EXCELLENT VALUE
SUSTAINABLE AND RELIABLE

PHEREFIX
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SAG10

SAG20

SMC10

SMC20

PHEREFIX

PRODUCT BROCHURE
SPHEREFIX

Precision Agriculture & Mechanical Control

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Guangzhou Spherefix Navigation Technology Co., Ltd

ABOUT US

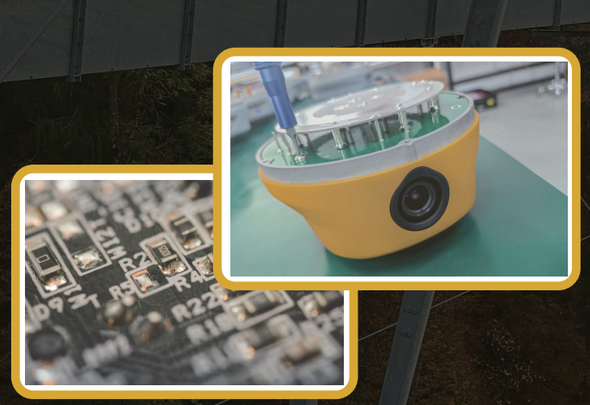
Company Introduction

Spherefix, a brand of Guangzhou Spherefix Information Technology Co., Ltd., is a reliable engineering surveying instrument supplier. Guided by the philosophy of "Smart Efficiency," Spherefix aims to offer affordable and precise surveying instruments to mass engineering users in emerging markets. We strive to make GNSS technology accessible to those unfamiliar with it, enhancing their engineering efficiency. Our global sales network covers over 50 countries and regions. Our product range includes RTK receivers, CORS receivers, precision agriculture & mechanical control systems, GIS data collectors, surveying controllers, and engineering surveying software.

SPHEREFIX Strength

Technology for All

SPHEREFIX is committed to making professional GNSS surveying and mapping technology accessible to every surveyor. We have a comprehensive supply chain that allows everyone to experience high-quality GNSS products at the most affordable price. We strive to achieve one goal: customers receive value far beyond price.

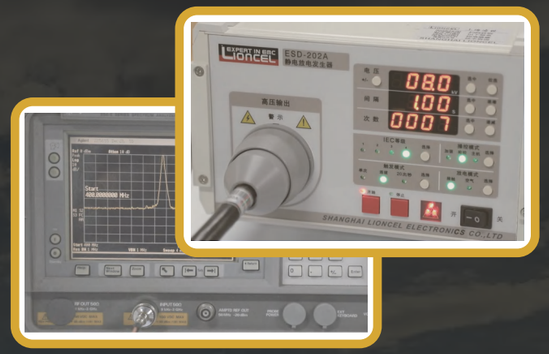


Self-produced & Self-researched

Self-produced & Self-researched are important components of SPHEREFIX's "technology for all" approach. We are committed to producing and researching personalized, branded high-quality products that cater to the rapid development of the market, allowing every surveyor to experience the fun brought by technology.

Quality Control

Quality is the survival foundation of SPHEREFIX. We implement strict control in every link, including production and supply chain. SPHEREEIX provides comprehensive after-sales service support and 24-month long-term warranty for all the products with a mission of gaining the trust of customers with the best quality.



R&D Laboratory

Through continuous exploration and investment, SPHEREFIX has completed the technical accumulation and precipitation of GNSS Receivers R&D. We established professional R&D laboratories, including Temperature, Electrostatic discharge, Electromagnetic compatibility laboratory, and ect. We are committed to developing the most professional surveying equipments for the exploration and challenges in the future.

Our Targets

Popularizing GNSS high-precision positioning technology to the general public.

Values

Value over price, sustainable, reliable.

Mission

Vision

Become a globally trusted brand of surveying instruments.

SAG10 Autonomous Steering System

PRECISION AGRICULTURE

SAG10 Autonomous Steering System is designed for agricultural machinery, offering centimeter-level accuracy through high-precision satellite positioning and advanced DC servo motor technology. It includes an integrated controller with 4G, IMU, UHF radio, and satellite positioning modules, making it easy to install and transfer between vehicles. Suitable for tasks like seeding, harvesting, and spraying, SAG10 boosts efficiency, reduces fuel use, and lowers labor costs.

