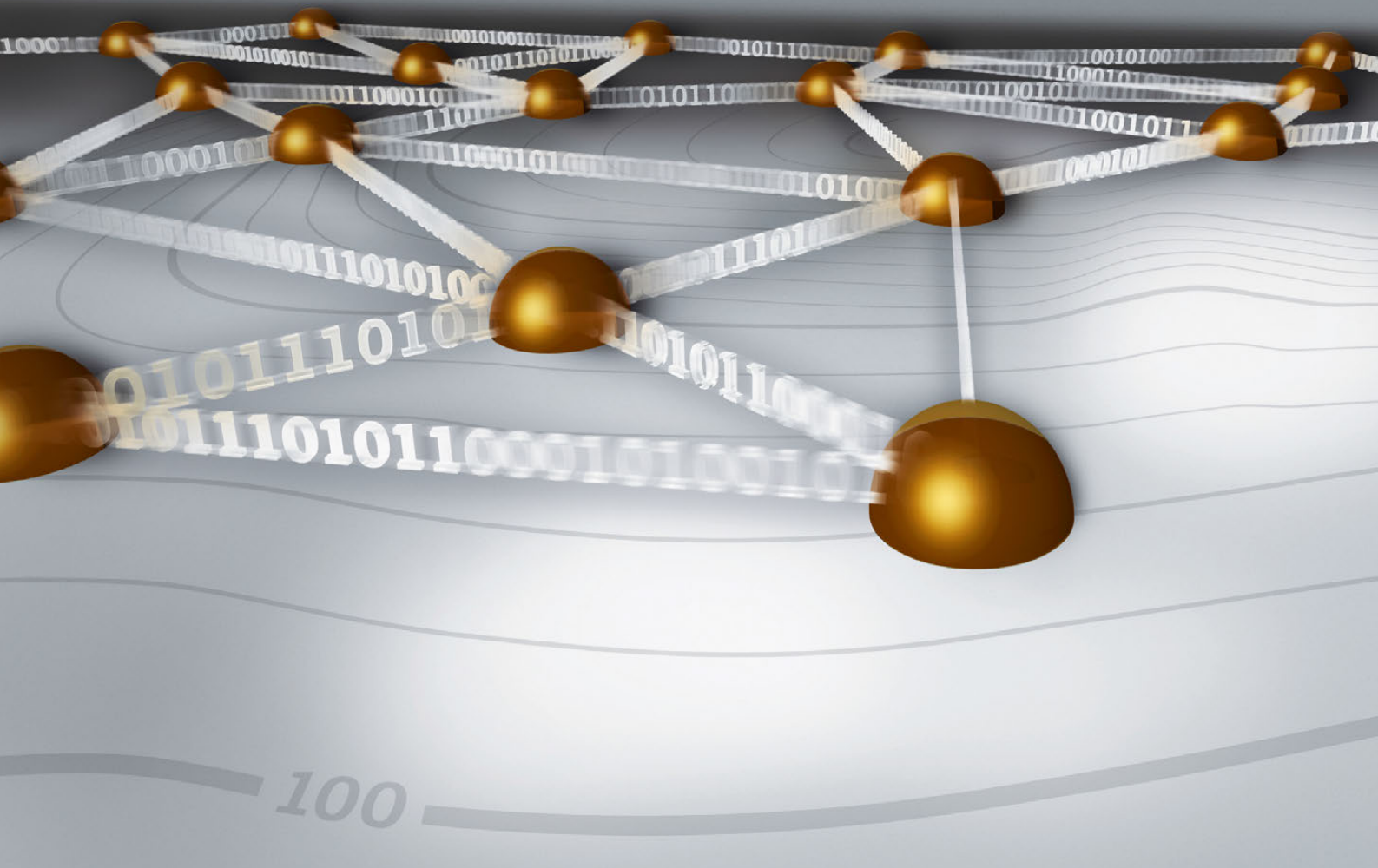


# Leica Spider hardware

## Technical data



# Introduction



This brochure contains important technical data regarding GNSS Receivers and Antennas.  
Read carefully through the Technical Data.

## Trademarks

- Windows is a registered trademark of Microsoft Corporation in the United States and other countries
  - SD is a trademark of the SD Card Association
  - *Bluetooth*<sup>®</sup> is a registered trademark of Bluetooth SIG, Inc.
- All other trademarks are the property of their respective owners.

## Validity of this brochure

This brochure applies to the Leica GR10/GR25.



myWorld@Leica Geosystems (<https://myworld.leica-geosystems.com>) offers a wide range of services, information and training material.  
With direct access to myWorld, you are able to access all relevant services whenever it is convenient for you, 24 hours a day, 7 days per week. This increases your efficiency and keeps you and your equipment instantly updated with the latest information from Leica Geosystems.

