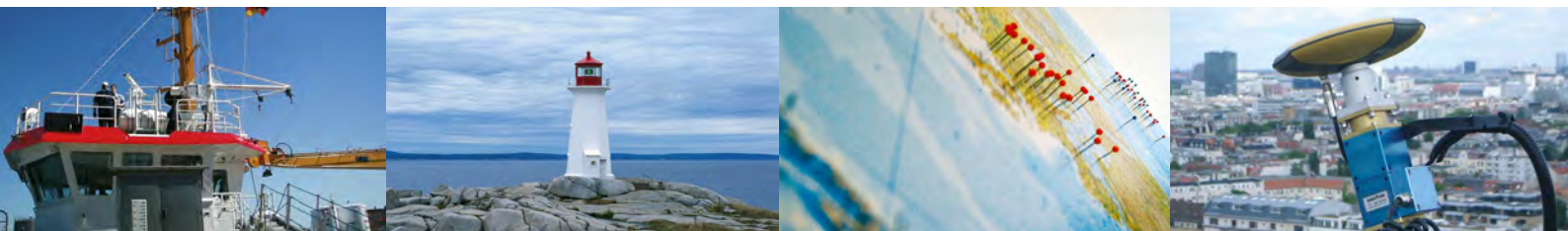




GeoBasis-DE

Satellite Positioning Service of the
Official German Surveying and Mapping

Agency for Geoinformation and
State Survey of Lower Saxony (LGLN)



SAPOS®

Precise Positioning in
Location and Height

OFFICIAL GERMAN SURVEYING AND MAPPING



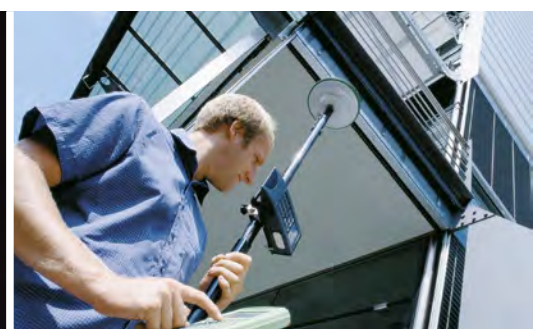
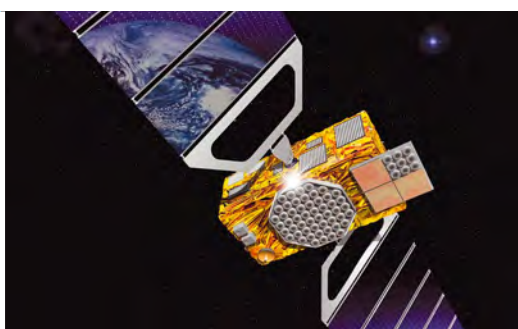
SAP^{POS}® – The benchmark in terms of accuracy, reliability and economy!

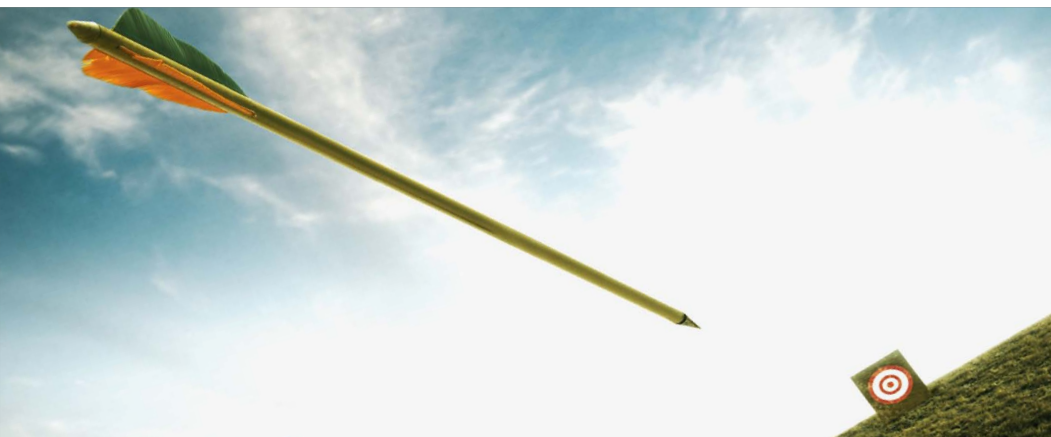
SAP^{POS}® enables a highly accurate position determination in location and height.