Integrated Controller

It features an integrated controller that combines a 4G module, IMU sensor, UHF radio, and positioning module. The high-level integration makes it easier and faster to install and transfer the system between vehicles. The need for additional wheel angle sensors is eliminated, simplifying installation and enhancing the system's stability and reliability.

High Precision

It delivers industry-standard RTK accuracy, integrating satellite positioning with INS terrain compensation to maintain 2.5 cm pass-to-pass precision in challenging terrain. This reduces operational errors, cutting down on time and labor costs while boosting overall efficiency. Such precision is essential for key agri-tasks like plowing, planting, and harvesting.

Consistency in Operations

The intelligent tablet displays operation information in multiple dimensions, including the front, side, and top views, and shows real-time deviations of the bucket from the reference plane. Operators can solo-fill control operations by following system guidance, skipping surveying and staking. Additionally, the bucket can perform precisely even in low-visibility conditions, significantly enhancing work efficiency.

Excellent Versatility

It is fully-featured and compatible with a variety of operating modes, including AB lines, a+ lines, custom curves, and offset harrowing. It meets the precise operational requirements for different terrains and tasks. Additionally, the system supports area statistics, operation tracking, data upload and download, and shared operating modes across multiple vehicles, significantly improving usability and operational efficiency.

CHARACTERISTIC

- It supports wheel angle sensor mode which is essential for specific agricultural operation.
- It supports secondary development to provide more tightly integrated components.
- It provides quick and convenient installation, allowing users to activate common functions in just a few steps.
- It features a 10.1-inch display with instant multi-touch response and is ruggedized for water, dust and shock.

MAIN COMPONENTS INSTALLATION LOCATION

SYSTEM COMPOSITION

APPLICATION SCENARIO

Spraying

Harvesting

Seeding

Plowing

ITEM		SPECIFICATION	REMARKS
RECEIVER	GPS	L1, L2, L5	
	GLONASS	L1, L2	
	BDS	B1, B2, B3	
	Accuracy (RTK)	Horizontal:±8mm + 1ppm RMS Vertical: ±15mm + 1ppm RMS	
	Working temperature	-20°C ~+70°C	
	Storage temperature	-40°C ~+80°C	
	Size	159*56 mm	
	Network	2G/3G/4G	
	Dust and Waterproof	IP69K	
VEHICLE MOUNTED TABLET	Display Screen	10.1-inch, Support 5-point capacitive touth	
	Brightness	750cd/m2	
	Resolution	1024*600px	
	I/O	RS232*2 RS485*1 CAN*1/2	
	Communication	4G WiFi 2.4G BT 4.2, BLE USB 2.0*1	
	Operating Temperature	-30°C ~ +70°C	
	Storage Temperature	-40°C ~ +85°C	
	Protection Level	IP65	
	Work Humidity	Humidity 95%, non-condensing	
	Vibration standard (Operational)	MIL-STD-810	
	Impact standard (Operational)	ISO16750	
	Power	5-36V DC Input ACC, State detection for ignitio	
AUTO-STEERING SYSTEM	Rated Torque	7.5 N·m	
	Max RPM	180 RPM	
	Rated Current	15A	
	I/O	1 × CAN	
	Power	(9-32) VDC	
	Motor Dimensions	165mm × 80.5mm	
	Steering Wheel Diameter	D: 410mm	
	Operating Temperature	-20°C ~ +70°C	
	Storage Temperature	-40°C ~ +85°C	
	Dust & Waterproof Rating	IP65	
CAMERA	Power Supply	DC12V ±5%	
	Viewing Angle	120°	
	Resolution	1280(H) × 720(V)	
	Operating Temperature	-20°C ~ +70°C	
	Storage Temperature	-40°C ~ +85°C	
	Dust & Waterproof Rating	IP65	
ACCESSORIES	Receiver	1 Unit	
	Tablet	1 Unit	
	Steering Wheel	1 PCS	
	Motor and Driver	1 PCS	
	Main Cable	1 PCS	
	Tablet Power Cable	1 PCS	
	Screw Accessories Pack	1 PCS	
	Mount	1 PCS	
	Camera (Optional)	1 PCS	

▶ Manufacturers may update parameters at any time, please refer to the latest product information.

