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## Leica Geosystems GS20

**Congratulations on your purchase of a new Leica Geosystems System GS20.**



This manual contains important safety directions (refer to chapter "Safety directions") as well as instructions for setting up the product and operating it.

Read carefully through the User Manual before you switch on the product.

### **Product identification**

The model and the serial number of your product are indicated on the typeplate.

Enter the model and serial number in your manual and always refer to this **information** when you need to contact your **agency** or authorized **service workshop**.

GPS Receiver            Type: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Software-Version      V:        \_\_\_\_\_ Build:        \_\_\_\_\_

External Antenna      Type: \_\_\_\_\_ Serial No.: \_\_\_\_\_

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## Symbols used in this manual

The symbols used in this User Manual have the following meanings:



### **DANGER:**

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



### **WARNING:**

Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.



### **CAUTION:**

Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and / or appreciable material, financial and environmental damage.



Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

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## ***Introduction***

For decades, Leica Geosystems has enjoyed a worldwide technological lead in the manufacture of classical surveying instruments and systems. Starting in 1987, Leica Geosystems established a close business relationship with Magnavox's commercial GPS business unit for the design and construction of GPS surveying sensors. This culminated into Leica Geosystems acquisition of the Magnavox GPS business unit in 1994. With this purchase, the unbroken chain of impressive "firsts" now incorporated the field of satellite navigation and positioning technology. Magnavox was one of the first pioneers in this arena, playing a leading role in the development of GPS and its predecessors. Further acquisition of the Philips Ap Navigator business in 1997 widened Leica Geosystems product palette to an even greater extent.

In May 1999, Leica Geosystems entered the GIS/GPS data collection market with the introduction of the Leica Geosystems GS50 GPS sensor and Leica Geosystems GIS DataPRO office software. With the integration of ERDAS and LH Systems in 2001, Leica Geosystems has expanded its product areas to offer four ranges of GIS and mapping solutions - airborne data acquisition, geographic imaging, GPS/GIS, and land information systems. Leica Geosystems' airborne sensors, field data collectors, workstations and software help customers create and update GIS databases rapidly, accurately and cost effectively. Leica Geosystems is the first choice for geographic data acquisition systems, 2D and 3D image processing and visualization, and mapping solutions. To find out more about the how Leica Geosystems products and solutions can benefit you, visit our website at [www.leica-geosystems.com](http://www.leica-geosystems.com)

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## ***The Leica Geosystems GS20***

The Leica Geosystems GS20 PDM was conceived to provide the GIS community with a GPS data collection device that combined the simplicity of a recreational GPS handheld with the power and flexibility of a professional grade mapping system. The Leica Geosystems GS20 represents a true turnkey GPS/GIS mapping solution by integrating the GPS receiver and antenna within the chassis of handheld data collector. Add to this the built-in efficiency of Bluetooth wireless technology and you only need add power and sky; the rest is up to you.

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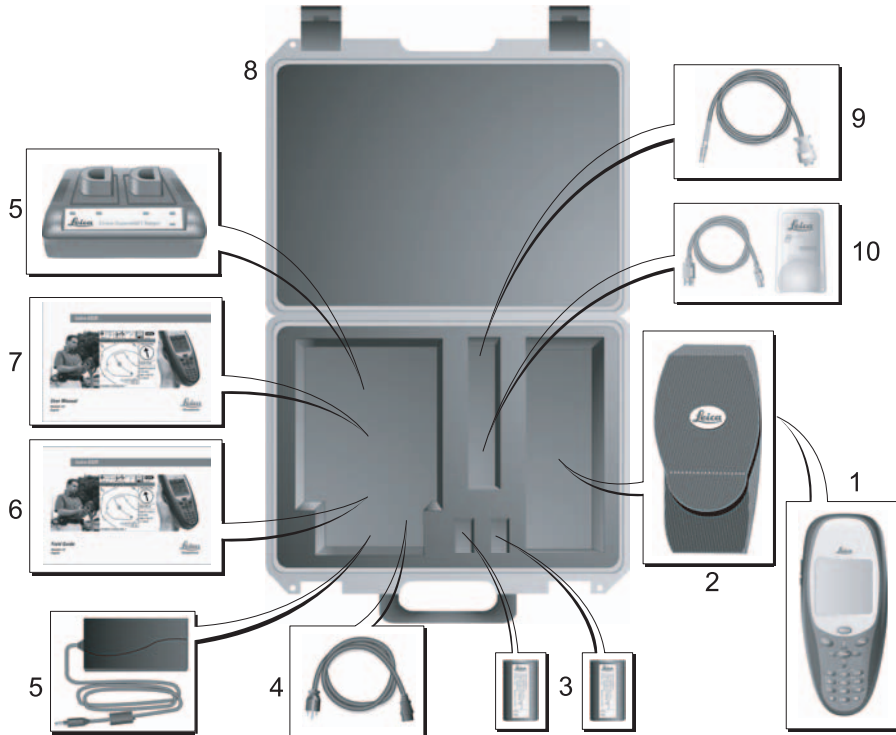
## ***Overview of the User Manual***

