

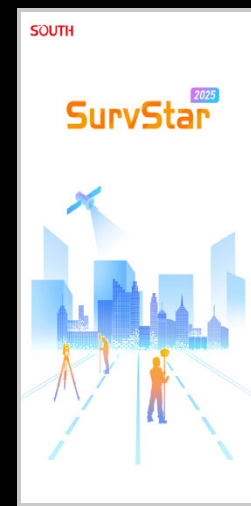
SPECIFICATION (SOFTWARE)

SOFTWARE

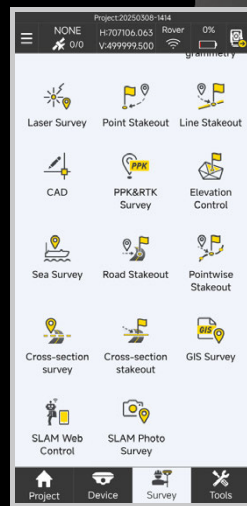
- GNSS Fieldwork
- Fieldwork Partner
- SurvStar
- smartphone recommended (instead of regular data logger)

- SLAM Fieldwork
- SLAM Pre-proces
- SurvStar
- RobotSLAM Engine

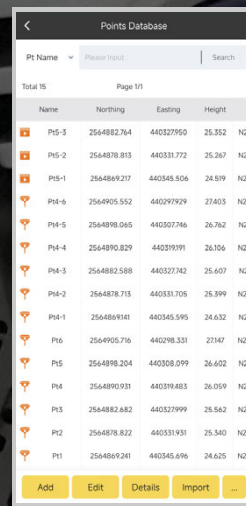
SOFTWARE



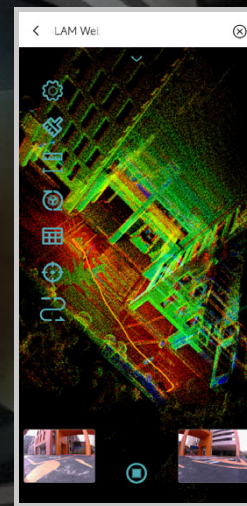
fieldwork software
SurvStar



newly added merged
applications

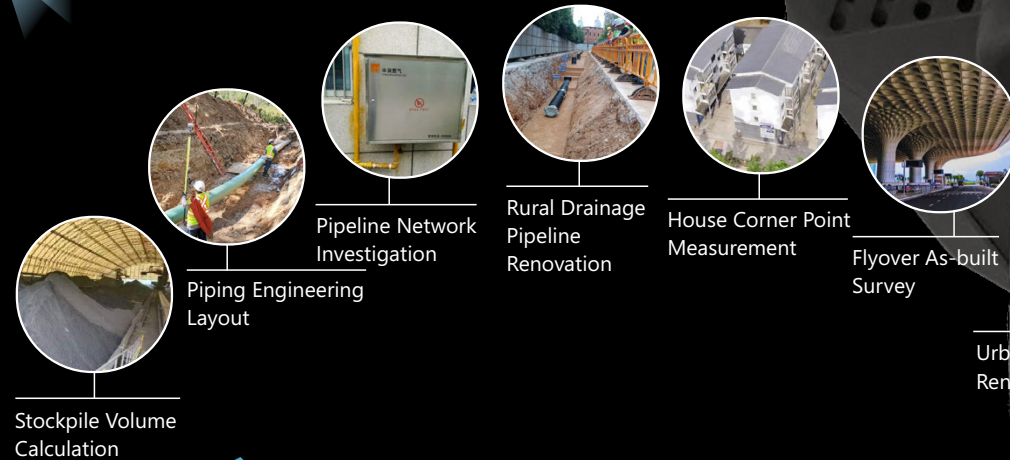


mixed solution
point library



realtime laser
point cloud

APPLICATIONS



The GNSS + SLAM Mixed&Match Combo tends to help this device tackle some tough cases in which conventional RTK survey suffers satellite signal loss and total station measurements come up with low efficiency. With DotLas Plus, it's possible to witness a few changes.