SAG20 Agricultural Satellite Land Leveling System

PRECISION AGRICULTURE

SAG20 Agricultural Satellite Land Leveling System is a high-precision navigation solution designed for agricultural machinery, ideal for leveling operations across diverse terrains. It uses multi-satellite signals for precise positioning and attitude control, supporting 24/7 operation with a coverage range up to 30 km. It offers multi-unit synchronization, automatic terrain recognition, benchmark adjustment, real-time mapping, and route planning, with cloud-based management via internet connectivity. It ensures high efficiency and accuracy in complex terrains, making it an excellent choice for precision agriculture.

CHARACTERISTIC

It ensures that land is leveled to a uniform plane, achieving precise and consistent grading.

It provides real-time visualization of agricultural machinery operation trajectories and terrain elevation maps, enabling precise and visible land leveling.

The intelligent display tablet features a 10.1-inch high-definition screen with multi-touch instant response. It is water-proof, dust-proof, and shock-proof.

The ECU controller enables multi-system control and real-time monitoring and adjustment of sensors.

Comprehensive Network Signal Coverage

The GNSS receiver is designed to be compatible with multiple satellite constellations, ensuring robust signal reception, with a reference station coverage radius of 30 km which significantly reduces the need for relocating conventional base stations or laser transmitters. This setup allows for simultaneous service to multiple units, enhancing operational efficiency. Moreover, no extra base stations are needed for long-distance operations, saving 15% in labor costs.

Multi-Purpose System Integration

It is highly adaptable, enabling tractors to perform precise positioning and integrate seamlessly with a variety of grading blades. This versatility allows for not only basic land leveling but also extended functionalities like autonomous operation, intelligent spraying, and enhanced navigation. The multi-purpose capability significantly reduces labor and material costs by 30%-50%.

