TERSUS
TS21 & TS20 GNSS Receiver

RIGHT TO THE POINT

TS21 & TS20
GNSS RECEIVER

TS21GNSS Receiver

WITH DUAL CAMERAS

TS20GNSS Receiver

WITH BOTTOM CAMERA

TS21 GNSS receiver integrates visual positioning, GNSS, IMU and dual cameras into one innovative device. The front camera enables high-precision, high-efficiency and multi-point measurement, allowing surveyors to measure what they see. The combination of front and bottom cameras supports CAD AR visual stakeout for precise path planning at varying distances.

TS20 GNSS receiver integrates visual positioning, GNSS, IMU and a bottom camera into one innovative device. The bottom camera supports CAD AR visual stakeout for precise path planning.

Equipped with a powerful multi-constellation, multi-frequency GNSS board, TS21/TS20 deliver stable, high-accuracy signal detection. With calibration-free IMU tilt compensation, accuracy is maintained without restrictions on tilt angles. The advanced antenna improves time-to-first-fix (TTFF) and enhances anti-jamming capability. A large-capacity battery ensures extended fieldwork in both network and radio rover modes, while the built-in UHF radio enables long-distance communication. Rugged housing with IP68 protection keeps the devices reliable in harsh environments.

TS21-TAP and TS20-TAP versions integrate the Tersus satellite-based Precise Point Positioning service (TAP), enabling centimeter-level accuracy worldwide without relying on local RTK base stations or CORS. By directly receiving satellite-broadcast corrections such as ephemeris and clock errors, Oscar-TAP ensures high-precision positioning even in remote areas with poor or no network coverage, including oceans, deserts, mountains, and high altitudes.

APPLICATION SCENARIO

Building Construction

Road Construction

Bridge Construction

Pipework

Landscaping

Metro Tunnel

FEATURES

Multiple constellations & frequencies
GPS, GLONASS, BeiDou, Galileo, QZSS, SBAS.

Professional cameras
visual positioning and stakeout.

1792 1792 channels

32GB internal storage

Tilt compensation without calibration
immune to magnetic disturbances.

Rich data transmission options
UHF radio, 4G network, Wi-Fi, Bluetooth, NFC.

Smart battery with extended working hours and power level display.

Global satellite-based PPP service[1]

VISUAL POSITIONING AND STAKEOUT

TS21
GNSS Receiver

Innovative Visual Positioning
Global shutter with video measurement delivers precise and reliable results.

Measure What You See
Multi-points a time, accelerate the workflow and improve efficiency.

On-Site Point Cloud Generation
Generate and export high-precision point clouds in real-time.

Dual-Camera Visual Stakeout
Front and bottom cameras work in tandem, automatically switching for precise navigation at varying distances.

TS20
GNSS Receiver

Effortless stakeout
Quick, one step stakeout on NUWA 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.

Technical Specifications
TS21 & TS20

Performance

Signal Tracking:
GPS L1 C/A, L1 C, L2C, L2P, L5;
GLONASS L1OF, L2OF, L3OC;
BeiDou B1I, B2I, B3I, B1C, B2a, B2b;
Galileo E1, E5a, E5b, E5AltBOC, E6;
QZSS L1 C/A, L1C, L2C, L5C;
SBAS L1 C/A, L5;
L-band[1]

Channels:	1792[1]
Image Sampling Accuracy(Typically):	2cm[2]

Image Point Measurement Accuracy:
Typically 2cm~4cm(2D)
within the distance of 2m to 15m to the object[2]

Single Point Positioning Accuracy (RMS):
- Horizontal：1.5m
- Vertica：2.5m

DGPS Positioning Accuracy (RMS):
- Horizontal：0.25m
- Vertica：0.5m

High-Precision Static (RMS):
- Horizontal：2.5mm+0.1ppm
- Vertica：3.5mm+0.4ppm

Static & Fast Static (RMS):
- Horizontal：2.5mm+0.5ppm
- Vertica：5mm+0.5ppm

Post Processed Kinematic (RMS):
- Horizontal：2.5mm+1ppm
- Vertica：5mm+1ppm

Real Time Kinematic (RMS):
- Horizontal：8mm+1ppm
- Vertica：15mm+1ppm

Initialization (Typical)：	4s[3]
Initialization Reliability：	>99.9%[4]

