

# Leica GRX1200+ Series

## Technical Data



- when it has to be right

**Leica**  
Geosystems



# GRX1200+ Series Technical Data

## Summary Description

	GRX1200+	GRX1200+ GNSS
Continuously Operating Reference Station (CORS)	•	•
GPS	•	•
Modernised GPS (L5)	•	•
Glonass and Galileo	•	•
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.	•	•

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+	GRX1200+ GNSS
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	- 16 L1 + 16 L2 GPS + 16 L5 GPS, - 4 SBAS	120 channels - L1/L2/L5 GPS - L1/L2 GLONASS - E1/E5a/ E5b/ Alt-BOC Galileo - Compass - 4 SBAS
L1 measurements (GPS)	Carrier phase full wave length C/A narrow code	Carrier phase full wave length C/A narrow code

L2 measurements (GPS)	Carrier phase full wavelength with C code and AS off or on P2 code 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
L5 measurements (GPS)	Carrier phase full wave length, Code	Carrier phase full wave length, Code
L1 measurements (GLONASS):	No	Carrier phase full wavelength C/A narrow code
L2 measurements (GLONASS):	No	Carrier phase full wavelength P narrow code
E1/E5a/E5b measurements (Galileo)	No	Carrier phase full wave length, Code
Alt-BOC measurements (Galileo)	No	Carrier phase full wave length and code using Alt-BOC
Future Signals	The GRX1200+ GNSS is designed to support future planned signals of the Compass System. The Compass signal structure is not finalised, 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.	
Independent measurements	Fully independent code and phase measurements on all frequencies	
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+	GRX1200+ GNSS
Ports		
- Serial RS232	4x LEMO-1, 8-pin, 115'200 baud	
- Power Input	2x External LEMO-1, 5-pin / 1x Internal	
- Antenna	1x TNC	
- PPS output	1x LEMO ERN.05.250.CTL	
- Event input	1x LEMO HGP.00.250.CTL	
- External frequency	1x 24QMA-50-2-3/133, 5/10 Mhz	
- Ethernet	1x rugged RJ45, 10/100Mbit, 3 configurable IP ports and http, https, ftp, smtp	
Supply voltage	Nominal 12V DC, range 10.5-28V DC	
Power consumption	3.3W typically, 320mA	3.6 - 4.0W typically, 320mA
Weight, receiver only	1.25kg	
Dimensions (without sockets):	length x width x thickness: 0.212m x 0.166m x 0.079m	

## Antennas

Standard geodetic antenna	AS10, GPS/GLONASS/Galileo
Groundplane	Built-in groundplane
Dimensions (diameter x height)	170mm x 62mm
Weight	0.44kg
Supply voltage	Pre-amp: 4.5-18 V DC, 35 mA typical
Gain	27 dBi
Phase centre stability	< 1mm

<b>Choke-ring geodetic antenna</b>	<b>AR10, GPS/GLONASS/Galileo/Compass</b>
Groundplane	Built in groundplane
Protection radome	Intergrated
Dimensions (diameter x height)	240mm x 140mm
Weight	1.1kg
Supply voltage	Pre-amp: 3.3 - 12 V DC, 40 mA typical
Gain	29 dBi
Noise Figure	< 1.8 dBi max.
Phase centre stability	< 1mm
<b>Choke-ring geodetic antenna :</b>	<b>AR25 choke ring, GPS/GLONASS/Galileo/Compass</b>
Design	Dorne & Margolin Wideband antenna element with 3D gold choke ring ground plane.
Protection radome	optional
Dimensions (diameter x height)	380mm x 140mm
Weight	7.6kg
Supply voltage	3.3 - 12 vdc, 100mA max
Gain	40 dBi
Noise Figure	0.5 - 1.2 dBi
BW, -3 dBi	82 MHz (L1) and 70 MHz (L2)
BW, -30 dBi	120 MHz (L1) and 100 MHz (L2)
Phase centre stability	< 1mm
<b>Controller (optional)</b>	

Type	RX1210, RX1210T (with touch screen) or CS09 in GPS1200 Terminal Mode
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	<p>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.</p> <p>Times required are dependent upon various factors including number of satellites, geometry, ionospheric conditions, multipath etc.</p> <p>The following accuracies, given as root mean square, are based on measurements processed using LGO and on real-time measurements.</p>
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### 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
* L5/E1/E5a/E5b/Alt-BOC values are expected to be similar to L1. Final values will be determined after initial operational capability (IOC) has been reached.	

