Leica GS10/GS15
User Manual

Version 8.0
English

- when it has to be **right**

Leica Geosystems

Introduction

Purchase

Congratulations on the purchase of a Leica GS10/GS15.

⚠️ 📖

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "1 Safety Directions" for further information. Read carefully through the User Manual before you switch on the product.

Product Identification

The model and serial number of your product are indicated on the type plate. Always refer to this information when you need to contact your agency or Leica Geosystems authorised service workshop.

Trademarks

- Windows is a registered trademark of Microsoft Corporation in the United States and other countries
- *Bluetooth*® is a registered trademark of Bluetooth SIG, Inc.
- SD Logo is a trademark of SD-3C, LLC.

All other trademarks are the property of their respective owners.

Validity of this manual

This manual applies to the GS10/GS15.

Available documentation

Name	Description/Format	🗐	📄
GS10/GS15 Quick Guide	Provides an overview of the product together with technical data and safety directions. Intended as a quick reference guide.	✓	✓
GS10/GS15 User Manual	All instructions required in order to operate the product to a basic level are contained in the User Manual. Provides an overview of the product together with technical data and safety directions.	-	✓

Name	Description/Format	🗐	📄
Viva Series Technical Reference Manual and Captivate Technical Reference Manual	Overall comprehensive guide to the product and application functions. Included are detailed descriptions of special software/hardware settings and software/hardware functions intended for technical specialists.	-	✓

Refer to the following resources for all GS10/GS15 documentation/software:
- the Leica USB documentation card
- https://myworld.leica-geosystems.com

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 products that you and your company own and explore your world of Leica Geosystems: View detailed information on your products and update your products with the latest software and keep up-to-date with the latest documentation.
myService	View the current service status and full service history of your products in Leica Geosystems service centres. Access detailed information on the services performed and download your latest calibration certificates and service reports.
mySupport	View the current service status and full service history of your products in Leica Geosystems service centres. Access detailed information on the services performed and download your latest calibration certificates and service reports.
myTraining	Enhance your product knowledge with Leica Geosystems Campus - Information, Knowledge, Training. Study the latest online training material on your products and register for seminars or courses in your country.
myTrusted Services	Add your subscriptions and manage users for Leica Geosystems Trusted Services, the secure software services, that assist you to optimise your workflow and increase your efficiency.

Table of Contents

1   Safety Directions

1.1   General Introduction

Description

The following directions 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.

About Warning Messages

Warning messages are an essential part of the safety concept of the instrument. They appear wherever hazards or hazardous situations can occur.

Warning messages...
*   make the user alert about direct and indirect hazards concerning the use of the product.
*   contain general rules of behaviour.

For the users' safety, all safety instructions and safety messages shall be strictly observed and followed! Therefore, the manual must always be available to all persons performing any tasks described herein.

DANGER, **WARNING**, **CAUTION** and **NOTICE** are standardized signal words for identifying levels of hazards and risks related to personal injury and property damage. For your safety it is important to read and fully understand the table below with the different signal words and their definitions! Supplementary safety information symbols may be placed within a warning message as well as supplementary text.

Type	Description
⚠ 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.
NOTICE	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in 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.

1.2 Definition of Use

Intended use
- Computing with software.
- Carrying out measurement tasks using various GNSS measuring techniques.
- Recording GNSS and point related data.
- Data communication with external appliances.
- Measuring raw data and computing coordinates using carrier phase and code signal from GNSS satellites.

Reasonably foreseeable misuse
- Use of the product without instruction.
- Use outside of the intended use and limits.
- Disabling safety systems.
- Removal of hazard notices.
- Opening the product using tools, for example screwdriver, unless this is permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with obvious damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at the working site.
- Controlling of machines, moving objects or similar monitoring application without additional control and safety installations.

1.3 Limits of Use

Environment

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

⚠ **DANGER**

Local safety authorities and safety experts must be contacted before working in hazardous areas, or close to electrical installations or similar situations by the person in charge of the product.

1.4 Responsibilities

Manufacturer of the product

Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a safe condition.

Person responsible for the product

The person responsible for the product has the following duties:
- To understand the safety instructions on the product and the instructions in the user manual.
- To ensure that it is used in accordance with the instructions.
- To be familiar with local regulations relating to safety and accident prevention.
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.
- To ensure that the national laws, regulations and conditions for the operation of e.g. radio transmitters or lasers are respected.
- To ensure that the radio modem is not operated without the permission of the local authorities on frequencies and/or output power levels other than those specifically reserved and intended for use without a specific permit.
  The internal and external radio modems have been designed to operate on frequency ranges and output power ranges, the exact use of which differs from one region and/or country to another.

1.5 Hazards of Use

⚠ **CAUTION**

Watch out for erroneous measurement results 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 as well as before and after important measurements.

⚠ **DANGER**

Because of the risk of electrocution, it is dangerous to use poles, levelling staffs 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.
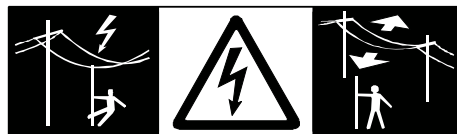
⚠ **WARNING**

During dynamic applications, for example stakeout procedures there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.
Precautions:
The person responsible for the product must make all users fully aware of the existing dangers.

⚠ **WARNING**	Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites and at industrial installations. **Precautions:** Always ensure that the working site is adequately secured. Adhere to the regulations governing safety, accident prevention and road traffic.	
⚠ **CAUTION**	If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people can sustain injury. **Precautions:** When setting-up the product, make sure that the accessories are correctly adapted, fitted, secured, and locked in position. Avoid subjecting the product to mechanical stress.	
⚠ **WARNING**	Incorrect fastening of the external antenna to vehicles or transporters poses the risk of the equipment being broken by mechanical influence, vibration or airstream. This may result in accident and physical injury. **Precautions:** Attach the external antenna professionally. The external antenna must be secured additionally, for example by use of a safety cord. Ensure that the mounting device is correctly mounted and able to carry the weight of the external antenna (>1 kg) safely.	
⚠ **WARNING**	If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning. **Precautions:** Do not use the product in a thunderstorm.	
⚠ **DANGER**	If the product is used with accessories, for example on masts, staffs, poles, you may increase the risk of being struck by 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 can 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 close to power lines. If it is essential to work in such an environment contact the safety authorities 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 below. Always follow the regulations in force in your country regarding 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, for example for antenna, power source or modem should be protected with appropriate protection elements, like a lightning arrester. These installations must be carried out by an authorised specialist. • 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, for example, instrument - antenna.	

Lightning conductors	Suggestion for design of a lightning conductor for a GNSS system:

Lightning conductors — Suggestion for design of a lightning conductor for a GNSS 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 four air terminals can be uniformly distributed around the antenna at a distance equal to the height of the air terminal.

   The air terminal diameter should be 12 mm for copper or 15 mm for aluminium. The height of the air terminals should be 25 cm to 50 cm. All air terminals should be connected to the down conductors. The diameter of the air terminal should be kept to a minimum to reduce GNSS 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

GS_039
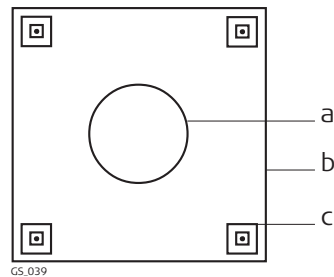
a) Antenna
b) Support structure
c) Air terminal

Grounding the instrument/antenna

GS_040
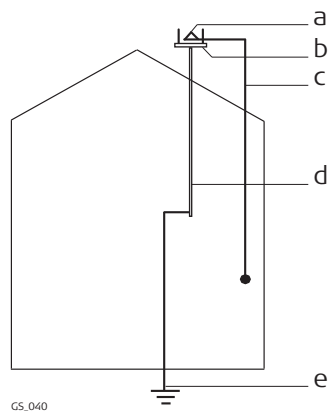
a) Antenna
b) Lightning conductor array
c) Antenna/instrument connection
d) Metallic mast
e) Connection to earth

⚠ **CAUTION**

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

Precautions:

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

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.

⚠ **WARNING**

High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.

Precautions:

Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.

⚠️ WARNING	If battery terminals are short circuited e.g. by coming in contact with jewellery, keys, metalized paper or other metals, the battery can overheat and cause injury or fire, for example by storing or transporting in pockets. **Precautions:** Make sure that the battery terminals do not come into contact with metallic objects.
⚠️ WARNING	If the product 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 product irresponsibly you may enable unauthorised 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:**

The product must not be disposed with household waste.
Dispose of the product appropriately in accordance with the national regulations in force in your country.
Always prevent access to the product by unauthorised personnel.

Product-specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http://www.leica-geosystems.com/treatment or received from your Leica Geosystems distributor.

⚠️ WARNING	Only Leica Geosystems authorised service workshops are entitled to repair these products.

1.6 Electromagnetic Compatibility EMC

Description

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 product 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 with accessories from other manufacturers, for example field computers, personal computers or other electronic equipment, non-standard cables or 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 or other electronic equipment, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

⚠ **CAUTION**

Disturbances caused by electromagnetic radiation can result in erroneous measurements.
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.
Precautions:
Check the plausibility of results obtained under these conditions.

⚠ **CAUTION**

If the product is operated with connecting cables attached at only one of their two ends, for example 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, for example product to external battery, product to computer, must be connected at both ends.

Radios or Digital Cellular Phones

Use of product with radio or digital cellular phone devices:

⚠ **WARNING**

Electromagnetic fields can cause disturbances in other equipment, in installations, in medical devices, for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.
Precautions:
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment can be disturbed or that humans or animals can be affected.
• Do not operate the product with radio or digital cellular phone 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 radio or digital cellular phone devices near to medical equipment.
• Do not operate the product with radio or digital cellular phone devices in aircraft.

1.7 FCC Statement, Applicable in U.S.

☞ The greyed paragraph below is only applicable for products without radio.

⚠ **WARNING**

This equipment 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 radio 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 the 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.

Labelling GS10
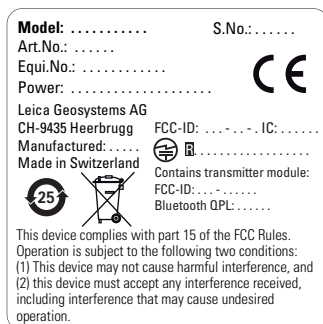
Labelling GS15

008607_002

**Labelling internal
battery GEB212**

Type: **GEB212** Art.No.: 772806
Li-Ion Battery: 7.4V --- / 2.6Ah
10A 5A/130°C 19Wh
Leica Geosystems AG, CH-9435 Heerbrugg
Manufactured: 20XX   S.No: 0118   Made in China

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.

ITE Accessory
E179078 . 70YL

005044_001

**Labelling internal
battery GEB222**

Type: **GEB222** Art.No.: 793973
Li-Ion Battery: 7.4V --- / 6.0Ah
15A 5A/130°C 44.4Wh
Leica Geosystems AG, CH-9435 Heerbrugg
S.No.: 10142   Made in China

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.

11WE
MH29443

005043_001

1.8 ICES-003 Statement, Applicable in Canada

⚠ **WARNING**

This Class (B) digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe (B) est conforme à la norme NMB-003 du Canada.

2 Description of the System

2.1 System Components

Main components

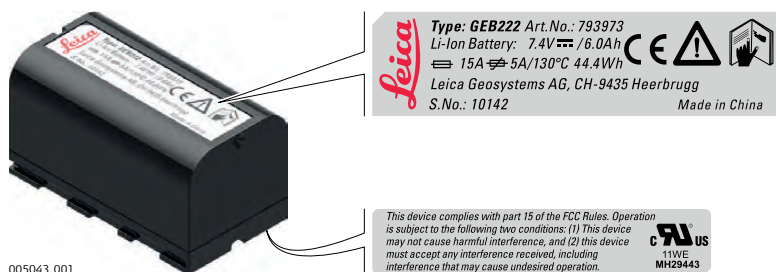| Component	Description
Instrument	To calculate a position from the computed ranges to all visible GNSS (Global Navigation Satellite System) satellites.
Web server	Web-based tool to preprogram the GNSS instrument.
Antenna	To receive the satellite signals from the GNSS satellites.
Leica Geo Office, Leica Infinity	The office software including a series of help programs which support working with Leica instruments.

Instruments

Depending on the satellite systems and signals configured, a maximum number of 555 channels is allocated.

Instrument	Description
GS10/GS15	GPS, GLONASS, BeiDou and Galileo GNSS receiver, multi-frequency, SBAS (EGNOS, WAAS, GAGAN, MSAS, QZSS), code and phase, real-time capable

2.2 System Concept
2.2.1 Software Concept

Description

All instruments use the same software concept.

Software for all GS GNSS instruments

Software type	Description
GS firmware (GS_xx.fw)	This important software covers all functions of the instrument.
	The Web server application is integrated into the firmware and cannot be deleted.
	The English language is integrated into the firmware and cannot be deleted.
Language software (WEB_LANG.sxx)	Numerous languages are available for the Web server application.
	The English language is the default language. One language is chosen as the active language.

Software upload

☞ Uploading GS firmware can take some time. Ensure that the battery is at least 75% full before beginning the upload, and do not remove the battery during the upload process.

Software for	Description
All GS models	The software can be uploaded using the Leica Web server application or myWorld@Leica Geosystems.
	☞ Ensure that a Leica SD card is inserted into the GS instrument before starting the upload. Refer to "4.3 Working with the Memory Device".

2.2.2 Power Concept

General

Use the batteries, chargers and accessories recommended by Leica Geosystems to ensure the correct functionality of the instrument.

Power options

Power for the instrument can be supplied either internally or externally. Up to two external power supplies can be connected.

Internal power supply:	Two batteries (for GS10: GEB222; for GS15: GEB212) fit into the instrument.
	☞ If one battery fails, a system shutdown of the GS10/GS15 GNSS instrument will be prevented by switching over directly to the second battery.
External power supply:	GEB371 battery connected via a cable.
	OR
	Car battery connected via a converter cable supplied by Leica Geosystems.
	OR
	10.5 V-28 V DC power supply via a converter cable supplied by Leica Geosystems.
	OR
	110 V/240 V AC to 12 V DC power supply unit, supplied by Leica Geosystems.

☞ For permanent operations use **U**ninterruptible **P**ower **S**upply units as a back-up in a main power failure.

2.2.3 Data Storage Concept

Description

Data (Leica GNSS raw data and RINEX data) can be recorded on the SD card.

Memory device

SD card: All GS GNSS instruments have an SD card slot fitted as standard. An SD card can be inserted and removed. Available capacity: 1 GB.

☞ While other SD cards can be used, Leica Geosystems recommends to only use Leica SD cards and is not responsible for data loss or any other error that can occur while using a non-Leica card.

☞ Unplugging connecting cables, removing the data storage device or interrupting the power supply during the measurement can cause loss of data. Only remove the data storage device, unplug connecting cables or interrupt the power supply when the GS GNSS instrument is switched off.

☞ SD cards can directly be used in an OMNI drive as supplied by Leica Geosystems. Other PC card drives can require an adaptor.

