# **GeoMax** ZGP800


GEOMAX
A Hexagon Company

**User manual**
Version 1.2

# Introduction

**Purchase**

Congratulations on the purchase of a ZGP800 series instrument.

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "8 Safety Directions" for further information. Read carefully through the User Manual before you switch on the product.

**Product identification**

The type and serial number of your product are indicated on the type plate. Enter the type and serial number in your manual and always refer to this information when you need to contact your agency or GeoMax authorized service workshop.

Type: _____

Serial No.: _____

**Symbols used in this manual**

The symbols used in this manual have the following meanings:

| 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 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. |

☞

- A ZGP800 real-time rover can only be made up of an ZGP800A GNSS antenna together with the ZGP800C controller and the ZRT100 Bluetooth (BT) radio.
- A ZGP800 real-time reference station can only be set up using an ZGP800A GNSS antenna and the ZGP800C controller, the satelline radio and the ZDC211 cable.

 The ZGP800C controller.

 The ZRT100 BT radio.

**Trademarks**

- Windows and Windows CE are a registered trademark of Microsoft Corporation
- Bluetooth is a registered trademark of Bluetooth SIG, Inc

All other trademarks are the property of their respective owners.

# Table of Contents

**In this manual**

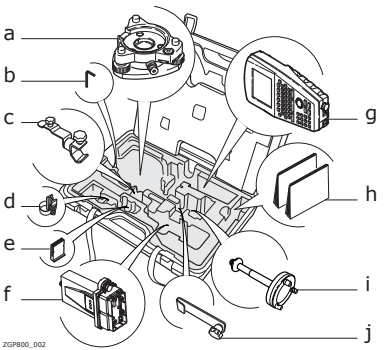
# 1 Unpacking the Container

## 1.1 Container Contents

**Description**

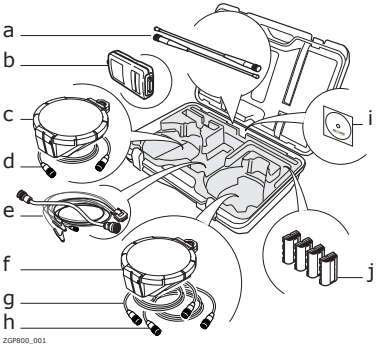
The main components required for the cableless GNSS real-time system are combined in one transport container.

**Container for ZGP800 and delivered accessories part 1 of 2**




a) ZTR100 tribrach
b) Adjusting pin
c) ZHR100 holder
d) ZHR200 holder
e) CompactFlash card
f) ZRT100 BT radio
g) ZGP800C
h) ZGP800 User Manual
i) ZCA100 carrier
j) Tripod bracket for ZGP800C

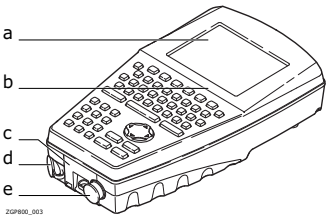
**Container for ZGP800 and delivered accessories part 2 of 2**




a) Radio antennas
b) Satel 3AS radio
c) ZGP800A
d) ZDC202 cable
e) ZDC211 V-cable and ZDC204 cable
f) ZGP800A
g) ZDC216 cable
h) ZDC210 cable
i) CD ROM
j) ZBA200 batteries for ZGP800A, ZGP800C and ZRT100

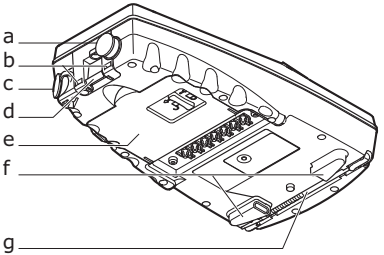
## 1.2 Components of the ZGP800C Controller

**Upperside of ZGP800C**




a) Touch screen
b) Keyboard
c) Hand strap bottom clips
d) HIROSE port, with integrated USB port
e) HIROSE port

**Underside of ZGP800C**




a) HIROSE port
b) Hand strap bottom clips
c) HIROSE port, with integrated USB port
d) Bottom spring clip
e) Battery compartment with CompactFlash card compartment
f) Hand strap top clips
g) Stylus for touch screen

Three Bluetooth ports are included inside ZGP800C, to facilitate connectivity to ZGP800A, ZRT100 and 3rd party BT devices.

## 1.3 Available Documentation and CD ROM Contents

**Available product manuals**

The following product manuals are available for ZGP800:

| Name of manual | Description of manual | Manual format | |
|---|---|---|---|
| | | PRINTED | PDF |
| 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. | ✓ | ✓ |

**CD ROM contents**

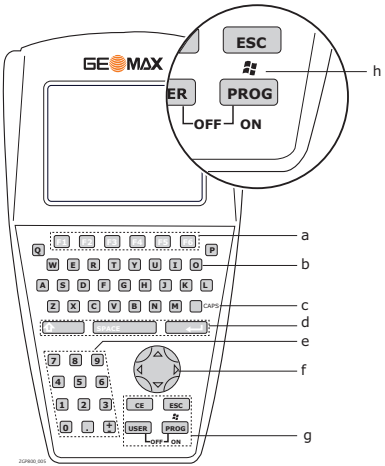
The ZGP800 CD ROM contains software and documentation specific to ZGP800:

| Type | Description |
|---|---|
| Software | System software<br>Language software<br>Application programs |
| Documentation | ZGP800 User Manual |

# 2 Using the ZGP800C Controller

## 2.1 The Keyboard

**Keyboard display**




a) Function keys **F1**-**F6**
b) Alpha keys
c) **CAPS**
d) **SHIFT**, **SPACE**, **ENTER**
e) Numeric keys
f) Arrow keys
g) **CE**, **ESC**, **USER**, **PROG**
h) Windows key symbol.
This is the Microsoft flag logo located between **PROG** and **ESC**.

**Special Keys**

| Key | Function |
|---|---|
| **PROG** (**ON**) | If the receiver is off: press and hold for 2 s to turn it on.<br>If the receiver is on: press at any time to access the Programs screen, where a program can be selected. |
| **USER** | User definable menu for quick access anytime and access to all STATUS panels. |

**Other Keys**

| Key | Function |
|---|---|
| **CAPS** | Switches between upper case and lower case letters. |
| **CE** | Clears all entry at the beginning of user input.<br>Clears the last character during user input. |
| **ENTER** | Selects the highlighted line and leads to the next logical menu / dialogue.<br>Starts the edit mode for edit fields.<br>Opens a choicelist. |
| **ESC** | Leaves the current menu or dialogue without storing any changes. |

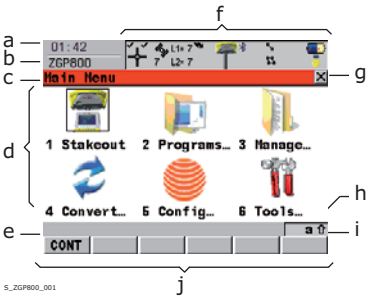
| Key | Function |
|---|---|
| | Turns receiver off when held for 2 s in the Main Menu screen. |
| **SHIFT** | Switches between the first and the second level of function keys. |
| **SPACE** | Enters a blank. |
| Arrow keys | Moves the focus on the screen. |
| Alpha keys | To type letters. |
| Function keys **F1**-**F6** | Correspond to six softkeys that appear on the bottom of the screen when the screen is activated. |
| Numeric keys | To type numbers. |

**Key combinations**

| Key | Function |
|---|---|
| **PROG** plus **USER** | Turns receiver off when held in the Main Menu screen. |
| **SHIFT**  | Pages up or down. |
| **SHIFT PROG** (  ) | Displays the Windows CE task bar and start menu. |

## 2.2 The Screen Display

**Screen**




a) Time
b) Caption
c) Title
d) Screen area
e) Message line
f) Icons
g) ESC ☒
h) CAPS
i) SHIFT icon
j) Softkeys

**Elements**

| Type | Description |
|---|---|
| Time | The current local time is shown. |
| Caption | Shows location either in the Main Menu screen, under **PROG** key or **USER** key. |
| Title | Name of the screen is shown. |
| Screen area | The working area of the screen. |

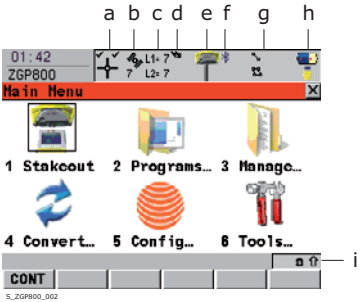
| Type | Description |
|---|---|
| Message line | Messages are shown for 10 s. |
| Icons | Shows current status information of the receiver. Can be used with touch screen to access the subsequent screen. |
| ESC ☒ | Can be used with touch screen. Same functionality as the **ESC** fixed key. The last operation will be undone. |
| CAPS | The caps mode for upper case letters is active. The caps mode is activated and deactivated by pressing **UPPER (F5)** or **LOWER (F5)** in some screens. |
| SHIFT icon | Shows the status of the **SHIFT** key; either first or second level of softkeys is selected. Can be used with touch screen and has the same functionality as the fixed key **SHIFT**. |
| Softkeys | Commands can be executed using **F1** - **F6** keys. The commands assigned to the softkeys are screen dependent. Can be used directly with touch screen. |

## 2.3 The Icons - Showing Receiver Status

**Description**

Icons show infomation about the current status of the receiver.