Service	Description
myProducts	Add all Leica Geosystems products that you and your company own. View detailed information on your products, buy additional options or Customer Care Packages (CCPs), update your products with the latest software and keep up-to-date with the latest documentation.
myService	View the service history of your products in Leica Geosystems Service Centres and detailed information on the services performed on your products. For your products that are currently in Leica Geosystems Service Centres view the current service status and the expected end date of service.
mySupport	Create new support requests for your products that will be answered by your local Leica Geosystems Support Team. View the complete history of your Support and view detailed information on each request in case you want to refer to previous support requests.
myTraining	Enhance your product knowledge with the Leica Geosystems Campus - Information, Knowledge, Training. Study the latest online training material or download training material on your products. Keep up-to-date with the latest News on your products and register for Seminars or Courses in your country.
myTrustedServices	Offers increased productivity while at the same time providing maximum security. <ul style="list-style-type: none"><li>• myExchange With myExchange you can exchange any files/objects from your computer to any of your Leica Exchange Contacts.</li><li>• mySecurity If your instrument is ever stolen, a locking mechanism is available to ensure that the instrument is disabled and can no longer be used.</li></ul>

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# 1 GNSS Receivers

## 1.1 Overview

### Sales variants

	GR10 Basic (774 409)	GR10 Performance (778 848)	GR10 Professional (778 849)	GR10 Unlimited (823 363)	GR25 WLAN Basic (799 085)	GR25 WLAN Performance (799 088)	GR25 WLAN Professional (799 090)	GR25 WLAN Unlimited (823 364)	GR25 Bluetooth Basic (744 410)	GR25 Bluetooth Performance (789 054)	GR25 Bluetooth Professional (789 055)	GR25 Bluetooth Unlimited (823 365)
<b>Supported GNSS Systems</b>												
GPS L1 & L2 (including L2C)	●	●	●	●	●	●	●	●	●	●	●	●
GPS L5	○	○	●	●	○	○	●	●	○	○	●	●
GLONASS L1 & L2 (including L2C)	○	○	●	●	○	○	●	●	○	○	●	●
Galileo E1/E5a/E5b/AltBOC	○	○	●	●	○	○	●	●	○	○	●	●
BeiDou	○	○	○	●	○	○	○	●	○	○	○	●
QZSS L1 & L2	○	○	○	●	○	○	○	●	○	○	○	●
QZSS L5	○	○	○	●	○	○	○	●	○	○	○	●
<b>Data rates</b>												
1Hz logging and streaming	●	●	●	●	●	●	●	●	●	●	●	●
2-20 Hz logging and streaming	○	○	○	○	○	○	○	○	○	○	○	○
50Hz logging and streaming	○	○	○	○	○	○	○	○	○	○	○	○
<b>Additional licenses</b>												
RINEX logging	○	●	●	●	○	●	●	●	○	●	●	●
FTP Push	○	●	●	●	○	●	●	●	○	●	●	●
Extended Formats	○	○	○	○	○	○	○	○	○	○	○	○
Multi-Client/Ntrip caster	○	●	●	●	○	●	●	●	○	●	●	●
Wake up	○	○	○	○	○	○	○	○	○	○	○	○
Campaign	●	●	●	●	●	●	●	●	●	●	●	●
Extended OWI*	○	○	○	○	○	○	○	○	○	○	○	○
WLAN	-	-	-	-	○	○	○	○	-	-	-	-
Site monitor	○	○	○	○	○	○	○	○	○	○	○	○

● Standard ○ Optional - Not Available

\* Not required for use with Leica GNSS Spider

## Options

### For GR10/GR25

774 411	<b>GRL100</b>	GPS L5 option
774 422	<b>GRL101</b>	GLONASS L1 & L2 option
774 424	<b>GRL103</b>	Galileo E1/E5a/E5b/AltBOC option
774 426	<b>GRL105</b>	BeiDou option
812 237	<b>GRL121</b>	QZSS L1 & L2 option
812 238	<b>GRL122</b>	QZSS L5 option ☞ Requires GRL121
774 428	<b>GRL107</b>	RINEX option
774 432	<b>GRL111</b>	FTP Push
774 429	<b>GRL108</b>	Extended Formats option. Includes BINEX / CMR / CMR+
774 430	<b>GRL109</b>	2-20 Hz logging and streaming option
774 431	<b>GRL110</b>	50 Hz logging and streaming option ☞ Requires GRL109
774 436	<b>GRL115</b>	Multi-Client and Ntrip Caster option
778 851	<b>GRL116</b>	Wake-Up option
778 852	<b>GRL117</b>	Extended OWI for third party software. (Not required for use with Leica GNSS Spider.)
774 435	<b>GRL114</b>	Site Monitor option
805 687	<b>GRL120</b>	GR25W WLAN option (for GR25W WLAN ready units only)

## Hardware and Software

	GR10	GR25
<b>Position &amp; data recording</b>		
1 Hz logging and streaming	●	●
2-20 Hz logging and streaming	○	○
50 Hz logging and streaming	○	○
<b>Connectors/Ports</b>		
Power Input Pins (Lemo)	2	2
Ethernet RJ45 ruggedized	●	●
Serial (Lemo)	1	2
PPS	-	●
External Oscillator	●	●
Event Input	-	●
USB Client	●	●
USB Host	-	●
Bluetooth	-	●
WLAN	-	●
Slot-in communication port	●	●
<b>User Interface</b>		
Screen	-	●
Keypad	-	●
Power Button	●	●
Function Button	1	6
LEDs	6	7
Web Interface	●	●
GNSS Spider Support	●	●