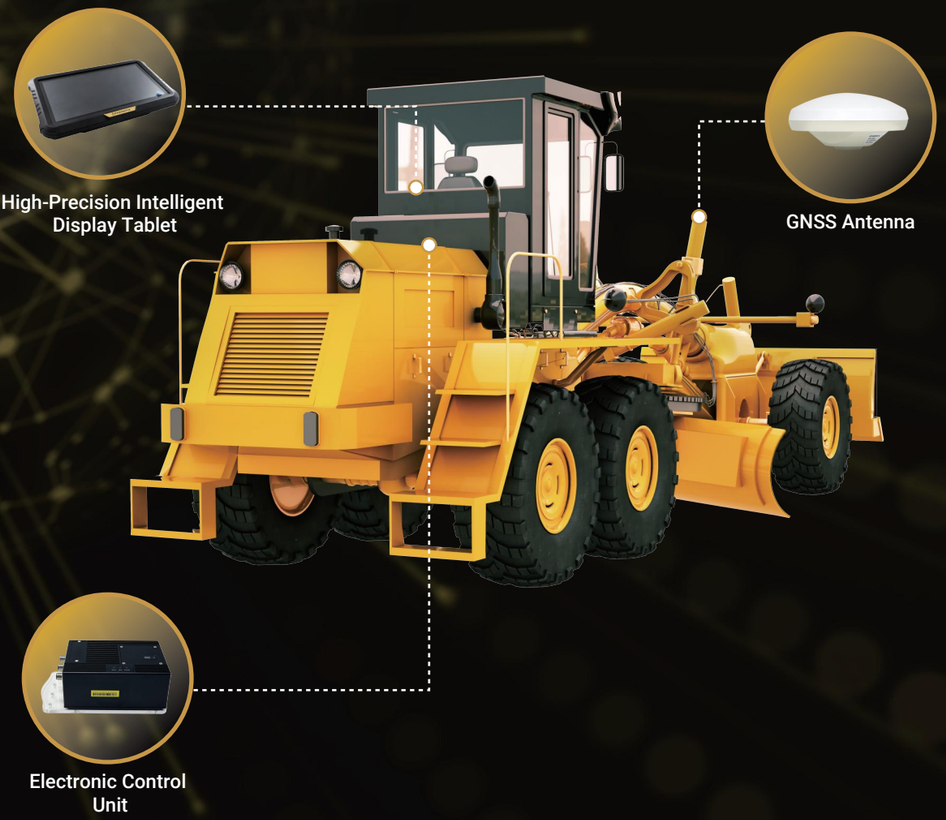
24/7 Continuous Operation

It is built for round-the-clock, all-weather performance, maintaining peak functionality in harsh conditions, including high winds, sandstorms, and low visibility, ensuring continuous work regardless of day or night.

Auto-Height Control & Smart-Benchmarking

It features automated terrain recognition and dynamic benchmark adjustment, ensuring leveling accuracy within ±2.5 cm across both flat and sloped terrains. Compared to manual operations, the high degree of automation increases work efficiency by 20%.

MAIN COMPONENTS INSTALLATION LOCATION



SYSTEM COMPOSITION

APPLICATION SCENARIO

Precision Farmland Leveling

Arid Land Reclamation

Efficient Terrain Handling

Automatic Terrain Recognition

ITEM		SPECIFICATION	REMARKS
SATELLITE SYSTEM	GPS	L1, L2, L5	
	GLONASS	L1, L2, L3	
	BDS	B1I, B2I, B3I, B1C, B2a, B2b*	
	GALILEO	E1, E5a, E5b, E6	
	QZSS	L1, L2, L5, L6	
	IRNSS	L5	
	L-Band		
WORKING ENVIRONMENT	Environment	Operating Temperature: -40°C ~ +85°C Storage Temperature: -55°C ~ +85°C	
	Vibration Standards	Complies with national standards GBT-3871, GBT-2423, and GBT-28046 for vehicle vibration standards.	
VEHICLE MOUNTED TABLET	Display Screen	10.1-inch, Support 5-point capacitive touth	
	Brightness	750cd/m2	
	Resolution	1024*600px	
	I/O	RS232*2 RS485*1 CAN*1/2	
	Communication	4G WiFi 2.4G BT 4.2, BLE USB 2.0*1	
	Operating Temperature	-30°C ~ +70°C	
	Storage Temperature	-40°C ~ +85°C	
	Protection Level	IP65	
	Work Humidity	Humidity 95%, non-condensing	
	Vibration standard (Operational)	MIL-STD-810	
	Impact standard (Operational)	ISO16750	
	Power	5-36V DC Input ACC, State detection for ignitio	
ECU CONTROLLER	Dimensions(L*W*H)	16cm* 10.8cm*4.5cm	
	Input Voltage	9–36V	
	Hydraulic Output Voltage	12V	
	Hydraulic Output Voltage	A highly integrated leveling control unit and radio communication unit. The leveling control unit is equipped with an on-board ARM processor and industrial-grade communication chip, ensuring stable performance and robust anti-interference capability. The radio communication unit incorporates mainstream measurement-grade communication modules, compatible with domestic and international standard measurement base stations.	
ACCESSORIES	Tablet	1 Unit	
	ECU	1 PCS	
	Gnss antenna	1 PCS	
	Hydraulic control valve	1 PCS	
	Tablet Holder	1 PCS	
	Power cable	1 PCS	
	Hydraulic valve cable	1 PCS	
	Gnss antenna cable	1 PCS	

▶ Manufacturers may update parameters at any time, please refer to the latest product information.

SMC10 Dozer Control System

MECHANICAL CONTROL

SMC10 Dozer Control System is a smart solution that boosts dozer precision, efficiency, and safety. It offers real-time blade positioning and guidance through high-precision positioning and sensors. With global navigation and embedded tech, it supports real-time monitoring and remote control, enhancing construction quality and reducing labor intensity. Ideal for land grading, road building, and airport runway construction, it enables stakeless and coordinated multi-machine operations.