**Position of the icons on the screen**




a) Position status
b) Number of visible satellites
c) Contributing satellites
d) Real-time status
e) Position mode
f) Bluetooth
g) Data management
h) Battery
i) **SHIFT**

**Position status**

Displays the status of the current position.
**Touch screen:** Tapping the icon leads to **STATUS Position**.

| Icon | Description |
|---|---|
| No icon | No position available. |

| Icon | Description |
|---|---|
|  | Autonomous solution available. |
|  | Code solution available. |
|  | Phase fixed solution available. The ticks indicate that an ambiguity check is being made. |

**Number of visible satellites**

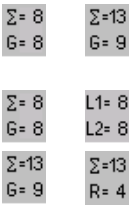
Displays the number of theoretically visible satellites above the configured cut off angle according to the current almanac.
**Touch screen:** Tapping the icon leads to **STATUS Satellites**.

| Icon | Description |
|---|---|
|  | The number of satellites being tracked. |

**Contributing satellites**

Displays the number of satellites that are contributing to the currently computed position solution.

**Touch screen:** Tapping the icon switches between the number of the satellites currently used for the position computation and the L1 and L2 values (GPS only) or toggles between the satellite systems (GPS & GLONASS).

| Icon | Description |
|---|---|
|  | When a position status icon is displayed, the number of satellites currently used for the position computation are shown.<br>If no position is currently available but satellites are being tracked then the L1 and L2 values (GPS only) or the Σ and G/R values (GPS & GLONASS) show how many satellites are being tracked.<br>The number of contributing satellites can differ from the number of visible satellites. This may be either because satellites cannot be viewed or the observations to these satellites are considered to be too noisy to be used in the position solution. |

| Icon | Description |
|---|---|
|  | The number of contributing GLONASS satellites could be zero if five or more GPS satellites are used for the position computation. The processing algorithm automatically selects the best possible set of satellite combinations for the position computation.<br>A position computation with R = 0 is certainly within the specified reliability. |

**Real-time device and real-time status**

Displays the real-time device configured to be used and its status.
**Touch screen:** Tapping the icon leads to **STATUS Real-Time Input**.

**Real-time mode: Reference**
An arrow pointing up indicates a reference configuration, it does not indicate if the device is working. The arrow flashes when a real-time message is sent. When two real-time devices are configured, then the icon for the real-time 1 device is shown.

| Icon | Description |
|---|---|
|  | Radio transmitting |

**Real-time mode: Rover**
An arrow pointing down indicates a rover configuration. The arrow flashes when real-time messages are received.

| Icon | Description |
|---|---|
|  | Digital cellular phone connecting. |
|  | Digital cellular phone receiving. |
|  | Radio receiving. |

**Position mode**

Displays the current position mode depending on the configuration defined. Symbols are added to the basic position mode icon when logging of auto points is configured. As soon as this icon becomes visible the receiver is in a stage where practical operation can commence.

| Icon | Position mode | Point occupation | Logging of auto points | Move antenna |
|---|---|---|---|---|
|  | Static | Yes | No | No |
|  | Moving | No | No | Yes |
|  | Moving | No | By time | Yes |
|  | Moving | No | By distance or height or by user decision | Yes |
|  | Moving | No | By stop & go | Yes |

**Bluetooth**

The status of each Bluetooth port and any Bluetooth connection is displayed.
**Touch screen:** Tapping the icon leads to **STATUS Bluetooth**.

| Icon | Description |
|---|---|
|  | Bluetooth is integrated. |
|  | A Bluetooth connection is established and active. |
|  | Bluetooth connection not established. Bluetooth port 1, 2 and 3 are down. |
|  | Bluetooth connection established. Bluetooth port 1, 2 and 3 are active. |

**Data management**

The number of lines and areas currently open in the active job is displayed.
**Touch screen:** Tapping the icon leads to **MANAGE Data: Job Name**

| Icon | Description |
|---|---|
|  | The active job in Data Management. |

**Battery icons**

The status of the battery is displayed. The remaining power in the battery is indicated by six levels.
**Touch screen:** Tapping the icon leads to **STATUS Battery & Memory**.

| Icon | Description |
|---|---|
|  | Internal battery is in use. |

**SHIFT**

The status of the **SHIFT** key is displayed.
**Touch screen:** Tapping the icon shows additional softkeys.

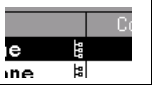
| Icon | Description |
|---|---|
|  | Additional softkeys are available in the currently visible screen. |
|  | The **SHIFT** key has been pressed. |

## 2.4 The Symbols - Showing Receiver Settings

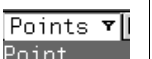
**Description**

Symbols show information about current receiver settings.

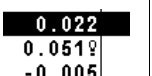
**Attributes**

| Symbol | Description | Example |
|---|---|---|
| | The attribute symbol is displayed in the MANAGE Codes screen to indicate codes that have attributes attached. |  |

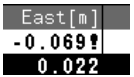
**Filter**

| Symbol | Description | Example |
|---|---|---|
| | The filter symbol is shown on the Points page if a stakeout filter is active. |  |

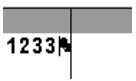
**Limits**

| Symbol | Description | Example |
|---|---|---|
| | The limits symbol indicates that a defined limit has been exceeded. For example, the exceeding of a residual limit in the Determine Coordinate System program. |  |

**Largest residual**

| Symbol | Description | Example |
|---|---|---|
| ! | The largest residual symbol is used to indicate the largest residual in the Determine Coordinate System program - DET C SYS Step 4: Check Residuals. |   |

**Staked out**

| Symbol | Description | Example |
|---|---|---|
| ⚑ | The staked out symbol is used in the MANAGE Data: Job Name screen to indicate points which have been staked out. |   |

# 3 Using the ZGP800A Antenna and the ZRT100 BT Radio

## 3.1 Understanding Antenna Heights

**Description**

- The height of the GNSS antenna above the point consists of three components:
  - the vertical height reading,
  - the vertical offset,
  - the vertical phase centre variations.
- For most operations, pre-configured standard settings in ZGP800C can be used. They automatically take the vertical phase centre variations into account.

**MRP**

ZGP800 accepts vertical height readings to the **M**echanical **R**eference **P**lane, MRP.

**Vertical phase centre variations**

These are handled automatically in the standard antenna records. The antenna calibrations to determine the phase centre variations were executed by Geo++® GmbH.

**Pole setup**. For other than GeoMax poles, the dimensions must be determined.

## 3.2 The Mechanical Reference Plane, MRP

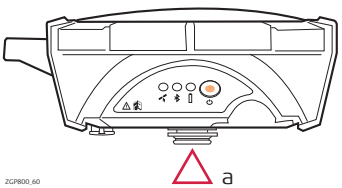
**Description**

The **M**echanical **R**eference **P**lane:

- is where the antenna heights are measured to.
- is where the phase centre variations refer to.
- varies for different antennas.

**MRP for ZGP800A**

The MRP for ZGP800A is shown in the diagram.

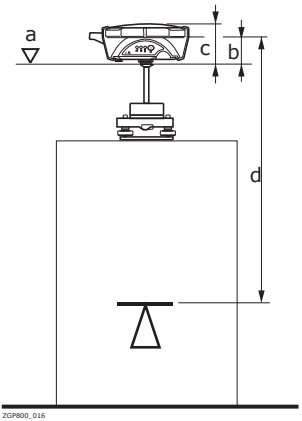



a) The mechanical reference plane is the underside of the threaded metal insert.

## 3.3 Measuring the Antenna Height for a Pillar Setup

**Measuring the antenna height, a quick overview**

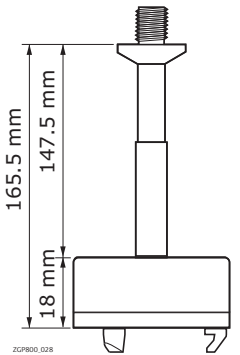
| Setup type | Antenna name | The required measurement |
|---|---|---|
| Pillar | ZGP800A Pillar | the vertical height reading to the arrow on the rubber ring of the ZGP800A antenna. |




a) Mechanical reference plane MRP
b) Vertical phase centre offset for L1
c) Vertical phase centre offset for L2
**d) Vertical Height Reading**

The Vertical offset = -0.061

**Determining the antenna height with the ZCA100 carrier step-by-step**

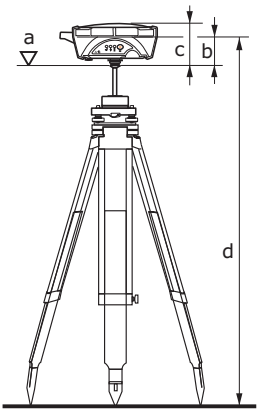
| Step | Description |
|---|---|
| 1. | Measure a height from the pillar benchmark to the arrow on the rubber ring of the ZGP800A antenna.<br>  |
| 2. | Use the appropriate measurement from the diagram above, to determine the height difference between the measured surface on the carrier and where the MRP of the ZGP800A antenna sits on the carrier. |

| Step | Description |
|---|---|
| 3. | The vertical height reading = adding the values in step 1. and step 2. |