Container for GS10 instrument and accessories part 1 of 2

009305_002
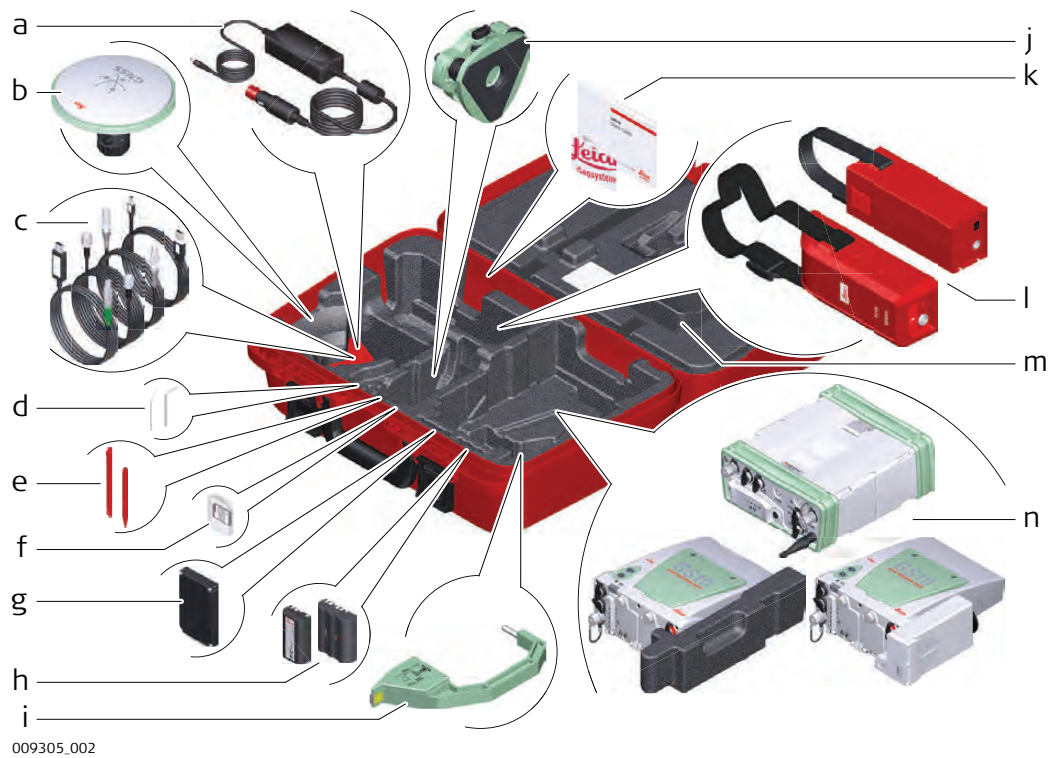
a) GDC221 car adapter cable
b) Antenna and GAD31 adapter
c) Cables
d) Adjustment tool and allen key
e) Stylus
f) SD card and cover
g) RTK phone or radio modem
h) GEB212 or GEB311 battery
i) Height hook
j) Tribrach
k) Manual & USB documentation card
l) External battery
m) Additional foam inlay piece (to be used with GS10 only)
n) GS10 with radio modem attached or GS10 with additional foam inlay piece

Container for GS10 instrument and accessories part 2 of 2

009306_001
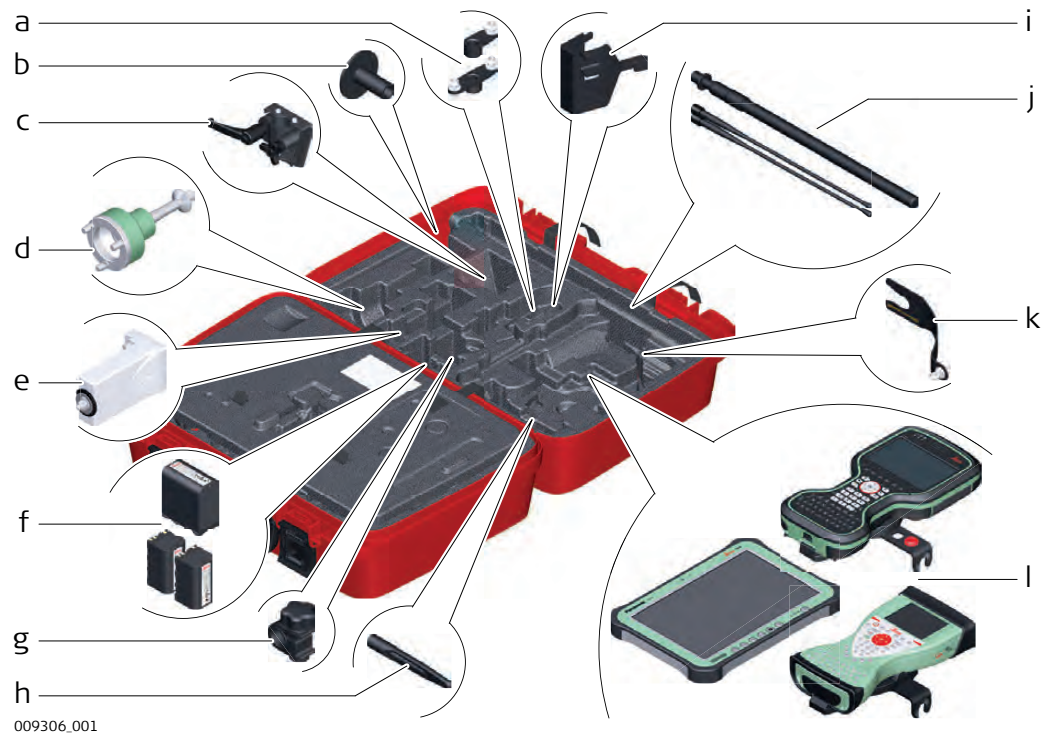
a) GAD34 antenna arm or GAD46 double antenna arm
b) GHT36 base for telescopic rod
c) GHT40 holder for GS receivers
d) GRT146 carrier
e) GFU RTK modem
f) GEB242 battery or GEB222 batteries (2pcs.)
g) GHT63 clamp
h) GAT18 mobile antenna
i) GHT58 tripod bracket for GFU
j) GAD32 telescopic rod and GAT1 or GAT2 radio antennas
k) GAD33 arm 15 cm
l) CS35 tablet or CS20 field controller with GHT66 holder or CS15 field controller with GHT62 holder

Container for GS15 instrument and accessories part 1 of 2

009307_002
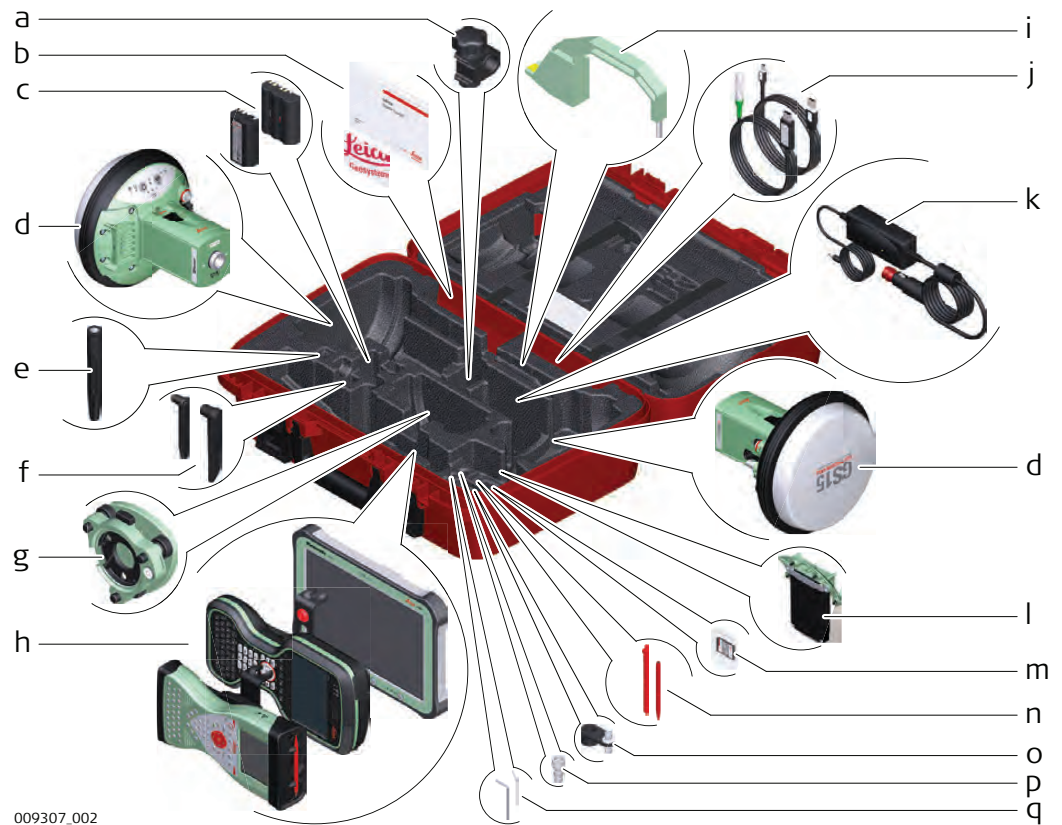
a) GHT63 clamp
b) Manuals and USB documentation card
c) GEB212 or GEB311 batteries
d) GS15 antenna
e) GAT18 mobile antenna
f) GAT21, GAT25 or GAT26 radio antenna
g) Tribrach
h) CS15 field controller with GHT62 holder or CS20 field controller with GHT66 holder or CS35 tablet
i) Height hook
j) Cables
k) GDC221 car adapter
l) RTK phone or radio modem for GS15
m) SD cards
n) Stylus
o) GAD34 arm 3 cm
p) TNC QN-adapter
q) Allen key and adjustment tool

Container for GS15 instrument and accessories part 2 of 2
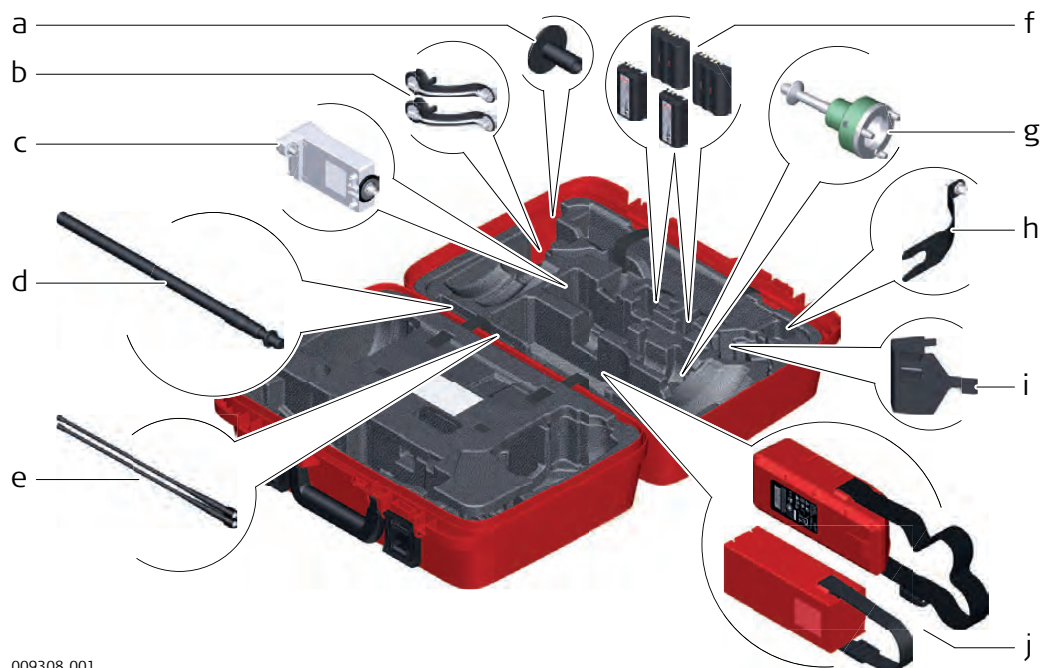
009308_001

a) GHT36 base for telescopic rod
b) GAD108 arm
c) GFU RTK modem
d) GAD32 telescopic rod
e) GAT1 or GAT2 radio antennas
f) GEB212 or GEB311 batteries
g) GRT146 or GRT247 carrier
h) GAD33 arm
i) GHT58 tripod bracket for GFU
j) External battery

2.4   Instrument Components

☞   The instrument can be preprogrammed using the Web server application running from the instrument on a web browser of a Windows device. In this case, the instrument is turned on by holding down the ON/OFF button for 2 s or off by holding down the ON/OFF button for 2 s. A green steady light at the power LED indicates that the instrument is turned on.

GS10 components

0012207_001   a   b   c d   e f g   h i   j   k l
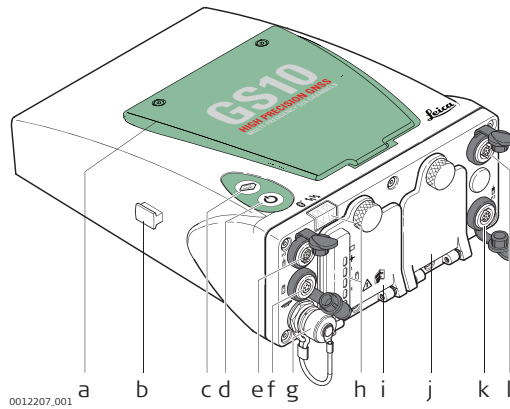
a) Bluetooth antenna
b) Guide rail for clip-on-housing of a device (available on both sides)
c) Function button
d) ON/OFF button
e) LEMO port P3
f) Power port
g) Antenna port
h) LED indicators
i) Battery compartment A including SD card compartment
j) Battery compartment B
k) LEMO port P2
l) LEMO port P1 including USB port

GS15 components

0012208_001
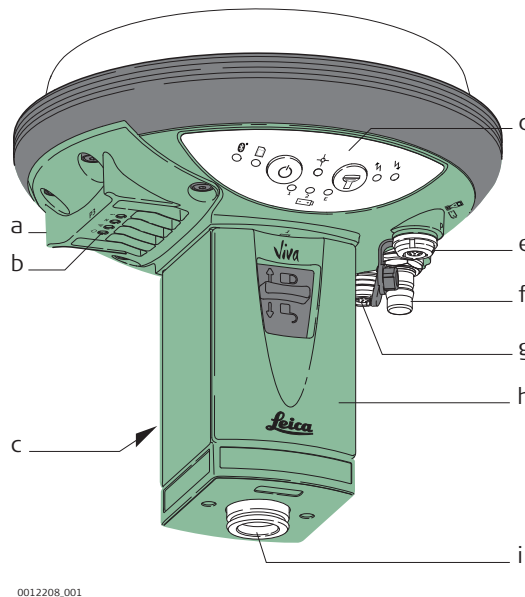
a) RTK device compartment including port P3
b) RTK device LEDs
c) Battery compartment 2
d) LEDs, ON/OFF button and Function button
e) LEMO port P1 including USB port
f) QN-connector for external UHF or digital cellular phone antenna
g) LEMO port P2
h) Battery compartment 1 with SD card slot
i) Mechanical Reference Plane (MRP)

☞   A Bluetooth port is included inside all GS GNSS instruments to enable connectivity to the field controller.

3 User Interface

3.1 Keyboard

Keyboard GS10
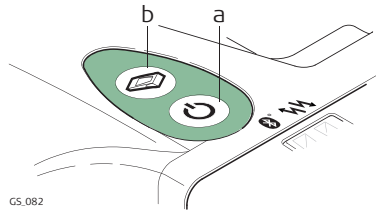
a) ON/OFF button
b) Function button

Keyboard GS15
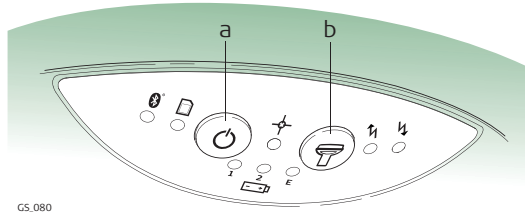
a) ON/OFF button
b) Function button

ON/OFF button

Button	Function
ON/OFF $(\bigcirc)$	If GS10/GS15 already off: Turns on GS10/GS15 when held for 2 s. ☞ While the GS10/GS15 is booting all three battery LEDs are lighted. Once the GS10/GS15 has started, the normal LED behaviour starts. If GS10/GS15 already on: Turns off GS10/GS15 when held for 2 s. ☞ All LEDs will shine red for 1 s-2 s and then are turned off.

