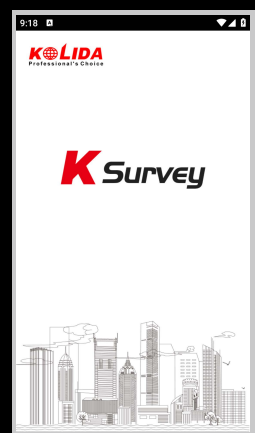## SPECIFICATION (SOFTWARE)

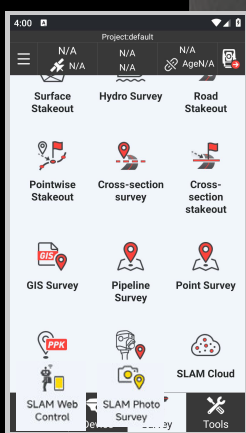**SOFTWARE**

| GNSS Fieldwork | • K-survey |
| Fieldwork Partner | • smartphone recommended (instead of regular data logger) |

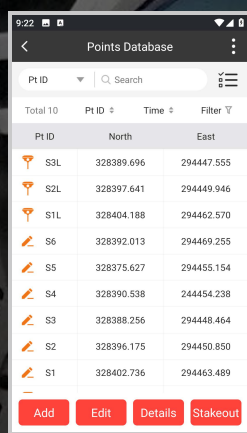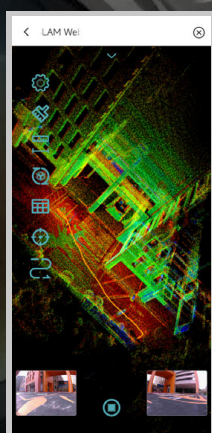| SLAM Fieldwork | • K-survey |
| Kolida SLAM Office | • RobotSLAM Engine |

