GeoMax Zenith35 Pro Series

User Manual

Version 1.0
English

GE☉MAX

Introduction

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 contact your agency or GeoMax 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.
- microSD 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 Zenith35 Pro GNSS instrument.

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 here.

DANGER, **WARNING**, **CAUTION** and **NOTICE** are standardised 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 following table 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.
- Recording measurements.
- Carrying out measurement tasks using various GNSS measuring techniques.
- Recording GNSS and point related data.
- Remote control of product.
- 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 GeoMax.
- 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

GeoMax AG, CH-9443 Widnau, hereinafter referred to as GeoMax, 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 GeoMax 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.

1.5　　　　　　　　　　Hazards of Use

⚠ **DANGER**

Because of the risk of electrocution, it is dangerous to use poles and extensions in the vicinity of electrical installations such as power cables or electrical railways.
Precautions:
Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

⚠ **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	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.

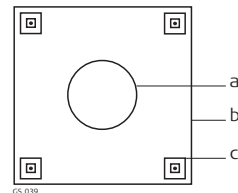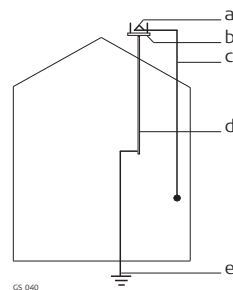| **Lightning conductors**	Suggestion for design of a lightning conductor for a GNSS system:
	1) On non-metallic structures
	    Protection by air terminals is recommended. An air terminal is a pointed solid or tubular rod of conducting material with proper mounting and connection to a conductor. The 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	 a) Antenna b) Support structure c) Air terminal

Grounding the instrument/antenna	 a) Antenna b) Lightning conductor array c) Antenna/instrument connection d) Metallic mast e) Connection to earth
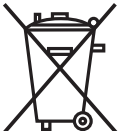
⚠ CAUTION	During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard. **Precautions:** Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat. When transporting 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, metallised 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	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 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 is available from GeoMax AG.

	WARNING	Only GeoMax 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, GeoMax 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 GeoMax. 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, GeoMax 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

⚠	**WARNING**

Use of product with radio or digital cellular phone devices:

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, GeoMax 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.

⚠	**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 GeoMax for compliance could void the user's authority to operate the equipment.

Labelling Zenith35 Pro

Labelling internal battery ZBA601

Model: ZBA601 (3ICR18/65)
Art.No: 827967
Rechargeable Li-ion Battery
10.8V ⎓ 3400mAh 36.7Wh
⚠ CAUTION:
RISK OF FIRE AND BURNS.DO NOT OPEN,
CRUSH,SHORT CONTANTS,OR DISPOSE
OF IN FIRE OR WATER.DO NOT EXPOSE
TO TEMPERATURES ABOVE 70°C (158°F).
DO NOT OVERCHARGE.

S/N: XXXXXXXX | Made in China
Manufactured: Apr.2015
Geoelectron Science Technology Co.LTD
510000 Guangzhou,CHN

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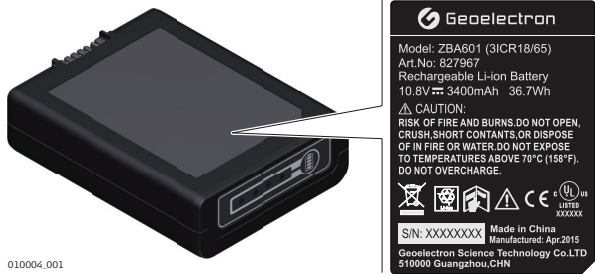
⚠ **WARNING**

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.

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2 Description of the System

2.1 System Components

Main components

| Component	Description
Instrument	A GNSS receiver with integrated communication devices.
Handheld	A multi-purpose device enabling the control of GeoMax instruments.
GeoMax Geo Office	An office software used for the processing of raw GNSS data.
Zenith35 Pro WebManager	A web-based user interface used to manage the GNSS receiver.