<b>Data Storage/Logging</b>		
Memory Type	SD/SDHC	SD/SDHC
Memory Size	32 GB	32 GB
Maximum Data Rate (Hz)	50 Hz	50 Hz
Proprietary (MDB)	●	●
RINEX v2.11, v3.01, v3.02	○	○
RINEX Hatanaka		
Zip File Compression	●	●
<b>Data Streaming</b>		
Maximum Data Rate (Hz)	50 Hz	50 Hz
TCP/IP Netports	20	20
<b>Services</b>		
HTTP / HTTPS	●	●
FTP Server	●	●
DHCP / DNS	●	●
DynDNS	●	●
SNMP	●	●
Active Assist	●*	●*
SSL	●	●
Internet connection sharing	●	●
<b>Electrical Specifications</b>		
Power Over Ethernet	-	●
Power Consumption (watts)	3.5 w	3.1 w
Internal Battery	-	●
Internal Charger	-	●
Battery Tpye	-	GEB242
<b>Physical Specifications</b>		
Size (mm)	210x190x78	210x190x78
Weight (kg)	1.67 kg**	2.01 kg**

● Standard ○ Optional - Not Available

\* Requires a valid Customer Care Package (CCP) contract for firmware maintenance and support.

\*\* Weight with bumpers

## 1.2

## Tracking Characteristics

### 1.2.1

### Overview

#### Instrument technology

Leica patented SmartTrack+ technology

- Advanced measurement engine
- Jamming resistant measurements
- High precision pulse aperture multipath correlator for pseudorange measurements
- Excellent low elevation tracking
- Very low noise GNSS carrier phase measurements with <0.5 mm precision
- Minimum acquisition time

#### Number of Satellites

The number of satellites tracked are shown below.

- Up to 60 satellites simultaneous dual-frequency, up to 7 signals per satellite, 120 channels
- "GNSS Unlimited" Series<sup>1)</sup>: 240+ satellites simultaneous dual-frequency, up to 7 signals per satellites, 500+ channels

1) The Unlimited Series has free future upgrade to 500+ channels that support more satellites to be tracked, and more signals such as BeiDou B3.

#### Satellites' signals tracking

The following satellites' signals are tracked

- GPS: L1, L2P, L2C, L5
- GLONASS: L1, L2P, L2C, L3<sup>1)</sup>
- Galileo: E1, E5a, E5b, AltBOC
- BeiDou: B1, B2, B3<sup>1)</sup>
- QZSS: L1, L2, L5
- SBAS: WAAS, EGNOS, GAGAN, MSAS

1) The Unlimited Series has free future upgrade to 500+ channels that support more satellites to be tracked, and more signals such as BeiDou B3.

#### GNSS measurements

Fully independent code and phase measurements of all frequencies.

#### GPS Carrier tracking

Type	L1, AS off or on	L2, AS off	L2, AS on
All receivers	Reconstructed carrier phase via C/A-code.	Reconstructed carrier phase via P2-code	Switches automatically to patented P-code aided technique providing full L2 reconstructed carrier phase.

#### GPS code measurements

Type	L1, AS off L1. AS of	L2, AS off	L2, AS on
All receivers	Carrier phase smoothed code measurements: C/A code.	Carrier phase smoothed code measurements: P2-code and/or L2C code.	Carrier phase smoothed code measurements: Patented P-code aided code and/or L2C code.



Carrier phase and code measurements on L1, L2 and L5 (GPS) are fully independent of AS on or off.

## 1.2.2 Measurement Precision

### Measurement precision

Type	Carrier phase	Code (pseudorange)
All receivers*	L1: 0.2 mm rms L2: 0.2 mm rms	L1: 20 mm rms L1: 20 mm rms

\* GPS L5 and Galileo E1/E5a/E5b/AltBOC values are expected to be similar to L1. Final values will be determined after initial operational capability (IOC) has been reached.

## 1.2.3 Measurement Resolution

### Measurement resolution

Type	Resolution phase	Resolution code
All receivers	0.01 mm	0.0005 m

## 1.2.4 Accuracy



Accuracy is dependent upon various factors including the number of satellites tracked, constellation geometry, observation time, ephemeris accuracy, ionospheric disturbance, multipath and resolved ambiguities.

The following accuracies, given as **root mean square**, are based on measurements processed using Leica Geo Office and the Bernese Software.

The use of multiple GNSS systems can increase accuracy by up to 30% relative to GPS only.

### Accuracy (rms) single receiver navigation mode

Navigation accuracy 5–10 m rms for each coordinate  
Degradation possible due to Selective Availability

### Accuracy in differential code mode

The baseline precision of a differential code solution for static and kinematic surveys is 25 cm.