CHARACTERISTIC

It uses RTK positioning technology with the positioning accuracy of up to 2 cm.
It uses valves to adjust the blade height based on guidance.

It supports the import of design data for seamless conversion and integration.
A single button press sets the elevation plane, making it simple and fast.

It provides 3D terrain visualization to assist operators with earthmoving and route planning.

It is easy to install and operate, allowing farmers to quickly master.
The intuitive interface simplifies tasks for operators, reducing technical demands.

High Precision

It leverages high-precision GNSS positioning, integrating attitude sensing technology, model algorithms, and electro-hydraulic control to achieve centimeter-level accuracy. This integrated approach ensures precise operation of the dozer, meeting pre-defined design specifications even in complex environments.

Stakeless Operation

It offers real-time positioning and guidance by integrating with advanced algorithms with digital design blueprints.It allows operators to work without the need for physical stakes or surveyors, enabling faster land leveling and significantly reducing labor costs and increasing efficiency by up to 50%.

24/7 Continuous Operation

It enables round-the-clock operation, unaffected by low visibility conditions. It allows engineering teams to optimize their schedule, making the most of night-time hours to boost productivity while maintaining safety.

Real-time Monitoring & Control

It provides real-time monitoring of the blade and construction environment. It uses sensor data to adjust the blade position with precision, ensuring optimal performance at all times.

MAIN COMPONENTS INSTALLATION LOCATION

SYSTEM COMPOSITION

APPLICATION SCENARIO

Land Grading

Road Building

Airport Runway Construction

Mining

ITEM		SPECIFICATION	REMARKS
SATELLITE SYSTEM	GPS	L1, L2, L5	
	GLONASS	L1, L2, L3	
	BDS	B1I, B2I, B3I, B1C, B2a, B2b*	
	GALILEO	E1, E5a, E5b, E6	
	QZSS	L1, L2, L5, L6	
	IRNSS	L5	
	L-Band		
WORKING ENVIRONMENT	Environment	Operating Temperature: -40°C ~ +85°C Storage Temperature: -55°C ~ +85°C	
	Vibration Standards	Complies with national standards GBT-3871, GBT-2423, and GBT-28046 for vehicle vibration standards.	
VEHICLE MOUNTED TABLET	Display Screen	10.1-inch, Support 5-point capacitive touth	
	Brightness	750cd/m2	
	Resolution	1024*600px	
	I/O	RS232*2 RS485*1 CAN*1/2	
	Communication	4G WiFi 2.4G BT 4.2, BLE USB 2.0*1	
	Operating Temperature	-30°C ~ +70°C	
	Storage Temperature	-40°C ~ +85°C	
	Protection Level	IP65	
	Work Humidity	Humidity 95%, non-condensing	
	Vibration standard (Operational)	MIL-STD-810	
	Impact standard (Operational)	ISO16750	
	Power	5-36V DC Input ACC, State detection for ignitio	
GYROSCOPE	Range	±400°/s	
	Resolution	0.000055(°/s)/(LSB)	Condition: ±400°/s
	Zero-drift at Rest	±1°/s	Condition: Horizontal Placement
	10s Smoothing (Zero Bias Stability)	2.03°/h	Condition: Horizontal Static Placement
	Allan Variance (Zero Bias Instability)	1.80°/h	Condition: Horizontal Static Placement
HEADING ANGLE	Range	Z:±180°	
	Heading Accuracy	0.1°	
	Resolution	0.0055°	Condition: Horizontal Placement
MODULE	Communication Interface	4800bps ~ 230400bps	Condition: UART Default: 115200bps
	Output Content	Angular Velocity, Angle	
	Output Rate	0.2Hz ~ 500Hz	Default: 10Hz
	Stratup Time	1000ms (Max Value)	
	Operating Temperature	-40°C~85°C	
	Storage Temperature	-40°C~100°C	
ELECTRICAL PARAMETERS	Supply Voltage	3.3V~5.5V	Typical: 5V
	Operating Current	9.5mA (Typical)	Condition: Operating (5V)
ACCESSORIES	Tablet	1 Unit	
	ECU	1 PCS	
	Gyroscope	1 PCS	
	Gnss antenna	2 PCS	
	Main Cable	1 PCS	
	Data Cable	1 PCS	
	Tablet Power Cable	1 PCS	
	Antenna harness	2 PCS	
	Mount	1 PCS	
	Screw Accessories Pack	1 PCS	
	Support Rod Kit	1 PCS	

▶ Manufacturers may update parameters at any time, please refer to the latest product information.