The User Manual is intended to provide information concerning safety, storage and technical data of the Leica Geosystems GS20 and accessories. For additional information on the use and operation of Leica Geosystems GS20, please refer the GS20 Field Guide (provided separately). For information concerning the use and interaction between Leica Geosystems GIS DataPRO and the Leica Geosystems GS20, please refer to the GIS DataPRO Manual, found in the documentation directory of installation, as well as the GIS DataPRO installation CD.

## Description of the System

### Unpacking

Take the product out of the transport case and check that it is complete:



- 1 GS20 Handheld GPS Receiver (724705)
- 2 GS20 Soft Case (731774)
- 3 GEB90 Battery, Li-Ion, 7.2V (724117)
- 4 US Power Cord for Dual Bay Charger (731772)
- 5 GKL24 Dual Bay Battery Charger (731771)
- 6 Leica Geosystems GS20 Field Guide
- 7 Leica Geosystems GS20 User Manual
- 8 GS20 Case (731775)
- 9 Data Transfer Cable, GS20 to RS232 (731354)
- 10 USB Bluetooth Module (731784)

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## ***GPS Receiver***

The GPS Receiver receives the GPS signal from the NAVSTAR satellites and calculates a range to all visible satellites.

The Leica Geosystems GS20 is a 12 L1 channels, code and phase handheld GPS receiver for professional data mapping (PDM).

See section "*Technical Data*".

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## ***Receiver Hardware***

In most cases, a short introduction in the use of the Receiver will be provided by the local Leica representative. If this is not the case proceed as outlined in the following sections.

Alternatively refer to the *FieldGuide* PDF-manual available on the GISDataPro Installation CD.



## **Charge the Batteries**

Your Leica Geosystems GS20 is powered by a rechargeable 7.2 V, Li-Ion battery.

Note that a new battery's full performance is achieved only after two or three complete charge and discharge cycles. The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operation time is noticeably shorter than normal, it is time to buy a new Leica Geosystems GEB90 Li-Ion Battery.

The Leica Geosystems GEB90 Li-Ion, 7.2 V, batteries may be charged using the Leica Geosystems GKL24 Dual Bay Battery Charger. Please find more information about your Leica Geosystems Dual Bay Battery Charger in the GKL24 Chargers User Manual.

One batteries, fully charged, will power the GS20 for about 7 hours continuously. Operating times will be shorter when working in cold weather.



### **CAUTION:**

Replace Battery with the same type only. Use of another Battery may present a risk of personal injury from fire, explosion, leakage, or excess heat.

### **Precautions:**

Use only the Leica Geosystems GEB90 Battery to power the GS20 or WoRcs.



### **CAUTION:**

Charge only with Leica Geosystems GKL24 Charger. Use of another charger may present risk of personal injury from fire, explosion, leakage, or excess heat.

### **Precautions:**

When charging Leica Geosystems GEB90 Batteries make sure to use only the Leica Geosystems GKL24 Charger.