2.2 Container Contents

Container for Zenith35 Pro instrument and accessories part 1 of 2
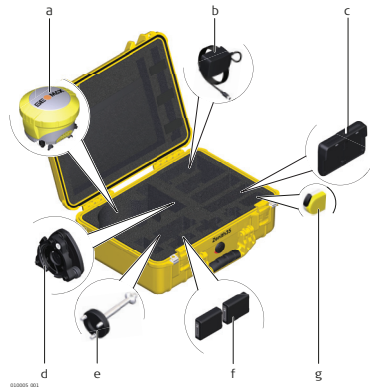
a) Zenith35 Pro instrument
b) Cable for ZCH601
c) ZCH601 battery charger
d) Tribrach
e) Carrier or datalogger
f) ZBA601 battery
g) Measuring tape

Container for Zenith35 Pro instrument and accessories part 2 of 2

a) UHF radio antenna and GSM antenna
b) Quick Guide and CD
c) ZDC509 USB/RS232 cable

2.3 System Concept

2.3.1 Software Concept

Software upload

The software can be uploaded using Zenith35 Pro WebManager.

☞ Refer to "4.2.6 Zenith35 Pro WebManager".

2.3.2 Power Concept

General

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

Power options

Power for the instrument can be supplied either internally or externally.

Internal power supply: One ZBA601 battery fitting into the instrument.
External power supply: 9V to 18V DC external power input with over-voltage protection up to 28V.

2.3.3   Data Storage Concept

Description   GNSS raw data can be recorded on the microSD card or internal memory.

**Data storage device**   ☞   Unplugging connecting cables or removing the microSD card during the measurement can cause loss of data. Only remove the microSD card or unplug connecting cables when the instrument is switched off.

Device	Description
microSD card	The instrument has a microSD card slot fitted as standard. A microSD card can be inserted and removed.
Internal memory	The instrument has an internal memory fitted as standard. Available capacity: 4 GB.

2.4   Instrument Components
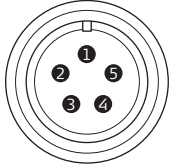
Zenith35 Pro components

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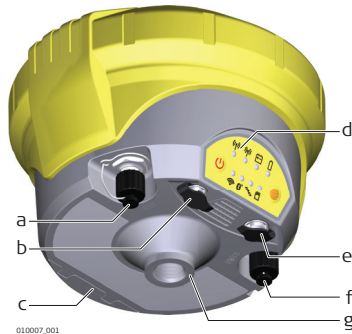
a) TNC connector for UHF antenna
b) LEMO port 1
c) Battery compartment with SIM card and microSD card holder
d) Keyboard with LEDs, ON/OFF button and Function button
e) LEMO port 2
f) TNC connector for UMTS antenna
g) Mechanical Reference Plane (MRP), where the instrument heights are measured.

2.5   Pin Assignments

Pin assignments for port 1

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Pin	Signal Name	Function
1	PWR	12V power supply in
2	GND	Signal and chassis ground
3	TxD	RS232, transmit data
4	GND	Signal ground
5	RxD	RS232, receive data

Pin assignments for port 2
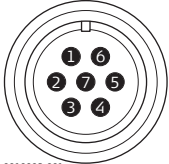
0010008_001

Pin	Signal Name	Function
1	NC	Not used
2	USB_D-	USB data line
3	PWR	5V power supply (USB)
4	USB_D+	USB data line
5	TxD	RS232, transmit data
6	RxD	RS232, receive data
7	GND	Signal ground

Plug types

Port1:   LEMO-1, 5 pin, LEMO EEG.0B.305.CLN
Port2:   LEMO-1, 7 pin, LEMO EEG.0B.307.CLN

Description

The **M**echanical **R**eference **P**lane:
* is where the instrument heights are measured to.
* is where the phase centre variations refer to.
* varies for different instruments.

