Leica GPS1200+ Series
Technical Data

GNSS
future proof

- when it has to be **right**

Leica Geosystems

GPS1200+ Technical Data

For reference station products please refer to the technical data for GRX1200+ series receivers (746097)

Summary Description

	GX1230+ GNSS / ATX1230+ GNSS	GX1220+ GNSS	GX1230+	GX1220+	GX1210+
Receiver type	Triple-frequency, GPS/GLONASS/Galileo/ Compass[1], geodetic, real-time RTK receiver	Triple-frequency, GPS/GLONASS/Galileo/ Compass[1], geodetic receiver	Dual-frequency, GPS only, geodetic, real-time RTK receiver, upgradable to GNSS version	Dual-frequency, GPS only, geodetic receiver, upgradable to GNSS version	Single-frequency, GPS only, survey receiver
Summary of measuring, modes and applications	Static, rapid static, kinematic, On the fly L1/L2/L5 E1/E5a/E5b/Alt-BOC, Compass[1], code, phase Real-time RTK Post processing DGPS/RTCM standard Survey, geodetic and real-time RTK applications	Static, rapid static, kinematic, On the fly L1/L2/L5 E1/E5a/E5b/Alt-BOC, Compass[1], code, phase Post processing DGPS/RTCM optional Survey and geodetic applications	Static, rapid static, kinematic, On the fly L1 + L2, code, phase Real-time RTK Post processing DGPS/RTCM standard Survey, geodetic and real-time RTK applications	Static, rapid static, kinematic, On the fly L1 + L2, code, phase Post processing DGPS/RTCM optional Survey and geodetic applications	Static, kinematic L1, code, phase DGPS/RTCM optional Survey and GIS applications
Upgrade to GX1230+ GNSS	-	Yes	Yes	Yes	Yes

System Components

Receiver

	GX1230+ GNSS / GX1220+ GNSS / ATX1230+ GNSS	GX1230+	GX1220+	GX1210+
Receiver technology	SmartTrack+ is built on SmartTrack technology and enhanced for all GNSS signals.	SmartTrack – patented. Discrete elliptical filters. Fast acquisition. Strong signal. Low noise. Excellent tracking, even to low satellites and in adverse conditions. Interference resistant.		
L5 enabled	Yes	No	No	No
Galileo enabled	Yes	No	No	No
L5 and Galileo ready	Yes	No	No	No
No. of channels	120 channels L1/L2/L5 GPS L1/L2 GLONASS E1/E5a/E5b/Alt-BOC Galileo Compass, 4 SBAS ⇨ GX1220+ GNSS (with DGPS option)	16 L1 + 16 L2 GPS 4 SBAS	16 L1 + 16 L2 GPS 4 SBAS (with DGPS option)	16 L1 4 SBAS (with DGPS option)
L1 measurements (GPS)	Carrier phase full wave length, C/A narrow code	Carrier phase full wave length, C/A narrow code	Carrier phase full wave length, C/A narrow code	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	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	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	No
L5 measurements (GPS)	Carrier phase full wave length, Code	No	No	No

[1] The Compass signal is not finalized, although, test signals have been tracked with GPS1200+ receivers in a test environment. As changes in the signal structure may still occur, Leica Geosystems cannot guarantee full Compass compatibility.

L1 measurements (GLONASS)	Carrier phase full wave length, C/A narrow code	No	No	No
L2 measurements (GLONASS)	Carrier phase full wave length, P narrow code	No	No	No
E1/E5a/E5b measurements (Galileo)	Carrier phase full wave length, Code	No	No	No
Alt-BOC measurements (Galileo)	Carrier phase full wave length and code using Alt-BOC	No	No	No
Independent measurements	Fully independent code and phase measurements of all frequences	Fully independent L1 and L2 code and phase measurements	Fully independent L1 and L2 code and phase measurements	Fully independent L1 code and phase measurements
Time to first phase measurement after switching ON	Typically 30 secs	Typically 30 secs	Typically 30 secs	Typically 30 secs