SOFTWARE

fieldwork software
K-survey

newly added merged
applications

mixed solution
point library

realtime laser
point cloud

APPLICATIONS

Piping Engineering Layout

Pipeline Network Investigation

Rural Drainage Pipeline Renovation

House Corner Point Measurement

Flyover As-built Survey

Stockpile Volume Calculation

Urban Street Renovation

Bridge Pier Measurement

Bank Position & Water Level Measurement

Slope Profile Survey

Old Building Renovation
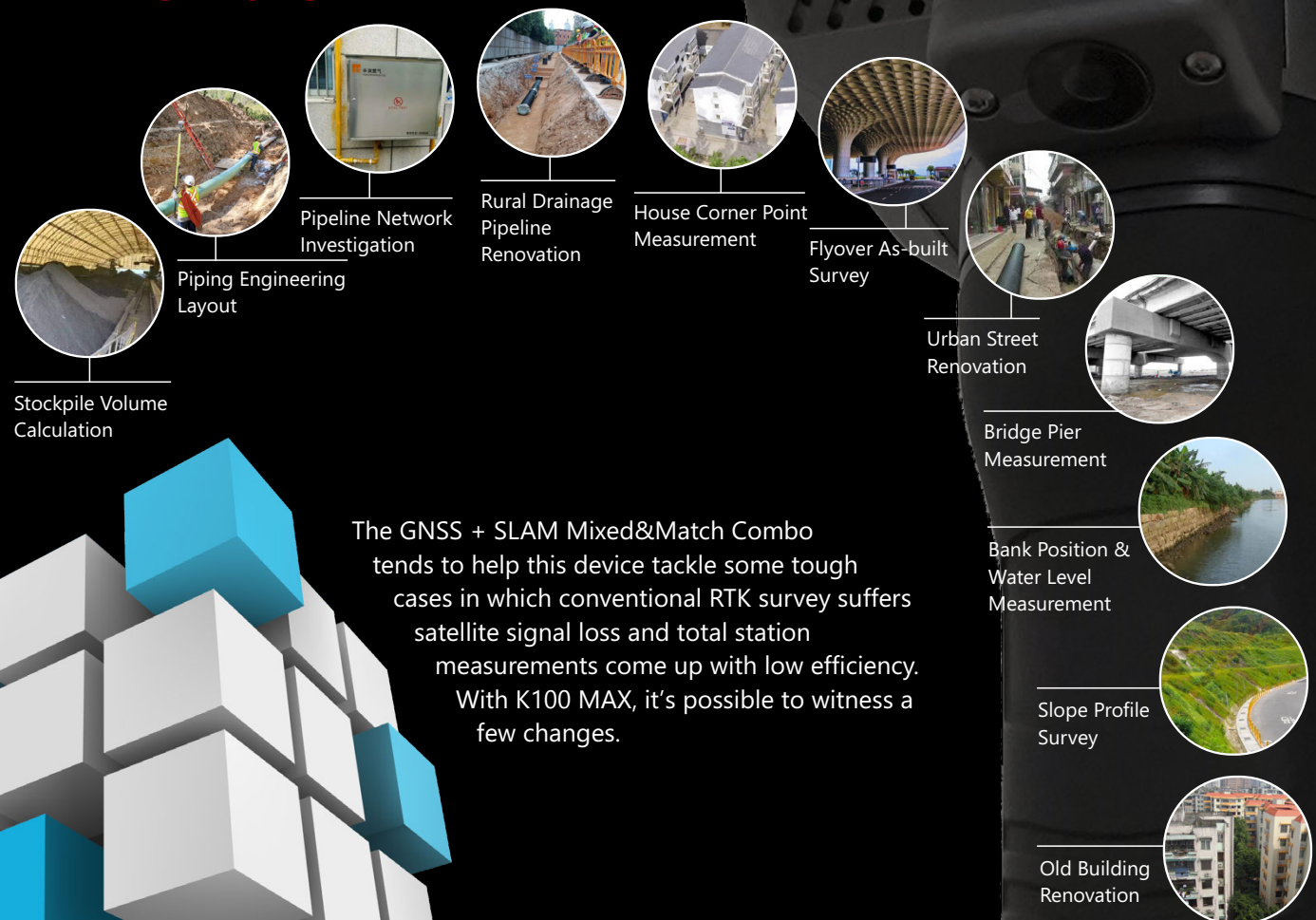
The GNSS + SLAM Mixed&Match Combo tends to help this device tackle some tough cases in which conventional RTK survey suffers satellite signal loss and total station measurements come up with low efficiency. With K100 MAX, it's possible to witness a few changes.

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 GALILEO: E1, E5b, E5a, E6* QZSS: L1C/A, L1C, L2C, L5 NavIC/IRNSS: L5 SBAS: EGNOS L1, L5* L-band
Positioning Output Frequency	• 1-10 Hz
Initialization Time	• < 10 sec
Cold Restart	• < 12 sec
Initialization Reliability	• > 99.9%
IMU Refresh Rate	• 200 Hz

GNSS Accuracy

Single Point Positioning	• H. 1.5 m RMS; V. 2.5 m RMS
DGPS	H. 0.4 m RMS; V. 0.8 m RMS
Real Time Kinematic (RTK)	• H. 8 mm + 1 ppm RMS; V. 15 mm + 1 ppm RMS
Post Processed Kinematic (PPK)	• H. 3 mm + 1 ppm RMS; V. 5 mm +1 ppm RMS
Precise Point Positioning (PPP)	• supports PPP-B2b, H. 10 cm; V. 20 cm
High-precision Static	• H. 2.5 mm + 0.1 ppm RMS; V. 3.5 mm + 0.4 ppm RMS
Static and Rapid Static	• H. 2.5 mm + 0.5 ppm RMS; V. 5 mm + 0.5 ppm RMS
Code Differential	• H. 0.4 m RMS; V. 0.8 m RMS
Positioning Refresh Rate	• 1Hz/5Hz/10Hz
Time for First Fixed Solution	• cold start < 45 sec hot start < 10 sec single reacquisition < 1 sec

IMU Performance (GNSS)

Calibration-free	• automatically calibrates coordinates according to tilt direction and tilting angle
Tilting Range	• 0°~60°
Tilt Compensating Accuracy	• RMS RTK+0.7mm/°tilt angle (in case of 1.8m carbon fiber pole)
Attitude Accuracy (post processed)	• 0.005° RMS pitch/roll, 0.01° RMS heading
Positioning Accuracy (post processed)	• 0.01 m RMS pitch/roll, 0.02 m RMS heading

