Leica GS09 GNSS
Datasheet

GS09 SmartAntenna

The SmartAntenna can be used in a large variety of operating modes, providing you with a complete surveying system.

- RTK Rover – exceptionally rugged and light weight pole setup without any cables
- Reference Station – easily setup RTK base station operates without controller
- Network Rover – a complete surveying system, operating in all reference networks
- SmartStation – the GS09 fits onto a TPS creating one easy-to-use instrument

CS09 Controller

The Leica CS09 controller is designed to suit any surveying task with a wide range of functionality and application programs.

- Ergonomic – QWERTY alphanumeric keyboard and function keys for rapid data entry
- Colour Display – large display with touch screen functionality
- Removable Memory – up to 1 GB data storage on CompactFlash card

SmartWorx Field Software

SmartWorx is based on the proven and familiar operating concept of the Leica System 1200.

- Icon-based Menus – quick to learn, ensuring instant productivity
- Application Programs – enable any survey task to be easily and efficiently completed
- Field-to-Office – transfer data between the work site and the office computer
- Plug & Play – automatic detection of communication devices for easy setup

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Leica GS09 SmartAntenna

GNSS Technology	**Measurement Engine**	
	Leica patented SmartTrack+ technology	• Jamming resistant measurements • High precision pulse aperture multipath correlator • Excellent low elevation tracking technology • Very low noise GNSS carrier phase measurements with < 0.5 mm precision • Minimum acquisition time
	No. of channels	72 channels
	Reacquisition time	< 1 sec
	GNSS Measurements	
	Satellite signals tracking	GPS: L1, L2, L2C (C/A, P, C Code) GLONASS: L1, L2 (C/A, P narrow Code)
Measurement Performance	**Accuracy** [1]	
	DGPS/RTCM	Typically 25 cm (rms)
	RTK Rapid static (phase) Static mode after initialization	Horizontal: 5 mm + 0.5 ppm (rms) Vertical: 10 mm + 0.5 ppm (rms)
	RTK Kinematic (phase) Moving mode after initialization	Horizontal: 10 mm + 1 ppm (rms) Vertical: 20 mm + 1 ppm (rms)
	Post Processing (phase) Static with long observations	Horizontal: 3 mm + 0.5 ppm (rms) Vertical: 6 mm + 0.5 ppm (rms)
	Post Processing (phase) Rapid static mode	Horizontal: 5 mm + 0.5 ppm (rms) Vertical: 10 mm + 0.5 ppm (rms)
	On-The-Fly initialization	
	Reliability	Better than 99,99% using Leica SmartCheck+ technology
	Time for initalization	Typically 8 sec [2]
	RTK baseline range	up to 50 km
Hardware	**User Interface**	
	Keys	On / Off key
	Led Status indicator	Satellite tracking, *Bluetooth*® communication and battery power
	Communication ports	• Combined USB / Power port with 8-pin Lemo plug • Integrated *Bluetooth*® port • 5-pin clip on contacts for Leica SmartStation setup
	Physical	
	Weight	1.05 kg including battery
	Dimension (diameter x height)	186 mm x 89 mm
	Environmental specifications	
	Temperature, operating	-40° C to +65° C (-40° F to +149° F) [3]
	Temperature, storage	-40° C to +80° C (-40° F to +176° F) [3]
	Humidity	100% [4]
	Sealed against water	IP67: Temporary submersion into water (max. depth 1 m)
	Sealed against sand and dust	Dust tight, protection against blowing dust
	Vibration	Withstands vibrations in compliance with ISO9022-36-08
	Drops	Withstands 1 m drop onto hard surface
	Topple over	Withstands topple over from a 2 m survey pole onto hard surface
	Functional shock	No loss of lock to satellite signals when used on a pole setup and submitted to pole bumps up to 150 mm
	Power management	
	Supply Voltage	Nominal 12 V DC, Range 10.5 – 28 V DC
	Power consumption	Typically: 1.8 W, 150 mA
	Internal Power supply	Removable & rechargable Li-Ion battery, GEB211 2.2 Ah / 7.4 V or GEB212 2.6 Ah / 7.4 V
	Operation time	Up to 7 hours using GEB212 battery [5]
Communications	**RTK transmission**	
	Source	Direct from GS09 (No datalogger required)
	RTK format	Leica Lite propriety format
	Radio Modems	All Satelline and Pacific Crest radios in GFU or standard housing
	Integration with TPS	
	SmartStation functionality	Connects to Leica TPS1200, TS30 and TM30 instruments

