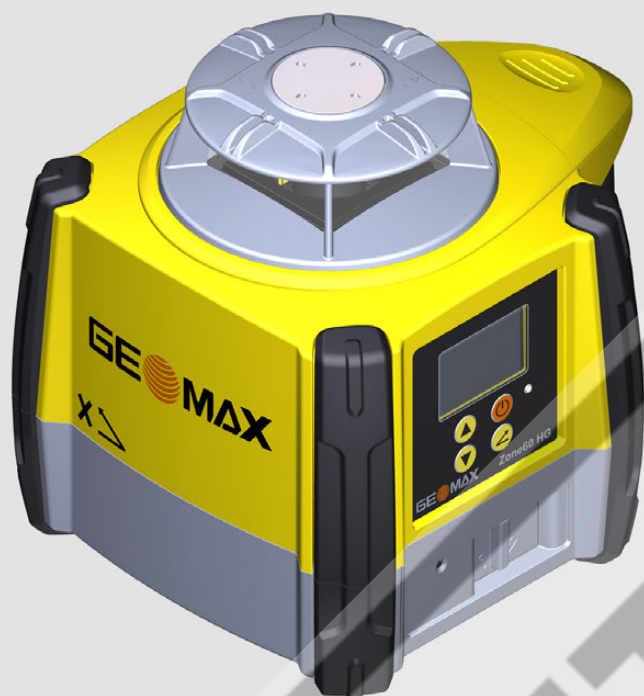


GeoMax Zone60 HG

User Manual



Version 1.0
English



Introduction

Purchase

Congratulations on the purchase of a GeoMax Rotating Laser product.



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

Validity of this manual

This manual applies to the Zone60 HG lasers. Differences between the models are marked and described.

Available documentation

Name	Description / Format		
Zone60 HG Quick Guide	Provides an overview of the product. Intended as a quick reference guide.	✓	✓
Zone60 HG 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.	-	✓

Refer to the following resources for all Zone60 HG documentation/software:

- the GeoMax Zone60 HG CD
- the GeoMax website: <http://www.geomax-positioning.com>

Table of Contents

In this manual	Chapter	Page
1	Safety Directions	4
1.1	General	4
1.2	Definition of Use	4
1.3	Limits of Use	5
1.4	Responsibilities	5
1.5	Hazards of Use	5
1.6	Laser Classification	6
1.6.1	General	6
1.6.2	Zone60 HG	7
1.7	Electromagnetic Compatibility EMC	7
1.8	FCC Statement, Applicable in U.S.	8
2	Description of the System	10
2.1	System Components	10
2.2	Zone60 HG Laser Components	10
2.3	Case Components	11
2.4	Setup	11
3	Operation	13
3.1	User Interface	13
3.2	LCD Display Information	13
3.3	Grade Entry	14
3.4	Elevation (H.I.) Alert, Bump Alert and Smart Slope Functions	15
3.5	Zone60 HG Option Menu	16
4	Receivers	18
4.1	ZRB35 Receiver	18
4.2	ZRP105 Receiver	19
4.3	ZRD105, Digital Receiver	20
5	Applications	22
5.1	Setting Forms	22
5.2	Checking Grades	22
5.3	Entering Grades	23
6	Batteries	24
6.1	Operating Principles	24
6.2	Battery for Zone60 HG	24
7	Accuracy Adjustment	27
7.1	Checking the Level Accuracy	27
7.2	Adjusting the Level Accuracy	27
8	Troubleshooting	30
9	Care and Transport	32
9.1	Transport	32
9.2	Storage	32
9.3	Cleaning and Drying	32
10	Technical Data	33
10.1	Conformity to National Regulations	33
10.2	Dangerous Goods Regulations	33
10.3	General Technical Data of the Laser	33

1

Safety Directions

1.1

General

Description

The following directions enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

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

About Warning Messages

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

Warning messages...