Function button

☞ All functions following described assume the GS10/GS15 is already on.

Button	Function
Function $(\overline{\bigtriangledown})$	Press and hold button for ‹1 s. If the GS10/GS15 is in: • base mode: The GS10/GS15 switches to be in rover mode. • rover mode and in static mode: The GS10/GS15 switches to be in base mode. • rover mode and in kinematic mode: The GS10/GS15 switches to be in base mode.
	Press and hold button for 3 s. If the GS10/GS15 is in: • base mode and a position is available: The RTK base LED flashes green for 2 s. The GS10/GS15 takes the next available position and updates the coordinates of the currently stored RTK base position. • base mode and no position is available: The RTK base LED flashes yellow for 2 s.

Button	Function
	• rover mode: No action.
	Press and hold button for 5 s.
	If the GS10/GS15 is in:
	• base mode: No action.
	• rover mode and configured for a dial-up or Ntrip connection: The RTK rover LED flashes green for 2 s. The GS10/GS15 will connect to the RTK base station or the Ntrip server configured.
	• rover mode and not configured for a dial-up or Ntrip connection: No action.

Button combinations

Button	Function
ON/OFF ⏻ Function ⏟	Press and hold buttons for 1 s.
	The current almanacs stored on the GNSS instrument are deleted and new almanacs are downloaded. The Position LED flashes red quickly three times.
	Press and hold buttons for 5 s.
	The Memory LED flashes red quickly three times. The SD card of the GNSS instrument is formatted. The Memory LED continues to flash red as the SD card is formatted.
	Press and hold buttons for 10 s.
	The System RAM on the GNSS instrument is formatted. Settings of all installed software will be deleted. All LEDs (except Battery LED and Bluetooth LED) flash red quickly three times. After the formatting the System RAM, the GNSS instrument is turned off.
	Press and hold buttons for 15 s.
	The registry of the GNSS instrument is deleted. Windows CE and communication settings will be reset to factory defaults. All LEDs (except Battery LED and Bluetooth LED) flash red quickly three times. After deleting the registry, the GNSS instrument is turned off.

3.2 Operating Principles

Operating the instrument

The GS10/GS15 GNSS instrument is operated either by the pressing its buttons (ON/OFF button, function button) or by the field controller.

Operation by buttons

The GS10/GS15 GNSS instrument is operated by pressing its buttons. Refer to "3.1 Keyboard" for a detailed description of the buttons and their function.

Operation by field controller

The GS10/GS15 GNSS instrument is operated by the field controller using the Leica SmartWorx Viva/Leica Captivate software. Refer to the User Manual of the field controller for a detailed description of the keys and their function.

Turn on GS10/GS15

To turn on the instrument press and hold the Power button for 2 s.

Turn off GS10/GS15

To turn off the instrument:
• press and hold the ON/OFF button for 2 s
• confirm to power down the instrument when exiting the software on the field controller

4 Operation

4.1 Equipment Setup

4.1.1 Setting up as a Post-Processing Base

Use   The equipment setup described is used for static operations over markers.

Description   The instrument can be programmed with the field controller before use which can then be omitted from the setup.

☞
- The antenna is mounted directly using screw fitting. If using stub and adapter, procedures can vary slightly.
- When using the adapter and carrier, ensure that the antenna and the adapter assembly slide down the full length of the carrier stub. An incorrectly mounted antenna will have a direct effect on the results.

☞   If the instrument is left in the container during use in high temperatures, the lid should be left open. Refer to the User Manual for operating and storage temperatures.

☞   Use an external battery such as GEB371 to ensure operation for a full day.

0012252_001

a) GNSS antenna AS05/AS10
b) GRT146 carrier
c) Tribrach
d) Height hook
e) GS10 instrument
f) 1.2 m antenna cable
g) Tripod
h) SD card
i) CompactFlash card
j) CS15 field controller
k) GEB212 battery
l) CS20 field controller
m) GEB331 batteries
n) GEB222 batteries
o) CS35 tablet
p) USB stick

Equipment setup - GS15

0012251_001
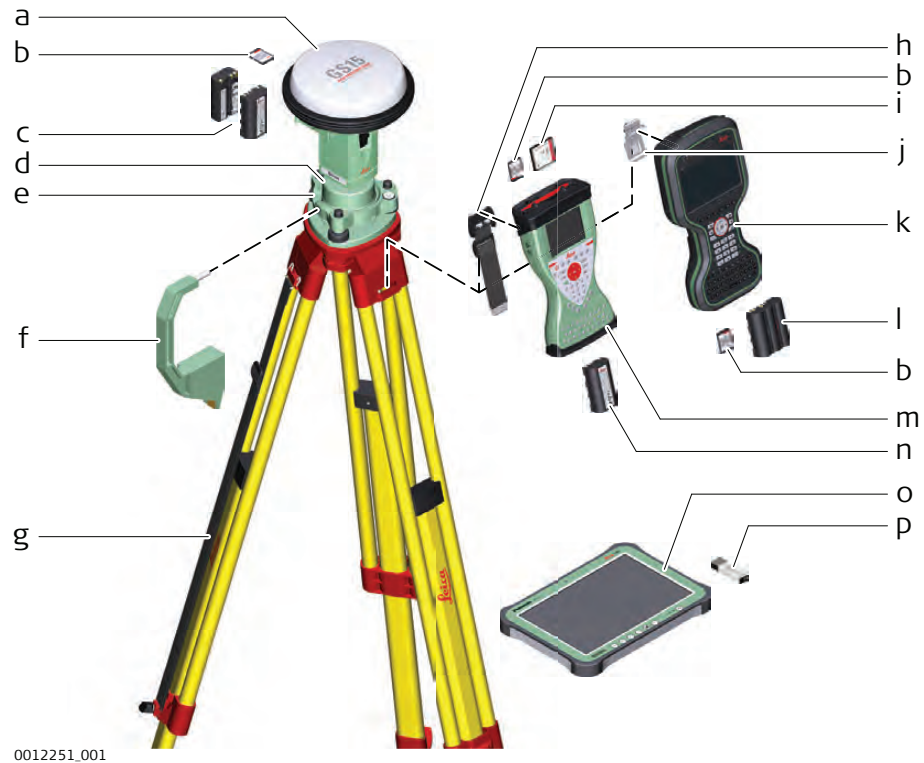
a) GS15 instrument
b) SD card
c) GEB212 batteries
d) GRT247 carrier
e) Tribrach
f) Height hook
g) Tripod
h) GHT61 hand strap
i) CompactFlash card
j) Utility hook
k) CS20 field controller
l) GEB331 batteries
m) CS15 field controller
n) GEB212 battery
o) CS35 field controller
p) USB stick

Equipment setup step-by-step

Step	Description	
1.	Set up the tripod.	
2.	Mount and level the tribrach on the tripod.	
3.	Ensure that the tribrach is over the marker.	
4.	Place and lock the carrier in the tribrach.	
	GS10	GS15
5.	Screw the GNSS antenna onto the carrier.	Insert the data storage device and the batteries into the GS15.
6.	Check that the tribrach is still level.	Screw the GS15 onto the carrier.
7.	Insert the batteries into the instrument.	Check that the tribrach is still level.
8.	Insert the SD card into the instrument.	Insert the data storage device and the battery into the field controller.
9.	Connect the instrument to the GNSS antenna using the antenna cable and port ANT on the instrument.	-
10.	Switch on the field controller and connect it to the instrument if necessary.	
11.	To hang the instrument on the tripod leg, use the hook on the rear of the unit. Or place the instrument in the container.	To hang the field controller on the tripod leg, use the hook on the hand strap or use the utility hook. Refer to the User Manual of the field controller.
12.	Insert the height hook into the carrier.	
13.	Measure the antenna height using the height hook.	
14.	Press the ON/OFF button on the instrument for at least 2 s to switch on the instrument .	

4.1.2 Setting up as a Real-Time Base

Use

The equipment setup described is used for real-time base stations with the need of optimal radio coverage. Raw observation data can also be collected for post-processing.

Description

The GS10 instrument clips to the tripod leg. Connections are made to the GNSS and radio antenna. The radio antenna is mounted on the antenna arm which clips to the GNSS antenna. The GS10/GS15 instrument can be programmed with the field controller before use which can then be omitted from the setup.
The connection between GS15 and the field controller is made via Bluetooth.

☞
- The antenna is mounted directly using screw fitting. If using stub and adapter, procedures can vary slightly.
- When using the adapter and carrier, ensure that the antenna and the adapter assembly slide down the full length of the carrier stub. An incorrectly mounted antenna will have a direct effect on the results.
- Standard radio is used throughout the instructions. Digital cellular phones can also be used but the setup can differ slightly.

☞
If the instrument is left in the container during use in high temperatures, the lid should be left open. Refer to the User Manual for operating and storage temperatures.

☞
Use an external battery such as GEB371 to ensure operation for a full day.

Equipment setup - GS10

0012255_001
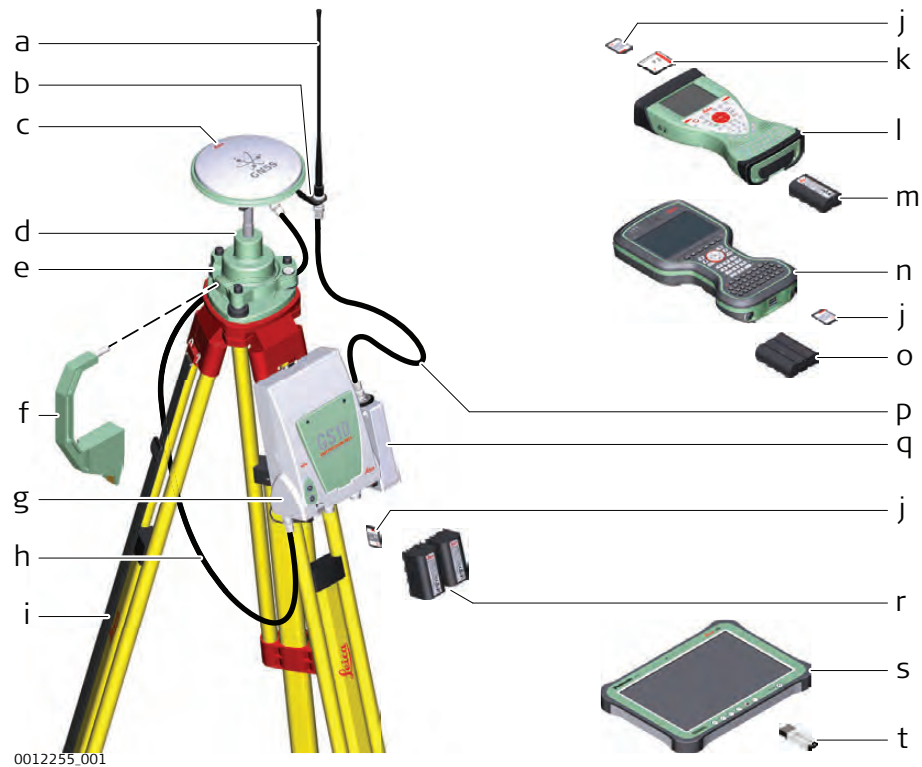
a) Radio antenna
b) GAD33 arm 15 cm
c) GNSS antenna AS05/AS10
d) GRT146 carrier
e) Tribrach
f) Height hook
g) GS10 instrument
h) 1.2 m antenna cable (instrument/GNSS antenna)
i) Tripod
j) SD card
k) CompactFlash card
l) CS15 field controller
m) GEB212 battery
n) CS20 field controller
o) GEB331 battery
p) 1.2 m antenna cable (radio housing/radio antenna)
q) GFU RTK modem
r) GEB222 batteries
s) CS35 tablet
t) USB stick

Equipment setup - GS15

002326_004
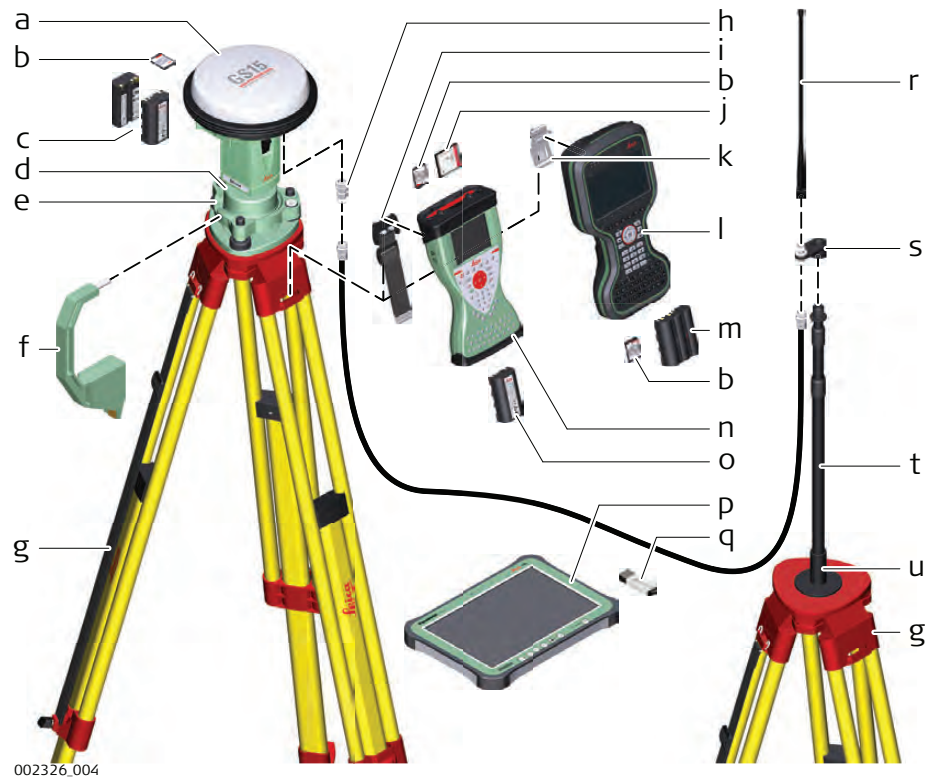
a) GS15 instrument with RTK slot-in device
b) SD card
c) GEB212 batteries
d) GRT247 carrier
e) Tribrach
f) Height hook
g) Tripod
h) GAD109 QN-TNC adapter
i) Hand strap
j) CompactFlash card
k) Utility hook
l) CS20 field controller
m) GEB331 battery
n) CS15 field controller
o) GEB212 battery
p) CS35 tablet
q) USB stick
r) GAT1/GAT2 radio antenna
s) GAD34 arm 3 cm
t) GAD32 telescopic rod
u) GHT36 base for telescopic rod

Equipment setup step-by-step

Step	Description	
1.	Set up the tripod.	
2.	Mount and level the tribrach on the tripod.	
3.	Ensure that the tribrach is over the marker.	
4.	Place and lock the carrier in the tribrach.	
	GS10	GS15
5.	Screw the GNSS antenna onto the carrier.	Insert the data storage device and the batteries into the GS15.
6.	Check that the tribrach is still level.	Press the ON/OFF button on the instrument for at least 2 s to switch on the instrument.
7.	Insert the data storage device and the batteries into the instrument.	Screw the GS15 onto the carrier.
8.	Connect the instrument to the GNSS antenna using the antenna cable and port ANT on the instrument.	Check that the tribrach is still level.
9.	Connect the field controller to the instrument if necessary.	Insert the data storage device and the battery into the field controller.
10.	To hang the instrument on the tripod leg, use the hook on the rear of the unit. Or place the instrument in the container.	Connect the field controller to the instrument if necessary.
11.	Insert the height hook into the carrier.	To hang the field controller on the tripod leg, use the hook on the hand strap or use the utility hook. Refer to the User Manual of the field controller.
12.	Measure the antenna height using the height hook.	Insert the height hook into the carrier.
13.	Clip the antenna arm to the GNSS antenna.	Measure the antenna height using the height hook.
14.	Screw the radio antenna onto the antenna arm.	Press the ON/OFF button on the instrument for at least 2 s to switch on the instrument.
15.	Attach the radio in its housing to port P2 or P3 on the instrument.	-
16.	Connect the radio antenna to the radio using the second 1.2 m antenna cable.	-
17.	Press the ON/OFF button on the instrument for at least 2 s to switch on the instrument.	-

4.1.3 Setting up as a Real-Time Rover

Use
The equipment setup is used for real-time rover with extended periods of use in the field.