As a joint-project of the Working Committee of the Surveying and Mapping Agencies of the Laender of the Federal Republic of Germany (AdV), SAP^{POS}® is based on a nationwide network of reference stations.

The permanently registered signals of the Global Navigation Satellite Systems (GNSS) are processed centrally and provided as correction data by means of digital data transmission.

SAP^{POS}® is available all over Germany, uses international, open and standardised formats and offers high information security owing to its official quality and more than 20 years of experience. Due to its high level of availability, its multi-functionality and quality, SAP^{POS}® has been internationally recognised for many years.





SAPOS® – The Satellite Positioning Service of the Official German Surveying and Mapping

SAPOS® is your solution if you wish to coordinate information, navigate vehicles or geo-reference thematic data. Making use of modern technology you easily and comfortably receive the spatial reference for your data quickly and precisely, based upon the Satellite Navigation Systems GPS, GLONASS, Galileo and Beidou. The following services, tailored to your individual requirements, are offered in different accuracy levels and applications in both realtime and postprocessing:

SAPOS®-HEPS

High Precision Real-Time Positioning Service with a horizontal accuracy of 1 to 2 cm and vertical accuracy of 2 to 3 cm.

SAPOS®-EPS

Real-Time Positioning Service with a horizontal accuracy of 0.3 to 0.8 m and vertical accuracy of 0.5 to 1.5 m.

SAPOS® | GEPOS®

German-wide broadcast-capable PPP-RTK service in trial operation with a positioning accuracy of a few centimetres.



Competencies

The Satellite Positioning Service SAPOS® of the Official German Surveying and Mapping provides the official spatial reference using the latest technology.

The implementation of the geodetic spatial reference is a statutory core task of the German Laender.

The SAPOS®-services are further developed in permanent collaboration with business and research according to user requirements.

Infrastructure

SAPOS® is making use of more than 270 own reference stations across Germany and another 30 reference stations from all neighbouring countries for a nationwide network. SAPOS® is operated by the German Laender.

Real Time

The position determination is effected during your measurements directly on the spot.

Post Processing

Subsequent to the local measurements the coordinates are determined through a postprocessing in your office or in a SAPOS®-centre.



How to make best use of SAPOS®

Some applications from everyday practice

1st Example Real estate cadastre

The high accuracy requirements of a few centimeters for the real estate cadastre pose a challenge to the satellite positioning services. SAPOS® meets these requirements in a masterful way, even in less favourable measuring conditions, through a high-quality network of reference stations and the use of GPS, GLONASS, Galileo and BeiDou.

The number of geodetic control points will constantly decline over the next couple of years. SAPOS® offers an excellent supplement and alternative to traditional tachymetry for your tasks and solutions.

The SAPOS® - measurements are performed within the official ETRS89/DREF91 (realisation 2025) reference system. "Official" thereby stands among others for reliability and high quality. This guarantees an enormous investment protection for all authorities and companies.

2nd Example Documentation of cables and pipes

The simple operation of modern GNSS receivers and the easy integration of correction data make SAPOS® an efficient and indispensable documentation aid – even non-professionals learn how to use SAPOS® in no time.

SAPOS® complements modern sensors, computers, communication systems and processing modules to a mobile real-time system with a continuously digital data flow to the graphic field book.





3rd Example Hydrography

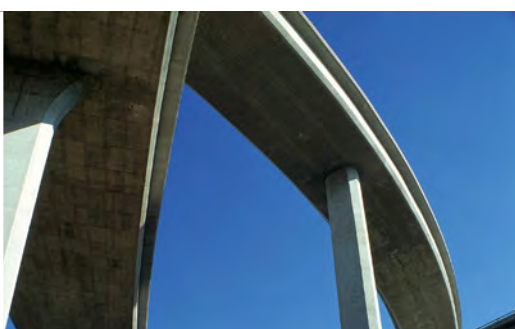
On sounding ships and dredgers, SAPOS® has catered for a high resolution 3D data acquisition of the river beds with centimeter accuracy for many years now.

Besides exact positioning, also depth information of highest quality is generated. Further, the AdV quasi geoid GCG2016/2023 allows a conversion of ellipsoidal height information determined with SAPOS® into physical heights for the sea and inland area.

„GNSS opens up new dimensions.