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

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

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

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

1.2

Definition of Use

Intended use

- The product casts a horizontal laser plane or a laser beam for the purpose of alignment.
- The laser beam can be detected by means of a laser detector.
- Remote control of product.
- Data communication with external appliances.

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.
- Deliberate dazzling of third parties.
- 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



CAUTION

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

Precautions:

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



DANGER

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

Precautions:

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



NOTICE

With the remote control of products, it is possible that extraneous targets will be picked out and measured.

Precautions:

When measuring in remote control mode, always check your results for plausibility.



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

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.

	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	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	If you open the product, either of the following actions may cause you to receive an electric shock. • Touching live components • Using the product after incorrect attempts were made to carry out repairs Precautions: Do not open the product. Only GeoMax authorised service workshops are entitled to repair these products.
	WARNING	If the product is improperly disposed of, the following can happen: • If polymer parts are burnt, poisonous gases are produced which may impair health. • If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination. • By disposing of the product irresponsibly you may enable unauthorised persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination. Precautions: The product must not be disposed with household waste. Dispose of the product appropriately in accordance with the national regulations in force in your country. Always prevent access to the product by unauthorised personnel. Product-specific treatment and waste management information can be downloaded from the GeoMax website at http://www.geomax-positioning.com/treatment or received from your GeoMax distributor.
	WARNING	Only GeoMax authorised service workshops are entitled to repair these products.
	WARNING	High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries. Precautions: Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.
	WARNING	If battery terminals are short circuited e.g. by coming in contact with jewellery, keys, metalized paper or other metals, the battery can overheat and cause injury or fire, for example by storing or transporting in pockets. Precautions: Make sure that the battery terminals do not come into contact with metallic objects.

1.6 Laser Classification

1.6.1 General

General

The following chapters provide instructions and training information about laser safety according to international standard IEC 60825-1 (2014-05) and technical report IEC TR 60825-14 (2004-02). The information enables the person responsible for the product and the person who actually uses the equipment, to anticipate and avoid operational hazards.



According to IEC TR 60825-14 (2004-02), products classified as laser class 1, class 2 and class 3R do not require:

- laser safety officer involvement,
- protective clothes and eyewear,
- special warning signs in the laser working area



if used and operated as defined in this User Manual due to the low eye hazard level.

National laws and local regulations could impose more stringent instructions for the safe use of lasers than IEC 60825-1 (2014-05) and IEC TR 60825-14 (2004-02).

1.6.2 Zone60 HG

General

The rotating laser built into the product produces a visible laser beam which emerges from the rotating head.

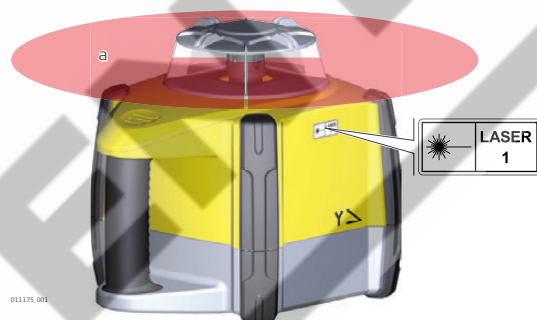
The laser product described in this section is classified as laser class 1 in accordance with:

- IEC 60825-1 (2014-05): "Safety of laser products"

These products are safe for momentary exposures but can be hazardous for deliberate staring into the beam. The beam may cause dazzle, flash-blindness and after-images, particularly under low ambient light conditions.

Description	Value
Maximum peak radiant power	0.6 mW / 2.2 mW
Pulse duration (effective)	500 ms / 1.1 ms
Pulse repetition frequency	1 Hz / 10 Hz
Beam divergence	0.2 mrad
Wavelength	635 nm

Labelling



a) Laser beam

1.7 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.

1.8

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.