Receiver Housing

	ATX1230+ GNSS	GX1230+ GNSS / GX1220+ GNSS / GX1230+ / GX1220+ / GX1210+
LED status indicators	3: for power, tracking, Bluetooth	3: for power, tracking, memory
Ports	1 RS232 clip-on port, 1 USB/RS232 port 1 Bluetooth port	4 RS232 port 1 Power only port 1 TNC port for antenna 1 PPS, 2 Event port optional
Supply voltage Power consumption	Nominal 12V DC Range 10.5-28V DC Typically 1.8W, 150mA	Nominal 12V DC Range 10.5-28V DC Typically 3.2W, 270mA
Dimensions	186mm x 89mm	0.212m x 0.166m x 0.079m (The dimensions are given for the housing without the sockets)
Weight, receiver only	1.12kg	1.2kg

GNSS Antennas

	GX1230+ GNSS / GX1220+ GNSS	GX1220+ / GX1230+	GX1210+
Standard survey antenna	**AX1203+ GNSS, L1/L2/L5 GPS GLONASS/Galileo/Compass SmartTrack+**	**AX1203+ GNSS, L1/L2/L5 GPS GLONASS/Galileo/Compass SmartTrack+**	**AX1201, L1 SmartTrack**
Groundplane Dimensions (diameter x height) Weight Gain	Built-in groundplane 170mm x 62mm 0.44kg 29±3 dbi	Built-in groundplane 170mm x 62mm 0.44kg 29±3 dbi	Built-in groundplane 170mm x 62mm 0.44kg typically 27 dbi
Choke-ring antenna	**AR25 choke-ring GPS/GLONASS Galileo/Compass**	**AT504 GG choke-ring, L1/L2 GPS/GLONASS**	**No**
Design Protection radome Dimensions: diameter x ht Weight Gain	Dorne Margolin, JPL design. optional 380mm x 200mm (antenna) 7.6kg (antenna) typically 40 dbi	Dorne Margolin, JPL design. optional 380mm x 140mm (antenna) 4.3kg (antenna) typically 27 dbi	

SmartAntenna

	ATX1230+ GNSS
Standard survey antenna	**ATX1230+ GNSS L1/L2/L5 GPS GLONASS/Galileo/ Compass SmartTrack+**
Groundplane	Built-in groundplane
Dimensions (diameter x height)	186mm x 89mm
Weight	1,12kg
Gain	typically 27 dbi

Controller

	for sensors: ATX1230+ GNSS GX1230+ GNSS / GX1230+ GX1220+ GNSS / GX1220+ GX1210+
Type	RX1210T (with touch screen) for GX1200+ Series RX1250 (with touch screen), RX1250c (with touch screen and colour display) for ATX1230+ GNSS
Display	¼ VGA, optional monochrome or colour, graphics capable, illumination
Character Set	Maximum 256 characters, extended ASCII characters set
Touch screen (RX1210T only)	Toughened film on glass
Keyboard	Full alphanumeric (62 keys), 12 function keys, 6 user-definable keys, illumination
Controller Weights	RX1210 0.48kg RX1250 0.75kg incl. GEB211 internal Battery
Total Weights of System	SmartRover 2.74kg (all on the pole) GX1200+ Rover 4.15kg (all on the pole) GX1200+ Rover 1.80kg (weight of pole for Minipack setup)

Measurement Precision and Position Accuracies

	ATX1230+ GNSS GX1230+ GNSS / GX1230+	GX1220+ GNSS / GX1220+	GX1210+
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. A full Galileo and GPS L5 constellation will further increase measurement performance and accuracy. 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)

	ATX1230+ GNSS GX1230+ GNSS / GX1230+	GX1220+ GNSS / GX1220+	GX1210+
Carrier phase on L1	0.2mm rms	0.2mm rms	0.2mm rms
Carrier phase on L2	0.2mm rms	0.2mm rms	
Carrier phase on L5	*		
Carrier phase on E1/E5a/E5b	*		
Carrier phase on Alt-BOC	*		
Code (pseudorange) on L1	2cm rms	2cm rms	2cm rms
Code (pseudorange) on L2	2cm rms	2cm rms	
Code (pseudorange) on L5	*		
Code (pseudorange) on E1/E5a/E5b	*		
Code (pseudorange) Alt-BOC	*		

* values to be expected similar to L1. Final values will be determined after initial operational capability (IOC) has been reached.