SPECIFICATION (TECHNICAL)

TECHNICAL

GNSS Feature

full constellation tracking and smart dynamic sensitivity positioning technology, supports all existing and under-planning satellites, reliable carrier tracking capability and quality observational data, adapts to various environments, complex terrains, and long-range challenges

GNSS Performance

- Signal Tracking
- Multi-constellation

- 1698 channels
- GPS: L1C/A, L2P, L2C, L5, L1C*
- GLONASS: G1, G2, G3*
- BDS-2: B1I, B2I, B3I
- BDS-3: B1I, B3I, B1C, B2a, B2b-PPP
- GALEO: E1, E5b, E5a, E6*
- QZSS: L1C/A, L1C, L2C, L5
- NavIC/IRNSS: L5
- SBAS: EGNOS L1, L5*
- L-band
- 1-10 Hz

- Positioning Output
- Frequency
- Initialization Time
- Cold Restart
- Initialization Reliability
- IMU Refresh Rate

GNSS Accuracy

- Single Point Positioning
- DGPS
- Real Time
- Kinematic (RTK)
- Post Processed
- Kinematic (PPK)
- Precise Point
- Positioning (PPP)
- High-precision Static

- Static and Rapid Static

- Code Differential
- Positioning Refresh Rate
- Time for First Fixed
- Solution

IMU Performance (GNSS)

- Calibration-free

- Tilting Range
- Tilt Compensating
- Accuracy
- Attitude Accuracy (post processed)
- Positioning Accuracy (post processed)

- H. 1.5 m RMS; V. 2.5 m RMS
- H. 0.4 m RMS; V. 0.8 m RMS
- H. 8 mm + 1 ppm RMS;
- V. 15 mm + 1 ppm RMS
- H. 3 mm + 1 ppm RMS;
- V. 5 mm + 1 ppm RMS
- supports PPP-B2b,
- H. 10 cm; V. 20 cm
- H. 2.5 mm + 0.1 ppm RMS;
- V. 3.5 mm + 0.4 ppm RMS
- H. 2.5 mm + 0.5 ppm RMS;
- V. 5 mm + 0.5 ppm RMS
- H. 0.4 m RMS; V. 0.8 m RMS
- 1Hz/5Hz/10Hz
- cold start 45 sec
- hot start 10 sec
- single reacquisition 1 sec

- automatically calibrates coordinates according to tilt direction and tilting angle
- 0°~60°
- RMS RTK+0.7mm/*tilt angle (in case of 1.8m carbon fiber pole)
- 0.005° RMS pitch/roll, 0.01° RMS heading

- 0.01 m RMS pitch/roll, 0.02 m RMS heading

IMU Performance (SLAM)

- Gyro Offset Stability TC
- Gyro Sensitivity/
- Temperature
- Accelerator Offset
- Stability TC
- Accelerator Sensitivity/
- Temperature
- Gyro + Accel Combo
- Current
- Extended Accel
- Full-scale Range
- Improved ODR Latency

SLAM Performance

- Scanning Range

- Measurement Rate
- Scanning Rate
- Field Of View (FOV)
- Laser Wavelength
- Laser Safety Class
- Loop Closure Free
- PPK Mode

SLAM Accuracy

- Realtime Assessment
- Relative Accuracy
- Range Noise
- Absolute Accuracy (RTK)

- Absolute Accuracy (PPK)

Merged Applications

- Positioning Accuracy
- while Satellites Unlocked
- Contactless Measurement
- Accuracy
- Super Stake-out Accuracy

AR Stake-out Performance

- Mode
- Visual Stake-out Accuracy

- ±10 mdps/C
- ±0.045%/C
- ±0.15 mg/C
- ±0.007%/C
- 0.77 mA
- 32 g
- 32 kHz
- 0.1-70m (70m@ 80% reflectivity; 40m@ 10% reflectivity)
- 200,000 pts/sec
- 10Hz
- 360° x 59°
- 905 nm
- CLASS 1 (IEC 60825-1:2014), eye-safe
- available when RTK is enabled outdoors
- available
- available
- ≤10 mm
- approx. 5-20 mm (optimized)
- best up to 3-5 cm (powered by onboard RTK positioning)
- best up to 2-4 cm (post processed)
- best up to 3 cm, typical 5-10 cm, known as Magicalc by means of Mixed Solution
- ≤5 cm (@15 m)
- optimal: H. 8 mm + 1 ppm RMS; V. 15 mm + 1 ppm RMS
- typical: H. 10 mm + 1 ppm RMS; V. 20 mm + 1 ppm RMS
- single-cam AR visualized
- optimal: H. 8 mm + 1 ppm RMS; V. 15 mm + 1 ppm RMS
- typical: H. 10 mm + 1 ppm RMS; V. 20 mm + 1 ppm RMS

Note: all specifications are subject to change without any prior notice.