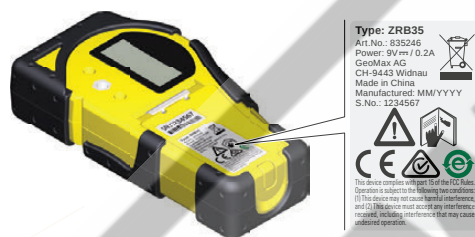
Labelling Zone60 HG



011176.001

Labelling receiver

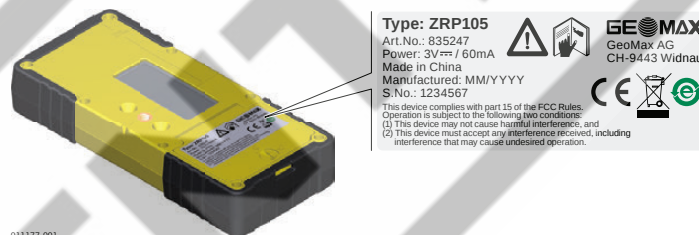
ZRB35:



011178.001

Labelling receiver

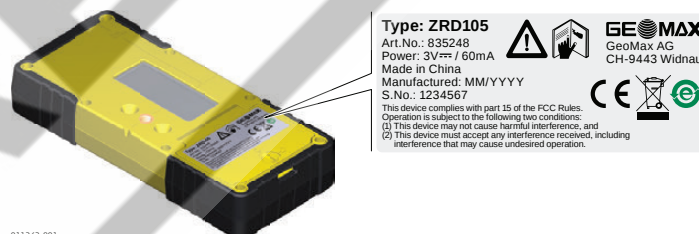
ZRP105:



011177.001

Labelling receiver

ZRD105:



011243.001

2

Description of the System

2.1

System Components

General description

The Zone60 HG is a semi-automatic laser. Semi-automatic means that the laser self-levels only when in Level mode, not when grade is entered.

The Zone60 HG is a laser tool for general construction and levelling applications such as:

- Setting forms
- Checking grades
- Controlling depths for excavations

If set up within the self-levelling range, the Zone60 HG automatically levels to create an accurate horizontal plane of laser light.

Once the Zone60 HG has levelled, the head will start rotating and the Zone60 HG is ready for use.

30 seconds after the Zone60 HG has completed the levelling, the Elevation Alert (H.I.) function becomes active and protects the Zone60 HG against changes in elevation caused by movement of the tripod to ensure accurate work.

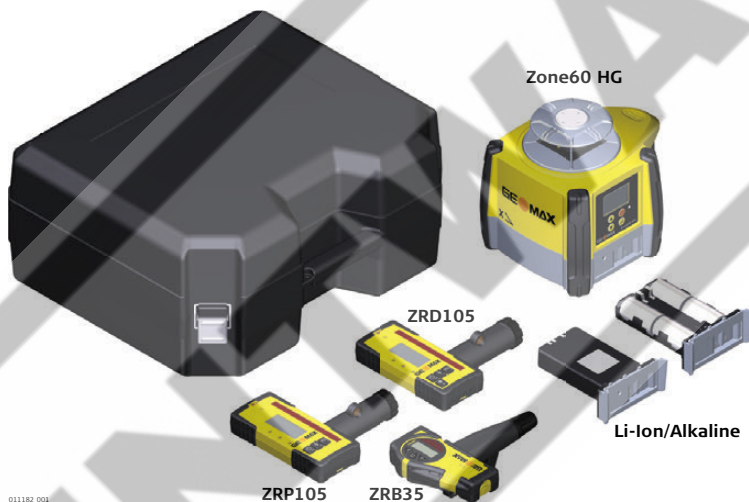
The Zone60 HG can also be used to create sloped planes for applications such as:

- Driveways
- Parking lots
- Landscaping

In Grade mode the Zone60 HG checks first the position of the beam at level, then adjusts to the desired grade input. If a single grade is entered, the cross axis will continue to self-level.

Once the Zone60 HG has reached the desired grade, it does not self-level, but is monitored by Bump Alert and temperature change functions to ensure reliable grade values.

Available system components



The delivered components depend on the package ordered.