SMC20 Excavator Guidance System

MECHANICAL CONTROL

SMC20 Excavator Guidance System is a sophisticated solution with high precision and high performance, which offers visualized operation. It provides accurate position information of the bucket tip and cut/fill volumes through high-precision positioning technology, sensor data acquisition, and real-time data processing. Compatible with various excavators, it fits many situations like river excavation, seabed dredging, and highway slope trimming. One operator can complete all tasks, reducing labor costs and construction time.

Dynamic IMU Sensor

It offers high dynamic precision and consistency, with an ultra-wide temperature range. The IMU integrates a high-performance microprocessor and advanced filtering algorithms, ensuring high measurement accuracy and stable data, suitable for the harsh environmental demands of engineering applications.

High Precision

It achieves a planar accuracy of up to 2 cm and a fill control height accuracy of 3 cm, minimizing rework due to under-digging or over-digging. It meets diverse construction needs, including underwater excavation, river dredging, and seawall building, significantly boosting construction precision.

Simplicity and Efficiency

The intelligent tablet displays operation information in multiple dimensions, including the front, side, and top views, and shows real-time deviations of the bucket from the reference plane. Operators can solo-fill control operations by following system guidance, skipping surveying and staking. Additionally, the bucket can perform precisely even in low-visibility conditions, significantly enhancing work efficiency.

