Leica GPS900
Technical Data

GPS900 Technical Data

Summary Description

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

Receiver technology	SmartTrack – patented. Discrete elliptical filters. Fast acquisition. Strong signal. Low noise. Excellent tracking, even to low satellites and in adverse conditions. Interference resistant. Multipath mitigation.
No. of channels	12 L1 + 12 L2
L1 measurements	Carrier phase full wave length C/A narrow code
L2 measurements	Carrier phase full wave length with AS off or on P2 code / P-code aided under AS. Equal performance with AS off or on.
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	ATX900: 3 for power, tracking and bluetooth
Ports	3 Bluetooth ports, 1 USB/RS232 port
Supply voltage Power consumption	Nominal 12V DC range 10.5-28V DC 3.8W typically, 320mA

ATX900

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

RX900 Controller

Type	RX900 (with touch screen)
Display	¼ VGA, monochrome, 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

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 can also not be quoted exactly. Times required are dependent upon various factors including number of satellites, geometry, ionospheric conditions, multipath etc.
	The following accuracies, given as **r**oot **m**ean **s**quare, 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),	Horizontal: 10mm + 1ppm
moving mode after initialization	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

Position update and latency

	RTK
Position update rate	Option: up to 0.5 sec (2Hz)
Position latency	0.03 sec or less

Real-time RTK and DGPS/RTCM Data Formats

RTK Data Formats for data transmission and reception	Leica and Leica Lite proprietary format for reception. Leica Lite for transmission.

Data recording

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

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

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

Environmental specifications

ATX900

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°

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	Withstands vibrations during operation on large civil construction machines 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. For GPS900 Real-Time RTK reference setup: Satelline 3ar (d) radio modem integrated into Leica GFU housing.

Coordinate systems

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	Upload geoid model from LGO
Transformation in receiver	Classical 7-parameter 3-D Helmert
	One step and two step (direct WGS84 to grid)

Onboard Software

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

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:	Converts the WGS 1984 coordinates to site coordinates
Setup Reference:	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 Lite:	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.

LEICA Geo Office Software

Description

Easy, fast and comprehensive, automated suite of programs for TPS, GPS and Level data. View and manage TPS, GPS and Level data in an integrated way. Process independently or combine data – including post processing and support of real-time GPS measurements.

Manages all data in an integrated manner. Project management, data transfer, import/export, processing, viewing data, editing data, adjustment, coordinate systems, transformations, codelists, reporting etc.

Consistent operating concepts for handling GPS, TPS and level data, based on Windows standards. An embedded help system includes tutorials with additional information.

Runs on Windows™, 2000 and XP platforms.

User Interface

Intuitive graphical interface with standard Windows™ operating procedures. Customizable built-in configuration options allow users to set up the software exactly to suit their specific needs and preferences.

Standard components

Data and Project Management:	Fast, powerful database manages automatically all points and measurements within projects according to well-defined rules to ensure data integrity is always maintained. Projects, coordinate systems, antennas, report templates and codelists all have their own management. Numerous transformations, ellipsoids and projections, as well as user-defined geoid models and country specific coordinate systems which are based on a grid of correction values are supported. Six different transformation types are supported, giving the flexibility to select the approach which suits the project needs best. Antenna management system for offsets and correction values. Codelist management for code groups / code / attributes.
Import & Export:	Import data from compact-flash cards, directly from receivers, total stations and digital levels, or from reference stations and other sources via the Internet. Import of real-time (RTK), DGPS coordinates.
ASCII Import & Export :	Import coordinate lists as user-defined ASCII files using the import wizard. Export results in any format to any software using the ASCII export function. Transfer point, line, area, coordinate, code and attribute data to GIS, CAD and mapping systems.

View & Edit:	The various graphical displays form the basis for visualizing data and giving an instant overview of the data contained within a project. Point, line and area information may be viewed in View/Edit together with coding and attribute information. Editing functionality is embedded allowing to query and clean up the data before processing or exporting it further.
Codelist Manager:	Generation of codelists with code groups, codes, and attributes. Management of codelists.
Reporting:	HTML-based reporting provides the basis for generating modern, professional reports. Measurement logs in field book format, reports on averaged coordinates, various processing log files and other information can be prepared and output. Configure reports to contain the information that are required and define templates to determine the presentation style.
Tools:	Powerful Tools like Codelist Manager, Data Exchange Manager, Format Manager and Software Upload are common tools for GPS receivers, total stations and also for digital levels.

GPS Options

L1 data processing:	Graphical interface for baseline selection, processing commands etc. Automatic or manual selection of baselines and definition of processing sequence. Single baseline or multi-baseline batch processing. Wide range of processing parameters. Automatic screening, cycle-slip fixing, outlier detection etc. Automated processing or user-controlled processing.
L1 / L2 data processing:	Graphical interface for baseline selection, processing commands etc. Automatic or manual selection of baselines and definition of processing sequence. Single baseline or multi-baseline batch processing. Wide range of processing parameters. Automatic screening, cycle-slip fixing, outlier detection etc. Automated processing or user-controlled processing.
RINEX Import:	Import of data in RINEX format.

Level Options

Level data processing:	View the data collected from the Leica digital level in the Geo Office level booking sheet. Select the preferred processing settings and process the level lines. Processing runs quickly and automatically. Use Results Manager to inspect and analyze the leveling results and generate a report. Finally, store the results and/or export them as required.
Design & Adjustment 1D:	Powerful MOVE3 Kernel with rigorous algorithms for 1D adjustment. Furthermore, network design and analysis is supported.

General Options

Datum & Map	LEICA Geo Office supports numerous transformations, ellipsoids and projections, as well as user-defined geoid models and country specific coordinate systems, which are based on a grid of correction values. The optional Datum/Map component supports the determination of transformation parameters. Six different transformation types are supported, giving the flexibility to select the approach which suits the project needs best.
Design & Adjustment 3D:	Combine all measurements in a least-squares network adjustment to obtain the best possible set of consistent coordinates and check that the measurements fit with the known coordinates. Use adjustment to help identify blunders and outliers based upon the extensive statistical testing. Using the powerful MOVE3 Kernel, the algorithms are rigorous and the user can choose between whether a 3D, 2D or 1D adjustment is computed. Furthermore, the component supports network design – allowing to design and analyze a network before actually going into the field.
GIS / CAD Export:	Permits export to GIS/CAD systems such as AutoCAD (DXF / DWG), MicroStation

System requirements

Minimum PC configuration:	Pentium 150 MHz processor 32MB RAM 100MB free hard disk space Microsoft® Windows™ 98 Microsoft® Internet Explorer 4.0
Recommended PC configuration:	Pentium® 300 MHz processor or higher 256 MB RAM or more 300 MB or more free space on hard disk Microsoft® Windows™ 2000 or XP Microsoft® Internet Explorer 5.5 or higher

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.

When it has to be right.

- when it has to be **right**

Leica
Geosystems