Description
The radio attaches to the GS10 and is placed in the backpack. Connections are made to the GNSS antenna, radio antenna and field controller. The cables coming from the backpack can be disconnected when an obstacle such as a fence has to be crossed. The field controller is fixed to the pole with the GHT62. Connection between the GS15 instrument and the field controller is made through Bluetooth.

☞
- The antenna is mounted directly using screw fitting. If using stub and adapter, procedures can vary slightly.
- When using the pole with stub, ensure that the antenna and the screw-to-stub adapter slide down the full length of the stub before tightening the locking ring. An incorrectly mounted antenna will have a direct effect on the results.
- Aluminium poles are used. They can be replaced with their carbon fibre equivalent without any change to these instructions.
- Standard radio is used throughout the instructions. Digital cellular phones can also be used but the setup can differ slightly.

Equipment setup - GS10

0012258_001
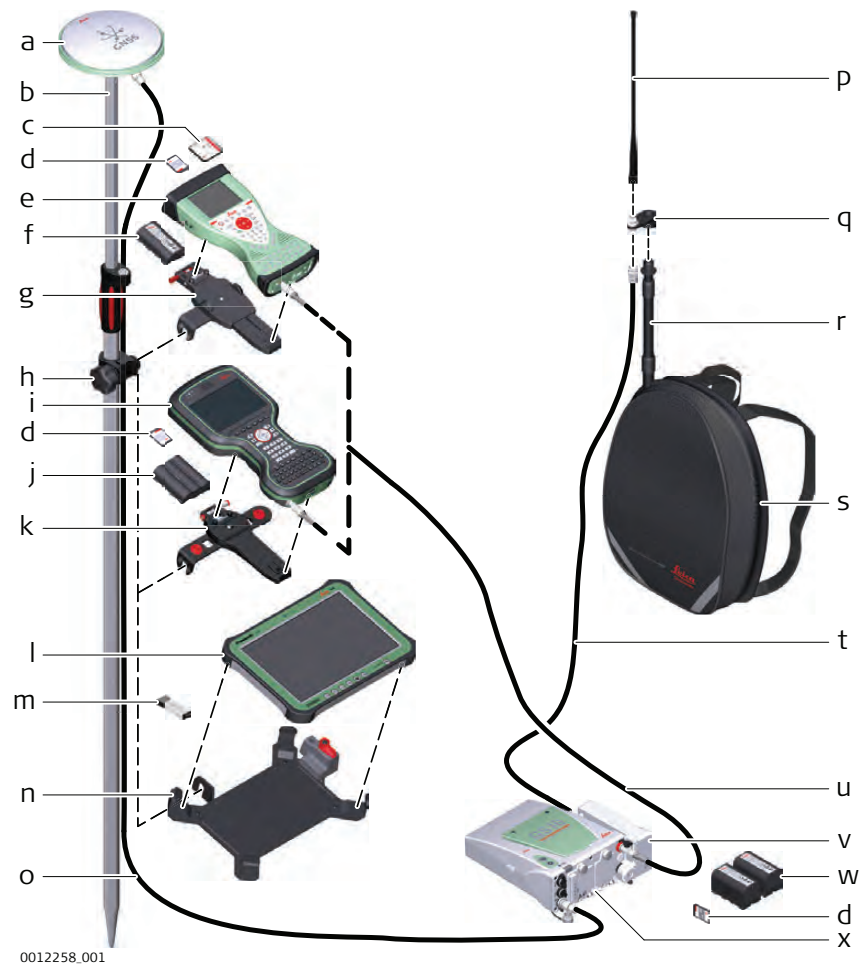
a) GNSS antenna AS05/AS10
b) Pole
c) CompactFlash card
d) SD card
e) CS15 field controller
f) GEB212 battery
g) GHT62 holder
h) Grip for pole
i) CS20 field controller
j) GEB331 batteries
k) GHT66 holder
l) CS35 tablet
m) USB stick
n) GHT78 holder
o) Antenna cable
p) Radio antenna
q) GAD34 arm 3 cm
r) Telescopic rod
s) Backpack
t) 1.2 m antenna cable (radio housing - radio antenna)
u) 1.8 m, field controller to GS10 cable
v) GFU RTK modem
w) GEB222 batteries
x) GS10 instrument

Equipment setup - GS15
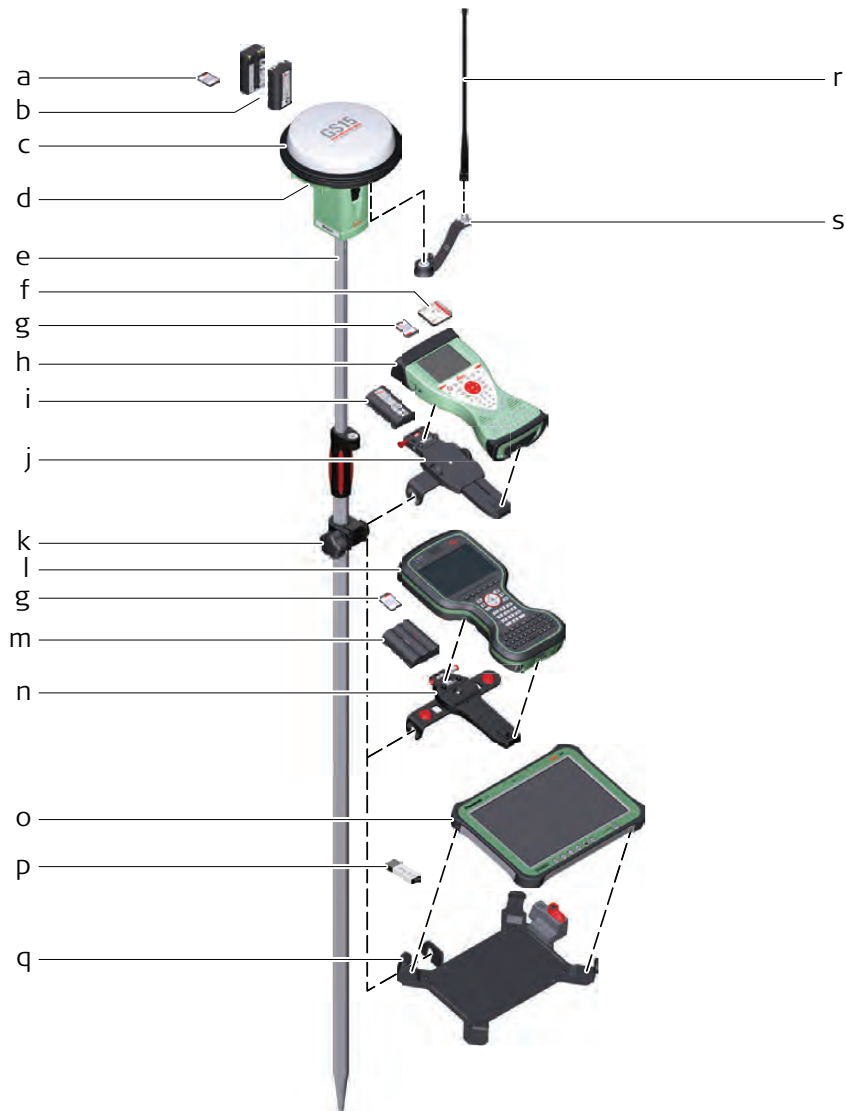
002325_003

a) SD card
b) GEB212 batteries
c) GS15 instrument
d) RTK slot-in device
e) Pole
f) CompactFlash card
g) SD card
h) CS15 field controller
i) GEB212 battery
j) GHT62 holder
k) GHT63 pole clamp
l) CS20 field controller
m) GEB331 battery
n) GHT66 holder
o) CS35 tablet
p) USB stick
q) GHT78 holder
r) GAT1/GAT2 radio antenna
s) GAD108 arm

Equipment setup step-by-step

Step	Description
1.	Attach the GHT62 for CS15 or the GHT66 for CS20 holder to the pole.
2.	Insert the data storage device and the battery into the field controller.
3.	Clip the field controller into the holder and lock it by pushing the locking pin into the locked position.
4.	Press ON/OFF button on the field controller to switch on.
	Proceed with step 5. for GS10 and with step 24. for GS15.
5.	Screw the GNSS antenna to the top of the pole.
6.	Insert the data storage device and the batteries into the instrument.
7.	GS10 Attach the radio in its housing to port P2 or P3 on the instrument. GS25 Insert the slot-in radio into port P3 on the instrument.
8.	Place the instrument in the backpack with the top side facing outwards and the instrument front panel to the top.
9.	Fasten the strap around the instrument.
10.	Push the telescopic rod through the slit in the top of the backpack. Ensure that it is located in the sleeve inside the backpack and push it all the way to the bottom.
11.	Adjust the height of the telescopic rod to suit.
12.	Screw the radio antenna arm onto the telescopic rod.
13.	Connect the first 1.2 m antenna cable to the radio antenna.
14.	Pass the cable through the opening in the top of the backpack and down underneath the instrument.
15.	Connect the first 1.2 m antenna cable to the radio.
16.	Connect the 1.6 m antenna cable to port ANT on the instrument.
17.	Pass the 1.6 m antenna cable through a cable brake and down through the opening in the bottom corner of the backpack flap.
18.	Draw the required amount of cable out of the backpack and tighten the cable brake.
19.	Connect one end of the second 1.2 m antenna cable to the loose end of the 1.6 m antenna cable and the other end to the GNSS antenna.
20.	Connect the 1.8 m, CS to GS cable to the field controller.
21.	Pass the 1.8 m, CS to GS cable through the opening in the bottom corner of the backpack flap and up through a cable brake.
22.	Plug it into port P1 on the instrument.
23.	Press ON/OFF button on the instrument to switch on.
	GS15
24.	Insert the data storage device and the batteries into the GS15.
25.	Press ON/OFF button on the GS15 to switch on.
26.	Screw the GS15 to the top of the pole.
27.	The field controller and GS15 are connected via Bluetooth.

Position of cables in the backpack

GS_112
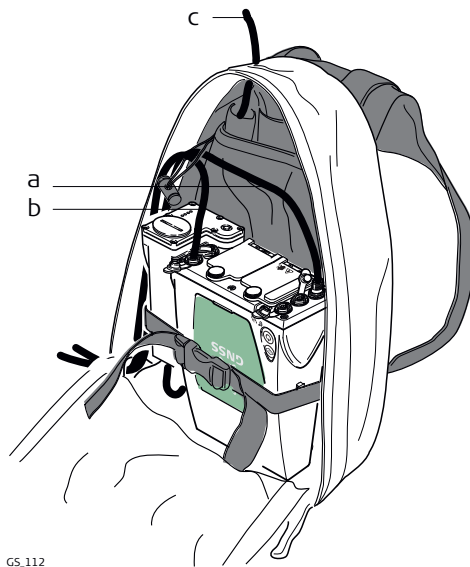
a) 1.6 m antenna cable
b) 1.8 m cable to connect field controller and GS instrument
c) 1.2 m antenna cable to connect radio housing and radio antenna

4.1.4 Using the Backpack

Use

The backpack is used for various applications. The applications are:
• Post-processed kinematic, pole and backpack.
• Real-time rover, pole and backpack.

Antenna pole strap

GS_105
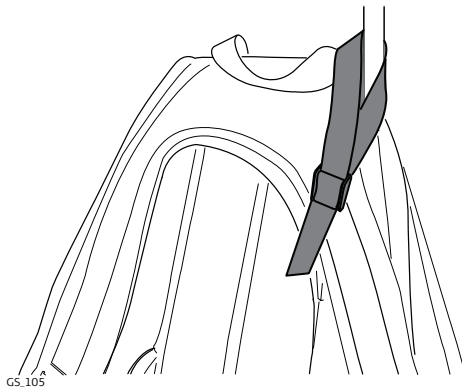
Ensures that the antenna pole does not sway around and remains as upright as possible.

Pass the strap around the pole and fasten using the clip as shown in the diagram.

Hip belt

GS_102

The hip belt
• transfers most of the weight from the shoulders to the hips when properly adjusted.
• contains velcro attachments through which cables can be passed.

Internal net pouch

GS_103
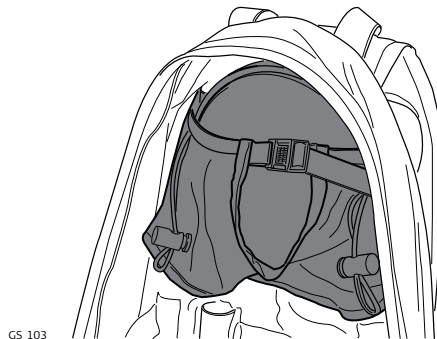
The internal net pouch is designed for
- carrying an AS05/AS10 antenna when not in use.
- storing coiled cables.
- carrying a non-standard radio.
- carrying spare batteries.
- carrying sandwiches.

Use in high temperatures

In high temperatures, it is desirable to increase air flow around the instrument. Therefore the backpack can be kept half or even fully open when in use.

GS_104

To half open the backpack:
1) Open the backpack halfway.
2) Tuck the flap inside.
3) Secure it with the velcro pad.

GS_106

To open the backpack completely:
1) Open the backpack completely.
2) Secure it with the velcro pad.
3) Tuck the flap under the instrument.

4.1.5 Fixing the Field Controller to a Holder and Pole

☞ This chapter is valid for all holders.

Components of the GHT66 Holder

The GHT66 holder consists of the following components:

008545_001
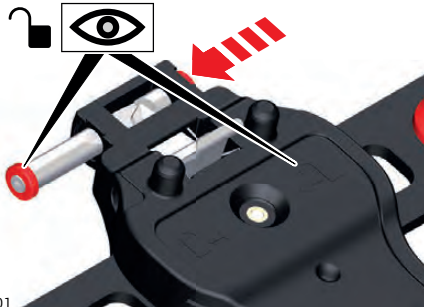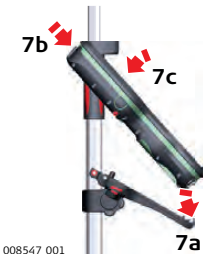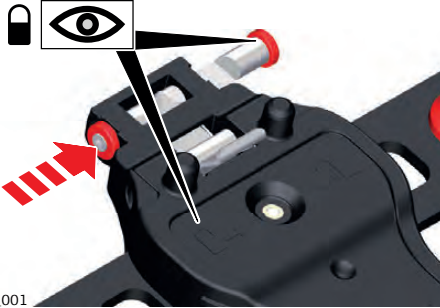
GHT63 clamp
a) Plastic sleeve
b) Pole clamp
c) Clamp bolt
GHT66 holder
d) Locking pin
e) Top clip
f) Mounting plate
g) Bottom clip
h) Tightening screw
i) Mounting arm
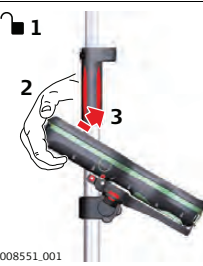
Fixing the Field Controller and GHT66 to a Pole Step-by-step

Step	Description
☞	For an aluminium pole, fit the plastic sleeve to the pole clamp.
1.	Insert the pole into the clamp hole.
2.	Attach the holder to the clamp using the clamp bolt.
3.	Adjust the angle and the height of the holder on the pole to a comfortable position.
4.	Tighten the clamp with the clamp bolt.
5.	Before placing the CS field controller onto the mounting plate, ensure that the locking pin is put into the unlocked position. To unlock the locking pin, push the locking pin to the left.
6.	Hold the CS field controller above the holder and lower the end of the CS field controller into the mounting plate.
7.	Apply slight pressure in a downward direction and then lower the top part of the CS field controller until the unit is clicked into the holder. The guides of the mounting plate aid in this action.
8.	After the CS field controller is placed onto the mounting plate, ensure that the locking pin is put into the locked position. To lock the locking pin, push the locking pin to the right.

