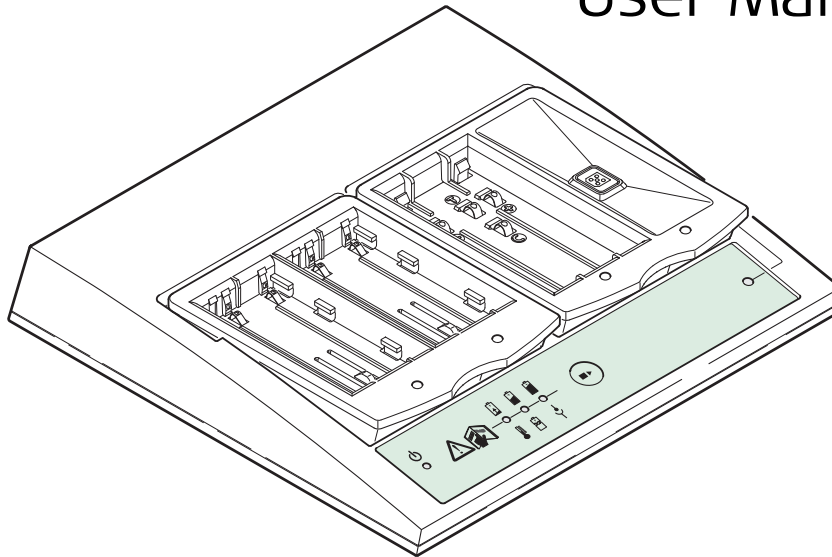


# Leica GKL221 Charger User Manual

EN



Version 1.2  
English

- when it has to be **right**

**Leica**  
Geosystems

## Introduction



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### Product identification

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "4 Safety Directions" for further information. Read carefully through this manual before switching on the product.

The model and the serial number of the product are indicated on the type plate. Enter the model and serial number in this manual and always refer to this information when contacting the agency or Leica Geosystems authorized service workshop.

Type: \_\_\_\_\_ Serial No.: \_\_\_\_\_

### Symbols

The symbols used in this manual have the following meanings:

Type	Description
<b>Danger</b>	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
<b>Warning</b>	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
<b>Caution</b>	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage.
	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

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# 1

## System Description

### Description

The Leica Geosystems GKL221 is an intelligent charger with advanced charging technology. It is designed to charge all Leica batteries. As power supply, the mains as well as GDC221 vehicle dapter connected to the cigarette lighter socket of a vehicle can be used. The GKL221 is a very useful complement to all of your battery operated Leica Geosystems products.

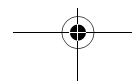
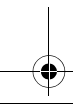
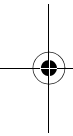
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### General information

Up to five batteries can be connected to the charger. Two batteries can be charged at the same time. With more than two batteries connected, the rest are charged in the order they were connected. Beside charging, the charger can also discharge and refresh batteries.



We recommend starting up the product at this point, while continuing to read the Operating Instructions.