- The accuracy performance and reliability might vary due to different factors such as signal obstruction, tilting angle, observation time, multipath model validation, optimal GNSS geometry and atmospheric conditions, etc.
- The battery endurance might result from the operating environment, operating temperature, and battery life.

GNSS RTK Hybrid Supreme DotLas Plus

When RTK Meets SLAM ...

1+1 > 2 IS TRUE

Why DotLas Plus?

Literally, DotLas is a highly integrated device capable of point (= dot) measurement and laser scanning. That's how this new compound word DotLas came. And Plus here actually refers to something extra, merged applications. By combining the immense power from the existing 2 core technologies in geo-spatial society, it features amazing versatility, and intends to challenge some complex environments where conventional GNSS RTK cannot satisfy. Therefore, it resets the benchmark of GNSS RTK hybrid models and tops itself as the supreme masterpiece in the industry.

SPECIFICATION (GENERAL & PHYSICAL)

GENERAL

Model
Component Series
Type

- DotLas Plus
- built in with GNSS mainboard, SLAM scanner, etc.
- RobotSLAM
- GNSS RTK hybrid supreme

Functionality

- camera lenses, temperature sensor, IMU, smartwatch-like LED screen, etc.
- SLAM-based RTK, RTK-based SLAM, and merged applications all-round

PHYSICAL

Dimension
Net Weight

- 120x120x340 mm (LxWxH)
- 1.4 kg (battery handgrip excluded); 1.8 kg (battery handgrip inclusive)

Camera (for SLAM)

- horizontal and forward, pixel size 2.0 μm, FOV 210°x120°, resolution 10 MP in total (5 MP x2), imaging effect best up to 20 MP
- downward, resolution 2 MP x1, FOV 75°

Camera (for GNSS)

- Livox Mid-360 built in, 3D mixed solid-state sensor, 40 channels

Laser Scanner

- Type-C and Ethernet interfacing
- LAN1 (7-pin) and LAN2 (9-pin), for debugging and RS232 data transfer, etc.

Data Download

LEMO Interfacing

Temperature Sensor

- built in, intelligent variable frequency temperature control, realtime monitors and regulates device temperature

IMU Module

- built in for GNSS, and supports tilt survey option, Linux OS

LED Screen

- smartwatch-like, round face, 1.39-inch, resolution 454x454

Wi-Fi Module

- built in and serves as a Wi-Fi hotspot source, accessible to any smart device for configuration

Network Telecom

- SIM card slot built in, Nano SIM

Radio Wireless

- radio antenna interfacing SMA

SPECIFICATION (ELECTRICAL & ENVIRONMENTAL)

ELECTRICAL

Power Supply

- battery handgrip unit, model: iGrip, 50 Wh, 3500 mAh

Endurance

- ≥ 2 hours

Power Consumption

- 26 W

ENVIRONMENTAL

Working Temperature

- -20 ~ 50 °C

Storage Temperature

- -20 ~ 60 °C

Charging

- charging time 2 hours, type-C recharge, max. current 3 A
- nominal 14.4 V
- charging 30 W max. current 5 A max.

Input Voltage

Power Output

Operating Humidity

- 80% non-condensing

Ingress Protection

- IP64 rating according to IEC 60529

How DotLas Plus Works?

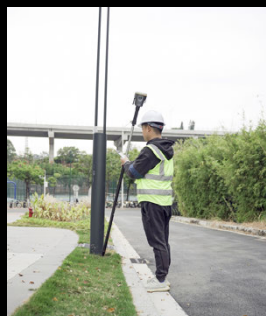
Primarily, when used in RTK work mode (without SLAM enabled), it would be performing as a rover connected to an allocated base station via either UHF or Ntrip.