Accuracy (rms) with post processing

	ATX1230+ GNSS GX1230+ GNSS / GX1230+	GX1220+ GNSS / GX1220+	GX1210+
	With Leica Geo Office L1/L2 processing software. GLONASS processing option also needed to process GLONASS data	With Leica Geo Office L1/L2 processing software GLONASS processing option also needed to process GLONASS data	With Leica Geo Office L1 processing software
Static (phase), long lines, long observations, choke ring antenna	Horizontal: 3mm + 0.5ppm Vertical: 6mm + 0.5ppm	Horizontal: 3mm + 0.5ppm Vertical: 6mm + 0.5ppm	Not applicable
Static and rapid static (phase) with standard antenna)	Horizontal: 5mm + 0.5ppm Vertical: 10mm + 0.5ppm	Horizontal: 5mm + 0.5ppm Vertical: 10mm + 0.5ppm	Horizontal: 5mm + 0.5ppm Vertical: 10mm + 0.5ppm
Kinematic (phase), in moving mode after initialization	Horizontal: 10mm + 1ppm Vertical: 20mm + 1ppm	Horizontal: 10mm + 1ppm Vertical: 20mm + 1ppm	
Code only	Typically 25cm	Typically 25cm	Typically 25cm

Accuracy (rms) with real-time/RTK

	ATX1230+ GNSS GX1230+ GNSS / GX1230+	GX1220+ GNSS / GX1220+	GX1210+
RTK capability	Yes, standard	No	No
Rapid static (phase), Static mode after initialization (compliance with ISO17123-8)	Horiz: 5mm + 0.5ppm Vertical: 10mm + 0.5ppm		
Kinematic (phase), moving mode after initialization	Horiz: 10mm + 1ppm Vertical: 20mm + 1ppm		
Code only	Typically 25cm		

Accuracy (rms) with DGPS/RTCM

	ATX1230+ GNSS GX1230+ GNSS / GX1230+	GX1220+ GNSS / GX1220+	GX1210+
	DGPS/RTCM standard	DGPS/RTCM optional	DGPS/RTCM optional
DGPS/RTCM	Typically 25cm (rms)	Typically 25cm (rms)	Typically 25cm (rms)

Accuracy (rms) in single receiver navigation mode

	ATX1230+ GNSS GX1230+ GNSS / GX1230+	GX1220+ GNSS / GX1220+	GX1210+
Navigation accuracy	5–10m rms for each coordinate	5–10m rms for each coordinate	5–10m rms for each coordinate
Degradation effect	Degradation possible due to SA	Degradation possible due to SA	Degradation possible due to SA

On-the-Fly (OTF) initialisation

	ATX1230+ GNSS GX1230+ GNSS / GX1230+	GX1220+ GNSS / GX1220+	GX1210+
OTF Capability	Real time and post processing	Post processing only	No OTF
Reliability of OTF initialisation	Better than 99.99%	Not applicable	Not applicable
Time for OTF initialisation	Typically 8secs, with 5 or more satellites on L1 and L2	Not applicable	Not applicable
OTF Range* *Assuming reliable data-link is available in RTK case	Typically up to 40km in normal conditions Up to 50km in favorable conditions	Not applicable	Not applicable

Position update and latency

	ATX1230+ GNSS GX1230+ GNSS / GX1230+	GX1220+ GNSS / GX1220+	GX1210+
	RTK and DGPS standard	DGPS optional	DGPS optional
Position update rate	Selectable: 0.05 sec (20Hz) to 60 secs	Selectable: 0.05 sec (20Hz) to 60 secs	Selectable: 0.05 sec (20Hz) to 60 secs
Position latency	0.03 sec or less	0.03 sec or less	0.03 sec or less