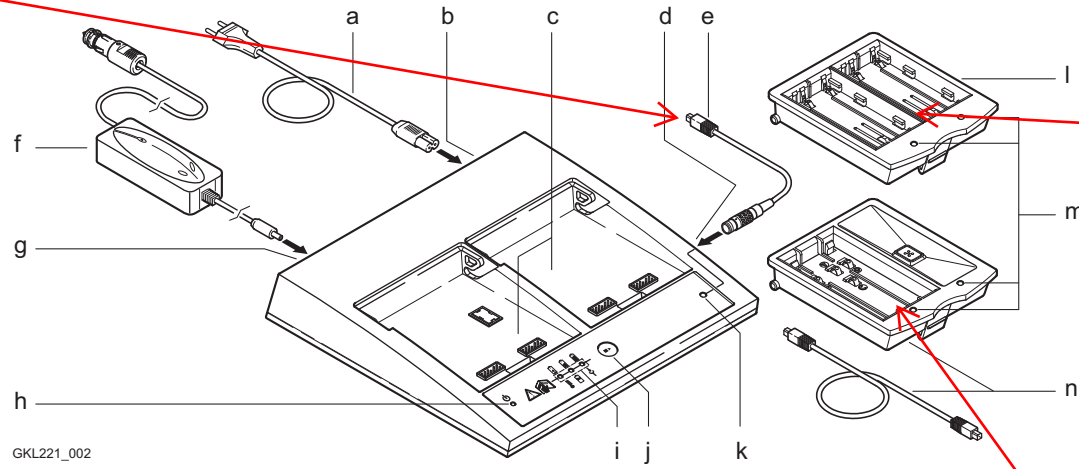




**System components**

**5針的電池**

- GEB87
- GEB187
- GEB77
- GEB79
- GEB70
- GEB71
- GEB171



GKL221\_002

- a) Mains cable, specific for relevant country
- b) Mains cable socket on the charger
- c) Adapter bays I and II for the GDI221 / GDI222 battery adapters
- d) External battery cable connection
- e) Cable socket for external 5 pole batteries
- f) Vehicle adapter GDC221, optional
- g) Vehicle cable socket on the charger
- h) Function indicator
- i) Capacity and error indicators
- j) Selection button
- k) Status indicator for external battery connection
- l) GDI221 battery adapter, optional
- m) Battery status indicators
- n) GDI222 battery adapter and 5 pole charging cable, optional

**可充兩個LI-ON電池(選購)**

- GEB90
- GEB211
- GEB212
- GEB221
- GEB241

**可充一個+一個5針的電池(選購)**

- GEB111
- GEB121
- 5針的電池
- GEB87
- GEB187
- GEB77
- GEB79
- GEB70
- GEB71
- GEB171

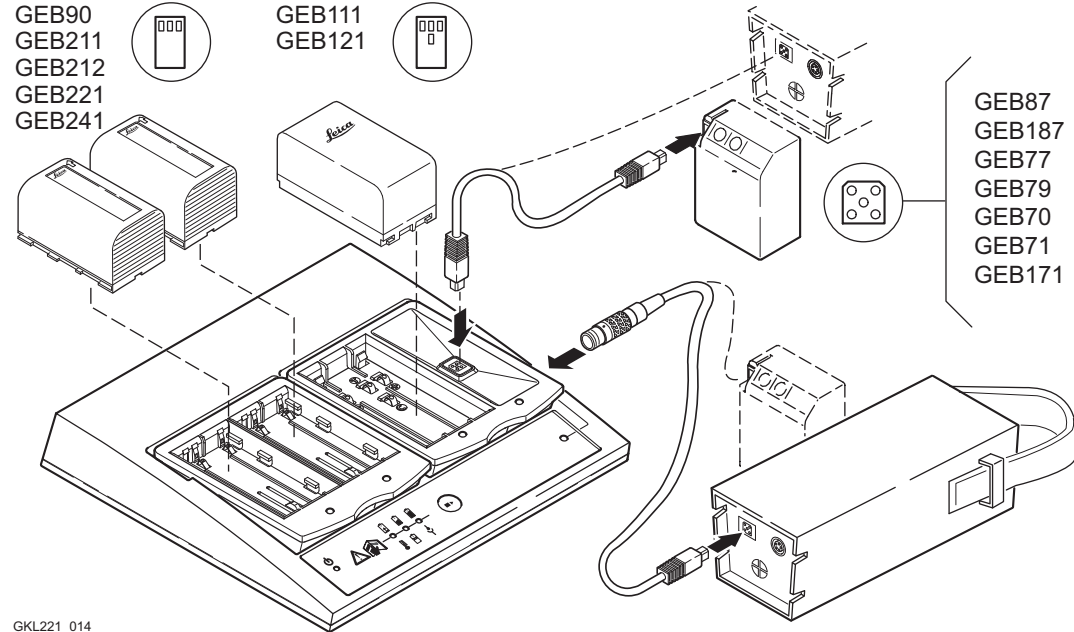
### Rechargeable batteries

The following Leica Geosystems batteries can be charged:

GEB90  
GEB211  
GEB212  
GEB221  
GEB241



GEB111  
GEB121



GKL221\_014



The charger is designed to recharge and discharge original Leica batteries as well as some NiMH/NiCd camcorder batteries. Refer to section "2.3 Inserting and Removing the Batteries" for more information.