Network Real Time Kinematic (RMS):
- Horizontal：8mm+0.5ppm
- Vertica：15mm+0.5ppm

Observation Accuracy (Zenith Direction):
- C/A Code：10cm
- P Code：10cm
- Carrier Phase：1mm

Time To First Fix (TTFF):
- Cold Start：<30s
- Warm Start：<5s

Re-acquisition：	<1s

Performance – continued

Tilt Compensation Accuracy (No tilt angle limit)：	≤2cm(within 60°)
Timing Accuracy (RMS)：	20ns
Velocity Accuracy (RMS)：	0.03m/s

PPP(TAP)[1]

Positioning Accuracy (RMS):

- Horizontal:	15mm
- Vertical:	30mm
Convergence Time:	3 minutes
Coverage:	Global
Signal Stability:	99.99%

System & Data

Operating System：	Linux
Storage：	Built-in 32GB
Data Format：	CMR, CMR+ (GPS only), RTCM2.x/3.x
Data Output：	RINEX, NMEA-0183, Tersus Binary
Data Update Rate：	20Hz

Communication

Cellular：	4G LTE/WCDMA/GSM/EDGE
Cellular Bands[5]：	LTE FDD B1,B3,B5,B7,B8,B20, B28 LTE TDD B38,B40,B41 WCDMA B1,B5,B8 GSM/EDGE 900/1800MHz
Network Protocols：	Ntrip Client, Ntrip Server, TCP, Tersus Caster Service (TCS)
Wi-Fi：	802.11a/b/g/n/ac
Bluetooth：	5.0

Internal Radio

RF Transmit Power：	0.5W/1.0W
Frequency Range：	410MHz ~ 470MHz
Operating Mode：	Half-duplex
Channel Spacing:	12.5KHZ/25KHZ/250KHz
Air Baud Rate：	4800 / 9600 / 19200bps
Modulation Type：	CSS, GMSK, 4FSK
Radio Protocols：	LORA, TrimTalk450, TrimMark3, South,Transparent,Satel

Wired Communication

USB：	Type-C, OTG

Camera

Pixel：	Front Camera 2.3MP Bottom Camera 2.0MP

Electrical

External Power Supply：	Support USB (5~20V)
Fast Charging：	Support, 15W max(5V 3A)
Lithium Battery：	Built-in, 7000mAh/7.4V
Charing Time：	3 hours (20%~90%)
Battery Charging Temperature：	+10℃~+45℃
Working Time：	Up to 19 hours[6]
Smart Battery with Power Display：	Support
Electronic Bubble：	Support

Physical

Dimension：	φ134x71mm
Weight：	≈ 850g[7]
GNSS Antenna：	Integrated
Operating Temperature：	-40℃ ~ +70℃
Storage Temperature：	-55℃ ~ +85℃
Relative Humidity：	100% not condensed
Dust- & Waterproof：	IP68
Pole Drop onto Concrete：	2m
Vibration：	MIL-STD-810G,FIG 514.6C-1
Warranty Period：	One Year

Software Support

Tersus Nuwa

User Interface

Button：	Power Button
LED Indicators:	Satellite, Correction data, Static, Solution
Power Display:	Support

Note:
(1) TAP Service is available exclusively on TS21-TAP and TS20-TAP versions.
(2) The measurement precision may be subject to anomalies such as multi-path, obstructions, satellite geometry, atmospheric conditions, etc.
(3) The initialization time depends on various factors, including the number of satellites, observation time, atmospheric conditions, multi-path, obstructions, satellite geometry, etc.
(4) The initialization reliability may be affected by atmospheric conditions, signal multipath, and satellite geometry.
(5) Optional.
(6) The working time of the battery is related to the working environment, working temperature and battery life.
(7) The actual size/weight may vary depending on the manufacturing process and measurement method.

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