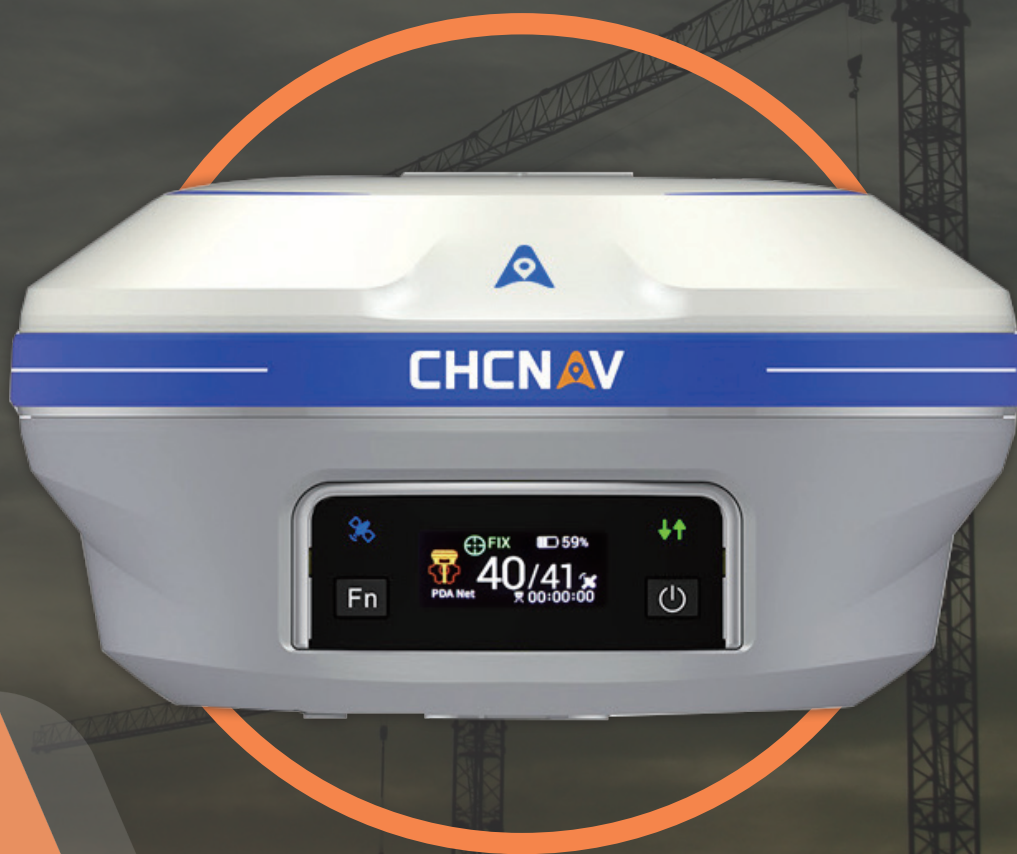# CHCNAV

i93

VERSATILE, EFFICIENT AND EASY-TO-USE VISUAL IMU-RTK

CHCNAV

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SURVEYING & ENGINEERING

EXTREME GNSS PERFORMANCE VISUAL POWER ON TOP

The i93 GNSS receiver is an extremely versatile RTK that integrates the latest GNSS, IMU, and premium dual-camera technologies for a more compelling user experience. Its 3D visual stakeout feature provides unparalleled ease of use and comfort, boosting efficiency for any construction site layout project. Visual survey with video-photogrammetry technology enables accurate point measurements and access to previously hard-to-reach, signal obstructed, and hazardous points. The i93 GNSS can be used to complement aerial surveys generated from oblique imagery since its data is compatible with the most popular 3D modeling software. The i93 GNSS receiver is powered by the innovative CHCNAV iStar GNSS RTK algorithm, multi-band GNSS channels, and hybrid engine for reliable, high accuracy positioning in even the most challenging site conditions. The Auto-IMU of i93 features automatic initialization, eliminating the hassle of manual initialization and simplifying surveying operations in the field. The i93 is the ideal solution for completing tasks faster, more accurately, and more efficiently.

1408-CHANNEL GNSS, iSTAR TECH AND HYBRID ENGINE

Enhanced GNSS RTK performance in challenging environments

The i93 GNSS receiver features 1408 channels tracking full constellations and frequencies, powered by an integrated RF-SoC processor and iStar CHCNAV technology. It delivers reliable and accurate positioning data, with a 15% gain in survey-grade GNSS RTK performance. The built-in hybrid engine and narrowband interference mitigation boost GNSS data quality and signal tracking capabilities by over 20% for optimal RTK performance.

