



## Precise Point Positioning

### What is TerraPOS?

The traditional way of accurate GNSS positioning involves reference stations or DGPS-services. With TerraPOS — the new way of GNSS post processing — no reference station is needed.

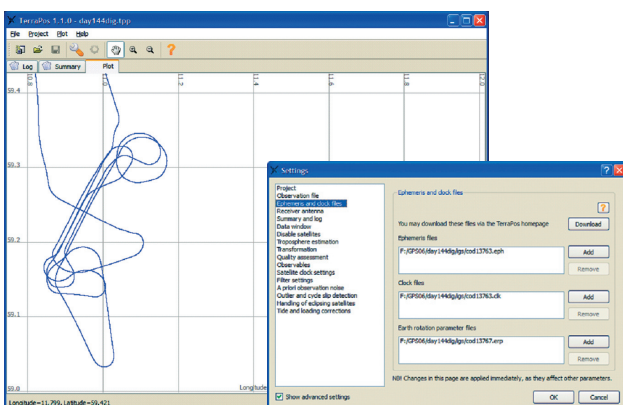
Reference stations are made obsolete by employing precise satellite orbits and satellite clock corrections coupled with state-of-the-art error modeling.

When processing kinematic raw data of good quality, accuracy of 3 cm (horizontal) and 4 cm (vertical) RMS has been independently verified. The combination of great ease-of-use and this level of performance makes TerraPOS unique worldwide.

TerraPOS provides true Global Positioning, with homogeneous quality. The result is delivered in the International Terrestrial Reference Frame, the most widely used and long-term-stable global reference frame available.

Should the application demand coordinates in local or regional reference frames, transformations may be applied inside TerraPOS prior to exporting the results.

More information and a tutorial version of TerraPOS is available from the TerraPOS web page: [www.terrapos.no](http://www.terrapos.no)



### For which applications are TerraPOS suitable?

TerraPOS is especially developed for kinematic applications, such as airborne photogrammetric or LIDAR operations, seabed mapping, or seismic surveying.

When evaluating TerraPOS for your applications, there are a few points to consider:

- TerraPOS is based on post-processing. Typical latency is less than 24 hours.
- A connection to the Internet is required for downloading freely available satellite orbits and clock corrections.
- Dual-frequency GNSS observations from a geodetic grade receiver and antenna should be used.
- Accuracy depends on data span, typically a few hours or more will be required.
- Observations must be provided in the RINEX format.



TerraPOS is developed in close cooperation with both university researchers and demanding customers. These relations have resulted in uncompromising accuracy, while retaining the ease-of-use and robustness required in critical production systems. Default settings have been specified with great care, leaving the operator with virtually no complex decisions or tuning.

TerraPOS is available for Windows and Linux platforms as a command line tool and with a graphical user interface.

## TerraPOS specifications:

### System requirements:

Windows or Linux operating systems. 512 MB RAM. Sufficient swap space, approx. 1GB required for 24h at 1Hz.

### Supported satellite systems:

GPS and GLONASS

### General Processing strategy:

Optimal filter/smoothing combination using ionosphere-free code and carrier phase observations. Doppler observations may be used for precise velocity estimation.

### Input formats:

Observations: RINEX (version 2 and higher)  
Ephemerides: SP3 (versions a, b and c)  
Clock corrections: RINEX clock files (version 2 and higher)  
Earth rotation parameters: IGS ERP format.  
Ocean tide loading: BLQ-format

### Export formats:

Default, GrafNav, IPAS, NMA, Terratec

### Quality assessment:

Result may be screened and classified on user specified limits on precision and reliability, horizontally and vertically separately.

### Error effects handled in TerraPOS:

Satellite antenna offset and phase center variations

Satellite hardware biases

Satellite yaw

Ionospheric delays

Tropospheric delays

Receiver antenna offset and phase center variations

System specific receiver hardware biases

Solid earth tides

Ocean loading

Rotational deformation due to polar motion

Official IGS antenna calibrations.

Official calibrations by the IGS, estimation of system specific effects

Nominal model, block and satellite specific model during eclipses and noon-turns, optional editing and stochastic corrections

Ionosphere-free linear combinations

A priori models, estimation of residual effects

Official IGS antenna calibrations

Estimation

Model recommended by the IERS

Model recommended by the IERS

Model recommended by the IERS

### Obtainable accuracy:

Static observations:

0.01m HRMS, 0.02m VRMS (24h duration)

0.02m HRMS, 0.04m VRMS (6h duration)

0.05m HRMS, 0.10m VRMS (1h duration)

Kinematic observations:

0.03m HRMS, 0.04m VRMS (24h duration)

0.03m HRMS, 0.05m VRMS (6h duration)

0.15m HRMS, 0.20m VRMS (1h duration)

### Transformations:

Basic transformations: Helmert (3p, 7p, 14p). NNR-Nuvel-1A (tectonic motions). Transformations between different ITRF editions.

Valid combinations of these transformations may be combined into a composite transformation.

Predefined transformations: NAD83 (North America), GDA94 (Australia), Euref89 (Norway)\*.

\*Permit from Norwegian Mapping Authorities required.

### Documentation:

Summary containing overall statistics from the processing, and a log of events, warnings, and errors. The verbosity of both the summary and the log is user definable.

### TerraPos editions:

TerraPOS is available in five editions:

TerraPos Total (all profiles available),  
TerraPos Marine (marine and static profiles),  
TerraPos Aerial (aerial and static profiles),  
TerraPos Land (land and static profiles),  
TerraPos Static (static profile only).

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