Detaching the Field Controller from a Pole Step-by-step

Step	Description
1.	Unlock the locking pin by pushing the locking pin to the left of the mounting plate.
2.	Place your palm over the top of the field controller.
3.	While in this position, lift the top of the field controller from the holder.

4.1.6　　Connecting to a Personal Computer

Description　　**W**indows **M**obile **D**evice **C**enter for PCs with Windows 7/Windows 8/Windows 10 operating system is the synchronization software for Windows mobile-based pocket PCs. WMDC enables a PC and a Windows mobile-based pocket PC to communicate.

Leica USB drivers support Windows 7, Windows 8 (8.1) and Windows 10 operating systems.
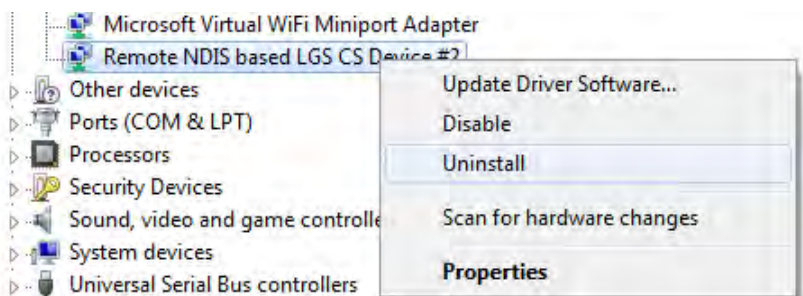
Cables

Leica USB drivers support:
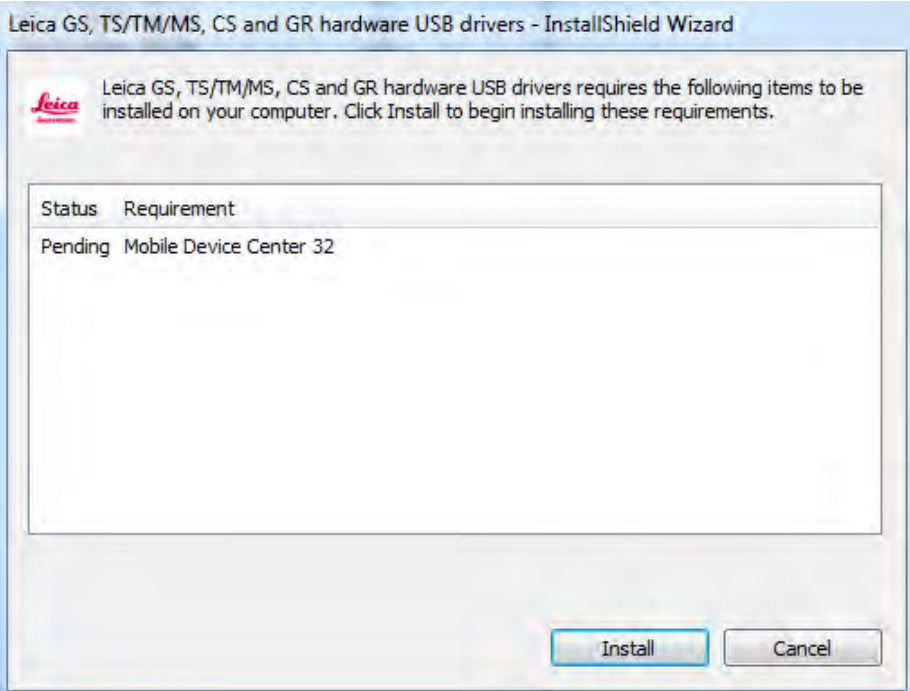
Name	Description
GEV223	USB data cable, 1.8 m, connects instrument to Mini-USB to USB
GEV234	USB data cable, 1.65 m, connects CS to GS or CS to PC (USB)
GEV261	Y-cable, 1.8 m, connects instrument to PC – battery
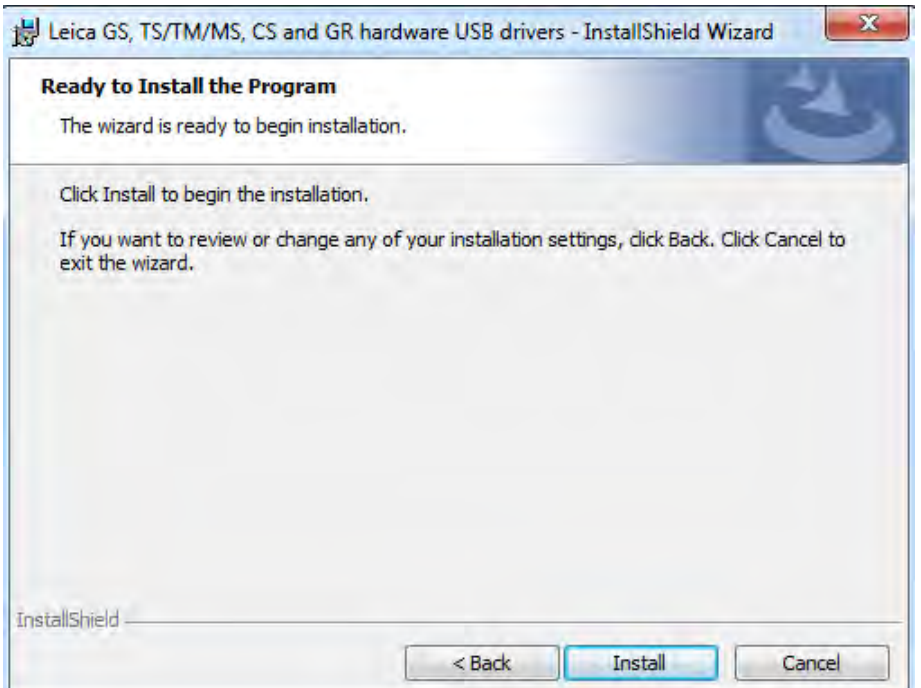
Uninstalling the previous drivers

☞　　Skip the following steps if you have never installed Leica USB drivers before. If older drivers were previously installed on the PC, follow the instructions to un-install the drivers prior the installation of the new drivers.

Step	Description
1.	Connect your instrument to the PC via cable.
2.	On your PC, select to **Control Panel** › **Device Manager**.
3.	In **Network Adapters**, right-click on **Remote NDIS based LGS...**.
4.	Click on **Uninstall**.
5.	Set **Delete the driver...** as checked. Press **OK**.

Install Leica USB drivers

Step	Description
1.	Start the PC.
2.	Run the **Setup_Leica_USB_XXbit.exe** to install the drivers necessary for Leica devices. Depending on the version (32bit or 64bit) of the operating system on your PC, you have to select between the three setup files following: • Setup_Leica_USB_32bit.exe • Setup_Leica_USB_64bit.exe • Setup_Leica_USB_64bit_itanium.exe ☞ To check the version of your operating system, go to **Control Panel** › **System** › **System type**. ☞ The setup requires administrative privileges. ☞ The setup has to be run only once for all Leicadevices. ☞ For PCs with Windows Vista/Windows 7/Windows 8/Windows 10 operating system: If not already installed, WMDC will be installed additionally otherwise this panel would not appear. Click **Install** to continue or **Cancel** to exit installation. Leica GS, TS/TM/MS, CS and GR hardware USB drivers - InstallShield Wizard Leica GS, TS/TM/MS, CS and GR hardware USB drivers requires the following items to be installed on your computer. Click Install to begin installing these requirements. Status Requirement Pending Mobile Device Center 32 Install Cancel

Step	Description
3.	The **Welcome to InstallShield Wizard for Leica GS, TS/TM/MS, CS and GR USB drivers** window appears. ☞ Ensure that all Leica devices are disconnected from your PC before you continue!
4.	**Next>**.
5.	The **Ready to Install the Program** window appears.
6.	**Install**. The drivers will be installed on your PC.
7.	The **InstallShield Wizard Completed** window appears.
8.	Click **Finish** to exit the wizard.

Connect to PC via USB cable step-by-step

Step	Description
1.	Start the PC.
2.	Plug the cable into the instrument.
3.	Turn on the instrument.
4.	Plug the cable into the USB port of the PC. ☞ Windows Device Manager cannot be used with CS20/TS16/TS60/MS60.
5.	Press the Windows Start button at the bottom left corner of the screen.
6.	Type the IP address of the device into the search field. • \\192.168.254.1\ for field controller • \\192.168.254.3\ for other instruments
7.	Press **Enter**. A file browser opens. You can now browse within the folders on the instrument.

4.1.7 Connecting to the Web Server

Description

The Web server is a web-based tool to view the status of and configure the GNSS instruments. The Web server application is integrated into the GS firmware and cannot be deleted.

Accessing the Web server via cable step-by-step

Step	Description
1.	Start the PC and turn on the GS GNSS instrument. ☞ Instead of connecting to your PC, you can connect your GS GNSS instrument to the field controller.
2.	Connect the GS GNSS instrument with the GEV234 cable to the PC. Refer to "4.1.6 Connecting to a Personal Computer".
3.	Double-Click the **Configure GS connection** shortcut from the desktop of your PC. The GS GNSS network adapter is configured with IP address: 192.168.254.1. A DOS window appears when the configuration was successful. Press any key to exit the DOS window. The **Configure GS connection** shortcut disappears from the desktop.
4.	Start the web browser of your PC.
5.	Type in **http://192.168.254.2** and press enter to access the web server of GS instrument.

Accessing the Web server via Bluetooth step-by-step

To access the Web server the tasks following have to be done:
• Configure the PC's Bluetooth device
• Establish a Bluetooth connection between PC and GS
• Accessing the Web server

Configuring the PC's Bluetooth device

Step	Description
1.	Start your PC.
2.	Activate the Bluetooth device of your PC.
3.	Go **Start⇒Settings⇒Network Connections**.
4.	Double-click **Bluetooth** from the **LAN or High-Speed Internet** device list. The **Bluetooth Properties** windows is started.

Step	Description
5.	In the **General** page, select **Internet Protocol (TCP/IP)** from the list and click **Properties**. The **Internet Protocol (TCP/IP) properties** windows is started.
6.	Set **IP address: 192.168.253.1** and **Subnet mask: 255.255.255.0** and click **OK** confirm the settings.
☞	This procedure has to be done only once.

Establishing a Bluetooth connection between PC and GS GNSS instrument

Step	Description
1.	Start the PC and turn on the GS GNSS instrument. ☞ Instead of connecting to your PC, you can connect your GS GNSS instrument to the field controller. In this case, turn on the field controller, start Leica SmartWorx Viva/Leica Captivate and establish a Bluetooth connection to the GS GNSS instrument.
2.	Run the Bluetooth software and start the **Bluetooth Setup Wizard**.
3.	Click **Next**. The **Bluetooth Device Selection** will be started and an automatic search will be done.
4.	Select the shown GS GNSS instrument and click **Next**. The Bluetooth Security Setup is started.
5.	Type in **0000** as **Bluetooth security code** and click **Pair Now**. The pairing procedure will be done and the Bluetooth Service Selection is started.
6.	Highlight **Personal Ad-hoc Network** and check the checkbox for Personal Ad-hoc Network. ☞ Do not select **Serial Port** as service.
7.	Click **Next**. The **Bluetooth Setup Wizard Completion Page** is started.
8.	Type in a name for your GS GNSS instrument and click **Finish** to complete the **Bluetooth Setup Wizard**.
☞	This procedure has to be repeated for every GS GNSS instrument you want to connect to.

Accessing the Web server

Step	Description
1.	Start the web browser on your PC/field controller. ☞ Ensure that your GS GNSS instrument is still running and the Bluetooth connection between PC/field controller and GS is established.
2.	Type in **192.168.253.2**. The Web server is started. You will see the home functions following: • **Go to Work!** – To select and start the Wake-up application. • **Current Status** – To access GNSS information of the GS as well as the instrument firmware. • **Instrument** – To access configuration settings for the GS. • **User** – To upload and activate firmware, licence keys and languages.

4.1.8 Configuring the Instrument

Description

The instrument can be set up as real-time rover or as real-time base by pressing the function button.

☞ Turn on the instrument before pressing the function button. Refer to "Turn on GS10/GS15".

Switching to a real-time rover

Function button	IF the	is	THEN
Press and hold button for ‹ 1 s	GS	in base mode	The GS GNSS instrument switches to be in rover mode.

Switching to a real-time base

Function button	IF the	is	THEN
Pressing for ‹ 1 s	GS	in rover mode and in static mode	The GS GNSS instrument switches to be in base mode and takes the most recent computed position (the average of all static positions).
		in rover mode and in kine-matic mode	The GS GNSS instrument switches to be in base mode.

Updating RTK base position

Function button	IF the	is	THEN
Press and hold button for 3 s	GS	in base mode and a position is available	The RTK base LED flashes green for 2 s. The GS GNSS instrument takes the next available position and updates the coordinates of the currently stored RTK base position.
		in base mode and no position is available	The RTK base LED flashes yellow for 2 s.
		in rover mode	No action. ☞ The GS has to be switched to base mode first. Refer to "Switching to a real-time base".

4.2 Batteries

4.2.1 Operating Principles

First-time Use / Charging Batteries
- The battery must be charged prior to using it for the first time because it is delivered with an energy content as low as possible.
- The permissible temperature range for charging is between 0°C to +40°C/ +32°F to +104°F. For optimal charging, we recommend charging the batteries at a low ambient temperature of +10°C to +20°C/+50°F to +68°F if possible.
- It is normal for the battery to become warm during charging. Using the chargers recommended by Leica Geosystems, it is not possible to charge the battery if the temperature is too high.
- For new batteries or batteries that have been stored for a long time (› three months), it is effectual to make only one charge/discharge cycle.
- For Li-Ion batteries, a single discharging and charging cycle is sufficient. We recommend carrying out the process when the battery capacity indicated on the charger or on a Leica Geosystems product deviates significantly from the actual battery capacity available.

Operation / Discharging
- The batteries can be operated from -20°C to +55°C/-4°F to +131°F.
- Low operating temperatures reduce the capacity that can be drawn; high operating temperatures reduce the service life of the battery.