## Accuracy in differential phase mode

<b>Accuracy (rms) with Post Processing<sup>1)</sup></b>						
	Horizontal			Vertical		
Static (phase) with long observations	3 mm + 0.1 ppm			3.5 mm + 0.4 ppm		
Static and rapid static (phase)	3 mm + 0.5 ppm			5 mm + 0.5 ppm		
Kinematic (phase)	8 mm + 1 ppm			15 mm + 1 ppm		
<b>Accuracy (rms) with Real Time (RTK)<sup>1)</sup></b>						
Standard of compliance	Compliance with ISO17123-8					
Site Monitor Positioning Modes	Reference Station		Monitoring		Network RTK Rover	
<b>(Horizontal/Vertical)</b>	H	V	H	V	H	V
Single Baseline (< 30 km)	6 mm + 1 ppm	10 mm + 1 ppm	8 mm + 1 ppm	15 mm + 1 ppm	8 mm + 1 ppm	15 mm + 1 ppm
Network RTK	6 mm + 0.5 ppm	10 mm + 0.5 ppm	8 mm + 0.5 ppm	15 mm + 0.5 ppm	8 mm + 0.5 ppm	15 mm + 0.5 ppm
Sampling	Smoothed		Instantaneous		Instantaneous	
<b>On-the-fly (OTF) initialisation</b>						
RTK technology	Leica SmartCheck technology					
Reliability of OTF initialisation <sup>1)</sup>	≥ 99,999%		≥ 99,999%		≥ 99,99%	
Time for initialisation (typically) <sup>2)</sup>	10 seconds		10 seconds		4 seconds	
OTF range <sup>2)</sup>	Up to 80 km		Up to 70 km		Up to 70 km	
<b>Network RTK</b>						
Network technology	Leica SmartRTK technology					
Supported RTK network solutions	VRS, FKP, iMAX					
Supported RTK network standards	MAC (Master Auxiliary Concept) approved by RTCM SC104					

<sup>1)</sup> 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. 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.

<sup>2)</sup> Might vary due to atmospheric conditions, signal multipath, obstructions, signal geometry and number of tracked signals.

Note: The above accuracy values for post processing are based on using the Leica Geo Office. Using specialist scientific software (Bernese) available from Leica Geosystems, the following accuracies can be achieved in static post processing mode, even on very long baselines:

- 2 - 4 mm in plan
- 3 - 6 mm in height

## Data recording

	GR10/GR25
<b>Data Storage</b>	
Storage Type (removable)	SD/SDHC (yes)
Logging channels	12
Multi session logging	●
Auto-delete	●
Smart Clean-up	●
User Defined folders	●
<b>Data Types</b>	
Leica raw (MDB)	●
RINEX v2.11, v3.01, v3.02	○
Hatanaka	○
Zipping of raw files	●
Zipping of RINEX files	●
<b>File Sizes</b>	
Maximum	24 h
Minimum	5 min
<b>Data Rates</b>	
Maximum (MDB)	50 Hz
Maximum (RINEX)	20 Hz
Minimum (MDB+RINEX)	300 s
<b>Logging Types</b>	
Continuous	●
Timed	●

● Standard ○ Optional - Needs Upgrade

RINEX logging when configured will generate files in real time. On the GR10/GR25 RINEX files can be logged independently without the need to log raw Leica MDB files.

## 1.4

## Data Streaming

### Data streaming

	GR10	GR25
<b>Data Streaming</b>		
Maximum number of streams	20	20
Maximum number of real time streams	10	10
<b>Streaming Port</b>		
Serial ports	1	2
TCP/IP ports	20	20
USB client port	1	1
Slot communication port	1	1
Bluetooth port	-	1 <sup>1</sup>
<b>Data Types and rates</b>		
Leica	10 Hz	10 Hz
Leica 4G	10 Hz	10 Hz
RTCM 2.1, 2.2 and 2.3	10 Hz	10 Hz
RTCM 3.0, 3.1, 3.2	10 Hz	10 Hz
CMR/CMR+	10 Hz	10 Hz
BINEX records 0x00, 0x01, 0x7d, 0x7e, 0x7f	10 Hz	10 Hz
Leica Proprietary LB2	50 Hz	50 Hz
NMEA 0183 v2.20 and Leica Proprietary	10 Hz	10 Hz
<b>Multi Clients</b>		
Clients per TCP/IP net port	10 <sup>2</sup>	10 <sup>2</sup>
Ntrip Caster	unlimited <sup>3</sup>	unlimited <sup>3</sup>
Time slicing of RTK output	●	●

● Standard ○ Optional - Needs Upgrade

- 1 Only GR25 BT variant
- 2 Requires Multi Client option
- 3 Whilst the Ntrip Caster supports unlimited client connections, performance and data latency will depend on the quality and bandwidth of the communications used. Users should limit the number of clients depending on the communications being used.

## 1.5

## Memory

### Memory Type

Type	Card	Capacity
GR10	Secure Digital (SD and SDHC)	Up to 32 GB
GR25	Secure Digital (SD and SDHC)	Up to 32 GB

### Data capacity All receivers

Data can be recorded on the SD cards.

The figures shown are accurate to about 1%. They are dependent on the tracking settings configured on the instrument.

