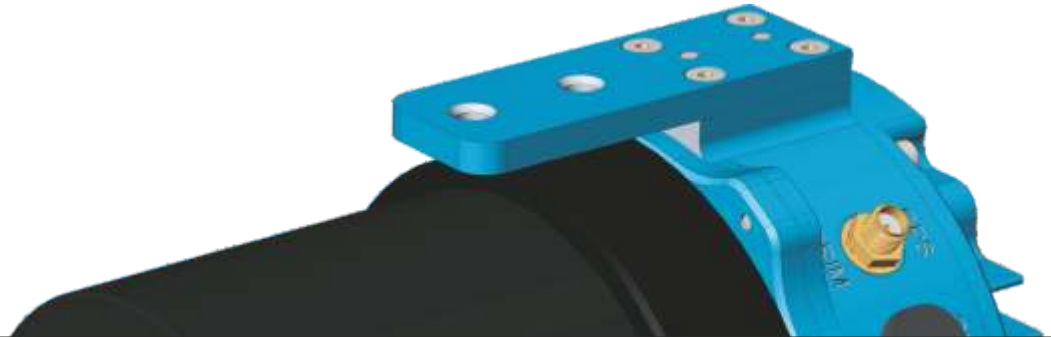
The DILABS RTK & DGPS Base Station utilizes an advanced single antenna GNSS multi-constellation and multifrequency DGPS and RTK with carrier phase receiver to deliver you precise location data wherever your unit is located. The device also has the ability to simultaneously track all accepted satellite signals which makes it even more reliable. The embedded internal datalogger means that you can remote access internal memory over your IP without having to relocate or even power off your unit.

For precise measurements using Real Time Kinematic (RTK) positioning, a base station is a vital necessity. For applications requiring up to 1 cm + 1 ppm accuracy, the need for a base station increases dramatically. The base station is responsible for measuring local errors and transmitting these errors to a corresponding field unit for more accurate position calculations. Many field applications require a base station such as surveying, point cloud development, precision farming, and autonomous navigation. A functional diagram of RTK communications can be seen below.



To transmit correction data from the Base Station to your intended device, a TCP server or an NTRIP (Network Transport for RTCM via Internet Protocol) server may be set up on the host computer. To facilitate a quick setup, the LefebureTM NTRIP Caster program may be used as a server. This software is available to use on multiple platforms such as a cell phone as well as a PC based system.

DESCRIPTION	UNITS	BASE STATION
Output Signal		Positions, PPS Timing: 1PPS, CMOS, Active High, Rising Edge Sync, 10 kΩ, 10 pF load
Input Signal		Event Marker: CMOS, Active Low, Falling Edge Sync, 10 kΩ 10 pF load
Main Features		Base Station; Ideal for reference unit; GNSS multi-frequency RTK with carrier phase; compatible with LefebureTM NTRIP Caster
Available colors of enclosure		Black, Desert tan or Green
Baud rates		4800 - 115200
Data Rate	Hz	Up to 200
Embedded Internal Data Logger		8 GB, 64 GB (optional)
Start-up time	Sec	<1
Corrections		RTCM Rev3
GNSS		
Number of GNSS Antennas		Single
Supported Navigation Signals		GPS L1CA/L1P/L1C/L2P/L2C/L5; GLONASS G1/G2, P1/P2; BeiDou,B1/B2 (B3 separate variant without L5); GALILEO E1BC/E5a/E5b; QZSS L1CA/L2C/L5/L1C
Channel Configuration		372 Channels
RTK Baseline Range	Kms	Upto 50
GNSS Positions Data Rate	Hz	1 (standard), 10 or 20 (optional), 50 (with firmware upgrade)
GNSS Measurements (raw) Data Rate	Hz	1 (standard), 10 or 20 (optional), 50 (with firmware upgrade)
Initialization Time	Sec	<60 (cold start), <30 (warm start), <10 (hot start)
Time Accuracy (clock drift) (1)	Nano sec	20
Differential Options		SBAS, Autonomous, External RTCM, RTK, L-band (Atlas) DGPS
Channels	MHz	1525 - 1560
Sensitivity	dBm	-140
Reacquisition Time	Sec	15 (typical)
ENVIRONMENT		
Operating Temperature	deg C	-40 to +75
Storage Temperature	deg C	-50 to +85
MTBF (GM @ +65degC)	Hours	1,00,000
Shock and Vibration		MIL-STD-810G
EMC/EMI		MIL-STD-461
ELECTRICAL		
Supply Voltage	V DC	9 to 36
Power Consumption	Watts	1
Output Interface (options)		RS-232, RS-422, Ethernet, CAN
Output Data Format		Binary (2), NMEA 0183 ASCII characters
PHYSICAL		
Size	mm	120 x 50 x 53
Weight	gms	220



DILABS

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NVT QC

ANAB ACCREDITED ISO/IEC 17021-1 MANAGEMENT SYSTEMS CERTIFICATION BODY

MAKE IN INDIA

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