Leica GRX1200 Series
Technical Data

GNSS
future proof

SMARTTRACK

- when it has to be **right**

Leica
Geosystems

GRX1200 Series Technical Data

Summary Description

	GRX1200 Lite	GRX1200 Classic	GRX1200 Pro	GRX1200 GG Pro
Continuously Operating Reference Station (CORS)	•	•	•	•
GPS	•	•	•	
GNSS				•
Survey, geodetic, real-Time, GIS and Monitoring applications	•	•	•	•
Dual-frequency L1 + L2	•	•	•	•
Phase and code measurements	•	•	•	•
Post processing		•	•	•
Real-time RTK reference standard	•*	•	•	•
DGPS/RTCM reference standard		•	•	•
Internal raw data logging		•	•	•
Raw data streaming	•	•	•	•
Advanced input/output ports (Event, PPS, Oscillator)			•	•
LAN/WAN enabled.			•	•

* exclusively for SmartStation

For GPS System 1200 field and rover receiver and office software technical data, please refer to LEICA GPS1200 series Technical Data sheet (Art.-No. 738817en)

System Components

Receiver

	GRX1200 Lite/Classic GRX1200 Pro	GRX1200 GG Pro
Receiver technology	SmartTrack - patented. Discrete elliptical filters. Fast acquisition. Strong signal. Low noise. Excellent tracking, even for low satellites and in adverse conditions. Interference resistant. Multipath mitigation.	SmartTrack+ is built on SmartTrack technology and enhanced for GNSS signals. Includes discrete elliptical filters. Fast acquisition. Strong signal. Low noise. Excellent tracking, even for low satellites and in adverse conditions. Interference resistant. Multipath mitigation.
No. of channels	12 L1 + 12 L2 2 SBAS (GRX Pro only)	72 channels - 14L1 + 14L2 GPS - 12L1 + 12L2 GLONASS - 2 SBAS
L1 measurements (GPS)	Carrier phase full wave length C/A narrow code	Carrier phase full wave length C/A narrow code

	GRX1200 Lite/Classic GRX1200 Pro	GRX1200 GG Pro
L2 measurements (GPS)	Carrier phase full wave length, AS off or on. P2 code / P-code aided under AS. Equal performance with AS off or on	Carrier phase full wavelength with C code and AS off or on P2 code Equal performance with AS off or on
L1 measurements (GLONASS):	No	Carrier phase full wavelength C/A narrow code
L2 measurements (GLONASS):	No	Carrier phase full wavelength P narrow code
Future Signals	GRX1200 Pro and GRX1200 GG Pro are designed to support the future planned third GPS civil (L5) and the planned GALILEO E1 and E5 signals, via a planned hardware upgrade	
Independent measurements	Fully independent L1 and L2 code and phase measurements	
Internal Oscillator	Aligned to GPS time within 10 nanoseconds	
High frequency SNR	Option to output Signal-to-Noise values in LB2 raw data with true 20Hz	
Time to first phase measurement after switching ON	Typically 30 secs	
LED status indicators	3: for power, tracking, recording/memory	

	GRX1200 Lite/Classic	GRX1200 Pro	GRX1200 GG Pro
Ports - Serial RS232 - Power Input - Antenna - PPS output - Event input - External frequency - Ethernet	4x LEMO-1, 8-pin, 115'200 baud 2x External LEMO-1, 5-pin / 1x Internal 1x TNC	4x LEMO-1, 8-pin, 115'200 baud 2x External LEMO-1, 5-pin / 1x Internal 1x TNC 1x LEMO ERN.0S.250.CTL 1x LEMO HGP.00.250.CTL 1x 24QMA-50-2-3/133, 5/10 Mhz 1x rugged RJ45, 10Mbit, 3 configurable IP ports and http, https, ftp	
Supply voltage	Nominal 12V DC, range 10.5-28V DC	Nominal 12V DC, range 10.5-28V DC	
Power consumption	3.8W typically, 320mA	4.0W typically, 320mA	3.6W typically, 320mA
Weight, receiver only	1.20kg	1.25kg	
Dimensions (without sockets):	length x width x thickness: 0.212m x 0.166m x 0.079m		

Antennas

Standard geodetic antenna	AX1202 GG, L1/L2 GPS/GLONASS SmartTrack+
Groundplane	Built-in groundplane
Dimensions (diameter x height)	170mm x 62mm
Weight	0.44kg
Supply voltage	Pre-amp: 4.75-15VDC, 50mA max.
Gain	29 ± 3 dBi
Phase centre stability	< 1mm

Choke-ring geodetic antenna	AT504 GG choke ring, L1/L2 GPS/GLONASS microstrip
Design	Dorne & Margolin L1/L2 antenna element with gold anodized choke ring ground plane. Complies with IGS type 'T' antenna, JPL design.
Protection radome	optional
Dimensions (diameter x height)	380mm x 140mm (antenna)
Weight	4.3kg (antenna)