## 3.4 Measuring the Antenna Height for a Tripod Setup

**Measuring the antenna height, a quick overview**

| Setup Type | Antenna type | The required measurement |
|---|---|---|
| Tripod | ZGP800A Tripod | the vertical height reading between the ground mark and the arrow on the rubber ring. |




a) Mechanical reference plane MRP
b) Vertical phase centre offset for L1
c) Vertical phase centre offset for L2
**d) Vertical Height Reading**

Vertical offset = -0.061

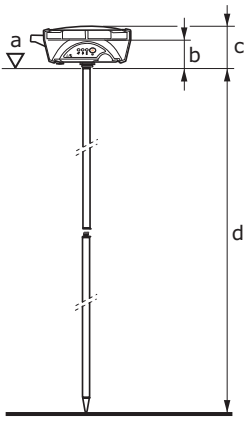
**Determining the antenna height step-by-step**

| Step | Description |
|---|---|
| 1. | The vertical height reading =<br>• The vertical height reading is the height difference between the ground mark and the arrow on the rubber ring of the ZGP800A antenna.<br>• The vertical offset of -0.061 m is automatically stored in the antenna setup record for a tripod setup and will automatically be taken into account. It does not need to be entered. |

## 3.5 Measuring the Antenna Height for a Pole Setup

**Measuring the antenna height, a quick overview**

| Setup Type | Antenna type | The required measurement |
|---|---|---|
| Pole | ZGP800A Pole | the vertical height reading of the pole. |




a) Mechanical reference plane MRP
b) Vertical phase centre offset for L1
c) Vertical phase centre offset for L2
**d) Vertical Height Reading**

Vertical offset = 0.00

**Determining the antenna height step-by-step**

| Step | Description |
|---|---|
| 1. | The vertical height reading =<br>• **2.00 m** for the GeoMax threaded carbon-fibre pole consisting of an upper half and a lower half. |

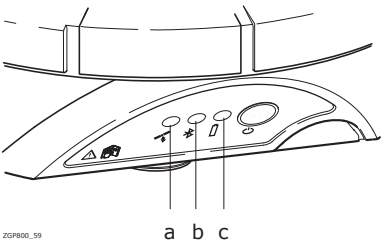
## 3.6 The LED Indicators on the ZGP800A Antenna

**LED indicators**

**Description**

ZGP800A has **L**ight **E**mitting **D**iode indicators. They indicate the basic antenna status.

**Diagram of the LED indicators**




a) Tracking LED
b) Bluetooth LED
c) Power LED

**Description of the LED indicators**

| IF the | is | THEN |
|---|---|---|
| TRK | off | No satellites are tracked. |
| | flashing yellow | Less than four satellites are tracked, a position is not yet available. |
| | yellow | Enough satellites are tracked to compute a position. |
| | red | ZGP800A is initialising. |
| BT | green | Bluetooth is in data mode and ready for connecting. |
| | blue | Bluetooth has connected. |
| | flashing blue | Data is being transferred |
| PWR | off | Power is off. |
| | yellow | Power is okay. |
| | flashing yellow | Power is low. The remaining time for which enough power is available depends on the type of survey, the temperature and the age of the battery. |

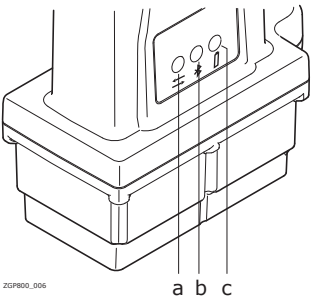
## 3.7 The LED Indicators on the ZRT100 BT Radio

**LED indicators**

**Description**

ZRT100 has **L**ight **E**mitting **D**iode indicators. They indicate the basic radio status.

**Diagram of the LED indicators**




a) Data Transfer LED
b) Bluetooth LED
c) Power LED

**Description of the LED indicators**

| IF the | is | THEN |
|---|---|---|
| Data | off | data is not being transferred. |
| | yellow or flashing yellow | data is being transferred. |
| BT | off | Bluetooth is in data mode and ready for connecting. |
| | blue | Bluetooth has connected. |
| | flashing blue | Data is being transferred |
| PWR | off | Power is off. |
| | yellow | Power is okay. |

# 4 Turning On / Turning Off

## 4.1 Turning On/Off, Switching to Desktop

**Turning ZGP800C on**

- Press and hold **PROG** (ON) for 2 s. (ZGP800C must have a power supply).

**Turning ZGP800C off**

- ZGP800C can only be turned off in the Main Menu screen.
  - Press the **USER** and **PROG** keys simultaneously, or
  - Hold **ESC** for 2 s.

**Putting ZGP800C into sleep mode**

- In sleep mode, ZGP800C shuts down and reduces power consumption. Rebooting from sleep mode is quicker than a cold start after turning off.
- ZGP800C can only be put into sleep mode in the Main Menu screen.
- Press **SHIFT SLEEP (F3)** to put ZGP800C into sleep mode.

**Switching between GeoMax software and the Windows CE desktop**


a) Icon to start GeoMax software
b) Windows CE desktop
c) Task bar
d) Windows CE start button

**Accessing the Main Menu screen**

| IF | THEN |
|---|---|
| ZGP800C is started | • the GeoMax software starts up automatically. |
| Windows CE desktop is active | • double click ZGP800 to display the GeoMax software, or |

| IF | THEN |
|---|---|
| | • press **SHIFT PROG** ( ) to display the GeoMax software. |
| GeoMax software is minimised | • double click  to maximise it, or<br>• select **ZGP800** in the task bar to maximise it. |



**Accessing the Windows CE desktop**

| IF | THEN |
|---|---|
| GeoMax software is to be minimised | **SHIFT MINIM (F5)** in the Main Menu screen. |
| GeoMax software is to be closed | **SHIFT EXIT (F6)** in the Main Menu screen. |
| Windows CE task bar is to be displayed | **SHIFT PROG** ( ). |

## 4.2 Operating by Keyboard or Touch Screen

**Operating with the keyboard and the touch screen**

The user interface is operated either by the keyboard or by the touch screen, with supplied stylus. The workflow is the same for keyboard and touch screen entry, the only difference lies in the way information is selected and entered.

**Operation by keyboard**
Information is selected and entered using the keys. Refer to "2.1 The Keyboard" for a detailed description of the keys on the keyboard and their function.

**Operation by touch screen**
Information is selected and entered on the screen using the supplied stylus.

| Operation | Description |
|---|---|
| To select an item | Tap on the item. |
| To start the edit mode in input fields | Tap on the input field. |
| To highlight an item or parts of it for editing | Drag the supplied stylus from the left to the right. |
| To accept data entered into an input field and exit the edit mode | Tap on the screen outside of the input field. |

# 5 Understanding the Main Menu

**Description**

The Main Menu is the first screen displayed when the instrument is switched on.

**The Main Menu screen**


**CONT (F1)**
To select the highlighted option and to continue with the subsequent screen.

**SHIFT SLEEP (F3)**
To put ZGP800C into sleep mode.

**SHIFT Hide (F4)**
To hide bottom three icons leaving Stakeout, Programs, Manage.

**SHIFT MINIM (F5)**
To minimise GeoMax software.

**SHIFT EXIT (F6)**
To close GeoMax software.

**Description of the Main Menu functions**

| Main menu function | Short description of functions |
|---|---|
| **Stakeout** | • To start staking out. |

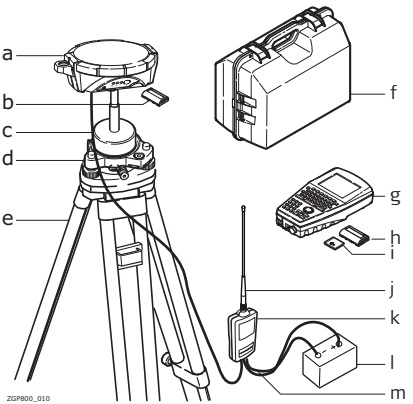
| Main menu function | Short description of functions |
|---|---|
|  **Programs...** | • To select and start programs. |
|  **Manage...** | • To manage jobs and their data, codelists and coordinate systems. |
|  **Convert...** | • To export data from a job on ZGP800C to a file on the CF card in a customised ASCII format or in DXF format.<br>• To import ASCII, GSI or DXF data from a file on the CF card to a job on ZGP800C.<br>• To copy points between jobs. |
|  **Config...** | • To access all configuration parameters related to a survey, ZGP800C and the radio. |
|  **Tools...** | • To format the memory device.<br>• To transfer non data related files between ZGP800C and CF card. |

| Main menu function | Short description of functions |
|---|---|
| | • To upload files relevant for ZGP800C and ZGP800A functionality, for example, firmware and language files.<br>• To perform arithmetic operations such as addition, subtraction, multiplication, division, statistical functions, trigonometric functions, conversions or roots.<br>• To view files on the CF card.<br>• To manually type in or upload a licence key. |

# 6 Setting Up and Starting Up

## 6.1 Setting Up as a Real-Time Reference

**Diagram showing real-time reference setup**



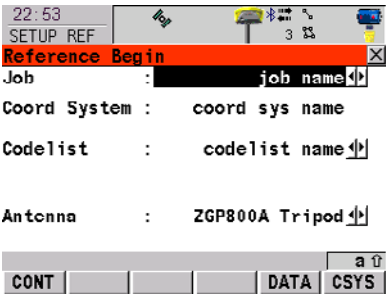

a) ZGP800A
b) ZBA200 battery for ZGP800A
c) ZCA100 carrier*
d) ZTR100 tribrach
e) Tripod
f) Transport container
g) ZGP800C
h) ZBA200 battery for ZGP800C
i) CompactFlash card
j) Radio antenna
k) Satel 3AS radio
l) Car battery
m) ZDC211 V-cable

* The ZCA100 carrier has a screw fitting. ZGP800A fits directly onto this fitting.