## Accuracy (rms) with post processing

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	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) with standard antenna	Horizontal: 5mm + 0.5ppm Vertical: 10mm + 0.5ppm
Code only	Typically 25cm

## Accuracy (rms) in single receiver navigation mode

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

## Position update and latency

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

## PPS output

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<b>PPS output</b>	
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
<b>Event input</b>	
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

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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/GNSS receiver, for indoor use only, input 100V-240VAC 50-60HZ, output 12VDC. Ideal for continuous receiver operation.
External battery Operation time	GEB171 rechargeable 8Ah/12V NiCd battery 1 GEB171 powers receiver plus antenna for about 25hrs
Internal battery Operation time Weight, GEB221 battery	GEB221 rechargeable Li-Ion battery 3.8Ah/7.2V, 1 battery fits into receiver 1 GEB221 powers receiver plus antenna for about 8 hrs 0.2kg

## Receiver Control & Operation

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### Receiver operation

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

### Internet connectivity

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Web interface ports	Web interface for remote configuration, operation and status displays. Supports HTTP and HTTPS <ul style="list-style-type: none"><li>▪ Ethernet port</li><li>▪ Serial Port (PPP)</li><li>▪ Simultaneous access over Ethernet port is fully supported</li></ul>
Security	Access restrictions configurable in User Management component: <ul style="list-style-type: none"><li>▪ Viewers (status only)</li><li>▪ Users (configuration and status)</li><li>▪ Administrators</li><li>▪ SSL encryption</li></ul>
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

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Protocol Versions OWI interface ports	Leica proprietary Outside World Interface - OWI – for receiver control commands from PC etc, for receiver configuration, control and status, e.g. using Leica GNSS Spider Binary or ASCII <ul style="list-style-type: none"><li>▪ All serial ports</li><li>▪ Ethernet port</li></ul> Simultaneous access, control and message output using these ports is fully supported
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### Startup configurator

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

## Receiver operation and receiver types

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	GRX1200+	GRX1200+ GNSS
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

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	GRX1200+	GRX1200+ GNSS
Leica	•	•
Leica 4G	•	•
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	•	•

## Transmitted NMEA Data Formats

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	GRX1200+	GRX1200+ GNSS
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

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	GRX1200+	GRX1200+ GNSS
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

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No. of simultaneous data links	Support of various Radio modems and GSM/GPRS/CDMA cellular mobile phones for RTK, DGPS or remote control operation modes 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 Recommended radio modems	Any suitable radio modem with RS232 interface and operating in transparent mode Satellite 3AS integrated into Leica GFU housing
GSM phone modem Recommended GSM/GPRS phone Recommended CDMA phone	Any suitable model Siemens MC45 or MC75 mobile phone integrated into Leica GFU housing Multitech MTMMC mobile phone integrated into Leica GFU housing
Landline phone modem	Any suitable model

## Data logging

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	GRX1200+	GRX1200+ GNSS
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 Standard medium	Selectable from 0.05 to 300 secs CompactFlash cards: 64MB, 256MB, 1GB, 4GB, 8GB
Data capacity:	1 GB is sufficient for - 1333hrs GPS L1 + L2 data logging at 1 second rate - 2000hrs GPS L1 + L2 data logging at 15 second rate Rates can be doubled if using the compression option
RINEX Conversion	RINEX conversion available as standard and compressed Hatanaka or zip

## Environmental specifications

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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	<p>Up to 100%*</p> <p>Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810F Method 507.4-I</p> <p>* The effects of condensation are to be effectively counteracted by periodically drying out the product</p>
Protection against Water, Sand and Dust	<p>IP67</p> <p>Protection against blowing rain</p> <p>Waterproof to temporary submersion into water (maximum depth of 1m)</p> <p>Dust-tight, protection against blowing dust</p> <p>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</p>
Drops	Withstands 1m drop onto hard surfaces
Vibration	<p>Compliance with ISO9022-36-08 and MIL-STD-810F Method 514.5-Cat24</p>
<b>GNSS Antennas</b>	<b>Valid for AS10</b>
Temperature, operating	<p>-40°C to +70°C</p> <p>Compliance with ISO9022-10-08, ISO9022-11-05 and MIL-STD-810F, Method 502.4-II, MIL-STD-810F, Method 501.4-II</p>
Temperature, storage	<p>-55°C to +85°C</p> <p>Compliance with ISO9022-10-08, ISO9022-11-06 and MIL-STD-810F, Method 502.4-II, MIL-STD-810F, Method 501.4-II</p>
Humidity	<p>Up to 100%*</p> <p>Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810F Method 507.4-I</p> <p>* The effects of condensation are to be effectively counteracted by periodically drying out the product</p>
Protection against Water, Sand and Dust	<p>IP66</p> <p>Protection against water jets</p> <p>IP67</p> <p>Protection against blowing rain</p> <p>Waterproof to temporary submersion into water (maximum depth of 1m)</p> <p>Dust-tight, protection against blowing dust</p> <p>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</p>
Drops	Withstands 1.5m drop onto hard surfaces
Vibration	<p>Withstands vibrations during operation on large civil construction machines</p> <p>Compliance with ISO9022-36-08 and MIL-STD-810F Method 514.5-Cat24</p>
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

<b>Valid for AR10</b>	
Temperature, operating	-40°C to +70°C Compliance with ISO9022-14-13/06 and ISO9022-15-02/03
Temperature, storage	-55°C to +85°C Compliance with ISO9022-14-13/06 and ISO9022-15-02/03
Humidity	Up to 100% Compliance with ISO9022-2 conditioning method 12-01 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
<b>Valid for AR25</b>	
Temperature, operating	-55°C to +85°C Compliance with ISO9022-10-09, ISO9022-11-06 and MIL-STD-810F, Method 502.4-II, MIL-STD-810F, Method 501.4-II
Temperature, storage	-55°C to +90°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 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 GNSS Spider – Reference Station software

For Leica GNSS Spider Reference Station software description and technical specifications please refer to the Leica GNSS 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.**

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