IMU Performance (SLAM)

Gyro Offset Stability TC	• ±10 mdps/C
Gyro Sensitivity/ Temperature	• ±0.045%/C
Accelerator Offset Stability TC	• ±0.15 mg/C
Accelerator Sensitivity/ Temperature	• ±0.007%/C
Gyro + Accel Combo Current	• 0.77 mA
Extended Accel Full-scale Range	• 32 g
Improved ODR Latency	• 32 kHz

SLAM Performance

Scanning Range	• 0.1-70m (70m@ 80% reflectivity; 40m@ 10% reflectivity)
Measurement Rate	• 200,000 pts/sec
Scanning Rate	• 10Hz
Field Of View (FOV)	• 360° x 59°
Laser Wavelength	• 905 nm
Laser Safety Class	• CLASS 1 (IEC 60825-1:2014), eye-safe
Loop Closure Free	• available when RTK is enabled outdoors
PPK Mode	• available

SLAM Accuracy

Realtime Assessment	• available
Relative Accuracy	• ≤10 mm
Range Noise	• approx. 5-20 mm (optimized)
Absolute Accuracy (RTK)	• best up to 3-5 cm (powered by onboard RTK positioning)
Absolute Accuracy (PPK)	• best up to 2-4 cm (post processed)

Merged Applications

Positioning Accuracy while Satellites Unlocked	• best up to 3 cm, typical 5-10 cm, known as Magicalc by means of Mixed Solution
Contactless Measurement Accuracy	• ≤5 cm (@15 m)
Super Stake-out Accuracy	• 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

AR Stake-out Performance

| Mode | • single-cam AR visualized |
| Visual Stake-out Accuracy | • 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.

1. 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.
2. The battery endurance might result from the operating environment, operating temperature, and battery life.

GNSS RTK Hybrid Supreme
K100 MAX

When **RTK** Meets **SLAM** ...

1+1 > 2 IS TRUE

(V. 202504)

KOLIDA
Professional's Choice

inbuilt RX radio module
(to enable its rover use via radio datalink)

inbuilt GNSS mainboard and antenna
(for RTK rover and RTK-based SLAM purposes)

inbuilt dual-cam facing forward
(to colorize SLAM point cloud with textures)

smartwatch-like LED screen
(touch screen, more interactive and informative)

market-proven laser scanner sensor
(for SLAM use and merged applications)

handgrip battery exclusive
(highly integrated handgrip with batteries built in)

inbuilt single-cam facing forward
(for intuitive AR stake-out practice)

RTK rover pole connector interface
(screw hole underneath handgrip to install pole)

Why K100 MAX?

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	• K100　MAX	Type	• GNSS RTK hybrid supreme
Series	• RobotSLAM	Component	• built in with GNSS mainboard, SLAM scanner,
Functionality	• SLAM-based RTK, RTK-based SLAM, and		camera lenses, temperature sensor, IMU,
	merged applications all-round		smartwatch-like LED screen, etc.

PHYSICAL

Dimension	• 120x120x340 mm (LxWxH)	Temperature Sensor	• built in, intelligent variable frequency
Net Weight	• 1.4 kg (battery handgrip excluded); 1.8 kg		temperature control, realtime monitors and
	(battery handgrip inclusive)		regulates device temperature
Camera (for SLAM)	• horizontal and forward, pixel size 2.0 µm,	IMU Module	• built in for GNSS, and supports tilt survey
	FOV 210°x120°, resolution 10 MP in total		option, Linux OS
	(5 MP x2), imaging effect best up to 20 MP	LED Screen	• smartwatch-like, round face, 1.39-inch,
Camera (for GNSS)	• downward, resolution 2 MP x1, FOV 75°		resolution 454x454
Laser Scanner	• Livox Mid-360 built in, 3D mixed solid-state	Wi-Fi Module	• built in and serves as a Wi-Fi hotspot source,
	sensor, 40 channels		accessible to any smart device for configuration
Data Download	• Type-C and Ethernet interfacing	Network Telecom	• SIM card slot built in, Nano SIM
LEMO Interfacing	• LAN1 (7-pin) and LAN2 (9-pin), for debugging	Radio Wireless	• radio antenna interfacing SMA
	and RS232 data transfer, etc.		