2.2

Zone60 HG Laser Components

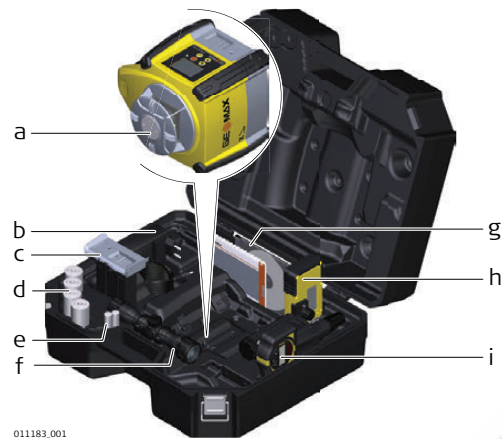
Zone60 HG laser components



- a) Carry handle
- b) LCD display
- c) Laser emission LED
- d) Buttons
- e) Battery compartment
- f) Charge LED (for Li-Ion battery pack)

2.3 Case Components

Case components



- 011183_001
- a) Zone60 HG laser
 - b) Charger (for Li-Ion versions only)
 - c) Li-Ion battery pack or Alkaline battery pack
 - d) 4 x D-cell battery (for alkaline versions only)
 - e) 2x AA-cell battery
 - f) Scope (optional)
 - g) User Manual/CD
 - h) Receiver mounted on the bracket
 - i) Second receiver (can be purchased separately)

2.4 Setup

- Location**
- Keep the location clear of possible obstructions that could block or reflect the laser beam.
 - Place the Zone60 HG on a stable ground. Ground vibration and extremely windy conditions can affect the operation of the Zone60 HG.
 - When working in a very dusty environment place the Zone60 HG up-wind so the dirt is blown away from the laser.

Setting up on a Tripod - Level

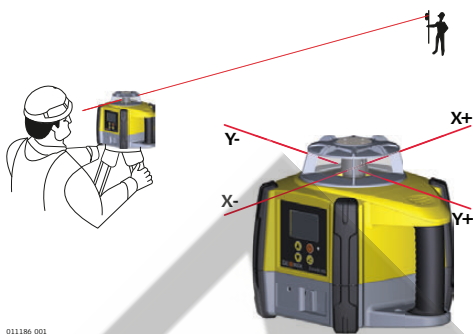


011184_001

Step	Description
1.	Set up the tripod.
2.	Place the Zone60 HG on the tripod.
3.	Tighten the screw on the underside of the tripod to secure the Zone60 HG on the tripod.

- Attach the Zone60 HG securely to a tripod or laser trailer, or mount on a stable level surface.
- Always check the tripod or laser trailer before attaching the Zone60 HG. Make sure all screws, bolts and nuts are tight.
- If a tripod has chains, they should be slightly loose to allow for thermal expansion during the day.
- Secure the tripod on extremely windy days.

Setting up on a Tripod - Grade



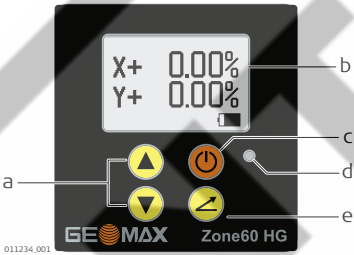
Step	Description
1.	Set up the tripod.
2.	Place the Zone60 HG on the tripod.
3.	Align the axes of the laser to the job.
4.	Tighten the screw on the underside of the tripod to secure the Zone60 HG on the tripod.

- Attach the Zone60 HG securely to a tripod or laser trailer, or mount on a stable level surface.
- Always check the tripod or laser trailer before attaching the Zone60 HG. Make sure all screws, bolts and nuts are tight.
- If a tripod has chains, they should be slightly loose to allow for thermal expansion during the day.
- Secure the tripod on extremely windy days.