MRP for instrument

The MRP for the instrument is shown in the diagram.

a) The Mechanical Reference Plane is the underside of the thread.

3 User Interface

3.1 Keyboard
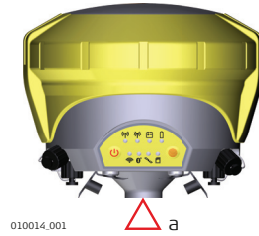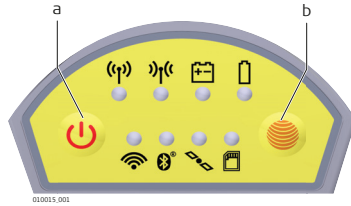
Using the keyboard

a) ON/OFF key
b) Function key

ON/OFF key

Key		Function
ON/OFF		If Zenith35 Pro is off: Turns on Zenith35 Pro when held for 2 s. ☞ While the Zenith35 Pro is booting the two Power LEDs flash. If Zenith35 Pro is already on: Turns off Zenith35 Pro when held for 2 s.

Function key

☞ All functions described assume the Zenith35 Pro is already on.

Key		Function
Function		Press and hold key for <1 s.
		Switches the Zenith35 Pro between rover or base mode.
		Press and hold key for 3 s.
		Updates the base position coordinates when Zenith35 Pro is in base mode. The RTK base LED flashes for 2 s. When no position is available, the LED flashes 2 times.
		Press and hold key for 5 s.
		Connects to the configured RTK base station or NTRIP server when the Zenith35 Pro is in rover mode. The RTK rover LED flashes for 2 s. No action if a rover mode is not configured.

Key combinations

Key		Function
ON/OFF		Press and hold keys for 1 s.
Function		The current almanacs stored on the GNSS instrument are deleted and new almanacs are downloaded. The Position LED flashes yellow three times.
		Press and hold keys for 5 s.
		The Memory LED flashes red quickly three times. The microSD card of the GNSS instrument is formatted. The Memory LED continues to flash red as the SD card is formatted.
		Press and hold keys for 10 s.
		The System RAM on the GNSS instrument is formatted. Settings of all installed software will be deleted. The Storage LED flashes red. The RTK Base and RTK Rover LEDs flash green. The Position LED flashes yellow quickly three times. After the formatting the System RAM, the GNSS instrument is turned off.

3.2 LED Indicators

LED indicators

Description

The Zenith35 Pro has **L**ight **E**mitting **D**iode indicators. They indicate the basic instrument status.

Diagram

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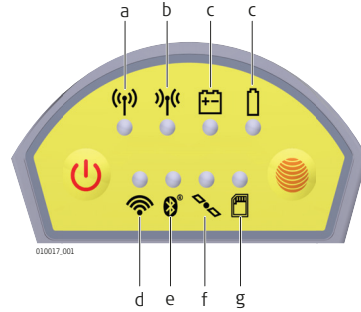
a) RTK Base LED
b) RTK Rover LED
c) Power LED
d) Wi-Fi LED
e) Bluetooth LED
f) Position LED
g) Storage LED

Description of the LEDs

IF the	is	THEN
Wi-Fi LED	green	Wi-Fi is in data mode and ready for connecting.
	blue	Wi-Fi has connected.
Bluetooth LED	green	Bluetooth is in data mode and ready for connecting.
	blue	Bluetooth has connected.
RTK Base LED	green	Zenith35 Pro is in RTK base mode. No RTK data is being passed to the interface of the communication device.
	flashing green	Zenith35 Pro is in RTK base mode. Data is being passed to the interface of the communication device.
RTK Rover LED	green	Zenith35 Pro is in rover mode. No RTK data is being received at the interface of the communication device.
	flashing green	Zenith35 Pro is in rover mode. RTK data is being received at the interface of the communication device.
Position LED	off	no satellites are tracked.
	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.
Power LED	off	battery is not connected, flat or Zenith35 Pro is switched off.
	green	power is 20% - 100%.
	red	power is 5% - 20%. The remaining time for which enough power is available depends on the type of survey, the temperature and the age of the battery.
	fast flashing red	power is low (<5%).
Storage LED	green	microSD card is inserted but no raw data is being logged.
	flashing green	raw data is being logged.
	flashing red	raw data is being logged but only 5% memory left.
	red	microSD card is full, no raw data is being logged or no microSD card is inserted but Zenith35 Pro is configured to log raw data.