#### 4 GB card, GPS (L1+L2), 12 satellites

Receiver	Rate	MDB only	RINEX 2.11 only	RINEX 2.11 Hatanaka only	RINEX 3.02 only	RINEX 3.02 Hatanaka only
All	1 s	3100 h	1300 h	4800 h	1300 h	4500 h
		5300 h*	4800 h*	12600 h*	4100 h*	12600 h*
	30 s	76400 h	31800 h	140000 h	32200 h	133000 h
		130000 h*	119000 h*	222000 h*	103000 h*	234500 h*

\*Size when zipped

#### 4 GB card, GPS + GLONASS (L1+L2), 12/10 satellites

Receiver	Rate	MDB only	RINEX 2.11 only	RINEX 2.11 Hatanaka only	RINEX 3.02 only	RINEX 3.02 Hatanaka only
All	1 s	1800 h	700 h	2600 h	700 h	2500 h
		3000 h*	2600 h*	6800 h*	2300 h*	7000 h*
	30 s	46700 h	17500 h	76500 h	18600 h	74200 h
		79000 h*	65600 h*	123600 h*	59700 h*	142700 h*

\*Size when zipped

#### 4 GB card, GPS + GLONASS + Galileo (E1+E5a+E5b+AltBOC), 12/10/10 satellites

Receiver	Rate	MDB only	RINEX 2.11 only	RINEX 2.11 Hatanaka only	RINEX 3.02 only	RINEX 3.02 Hatanaka only
All	1 s	950 h	400 h	1400 h	400 h	1360 h
		1614 h*	1400 h*	3650 h*	1230 h*	3800 h*
	30 s	26750 h	9400 h	41000 h	10000 h	40250 h
		45300 h*	35200 h*	66000 h*	31800 h*	74050 h*

\*Size when zipped

## 1.6 User Interface

### 1.6.1 Overview

---

Buttons/LEDs	GR10	GR25
	ON / OFF button	●
Functions buttons	1	6
LEDs	6	7

---

**Web Interface** The GR10/GR25 Series have integrated web interface functionality that provides full status information and configuration options. The web interface contains a detailed Event/Message log that keeps the user informed of all important activities. The web interface also contains a detailed built in online help.

**GNSS Spider** The GR10/GR25 Series can be configured and maintained using the Leica GNSS Spider Software.

---

### 1.6.2 GR10 User Interface

**GR10 button functionality**

- Receiver power up/power down
- Start/stop all logging sessions
- Start/stop all data streams
- Initialize the measurement engine
- Reset receiver settings
- Format SD card

---

**GR10 LED status indicator**

- Power LED
- SD card LED
- Raw data logging LED
- RT out data stream LED
- RT in data stream LED
- Position LED

---

### 1.6.3 GR25 User Interface

**GR25 button functionality**

- Functionality
  - Receiver power up/power down
  - Network Configuration, including IP address, DHCP, Hostname and Bluetooth
- Maintenance
  - Format SD card or USB device
  - Format Systems Settings
  - Stop USB device
  - Initialize the measurement engine
- Status
  - Tracking
  - Position
  - Power Memory

---

**GR25 LED status indicator**

- Power LED
- SD card LED
- Raw data logging LED
- RT out data stream LED
- RT in data stream LED
- Position LED
- Bluetooth LED

---

**Internet connectivity**

Web interface for remote configuration, operation and status displays. Supports HTTP and HTTPS. The GR10/GR25 additionally supports DHCP/DNS and unique hostname.

Web interface ports:

- Ethernet port
- GPRS via mobile internet
- USB Client Port - GR10/GR25 only
- Bluetooth Port - GR25 only
- Simultaneous access over Ethernet port is fully supported

Security Access restrictions configurable in User Management component:

- Viewers (status only)
- Users/GNSS Managers (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 / Multi Client

Option to allow RTK data streaming direct from the sensor, via TCP/IP, for up to 10 clients per TCP/IP port. Unlimited clients supported on the GR10/GR25 using Ntrip Caster.

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 GNSS Spider. Binary and ASCII version of the OWI protocol are available. Supported via serial and TCP/IP ports. Simultaneous access, control and message output is fully supported. The OWI use requires a license option to be used with third party software. Using the GR10/GR25 with Leica GNSS Spider does not require the OWI license option.

---

## 1.7

## Connectors, Ports and Devices

### 1.7.1

### Connector Ports Overview

#### Connector ports

#### GR10

Type	Description
Power	1x Lemo-1 female, 5 pin
Serial P1	1x Lemo-1 female, 8 pin
GNSS Antenna	1x TNC female
Communication Slot port	1x UART Serial/USB for removable internal communication devices
P3 Slot-in Antenna	1x TNC female
External Oscillator	1x MMCX female, 24QMA-50-2-3/133,5/10 Mhz
Ethernet	1x RJ45 ruggedised, 10/100 Mbit
USB	USB client (Mini B)


#### GR25

Type	Description
Power	1x Lemo-1 female, 5 pin
Serial P1	1x Lemo-1 female, 8 pin
Serial P2 / Event	1x Lemo-1 female, 8 pin
Communication Slot port	1x UART Serial/USB for removable internal communication devices
GNSS Antenna	1x TNC female
P3 Slot-in Antenna	1x TNC female
External Oscillator	1x MMCX female, 24QMA-50-2-3/133,5/10 Mhz
Ethernet	1x RJ45 ruggedised, 10/100 Mbit
PPS	1x Lemo ERN.OS.250.CTL
USB	USB client (Mini B)
USB Host	Standard Type A
Bluetooth/WLAN antenna	SMA Male



#### Data Links

	GR10	GR25
Serial ports (incl. one Slot-In device port)	2	3
TCP/IP ports*	20	20
Bluetooth (Serial)	-	1
Simultaneous data streams	20	20
Concurrent RTK formats	10	10

\* Using any available hardware interface (Ethernet, WLAN, Bluetooth, USB, mobile device internet).