### Charger and battery adapters

Using the charger in combination with the battery adapters, enables the following batteries to be connected to the charger:

Charger / battery adapter	Rechargeable batteries
GKL221 with two GDI221	Up to four Li-Ion batteries and one battery with a 5 pole socket.
GKL221 with one GDI221 and one GDI222	Up to two Li-Ion batteries, one camcorder type battery and two batteries with 5 pole sockets.
GKL221 with two GDI222	Up to two camcorder type batteries and three batteries with 5 pole sockets.

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## 2

### 2.1

## Operation

### Battery Adapter

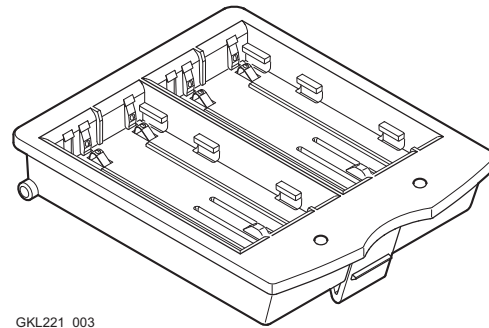
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#### Purpose

The battery adapter connects the charger to the corresponding batteries and has one LED per charging bay that indicates the status of the battery.

#### Type

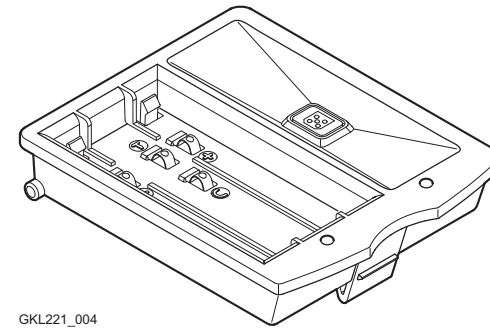
The following battery adapters are available:



GKL221\_003

#### GDI221

- For two Leica Geosystems Li-Ion batteries GEB90, GEB211, GEB212, GEB221 or GEB241.

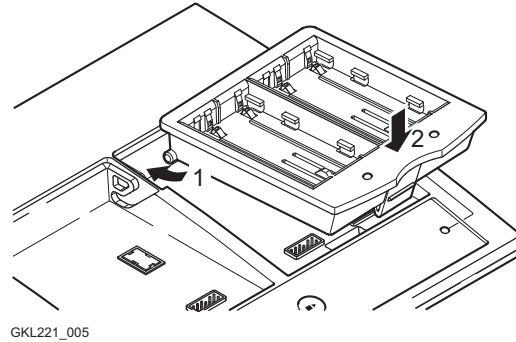


GKL221\_004

#### GDI222

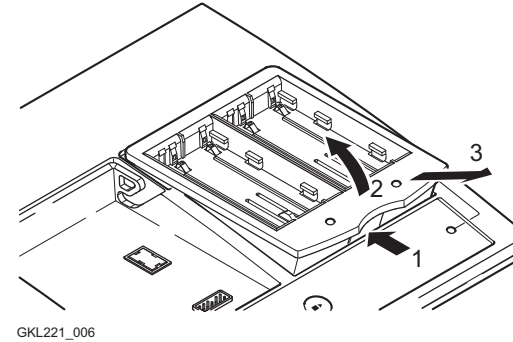
- For one Leica Geosystems NiMH battery GEB111 or GEB121 and one NiCd or NiMH 5 pole battery.