VISUAL NAVIGATION AND STAKEOUT

Effortless one-step stakeout at a glance

The i93 integrates star-level cameras to provide an immersive 3D visual navigation and stakeout experience. With LandStar™ software's 3D visual view, surveyors are guided by a clear, eye-catching directional arrow and real-time distance, and the stakeout point marked directly on the ground in the 3D visual view. Moreover, 3D visual capabilities are also available for line stakeout and CAD-based map stakeout, making operations similarly effortless, intuitive, and efficient. This simplifies the stakeout process, allowing for quick completion in seconds and increasing efficiency by up to 50% for less experienced field operators.

VISUAL SURVEY AND 3D MODELING

Accuracy comes into view: Measure any point with ease

The i93 Visual RTK combines GNSS, IMU and premium global shutter camera with video photogrammetry technology, delivering survey-grade 3D coordinates from real-world video in seconds. It is easy to survey previously hard-to-reach, signal-obstructed and hazardous points in the field, with dynamic panoramic video capture and automatic image matching that improves productivity by up to 60%. Automatic high-speed continuous shooting with up to 85% overlap ensures high processing success. Surveyors looking for ease, speed and accuracy will find the i93 Visual RTK an ideal tool.

ENGINEERED FOR VERSATILE FIELD USE

Uninterrupted operation in any RTK modes

The i93 Visual RTK has all the connectivity features a surveyor needs to complete any GNSS survey project scenario. Built-in Wi-Fi, Bluetooth and NFC technologies allow for seamless connection to field data controllers and tablets. Integrated 4G and UHF modems support all GNSS survey modes. Smart power management ensures up to 34 hours of operation as a GNSS RTK network rover and eliminates the need for spare or external batteries. No matter where or when, the i93 GNSS magnesium alloy body is shock, dust and water resistant to ensure uninterrupted performance.

FAST, RELIABLE INDUSTRIAL AUTO-IMU

Reliable accuracy with automatic IMU initialization

The i93 GNSS receiver features CHCNAV's state-of-the-art 200 Hz Auto-IMU, eliminating manual initialization and simplifying field surveying. With IMU corrections available even when the range pole is carried on the shoulder, in the hand, or placed horizontally, the i93's IMU-RTK automatic pole tilt compensation technology can boost surveying, engineering, and mapping efficiency by 30%. The i93 enables measuring and staking with survey-grade accuracy over a pole-tilt of up to 30 degrees, ideal for engineers, site managers, and surveyors.
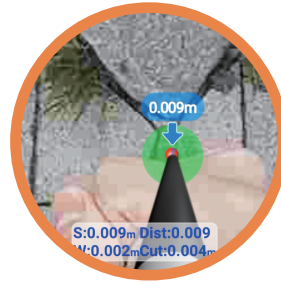
1. VISUAL NAVIGATION AND STAKEOUT

Effortless stakeout
Quick, one-step stakeout on LandStar™ software's 3D view with 50% efficiency gain for less experienced operators.

3D visual navigation
Guided by a clear, eye-catching directional arrow and real-time distance.

3D visual stakeout
Immersive 3D stakeout experience with the stakeout point marked directly on the ground.

Star-level cameras
The stakeout display is clear even at night.

2. VISUAL SURVEY

Enhanced Productivity
Deliver survey-grade 3D coordinates from real-world video capture in seconds even in challenging site conditions.

Hard-to-reach points
Such as ditches, construction hoarding, rivers, and buildings.

Signal-obstructed points
Such as corners, under trees, under overpasses, and narrow gaps between buildings in urban areas.

Hazardous points
Such as transformers, substations, high-voltage power line poles, pipelines, renovated dangerous walls, and manhole covers in the middle of the road.

3. 3D MODELING

Before joint modeling
Result of using a drone alone for modeling, where blurring occurs in areas of occlusion, such as pillars and benches.

After joint modeling
Use i93+UAV to complement aerial surveys generated from oblique imagery.

Single-building modeling
With the i93's dynamic panoramic video capture, 3D modeling is done in one go.

Compatible Software
Compatible with the most popular 3D modeling software including ContextCapture, smart3D, etc.