4.2.2 Battery for GS10

Change battery step-by-step

0012212_001
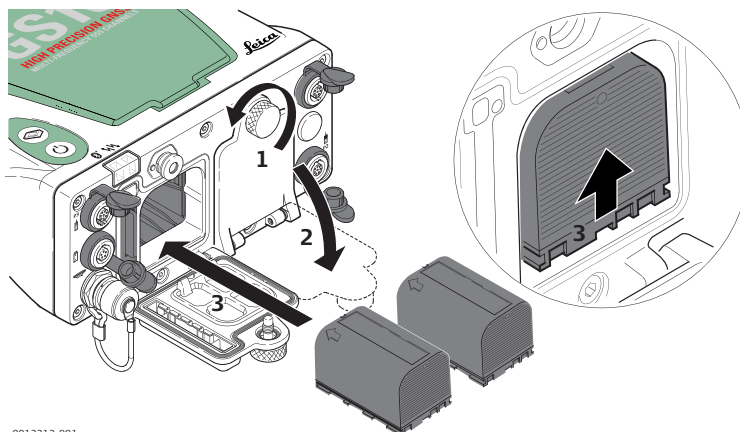
Step	Description
☞	The batteries are inserted in the front of the instrument.
1.	Loosen the screw of one of the battery compartments.
2.	Open the cover of the battery compartment.
3.	With the Leica logo facing upwards, slide the battery into the battery compartment and push upwards so that it locks into position.
4.	Close the cover of the battery compartment and tighten the screw.
5.	Repeat steps 1. to 4. for the second battery compartment.
6.	To remove a battery, loosen the screw to open the cover of the battery compartment.
7.	Push the battery slightly in and at the same time downwards. This releases the battery from its fixed position.
8.	Pull out the battery.
9.	Close the cover of the battery compartment and tighten the screw.
10.	Repeat steps 6. to 9. for the second battery compartment.

Change Battery Step-by-Step (GS15)

008649_002
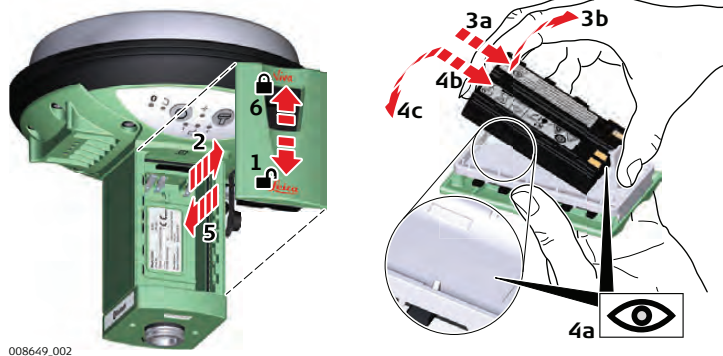
Step	Description
☞	The batteries are inserted in the bottom part of the instrument.
1.	Push the slide fastener of one of the battery compartments in the direction of the arrow with the open-lock symbol.
2.	Remove the cover from the battery compartment.
3.	With the battery contacts facing upwards, slide the battery into the cover of the battery compartment.
4.	Push the battery upwards so that it locks into position.
5.	Insert the cover of the battery compartment into the compartment.
6.	Push the slide fastener in the direction of the arrow with the close-lock symbol.

☞
- Keep the card dry.
- Use it only within the specified temperature range.
- Do not bend the card.
- Protect the card from direct impacts.

☞
Failure to follow these instructions could result in data loss and/or permanent damage to the card.

Insert and remove an SD card into GS10 step-by-step

0012213_001
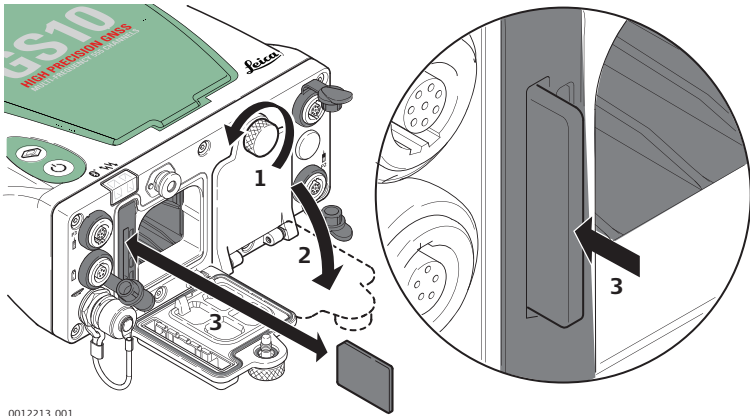
Step	Description
☞	The SD card is inserted into a slot inside the battery compartment A of the instrument.
1.	Open the cover of battery compartment A. Refer to "4.2.2 Battery for GS10" for further information.
2.	Insert the card firmly into the slot until it clicks into position.
3.	Close the cover of battery compartment A and tighten the screw.
4.	To remove the card, open the cover of battery compartment A.
5.	Gently press on the top of the card to release it from the slot.
6.	Remove the SD card.
7.	Close the cover of battery compartment A and tighten the screw.

**Insert and Remove
an SD Card into
GS15 Step-by-Step**
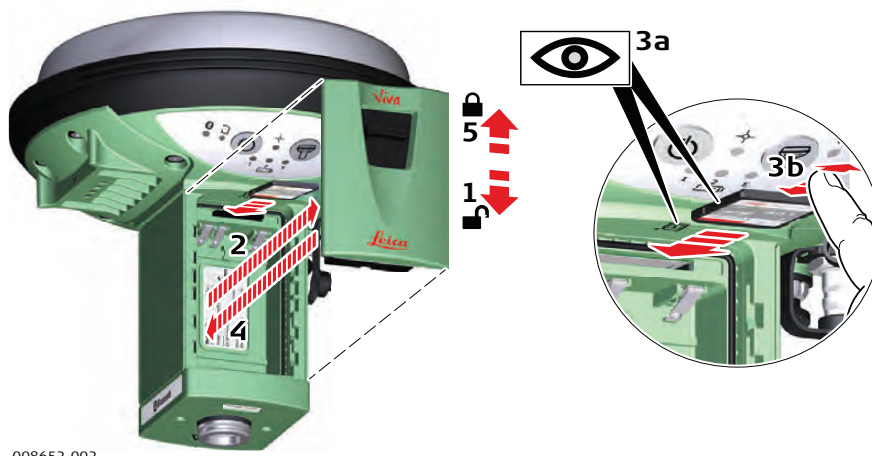
008652_002

Step	Description
☞	The SD card is inserted into a slot inside the battery compartment 1 of the instrument.
1.	Push the slide fastener of battery compartment 1 in the direction of the arrow with the open-lock symbol.
2.	Remove the cover from battery compartment 1.
3.	Slide the card firmly into the slot until it clicks into position.
☞	Do not force the card into the slot. The card should be held with the contacts upwards and facing the slot.
☞	To remove the card, push the slide fastener of battery compartment 1 in the direction of the arrow with the open-lock symbol and remove the cover. Gently press on the top of the card to release it from the slot. Remove the SD card.
4.	Insert the cover into battery compartment 1.
5.	Push the slide fastener in the direction of the arrow with the close-lock symbol.

4.4   Working with the RTK Device
4.4.1   GS10

Devices fitting into a clip-on-housing

Digital cellular phones fitting into a clip-on-housing

Digital cellular phone	Clip-on-housing
Telit UC864-G	GFU28
Cinterion PXS8	GFU29

Radios fitting into a clip-on-housing

Radio	Clip-on-housing
Satelline M3-TR1, transceive	GFU27
Satelline M3-TR4, transceive	GFU30

Attach and detach a clip-on-housing step-by-step

0012214_001
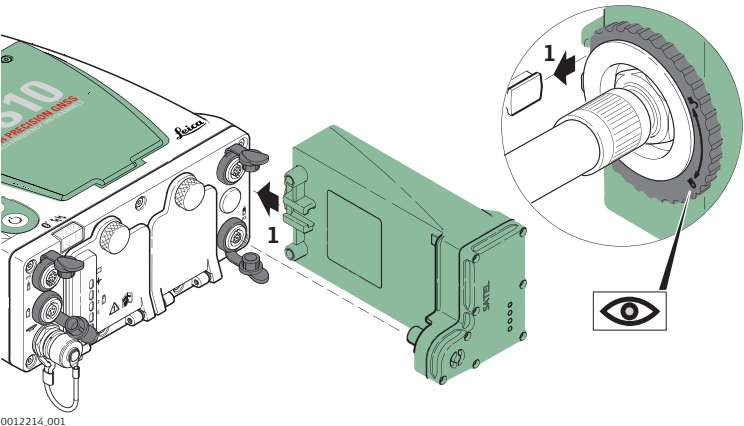
Step	Description
☞	The clip-on-housing for devices fits on either of the small sides of the instrument.
1.	Place the clip-on-housing into position such that the guide rails for the clip-on-housing on the instrument and the guide rails on the clip-on-housing are aligned.
2.	Ensure that the connector on the clip-on-housing fits to port P2 or port P3 on the instrument front panel.
3.	Slide the clip-on-housing toward the instrument front panel until the connector is plugged into port P2 or port P3.
4.	On the top side of the clip-on-housing, turn the screw clockwise, as shown by the symbols on the screw, to lock the clip-on-housing to the instrument.
5.	To detach the clip-on-housing, turn the screw anticlockwise on the top side of the clip-on-housing, as shown by the symbols on the screw, to unlock the clip-on-housing from the instrument.
6.	Slide the clip-on-housing away from the instrument front panel until the connector is unplugged from port P2 or port P3.

Insert and remove a SIM card step-by-step

GS_087
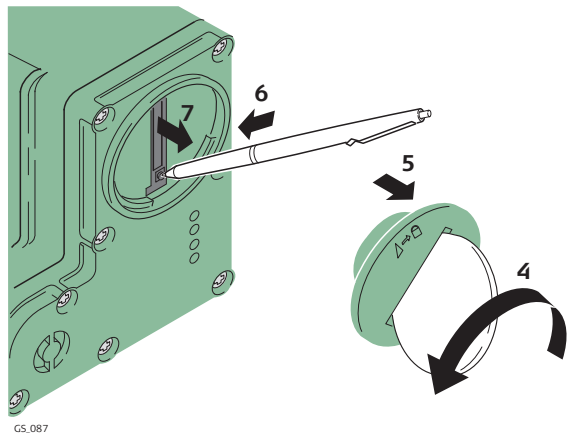
Step	Description
☞	The SIM card is inserted into a slot on the bottom of the clip-on-housing.
1.	Take the SIM card, a coin and a pen.
2.	Locate the SIM card screw, that covers the SIM card slot, on the bottom of the clip-on-housing.
3.	Insert the coin into the groove of the SIM card screw.
4.	Turn the coin anticlockwise to loosen the SIM card screw.
5.	Remove the SIM card screw from the housing.
6.	Using the pen, press the small button of the SIM card slot to eject the SIM card holder.
7.	Take the SIM card holder out off the housing.
8.	Place the SIM card into the SIM card holder, the chip facing up.
9.	Insert the SIM card holder into the SIM card slot, the chip facing the connectors inside the slot.
10.	Place the SIM card screw back on the housing.
11.	Insert the coin into the groove of the SIM card screw.
12.	Turn the coin clockwise to tighten the SIM card screw.

LED indicators

Description
Each clip-on-housing for a radio or digital cellular phones has **L**ight **E**mitting **D**iode indicators on the bottom side. They indicate the basic device status.

Diagram

GS_088
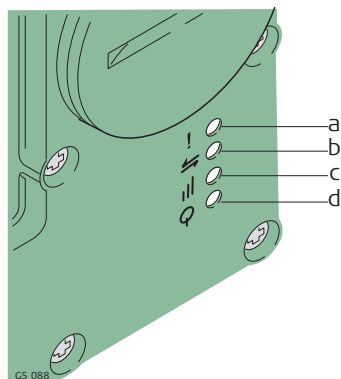
a) Mode LED, available for Satel radios
b) Data transfer LED
c) Signal strength LED
d) Power LED

Description of the LEDs

IF the	on	is	THEN
Mode LED	GFU27 with Satelline M3-TR1 GFU30 with Satelline M3-TR4	red	the device is in the programming mode controlled from the PC via cable.
Data transfer LED	any device	off	data is not being transferred.
		green or flashing green	data is being transferred.
Signal strength LED	GFU28 with Telit UC864-G	red	call is in progress.
		red: long flash, long break	no SIM card inserted, no PIN entered or network search, user authentication or network login in progress.
		red: short flash, long break	logged on to network, no call in progress.
		red: flashing red, long break	GPRS PDP context activated.
		red: long flash, short break	Packet switched data transfer is in progress.
		off	device is off.
	GFU29 with Cinterion PXS8	off	LED has not been activated by the GS10/GS15.
		500 ms on and 500 ms off	network searching or limited GSM/UMTS service due to missing SIM or PIN.
		Flashing every 4 s	registered to network, but no data transfer in progress.
		Flashing every 2 s	packet service data transfer in progress.
		Flashing every 1 s	circuit switched data transfer in progress (GSM/UMTS only).
	GFU27 with Satelline M3-TR1 GFU30 with Satelline M3-TR4	red or flashing red	the communication link, **D**ata **C**arrier **D**etection, is okay on the roving instrument.
		off	the DCD is not okay.
Power LED	GFU29 with Cinterion PXS8	off	power is completely off OR GSM module is shut down. 10 s power down are required to restart.
		green	power is on AND GSM module is ready.
	any other device	off	power is off.
		green	power is okay.

Devices Fitting into the GS15 GNSS Instrument

Digital cellular phones fitting into the GS15 GNSS instrument

Digital cellular phone	Device
Telit UC864-G	SLG1

Radios fitting into the GS15 GNSS instrument

Radio	Device
Satelline M3-TR1, transceive	SLR5
Satelline M3-TR4, transceive	SLR6

Insert and Remove a Slot-in-Device Step-by-Step

008653_002

Step	Description
☞	Turn over the GS15 to gain access to the slot-in-device compartment.
1.	Loosen the screws of the compartment cover with the supplied Allen key.
2.	Remove the compartment cover.
3.	Attach the slot-in-device to the compartment cover.
4.	Insert the compartment cover into the compartment (port P3).
5.	Tighten the screws. ☞ All screws have to be tightened to ensure that the instrument is waterproof.
☞	For the equipment setup as real-time base station with radio, it's recommended to use an external radio antenna mounted on a second tripod. This increases the height of the radio antenna and therefore maximises radio coverage.

Insert and Remove a SIM Card Step-by-Step
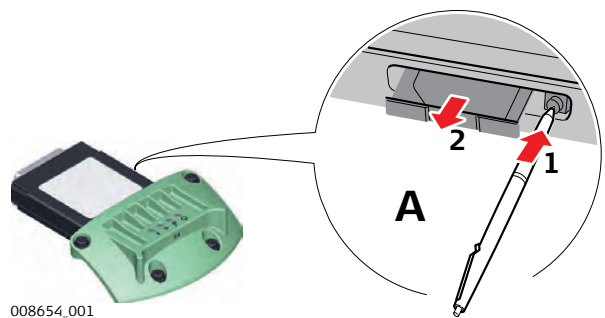
008654_001

Step	Description
☞	The SIM card is inserted into a slot on the side of the SLG1.
☞	Take the SIM card and a pen.
1.	Using the pen, press the small button of the SIM card slot to eject the SIM card holder.
2.	Take the SIM card holder out off the SLG1.
3.	Place the SIM card into the SIM card holder, the chip facing up.
4.	Insert the SIM card holder into the SIM card slot, the chip facing the connectors inside the slot.

LED Indicators

Description

Each slot-in-device for a radio or digital cellular phones has **L**ight **E**mitting **D**iode indicators on the bottom side. They indicate the basic device status.

Diagram
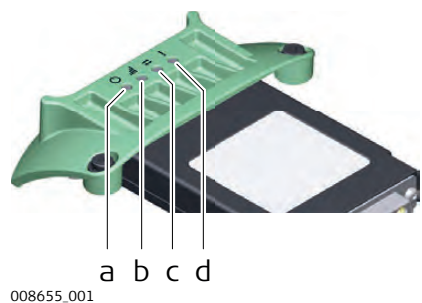
008655_001

a) Power LED
b) Signal strength LED
c) Data transfer LED
d) Mode LED, available for Satel radios

Description of the LEDs

IF the	on	is	THEN
Mode LED	SLR5 with Satelline M3-TR1 SLR6 with Satelline M3-TR4	red	the device is in the programming mode controlled from the PC via cable.
Data transfer LED	any device	off	data is not being transferred.
		flashing green	data is being transferred.