## Inserting and removing



### Inserting

1. Insert the battery adapter along the rear guiding edge.
2. Press on the front of the battery adapter until it clicks and locks into place.



### Removing

1. Press on the front edge of the battery adapter to open it.
2. Carefully lift it up to the stop point.
3. Remove the adapter by pulling it out forwards.

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## 2.2

## Connecting the Charger

### Warning

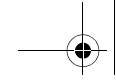
#### Start up

Only use the charger in dry rooms! Never use the charger when it is wet or damp!

Always set the charger on a firm surface before starting it up.

Connect the charger either:

- With the supplied mains cable to the mains power socket or
- With the optional GDC211 vehicle adapter to the battery circuit of a vehicle



Pull the plug from the mains socket and from the vehicle's power socket, if the charger will not be used for a long period.



Only use the vehicle adapter for power supply from a vehicle. If the power supply comes from other sources, such as transformers, malfunctions could occur. Refer to section "5 Technical Data" for information on voltage and rated power.

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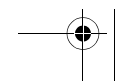
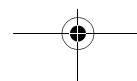
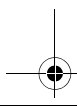
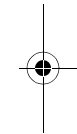
Check older vehicles and make sure that the + pole is on the middle contact surface of the cigarette lighter socket. Should the polarity be wrong, then the fuse in the charger or the fuse in the vehicle adapter has to be changed. The fuse in the charger has to be changed by an authorised Leica Geosystems service workshop. The fuse in the vehicle adapter has to be changed as described in the manual of the adapter.

**Function check**

After the adapter is connected to the mains or to the vehicle's battery circuit, the red, yellow and green function indicators light up once, the capacity and error indicators light up red and green. This is a function check.

If no battery was inserted, then only the green function indicator will light up.

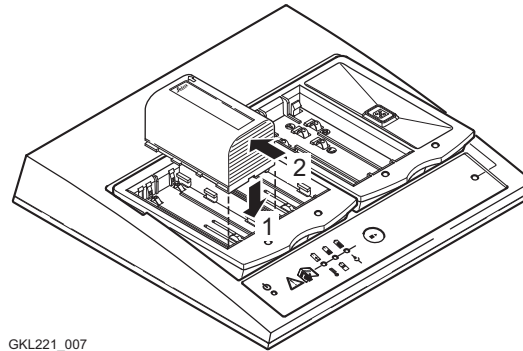
If the status indicator and the three capacity and error indicators light up and remain red, then a defect was detected. Refer to section "2.6 Indicators" for additional information.



## 2.3

## Inserting and Removing the Batteries

### Li-Ion batteries



GKL221\_007

#### Inserting:

1. Insert the battery flush to the front edge of the GDI221 battery bay.
2. Push the battery downwards with only slight pressure to the stop position.

#### Removing:

- Push the battery backwards to the stop and then remove it.

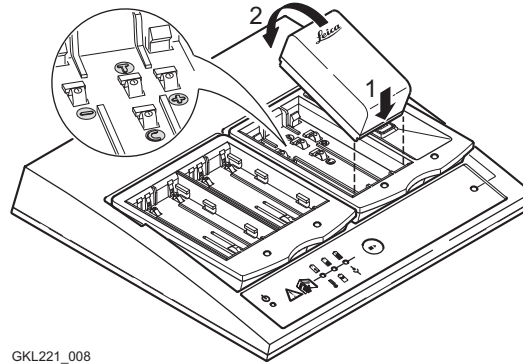
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### Warning

Only charge or discharge batteries recommended by Leica Geosystems. Only use Leica Geosystems Li-Ion batteries.

## NiCd and NiMH batteries

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GKL221\_008

### Inserting:

1. Insert the battery into the front edge of the GDI222 battery bay.
2. Press it downwards until it clicks into place.

### Removing:

- Pull up the back of the battery and remove it.

The Leica Geosystems GEB111 and GEB121 batteries have four contact surfaces, whereas camcorder batteries made by third parties only have three. The charger can distinguish between these two types of batteries and adjust the charging process accordingly.