Supply voltage	Pre-amp: 4.5 - 18.0VDC, 50mA max
Gain	29 ± 3 dBi
Noise Figure	3 dBi max.
BW, -3 dBi	23 MHz min.
BW, -30 dBi	100 MHz max.
Phase centre stability	‹ 1mm

Choke-ring geodetic antenna	**AT504 choke-ring, L1/L2 GPS microstrip**
Design	Dorne & Margolin L1/L2 antenna element with gold anodized choke ring ground plane. Complies with IGS type 'T' antenna, JPL design.
Protection radome	optional
Dimensions (diameter x height)	380mm x 140mm (antenna)
Weight	4.3kg (antenna)
Supply voltage	Pre-amp: 3.75 - 30VDC, 50mA max.
Gain	typically 27 dBi
Noise Figure	3 dBi max.
BW, -3 dBi	30 MHz min.
BW, -30 dBi	80 MHz max.
Phase centre stability	‹ 1mm

Controller (optional)

Type	RX1210, RX1210T (with touch screen)
Display	¼ VGA, monochrome, 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
Weight	0.48kg

GRX1200 Series

Measurement Precision and Position Accuracies

Important Note	Measurement precision and accuracy in position and 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 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 / L2	0.2mm rms	/	0.2mm rms
Code (pseudorange) on L1 / L2	2cm rms	/	2cm rms

Accuracy (rms) with post processing

	With LEICA Geo Office L1/L2 processing software GLONASS option needed to process GLONASS data
Static (phase), choke ring antenna long lines, long observation time	Horizontal: 3mm + 0.5ppm
	Vertical: 6mm + 0.5ppm
Static and rapid static (phase)	Horizontal: 5mm + 0.5ppm

	GRX1200 Series

with standard antenna	Vertical:	10mm + 0.5ppm
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

Position update rate	Selectable: 0.05 sec (20Hz) to 60 secs
Position latency	0.03 sec or less

PPS output

PPS output	For GRX1200 Pro/GRX1200 GG Pro
Characteristics	
Peak	3.3 V= High
Impedance	50 Ω
Pulse length	1ms
Leading edge	Coinciding with the beginning of each epoch.
Positive/negative edge	Selectable via RX1200 or web interface
Cable connectivity:	
Matched with an appropriate impedance of	50 Ω
Socket:	LEMO ERN.OS.250.CTL

Event input	For GRX1200 Pro/GRX1200 GG Pro
Pulse type	TTL, positive or negative going pulse
Pulse length	125 ns at minimum
Voltage	TTL level, ~ 5V, min. 3.3V
Pin definition	Centre = signal, Case = ground
Socket	LEMO HGP.00.250.CTL

Power supply

External power supply unit	Up to two external power sources can be connected simultaneously. It is possible to configure one as the primary power input and the other as backup power source. An internal plug-in battery can be used for temporary set ups. Power-supply unit for GPS receiver, for indoor use only, input 100V-240VAC 50-60HZ, output 12VDC. Ideal for continuous receiver operation.
External battery	GEB171 rechargeable 8Ah/12V NiCd battery
Operation time	1 GEB171 powers receiver plus antenna for about 25hrs
Internal battery	GEB221 rechargeable Li-Ion battery 3.8Ah/7.2V, 1 battery fits into receiver
Operation time	1 GEB221 powers receiver plus antenna for about 8 hrs
Weight, GEB221 battery	0.2kg

Receiver Control & Operation

Receiver operation

Web interface	Standard method of receiver configuration, operation and status display.
Operation using OWI	Receiver control, operation, data input, survey-data acquisition, information display via remote SW application using OWI command control, e.g with Leica GPS Spider.
Built-In Status LED's	3 LED's indicate power, tracking, recording/memory
RX1210 & RX1220 Controller	Can be used for initial receiver configuration and status information display
	With the campaign option, GRX1200 Classic and Pro instruments can be used for field campaigns. The instruments can be fully operated with a RX1210 controller for static raw data logging.
Startup configurator	Initial configuration and query of settings using a simple ASCII text file on the CF card
FTP Server	Access to receiver memory with FTP

Internet connectivity

	Web interface for remote configuration, operation and status displays. Supports http and https
Web interface ports	▪ Ethernet port ▪ Serial Port (PPP) ▪ Simultaneous access over Ethernet port is fully supported
Security	Access restrictions configurable in User Management component: • Viewers (status only) • Users (configuration and status) • Administrators SSL encryption
E-Mail:	Sending of message log in scheduled intervals over email. Ethernet and PPP connection to the internet is supported
FTP Push (optional):	Automated FTP Push of raw data and/or RINEX files to a remote FTP server. Ethernet and PPP connection to the internet is supported
RTK Multiplexing	Option to allow RTK data streaming direct from the sensor, via TCPIP, for up to 20 clients
DynDNS	Allows receiver addressing with dynamic IP address through a static host name. Requires registration with a DynDNS service

