

# Leica GM10

## Technical data

Monitoring  
Solutions



# Introduction



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

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## Validity of this brochure

This brochure applies to the Leica GM10.



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Service	Description
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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.
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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 Leica GM10 GNSS Monitoring Receiver

## 1.1 Overview

### Sales variants

	GM10 Basic	GM10 Performance	GM10 Professional
<b>Supported GNSS Systems</b>			
GPS L1	●	●	●
GPS L1 & L2 (including L2C)	○	●	●
GLONASS L1 & L2	○	●	●
Galileo/BeiDou/QZSS	○	○	○
<b>Position update &amp; Data recording</b>			
1Hz logging and streaming	●	●	●
2-20 Hz logging and streaming	○	●	●
50Hz logging and streaming	○	○	○
RINEX logging	○	○	●
<b>Additional features</b>			
FTP Push	○	○	●
Extended Formats	○	○	○
Multi-Client/Ntrip caster	○	○	○
Wake up	○	○	○
Site monitor	○	○	○

● Standard ○ Optional

### Options

#### For GM10

782 366	<b>GRL119</b>	Dual frequency option
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

	GM10
<b>Connectors/Ports</b>	
Power Input Pins (Lemo)	2
Ethernet RJ45 ruggedized	●
Serial (Lemo)	1
External Oscillator	●
USB Client	●
Slot-in communication port	●
<b>User Interface</b>	
Power Button	●
Function Button	1
LEDs	6
Web Interface	●
GNSS Spider Support	●
<b>Data Storage/Logging</b>	
Memory Type	SD/SDHC
Memory Size	32 GB
Maximum Data Rate (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
TCP/IP Netports	20
<b>Services</b>	
HTTP / HTTPS	●
FTP Server	●
DHCP / DNS	●
DynDNS	●
SNMP	●
Active Assist	●*
SSL	●
Internet connection sharing	●
<b>Electrical Specifications</b>	
Power Consumption (watts)	3.5 w
<b>Physical Specifications</b>	
Size (mm)	210x190x78
Weight (kg)	1.67 kg**

● Standard ○ Optional

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

\*\* Weight with bumpers

## 1.2

## Tracking Characteristics

### 1.2.1

### Overview

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<b>Instrument technology</b>	Leica patented SmartTrack+ technology <ul style="list-style-type: none"><li>• Advanced measurement engine</li><li>• Jamming resistant measurements</li><li>• High precision pulse aperture multipath correlator for pseudorange measurements</li><li>• Excellent low elevation tracking</li><li>• Very low noise GNSS carrier phase measurements with &lt;0.5 mm precision</li><li>• Minimum acquisition time</li></ul>
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<b>Number of Satellites</b>	The number of satellites that can be tracked: Up to 60 satellites simultaneous dual-frequency, up to 7 signals per satellite, 120 channels
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<b>Satellites' signals tracking</b>	The following satellites' signals are tracked <ul style="list-style-type: none"><li>• GPS: L1, L2P, L2C, L5</li><li>• GLONASS: L1, L2P, L2C</li><li>• Galileo: E1, E5a, E5b, AltBOC</li><li>• BeiDou: B1, B2</li><li>• QZSS: L1, L2, L5</li><li>• SBAS: WAAS, EGNOS, GAGAN, MSAS</li></ul>
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<b>GNSS measurements</b>	Fully independent code and phase measurements of all frequencies.
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#### GPS Carrier tracking


Type	L1, AS off or on	L2, AS off	L2, AS on
GM10	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.

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#### GPS code measurements

Type	L1, AS off L1. AS of	L2, AS off	L2, AS on
GM10	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.

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

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## 1.2.2 Measurement Precision

### Measurement precision

Type	Carrier phase	Code (pseudorange)
GM10	L1: 0.2 mm rms L2: 0.2 mm rms	L1: 20 mm rms L2: 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
GM10	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>	<b>H</b>	<b>V</b>	<b>H</b>	<b>V</b>	<b>H</b>	<b>V</b>
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

	GM10
<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 GM10 RINEX files can be logged independently without the need to log raw Leica MDB files.