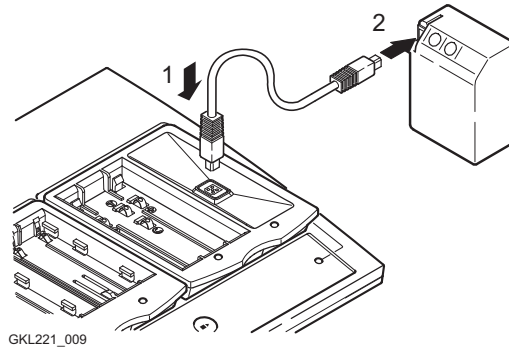
Camcorder batteries with three contact surfaces must meet the following specifications to prevent damage:

- Voltage: 6 V
- Type of battery: NiCd or NiMH
- Minimum capacity: NiCd 1500 mAh, NiMH 1800 mAh
- Compatible contacts in the correct sequence, i.e. "+, T, -" in one line.

Camcorder batteries that meet these specifications are monitored for temperature and charged with a current of 1.6 A.



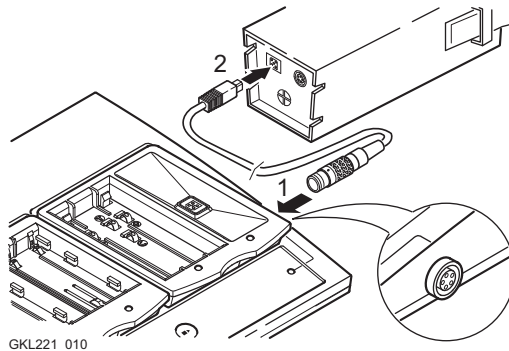
### Batteries with 5 pole charging sockets



Leica Geosystems batteries with 5 pole charging sockets, e.g. the GEB87 or GEB70, must be connected to the 5 pole charging socket of the charging cable.

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### External batteries with 5 pole charging sockets



Leica Geosystems batteries with 5 pole charging sockets, e.g. the GEB87 or GEB70, must be connected to the external battery connection socket of the charging cable.

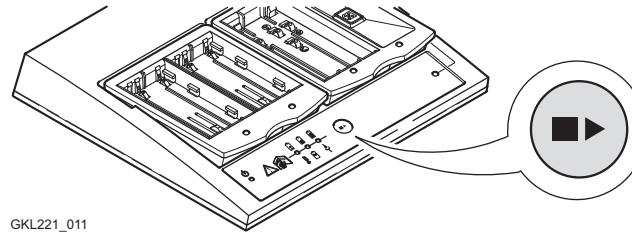
☞ Batteries on external battery connection sockets can be charged without terminating a charging process that has already begun.

## 2.4

## Selection Button

### Functions

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GKL221\_011

The selection button is used to select a charging bay and to toggle between the charging and discharging modes.


Functions	Press the selection button	Description
Select the charging bay	Less than two seconds	The next bay containing a battery is selected. The selected bay is indicated by the yellow status indicator flashing quickly for about three seconds; the battery capacity is also displayed.
Switching between charging and discharging modes	More than three seconds	Switching to the discharging mode causes the status indicator to flash yellow-red for about five seconds, switching into charging mode causes it to flash yellow-green for about five seconds.



Discharging is indicated by the red status indicator flashing. When the process of discharging is completed, the green indicator starts to flash, indicating that the battery is now being charged.

## 2.5 Charging the Battery

### Procedure

Step	Description
1.	Insert the battery adapter.
2.	Connect the charger to the power supply, the green function indicator lights up.
3.	Insert the battery. The yellow status indicator flashes to indicate that the battery has been recognized.
4.	Make sure the green status indicator remains on. The battery is now being charged. Refer to section "2.6 Indicators Lamps", if after connecting the battery a different status indicator lights up.  Check the status indicator after about one minute.
5.	The battery has been completely charged when the green status indicator starts to flash. Refer to section "5 Technical Data", for information on the charging times.
6.	The battery may be removed or remain connected to ensure it is fully charged when needed. Refer to section "Charging modes" for more information.