<b>GNSS Antenna</b>	<b>All receivers</b>	
	Connector	TNC female
	Output voltage	5.0 v DC nominal
	Maximum output current	150 mA
	Maximum cable loss	12 dB
	Recommended antennas	AR25 / AR20 / AR10 / AS10
	Other antennas	Older legacy Leica antennas and some third-party antennas can also be used. Third-party antennas might require an additional inline amplifier or attenuator.
<b>Power port</b>	<b>All receivers</b>	
	Description	5 pin LEMO supporting dual power inputs
	Connector	LEMO-1, 5 pin, LEMO HMG.1B.306.CLNP
<b>Ethernet network interface</b>	<b>All receivers</b>	
	IEEE Standards:	802.3 10BASE-T Ethernet 802.3u 100BASE-TX Fast Ethernet 802.3 Auto-negotiation
	Link Speed:	10/100 MB, Half/Full Duplex
	Protocol:	CSMA/CD
	Connector:	Ruggedised RJ45
<b>Bluetooth</b>	Type:	Bluetooth 2.0
	Enhanced Data Rate:	EDR maximum 2.1 Mbits/s
	Connector:	SMA male
<b>WLAN</b>	Type (single stream):	IEEE 802.11 bg and n
	Network authentication:	Open, Shared, WPA-PSK (no server), WPA-NONE, WPA, WPA2, WPA2-PSK (no server)
	Encryption type:	Disabled, WEP, TKIP, AES
	Connector:	SMA male
<b>Serial ports</b>	<b>All receivers</b>	
	Description	8 pin LEMO supporting 2400-115200 baud, incl. RTS/CTS
	Default setting	115200/N/8/1/N
	Connector (P1/P2/P3)	LEMO-1, 8 pin, LEMO HMA.1B.308.CLNP
	 Please note, when using external devices the current draw is;	
	• 1A/12V with external power supply on power port	
	• 0.5A/12V with internal battery	
	• High power radios (PDL:2W, 35W Booster, etc) have to be powered separately with Y-cable!	



<b>External oscillator</b>	<b>All receivers</b>	Frequency:	5 MHz or 10 MHz
		Input impedance:	50Ω nominal
		Input VSWR:	2:1 maximum
		Signal level:	0 dBm minimum to +13.0 dBm maximum
		Frequency stability:	+0.5 ppm maximum
		Wave shape:	Sinusoidal
		Connector:	MMCX female - 24QMA-50-2-3/133
		On the GR10/GR25, remove the External oscillator port cover before connecting the cable.	
		Internal Oscillator aligned to GPS time within 10 ns.	
<b>Pulse Per Second (PPS)*</b>	<b>GR25 only</b>	Peak	3.3 V= High
		Impedance	50 Ω
		Pulse length	1 ms
			Leading edge coinciding with the beginning of each epoch
		Positive/negative edge	Selectable via Web interface.
		Cable connectivity	Matched with an appropriate impedance of 50 Ω
		Connector	LEMO ERN.OS.250.CTL
		* PPS pulse typically accurate to 50 ns (120 ns 3 sigma).	
<b>Event input</b>	<b>GR25 only</b>	Pulse type	TTL, positive or negative going pulse
		Pulse length	200 ns at minimum
		Voltage	TTL level, ~ 5 V, min. 3.3 V
		Pin definition	Pin 7 = signal, Pin 3 = ground
		Connector	LEMO-1, 8 pin, LEMO HMI.1B.308.CLNP
<b>USB client port</b>	<b>GR10/GR25 only</b>	USB	Full Speed USB
		Connector	Mini B
<b>USB host port</b>	<b>GR25 only:</b>	USB	High Speed USB
		Connector	Standard Type A

### 1.7.3

## Communications Devices

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#### Supported Communications devices

The GR10/GR25 Series support a variety of communications devices. All receivers support the use of external serial devices. Leica Geosystems offers many devices in external ruggedised GFU housing. Additionally, the GR10/GR25 supports the use of removable slot in communication devices.

---

#### Supported Radio modems

- Support of any suitable UHF / VHF radio with RS232 interface and operating in transparent mode
  - Satelline3AS in Leica GFU housing, fully sealed and protected, IP67
  - Pacific Crest PDL in Leica GFU housing, fully sealed and protected, IP67
- 

#### Supported GSM / UMTS (HSDPA) phone modems

- Support of any suitable GSM / GPRS / UMTS(HSDPA) modem
  - Siemens MC75 in Leica GFU housing, Quad-Band 850 / 900 / 1800 / 1900 MHz fully sealed and protected, IP67
- 

#### Supported CDMA phone modems

- Support of any suitable CDMA modem
  - Multitech MTMMC CDMA in Leica GFU housing, Dual-Band 800 / 900 MHz, 1xRTT, fully sealed and protected, IP67
- 

#### Supported Landline phone modems

- Support of any suitable Landline phone modem, based on US Robotics or Courier V.90.
- 

#### Supported Slot in devices for GR10/GR25

- Support of a variety of removable slot in devices on the GR10/GR25
  - Satelline TA11 radio, 403-470 MHz TXO
  - Telit 3G GSM/GPRS/UMTS module, 5-Band 850 / 900 / 1800 / 1900 / 2100 MHz
  - Cinterion MC75i GSM/GPRS/EDGE module, 4-Band 850 / 900 / 1800 / 1900 MHz
- 