Leica CS09 Controller

User Interface	**Standard software**	
	Operating system	Microsoft Windows CE 5.0 software
	Application software	Leica SmartWorx field software
	Terminal software	Leica GX1200 sensor control
	Software control	
	Display	¼ VGA colour, graphics capable
	Touch screen	Toughened film on glass
	Keyboard	62 keys with QWERTY alphanumeric & function keys
	Illumination	Backlight illuminated display and fully illuminated keys
Hardware	**Physical**	
	Dimension	218 mm x 123 mm x 47 mm
	Weight of CS09	740 g including battery
	Weight of pole setup	3.47 kg for complete rover pole setup
	Weight of network rover	2.85 kg for complete network rover using a *Bluetooth*® mobile phone
	Interfaces	
	Data storage	Removable CF card (256 MB and 1 GB available)
	Communication ports	• Combined USB/Power port with 8-pin Lemo plug • 2 x *Bluetooth*® ports Class 2 • 7-pin clip on contacts for GHT56 SmartHolder connection
	Environmental Specifications	
	Temperature, operating	-30° C to +65° C (-22° F to +149° F) [3]
	Temperature, storage	-40° C to +80° C (-40° F to +176° F) [3]
	Humidity	100% [4]
	Sealed against water	IP67: Temporary submersion into water (max. depth 1 m)
	Sealed against sand and dust	Dust tight, protection against blowing dust
	Drops	Withstands 1.5 m drop onto hard surface
	Vibration	Withstands vibrations in compliance with ISO9022-36-08
	Power Management	
	Supply Voltage	Nominal 12 V DC, Range 11.5 – 28 V DC
	Power consumption	Typically: 1.4 W, 120 mA
	Internal Power supply	Removable & rechargable Li-Ion battery, GEB211 2.2 Ah / 7.4 V or GEB212 2.6 Ah / 7.4 V
	Operation time	Up to 13 hours using GEB212 battery [5]
Communications	**RTK specifications**	
	Data Formats	Leica propriety formats (Leica, Leica Lite, Leica 4G) Optional CMR, CMR+, RTCM 2.1, RTCM 2.3, RTCM 3.0, RTCM 3.1
	RTK baseline	Optional 5 km maximum baseline or unlimited baseline lengths
	Position update rate	1 Hz standard. Optional 20 Hz (0.05 sec)
	Network Rover	VRS, FKP, iMAX, MAX, Nearest station
	External Devices	
	Radio Modem	Satelline and Pacific Crest radios in GFU housing (connected using GHT56 SmartHolder)
	Mobile Phone	• GSM / CDMA modules in GFU housing (connected using GHT56 SmartHolder) • *Bluetooth*® mobile phones
	GS09 SmartAntenna	• *Bluetooth*® • USB Cable
	PC with Microsoft Windows	• USB data cable • CF-card reader
	Internet	Mobile phone using FTP protocol

[1] Measurement precision, accuracy and reliability are dependent upon various factors including number of satellites, geometry, obstructions, observation time, ephemeris accuracy, ionospheric conditions, multipath etc. Figures quoted assume normal to favorable conditions. GPS and GLONASS can increase performance and accuracy by up to 30% relative to GPS only.

[2] May vary due to atmospheric conditions, multipath, obstructions, signal geometry and number of tracked signals.

[3] Compliance with ISO9022-10-08, ISO9022-11-special and MIL-STD-810F Method 502.4-II, MIL-STD-810F Method 501.4-II

[4] Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810F Method 507.4-I

[5] May vary with temperature and battery age.

Leica SmartWorx Field Software

Standard features

Operation
Always in view status information bar
Permanent display of current positioning accuracy
Data import: ASCII, DXF, GSI, DTM models
Data export: Custom ASCII, DXF, XML, Raw data
Field-to-Office data transfer using ftp
Setup Reference
Configuration of RTK base station for operation without requiring a controller
Selection of antenna type
Selection of radio channel
Computation of navigated base position
GPS Resection
Provides a rapid localisation of a GPS job
Positions onto existing control points
Uses a similar method as a TPS resection
Requires no knowledge of coordinate systems
Determine Coordinate Systems
For the conversion of GNSS positions to local coordinates
Provides a Onestep, Twostep or Classic 3D transformation type
One point localisation for rapid calibration
Display and recording of parameters and residuals
Automatic matching of measured and entered points
Coordinate Geometry
Inverse, intersections, line and arc related computations
Calculations made from entered or measured points
Graphical plot view of computations
Coding of calculated points
Immediate stakeout of calculated points
Survey
Manual or automated point measurement
Configurable display layout
Point, line, area or free coding
Smart and Quick coding
Measuring of hidden points using offset data
Stakeout
Orientation to north, point, line, sun or by arrow
Quality comparison between stake and design
Automatic selection of closest design point
Graphical selection of point from map display
Design height editing during stakeout

Optional features

Reference Line
Staking of line, arcs and polylines
Staking of chainages
Staking of slopes
Quality comparison between stake and design
Graphical display of design
RoadRunner
Staking of alignments: Stringlines, single/double cross slopes, batters, surfaces
Graphical staking and quality control
Alignments can be created in the field
Importing of alignments from various design formats
Comprehensive field report of completed work
Volume Calculations
Computation of surface areas and volumes
Using imported or measured points
Graphical display of triangles
DXF export of measured surfaces
Comprehensive reporting
DTM Stakeout
Staking out of heights based on a digital terrain model
Staking out of points with heights taken from the DTM
Various DTM layers can be selected for stakeout
Can be used for quality control of design surface
Functionality Options
GLONASS satellite tracking
Raw data logging for post-processing
RTK functionality with unlimited baseline length
Position and display update rate of 5 Hz (0.2 sec)
Reference network access (includes unlimited baseline)
RTCM/CMR RTK data messages input
Bluetooth® mobile phone connection
NMEA out

SmartWorx

Swiss Technology by Leica Geosystems

TQM ISO 9001 / ISO 14001

Total Quality Management – our commitment to total customer satisfaction.

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