### Set the charging sequence

The GKL221 charger can charge two batteries simultaneously.  
When more than one battery is connected to the charger, the one connected first is charged first.  
Always connect the more urgently needed battery first.

### Priorities

Batteries are charged at the external battery connection without interrupting a charging process already begun.




### Retaining the full charge

When the battery is fully charged, it may remain connected. NiCd and NiMH batteries are charged in turns to retain their full charge. In this way, the intrinsic self-discharging is compensated and the battery is always fully charged and ready for use. Refer to section "Charging modes" for more information.

### Refreshing the battery




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The refresh function totally discharges the battery and then puts it on quick charge.



Step	Description
1.	Connect the charger to the power supply.
2.	Insert the battery. The yellow status indicator flashes to indicate that the battery has been recognized.
3.	Press the selection button for more than three seconds to start the process of discharging the battery. Discharging is indicated by the red status indicator flashing.  Discharging may take a long time for large capacity batteries. To keep discharge times short, only use this function with batteries that are empty or low on charge.
4.	When the battery has been discharged, it is put on quick charge. The status indicator lights up green.
5.	The battery has been completely charged when the green status indicator starts to flash.
	We recommend refreshing NiCd and NiMH batteries two to three times when their capacity starts to sink noticeably.
	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.

## 2.6 Indicators





### Explanation of the symbols

Symbol	Meaning
	LED Off.
	LED on permanently.
	LED flashes.

### Operation indicators




Symbol	LED	Meaning
	Off	The charger is not connected to the power supply.
	Green	The charger is connected to the power supply.

### Status indicators

Symbol	LED	Meaning
	Off	The connected battery was not recognized.
	Yellow	The connected battery was recognized. The charger is in stand-by mode as two other batteries are being charged or discharged.
	Green	The connected battery is now being charged.
	Green	The connected battery is fully charged and can be removed.

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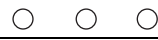



Symbol	LED	Meaning
	Red	The charger has detected an error.
	Red	A battery to be refreshed is connected. The battery is being discharged.
	Yellow	Indicates the active, selected bay.

### Capacity and error indicators

- In normal operation, the three capacity and error indicators light up green to indicate the capacity of the battery in the selected bay. After selecting the bay, the indicators light up for about ten to fifteen seconds, then they switch off.
- In case of an error, the capacity and error indicators turn red to show that there is an error in the selected bay.

### Capacity indicators

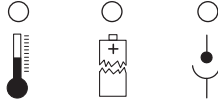


LEDs	Meaning
	The battery charge is less than 20%.
	The battery charge is at least 20%.
	The battery charge is at least 50%.
	The battery charge is at least 80%.



Presently, the level of charge can only be displayed for the Leica Geosystems GEB211, GEB212, GEB221, GEB241 and GEB90 batteries.

**Error indicators**



LEDs	Meaning	Measures to take
	The battery is too cold or overheated.	Refer to section "Temperature range" for additional information.
	The battery is defective.	Use a different battery.
	Faulty contact on the battery or the battery adapter.	Check the contacts.
	Hardware error in the charger.	Contact an authorised Leica Geosystems service workshop.

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If the charger indicates an error when the battery is connected:

- Connect a different battery to check if the fault lies with the battery or the charger.
- If the problem persists, contact an authorised Leica Geosystems service workshop.



In case of error, please also check:

- If there is power coming from the mains or vehicle battery power circuit.
- If the cables are all correctly connected and no obvious faults can be detected.
- If the function indicator is lit on the optionally connected vehicle adapter.