In the marine survey it is now possible to determine the height in real time by using SAPOS®-HEPS. This means an increase in accuracy compared to the existing feed of data on the water level and an optimisation of the evaluation process.“

(Gunther Braun, Generaldirektion Wasserstraßen und Schifffahrt, Außenstelle Nordwest)



Other areas of application

- Traffic management systems, logistics and fleet management
- Authorities and organisations with security management tasks (BOS)
- Agriculture and forestry, environmental protection
- GIS-data acquisition in a municipal and business environment
- Aerial photography and airborne laser scanning (LIDAR) – precise determination of projection centres
- Hydrological, geological and geodynamic investigations
- Coastal protection, monitoring of dwelling and level monitoring
- Land consolidation, soil valuation
- Engineering survey
- Classical tasks of the official surveying and mapping

Your benefits

- Measurements directly in the official reference system
- Exact coordinates in location, height and 3D
- Simple transformation into defined target systems
- Digital data flow
- Easy data exchange with third parties
- Optimisation of available staff resources
- Time saving due to maximum flexibility
- Long-term investment security

SAPOS® offers a maximum of quality, security and reliability.

RTCM

SAPOS® has been an active member in the RTCM since 2003. This international standardisation committee has developed open standards for the transmission of GNSS correction data since the 1980s.

NTRIP

With NTRIP a technology for transmission of GNSS data streams via the Internet is available. In this way, the SAPOS® data can be accessed via a mobile communication connection to the Internet.

Network

Through the networking of SAPOS®-reference stations, the distance-dependent components of the overall GNSS error budget can largely be reduced.

Networking enables better positioning accuracies and a fast initialisation.

RINEX

RINEX is a manufacturer-independent data format used to provide SAPOS®-data for postprocessing applications.



How to become a SAPOS® user

Quickly and easily in two steps...

1. The following equipment is required

For SAPOS®-HEPS you will need a rover equipment including an RTK-capable GNSS receiver as well as a cellular modem for receiving SAPOS® data via a mobile internet connection.

In the SAPOS®-GPPS, GNSS observation data are provided in the RINEX format via internet through respective data servers for subsequent evaluation (postprocessing). The GNSS-receiver must be able to record its measurements. Reversely, the service GPPS-Pro allows users to transmit of their data to an evaluation server located in the SAPOS® centre, which performs the calculation.


2. Registration as SAPOS® user



Log in and register

- at the SAPOS® distribution agency of German Laender.
- at the central office SAPOS® for a nationwide release.

SAPOS® – An overview

|  | SAPOS® HEPS | SAPOS® GPPS | SAPOS® GEPOS® |
|---|---------------------|--------------------------|-----------------------------|
| Procedure | Real time | Postprocessing | Real time |
| Accuracy – position | 0,01 – 0,02 m | ≤ 0,01 m | 0,02 - 0,03 m |
| Accuracy – vertical | 0,02 – 0,03 m | 0,01 – 0,02 m | 0,03 - 0,05 m |
| Transmission | NTRIP over Internet | Internet (Web Server) | NTRIP over Internet DAB+ |
| Clocking unit | 1 s | ≥ 1 s | 1 s |
| GNSS | GPS, GLO, GAL, BDS | GPS, GLO, GAL, BDS | GPS, GLO, GAL, BDS |
| Standard / Format | RTCM 3 | RINEX 3.03 | Geo++ SSRZ |

Source: Product definition SAPOS® (Version 8.4), product information SAPOS® | GEPOS®

SAPOS® developments

As SAPOS®-operator, we are constantly working on the quality improvement of our services. In this way, added-value services such as providing users with information on transformation into defined target systems are possible.

Currently, the development within the Laender is moving towards providing SAPOS® correction data services free of charge. The objective is to advance digitisation and promote innovation.

Contact

GeoBasis-DE

Satellite Positioning Service of the
Official German Surveying and Mapping

Agency for Geoinformation and
State Survey of Lower Saxony (LGLN)

or the SAPOS® distribution agencies of German States
www.sapos.de



GNSS

Global Navigation Satellite System (GNSS) is the general term for satellite-based navigation and positioning systems. GNSS is not limited to GPS only, but does also refer to GLONASS, Galileo, Beidou as well as regional extension systems (e.g. EGNOS, QZSS).

GPS

The Global Positioning System (GPS) was developed in the 1970s in the USA and is based on a military concept. It has increasingly been used for civil purposes since the 1980s and is constantly modernised.

GLONASS

The construction of the Russian system GLONASS coincided with the establishment of GPS. Full operational functionality is achieved since 2011 after several years of reconstruction.

Galileo

The European Union (EU) and the European Space Agency (ESA) operate Galileo, a non-military and technically system-independent GNSS.