3 Operation

3.1 User Interface

Overview



- a) Up and Down arrow buttons
- b) LCD display
- c) Power button
- d) Laser emission LED
- e) Grade button

Description

Item	Function
Up and Down arrow buttons	Press the Up and Down buttons to enter a grade or highlight options in the Option Menu.
LCD display	Displays user information.
Power button	Press to turn the Zone60 HG on or off.
Laser emission LED	The LED flashes when the laser beam is flashing. The LED is on when the laser beam is on.
Grade buttons	Press to start grade entry process or accept settings in the Option Menu.

Start up screens

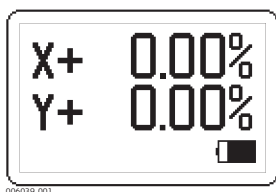


When the Zone60 HG is turned on, the GeoMax Start up screen is shown followed by the Zone60 HG Information screen displaying the following information:

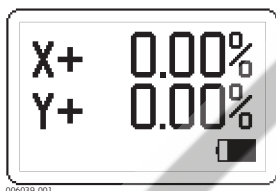
- Model and type
- Serial number
- Software revision level
- Hours of use

Main user screen

The Main user screen show the grade input.

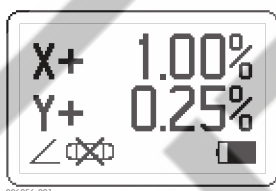


Level mode screen



The grade shown must be 0.00% to use the Zone60 HG in Level mode, for example for forms and footings. In Level mode, the Zone60 HG automatically levels to the horizontal plane.

Grade mode screen

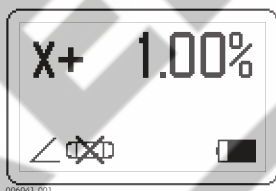


Enter your desired grade in Grade mode. The Zone60 HG will check the level position and then adjust the plane of laser light to the grade input. In Grade mode, the Zone60 HG does not self-level, but is set to detect bumps and temperature changes. A small icon in the bottom left corner of the screen indicates that the axis with grade is not self-levelling.

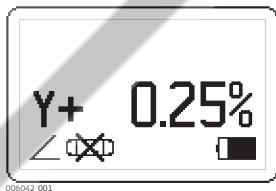
3.3

Grade Entry

Entering grade



Zone60 HG: X-axis entry



Zone60 HG: Y-axis entry

The Zone60 HG always starts up with no grade input.

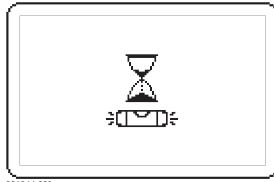
To enter grade, do the following:

- 1) Press the Grade button once to enter Grade mode.
- 2) Press the Up and Down arrow buttons to enter a grade for the X-axis.
- 3) Zone60 HG only: Press the Grade button a second time to switch to the Y-axis.
- 4) Zone60 HG only: Press the Up and Down arrow buttons to enter a grade for the Y-axis.
- 5) Press the Grade button again to return to the Main user screen.

The Zone60 HG will begin the grade setting process.

-  The smallest grade increment is 0.05% up to 3.00% grade and 0.10% for grade greater than 3.00%.
-  When entering grade the displays change as shown.
-  To restore the last set grade(s), press and hold the Grade button for 1.5 seconds.
-  If after eight seconds no button is pressed, the Zone60 HG will accept the grade entered and will begin the grade setting process.

Grade setting process



006044.001
Levelling to grade screen

After grade entry for one or both axes, the Zone60 HG waits for 8 seconds of no movement or button presses before beginning the process.

The Zone60 HG then displays the Levelling to grade screen and automatically self-levels in the horizontal plane, followed by readjusting the servo mechanism to the desired grade value.

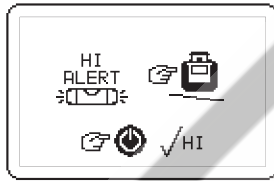
After completion, the Zone60 HG activates the Slope/Bump Alert and Temperature Alert functions (if enabled).

-  During this process, do not touch or disturb the Zone60 HG.