CHCNAV · i93

SPECIFICATIONS

GNSS Performance [1]

Channels	1408 channels
GPS	L1C, A, L2C, L2P(Y), L5
GLONASS	L1, L2, L3
Galileo	E1, E5a, E5b, E6*
BeiDou	B1I, B2I, B3I, B1C, B2a, B2b
QZSS	L1, L2, L5, L6*
PPP	B2b-PPP
SBAS (EGNOS Support)	L1, L5

GNSS Accuracies [2]

Real time kinematic (RTK)	H: 8 mm + 1 ppm RMS V: 15 mm + 1 ppm RMS Initialization time: <10 s Initialization reliability: >99.9%
Post-processing kinematic (PPK)	H: 3 mm + 1 ppm RMS V: 5 mm + 1 ppm RMS
Post-processing 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
Autonomous	H:1.5 m RMS | V: 2.5 m RMS
Visual survey	Typical 2~4 cm, range 2~15 m
Positioning rate [3]	1 Hz, 5 Hz and 10 Hz
Time to first fix [4]	Cold start: < 45 s, Hot start: < 10 s Signal re-acquisition: < 1 s
IMU update rate	200 Hz
Till angle	0-60°
RTK tilt-compensated	Additional horizontal pole-tilt uncertainty typically less than 10 mm + 0.7 mm/° tilt

Environments

Temperature	Operating: -40°C to +65°C (-40°F to +149°F) Storage: -40°C to +85°C (-40°F to +185°F)
Humidity	100% non-condensation
Ingress protection	IP67 (according to IEC 60529)
Drop	Survive a 2-meter pole-drop
Vibration	Compliant with ISO 9022-36-08 and MIL-STD-810G- 514.6-Cat.24.
Waterproof and breathable membrane	Prevent water vapor from entering under harsh environments

Electrical

Power consumption	UHF/ 4G RTK Rover w/o camera: Typical 2.8 W Visual Stakeout/Visual Survey: Typical 4 W
Li-ion battery capacity	Built-in non-removable battery 9,600 mAh, 7.4 V
Operating time on internal battery [5]	UHF/ 4G RTK Rover w/o camera: up to 34 h Visual Stakeout/Visual Survey: up to 24 h UHF RTK Base: up to 16 h Static: up to 36 h
External power input	9 V DC to 28 V DC

Hardware

Size (D x H)	Φ 152 x 81 mm (Φ 5.98 x 3.19 in)
Weight	1.15 kg (2.54 lb)
Front panel	1.1" OLED Color Display 2 LED, 2 physical buttons
Tilt sensor	Calibration-free IMU for pole-tilt compensation. Immune to magnetic disturbances. E-Bubble leveling.

Cameras

Sensor pixels	Global shutter with 2 MP & 5 MP
Field of view	75°
Video frame rate	25 fps
Image group capture	Method: video photogrammetry. Rate: typically 2 Hz, up to 25Hz. Max. capture time: 60s with an image group size of appr. 60MB.
Illumination	Starlight-grade camera. OmniPixel®-GS technology. Maintain full color at illumination levels as low as 0.01 lux.

Communication

SIM card type	Nano-SIM card
Network modem	Integrated 4G modem: TDD-LTE, FDD-LTE, WCDMA, EDGE, GPRS, GSM
Wireless connection	NFC for device touch pairing
Wi-Fi	Wi-Fi IEEE 802.11a/b/g/n/ac, access point mode
Bluetooth®	5.0 and 4.2 +EDR, backward compatible
Ports	1 x 7-pin LEMO port (RS-232) 1 x USB Type-C port (external power, data download, firmware update) 1 x UHF antenna port (TNC female)
Built-in UHF radio	Rx/Tx: 410 - 470 MHz Transmit Power: 0.5 W to 2 W Protocol: CHC, Transparent, TT450, Satel Link rate: 9 600 bps to 19 200 bps Range: Typical 3 km to 5 km, up to 15 km with optimal conditions
Data formats	RTCM 2.x, RTCM 3.x, CMR input / output HCN, HRC, RINEX 2.11, 3.02 NMEA 0183 output NTRIP Client, NTRIP Caster
Data storage	8 GB internal memory. Support 128 GB external expansion

Compliance with Laws and Regulations

International standards	NGS Antenna Calibration, IEC 62133-2:2017+A1, IEC 62368-1:2014, UN Manual Section 38.3

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