Beidou

Chinese Beidou completes the list of global satellite navigation systems and expands the number of usable satellites for navigation and positioning.

Statewide, nationwide, distribution agencies of the Official German Surveying and Mapping

GeoBasis-DE

Satellitenpositionierungsdienst der deutschen Landesvermessung

Landesamt für Geoinformation und Landesvermessung Niedersachsen

Tel.: +49 511 64609-222
E-Mail: sapos-zentrale-stelle@lgl.niedersachsen.de
www.zentrale-stelle-sapos.de

GeoBasis-DE

Hauskoordinaten und Hausumringe des deutschen Liegenschaftskatasters

Landesamt für Digitalisierung, Breitband und Vermessung Bayern

Tel.: +49 89 2129-1299
E-Mail: zshh@ldbv.bayern.de
www.geodaten.bayern.de

GeoBasis-DE

Geodaten der deutschen Landesvermessung

Bundesamt für Kartographie und Geodäsie

Tel.: +49 341 5634-333
E-Mail: dlz@bkg.bund.de
www.gdz.bkg.bund.de

SAPOS® distribution agencies in German Laender

■ Baden-Württemberg

Landesamt für Geoinformation und Landentwicklung Baden-Württemberg
Tel.: +49 170 8572321
E-Mail: sapos@lgl.bwl.de

■ Bayern

Landesamt für Digitalisierung, Breitband und Vermessung Bayern
Tel.: +49 89 2129-1111
E-Mail: service@geodaten.bayern.de

■ Berlin

Senatsverwaltung für Stadtentwicklung, Bauen und Wohnen Berlin
Tel.: +49 30 90139-5379
E-Mail: sapos@senstadt.berlin.de

■ Brandenburg

LGB Landesvermessung und Geobasisinformation Brandenburg
Tel.: +49 331 8844-507
E-Mail: sapos@geobasis-bb.de

■ Bremen

Geoinformation Bremen
Landesamt für Kataster - Vermessung - Immobilienbewertung - Informationssysteme
Tel.: +49 511 64609-222
E-Mail: sapos-hotline@lgl.niedersachsen.de

■ Hamburg

Freie und Hansestadt Hamburg
Landesbetrieb Geoinformation und Vermessung
Tel.: +49 40 42826-5000
E-Mail: sapos.geonord@gv.hamburg.de

■ Hessen

Hessisches Landesamt für Bodenmanagement und Geoinformation
Tel.: +49 611 535-5567
E-Mail: sapos@hvbh.hessen.de

■ Mecklenburg-Vorpommern

Landesamt für innere Verwaltung Mecklenburg Vorpommern
Amt für Geoinformation, Vermessungs- und Katasterwesen
Tel.: +49 385 588 56-999
E-Mail: sapos@laiv-mv.de

■ Niedersachsen

Landesamt für Geoinformation und Landesvermessung Niedersachsen
Landesvermessung und Geobasisinformation
Tel.: +49 511 64609-222
E-Mail: sapos-hotline@lgl.niedersachsen.de

■ Nordrhein-Westfalen

Bezirksregierung Köln
Abteilung 7 Geobasis NRW
Tel.: +49 221 147-4849
E-Mail: sapos@bezreg-koeln.nrw.de

■ Rheinland-Pfalz

Landesamt für Vermessung und Geobasisinformation Rheinland-Pfalz
Tel.: +49 261 492-123
E-Mail: sapos@vermkv.rlp.de

■ Saarland

Landesamt für Vermessung, Geoinformation und Landentwicklung Saarland
Tel.: +49 681 9712-222
E-Mail: sapos@lvgl.saarland.de

■ Sachsen

Landesamt für Geobasisinformation Sachsen - GeoSN
Tel.: +49 351 8283-7241
E-Mail: sapos@geosn.sachsen.de

■ Sachsen-Anhalt

Landesamt für Vermessung und Geoinformation Sachsen-Anhalt
Tel.: +49 391 567-8585
E-Mail: service@lvermgeo.sachsen-anhalt.de

■ Schleswig-Holstein

Landesamt für Vermessung und Geoinformation Schleswig-Holstein
Tel.: +49 40 42826-5000
E-Mail: sapos.geonord@gv.hamburg.de

■ Thüringen

Landesamt für Vermessung und Geoinformation Thüringen
Tel.: +49 361 574176-310
E-Mail: sapos@tlbg.thueringen.de

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Working Committee of the Surveying Authorities
of the States of the Federal Republic of Germany

www.adv-online.de