Real-time RTK and DGPS/RTCM Data Formats

	ATX1230+ GNSS GX1230+ GNSS / GX1230+	GX1220+ GNSS / GX1220+	GX1210+
	Real-time RTK standard DGPS/RTCM standard	DGPS/RTCM optional	DGPS/RTCM optional
RTK Data Formats for data transmission and reception	Leica proprietary formats (Leica, Leica 4G) CMR, CMR+		
RTCM Format for data transmission and reception	RTCM Versions 2.x supporting messages 1,2,3,9,18,19,20,21,22,23,24 And RTCM Version 3.x	RTCM Versions 2.x supporting messages 1,2,3,9	RTCM Versions 2.x supporting messages 1,2,3,9
Simultaneous transmissions	2 real time output interfaces via independent ports, providing identical or different RTK/RTCM formats		

Data recording

Recording rate	Selectable from 0.05 to 300 s
Standard medium	CompactFlash cards: 64MB, 256MB, 1GB
Optional medium	Internal memory for receiver: 256MB
Data capacity:	64 MB is typically sufficient for about GPS only (8 satellites) ■ 500h L1+L2 data logging at 15 s rate ■ 2000h L1+L2 data logging at 60 s rate ■ 90'000 real-time points with codes GPS+GLONASS (8+4 satellites) ■ 340h data logging at 15 s rate ■ 1360h data logging at 60 s rate ■ 90´000 real-time points with codes

Power supply for GX1200+ receivers

Internal battery	GEB221 rechargeable Li-Ion battery 4.4Ah/7.4V, 2 batteries fit into receiver
Operation time	2 GEB221 power GX1200 receiver plus antenna plus RX1200 Controller for about 17h
Weight, GEB221 battery	0.2kg
External battery, optional	GEB171 9Ah/12V NiMh battery
Operation time	1 GEB171 powers GX1200 receivers plus antenna plus RX1200 Controller for about 30h

Power supply for SmartRovers

Internal battery	GEB211 rechargeable Li-Ion battery 2.2Ah/7.4V, 1 battery fits into ATX1230+ GNSS and 1 battery fits into RX1250/RX1250c
Operation time	1 GEB211 powers ATX1230+ GNSS for about 6h 1 GEB211 powers RX1250 for about 13h 1 GEB211 powers RX1250c for about 12h
Weight, GEB211 battery	0.11kg

Operation of GX1200+ receivers with and without controller

Manual operation with RX1210 Controller	Standard method. Receiver control, operation, data input, survey-data acquisition, information display via controller
Automatic operation without Controller	Automatic on switching on. Modes and parameters for receiver operation, measuring, recording, transmission etc preset using controller
LED	3 LED's indicate power, tracking, memory
Manual operation with RX1250 Controller	As an alternative the controller RX1250 in Terminal Mode can be used for manual operation of the sensor in exactly the same way as the RX1210

Operation of SmartRovers with and without controller

An RX1250/RX1250c Controller is always required to operate an ATX1230+ GNSS

Navigation mode

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

Environmental specifications

Receivers	**Valid for GX1210+, GX1220+, GX1220+ GNSS, GX1230+, GX1230+ GNSS, ATX1230+ GNSS**
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

GNSS Antennas	**Valid for AX1201, AX1203+ GNSS** For AT504 GG and AR25 please refer to the technical data for GRX1200+ series receivers (746097)
Temperature, operating	-40°C to +70°C Compliance with ISO9022-10-08, ISO9022-11-05 and MIL-STD-810F Method 502.4-II, MIL-STD-810F Method 501.4-II
Temperature, storage	-55°C to +85°C Compliance with ISO9022-10-09, ISO9022-11-06 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	IP66, IP67 Protection against water jets Protection against blowing rain Waterproof to temporary submersion into water (maximum depth of 1m) Dust-tight, protection against blowing dust Compliance with IP66 and 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
Functional Shock	No loss of lock to satellite signal when used on a pole set-up and submitted to pole bumps up to 150mm
Topple over pole	Survives topple over from a 2m survey pole onto hard wood on a concrete floor