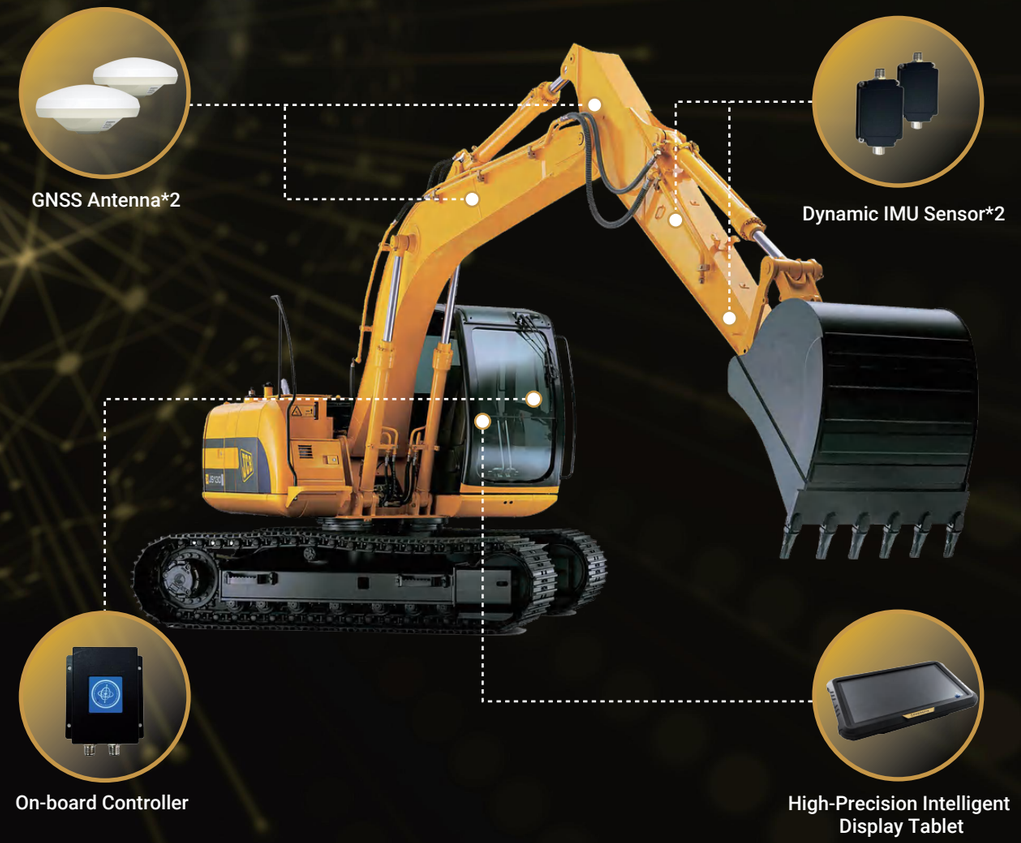
Multi-Scenario All-Weather Application

It is versatile, supporting various excavators and suitable for multiple scenarios like river excavation, seabed dredging, and foundation filling. It operates efficiently in all weather conditions including low visibility(night, heavy rain, fog), by combining IMU sensor technology with satellite positioning.

CHARACTERISTIC

- It achieves planar accuracy of 2 cm and elevation accuracy of 3 cm, significantly improving construction precision.
- It reduces surveying and staking time with colorful construction map guide operations, improving efficiency, and shortening project duration.
- It avoids duplicate work by marking the completed areas with different colors.
  It provides automatic area calculation, making it clear and simple.
- With the precise positioning, IP65 protection, and high brightness, it's ideal for tough environments.

MAIN COMPONENTS INSTALLATION LOCATION



SYSTEM COMPOSITION

APPLICATION SCENARIO

River Excavation

Seabed Dredging

Highway Slope trimming

Mining

ITEM		SPECIFICATION	REMARKS
SATELLITE SYSTEM	GPS	L1, L2, L5	
	GLONASS	L1, L2, L3	
	BDS	B1I, B2I, B3I, B1C, B2a, B2b*	
	GALILEO	E1, E5a, E5b, E6	
	QZSS	L1, L2, L5, L6	
	IRNSS	L5	
	L-Band		
WORKING ENVIRONMENT	Environment	Operating Temperature: -40°C ~ +85°C Storage Temperature: -55°C ~ +85°C	
	Vibration Standards	Complies with national standards GBT-3871, GBT-2423, and GBT-28046 for vehicle vibration standards.	
VEHICLE MOUNTED TABLET	Display Screen	10.1-inch, Support 5-point capacitive touth	
	Brightness	750cd/m2	
	Resolution	1024*600px	
	I/O	RS232*2 RS485*1 CAN*1/2	
	Communication	4G WiFi 2.4G BT 4.2, BLE USB 2.0*1	
	Operating Temperature	-30°C ~ +70°C	
	Storage Temperature	-40°C ~ +85°C	
	Protection Level	IP65	
	Work Humidity	Humidity 95%, non-condensing	
	Vibration standard (Operational)	MIL-STD-810	
	Impact standard (Operational)	ISO16750	
	Power	5-36V DC Input ACC, State detection for ignitio	
SENSOR PERFORMANCE	Angle Measurement Range	Pitch Angle: ±80° Roll Angle: ±180°	
	Angle Repeatability	<0.05	
	Angular Velocity Measurement Range	±450°/s	
	Resolution	0.01°	
	Dynamic Accuracy	0.7°	
	Acceleration Measurement Range	±6g	
	Update Rate	100Hz	
	Voltage Input	9-36 V	
	Power Consumption	0.1-0.24W	
	Interfaces	CAN/RS-485/RS-232/TTL	
	Connector Model	GX12 - 4 Pin (Male)	
	Product Dimensions	37.65524mm	
	Waterproof Rating	IP68	
	Operating Temperature	-40~85°C	
	Storage Temperature	-40~85°C	
ACCESSORIES	Tablet	1 Unit	
	Gnss antenna	2 PCS	
	Dynamic IMU Sensor	2 PCS	
	In-vehicle controller	1 PCS	
	Antenna harness	2 PCS	
	Main Cable	1 PCS	
	Data Cable	2 PCS	
	Power cable	1 PCS	
	Screw Accessories Pack	1 PCS	
	Mount	1 PCS	

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