3.4

Elevation (H.I.) Alert, Bump Alert and Smart Slope Functions

Elevation (H.I.) Alert



006045.001
Elevation (H.I.) Alert screen

The Elevation Alert or Height of Instrument (H.I) function prevents incorrect work caused by movement or settling of the tripod that would cause the Zone60 HG to level at a lower height.

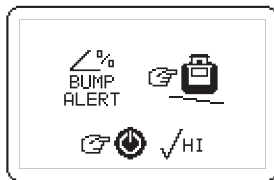
The Elevation (H.I.) Alert function becomes active and monitors the movement of the Zone60 HG 30 seconds after it has completely levelled and the head starts rotating.

If the Zone60 HG gets disturbed, the Elevation (H.I.) Alert screen is displayed and the Zone60 HG beeps rapidly.

To stop the alert, turn the Zone60 HG off and on again. Check the height of the laser before beginning to work again.

-  The Elevation (H.I.) Alert functions in Level mode (0.00%) and in Grade mode when one of the axes remains at 0.00%.
-  The Elevation (H.I.) Alert function turns on automatically every time the Zone60 HG is turned on. It can be enabled/disabled in the Option Menu (enabled by default).

Bump Alert



006046.001

Bump Alert screen

The Bump Alert function prevents incorrect work caused by movement or settling of the tripod that occurs when the Zone60 HG is used for grade.

The Bump Alert function becomes active and monitors the movement of the Zone60 HG when it has completely levelled and the head starts rotating.

If the Zone60 HG gets disturbed, the Bump Alert screen is displayed and the Zone60 HG beeps rapidly.

To stop the alert, do one of the following:

- If the height has not changed, press the Grade button for 1.5 seconds to stop the alert and continue working.
The Zone60 HG will check level and return to desired grade.
- If the height has changed, turn the Zone60 HG off and on again, check the height of the laser and reenter the grade.



If one axis is still set to Level mode (0.00%), the Elevation (H.I.) Alert function is also active for this axis.

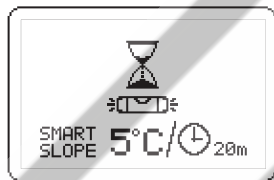


The Bump Alert function turns on automatically every time grade is entered in the Zone60 HG. It can be enabled/disabled in the Option Menu (enabled by default).



The Bump Alert function can be set to FINE or COARSE in the Option Menu (FINE by default).

Smart Slope



006048.002

Smart Slope screen: COARSE

If the Zone60 HG detects a change in ambient temperature, the grade mechanism will return to level position, check level and return to the grade set.

During this, the Zone60 HG cannot be used and the Smart Slope screen is displayed.

There are two settings for the Smart Slope function:

- FINE: 2°C temperature change / 10 minutes
- COARSE: 5°C temperature change / 20 minutes



The Smart Slope setting can be changed in the Option Menu (COARSE by default).

3.5

Zone60 HG Option Menu

Option Menu



006050.001

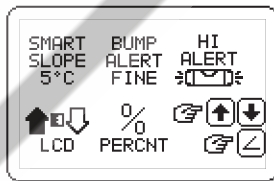
Option Menu

Press both the Up arrow button and Power button for 1.5 seconds to enter the Option Menu.

There are five options available:

- Smart Slope: FINE/COARSE/OFF
- Bump Alert: FINE/COARSE/OFF
- H.I. Alert: ON/OFF at start up
- Contrast
- Percent/Per mil

Selecting an option

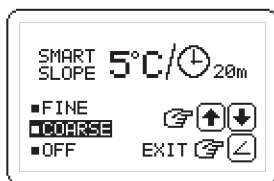


006050.001

Option Menu

- 1) Press the Up arrow or Down arrow button to highlight the option to change.
- 2) Press the Grade button to enter the selected option screen.

Changing an option



006146.001

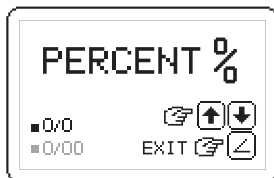
Smart Slope option

- 1) Press the Up arrow or Down arrow button to highlight the desired option.
- 2) Press the Grade button to confirm the setting and return to the Option Menu.