### 1.7.4

## External Controllers

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#### GR10/GR25

- The GR Series has a built in web server software called RefWorx. Any Web enabled device can be used to configure the GR10/GR25. The CS10/CS15/CS25 controllers can be used to configure the GR10/GR25 using built in web browser and a USB connection to the GR10/GR25.
-

## Services

	GR10	GR25
TCP/IP	●	●
Static IP	●	●
DHCP	●	●
DNS	●	●
Hostname support	●	●
DynDNS	●	●
HTTP	●	●
HTTPS	●	●
User defined HTTP port	●	●
User defined HTTPS port	●	●
Secure SSL	●	●
Custom SSL certificates	●	●
FTP Server	●	●
User defined FTP ports	●	●
Passive mode FTP	●	●
Active mode FTP	●	●
Simultaneous FTP clients	6	6
Anonymous FTP	●	●
FTP push	○/●*	○/●*
File download via HTTP	●	●
SNMP	●	●
TCP/IP server	●	●
TCP/IP client	●	●
NTRIP server (source)	●	●
NTRIP client	●	●
NTRIP caster	○	○
TCP/IP over USB	●	●
Web interface event log	●	●
Email alerts	●	●

● Standard ○ Optional - Not Available

\* For the GR10/GR25 Basic FTP push is optional. For all other GR10/GR25 models FTP is standard.

## 1.9

## Weight & Dimensions

### Dimensions

The dimensions are given for the housing without the sockets.

Type	Length [mm]	Width [mm]	Thickness [mm]
GR10/GR25	210	190	78
GR10/GR25 with bumpers	220	200	94

### Weight

GR10: 1.50 kg (without bumpers), 1.67 kg (with bumpers)  
GR25: 1.84 kg (without bumpers), 2.29 kg (with battery and bumpers)

## 1.10

## Environmental Specifications

### Environmental specifications

Environmental specifications apply to the receiver including all connectors on the back panel.

#### Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
All receivers	-40 to +65	-40 to +80
Leica SD cards	-40 to +85	-40 to +85

Compliance with ISO9022-10-08, ISO9022-11-special, MIL-STD-810G - 502.5-II, MIL-STD-810G - 501.5-II (operating) and MIL-STD-810G - 502.5-I, MIL-STD-810G - 501.5-I (storage).

#### Protection against water, dust and sand

Type	Protection
All receivers	IP67 (IEC 60529) and MIL-STD-810G - 512.5-I Dust tight Protected against water jets Waterproof to 1 m temporary immersion

#### Humidity

Type	Protection
All receivers	Up to 100 % Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810G - 507.5-I The effects of condensation are to be effectively counteracted by periodically drying out the instrument.

#### Vibration

Type	Protection
All receivers	Withstands strong vibration during operation, compliance with ISO9022-36-08 and MIL-STD-810G - 514.6-Cat.24

#### Drops

Type	Protection
All receivers	Withstands 1 m drop onto hard surfaces

## 1.11

## Power & Electrical Certifications

**Operating times** Designed for continuous operation.

**Supply voltage** **All receivers**  
Nominal 24 V DC, voltage range 10.5 V - 28 V DC

**Power consumption** GR10 3.5 W typically, 24 V@150 mA  
GR25 3.1 W typically, 24 V@150 mA

**Power supply** **All receivers**  
Dual input

Up to two external power sources can be connected simultaneously. For the GR25, it is possible to configure one as the primary power input and the other as the backup power source.

### Batteries

	GR10	GR25
Battery internal	-	●
Battery external	●	●
Internal charger	-	●
Type	-	GEB242

#### Internal

Type (GEB242) Rechargeable Li-Ion battery.  
Voltage 14.8 V  
Capacity GEB242: 5.8 Ah/85.8 Wh  
Weight 0.41 kg  
Operation time Powers receiver plus antenna for up to 22 / 27 hours.

#### External

Type (GEB171) Rechargeable NiCd.  
Voltage 12 V  
Capacity 9.0 Ah/108 Wh  
Weight 2.1 kg  
Operation time Powers receiver plus antenna for about 27 to 35 hours.

**Certifications** Compliance to FCC, CE  
Local approvals (as IC Canada, C-Tick Australia, Japan, China)  
RoHS  
REACH [http://www.leica-geosystems.com/en/Reach-Compliance\\_79929.htm](http://www.leica-geosystems.com/en/Reach-Compliance_79929.htm)

**Description and use** The antenna is selected for use based upon the application. The table gives a description and the intended use of the individual antennas.

Type	Description	Use
AR25	Dorne & Margolin GPS, GLONASS, Galileo, BeiDou, QZSS antenna element with 3D choke ring ground plane. Optional protective radome.	High end applications, including all reference station and monitoring. Especially good for scientific studies where excellent low elevation tracking is required.
AR20	GPS, GLONASS, Galileo, BeiDou, QZSS reference station and monitoring antenna with gold choke ring ground plane. Optional protective radome.	High end applications, including all reference station and monitoring. Especially suited for Network RTK, where excellent multipath rejection and the best phase centre stability is required.
AR10	GPS, GLONASS, Galileo, BeiDou, QZSS reference station and monitoring antenna with large ground plane and built-in radome.	General use for standard and high accuracy reference station and monitoring applications.
AS10	Compact geodetic GPS, GLONASS, Galileo, BeiDou, QZSS antenna with built-in ground plane.	Standard network RTK and monitoring applications.

