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# Leica GPS900 Technical Data



- when it has to be right

**Leica**  
Geosystems

# GPS900 Technical Data

## Summary Description

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Receiver type	Dual-frequency, geodetic, real-time RTK receiver
Summary of measuring, modes and applications	L1 + L2, code, phase Real-time RTK standard. Survey and real-time RTK applications

## System Components

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Receiver technology	SmartTrack+ is built on SmartTrack technology and enhanced for GNSS signals. Code and phase multipath mitigation.
No. of channels	72 channels 14 L1 + 14 L2 GPS 2 SBAS 12 L1 + 12 L2 GLONASS
L1 measurements (GPS)	Carrier phase full wave length C/A narrow code
L2 measurements (GPS)	Carrier phase full wave length with C-code and P-code (AS off) or P-code aided under AS Equal performance with AS off or on
L1 measurements (GLONASS)	Carrier phase full wave length C/A narrow code
L2 measurements (GLONASS)	Carrier phase full wave length P narrow code
Independent measurements	Fully independent L1 and L2 code and phase measurements
Time to first phase measurement after switching ON	Typically 30 secs
LED status indicators	3: for power, tracking, Bluetooth
Ports	3 Bluetooth ports, 1 USB/RS232 port
Supply voltage	Nominal 12V DC
Power consumption	Range 10.5-28V DC 3.8W typically, 320mA

### ATX900 GG

Groundplane	Built-in groundplane
Dimensions (diameter x height)	186mm x 89mm
Weight	0.96kg

### RX900 Controller

Type	RX900 (with touch screen), RX900c (with touch screen and colour display)
Display	¼ VGA, optional monochrome or colour, graphics capable, illumination
Character Set	Maximum 256 characters , extended ASCII characters set
Touch screen	Toughened film on glass
Keyboard	Full alphanumeric (62 keys), 12 function keys, 6 user-definable keys, illumination
Controller Weights	RX900 0.73kg
Total Weights of System	3.49kg (all on the pole)

## Measurement Precision and Position Accuracies

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Important Note	Measurement precision and accuracy in position and accuracy in height are dependent upon various factors including number of satellites, geometry, observation time, ephemeris accuracy, ionospheric conditions, multipath etc. Figures quoted assume normal to favourable conditions. Times required are dependent upon various factors including number of satellites, geometry, ionospheric conditions, multipath etc. GPS and GLONASS can increase performance and accuracy by up to 30% relative to GPS only.
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The following accuracies, given as root mean square, are based on measurements processed using LGO and on real-time measurements.

### Code and Phase Measurement Precision (irrespective whether AS off/on)

Carrier phase on L1	0.2mm rms
Carrier phase on L2	0.2mm rms
Code (pseudorange) on L1	2cm rms
Code (pseudorange) on L2	2cm rms

### Accuracy (rms) with real-time/RTK

RTK capability	Yes, standard
Kinematic (phase), moving mode after initialization	Horizontal: 10mm + 1ppm Vertical: 20mm + 1ppm
Code only	Typically 25cm

### Accuracy (rms) in single receiver navigation mode

Navigation accuracy	5–10m rms for each coordinate
Degradation effect	Degradation possible due to SA

## RTK baseline length

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Standard 2500 metres. Option up to 5000 metres.

## Position update and latency

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	RTK
Position update rate	Option: up to 0.2 sec (5Hz)
Position latency	0.03 sec or less

## Real-time RTK and DGPS/RTCM Data Formats

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RTK Data Formats for data transmission and reception	Leica and Leica Lite proprietary format CMR and CMR+ reception. Leica Lite for transmission.
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## Data recording

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Standard medium	Internal memory for receiver: 256 MB
Data capacity:	256 MB is sufficient for about ■ 360'000 real-time points with codes

## Power supply

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Internal battery	GEB211 rechargeable Li-Ion battery 1.9Ah/7.2V, 1 battery fits into ATX900 and 1 battery fits into RX900
Operation time	1 GEB211 powers ATX900 for about 5h 1 GEB211 powers RX900 for about 8h
Weight, GEB211 battery	0.11kg

## Navigation mode

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Navigation	Full navigation information in position and stakeout displays Position, course, speed, bearing and distance to waypoint
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## Environmental specifications

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### ATX900 GG

Temperature, operating	-40°C to +65°C* Compliance with ISO9022-10-08, ISO9022-11-special and MIL-STD-810F Method 502.4-II, MIL-STD-810F Method 501.4-II *Bluetooth: -30°C to +60°
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Temperature, storage	-40°C to +80°C Compliance with ISO9022-10-08, ISO9022-11-special and MIL-STD-810F Method 502.4-I, MIL-STD-810F Method 501.4-I
Humidity	Up to 100%* Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810F Method 507.4-I * The effects of condensation are to be effectively counteracted by periodically drying out the product
Protection against Water, Sand and Dust	IP67 Protection against blowing rain Waterproof to temporary submersion into water (maximum depth of 1m) Dust-tight, protection against blowing dust  Compliance with IP67 according IEC60529 and MIL-STD-810F Method 506.4-I, MIL-STD-810F Method 510.4-I, MIL-STD-810F Method 512.4-I
Drops	Withstands 1m drop onto hard surfaces
Vibration	Compliance with ISO9022-36-08 and MIL-STD-810F Method 514.5-Cat24
Functional Shock	No loss of lock to satellite signal when used on a pole set-up and submitted to pole bumps up to 150mm