Percent / Per mil



Do not change this option unless you are sure you want to work with Per mil values (Percent by default).



006053.001

Percent/Per mil option

Changing from Percent to Per mil moves the decimal point one place to the right:

- Percent: 1 m per 100 m
- Per mil: 1 m per 1,000 m (1 mm per 1 m)

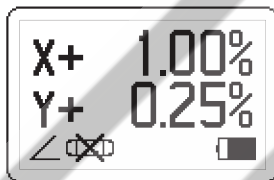


006145.001

Confirm Percent



If changing from Percent to Per mil, confirmation for the change is necessary.



006054.001

Percent



The Percent and Per mil screens to the left are equal.



006055.001

Per mil

Description

The Zone60 HG is sold with the ZRB35, ZRP105 or ZRD105 Receiver.

4.1

ZRB35 Receiver

Instrument components
part 1 of 2

- a) Level vial
- b) Keypad
- c) On-grade
- d) Laser Reception window
- e) LCD window
- f) Audio Speaker

Component	Description
Level vial	Aids to keep the rod plumb when taking readings.
Keypad	Power, accuracy and volume functions.
On-grade	Indicates the on-grade position of the laser.
Laser Reception window	Detects the laser beam. The reception windows must be directed towards the laser.
LCD window	Front and rear LCD arrow indicate the detector's position.
Audio Speaker	Indicates the detector's position: • High - Fast beeping • On-grade - Solid tone • Low - Slow beeping

Instrument components
part 2 of 2

- a) Bracket Mounting Hole
- b) Offset notch
- c) Battery door
- d) Serial number label
- e) Product label

Component	Description
Bracket Mounting Hole	Location to attach the receiver bracket for normal operation.
Offset notch	Use to transfer reference marks. The notch is 45 mm (1.75") below to top of the detector.
Battery door	Access to the battery compartment.

Description of the
buttons

- a) Audio
- b) Bandwidth
- c) Power

Button	Function
Audio	Press to change the audio output.
Bandwidth	Press to change detection bandwidth.
Power	Press once to turn on the Receiver.

Instrument components part 1 of 2

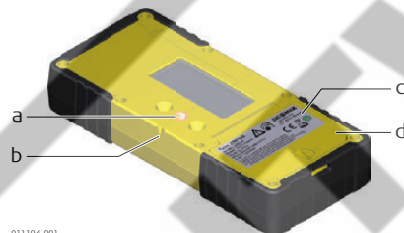


011193.001

- a) Level vial
- b) Audio Speaker
- c) LCD window
- d) LEDs
- e) Laser Reception window
- f) On-grade
- g) Keypad

Component	Description
Level vial	Aids to keep the rod plumb when taking readings.
Audio Speaker	Indicates the detector's position: • High - Fast beeping • On-grade - Solid tone • Low - Slow beeping
LCD window	Front and rear LCD arrow indicate the detector's position.
LEDs	Display the relative position of the laser beam. Three channel indication: • High - Red • On-grade - Green • Low - Blue
Laser Reception window	Detects the laser beam. The reception windows must be directed towards the laser.
On-grade	Indicates the on-grade position of the laser.
Keypad	Power, accuracy and volume functions.

Instrument components part 2 of 2



011194.001

- a) Bracket Mounting Hole
- b) Offset notch
- c) Product label
- d) Battery door

Component	Description
Bracket Mounting Hole	Location to attach the receiver bracket for normal operation.
Offset notch	Use to transfer reference marks. The notch is 85 mm (3.35") below to top of the detector.
Product label	The serial number is located inside the battery compartment.
Battery door	Access to the battery compartment.

Description of the Buttons



011195.001

- a) Power
- b) Audio
- c) Bandwidth

Button	Function
Power	Press once to turn on the Receiver.
Audio	Press to change the audio output.
Bandwidth	Press to change detection bandwidth.