## 2.7

### Tips

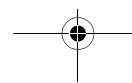
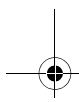
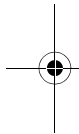
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### Tips

- To charge batteries to their full capacity, new NiCd and NiMH batteries should be fully discharged and charged three to five times.
- Let the batteries in the instrument discharge as much as possible. It prevents the so-called "memory effect" with NiCd batteries.
- When using the vehicle adapter, always keep the motor running while charging the batteries.

Avoid sudden ambient temperature changes while charging the batteries (e.g. do not let the sun shine directly on the batteries or on the charger). Sudden ambient temperature changes may cause the charging process to end prematurely without having fully charged the batteries.







## 3 Care and Transport

### 3.1 Transport



#### Shipment

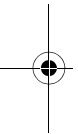
When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.

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### 3.2 Storage

#### Product

Respect the temperature limits when storing the product, particularly in summer if the product is inside a vehicle. Refer to section "5 Technical Data" for information about temperature limits.



### 3.3 Cleaning and Drying

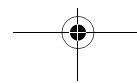
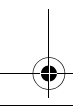


#### Product

Use only a clean, soft, lint-free cloth for cleaning.

#### Cables and plugs

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





## 4 Safety Directions

### 4.1 General

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#### Description

The following instructions should enable the person responsible for the product and the person who actually uses the equipment to anticipate and avoid operational hazards

The person responsible for the product must ensure that all users understand these instructions and adhere to them.

### 4.2 Purpose

#### Permitted use

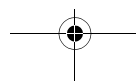
- Charging and discharging batteries of differing cell technologies.

#### Adverse use

- Use of the product without instruction.
- Use outside of the intended limits.
- Disabling safety systems.
- Removal of hazard notices.
- Opening the product using tools, for example screwdriver, unless this is specifically permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with obviously recognizable damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.

#### Warning

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





### 4.3

### Limits of Use

#### Environment

Suitable for use in dry environment only and not under adverse conditions

### 4.4

### Areas of 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 completely safe condition.

#### Manufacturers of non Leica Geosystems accessories

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

#### Person in charge of the product

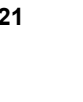
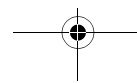
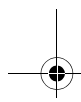
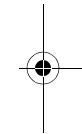
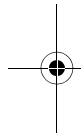
The person in charge of the product has the following duties:

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

#### Warning

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

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## 4.5

## Hazards of Use

### Warning

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

**Precautions:**

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

### Warning

The product is not designed for use under wet and severe conditions. If unit becomes wet it may cause you to receive an electric shock.

**Precautions:**

Use the product only in dry environments, for example in buildings or vehicles. Protect the product against humidity. If the product becomes humid, it must not be used !

### Warning

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

- Touching live components
- Using the product after incorrect attempts were made to carry out repairs.

**Precautions:**

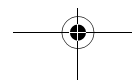
Do not open the product. Only Leica Geosystems authorized service workshops are entitled to repair these products.

### Warning

Batteries not recommended by Leica Geosystems may be damaged if charged or discharged. They may burn and explode.

**Precautions:**

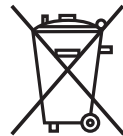
Only charge and discharge batteries recommended by Leica Geosystems.



**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 equipment irresponsibly you may enable unauthorized persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

**Precautions:**

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 unauthorized 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 dealer.

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## 4.6

## Electromagnetic Compatibility EMC

**Description**

The term Electromagnetic Compatability 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**

May cause failure in other equipment if the product is used with third party components, e.g. third party cables or external batteries.

**Precautions:**

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

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 **Warning**

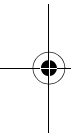
If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

**Precautions:**

While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

**4.7**

**FCC Statement, Applicable in U.S.**



 **Warning**

This product has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

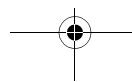
These limits are designed to provide reasonable protection against harmful interference in a residential installation.