4 Operation

4.1 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.

4.2 Equipment Setup

4.2.1 Setting up as a Real-Time Base

Use

The following equipment setup is used for real-time base stations. Raw observation data can also be collected for post-processing.

Equipment setup - Zenith35 Pro

a) Zenith35 Pro instrument
b) ZBA601 battery
c) ZCA100 carrier
d) Handheld
e) Tribrach
f) Tripod
g) UHF antenna
h) ZAR200 antenna arm
i) ZDC202 antenna cable
j) ZPC200 pole

Equipment setup step-by-step

Step	Description
1.	Set up the tripod.
2.	Mount the tribrach on the tripod.
3.	Ensure that the tribrach is over the marker.
4.	Mount and level the carrier on the tribrach.
5.	Insert the battery into the instrument.
6.	Connect the UHF antenna to the instrument using ZAR200 antenna arm and ZDC202 antenna cable.
7.	Press the ON/OFF button on the instrument for 2 s to switch on the instrument.
8.	Screw the instrument onto the carrier.
9.	Check that the tribrach and carrier are still level.
10.	Connect the handheld to the instrument through Bluetooth or through Wi-Fi to the Zenith35 Pro WebManager.
11.	Measure the instrument height using the measuring tape. Refer to "2.6 The Mechanical Reference Plane, MRP" for information on the instrument height.

4.2.2　Setting up as a Post-Processing Base

Use

The following equipment setup is used for static operations over markers.

Equipment setup - Zenith35 Pro
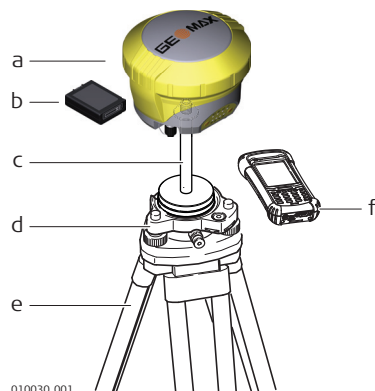
a) Zenith35 Pro instrument
b) ZBA601 battery
c) ZCA100 carrier
d) Tribrach
e) Tripod
f) Handheld

Equipment setup step-by-step

Step	Description
1.	Set up the tripod.
2.	Mount the tribrach on the tripod.
3.	Ensure that the tribrach is over the marker.
4.	Mount and level the carrier on the tribrach.
5.	Insert the battery into the instrument.
6.	Press the ON/OFF button on the instrument for 2 s to switch on the instrument.
7.	Screw the instrument onto the carrier.
8.	Check that the tribrach and carrier are still level.
9.	Connect the handheld to the instrument through Bluetooth or through Wi-Fi to the Zenith35 Pro WebManager.
10.	Measure the instrument height using the measuring tape. Refer to "2.6 The Mechanical Reference Plane, MRP" for information on the instrument height.

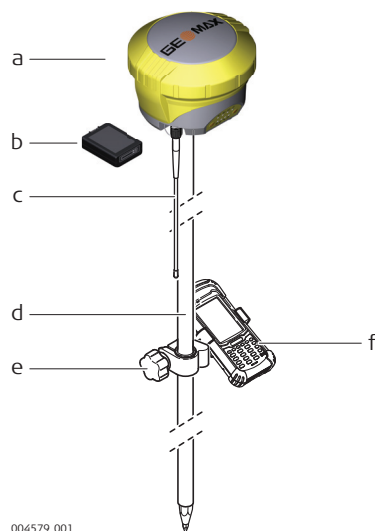## 4.2.3　Setting Up as a Real-Time Rover

Use

The following equipment setup is used for real-time rover.