## Data streaming

	GM10
<b>Data Streaming</b>	
Maximum number of streams	20
Maximum number of real time streams	10
<b>Streaming Port</b>	
Serial ports	1
TCP/IP ports	20
USB client port	1
Slot communication port	1
<b>Data Types and rates</b>	
Leica	10 Hz
Leica 4G	10 Hz
RTCM 2.1, 2.2 and 2.3	10 Hz
RTCM 3.0, 3.1, 3.2	10 Hz
CMR/CMR+	10 Hz
BINEX records 0x00, 0x01, 0x7d, 0x7e, 0x7f	10 Hz
Leica Proprietary LB2	50 Hz
NMEA 0183 v2.20 and Leica Proprietary	10 Hz
<b>Multi Clients</b>	
Clients per TCP/IP net port	10 <sup>1</sup>
Ntrip Caster	unlimited <sup>2</sup>
Time slicing of RTK output	●

● Standard ○ Optional

- 1 Requires Multi Client option
- 2 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
GM10	Secure Digital (SD and SDHC)	Up to 32 GB

### Data capacity

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*
All	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*
All	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*
All	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

	GM10
ON / OFF button	1
Functions button	1
LEDs	6

#### Web Interface

The GM10 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 GM10 Series can be configured and maintained using the Leica GNSS Spider Software.

### 1.6.2 GM10 User Interface

#### GM10 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

#### GM10 LED status indicator

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

**Internet connectivity**

Web interface for remote configuration, operation and status displays. Supports HTTP and HTTPS. The GM10 additionally supports DHCP/DNS and unique hostname.

Web interface ports:

- USB Client Port
- 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 TCPIP, for up to 10 clients per TCP/IP port. Unlimited clients supported on the GM10 using Ntrip Caster.

DynDNS

Allows receiver addressing with dynamic IP address through a static host name, Requires registration with a DynDNS service.

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**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 GM10 with Leica GNSS Spider does not require the OWI license option.

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## 1.7

## Connectors, Ports and Devices

### 1.7.1

### Connector Ports Overview

#### Connector ports GM10

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)

#### Data Links

	GM10
Serial ports (including one Slot-In device port)	2
TCP/IP ports*	20
Simultaneous data streams	20
Concurrent RTK formats	10

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

## 1.7.2

## Connectors

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<b>GNSS Antenna</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.

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<b>Power port</b>	Description	5 pin LEMO supporting dual power inputs
	Connector	LEMO-1, 5 pin, LEMO HMG.1B.306.CLNP


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<b>Ethernet network interface</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

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<b>Serial ports</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
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 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!

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<b>External oscillator</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 GM10, remove the External oscillator port cover before connecting the cable.

 Internal Oscillator aligned to GPS time within 10 ns.

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<b>USB client port</b>	<b>GM10</b>	
	USB	Full Speed USB
	Connector	Mini B

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### 1.7.3

## Communications Devices

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#### Supported Communications devices

The GM10 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 GM10 supports the use of removable slot in communication devices.

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#### 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
  - Satelline M3-TR1 403-470 MHz transmit/receive UHF radio module to be easily plugged into the GR/GM receiver
- 

#### 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 GM10

- Support of a variety of removable slot in devices on the GM10
  - 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
  - Satelline M3-TR1 403-470 MHz transmit/receive UHF radio module to be easily plugged into the GR/GM receiver
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### 1.7.4

## External Controllers

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#### GM10

- The GM Series has a built in web server software called RefWorx. Any Web enabled device can be used to configure the GM10. The CS10/CS15/CS25 controllers can be used to configure the GM10 only using built in web browser and a USB connection to the GM10.
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## 1.8

## Ethernet Services

### Services

	GM10
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
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

## 1.9

## Weight & Dimensions

### Dimensions

The dimensions are given for the housing without the sockets.

Type	Length [mm]	Width [mm]	Thickness [mm]
GM10	210	190	78
GM10 with bumpers	220	200	94

### Weight

1.50 kg (without bumpers), 1.67 kg (with bumpers)

**Environmental specifications**

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

**Temperature**

Type	Operating temperature [°C]	Storage temperature [°C]
GM10	-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
GM10	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
GM10	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
GM10	Withstands strong vibration during operation, compliance with ISO9022-36-08 and MIL-STD-810G - 514.6-Cat.24

**Drops**

Type	Protection
GM10	Withstands 1 m drop onto hard surfaces

## 1.11

## Power & Electrical Certifications

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<b>Operating times</b>	Designed for continuous operation.
<b>Supply voltage</b>	Nominal 24 V DC, voltage range 10.5 V - 28 V DC
<b>Power consumption</b>	3.5 W typically, 24 V@150 mA
<b>Power supply</b>	Dual input  Up to two external power sources can be connected simultaneously.
<b>Certifications</b>	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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**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
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### 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 you monitor the movement of a volcanic slope, the structure of a long bridge or track the settlement of a dam; whether you measure, analyse and manage the structures of natural or man-made objects: the monitoring systems by Leica Geosystems provide you with the right solution for every application. Our solutions provide reliable, precise data acquisition, advanced processing, sophisticated analysis and secure data transmission. Using standard interfaces, open architectures and scalable platforms, the solutions are customisable to meet individual requirements - for permanent and temporary installations, for single sites and monitoring networks.

**When it has to be right.**

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