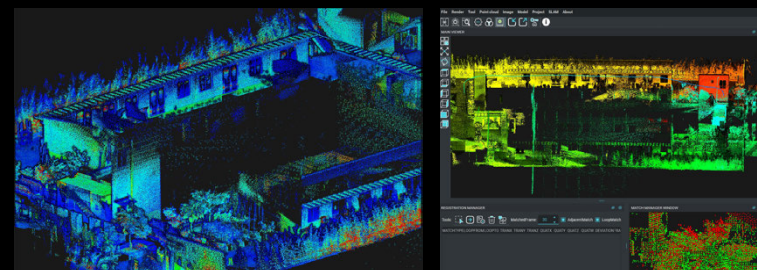
Connected to UHF or Ntrip



Point Survey



Tilt Survey



colorized point cloud

point cloud direct geo-referencing



SLAM data capture (outdoor)



SLAM data capture (indoor)

Secondly, when used in SLAM work mode, it's just quite similar to other SLAM handhelds for indoor purposes. On the other hand, it enjoys much better satellite signals tracking performance compared to other SLAM handheld devices simply equipped with an external black aviation antenna stick. Moreover, PPK standby is good for further improving point cloud accuracy.

Why 1 + 1 > 2 Is True?

① Magicalc = Magic + calculation (Positioning while Satellites Unlocked)

With DotLas Plus, it's possible to obtain coordinate information in the way of Mixed Solution in GNSS-unfriendly or even GNSS-denied areas. The SLAM trajectory will help to reverse compute the positional result and continue point measurements when satellites are unlocked. The Magicalc accuracy mainly depends on the unlocked duration, SLAM trajectory distance, and texture details of the new environment.

② AirMeas = Air Measurement (Contactless Measurement)

Have you heard about iPhone AirDrop? AirMeas is somewhat similar to this principle or saying. For some inaccessible zones, DotLas Plus may help to measure in the way of SLAM data capture within scanning range. Just imagine how to measure the center of the manhole cover on the ground, center of a router device installed overhead, etc. Go to the point in pano image overlaid with colorized point cloud, and you will obtain the coordinate automatically instead of reaching there physically.

③ Super Stake-out

On the market, AR stake-out has been applied to more and more RTK receiver models. Generally speaking, AR stake-out goes with visual aided methodology. While AirMeas is to measure the unknown point that is inaccessible, Super Stake-out helps to reach the known point in the way of pano image overlaid with colorized point cloud, which is a powerful reverse application of AirMeas.

About Fixed Solution & Mixed Solution

Fixed Solution means that the GNSS RTK rover and its allocated base station can simultaneously track at least five satellites in common, and then the rover keeps receiving differential corrections from the base station, which is already widely acknowledged in the geospatial community.



no satellite signals tracking
GNSS positioning - indoor

Mixed Solution refers to a reverse computed result scientifically derived from the time synchronization of SLAM trajectory and earlier positional records, which well interprets the Mix&Match Combo. By unlocking the combined power of GNSS+SLAM, it sets out **A Brand New Concept to the Industry** indeed.



SLAM to enable and deploy
GNSS positioning - indoor

SPECIFICATION (COMMUNICATION & DATA MANAGEMENT)

COMMUNICATION

Screen Operation

- touch operation, for mode setting and status display
- device may access to Wi-Fi for transmit and receive differential corrections

Wi-Fi Datalink

- Web UI management platform built in, accessible to device for reltime monitoring device status and device configuration via Wi-Fi and USB

Web Interaction

- iVoice smart audio technology on board, for smart status broadcasting and voice instructions

Audio Messaging

Voice Language

- supports Chinese, English, Korea, Russian, Portuguese, Spanish, Turkish as default
- RX radio module built in, working frequency 410-470 MHz, protocol Farlink, SOUTH, TrimTalk450S, ZHD, HUACE
- BT4.2 (BR/EDR+BLE) standard automatic Bluetooth pairing between device and controller by touch (NFC module on board is needed for controller side)
- 802.11b/g/n standard

Radio Datalink

Bluetooth

NFC Wireless WLAN

DATA MANAGEMENT

Data Transfer

- USB, FTP, and HTTP
- SSD 4 GB (for GNSS) and 512 GB (for SLAM) built in, extendable to 1 TB max.

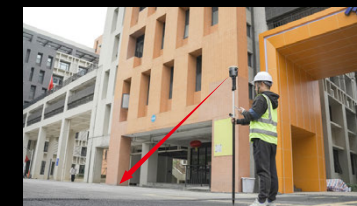
Data Storage

Data Format

- Static: South STH, Rinex2, Rinex3.02, etc.
- Differential: RTCM3.0, RTCM3.2 input and output
- GPS output: NMEA0183, PJK plane coordinate, binary code
- Network module: VRS, FKP, MAC, N-Trip



open air outside



indoor, with no satellite locked