Equipment setup - Zenith35 Pro

a) Zenith35 Pro instrument
b) ZBA601 battery
c) UHF antenna
d) ZPC200 pole
e) ZHR200 holder
f) Handheld

Equipment setup step-by-step

Step	Description
1.	Attach the ZHR200 holder to the ZPC200 pole. Refer to "4.2.4 Fixing the handheld to a holder and pole".
2.	Clip the handheld into the holder and lock it by tighten the screw on the holder.
3.	Turn on the handheld.
4.	Insert the battery into the instrument.
5.	Connect the UHF antenna to the instrument. The connection is only required when using the internal radio.
6.	Press ON/OFF key on the instrument for 2 s to switch on the instrument.
7.	Screw the instrument to the top of the pole.
8.	Connect the handheld to the instrument through Bluetooth. ☞ If RTK corrections are received with the handheld, the handheld must be connected to the instrument by serial cable.

4.2.4 Fixing the handheld to a holder and pole

Components of the ZHR200 holder
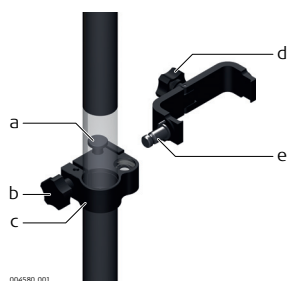
Clamp
a) Locking pin
b) Tightening screw
c) Pole clamp
Holder
d) Tightening screw
e) Pin

004580_001

Fixing the handheld to the holder step-by-step

Step	Description
1.	Insert the pole into the clamp hole.
2.	Tighten the clamp with the tightening screw.
3.	To attach the holder to the clamp insert the pin into the catch of the clamp while pushing down the locking pin.
4.	Place the handheld in the holder.
5.	Tighten the screw of the holder to fix the handheld to the holder.

4.2.5 Connecting to a Personal Computer

Description

The instrument is connected to a Personal Computer via serial/USB cable.

Install software

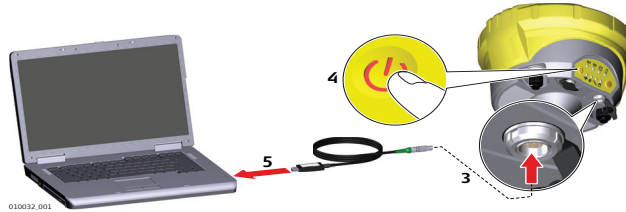| Step	Description
1.	Start the PC.
2.	Download the cable driver from the GeoMax website.
3.	Install the cable driver on a PC using a Windows operating system.

Connect instrument to PC

Step	Description
1.	Start the PC.
2.	Plug the included cable into the port of the instrument.
3.	Turn on the instrument.
4.	Plug the cable into the USB port of the PC. If Windows Hardware Wizard starts up, select **CLOSE**.

4.2.6 Zenith35 Pro WebManager

Description

The Zenith35 Pro WebManager software can be used to set up, configure and operate the instrument, download data from the instrument and microSD card, enter licence keys and upload firmware.

Start Zenith35 Pro WebManager

Step	Description
1.	Turn on the Zenith35 Pro instrument.
2.	Make sure your Wi-Fi on your PC/mobile device is turned on. Search for available connections.
3.	When the instrument is found, connect it to your PC/mobile device.
4.	As soon as the connection is established, start the web browser. Enter into the address bar the IP http://192.168.10.1. A login-window pops up.
5.	Enter user name and password. The default values are: • User name: admin • Password: password
6.	After a successful login the info start screen of the Zenith35 Pro WebManager will appear and the instrument can be accessed.