### **CAUTION:**

Never carry a Leica Geosystems GEB90 Battery loose. It can be affected by temperature extremes, accidental short circuit, shock and vibration. This may present a risk of personal Injury from fire, explosion, leakage or excess heat.

### **Precautions:**

Always carry it in its case and secure it. When transporting the Leica Geosystems GEB90 Battery by road vehicle, rail, air or ship, always use the complete original packaging (case and cardboard box), or its equivalent, to protect it against temperature extremes, short circuit shock and vibration.



### **CAUTION:**

Do not dispose of battery in fire. Disposing in fire may present a risk of personal injury from fire, explosion, leakage, or excess heat.

### **Precautions:**

Dispose Leica Geosystems GEB90 Batteries only according to local regulations (e.g. recycling).

**WARNING:**

The battery chargers are intended for indoor use only. Use a battery charger in a dry room only, never outdoors. Charge batteries only at an ambient temperature between 10°C and 30°C (50°F to 86°F). We recommend a temperature of 0°C to +20°C (32°F to 68°F) for storing the batteries. Exposing batteries above 70 °C may present a risk of personal injury from fire, explosion, leakage, or excess heat.

**WARNING:**

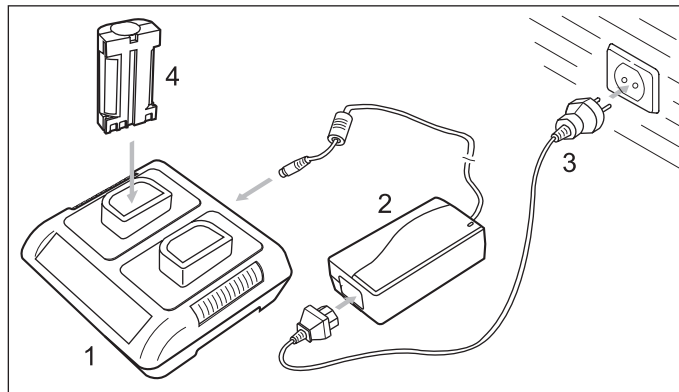
Do not short-circuit the battery. Accidental short circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery. Short circuiting the terminals may present a risk of personal injury from fire, explosion, leakage, or excess heat.

**WARNING:**

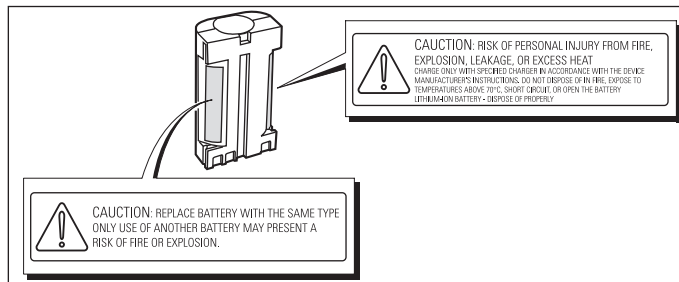
Use of open, damaged or worn out batteries may present a risk of personal injury from fire, explosion, leakage or excess heat.



The battery contains toxic material and must be disposed of in an environmentally friendly manner. Do not dispose of the battery in normal household or office waste.



- 1 GKL24 Dual Bay Battery Charger including
- 2 AC/DC Converter
- 3 Power Cord for GKL24
- 4 GEB90 Battery, Li-Ion, 7.2V



## ***Set Up the Equipment***

For best performance GPS surveys require undisturbed satellite signal reception. This means that GPS Receivers work best in locations which are free of obstructions.

Press and release the Power Button located on lower left of the keyboard. The unit will reply with an audible tone, then proceed to a splash screen and then to the Main Menu.

Your Leica Geosystems GS20 is now fully ready for operation.

When you consider to work in wireless real time the Leica Geosystems "WoRCS", Wireless Real-time Corrections System, for the DGPS is needed.

The Leica Geosystems "WoRCS" consists of a belt-mounted communication hub, power supply and differential module and gives you everything you need to become a self-contained mobile data collection system for real time.