**Setup and Startup for real-time reference step-by-step**

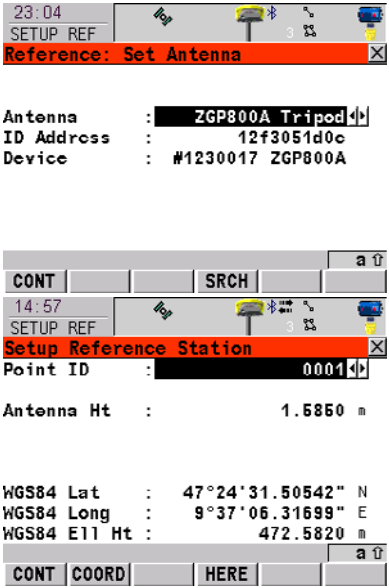
| Step | Description |
|---|---|
| 1. | **Setting Up the Equipment** |
| | • Set up the tripod, mount and level the tribrach onto the tripod. |
| | • Check that the tribrach is correctly centred over the marker. |
| | • Place and lock the carrier into the tribrach. |
| | • Insert the battery into ZGP800A and screw ZGP800A onto the carrier. |
| | • Check that the tribrach is still correctly positioned and levelled. |
| | • Take the V-cable. |
| | • Attach the connector with the 10 pin plug to ZGP800A. |
| | • Attach the serial connector to the satelline radio. Make sure that the radio antenna is screwed onto the radio housing. |
| ☞ | • When using high power radios or radios working in a frequency band close to the satellite signal frequency band, it may influence the performance of your system. |
| | • Attach the crocodile clips to the car battery. |
| | • Insert the CompactFlash card into ZGP800C. |

| Step | Description |
|---|---|
| | • Insert the battery into ZGP800C and turn on ZGP800C and ZGP800A. |
| 2. | **Starting Up with the Setup Reference Program** |




**2.a Selecting the Job**

- Select a Job.
- Press **DATA (F5)** to check all of the points in the selected job.
- Press **CONT (F1)** to continue.

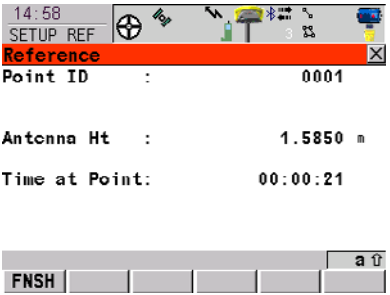



**2.b Selecting the Antenna**

- Select the antenna.*
  For a pillar setup, select ZGP800A Pillar.
  For a tripod setup, select ZGP800A Tripod.
- Press **SRCH (F4)** to start searching for the antenna, via Bluetooth.
- Press **CONT (F1)** to continue.

**2.c Selecting the Reference Point**

- Select the known point.**
- Enter the antenna height.
  For a pillar setup, this will be the vertical height reading.
  For a tripod setup, this will be the vertical height reading.
- Press **HERE (F4)** to use the current navigated position for the setup.
- Press **CONT (F1)** to continue.




**2.d Completing the Setup**

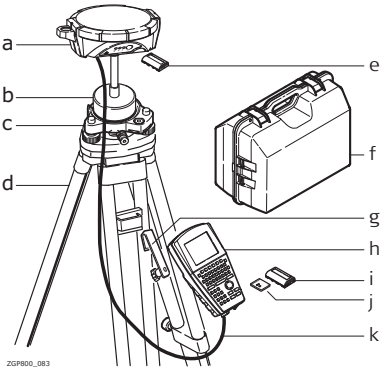
- Press **FNSH (F1)** to continue and return to the Main Menu screen.

* Refer to "3 Using the ZGP800A Antenna and the ZRT100 BT Radio" for further information on antennas and antenna heights.

** When setting the reference point for the setup, the selected point must be able to be viewed as WGS1984 coordinates.

## 6.2 Setting Up as a Post-Processing Reference

**Diagram showing post-processing reference setup**



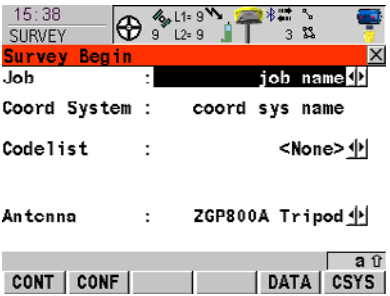

a) ZGP800A
b) ZCA100 carrier*
c) ZTR100 tribrach
d) Tripod
e) ZBA200 battery for ZGP800A
f) Transport container
g) ZMH100 tripod bracket for ZGP800C
h) ZGP800C
i) ZBA200 battery for ZGP800C
j) CompactFlash card
k) ZDC210 cable

* The ZCA100 carrier has a screw fitting. ZGP800A fits directly onto this fitting.

**Setup and Startup for post-processing reference step-by-step**

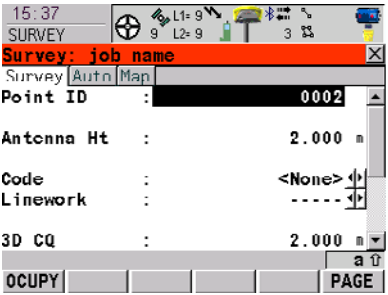
| Step | Description |
|---|---|
| 1. | **Setting Up the Equipment** |
| | • Set up the tripod, mount and level the tribrach onto the tripod. |
| | • Check that the tribrach is correctly centred over the marker. |
| | • Place and lock the carrier into the tribrach. |
| | • Insert the battery into ZGP800A and screw ZGP800A onto the carrier. |
| | • Check that the tribrach is still correctly positioned and levelled. |
| | • Insert the CompactFlash card into ZGP800C. |
| | • Insert the battery into ZGP800C. |
| | • Hang the tripod bracket onto a tripod leg and attach the ZGP800C onto the tripod bracket. |
| | • Attach the connectors with the 10 pin plug to ZGP800A and to ZGP800C. |
| | • Turn on ZGP800A and ZGP800C. |
| 2. | **Configuring the Raw Data Logging** |
| | • Determine during what circumstances raw observations are logged (**Static Only** or **Static & Moving**). |

| Step | Description |
|---|---|
| | • Determine the rate at which raw observations are logged. |
| 3. | **Starting Up with the Survey Program** |




**3.a Selecting the Job**

- Select the Job Default.
- Select the WGS1984 coord system.
- Press **CONT (F1)** to continue.



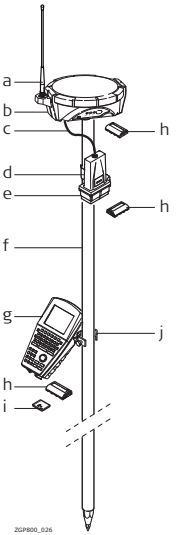

**3.b Surveying the Point**

- Enter the point ID.
- Enter the antenna height.
  For a tripod setup, this will be the vertical height reading.
- Press **OCUPY (F1)** to start measuring the point.*
  Press **STOP (F1)** when enough data is collected for the point.
  Press **STORE (F1)** to store the point.
- Continue to press **ESC** until the Main Menu screen appears.

* **SHIFT QUIT (F6)** always terminates the survey operation. In this case all data collected since pressing **OCUPY (F1)** is lost.