IF the	on	is	THEN
Signal strength LED	SLG1 with Telit UC864-G	red	call is in progress.
		red: long flash, long break	no SIM card inserted, no PIN entered or network search, user authentication or network login in progress.
		red: short flash, long break	logged on to network, no call in progress.
		red: flashing red, long break	GPRS PDP context activated.
		red: long flash, short break	Packet switched data transfer is in progress.
		off	device is off.
	SLR5 with Satelline M3-TR1 SLR6 with Satelline M3-TR4	red	the communication link, **D**ata **C**arrier **D**etection, is okay on the roving instrument.
		flashing red	the communication link, **D**ata **C**arrier **D**etection, is okay on the roving instrument, but signal is weak.
		off	the DCD is not okay.
Power LED	any device	off	power is off.
		green	power is okay.

4.5 LED Indicators on GS10/GS15

LED indicators

Description

The GS10/GS15 GNSS instrument has **L**ight **E**mitting **D**iode indicators. They indicate the basic instrument status.

Diagram

GS10
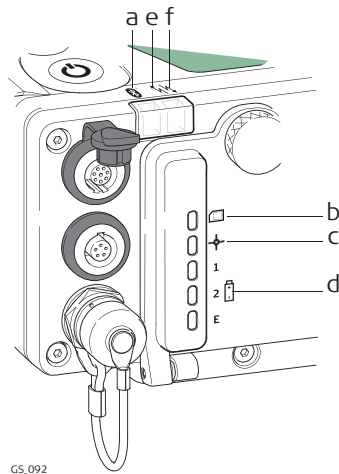
GS_092

GS15
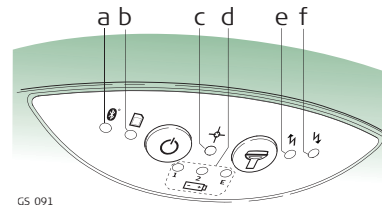
GS_091

a) Bluetooth LED
b) Storage LED
c) Position LED
d) Power LEDs
e) RTK Base LED
f) RTK Rover LED

Description of the LEDs

IF the	is	THEN
Bluetooth LED	green	Bluetooth is in data mode and ready for connecting.
	purple	Bluetooth is connecting.
	blue	Bluetooth has connected.
Storage LED	off	no SD card is inserted or GS10/GS15 is switched off.
	green	SD card is inserted but no raw data is being logged.
	flashing green	raw data is being logged.
	flashing yellow	raw data is being logged but only 10% memory left.
	flashing red	raw data is being logged but only 5% memory left.
	red	SD card is full, no raw data is being logged.
	fast flashing red	no SD card is inserted but GS10/GS15 is configured to log raw data.
Position LED	off	no satellites are tracked or GS10/GS15 is switched off.
	flashing yellow	less than four satellites are tracked, a position is not yet available.
	yellow	a navigated position is available.
	flashing green	a code-only position is available.
	green	a fixed RTK position is available. SmartLink is converging or has converged.
Power LED (active battery[*1])	off	battery is not connected, flat or GS10/GS15 is switched off.

IF the	is	THEN
	green	power is 40% - 100%.
	yellow	power is 20% - 40%. The remaining time for which enough power is available depends on the type of survey, the temperature and the age of the battery.
	red	power is 5% - 20%.
	fast flashing red	power is low (< 5%).
Power LED (passive battery[*2])	off	battery is not connected, flat or the GS10/GS15 is switched off.
	flashing green	power is 40% - 100%. LED is green for 1 s every 10 s.
	flashing yellow	power is 20% - 40%. LED is yellow for 1 s every 10 s.
	flashing red	power is less than 20%. LED is red for 1 s every 10 s.
RTK Rover LED	off	GS10/GS15 is in RTK base mode or GS10/GS15 is switched off.
	green	GS10/GS15 is in rover mode. No RTK data is being received at the interface of the communication device.
	flashing green	GS10/GS15 is in rover mode. RTK data is being received at the interface of the communication device.
RTK Base LED	off	GS10/GS15 is in RTK rover mode or GS10/GS15 is switched off.
	green	GS10/GS15 is in RTK base mode. No RTK data is being passed to the RX/TX interface of the communication device.
	flashing green	GS10/GS15 is in RTK base mode. Data is being passed to the RX/TX interface of the communication device.

*1 The battery, which currently powers the GS10/GS15 GNSS instrument.

*2 Other batteries, which are inserted or connected but are not currently power the GS10/GS15 GNSS instrument.

4.6 Guidelines for Correct Results with GNSS Surveys

Undisturbed satellite signal reception

Successful GNSS surveys require undisturbed satellite signal reception, especially at the instrument which serves as a base. Set up the instrument in locations which are free of obstructions such as trees, buildings or mountains.

Steady instrument for static surveys

For static surveys, the instrument must be kept perfectly steady throughout the whole occupation of a point. Place the instrument on a tripod or pillar.

Centred and levelled instrument

Centre and level the instrument precisely over the marker.

5　Care and Transport

5.1　Transport

Transport in the field

When transporting the equipment in the field, always make sure that you
- either carry the product in its original transport container,
- or carry the tripod with its legs splayed across your shoulder, keeping the attached product upright.

Transport in a road vehicle

Never carry the product loose in a road vehicle, as it can be affected by shock and vibration. Always carry the product in its transport container, original packaging or equivalent and secure it.

Shipping

When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.

Shipping, transport of batteries

When transporting or shipping batteries, the person responsible for the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping, contact your local passenger or freight transport company.

5.2　Storage

Product

Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "6 Technical Data" for information about temperature limits.

Li-Ion batteries

- Refer to "Technical Data" for information about storage temperature range.
- Remove batteries from the product and the charger before storing.
- After storage recharge batteries before using.
- Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.
- A storage temperature range of 0°C to +30°C / +32°F to +86°F in a dry environment is recommended to minimize self-discharging of the battery.
- At the recommended storage temperature range, batteries containing a 40% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.

5.3 Cleaning and Drying

Product and accessories

• Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol. Do not use other liquids; these may attack the polymer components.

Damp products

Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40 °C [104 °F] and clean them. Remove the battery cover and dry the battery compartment. Do not repack until everything is dry. Always close the transport container when using in the field.
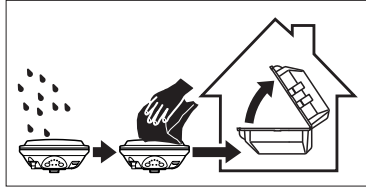
Cables and plugs

Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables.

Connectors with dust caps

Wet connectors must be dry before attaching the dust cap.

6　　Technical Data

6.1　　GS10/GS15 Technical Data

6.1.1　　Tracking Characteristics

Satellite reception　　Multi-frequency

Instrument channels　　☞　Depending on the satellite systems and signals configured, a maximum number of 555 channels is allocated.

Supported signals

System	Signal
GPS	L1 C/A, L2P, L2C, L5
GLONASS	L1 C/A, L2P, L2C
Galileo	E1, E5a, E5b, AltBOC
BeiDou	B1, B2

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

☞　Support of QZSS L1, L2S, L5Q, L6L and IRNSS L5A is incorporated and will be provided through future firmware upgrade.

6.1.2　　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 **r**oot **m**ean **s**quare, are based on measurements processed using Infinity and on real-time measurements.

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

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

Differential phase in post-processing

Type	Horizontal	Vertical
Static and rapid static	3 mm + 0.5 ppm	5 mm + 0.5 ppm
Kinematic	8 mm + 1 ppm	15 mm + 1 ppm
Static with long observations	3 mm + 0.1 ppm	3.5 mm + 0.4 ppm

Differential phase in real-time

Type	Horizontal	Vertical
Single Baseline (< 30 km)	8 mm + 1 ppm	15 mm + 1 ppm
Network RTK	8 mm + 0.5 ppm	15 mm + 0.5 ppm

6.1.3 Technical Data

Dimensions

The dimensions are given for the housing without the sockets.

Type	Length [m]	Width [m]	Thickness [m]
GS10	0.212	0.166	0.079

Type	Height [m]	Diameter [m]
GS15	0.198	0.196

Weight

Instrument weights without battery and radio:

Type	Weight [kg]/[lbs]
GS10	1.20/2.65
GS15	1.34/2.95

Recording

Data (Leica GNSS raw data and RINEX data) can be recorded on the SD card.
1 GB is sufficient for over 1 year of raw data logging based on logging every 15 s from an average of 15 satellites.

Power

Power consumption: GS10/GS15, radio excluded: 3.5 W typically, 300 mA
External supply voltage: Nominal 12 V DC (⎓, GEV71 car battery cable to a 12 V car battery), voltage range 10.5 V-28 V DC

Internal battery

Type: Li-Ion
Voltage: 7.4 V
Capacity: GEB212: 2.6 Ah
GEB222: 6.0 Ah

External battery

GEB371
Type: Li-Ion
Voltage: 13 V
Capacity: 16.8 Ah

Operating times

The given operating times are valid for
* GS10: instrument plus antenna; two fully charged GEB222 batteries.
* GS15: instrument; two fully charged GEB212 batteries.
* room temperature. Operating times will be shorter when working in cold weather.

Equipment			Operating time
Type	Radio	Digital cellular phone	
Static (GS10)	-	-	27 h continuously
Static (GS15)	-	-	19 h continuously
Rover (GS10)	SATELLINE M3-TR1, receive (GFU27)	-	20 h continuously
	SATELLINE M3-TR4, receive (GFU30)	-	20 h continuously
Rover (GS15)	SATELLINE M3-TR1, receive (SLR5)	-	10 h continuously
	SATELLINE M3-TR4, receive (SLR6)	-	10 h continuously

Equipment			Operating time
Type	Radio	Digital cellular phone	
Rover (GS10)	-	Telit UC864-G (GFU28) Cinterion PXS8 (GFU29)	19 h continuously
Rover (GS15)	-	Telit UC864-G (SLG1)	7.5 h continuously

Electrical data

Type	GS10	GS15
Voltage	-	-
Current	-	-
Frequency GPS L1 1575.42 MHz	✓	✓
GPS L2 1227.60 MHz	✓	✓
GPS L5 1176.45 MHz	✓	✓
GLONASS L1 1602.5625-1611.5 MHz	✓	✓
GLONASS L2 1246.4375-1254.3 MHz	✓	✓
Galileo E1 1575.42 MHz	✓	✓
Galileo E5a 1176.45 MHz	✓	✓
Galileo E5b 1207.14 MHz	✓	✓
Galileo AltBOC 1191.795 MHz	✓	✓
BeiDou B1 1561.098 MHz	✓	✓
BeiDou B2 1207.14 MHz	✓	✓
Gain (LNA)	Typically 22 dB	Typically 22 dB
Noise Figure	Typically < 2 dB	Typically < 2 dB

☞ Galileo AltBOC covers bandwidth of Galileo E5a and E5b.

Environmental specifications

Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
All instruments	-40 to +65	-40 to +80
Leica SD cards	-40 to +80	-40 to +80
Battery internal	-20 to +55	-40 to +70

Protection against water, dust and sand

Type	Protection
All instruments	IP68 (IEC 60529) Dust tight Protected against continuous immersion in water Tested for 2 h in 1.40 m depth

Humidity

Type	Protection
All instruments	Up to 100 % The effects of condensation are to be effectively counteracted by periodically drying out the instrument.

6.2 Antennas Technical Data

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
AS05	GPS, GLONASS, SBAS single-frequency antenna with built-in ground plane.	With GS06 or GS10/GS25.
AS10	GPS, GLONASS, Galileo, BeiDou, SBAS, QZSS, L-band antenna with built-in ground plane.	With GS10/GS25.
AR10	GPS, GLONASS, Galileo, BeiDou, SBAS, QZSS, L-band antenna with large ground plane and built-in radome.	With GS10/GS25 where higher precision is required. For example static surveys of long baselines, tectonic plate monitoring and base stations.
AR20	GPS, GLONASS, Galileo, BeiDou, SBAS, QZSS, L-band 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.
AR25	Dorne & Margolin GPS, GLONASS, Galileo, BeiDou, SBAS, QZSS, L-band antenna with 3D choke ring ground plane. Optional protective radome.	With GS10/GS25 where higher precision is required. For example static surveys of long baselines, tectonic plate monitoring and base stations.

Dimensions

Type	AS05/AS10	AR10	AR20	AR25
Height	6.2 cm	14.0 cm	16.3 cm	20.0 cm
Diameter	17.0 cm	24.0 cm	32.0 cm	38.0 cm

Connector

AS05/AS10/AR10:	TNC female
AR20/AR25:	N female

Mounting

All antennas: 5/8" Whitworth

Weight

AS05/AS10:	0.4 kg
AR10:	1.1 kg
AR20:	5.9 kg
AR25:	7.6 kg, radome 1.1 kg

Electrical data

Type	AS05	AS10	AR10	AR20	AR25
Voltage	4.5 V to 18 V DC	4.5 V to 18 V DC	3.3 V to 12 V DC	3.3 V to 12 V DC	3.3 V to 12 V DC
Current	35 mA typ.	35 mA typ.	100 mA max	100 mA max	100 mA max
Frequency					
GPS L1 1575.42 MHz	✓	✓	✓	✓	✓
GPS L2 1227.60 MHz	-	✓	✓	✓	✓
GPS L5 1176.45 MHz	-	✓	✓	✓	✓
GLONASS L1 1602.5625-1611.5 MHz	✓	✓	✓	✓	✓
GLONASS L2 1246.4375-1254.3 MHz	-	✓	✓	✓	✓
GLONASS L3	-	-	✓	✓	✓
GLONASS L5	-	-	-	✓	-
Galileo E1 1575.42 MHz	-	✓	✓	✓	✓
Galileo E5a 1176.45 MHz	-	✓	✓	✓	✓
Galileo E5b 1207.14 MHz	-	✓	✓	✓	✓
Galileo AltBOC 1191.795 MHz	-	✓	✓	✓	✓
Galileo E6 1278.75 MHz	-	-	✓	✓	✓
BeiDou B1 1561.098 MHz	✓	✓	✓	✓	✓
BeiDou B2 1207.14 MHz	-	✓	✓	✓	✓
BeiDou B3 1268.52 MHz	-	-	✓	✓	✓
Gain (typically)	27 dBi	29 dBi	29 dBi	29 dBi	40 dBi
Noise Figure (typically)	‹ 2 dBi	‹ 2 dBi	‹ 2 dBi	‹ 2 dBi	‹ 1.2 dBi max

☞ Galileo AltBOC covers bandwidth of Galileo E5a and E5b.

Environmental specifications

Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
AS05/AS10/AR10	-40 to +70	-55 to +85
AR20/AR25	-55 to +85	-55 to +90

Protection against water, dust and sand

Type	Protection
AS05/AS10	IP68 (IEC 60529)
	Dust tight
	Protected against water jets
	Protected against continuous immersion in water Tested for 2 h in 1.40 m depth
AR10/AR20/AR25	IP67 (IEC 60529)
	Dust tight
	Protected against water jets
	Waterproof to 1 m temporary immersion

Humidity

Type	Protection
All antennas	Up to 100 %
	The effects of condensation are to be effectively counter-acted by periodically drying out the antenna.

Cable length

Separation distance from instrument ...	to antenna	Supplied cable lengths [m]	Optional cable lengths [m]
GS10/GS25	AS05/AS10/ AR10/AR20/AR25	1.2 2.8 10	30 50 70

6.3 Conformity to National Regulations

Conformity to National Regulations

For products which do not fall under R&TTE directive:

CE   Hereby, Leica Geosystems AG, declares that the product/s is/are in compliance with the essential requirements and other relevant provisions of the applicable European Directives. The declaration of conformity can be consulted at http://www.leica-geosystems.com/ce.

• Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
    – This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
    – This device should not be modified (otherwise the granted designation number will become invalid).

6.3.1 GS10

Conformity to national regulations

• FCC Part 15, 22 and 24 (applicable in US)
• Hereby, Leica Geosystems AG, declares that the product GS10 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity can be consulted at http://www.leica-geosystems.com/ce.

CE   Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA member state.

• The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.
• Japanese Radio Law and Japanese Telecommunications Business Law Compliance (applicable for Japan).
    – This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
    – This device should not be modified (otherwise the granted designation number will become invalid).

Frequency band

Type	Frequency band [MHz]
GS10	1176.45 1191.795 1207.14 1227.60 1246.4375 - 1254.3 1575.42 1602.4375 - 1611.5
Bluetooth	2402 - 2480

Output power

Type	Output power [mW]
GNSS	Receive only
Bluetooth	5 (Class 1)

Antenna

Type	Antenna	Gain [dBi]	Connector	Frequency band [MHz]
GNSS	External GNSS antenna element (receive only)	-	-	-
Bluetooth	Internal Microstrip antenna	1.5	-	-

6.3.2 GS15

Conformity to national regulations
- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product GS15 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity can be consulted at http://www.leica-geosystems.com/ce.

  ϵ Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA member state.
- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance (applicable for Japan).
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

Frequency band

Type	Frequency band [MHz]
GS15	1176.45 1191.795 1207.14 1227.60 1246.4375 - 1254.3 1561.098 1575.42 1602.4375 - 1611.5
Bluetooth	2402 - 2480

Output power

Type	Output power [mW]
GNSS	Receive only
Bluetooth	5 (Class 1)

Antenna

Type	Antenna	Gain [dBi]	Connector	Frequency band [MHz]
GNSS	Internal GNSS antenna element (receive only)	-	-	-
Bluetooth	Internal Microstrip antenna	1.5	-	-

6.3.3 GFU27, SATEL Satelline M3-TR1

Conformity to national regulations

- FCC Part 15 and 90 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product GFU27 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and other applicable European Directives. The declaration of conformity can be consulted at http://www.leica-geosystems.com/ce.
- This Class 2 equipment may be operated in: AT, BE, CY, CZ, DK, EE, FI, FR, DE, GR, HU, IE, IT, LV, LT, LU, MT, NL, PL, PT, SK, SI, ES, SE, GB, IS, LI, NO, CH, BG, RO and TR.

  Class 2 equipment according European Directive 1999/5/EC (R&TTE) for which following EEA Member States apply restrictions on the placing on the market or on the putting into service or require authorisation for use:
  - Russia
  - Ukraine (max. 10 mW output power, 433.050 - 434.790 MHz)
  - Georgia
  - Serbia

- The conformity for countries with other national regulations not covered by the FCC part 15 and 90 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

Frequency band

403 MHz - 470 MHz

Output power

GFU27: 0.5 W - 1.0 W

Antenna

Type	Internal	GAT1	GAT2
Frequency band [MHz]	400 - 470	400 - 435	435 - 470
Type	Internal	Detachable λ/2 antenna	Detachable λ/2 antenna
Connector	-	TNC	TNC

Specific Absorption Rate (SAR)

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

6.3.4 GFU28, Telit UC864-G

Conformity to national regulations

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the GFU28 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and other applicable European Directives. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.

  $C\epsilon$ Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.

- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

Frequency band

UMTS/HSDPA (WCDMA/FDD) 850 MHz/ 1900 MHz/ 2100 MHz
Quad-Band EGSM 850 MHz/ 900 MHz/ 1800 MHz/ 1900 MHz
GPRS multi-slot class 12
EDGE multi-slot class 12

Output power

EGSM850/900:	2 W
GSM1800/1900:	1 W
UMTS2100:	0.25 W
EDGE850/900:	0.5 W
EDGE1800/1900:	0.4 W

Antenna

Type	GS15 Internal	GAT3	GAT5	GAT18
Frequency band [MHz]	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170	890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170
Type	Internal	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
Connector	-	TNC	TNC	TNC

Specific Absorption Rate (SAR)

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

6.3.5 GFU29, Cinterion PXS8

Conformity to national regulations
- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the GFU29 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and other applicable European Directives. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.

  $C\epsilon$ Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.
- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

Frequency band

UMTS/HSPA (WCDMA/FDD) 800 MHz/ 850 MHz/ 900 MHz/ 1900 MHz/ 2100 MHz
(E)GSM 850 MHz/ 900 MHz/ 1800 MHz/ 1900 MHz
GPRS/EDGE multi-slot class 12

Output power

UMTS/HSPA:	0.25 W
EGSM850/900:	2 W (EDGE: 0.5 W)
GSM1800/1900:	1 W (EDGE: 0.4 W)

Antenna

Type	GAT3	GAT5	GAT18
Frequency band [MHz]	890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170
Type	Detachable λ/2 antenna	Detachable λ/2 antenna	Detachable λ/2 antenna
Connector	TNC	TNC	TNC

Specific Absorption Rate (SAR)

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

6.3.6 GFU30, SATEL Satelline M3-TR4

Conformity to national regulations

- FCC Part 15 and 90 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product GFU30 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and other applicable European Directives. The declaration of conformity can be consulted at http://www.leica-geosystems.com/ce.
- This Class 2 equipment may be operated in: AT, BE, CY, CZ, DK, EE, FI, FR, DE, GR, HU, IE, IT, LV, LT, LU, MT, NL, PL, PT, SK, SI, ES, SE, GB, IS, LI, NO, CH, BG, RO and TR.

$\mathrm{C}\,\mathrm{E}$ ⊕ Class 2 equipment according European Directive 1999/5/EC (R&TTE) for which following EEA Member States apply restrictions on the placing on the market or on the putting into service or require authorisation for use:
  - Russia
  - Ukraine (max. 10 mW output power, 433.050 - 434.790 MHz)
  - Georgia
  - Serbia

- The conformity for countries with other national regulations not covered by the FCC part 15 and 90 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

Frequency band

403 MHz - 470 MHz

Output power

GFU30:   0.5 W - 1.0 W

Antenna

Type	Internal	GAT1	GAT2
Frequency band [MHz]	400 - 470	400 - 435	435 - 470
Type	Internal	Detachable λ/2 antenna	Detachable λ/2 antenna
Connector	-	TNC	TNC

Specific Absorption Rate (SAR)

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

6.3.7 SLR5, SATEL SATELLINE M3-TR1

Conformity to National Regulations

- FCC Part 15 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product SLR5 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and other applicable European Directives. The declaration of conformity can be consulted at http://www.leica-geosystems.com/ce.
- This Class 2 equipment may be operated in: AT, BE, CY, CZ, DK, EE, FI, FR, DE, GR, HU, IE, IT, LV, LT, LU, MT, NL, PL, PT, SK, SI, ES, SE, GB, IS, LI, NO, CH, BG, RO and TR.

  CE ⊕ Class 2 equipment according European Directive 1999/5/EC (R&TTE)

- The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

Frequency band

403 MHz - 470 MHz

Output power

SLR5: 0.5 W-1.0 W

Antenna

Type	Internal	GAT1	GAT2
Frequency band [MHz]	400 - 470	400 - 435	435 - 470
Type	Internal	Detachable λ/2 antenna	Detachable λ/2 antenna
Connector	-	TNC	TNC

Specific Absorption Rate (SAR)

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

6.3.8 SLR6, SATEL SATELLINE M3-TR4

Conformity to National Regulations

- FCC Part 15 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product SLR6 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and other applicable European Directives. The declaration of conformity can be consulted at http://www.leica-geosystems.com/ce.
- This Class 2 equipment may be operated in: AT, BE, CY, CZ, DK, EE, FI, FR, DE, GR, HU, IE, IT, LV, LT, LU, MT, NL, PL, PT, SK, SI, ES, SE, GB, IS, LI, NO, CH, BG, RO and TR.

  CE ⚠ Class 2 equipment according European Directive 1999/5/EC (R&TTE)

- The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  – This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  – This device should not be modified (otherwise the granted designation number will become invalid).

Frequency band

403 MHz - 470 MHz

Output power

SLR6:   0.5 W-1.0 W

Antenna

Type	Internal	GAT1	GAT2
Frequency band [MHz]	400 - 470	400 - 435	435 - 470
Type	Internal	Detachable λ/2 antenna	Detachable λ/2 antenna
Connector	-	TNC	TNC

Specific Absorption Rate (SAR)

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

6.3.9 SLG1, Telit UC864-G

Conformity to national regulations
- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the SLG1 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and other applicable European Directives. The declaration of conformity may be consulted at http://www.leica-geosystems.com/ce.

  CE Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.
- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

Frequency band

UMTS/HSDPA (WCDMA/FDD) 850 MHz/ 1900 MHz/ 2100 MHz
Quad-Band EGSM 850 MHz/ 900 MHz/ 1800 MHz/ 1900 MHz
GPRS multi-slot class 12
EDGE multi-slot class 12

Output power

EGSM850/900:	2 W
GSM1800/1900:	1 W
UMTS2100:	0.25 W
EDGE850/900:	0.5 W
EDGE1800/1900:	0.4 W

Antenna

Type	GS15 Internal	GAT3	GAT5	GAT18
Frequency band [MHz]	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170	890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170
Type	Internal	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
Connector	-	TNC	TNC	TNC

Specific Absorption Rate (SAR)

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

6.3.10   Dangerous Goods Regulations

Dangerous Goods Regulations

The products of Leica Geosystems are powered by Lithium batteries.

Lithium batteries can be dangerous under certain conditions and can pose a safety hazard. In certain conditions, Lithium batteries can overheat and ignite.

☞   When carrying or shipping your Leica product with Lithium batteries onboard a commercial aircraft, you must do so in accordance with the **IATA Dangerous Goods Regulations**.

☞   Leica Geosystems has developed **Guidelines** on "How to carry Leica products" and "How to ship Leica products" with Lithium batteries. Before any transportation of a Leica product, we ask you to consult these guidelines on our web page (http://www.leica-geosystems.com/dgr) to ensure that you are in accordance with the IATA Dangerous Goods Regulations and that the Leica products can be transported correctly.

☞   Damaged or defective batteries are prohibited from being carried or transported onboard any aircraft. Therefore, ensure that the condition of any battery is safe for transportation.

7   Software Licence Agreement

Software Licence Agreement

This product contains software that is preinstalled on the product, or that is supplied to you on a data carrier medium, or that can be downloaded by you online according to prior authorisation from Leica Geosystems. Such software is protected by copyright and other laws and its use is defined and regulated by the Leica Geosystems Software Licence Agreement, which covers aspects such as, but not limited to, Scope of the Licence, Warranty, Intellectual Property Rights, Limitation of Liability, Exclusion of other Assurances, Governing Law and Place of Jurisdiction. Please make sure, that at any time you fully comply with the terms and conditions of the Leica Geosystems Software Licence Agreement.

Such agreement is provided together with all products and can also be referred to and downloaded at the Leica Geosystems home page at http://www.leica-geosystems.com/swlicense or collected from your Leica Geosystems distributor.

You must not install or use the software unless you have read and accepted the terms and conditions of the Leica Geosystems Software Licence Agreement. Installation or use of the software or any part thereof, is deemed to be an acceptance of all the terms and conditions of such Licence Agreement. If you do not agree to all or some of the terms of such Licence Agreement, you must not download, install or use the software and you must return the unused software together with its accompanying documentation and the purchase receipt to the distributor from whom you purchased the product within ten (10) days of purchase to obtain a full refund of the purchase price.
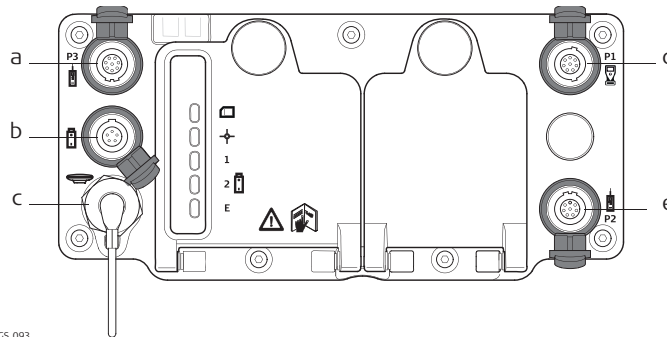
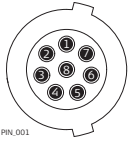# Appendix A   Pin Assignments and Sockets
A.1   GS10

Description

Some applications require knowledge of the pin assignments for the GS10 ports. In this chapter, the pin assignments and sockets for the ports of the GS10 are explained.

Ports at the instrument front panel

a) Port P3: Power out, data in/out or remote interface in/out. 8 pin LEMO
b) Port PWR: Power in. 5 pin LEMO
c) Port ANT: GNSS antenna in
d) Port P1: Field controller in/out or remote interface in/out. 8 pin LEMO
e) Port P2: Power out, data in/out or remote interface in/out. 8 pin LEMO
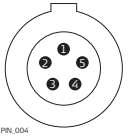
Pin assignments for port P1

Pin	Signal Name	Function	Direction
1	USB_D+	USB data line	In or out
2	USB_D-	USB data line	In or out
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In or out
7	PWR	Power input, 10.5 V-28 V	In
8	TRM_ON/USB_ID	RS232, general-purpose signal	In or out

Pin assignments for port P2, and port P3

Pin	Signal Name	Function	Direction
1	RTS	RS232, ready to send	Out
2	CTS	RS232, clear to send	In
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In
7	GPIO	RS232, configurable function	In or out
8	+12 V	12 V power supply out	Out

Pin assignments for port PWR

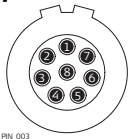| Pin	Signal Name	Function	Direction
1	PWR1	Power input, 11 V-28 V	In
2	ID1	Identification pin	In
3	GND	Signal ground	-
4	PWR2	Power input, 11 V-28 V	In
5	ID2	Identification pin	In

A.2   GS15

Description   Some applications require knowledge of the pin assignments for the GS15 ports. In this chapter, the pin assignments and sockets for the ports of the GS15 are explained.

Ports at the instrument under-side

0012261 001

a) QN-connector
b) Port 2
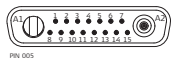c) Port 1 (USB and serial)
d) Port 3

Pin assignments for port P1

PIN_001

Pin	Signal Name	Function	Direction
1	USB_D+	USB data line	In or out
2	USB_D-	USB data line	In or out
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In or out
7	PWR	Power input, 10.5 V-28 V	In
8	TRM_ON/USB_ID	RS232, general-purpose signal	In or out

Pin assignments for port P2

PIN_003

Pin	Signal Name	Function	Direction
1	RTS	RS232, ready to send	Out
2	CTS	RS232, clear to send	In
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In
7	GPIO	RS232, configurable function	In or out
8	+12 V	12 V power supply out	Out

Pin assignments for port P3

Pin	Signal Name	Function	Direction
1	PWR	4 V power supply in	In
2	Tx	Transmit data	In
3	Rx	Receive data	Out
4	GPO/DCD	General-purpose out, carrier detect out	Out
5	RTS	Request to send	In
6	CTS	Clear to send	Out
7	GPI/CFG	General-purpose in, config mode in	In
8	PWR	6 V power supply in	In
9	GPIO	General-purpose signal	In or out
10	GND	Signal and chassis ground	-
11	USB+	USB data line (+)	In or out
12	USB-	USB data line (-)	In or out
13	GND	Signal and chassis ground	-
14	ID	Identification pin	In or out
15	GPIO	General-purpose signal	In or out
A1	NC	Not used	-
A2	RF1	Antenna port, radio to antenna	-

- when it has to be **right**

Geosystems