Menu functions

Function	Description
Hardware Information	To view the current status of the GNSS instrument as well as the instrument firmware.
Position/link Information	To view the current position and link setting.
Satellite settings	To view all currently available satellites and the option to enable or disable each satellite and each satellite system.
Sensor settings	To view and configure the sensor and data link.
Format sensor	To format the memory, reset to factory settings, backup data or restart the instrument.
License key file	To upload license key files. Refer to "Upload key".
Firmware file	To upload instrument, UHF and ME firmware. Refer to "Sensor firmware".
Language file	To upload language files.
Antenna file	To upload base antenna calibration values to the instrument.
Data Download	To download raw data files from instrument or the microSD card in DAT or RINEX format. Refer to "Data download".

Download data

At the **Data Download** Tab select the file that you want to download. Both .DAT and Rinex files can be directly downloaded. The raw data is transferred from the instrument to PC where it is processed using the GeoMax Geo Office software.

Radio settings

☞ To meet country radio licence requirements, the internal UHF radio must be set before use to legally allowed local frequencies as defined by local or governmental authorities. Use of forbidden frequencies may lead to prosecution and penalties.

At the **Sensor Settings** screen the internal radio can be configured with default channel, protocol type, channel spacing, transmission power and unit ID. Various required frequencies can be entered into the channel table and assigned to a specific channel number.

Sensor firmware

The latest version of the instrument firmware is available from the GeoMax website.

License key

Optional GNSS receiver licences are activated with a key file.
At the **Licence Key** file screen browse for the key file on your PC and click **Upload**. A confirmation message is shown once the option has been activated.

4.3 Batteries
4.3.1 Operating Principles

Charging / first-time use

- 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 -10°C to +55°C / +14°F to + 131°F. For optimal charging we recommend charging the batteries at a low ambient temperature of +10°C to +45°C/ +50°F to 113°F if possible.
- It is normal for the battery to become warm during charging. Using the chargers recommended by GeoMax, 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 GeoMax product deviates significantly form the actual battery capacity available.
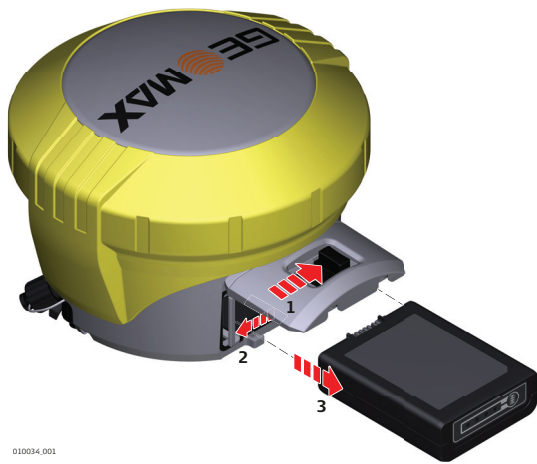
Operation / Discharging

- The batteries can be operated from -20°C to +60°C/-4°F to +140°F.
- Low operating temperatures reduce the capacity that can be drawn; high operating temperatures reduce the service life of the battery.

Change battery step-by-step

010034_001

Step	Description
☞	The battery is inserted at the side of the instrument.
1.	To remove a battery, push the slide fastener of the battery compartment in the direction of the arrow with the open-lock symbol and open the battery compartment.
2.	Push the locker sideward and at the same time pull out the battery. This releases the battery from its fixed position.
3.	Remove the battery.
4.	To insert battery, push the slide fastener of the battery compartment in the direction of the arrow with the open-lock symbol.
5.	Open the battery compartment.
6.	With the battery contacts facing upwards, slide the battery into the battery compartment.
7.	Push the battery backwards so that it locks into position.
8.	Close the battery compartment and push the slide fastener in the direction of the arrow with the close-lock symbol.