## 6.3 Setting Up as a Real-Time Rover

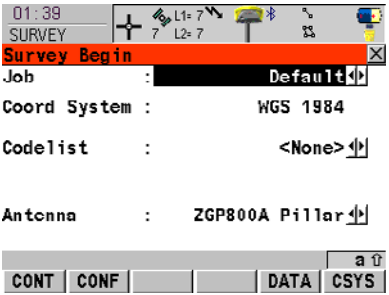
**Diagram showing real-time rover setup**




a) Radio antenna
b) ZGP800A
c) ZDC204 antenna cable
d) ZHR200 holder for ZRT100
e) ZRT100 BT radio
f) ZPC100 carbon-fibre pole
g) ZGP800C
h) ZBA200 battery for ZGP800A, ZGP800C and ZRT100 BT radio
i) CompactFlash card
j) ZHR100 holder for ZGP800C

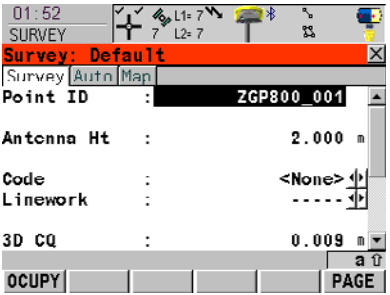
**Setup and Startup step-by-step**

| Step | Description |
|---|---|
| 1. | **Setting Up the Equipment** |
| | • Insert the battery into ZGP800A. |
| | • Slide the ZHR200 holder onto the top part of the pole and fix it. |
| | • Fix ZRT100 onto the holder. Refer to "Attaching ZRT100 to the ZHR200 holder step-by-step" for further information. |
| | • Mount radio antenna onto the ZGP800A. |
| | • Screw ZGP800A onto the top of the pole. |
| | • Connect ZRT100 with ZGP800A using the ZDC204 antenna cable. |
| | • Fix the ZHR200 holder to the pole with the tightening screw. Before tightening, ensure that the holder is at a comfortable working height and angle. Tighten the tightening screw. |
| | • Insert the CompactFlash card into ZGP800C. |
| | • Insert the battery into ZGP800C. |
| | • Fix ZGP800C onto the holder. Refer to "Attaching ZGP800C to the ZHR100 holder step-by-step" for further information. |
| | • Turn on ZGP800A and ZGP800C. |
| 2. | **Starting Up with the Survey Program** |




**2.a Selecting the Job**

- Select the Job Default.
- Select the WGS1984 coord system.
- Press **CONT (F1)** to continue.



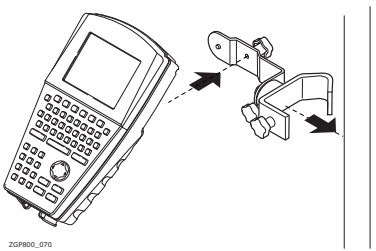

**2.b Surveying the Point**

- Move to the point, enter the point ID.
- Enter the antenna height.
  For GeoMax standard poles = 2.00 m.
- Press **OCUPY (F1)** to start measuring the point.*,**
  Press **STOP (F1)** when enough data is collected for the point.
  Press **STORE (F1)** to store the point.
- Are more points to be surveyed?
  If yes, repeat the first three points.
  If no, continue with the next point.
- Continue to press **ESC** until the Main Menu screen appears.

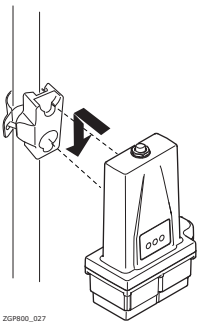
* Before the point is measured, the position mode icon is the moving icon, indicating that the rover can still be moved around.

** **SHIFT QUIT (F6)** always terminates the survey operation. In this case all data collected since pressing **OCUPY (F1)** is lost.

**Attaching ZGP800C to the ZHR100 holder step-by-step**

| Step | Description |
|---|---|
| ☞ | The ZHR100 holder can be attached either to the left side or right side of the pole. |
| 1. | Hold ZGP800C above the holder.<br>  <br> |
| 2. | Place ZGP800C onto the mounting plate and fix it with the screw. |

**Attaching ZRT100 to the ZHR200 holder step-by-step**

| Step | Description |
|---|---|
| ☞ | Ensure that ZHR200 holder is attached to the pole in the direction shown in the drawing. |
| 1. | Hold ZRT100 above the holder.<br>  <br> |
| 2. | Place ZRT100 onto the holder and apply slightly pressure in a downward direction until ZRT100 is clicked into the holder. |

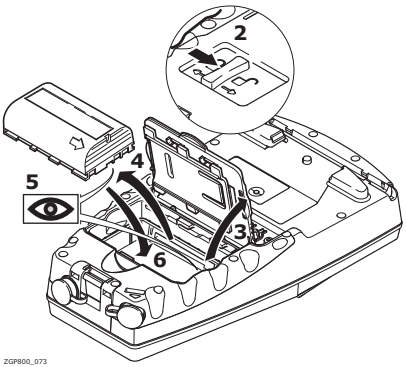
## 6.4 Connecting to the ZGP800A Antenna with Bluetooth

**Communicating via Bluetooth step-by-step**

| Step | Description |
|---|---|
| 1. | Select Main Menu:    |
| 2. | Select Comm: Bluetooth. |
| 3. | Press **SRCH (F4)** to search for Bluetooth devices. The ZGP800A antenna must be turned on. |
| 4. | The **CONFIGURE Search Bluetooth Device** screen appears.<br>All available Bluetooth devices are displayed. |
| 5. | Highlight and select the antenna to be used. |
| 6. | Press **CONT (F1)**. Press **CONT (F1)** to return to the Main Menu screen. |
| ☞ | If the antenna selected is connected for the first time, a Windows CE authentication request comes up. Type in 0000 as identification number for GeoMax's Bluetooth and click **OK**. |
| ☞ | Once the Bluetooth connection is established, the Bluetooth LED on the antenna starts flashing in blue. |

## 6.5 Changing the Battery on the ZGP800C Controller

**Changing the battery on ZGP800C step-by-step**

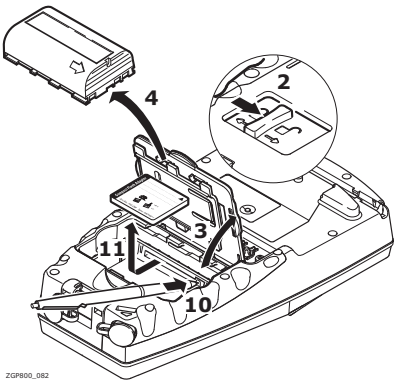



| Step | Description |
|---|---|
| 1. | Turn ZGP800C over to gain access to the battery compartment. |
| 2. | Push the slide fastener in the direction of the arrow with the open-lock symbol. |
| 3. | Open the battery compartment. |

| Step | Description |
|---|---|
| 4. | Pull the battery from the battery compartment. |
| 5. | Place the battery into the battery compartment, ensuring that the engraved arrow symbol is pointing toward the battery contacts. |
| 6. | Close the battery compartment by pushing the slide fastener in the direction of the arrow with the close-lock symbol. |

## 6.6 Changing the CompactFlash card on the ZGP800C Controller

**Changing the CompactFlash card on ZGP800C step-by-step**

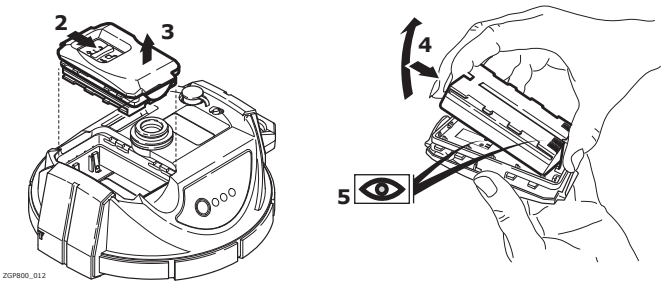



| Step | Description |
|---|---|
| ☞ | The CompactFlash card is inserted into a slot inside the battery compartment. |

| Step | Description |
|---|---|
| 1. | Turn ZGP800C over to gain access to the battery compartment. |
| 2. | Push the slide fastener in the direction of the arrow with the open-lock symbol. |
| 3. | Open the battery compartment. |
| 4. | Pull the battery from the battery compartment. |
| 5. | ☞ The card should be held with the label for the care instructions upwards and the contacts facing the slot. |
| | Slide the card firmly into the slot until it clicks into position. |
| 6. | Place the battery into the battery compartment, ensuring that the engraved arrow symbol is pointing toward the battery contacts. |
| 7. | Close the battery compartment by pushing the slide fastener in the direction of the arrow with the close-lock symbol. |
| 8. | To remove the card, open the cover of the battery compartment. |
| 9. | Pull the battery from the battery compartment. |
| 10. | Press the eject button on the right side of the card slot twice. |
| 11. | Pull out the CompactFlash card and close the compartment cover. |

## 6.7 Changing the Battery on the ZGP800A Antenna

**Changing the battery on ZGP800A step-by-step**

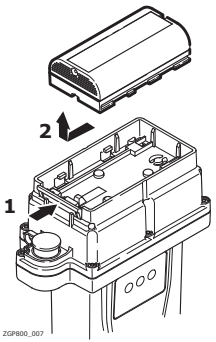



| Step | Description |
|---|---|
| 1. | Turn ZGP800A over to gain access to the battery compartment. |
| 2. | Open the battery compartment by pushing the slide fastener in the direction of the arrow with the open-lock symbol. |
| 3. | Pull out the battery housing. The battery is attached to the housing. |
| 4. | Hold the battery housing and pull the battery from the battery housing. |

| Step | Description |
|---|---|
| 5. | A polarity of the battery is displayed inside the battery housing. This is a visual aid to assist in placing the battery correctly. |
| 6. | Place the battery onto the battery housing, ensuring that the contacts are facing outward. Click the battery into position. |
| 7. | Close the battery compartment by pushing the slide fastener in the direction of the arrow with the close-lock symbol. |

## 6.8 Changing the Battery on the ZRT100 BT Radio

**Changing the battery on ZRT100 step-by-step**




| Step | Description |
|---|---|
| ☞ | Turn ZRT100 over. |
| 1. | Push the release catch in the direction as shown in the illustration. |
| 2. | Push the battery in the direction as shown in the illustration and pull out the battery. |

## 6.9 Essential Battery Operating Principles

**Primary Use/Charging**

- 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.
- 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 from the actual battery capacity available.
- 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 GeoMax, it is not possible to charge the battery if the temperature is too high.