With built-in Bluetooth communications technology, you'll have the ability to make wireless connections to external devices such as DGPS, cellular phones, Laser Range-finders and PDAs.

Please find the full settings in the Field Guide.

The Leica Geosystems "WoRCS" Belt includes

- Beacon receiver (Satellite correction module or custom RTCM solutions also available)
- Bluetooth communication hub
- "Smart" power supply

## ***Post-processing software***

The Post-processing software is used to process the observations taken by the Receiver in order to compute baselines and coordinates.

Leica Geosystems GISDataPro Static Kinematic software is the standard post-processing software for Leica Geosystems receivers.

Please refer to the GISDataPro Software reference manual to get detailed description.

# Getting Started with the new GIS equipment

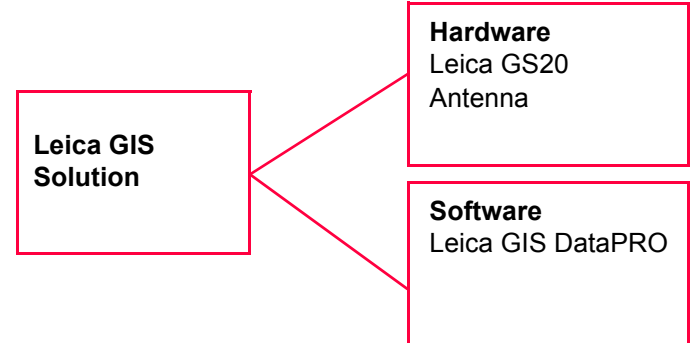
## Introduction

“Getting Started with New GIS Equipment” is designed to help get the beginning user up and running with their new Leica Geosystems GS20.

For more information about setup, features and operations of the Leica Geosystems GS20, please refer to the “GS20 FieldManual”.

The Leica Geosystems GIS DataPRO system is composed of both hardware and software components.

The hardware consists of the Leica Geosystems GS20 sensor. This is used in the field to collect and record spatial (position) and non-spatial attributes.



The Leica Geosystems GIS DataPRO office software is comprised of a GPS post-processing system and data editing functionality which works in the native ESRI shape-file format.

## Leica Geosystems GIS DataPRO Post-processing software

Leica Geosystems GIS DataPRO is used for data collection preparation and data post processing. Please refer to the “Getting Started with the GIS DataPRO Office Software” User Manual for more details.

To install the GIS DataPRO software:

- 1 Insert the CD-ROM into the CD drive of your PC.
- 2 Execute the “Setup” command.
- 3 Follow the instructions that appear on the screen.

Both a hardware and software user manual can be found on the CD in PDF format. The software itself contains a comprehensive online Help System.

After the data is collected in the field, the GIS DataPRO office software allows you to import, edit and export the data to your GIS. The software can also be used to design codelists which allow you to customize the field data collection process to suit your needs. To learn more about the Leica Geosystems GIS DataPRO office software, please consult the “Getting Started with the GIS DataPRO Office Software” User Manual.

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## Receiver Hardware

### Leica Geosystems GS20 Sensor

The Leica Geosystems GS20 is a handheld GPS receiver for professional data mapping. With the position and the field data the user is capable to collect Data for his needs in his GIS application. The GPS receiver receives the GPS signal from the NAVSTAR satellites and calculates a range to the satellites that are visible.


The Leica Geosystems GS20 is a 12-channel L1 code and phase GPS receiver. The standard Leica Geosystems GS20 does record phase measurements for post processing purposes. Phase measurements are used internally to smooth pseudorange measurements for higher code positioning. Phase measurement recording for post processing is available.

There are three antennas available with the Leica Geosystems GS20:

- AT501 – tracks L1 only.
- RTB Combined Antenna - tracks L1 and RTCM differential signal from public and private beacon infrastructure.
- RTS Combined Antenna - tracks L1 and differential signals from Racad DGPS Satellite systems.

Please refer to the Field Guide for the use of your Leica Geosystems GS20 equipment.