Controller	**Valid for RX1210T and RX1250, RX1250c controllers**
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 RX1250c (-30°C to +50°C)
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

Communication Module	**Valid for all Leica GFU based communication modules**
Humidity	Up to 100%* Compliance with ISO9022-13-06, ISO9022-12-04 * 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

NMEA output

	NMEA Data output format, internationally standardized format for data and position output, For real-time/RTK, DGPS, navigation positions,
NMEA sentences	NMEA 0183 V2.20 and Leica proprietary

OWI interface

Leica proprietary Outside World Interface, enables full remote control of GPS receivers by PC, PDA

Protocol Versions	Binary or ASCII

Data links

Support of various Radio modems and GSM/UMTS/CDMA cellular mobile phones for RTK, DGPS or remote control operation modes

No. of simultaneous data links	Up to two data links can be attached simultaneously using Leica GFU housing, plus two generic data links, to be used with different sensor interfaces. Or up to four generic data links can be attached simultaneously.
Radio modem	Any suitable radio modem with RS232 interface and operating in transparent mode
Recommended radio modems	Satelline 3AS integrated into Leica GFU housing Pacific Crest PDL receive-only integrated into Leica GFU housing
GSM/UMTS phone modem	Any suitable model
Recommended GSM phone	Siemens MC75 mobile phone integrated into Leica GFU housing, 850, 900, 1800, 1900 MHz.
Recommended CDMA phone	Multitech MTMMC CDMA phone integrated into Leica GFU housing, 800, 1900 MHz.
Landline phone modem	Any suitable model

Coordinate systems

	Management of ellipsoids, projections, geoid models, transformation parameters
Ellipsoids	All common ellipsoids User-definable ellipsoids
Map projections User definable and country specific	Mercator Transverse Mercator 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, battery etc.
Status information:	Current position, satellite status, logging 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

Configuration sets:	Ability to store and transfer all instrument and application configuration settings for different operators, survey tasks etc.
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, lines and areas with optional attributes when measuring Manual code entry or selection from a user defined codelist
Quick Coding:	Recording a measurement with a point code or free code by entering a alphanumeric or a numeric quick code from user defined codelist
SmartCodes:	Recording a measurement with a point, line or area code by selecting a box to which a code is assigned
Line Work:	Recording additional point information which effects creating lines, curves, splines, areas

Data Management

Jobs:	User definable jobs containing measurements, points, lines, areas and codes Directly transferable to Leica Geo Office software
Points, lines, areas: Functions:	Creating, viewing, editing, and deleting points, lines and areas and codes Sorting and filtering of points, lines and areas Averaging of multiple points within user defined averaging limits
Field to Office:	Remote transfer of objects and files to and from the instrument (field) to the office via the internet, and vice versa, using the common File Transfer Protocol (FTP)

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 Direct onboard upload of DXF files for interactive maps and drawings
Data export:	User defined ASCII files with measurements, points, lines, codes Direct onboard export to DXF and LandXML files

Standard application programs

Survey: Measuring points, lines and areas with codes and offsets

- Auto Points:
  High-speed surveying for mass data acquisition by automatically logging points at a given time interval, minimum distance difference or minimum height difference

- Hidden Point:
  The coordinates of inaccessible points can be calculated by
  - measuring distances and/or azimuth to the inaccessible point using a hidden point measurement device such as the Leica Disto or any other suitable laser range finder or by using a conventional tape
  - manually occupying auxiliary points
  - computing bearings from previously occupied points

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. Three different transformation methods are available:
- Onestep
- Twostep
- Classic 3 D (Helmert transformation)

Stakeout:

3D Staking of points using various stakeout methods:
- Orthogonal: Displaying distances forwards / backwards, left / right from or to the station and cut / fill
- Polar: Displaying direction, distance and cut / fill
- Coordinate differences: Displaying coordinate differences and cut /fill
- Stakeout direct from graphical map

COGO:

Computation of coordinates of points using various coordinate geometrical methods:
- Inverse: Compute bearing and distance between 2 points, point and line, point and arc and between point and the actual position.
- Traverse: Compute coordinates of points using bearing and distance from origin point
- Intersections: Compute coordinates of points using intersections created from other points
- Line Calculations: Compute coordinates of points based on distance and offsets along lines
- Arc Calculation: various arc related calculations, like arc center, offsetpoints related to an arc or segmentation of arcs
- Shift, Rotate and Scale: Compute coordinates of group of points based on a shift, rotate and scale from their existing coordinates. The shift, rotate and scale values can be manually entered or computed
- Area Division: Divide areas into smaller areas using a variety of methods

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 ist 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
- Grid staking to a line / arc where a grid can be staked relative to a reference line / arc
- Defining and staking slopes along defined lines and arcs
- Staking relative to a polyline which was imported from a DXF file or manually created

Reference Plane:

Stake-out or measure points relative to a reference plane
- Defining a plane by either measuring or selecting points
- Calculate the perpendicular distance and height difference from a measure point to the plane

DTM Stakeout:

- Staking out a Digital Terrain Model
- Comparing actual and design height and displaying height differences

Cross Section Survey:

Survey cross sections (such as highway profiles, river profiles, beach profiles) using code templates. The appropriate code for the next point on the profile is always correctly suggested
- Also shows distance from last cross section
- Free, point, line or area codes can be used

Area Division:

Area Division as an optional add on functionality of COGO Application
- Divide areas into smaller areas using a variety of methods
- Full graphical support

Volume Calculation:

- Defining and Editing of surfaces and boundaries
- Calculating of Digital Terrain Models
- Computation of Volumes of defined surfaces in relation of a defined reference height

RoadRunner:

Stake-out and as-built check of roads and any type of alignment related design (e.g. 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

- Covers all working tasks including stake-out/check of lines, grades/slopes (e.g. road surface, cut & fill), DTMs and many more
- Visualization of cross-sections and planar view of design
- Graphical selection of elements to stake-out/check
- Smart project management of design data
- Support of multiple road layers (construction phases)
- Enhanced station equation capabilities
- Comprehensive, user definable log files and cut sheets
- Seamless data flow from all major design packages via PC conversion tool.

RoadRunner Rail: Version of RoadRunner to stake-out and as-built check for rail construction and maintenance

- Stake-out of rails
- As-built checks of rails
- Superelevation (cant) supported
- Clearance (gauge) control
- View design data
- Reporting

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, XP and Vista 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.

TPS Processing: Re-calculate TPS setups to update station coordinates and orientations.
Define setups and traverses and process with preferred parameters.
Display traverse results in HTML-based reports.

COGO: Computation of coordinates of points using inverse, traverse, intersection, line and arc calculations and area divisions. Select points graphically and create HTML-based reports.

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.
GLONASS data processing:	Allows processing of GLONASS data in addition to GPS data 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
Surfaces & Volumes:	Assign measured points of surfaces and calculate Digital Terrain Models. Use automatic boundary creation or define boundaries manually. Introducing breaklines will automatically update the model. Visualize the surface in a 2D or 3Dview. Calculate volumes above the reference heights or between surfaces.

System requirements

Recommended PC configuration:	Pentium® 1 GHz processor or higher 512 MB RAM or more Microsoft® Windows™ 2000, XP or Vista Microsoft® Internet Explorer 5.5 or higher

Whether you want to survey a parcel of land or a construction site, a facade or indoors to create as-built plans or carry out high-precision measurements of bridge and tunnel constructions – Leica Geosystems' surveying instruments provide the right solution for all measuring tasks.

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