OWI interface

	Leica proprietary Outside World Interface - OWI – for receiver control commands from PC etc, for receiver configuration, control and status, e.g. using Leica GPS Spider
Protocol Versions	Binary or ASCII
OWI interface ports	▪ All serial ports ▪ Ethernet port Simultaneous access, control and message output using these ports is fully supported

Startup configurator

	Initial configuration and query of serial ports settings, Ethernet port and address settings using a simple ASCII text file on the CF card
Set and query	Serial port settings PPP on RX port Ethernet settings Web Server settings DynDNS settings
Query	MAC address

Receiver operation and receiver types

	GRX1200 Lite	GRX1200 Classic	GRX1200 Pro	GRX1200 GG Pro
Web interface over ethernet			•	•
Web interface over serial cable (PPP)	•	•	•	•
OWI interface (e.g. GPS Spider)	•	•	•	•
RX1210 & RX1220 Controller	•	•	•	•
Startup configurator	•	•	•	•
FTP Server			•	•

Transmitted Real-time RTK and DGPS/RTCM Data Formats

	GRX1200 Lite	GRX1200 Classic	GRX1200 Pro	GRX1200 GG Pro
Leica	•*	•	•	•
CMR/CMR+		•	•	•
RTCM versions 2.x, Message types 1, 2, 3, 9,18, 19, 20, 21, 22, 23, 24		•	•	•
RTCM versions 3.0, 3.1		•	•	•
Simultaneous transmissions: 2 real time output interfaces via independent ports, providing identical or different RTK/RTCM formats	•	•	•	•
Time Slicing: Up to four time slots supported	•	•	•	•
NTRIP Server: Direct data streaming to NTRIP Caster			•	•

* exclusively for SmartStation

Transmitted NMEA Data Formats

	GRX1200 Lite	GRX1200 Classic	GRX1200 Pro	GRX1200 GG Pro
NMEA 0183 V2.20 and Leica proprietary	•	•	•	•
Simultaneous transmissions: 2 NMEA output interfaces via independent ports, providing identical or different NMEA messages	•	•	•	•

Transmitted GNSS Data Formats

	GRX1200 Lite	GRX1200 Classic	GRX1200 Pro	GRX1200 GG Pro
Leica binary (LB2)	•	•	•	•
BINEX records 0x00, 0x01, 0x7d, 0x7e, 0x7f	•	•	•	•
Simultaneous transmissions: as many raw data outputs as ports available, providing identical or different raw data output	•	•	•	•

Data links

	Support of various Radio modems and GSM/GPRS/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	Sateline 3AS integrated into Leica GFU housing
GSM phone modem	Any suitable model
Recommended GSM/GPRS phone	Siemens MC45 or MC75 mobile phone integrated into Leica GFU housing
Recommended CDMA phone	Multitech MTMMC mobile phone integrated into Leica GFU housing
Landline phone modem	Any suitable model

Data logging

	GRX1200 Lite	GRX1200 Classic	GRX1200 Pro	GRX1200 GG Pro
Primary raw data logging		•	•	•
Ring buffer raw data logging		•	•	•
RINEX v2.11 primary data logging		•	•*	•*
RINEX v2.11 ring buffer data logging		•	•*	•*

*optional

Recording rate	Selectable from 0.05 to 300 secs
Standard medium	CompactFlash cards: 64MB, 256MB, 1GB
Data capacity:	1 GB is sufficient for
	▪ 1152hrs GPS L1 + L2 data logging at 1 sec rate
	▪ 17600hrs GPS L1+L2 data logging at 15 sec rate
RINEX Conversion	RINEX conversion available as standard and compressed Hatanaka or zip

Environmental specifications

Receivers

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
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 Vibration	Withstands 1m drop onto hard surfaces Compliance with ISO9022-36-08 and MIL-STD-810F Method 514.5-Cat24
GPS Antennas	**Valid for AX1201, AX1202 GG**
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 ISO9022-10-08, ISO9022-11-06 and MIL-STD-810F, Method 502.4-II, MIL-STD-810F, Method 501.4-II
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 Protection against water jets IP67 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 Vibration	Withstands 1.5m drop onto hard surfaces 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

	Valid for AT504 GG & AT504
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	-40°C to +70°C Compliance with ISO9022-10-08, ISO9022-11-06 and MIL-STD-810F, Method 502.4-I, MIL-STD-810F, Method 501.4-I
Humidity	Up to 92%* Compliance with 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

Leica GPS Spider – Reference Station software

For Leica GPS Spider Reference Station software description and technical specifications please refer to the Leica GPS Spider software brochure (Art.-No. 745970en)

Whether providing corrections from just a single reference station, or an extensive range of services from a nationwide RTK network – innovative reference station solutions from Leica Geosystems offer tailor-made yet scalable systems, designed for minimum operator interaction whilst providing maximum user benefit. In full compliance with international standards, Leica's proven and reliable solutions are based on the latest technology.

Precision, value, and service from Leica Geosystems.
When it has to be right.

- when it has to be **right**

Leica
Geosystems