4.4   Inserting a microSD/SIM Card
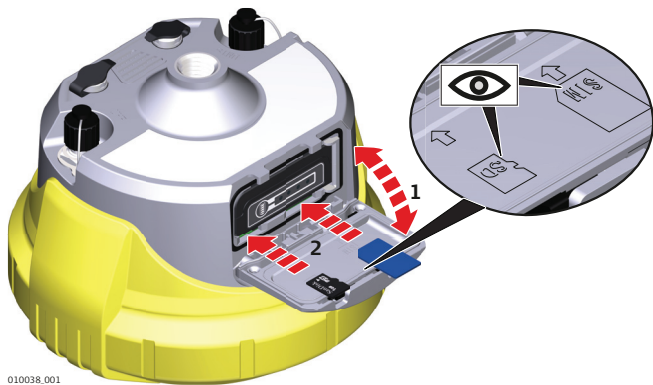
☞
- Keep the card dry.
- Use it only within the specified temperature range.
- Do not bend the card.
- Protect the card from direct impacts.

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

Inserting a microSD /SIM card step-by-step

010038_001

Inserting a microSD card

Step	Description
☞	Removing the microSD card while the instrument is turned on can cause loss of data. Only remove the microSD card or unplug connecting cables when the instrument is switched off.
☞	The microSD card is inserted into a slot inside the battery compartment of the instrument.
1.	Push the slide fastener of the battery compartment in the direction of the arrow with the open-lock symbol. Open the battery compartment
2.	Slide the microSD card with the logo facing upwards firmly into the slot as shown inside the battery lid until it clicks into position.

Inserting a SIM card

Step	Description
☞	Inserting/removing the SIM card while the Zenith35 Pro is turned on can result in permanent damage to the card. Only insert/remove the SIM card when the Zenith35 Pro is switched off.
☞	The SIM card is inserted into a slot inside the battery compartment.
1.	Push the slide fastener of the battery compartment in the direction of the arrow with the open-lock symbol. Open the battery compartment
2.	Slide the SIM card with the connectors facing downwards firmly into the slot as shown inside the battery lid until it clicks into position.

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 GeoMax 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 Technical Data

6.1.1 Tracking Characteristics

Tracking

GNSS receiver: NovAtel OEM719 multi-frequency with 555 channels.

Satellite system	Signals
GPS tracking	L1, L2, L2C, L5
GLONASS tracking	L1, L2, L3*
BeiDou tracking	B1, B2, B3** (optional)
Galileo tracking	E1, E5a, E5b, AltBOC, E6** (optional)
Positioning rate	20 Hz
SBAS	EGNOS, WAAS, MSAS, GAGAN, QZSS***

Initialisation: Initialisation time <5 s
                         Initialisation reliability >99.9%

* GLONASS L3 will be provided through future firmware upgrade.
** Believe to comply. Subject to ICD description availability.
*** Support of QZSS is incorporated and will be provided through future firmware upgrade when QZSS will be operational.

6.1.2 Accuracy

Differential code

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

Static

Horizontal: 3 mm + 0.5 ppm
Vertical: 5 mm + 0.5 ppm

Kinematic

Horizontal: 8 mm + 1 ppm
Vertical: 15 mm + 1 ppm

☞ 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 accuracies, given as **r**oot **m**ean **s**quare, are based on measurements processed using GeoMax Geo Office and on real-time measurements.

6.1.3 GNSS antenna specifications

GNSS antenna specifications

Phase centre offset: ± 2 mm
LNA gain: Typically 28 dBi

6.1.4 Internal devices

Internal devices

GSM/UMTS module: Cinterion PHS8
                         Quad-Band GSM 850/900/1800/1900 MHz
                         Penta-Band UMTS 800/850/900/1900/2100 MHz
UHF radio module: Satel M3-TR4
                         Transmission power 0.5 and 1.0 W
                         Frequency range 403 to 473 MHz
Bluetooth: Class 2

6.1.5   Technical Data

Dimensions	Height: Diameter:	131 mm (5.2") 161 mm (6.3")