### Dimensions

Type	AR25	AR20	AR10	AS10
Height	20.0 cm	16.3 cm	14.0 cm	6.2 cm
Diameter	38.0 cm	32.0 cm	24.0 cm	17.0 cm

### Connector

AR25:	N-Type female, with TNC adapter supplied
AR20:	N-Type female, with TNC adapter supplied
AR10:	TNC female
AS10:	TNC female

### Mounting

All antennas: 5/8" Whitworth Thread

### Weight

AR25:	8.1 kg, radome 1.1 kg
AR20:	5.9 kg, radome 0.9 kg
AR10:	1.1 kg
AS10:	0.4 kg

## Electrical data

Type	AR25	AR20	AR10	AS10
<b>Voltage</b>	3.3 V to 12 V DC	3.3 V to 12 V DC	3.3 V to 12 V DC	4.5 V to 18 V DC
<b>Current</b>	100 mA max	100 mA maxl	100 mA maxl	35 mA typical
<b>Frequency</b>				
GPS:	L1, L2 (including L2C), L5.	L1, L2 (including L2C), L5.	L1, L2 (including L2C), L5.	L1, L2 (including L2C), L5.
GLONASS:	L1, L2, L3.	L1, L2, L3.	L1, L2, L3.	L1, L2.
Galileo:	E2-L1-E1, E5a, E5b, E5a+b (AltBOC), E6.	E2-L1-E1, E5a, E5b, E5a+b (AltBOC), E6.	E2-L1-E1, E5a, E5b, E5a+b (AltBOC), E6.	E2-L1-E1, E5a, E5b, E5a+b (AltBOC).
BeiDou:	B1, B2, B3.	B1, B2, B3.	B1, B2, B3.	B1, B2.
QZSS	L1, L1C, L2C, L5, L1-SAIF, LEX	L1, L1C, L2C, L5, L1-SAIF, LEX	L1, L1C, L2C, L5, L1-SAIF, LEX	L1, L1C, L2C, L5, L1-SAIF
L-Band	SBAS, Omni-STAR, Veripos, CDSGPS	SBAS, Omni-STAR, Veripos, CDSGPS	SBAS, Omni-STAR, Veripos, CDSGPS	-
<b>Gain (typically)</b>	40 dBi	29 dBi	29 dBi	27 dBi
<b>Noise Figure (typically)</b>	< 1.2 dBi max	< 2 dBi	< 2 dBi	< 2 dBi
<b>Phase center stability</b>	< 1 mm	< 1 mm	< 1 mm	< 1 mm

## Environmental specifications

### Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
AR25	-55 to +85	-55 to +90
AR20	-55 to +85	-55 to +85
AR10	-40 to +70	-55 to +85
AS10	-40 to +70	-55 to +85

Operating temperatures in compliance with ISO9022-10-08, ISO9022-11-05 and MIL-STD-810G, Method 502.5-II, MIL-STD-810G, Method 501.5-II

Storage temperatures in compliance with ISO9022-10-08, ISO9022-11-06 and MIL-STD-810G, Method 502.5-I, MIL-STD-810G, Method 501.5-I

### Protection against water, dust and sand

Type	Protection
All antennas	IP67 (IEC 60529) Dust tight Protected against water jets Waterproof to 1 m temporary immersion

## Humidity

Type	Protection
All antennas	Up to 100 % Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810G Method 507.5-I The effects of condensation are to be effectively counteracted by periodically drying out the antenna.

## Vibration

Type	Rating
AR25	ISO9022-36-05, 10-55 Hz; $\pm 0.15$ mm, 5 cycles
AR20	ISO9022-36-05, 10-55 Hz; $\pm 0.15$ mm, 5 cycles
AR10	ISO9022-36-05, 10-55 Hz; $\pm 0.15$ mm, 5 cycles
AS10	ISO9022-36-08 and MIL-STD-810G Method 514.6-Cat.24

## Drops

AR25:	Withstands 0.6 m drop onto hard surfaces (upside down excluded)
AR20:	Withstands 1.0 m drop onto hard surfaces (upside down excluded)
AR10:	Withstands 1.2 m drop onto hard surfaces
AS10:	Withstands 1.5 m drop onto hard surfaces

## Cable length

Available cable lengths for all antennas (m)

Coaxial (5mm):	1.2, 2.8 and 10
Coaxial (11mm):	2, 10, 30, 50 and 70

## Certifications

Compliance to	FCC, CE Local approvals (as IC Canada, C-Tick Australia, Japan, China) RoHS REACH <a href="http://www.leica-geosystems.com/en/Reach-Compliance_79929.htm">http://www.leica-geosystems.com/en/Reach-Compliance_79929.htm</a>
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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.

**When it has to be right.**

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**Leica Geosystems AG**  
Heinrich-Wild-Strasse  
CH-9435 Heerbrugg  
Switzerland  
Phone +41 71 727 31 31  
[www.leica-geosystems.com](http://www.leica-geosystems.com)

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