### Transport

-  When dispatching the product, always use the complete original Leica Geosystems packaging (case and cardboard box).



When transporting the equipment in the field, always make sure that you:

- either carry the product in its original transport case
- or carry the tripod with its legs splayed across your shoulder, keeping the attached product upright.


Never carry the product loose in a **road vehicle**. It can be affected by shock and vibration. Always carry it in its case and secure it.

When transporting the product by **rail, air or ship**, always use the complete original Leica Geosystems packaging (case and cardboard box), or its equivalent, to protect it against shock and vibration.


### Storage

-  **Temperature limits**  
(-40°C to +70°C / -40°F to +158°F)  
Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle.
-  **Damp** products must be unpacked. Dry the product, the case, the foam inserts and the accessories at not more than 40°C / 108°F and clean them. Do not repack until everything is completely dry.

### Cleaning and drying

-  Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with pure alcohol.

Use no other liquids; these may attack the polymer components.

-  **Cables and plugs**  
Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables. Unplugging connecting cables or removing the memory card during the measurement may cause loss of data. Always switch off the product before removing the cables or the memory card.

## ***Safety Directions***

The following directions should enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards. The person responsible for the product must ensure that all users understand these directions and adhere to them.

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### ***Intended use of product***

#### ***Permitted uses***

The product is intended for the following applications:

- Measuring and computing coordinates using P-code and/or C/A-code signals from NAVSTAR GPS satellites
- Carrying out measurement tasks using various GPS measuring techniques
- Recording GPS and point related data
- Computation and evaluation by means of software
- Datatransfer via internal radio (BLUETOOTH) for real-time surveys
- Datatransfer via internal radio (BLUETOOTH) for up and download of projects, coordinate systems, and configurations

#### ***Prohibited uses***

- Use of the product without instruction
- Use outside of the intended limits
- Disabling safety systems
- Removal of hazard notices
- Opening the product using tools (screwdriver, etc.), unless this is specifically permitted for certain functions
- Modification or conversion of the product
- Use after misappropriation
- Use with accessories from other manufacturers without the prior express approval of Leica Geosystems
- Inadequate safeguards at the measuring station (e.g. when measuring on roads)



#### **WARNING:**

Adverse use can lead to injury, malfunction and damage. It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be operated until the user has been instructed how to work with it.

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## Limits of use

See chapter "Technical Data".

### Environment:

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.

### External Antenna:

Use in rain is permissible. After long term use in this environment the External Antenna must be checked by a Leica Geosystems service technician.



### DANGER:

Local safety authorities and safety experts must be contacted before working in hazardous explosive areas, near to electrical installations or in extreme environment conditions by the person in charge of the product.

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## Responsibilities

**Area of responsibility for the manufacturer of the original equipment Leica Geosystems AG, CH-9435 Heerbrugg (hereinafter referred to as Leica Geosystems):** Leica Geosystems is responsible for supplying the product, including the User Manual and original accessories, in a completely safe condition.



### Responsibilities of the manufacturers of non-Leica Geosystems accessories:

The manufacturers of non-Leica Geosystems accessories for product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica Geosystems product.



## Responsibilities of the person in charge of the equipment:



### **WARNING:**

The person responsible for the equipment must ensure that it is used in accordance with the instructions. This person is also accountable for the training and deployment of personnel who use the equipment and for the safety of the equipment when in use.

## The person in charge of the product has the following duties:

- To understand the safety instructions on the product and the instructions in the User Manual.
- To be familiar with local regulations relating to accident prevention.
- To inform Leica Geosystems immediately if the equipment becomes unsafe.

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## **Hazards of use**

### **Main hazards of use**



### **WARNING:**

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far-reaching human, material, financial and environmental consequences.

### **Precautions:**

All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.



### **WARNING:**

The charger must not be used under damp or inclement conditions. If moisture penetrates these devices, the user may receive an electric shock.

### **Precautions:**

Use the charger only indoors, in dry rooms. Protect them from damp. If the devices are damp, do not use them.