Weight	Zenith35 Pro:	1.170 kg (without battery)

Recording

GNSS raw data can be recorded on a microSD card or internal memory.
1 GB capacity is typically sufficient for about 7000 h dual frequency logging at a 15 s rate (average constellation).
- Internal memory: 4 GB
- microSD card: 4 GB

Power	Internal battery: External power input: Power consumption:	Li-Ion battery 10.8 V/3.4 Ah 9 V to 18 V DC external power input with over-voltage protection up to 28 V with ZDC221 cable Typically 5.5 W (Wi-Fi on)/5.0 W (Wi-Fi off)

Operating times

Equipment type	Operating time ZBA601
Static:	8.5 h
Rover (radio; Satel M3-TR4, receive):	6 h
Rover (Digital cellular phone; Cinterion PHS8-P):	6.25 h

☞   Operating times may vary depending on the temperature and battery age.

6.1.6   Environmental specifications

Environmental specifications

Temperatures (°C):

Instrument:	-40 to +65 (operation*)	-40 to +85 (storage)
Battery:	-40 to +65 (operation)	-40 to +70 (storage)

Protection:
IP68 (IEC 60529)

Vibration:
ASAE EP455 Section 5.15.1 Random, MIL-STD-810G, method 514.6E-I

Shock:
Withstands a 2 m (6.6 ft) pole topple over onto hard surface.

Humidity:
100% condensing
The effects of condensation are to be effectively counteracted by periodically drying out the instrument.

* Tilt & Go functionality: -30°C to +65°C

Conformity to national regulations

- FCC Part 15 (applicable in US)
- Hereby, GeoMax AG, declares that the product Zenith35 Pro 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 is available from GeoMax AG.
- 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:
- France
- Italy
- Norway (if used in the geographical area within a radius of 20km from the centre of Ny-Ålesund)

- 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.

Frequency band

Type	Frequency band (MHz)
GNSS receiver:	GPS L1: 1575.42
	GPS L2: 1227.60
	GPS L5: 1176.45
	GLONASS L1: 1602.5625 - 1611.5
	GLONASS L2: 1246.4375 - 1254.3
	Galileo E1: 1575.42
	Galileo E5a: 1176.45
	Galileo E5b: 1207.14
	Galileo AltBOC: 1191.795
	BeiDou B1: 1561.098
	BeiDou B2: 1207.140
Bluetooth:	2402 - 2480
Radio:	403 - 473
2G GSM:	Quad-Band EGSM 850/900/1800/1900
	GPRS multi-slot class 10
3.75 GSM/UMTS:	Quad-Band GSM 850/900/1800/1900
	Penta-Band UMTS 800/850/900/1900/2100

Output power

Type	Output power [mW]
GNSS:	Receive only
Bluetooth:	5
Radio:	500, 1000
2G GSM EGSM850/900:	2000
2G GSM GSM1800/1900:	1000
3G UMTS 800/850/900/1900/2100:	250

Antenna

Type	Antenna	Gain [dBi]
GNSS:	Internal GNSS antenna element (receive only)	28
Bluetooth:	Internal ceramic antenna	4.5 max.
UHF:	Detachable $\lambda/4$ antenna	4 max.
GSM/UMTS:	Primary: Detachable $\lambda/2$ antenna	max.2dBi @ 800/850/900 MHz max. 2dBi @ 1800/1900/2100 MHz
	Secondary: Internal patch antenna	max.1dBi @ 800/850/900 MHz max. 1dBi @ 1800/1900/2100 MHz
Wi-Fi:	Internal ceramic antenna	4.5 max.

6.3　　　　　　　　Dangerous Goods Regulations

Dangerous Goods Regulations

The products of GeoMax 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 GeoMax product with Lithium batteries onboard a commercial aircraft, you must do so in accordance with the **IATA Dangerous Goods Regulations**.

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

GeoMax Zenith35 Pro Series

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