SPECIFICATION (ELECTRICAL & ENVIRONMENTAL)

ELECTRICAL

Power Supply	• battery handgrip unit, model: iGrip,	Charging	• charging time 2 hours, type-C recharge,
	50 Wh, 3500 mAh		max. current 3 A
Endurance	• ≥2 hours	Input Voltage	• nominal 14.4 V
Power Consumption	• 26 W	Power Output	• charging 30 W max. current 5 A max.

ENVIRONMENTAL

Working Temperature	• -20 ~ 50 ℃	Operating Humidity	• 80% non-condensing
Storage Temperature	• -20 ~ 60 ℃	Ingress Protection	• IP64 rating according to IEC 60529

How K100 MAX 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.
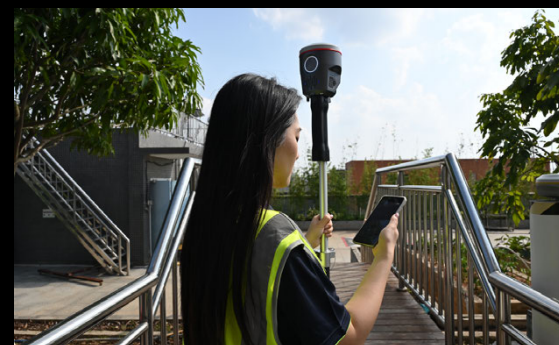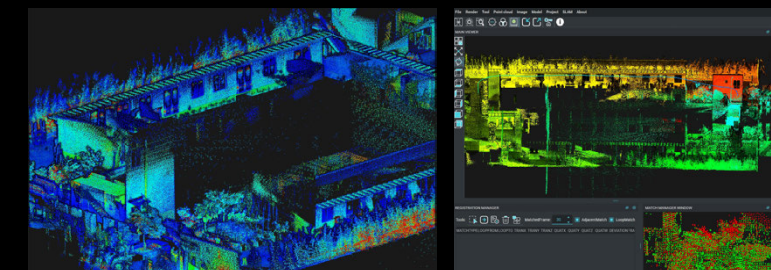

Connected to UHF or Ntrip

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?

Magicalc = Magic + calculation (Positioning while Satellites Unlocked)
With K100 MAX 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.

· **AirMeas = Air Measurement (Contactless Measurement)**
Have you heard about iPhone AirDrop? AirMeas is somewhat similar to this principle or saying. For some inaccessible zones, K100 MAX 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.

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.

open air outside
indoor with no satellite locked

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.

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.

RTK FIXED — no satellite signals tracking
✖ GNSS positioning - indoor

GNSS SLAM MIXED — SLAM to enable and deploy
✔ GNSS positioning - indoor

SPECIFICATION (COMMUNICATION & DATA MANAGEMENT)

COMMUNICATION

Screen Operation	• touch operation, for mode setting and	Voice Language	• supports Chinese, English, Korean, Russian,
	• status display		Portuguese, Spanish, Turkish as default
Wi-Fi Datalink	• device may access to Wi-Fi for transmit and	Radio Datalink	• RX radio module built in, working frequency
	receive differential corrections		410-470 MHz, protocol Farlink, SOUTH,
Web Interaction	• Web UI management platform built in,		TrimTalk450S, ZHD, HUACE
	accessible to device for realtime monitoring	Bluetooth	• BT4.2 (BR/EDR+BLE) standard
	device status and device configuration via		automatic Bluetooth pairing between device
	Wi-Fi and USB		and controller by touch (NFC module on board
Audio Messaging	• iVoice smart audio technology on board,	NFC Wireless	• is needed for controller side)
	for smart status broadcasting and voice	WLAN	• 802.11b/g/n standard
	instructions		

DATA MANAGEMENT

Data Transfer	• USB, FTP, and HTTP	Data Format	• Static: South STH, Rinex2, Rinex3.02, etc.
Data Storage	• SSD 4 GB (for GNSS) and 512 GB (for SLAM)		Differential: RTCM3.0, RTCM3.2 input and output
	built in, extendable to 1 TB max.		GPS output: NMEA0183, PJK plane coordinate,
			binary code
			Network module: VRS, FKP, MAC, N-Trip