### **WARNING:**

If you open the charger, either of the following actions may cause you to receive an electric shock:

- Touching live components
- Using the charger after incorrect attempts to carry out repairs

**Precautions:**

Do not open the charger yourself. Only a Leica Geosystems-approved service technician is entitled to repair it.

**CAUTION:**

Watch out for erroneous measurements if the product has been dropped or has been misused, modified, stored for long periods or transported.

**Precautions:**

Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.

**WARNING:**

If computers intended for use indoors are used in the field there is a danger of electric shock.

**Precautions:**

Adhere to the instructions given by the computer manufacturer with regard to field use in conjunction with Leica Geosystems products.

**CAUTION:**

If the accessories used with the equipment are not properly secured and the equipment is subjected to mechanical shock (e.g. blows, falling), the equipment may be damaged or people may sustain injury.

**Precautions:**

When setting-up the equipment, make sure that the accessories (e.g. tripod, tribrach, connecting cables) are

correctly adapted, fitted, secured, and locked in position. Avoid subjecting the equipment to mechanical shock.

**CAUTION:**

The product uses the GPS P-Code signal, which by U.S. policy, may be switched off without notice.

**WARNING:**

Inadequate securing of the survey site can lead to dangerous situations, for example in traffic, on building sites and at industrial installations.

**Precautions:**

Always ensure that the survey site is adequately secured. Adhere to the regulations governing accident prevention and road traffic.

**DANGER:**

Because of the risk of electrocution, it is very dangerous to use poles and extensions in the vicinity of electrical installations such as power cables or electrical railways.

**Precautions:**

Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

**CAUTION:**

During the transport or disposal of charged batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.

**Precautions:**

Before dispatching the equipment or disposing of it, discharge the batteries by running the product until they are flat.

 **WARNING:**

If an External Antenna is not properly fitted to vehicles or any other means for transportation it can be torn off by mechanical shock, vibration or wind, possibly causing accident and injury.

**Precautions:**

Attach the External Antenna professionally. The External Antenna must be secured additionally, e.g. by use of a safety cord. Ensure that the mounting device is correctly mounted and able to safely carry the weight of the External Antenna (>1kg).

 **WARNING:**

If the equipment is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the equipment irresponsibly you may enable unauthorized persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

**Precautions:**

Dispose of the equipment appropriately in accordance with the regulations in force in your country. Always prevent access to the equipment by unauthorized personnel.

 **DANGER:**

If the product is used in exposed locations (e.g. on masts, mountains or buildings), it is at risk from lightning. Danger from high voltages also exists near power lines. Lightning, voltage peaks, or the touching of power lines can cause damage, injury and death.

**Precautions:**

- Do not use the product in a thunderstorm as you may increase the risk of being struck by lightning.
- Be sure to remain at a safe distance from electrical installations. Do not use the product directly under or in close proximity to power lines. If it is essential to work in such an environment contact the local statutory regulatory bodies responsible for electrical installations and follow their instructions.
- If the product has to be permanently mounted in an exposed location, it is advisable to provide a lightning conductor system. A suggestion on how to design a lightning conductor for the product is given hereinafter.
- Always follow the regulations in force in your country with regard to grounding Antennas and masts. These installations must be carried out by an authorised specialist.

- To prevent damages due to indirect lightning strikes (voltage spikes) cables (antenna, power source, modem, ...) should be protected with appropriate protection elements (lightning arrester). These installations must be carried out by an authorized, local specialist.
- Additional protection against lightning:  
If there is a risk of a thunderstorm, or if the equipment is to remain unused and unattended for a long period, protect your product additionally by unplugging all systems components and disconnecting all connecting cables and supply cables (e.g. Receiver - Antenna).