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

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

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to eliminate 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



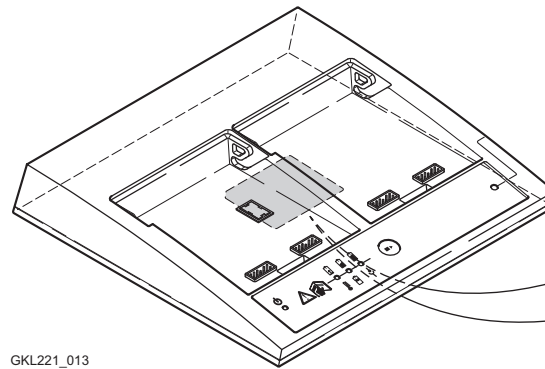
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**Warning**

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

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**Labels**



GKL221\_013

**Type: GKL221**

**Art.No.: .....**

.....  
.....  
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.....  
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*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.*

## 5

## Technical Data

### Power supply

- Mains connection, ~
- D/C voltage connection, ==

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### Input voltage

- 100 - 240 VAC, 50/60 Hz
- 24VDC

### Charging power

Maximum 18 VDC / maximum 4.0 A; depends on the type of battery

### Discharging

4 W

### Power rating

~ : 75 W                      == : 55 W

### Operating environment

Only operate in dry environments, e.g. in buildings and vehicles  
IP40, according to IEC60529

### Temperature range

Storage:	-40°C to +70°C	-40°F to +158°F
Operating:	~ : 0°C to +40°C	+32°F to 104°F
	== : 0°C to +50°C	+32°F to 122°F

### Charging modes

#### Quick charging mode for:

- All Leica Geosystems batteries. It features temperature monitoring and battery recognition. Charging current is maximum 4.0 A, depending on the battery.
- All standard camcorder batteries with three contact surfaces and temperature monitoring. Charging current maximum 1.6 A

#### Normal charging mode for:

- NiCd and NiMH batteries with temperature below +10°C.
- Li-Ion batteries with temperature below +6°C
- Almost or totally empty Li-Ion, NiCd and NiMH batteries.





### Charging technology

#### Conservation charging mode for:

- NiCd and NiMH batteries. Charging current depends on the type of battery. Charging is done in turns of about fifteen seconds per battery.

Li-Ion batteries do not require conservation charging, as they do not lose their charge when not used.

#### Switch off conditions in the quick charging mode:

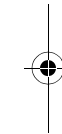
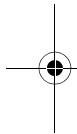
##### For NiCd and NiMH batteries:

- Timer
- Capacity
- Battery temperature
- Negative voltage difference
- Temperature increase per minute
- Double inflection method

##### For Li-Ion batteries:

- Timer
- Capacity
- Battery temperature
- Charging current

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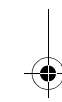
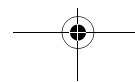
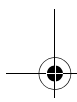


### Cell type

#### Conservation charging of NiCd and NiMH batteries:

Monitors battery voltage, charging current and battery temperature.

- NiCd
- NiMH
- Li-Ion



## Recharging and discharging times

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Recharging and discharging times depend primarily on the charging and discharging current, the capacity of the battery and the state of charge it is in when connected.

The following guidelines can be given:

### Quick charging at 20°C:

#### NiCd batteries

max 2200 mAh 1.0 to 1.5 h  
max 7200 mAh 2.5 to 4.0 h

#### NiMH batteries

max 2200 mAh 1.5 to 2.0 h  
max 4900 mAh 2.0 to 2.5 h  
max 10000 mAh 2.5 to 5.5 h

#### Li-Ion batteries

max 4600 mAh 2.5 to 3.5 h

### Discharging:

#### For NiCd and NiMH batteries

6V batteries with 600 mAh per hour  
12V batteries with 300 mAh per hour

#### Li-Ion batteries

7.4V batteries with 500 mAh per hour

## Indication

Refer to section "2.6 Indicators".

## Weight

Charger including two battery adapters: 1.12 kg

## Dimensions

W X D X H: maximum 237 mm x 227 mm x 43 mm; including the battery adapter