**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; very high operating temperatures reduce the service life of the battery.

## 6.10 Using Licence Keys

**Description**

A licence key can be used to activate protected programs and protected receiver options and can be used to define the expiry date of the software maintenance.

**Protected programs**

A licence key is required for the following protected programs:

| Protected programs |
| --- |
| • DXF Export<br>• Reference Line |

**Protected receiver option**

A licence key is required for the following protected receiver option:

| Protected receiver option |
| --- |
| • GLONASS option<br>• Raw data logging<br>• RTK network option |

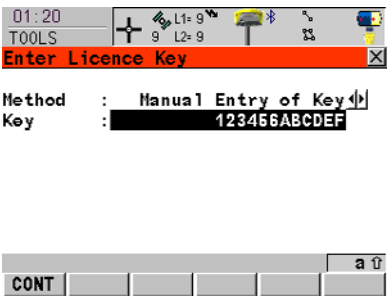
**Access**

- 

, or
- Select a program on ZGP800C which is not yet activated.

**Entering/ Loading a licence key**

- A licence key file can be uploaded to ZGP800C. To upload a licence key file the file should be located on the \SYSTEM directory of CompactFlash card. Licence key files use the naming convention L_123456.key, where 123456 is the instrument serial number.
- Licence keys can also be typed in manually.




**CONT (F1)**
To accept changes and return to the Main Menu screen or continue with the program.

**SHIFT DEL (F4)**
To delete all licence keys on ZGP800C.

| Field | Description of Field |
|---|---|
| **Method** | • The method used to input the licence key to activate the program or the protected options or the software maintenance.<br>• **Upload Key File**. The licence key file is uploaded from the CompactFlash card. The licence key file must be stored in the \SYSTEM directory on the CompactFlash card.<br>• **Manual Entry of Key**. Allows the licence key to be typed in manually. |
| **Key** | • Available for <Method: Manual Entry of Key>. The licence key required to activate a program. Entry is not case sensitive. |

**The next step**

| IF a licence key is to be | THEN |
|---|---|
| uploaded | select the method used to input the licence key and press **CONT (F1)**. |
| deleted | press **SHIFT DEL (F4)**. |

## 6.11 Checking and Adjusting the Circular Level of the Tribrach

**Description**

- The adjustable circular level on the tribrach is used to level the ZGP800A antenna over the observation point. An incorrectly adjusted circular level means that the ZGP800A antenna is not properly positioned over the point, which means that another point on the ground is observed.
- The tribrach should be checked and adjusted:
  - at regular periods,
  - before the first use,
  - after long periods of transport,
  - after long periods of work,
  - if the temperature changes by more than 20 °C.

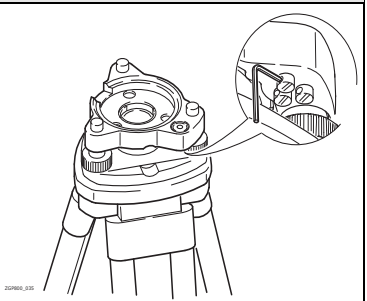
**Equipment checklist**

The required equipment for the checking and adjusting of the circular level are:

- Tripod,
- Tribrach,
- A carrier, with a precision bubble checked and adjusted or a TPS instrument,
- Adjusting pin.

**Checking and adjusting the circular level step-by-step**

| Step | Description |
|---|---|
| 1. | Set up the tripod. |
| 2. | Screw the tribrach onto the tripod. |
| 3. | Fix the carrier/instrument onto the tribrach. |
| 4. | Level the tribrach using the precision bubble on the carrier or the precision bubble on the instrument. |
| 5. | Is the circular level on the tribrach centered and not extended beyond the enscribed circle?<br>• If **yes**, no adjustment is required. The procedure is finished.<br>• If **no**, the bubble requires adjusting. Continue with step 6. |
| 6. | Remove the carrier/instrument. |

| Step | Description |
|---|---|
| 7. | Centre the circular level using the adjustment pin in conjunction with the adjustment screws on the underside of the casing of the circular level.  |
| 8. | Fix the carrier/instrument onto the tribrach. |
| 9. | Repeat steps 4. to 5. |

## 6.12 Checking and Adjusting the Circular Bubble of the Pole

**Checking and adjusting the circular bubble**

It is important that the adjustable circular bubble of the pole is kept in adjustment. Whenever the ZGP800 equipment is sent for servicing to a GeoMax authorized service workshop, it is recommended that the pole is also sent for servicing.

## 6.13 Guidelines for Correct Results with GNSS Surveys

| | |
|---|---|
| **Undisturbed satellite signal reception** | Successful GNSS surveys require undisturbed satellite signal reception, especially at the receiver which serves as a reference. Set up the receivers in locations which are free of obstructions such as trees, buildings or mountains. |
| **Steady antenna for static surveys** | For static surveys, the antenna must be kept perfectly steady throughout the whole occupation of a point. Put the antenna on a tripod or pillar. |
| **Centred and levelled antenna** | Centre and level the antenna precisely over the marker. |

# 7 Care and Transport

## 7.1 Transport

| | |
|---|---|
| **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 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 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. |

## 7.2 Storage

**Product**

Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "9 Technical Data" for information about temperature limits.

**Li-Ion batteries**

- Refer to "9 Technical Data" for information about storage temperature range.
- A storage temperature range of -20 to +30°C/-4 to 86°F in a dry environment is recommended to minimise self-discharging of the battery.
- At the recommended storage temperature range, batteries containing a 10% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.
- 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.

## 7.3 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. Do not repack until everything is completely 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 completely dry before attaching the dust cap. |

# 8 Safety Directions

## 8.1 General Introduction

**Description**

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

## 8.2 Intended Use

**Permitted use**

- Measuring raw data and computing coordinates using carrier phase and code signal from GNSS (Global Navigation Satellite System) satellites.
- Carrying out measurement tasks using various GNSS measuring techniques.
- Recording GNSS and point related data.
- Computating by means of software.
- Data communication with external appliances.

**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 GeoMax.
- Inadequate safeguards at the working site, for example when measuring on roads.

- Controlling of machines, moving objects or similar monitoring application without additional control- and safety installations.

**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.

## 8.3 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 in close proximity to electrical installations or similar situations by the person in charge of the product.

## 8.4 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 completely safe condition.

**Manufacturers of non GeoMax accessories**

The manufacturers of non GeoMax accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the GeoMax 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 GeoMax immediately if the product and the application becomes unsafe.
- To ensure that the national laws, regulations and conditions for the operation of radio transmitters are respected.

**⚠ 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.

## 8.5 End User Licence Agreement EULA

**EULA terms**

- You have acquired a device ZGP800C that includes software licenced by GeoMax from an affiliate of Microsoft Corporation ("MS"). Those installed software products of MS origin, as well as associated media, printed materials, and "online" or electronic documentation ("SOFTWARE") are protected by international intellectual property laws and treaties. The SOFTWARE is licenced, not sold. All rights reserved.
- IF YOU DO NOT AGREE TO THIS END USER LICENCE AGREEMENT ("EULA"), DO NOT USE THE DEVICE OR COPY THE SOFTWARE, INSTEAD, PROMPTLY CONTACT GeoMax FOR INSTRUCTIONS ON RETURN OF THE UNUSED DEVICE(S) FOR A REFUND. **ANY USE OF THE SOFTWARE, INCLUDING BUT NOT LIMITED TO USE ON THE DEVICE, WILL CONSTITUTE YOUR AGREEMENT TO THIS EULA (OR RATIFICATION OF ANY PREVIOUS CONSENT).**
- **GRANT OF SOFTWARE LICENCE**. This EULA grants you the following licence:
  - You may use the SOFTWARE only on the DEVICE.
  - **NOT FAULT TOLERANT**. THE SOFTWARE IS NOT FAULT TOLERANT. GeoMax HAS INDEPENDENTLY DETERMINED HOW TO USE THE SOFTWARE IN THE DEVICE, AND MS HAS RELIED UPON GeoMax TO CONDUCT SUFFICIENT TESTING TO DETERMINE THAT THE SOFTWARE IS SUITABLE FOR SUCH USE.