## **Suggestion for design of a Lightning Conductor for a GPS System**

### **1. On non-metallic structures**

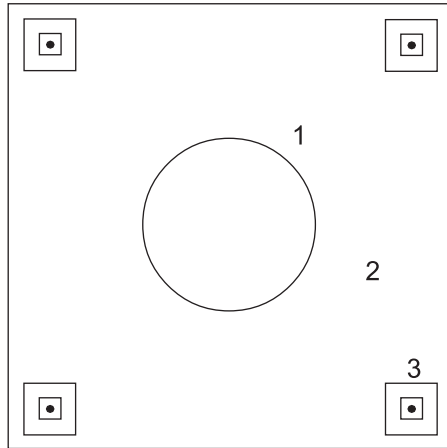
Protection by Air Terminals is recommended. An Air Terminal is a pointed solid or tubular rod of conducting material with proper mounting and connection to a conductor. The position of 4 Air Terminals should be uniformly distributed around the Antenna at a distance equal to the height of the Air Terminal.

The Air Terminal diameter should be 12mm for copper or 15mm for aluminium. The height of the Air Terminals should be 25 to 50cm. All Air Terminals should be connected to the down conductors. The diameter of the Air Terminal should be kept to a minimum to reduce GPS signal shading.

### **2. On metallic structures**

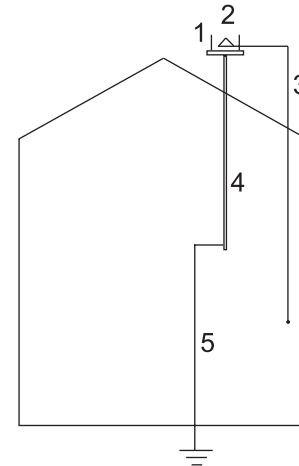
Protection is as described for non-metallic structures, but the Air Terminals can be connected directly to the conducting structure without the need for down conductors.

## Air Terminal arrangement (plan view)



- 1 GPS Antenna
- 2 Support-Structure
- 3 Air Terminal

## Grounding the Receiver/Antenna



- 1 Lightning Conductor Array
- 2 GPS Antenna
- 3 Antenna/Receiver Connection
- 4 Metallic Mast
- 5 Connection to Earth

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## **Electromagnetic Compatibility (EMC)**

The term "electromagnetic compatibility" is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.



### **WARNING:**

Electromagnetic radiation can cause disturbances in other equipment.

Although the Leica Geosystems GPS meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.



### **CAUTION:**

There is a risk that disturbances may be caused in other equipment if the product is used in conjunction with accessories from other manufacturers, e.g. field computers, personal computers, walkie-talkies, non-standard cables, external batteries.

### **Precautions:**

Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards.

When using computers and walkie-talkies, pay attention to the information about electromagnetic compatibility provided by the manufacturer.



### **CAUTION:**

Disturbances caused by electromagnetic radiation can result in the tolerance limits for measurements being exceeded.

Although the product meets the strict regulations and standards which are in force in this connection, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by very intense electromagnetic radiation, e.g. near radio transmitters, walkie-talkies, diesel generators.

Check the plausibility of results obtained under these conditions.



### **WARNING:**

If the product is operated with connecting cables attached at only one of their two ends (e.g. external supply cables, interface cables), the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

### **Precautions:**

While the product is in use, connecting cables (e.g. product to external battery, product to computer) must be connected at both ends.

## Use of the product with internal (BLUETOOTH) and external Radio devices:



### **WARNING:**

Electromagnetic radiation can cause disturbances in other equipment, in installations (e.g. medical ones such as pacemakers or hearing aids) and in aircraft. It can also affect humans and animals.

### **Precautions:**

Although the product meets in combination with internal (BLUETOOTH) and external Radio devices the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed or that humans or animals may be affected.

- Do not operate the product with internal (BLUETOOTH) and external Radio devices in the vicinity of filling stations or chemical installations, or in other areas where an explosion hazard exists.
- Do not operate the product with internal (BLUETOOTH) and external Radio devices near to medical equipment.
- Do not operate the product with internal (BLUETOOTH) and external Radio devices in aircraft.
- Do not operate the product with internal (BLUETOOTH) and external Radio devices for long periods with it immediately next to your body.



### **WARNING:**

This Bluetooth transmitter must not be operating in conjunction with any other transmitter or transmitting antenna.