## **RX900**

Temperature, operating	-30°C to +65°C Compliance with ISO9022-10-06, ISO9022-11-special and MIL-STD-810F Method 502.4-II, MIL-STD-810F Method 501.4-II
Temperature, storage	-40°C to +80°C Compliance with ISO9022-10-08, ISO9022-11-special and MIL-STD-810F Method 502.4-I, MIL-STD-810F Method 501.4-I
Humidity	Up to 100%* Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810F Method 507.4-I * The effects of condensation are to be effectively counteracted by periodically drying out the product
Protection against Water, Sand and Dust	IP67 Protection against blowing rain Waterproof to temporary submersion into water (maximum depth of 1m) Dust-tight, protection against blowing dust  Compliance with IP67 according IEC60529 and MIL-STD-810F Method 506.4-I, MIL-STD-810F Method 510.4-I, MIL-STD-810F Method 512.4-I
Drops	Withstands 1.5m drop onto hard surfaces
Vibration	Withstands vibrations during operation on large civil construction machines Compliance with ISO9022-36-08 and MIL-STD-810F Method 514.5-Cat24

## **Data links**

Radio modems	For GPS900 Real-Time RTK rover: Satelline 3ar (d) radio modem integrated into Leica GFU housing. Also available are Intuicom 1200 DL, PacificCrest PDL and IFR300L.  For GPS900 Real-Time RTK reference setup: Satelline 3ar (d) radio modem integrated into Leica GFU housing. Also available are Intuicom 1200 DL, PacificCrest PDL and IFX301CB.
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## Coordinate systems

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	Management of ellipsoids, projections, geoid models, transformation parameters
Ellipsoids	All common ellipsoids User-definable ellipsoids
Map projections	Mercator Transverse Mercator
User definable and country specific	UTM Oblique Mercator Lambert (1 and 2 standard parallels) Soldner Cassini Polar Stereographic Double Stereographic RSO (rectified skewed orthomorphic projection) Other country-specific projections
Geoid model Transformation in receiver	Upload geoid model from LGO Classical 7-parameter 3-D Helmert One step and two step (direct WGS84 to grid)

## Onboard Software

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### User Interface

Graphics:	Graphical representation of points, lines and areas Application result plots
Icons:	Icons indicating the current status of measure modes, settings, etc.
Status information:	Current position, satellite status, real-time status, battery and memory status
Function keys:	Direct function keys for quick and easy operation.
User menu:	User menu for quick access of the most important functions and settings

### Configuration

Displays masks:	User definable measuring display
User menu:	User definable menu for quick access to specific functions
Hot keys:	User configurable hot keys for quick access to specific functions

### Coding

Free Coding:	Recording codes with optional attributes in between of measurements Manual code entry or selection from a user defined codelist
Thematical Coding:	Coding points, with optional attributes when measuring Manual code entry or selection from a user defined codelist

### Data Management

Jobs:	User definable jobs containing measurements, points, lines, areas and codes Directly transferable to LEICA Geo Office software
Points, and codes:	Creating, viewing, editing, and deleting points and codes
Functions:	Sorting and filtering of points.

### Data Import & Export

Data import:	Character delimited ASCII files with point id, easting, northing, height and point code GSI8 and GSI16 files with point id, easting, northing, height and point code
Data export:	User defined ASCII files with measurements, points, lines, codes. Direct onboard export of DXF files. Direct onboard upload of DXF files for interactive maps and drawings.

### Standard application programs

Survey:	Measuring points with codes. ■ Auto Points: High-speed surveying for mass data acquisition by automatically logging points at a given time interval or minimum distance difference.
GPS Resection: Setup Reference:	Converts the WGS 1984 coordinates to site coordinates Configure the ATX900 together with accessories as a Real-Time RTK reference station for GPS900
Determine Coordinate System:	GPS coordinates are measured relative to the global geocentric datum known on WGS 1984. A transformation is required to convert the WGS 1984 coordinates to local coordinates. Different transformation methods are available: ■ Onestep

- Stakeout: 3D Staking of points using various stakeout methods:
- Orthogonal:  
Displaying distances forwards / backwards, left / right from or to the station and cut / fill.
  - Coordinate differences:  
Displaying coordinate differences and cut / fill.
- Optional application programs**
- Reference Line: Defining lines and arcs, which can be stored and used for other tasks, using various methods:
- Measuring to a line / arc where the coordinates of a target point are calculated from its position relative to the defined reference line / arc.
  - Staking to a line / arc where a target point is known and instructions to locate the point are given relative to the reference line / arc.
- DTM Stakeout:
- Staking out a Digital Terrain Model.
  - Comparing actual and design height and displaying height differences.
- RoadRunner: Stake-out and as-built check of roads and any type of alignment related design (e.g. rail, pipeline, cable, earthworks)
- Handles any combination of geometric elements in the horizontal alignment, from simple straights to different types of partial spirals.
  - Vertical alignment supports straights, arcs and parabolas.
  - Smart project management of design data.
- Volume Calculation:
- Defining and Editing of surfaces and boundaries.
  - Calculating of terrain models.
  - Computation of Volumes of defined surfaces in relation of a defined reference height.



Whether you want to survey a parcel of land or objects on a construction site, determine measured points on facades or in rooms, gather the coordinates of a bridge or a tunnel – Leica Geosystems' surveying instruments provide the right solution for every application.

They unite reliable results with easy operation and user-friendly applications. They are designed to meet your specific requirements. Modern technology enables you to work fast and productively, thanks to the straightforward and clearly structured range of functions.

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