- **NO WARRANTIES FOR THE SOFTWARE**. THE SOFTWARE is provided "AS IS" and with all faults. THE ENTIRE RISK AS TO SATISFACTORY QUALITY, PERFORMNCE, ACCURACY, AND EFFORT (INCLUDING LACK OF NEGLIGENCE) IS WITH YOU. ALSO, THERE IS NO WARRANTY AGAINST INTERFERENCE WITH YOUR ENJOYMENT OF THE SOFTWARE OF AGAINST INFRINGEMENT. **IF YOU HAVE RECEIVED ANY WARRANTIES REGARDING THE DEVICE OR THE SOFTWARE, THOSE WARRANTIES DO NOT ORIGINATE FROM, AND ARE NOT BINDING ON, MS.**
- No Liability for Certain Damages. **EXCEPT AS PROHIBITED BY LAW, MS SHALL HAVE NO LIABILITY FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES ARISING FROM OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE SOFTWARE. THIS LIMITATION SHALL APPLY EVEN IF ANY REMEDY FAILS FOF ITS ESSENTIAL PURPOSE. IN NO EVENT SHALL MS BE LIABLE FOR ANY AMOUNT IN EXCESS OF U.S. TWO HUNDRED FIFTY DOLLARS (U.S.$250.00).**
- **Limitations on Reverse Engineering, Decompilation, and Disassembly.** You may not reverse engineer, decompile, or disassemble the SOFTWARE, except and only to the extent that such activity is expressly permitted by applicable law notwithstanding these limitation.
- **SOFTWARE TRANSFER ALLOWED BUT WITH RESTRICTIONS.** You may permanently transfer rights under this EULA only as part of a permanent sale or transfer of the Device, and only if the recipient agrees

to this EULA. If the SOFTWARE is an upgrade, any transfer must also include all prior versions of the SOFTWARE.

- **EXPORT RESTRICTIONS.** You acknowledge that SOFTWARE is subject to U.S. and European Union export jurisdiction. You agree to comply with all applicable international and national laws that apply to the SOFTWARE, including the U.S. Export Administration Regulations, as well as end-user, end-use and destination restrictions issued by U.S. and other governments. For additional information see http://www.microsoft.com/exporting/.

## 8.6 Hazards of Use

**Warning**

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

**Precautions:**

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

**Warning**

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 and before and after important measurements.

**Danger**

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

**Precautions:**

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

**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.

**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 and accident prevention and road traffic.

---

**Warning**

Only GeoMax authorized service workshops are entitled to repair these products.

---

**Warning**

If computers intended for use indoors are used in the field there is a danger of electric shock.
**Precautions:**
Adhere to the instructions given by the computer manufacturer with regard to field use in conjunction with GeoMax products.

---

**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 may 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 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 safely carry the weight of the external antenna (>1 kg).

---

**Caution**

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

---

**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**

Using a battery charger not recommended by GeoMax can destroy the batteries. This can cause fire or explosions.
**Precautions:**
Only use chargers recommended by GeoMax to charge the batteries.

---

**Warning**

High mechanical stress, high ambient temperatures or immersion into fluids can cause leackage, 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**

Short circuited battery terminals can overheat and cause injury or fire, for example by storing or transporting in pockets if battery terminals come in contact with jewellery, keys, metallized paper or other metals.
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 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 GeoMax home page at http://www.geomax-positioning.com or received from your GeoMax dealer.

---

**Danger**

If the product is used with accessories, for example 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 may increase the risk of being struck by lightning.
- Be sure to remain at a safe distance from electrical installations. Do not use the product directly under or in close proximity to power lines. If it is essential to work in such an environment contact the 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 with regard to grounding antennas and masts. These installations must be carried out by an authorised specialist.
- To prevent damages due to indirect lightning strikes (voltage spikes) cables, 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 authorized 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, receiver - antenna.

**Lightning conductors**

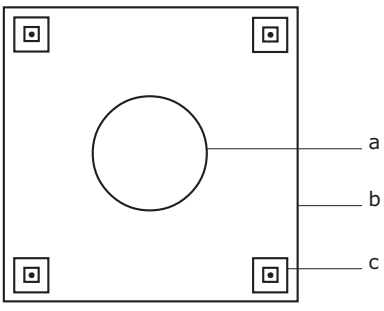
Suggestion for design of a lightning conductor for a GNSS system:

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 should 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.

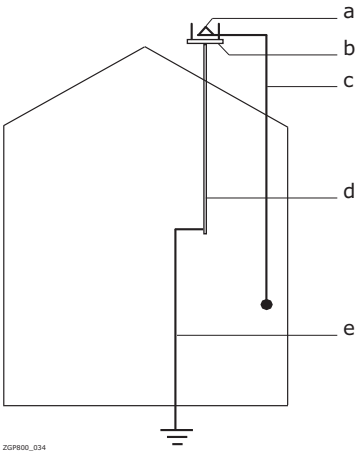
2. On metallic structures
   Protection is as described for non-metallic structures, but the air terminals can be connected directly to the conducting structure without the need for down conductors.

**Air terminal arrangement, plan view**




a) Antenna
b) Support structure
c) Air terminal

**Grounding the receiver / antenna**




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

## 8.7 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, 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 in conjunction with accessories from other manufacturers, for example field computers, personal computers, two-way radios, 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 and two-way radio, 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 very intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.

**Precautions:**

Check the plausibility of results obtained under these conditions.

---

**⚠ Warning**

If the product is operated with connecting cables attached at only one of their two ends, 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:

Electromagnetic radiation 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 may be disturbed or that humans or animals may 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.
- Do not operate the product with radio or digital cellular phone devices for long periods immediately next to your body.

## 8.8 FCC Statement, Applicable in U.S.

**Applicablility**

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

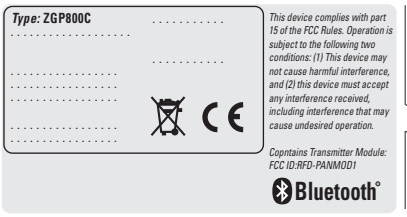
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- 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.

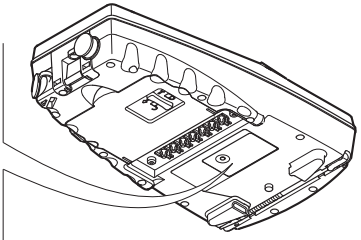
**Warning**

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

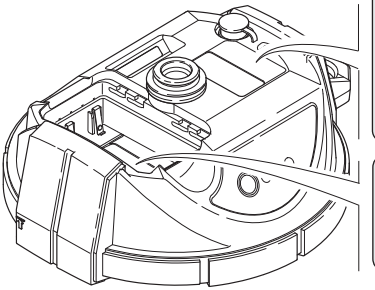
**Labelling ZGP800C**




ZGP800_013



## Labelling ZGP800A



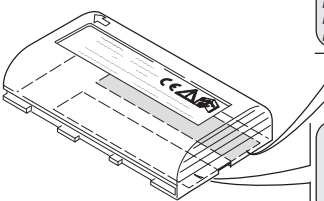
ZGP800_014

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.

Advisory Notice: this receiver uses the P-Code signal, which by U.S. policy, may be switched off without notice.
This device contains a transmitter:
FCC-ID: PVH090202S

**Type: ZGP 800A** Art.No.: .....
Equip.No.: XXXXXX S.No.: .....
Power: 12V⎓, ≥0.5A max.
GeoMax AG
CH-9443 Widnau
Manufactured: 2008
Made in Switzerland

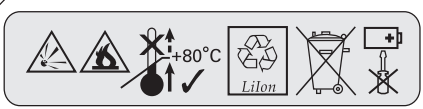
## Labelling ZBA200



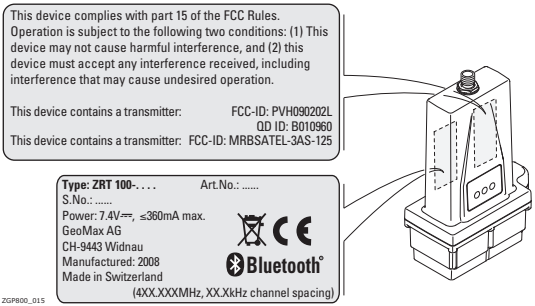
ZGP800_076

*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.*

c UL us LISTED
**ITE Accessory**
**E179078 . 70YL**



## Labelling ZRT100



# 9 Technical Data

## 9.1 ZGP800C Technical Data

**Design**

Glass reinforced polymer housing with integrated battery.