## ***FCC statement (applicable in U.S.)***



### **WARNING:**

This equipment, including GS20 and WoRCS (BLUETOOTH), has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



### **WARNING:**

Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

### **Product Labeling:**

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label indicator is placed on the backside of the device in the center above the battery case.





## Technical Data

### Tracking Characteristics

- **Satellite Reception**  
Single frequency
- **Receiver channels**  
12 L1 continuous tracking
- **L1 channels**  
Carrier phase, C/A narrow code
- **L1 Carrier Tracking**  
Reconstructed carrier phase via C/A code
- **L1 Code Measurements**  
Carrier phase smoothed C/A code measurements
- **Satellites Tracked**  
Up to 12 simultaneously on L1

Time to first phase measurement typically 30 seconds.

### GPS Antennas

- **AT575 Internal**  
Microstrip L1 antenna with build in groundplane
- **AT501**  
Microstrip L1 antenna with built in groundplane
- **RTB**  
Combined GPS L1/ beacon antenna
- **RTS**  
Combined GPS L1/ L-Band antenna

### Interface

- **Port 1**  
Conformable with RS232  
Lemo 7 Pin
- **BLUETOOTH Specification**
  1. Radio:  
Taiyo Yuden Class 2 Bluetooth module EYSF2SSXX  
Nominal transmit ..... 0dBm with included antenna  
Frequency range ..... from 2402 to 2480 MHz  
Transmission power ..... < 2.5 mW (e.r.p.)  
Operating range ..... within 10m
  2. Other Characteristics  
Baudrate ..... 115.2 kps
- **Baudrate**  
300/1200/2400/4800/7200/9600/19200/38400/57600/  
115200 bps
- **Data Format**  
Parity ..... none/odd/even  
Data Bit ..... 7;8  
Stop Bits ..... 1;2  
Flow Control ..... RTC/CTS  
..... XON/XOFF

## Equipment weights

- **Receivers**  
Leica Geosystems GS20 ..... 0.55 kg
- **Antennas**  
AT501 ..... 0.4 kg

## Power

- **Supply Voltage**  
All equipment: ..... Nominal 7.2V DC  
External: ..... 12V DC

## Environmental Specifications

Instrument	Operation	Storage
Leica Geosystems GS20	-20°C to +55°C (-4°F to 131°F)	-40°C to +70°C (-40°F to 158°F)
AT501	-40°C to +75°C (-40°F to 167°F)	-40°C to +75°C (-40°F to 167°F)
Leica Geosystems PC-cards, all sizes	-20°C to +75°C (-4°F to 167°F)	-40°C to +75°C (-40°F to 167°F)

- **Humidity**  
Up to 99%, non-condensing
- **Weather**  
Will withstand rain, snow, dust, sand etc.

## Separation distances

- **Leica Geosystems GS20 to AT501 RTB or RTS Antenna**  
Supplied cables: ..... 1.2m  
Longer cables available on request.

## Baseline precision

The following specifications are based on measurements processed using Leica Geosystems GISDataPro software and are given as baseline rms (root mean square).

### • Differential Phase

Operation	Static	Rapid Static	Kinematic
	10mm + 2ppm	10mm + 2ppm	20mm + 2ppm

### • Differential Code

Operation	Post Processing	Realtime DGPS
Static	30 cm	40 cm
Kinematic	30 cm	40 cm



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

### **Conformity to national regulations**

- FCC part 15 (applicable in U.S.)
- European directive 1999/5/EC on radio equipment and telecommunications terminal equipment (see CE Conformity Declaration).
- The conformity for countries with other national regulations not covered by FCC part 15 or European directives 1999/5/EC has to be approved prior to use and operation.

***Leica Geosystems AG, Heerbrugg,  
Switzerland, has been certified as  
being equipped with a quality system  
which meets the International  
Standards of Quality Management and  
Quality Systems (ISO standard 9001)  
and Environmental Management  
Systems (ISO standard 14001).***



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program.*

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