**Control unit**

| | |
|---|---|
| Display: | 1/4 VGA (320 x 240 pixels), color, graphics capable LCD, illumination, touch screen |
| Keyboard: | 56 keys including 6 function keys, illumination |
| Angle Display: | 360°'", 360° decimal, 400 gon, 6400 mil, V % |
| Distance Display: | m, ft int, ft us, ft int inch, ft us inch |
| Touch screen: | Toughened film on glass |

**Dimensions**

| Type | Length [m] | Width [m] | Thickness [m] |
|---|---|---|---|
| ZGP800C | 0.218 | 0.123 | 0.047 |

**Weight**

| Type | Weight [kg]/[lbs] |
|---|---|
| ZGP800C with ZBA200 battery | 0.741/1.634 |

**Recording**

For ZGP800C, data can only be recorded on the CompactFlash card.

| Type | Capacity [MB] | Data capacity |
|---|---|---|
| CompactFlash card | • 256 | 256 MB is sufficient for about 360000 real-time points with codes |

**Power**

| Type | Consumption [W] | External supply voltage |
|---|---|---|
| ZGP800C | 1.1/<br>1.4<br>Bluetooth to ZGP800A, radio receiving data | Nominal voltage 12 V DC (⎓)<br>Voltage range 10.5 V-28 V |

**Internal battery**

| Type | Battery | Voltage | Capacity | Operating time, typical |
|---|---|---|---|---|
| ZGP800C | Li-Ion | 7.4 V | ZBA200:<br>2.2 Ah | 12 h/<br>11 h<br>Bluetooth to ZGP800A |

## Environmental specifications

### Temperature

| Type | Operating temperature [°C] | Storage temperature [°C] |
|---|---|---|
| ZGP800C | -30 to +65<br>Bluetooth: -25 to +65 | -40 to +80 |
| Internal battery | -20 to +50 | -40 to +70 |

### Protection against water, dust and sand

| Type | Protection |
|---|---|
| ZGP800C | IP54 (IEC60529) |

### Humidity

| Type | Protection |
|---|---|
| ZGP800C | Up to 100 %<br>The effects of condensation are to be effectively counteracted by periodically drying out ZGP800C. |

## Interfaces

| Type | RS232<br>No handshake | USB | Bluetooth |
|---|---|---|---|
| ZGP800C | HIROSE port | HIROSE port | Class 2 |

**Data format for RS232**

The default values are:

Baud rate: 115200
Parity: None
Terminator: CR/LF
Data bits: 8
Stop bits: 1

**Ports**

| Type | 10 pin HIROSE-1 |
|---|---|
| ZGP800C | For power and/or communication |

## 9.2 ZGP800A Technical Data

### 9.2.1 Tracking Characteristics

**Receiver technology**

QTrack+

**Satellite reception**

Dual frequency

**Receiver channels**

14 channels continuous tracking on L1 and L2 (GPS); twelve channels continuous tracking on L1 and L2 (GLONASS).

**Supported codes**

**GPS**

| L1 | L2 |
|---|---|
| Carrier phase, C/A code | Carrier phase, C code (L2C) and P2 code |

**GLONASS**

| L1 | L2 |
|---|---|
| Carrier phase, C/A code | Carrier phase, P2 code |

**Carrier tracking**

**GPS**

| Condition | ZGP800A |
|---|---|
| L1, AS off or on | Reconstructed carrier phase via C/A code |
| L2, AS off | Reconstructed carrier phase via P2 code |
| L2, AS on | Switches automatically to patented P code-aided technique providing full L2 reconstructed carrier phase |

**GLONASS**

| Condition | ZGP800A |
|---|---|
| L1 | Reconstructed carrier phase via C/A code |
| L2 | Reconstructed carrier phase via P2 code |

**Code measurements**

**GPS**

| Condition | ZGP800A |
|---|---|
| L1, AS off<br>L1, AS on | Carrier phase smoothed code measurements: C/A code |
| L2, AS off | Carrier phase smoothed code measurements: P2 code |

| Condition | ZGP800A |
|---|---|
| L2, AS on | Carrier phase smoothed code measurements: Patented P code-aided code |

**GLONASS**

| Condition | ZGP800A |
|---|---|
| L1 | Carrier phase smoothed code measurements: C/A code |
| L2 | Carrier phase smoothed code measurements: P2 code |

Carrier phase and code measurements on L1 and L2 are fully independent with AS on or off.

**Satellites tracked** Up to 14 simultaneously on L1 and L2 (GPS) + up to 12 simultaneously on L1 and L2 (GLONASS)

## 9.2.2 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 GeoMax PC-Tools and on real-time measurements.

**Differential code**

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

**Differential phase in real-time**

| **Static** | | **Kinematic** | |
|---|---|---|---|
| **Horizontal** | **Vertical** | **Horizontal** | **Vertical** |
| 5 mm + 1 ppm | 10 mm + 1 ppm | 10 mm + 1 ppm | 20 mm + 1 ppm |

## 9.2.3 Technical Data

**Dimensions**

| | |
|---|---|
| Height: | 0.089 m |
| Diameter: | 0.186 m |

**Connector**

10 pin HIROSE-1

**Mounting**

5/8" Whitworth

**Weight**

1.1 kg including internal battery ZBA200

**Power**

| | |
|---|---|
| Power consumption: | 1.8 W typically |
| External supply voltage: | Nominal 12 V DC (⎓), voltage range 5-28 V DC |

**Battery internal**

| | |
|---|---|
| Type: | Li-Ion |
| Voltage: | 7.4 V |
| Capacity: | ZBA200: 2.2 Ah |
| Typical operating time: | 6 h |

**Electrical data**

| Type | ZGP800A |
|---|---|
| Voltage | - |
| Current | - |

| Type | ZGP800A |
|---|---|
| Frequency | GPS L1 1575.46 MHz<br>GPS L2 1227.60 MHz<br>GLONASS L1 1602.5625-1611.5 MHz<br>GLONASS L2 1246.4375-1254.3 MHz |
| Gain | Typically 27 dBi |
| Noise Figure | Typically < 2 dBi |
| BW, -3 dBiW | - |
| BW, -30 dBi | - |

## Environmental specifications

### Temperature

| Operating temperature [°C] | Storage temperature [°C] |
|---|---|
| -30 to +65 | -40 to +80 |

### Protection against water, dust and sand

| Protection |
|---|
| IP54 (IEC 60529) |

**Humidity**

| Protection |
| --- |
| Up to 100 %<br>The effects of condensation are to be effectively counteracted by periodically drying out the antenna. |

## 9.3 Conformity to National Regulations

### 9.3.1 ZGP800C

**Conformity to national regulations**

- FCC Part 15 (applicable in US)
- Hereby, GeoMax AG, declares that the ZGP800 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at http://www.geomax-positioning.com.

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 EU Member state.

- 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** | Bluetooth | 2402 - 2480 MHz |
| **Output power** | Bluetooth | 2.5 mW |

## Antenna

| Type | Antenna | Gain [dBi] | Connector | Frequency band [MHz] |
|---|---|---|---|---|
| ZGP800C, Bluetooth | Integrated antenna | - | - | - |

### 9.3.2 ZGP800A

**Conformity to national regulations**

- FCC Part 15 (applicable in US)
- Hereby, GeoMax AG, declares that the ZGP800A is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at http://www.geomax-positioning.com.

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 EU Member state.

- 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] |
|---|---|
| ZGP800A | 1227.60<br>1575.42 |
| ZGP800A | 1246.4375 - 1254.3<br>1602.4375 - 1611.5 |
| Bluetooth | 2402 - 2480 |

| | | |
|---|---|---|
| **Output power** | GNSS<br>Bluetooth | Receive only<br>5 mW |
| **Antenna** | GNSS<br>Bluetooth | Internal GNSS antenna element (receive only)<br>Type: Internal Microstrip antenna<br>Gain: 1.5 dBi |

### 9.3.3 ZRT100

**Conformity to national regulations**

- FCC Part 15 (applicable in US)
- Hereby, GeoMax AG, declares that the ZRT100 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at http://www.geomax-positioning.com.

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 EU Member state.

- 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] |
|---|---|
| Radio (receive only) | 380 - 470 |
| Bluetooth | 2402 - 2480 |

**Output power**

| | |
|---|---|
| Radio | Receive only |
| Bluetooth | 5 mW |

## Antenna

| Type | Antenna | Gain [dBi] | Connector | Frequency band [MHz] |
|---|---|---|---|---|
| ZRA101 | Gainflex radio antenna | 4 dBi | TNC | 380 - 435 |
| ZRA100 | Gainflex radio antenna | 4 dBi | TNC | 435 - 470 |
| Bluetooth | Integrated antenna | 1.5 dBi | - | 2402 - 2480 |

# 10 International Limited Warranty, Software Licence Agreement

**International Limited Warranty**

This product is subject to the terms and conditions set out in the International Limited Warranty which you can download from the GeoMax home page at http://www.geomax-positioning.com or collect from your GeoMax distributor.

The foregoing warranty is exclusive and is in lieu of all other warranties, terms or conditions, express or implied, either in fact or by operation of law, statutory or otherwise, including warranties, terms or conditions of merchantability, fitness for a particular purpose, satisfactory quality and non-infringement, all of which are expressly disclaimed.

**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 pursuant to prior authorization from GeoMax. Such software is protected by copyright and other laws and its use is defined and regulated by the GeoMax 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 GeoMax Software Licence Agreement.

Such agreement is provided together with all products and can also be referred to and downloaded at the GeoMax home page at http://www.geomax-positioning.com or collected from your GeoMax dealer.

You must not install or use the software unless you have read and accepted the terms and conditions of the GeoMax 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 may 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 dealer from whom you purchased the product within ten (10) days of purchase to obtain a full refund of the purchase price.

# Index

**S**



**T**

# **GeoMax** ZGP800



**765258-1.2.0en, Original text**



GEOMAX
A Hexagon Company

**GeoMax AG**
www.geomax-positioning.com
info@geomax-positioning.com