Menu access and navigation

To access the menu of the ZRP105 Receiver, press the Bandwidth button and Audio button simultaneously.

- Use the Bandwidth button and Audio button to change parameters.
- Use the Power button to scroll through the menu.

Menu



MENU MODE - The blue LED will blink slowly indicating menu mode.

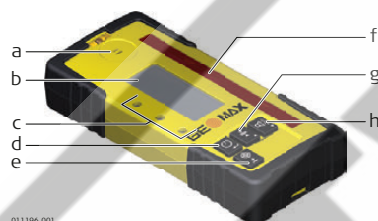
Menu	Function	Indication
LED Red and Green LEDs change brightness to indicate this parameter.	Changes the brightness of the LED indicators.	Red and green LEDs - High/Low/Off
BAT The laser icon flashes to indicate this parameter.	Turns on or off the Laser low battery indication on the receiver.	Green LED is on: Laser low battery icon function is active. Red LED is on: Laser low battery icon function is not active.
MEM The down arrow bars are filling to indicate this parameter.	Turns on or off the position memory function.	Green LED is on: function is on. Red LED is on: function is off.

4.3

ZRD105, Digital Receiver

The ZRD105 Digital Receiver provides you with basic position information by using an arrow display plus digital readout.

Instrument components



- a) Speaker
- b) LCD Digital Display
- c) LED Display
- d) Power button
- e) Target button
- f) Reception window
- g) Bandwidth button
- h) Audio button

Description of the Buttons

Button	Function
Power	Press once to turn on the receiver.
	Press 1.5 seconds to turn off the receiver.
Target	Press to capture the digital reading.
Bandwidth	Press to change detection bandwidths.
Audio	Press to change the audio output.

5

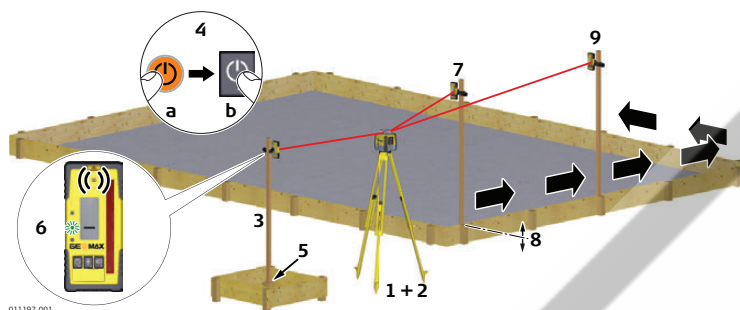
Applications

5.1

Setting Forms

Setting Forms step-by-step

Application shown using the ZRP105 Receiver.



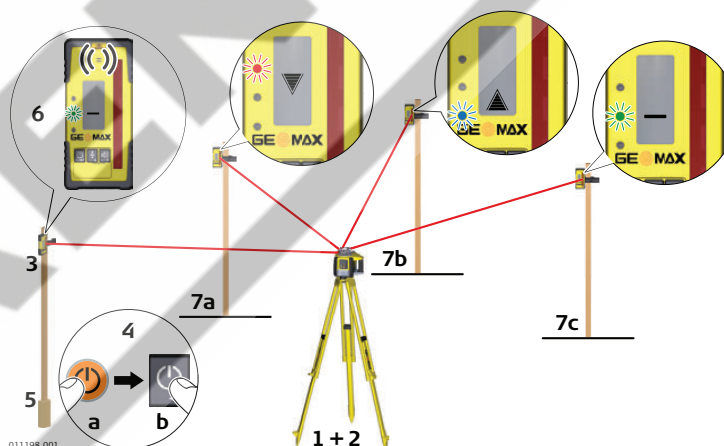
Step	Description
1.	Set up the Zone60 HG on a tripod.
2.	Set up the tripod on a stable surface outside the working area.
3.	Attach the receiver to a rod.
4.	Turn on the Zone60 HG and the receiver.
5.	Set the base of the rod on a known point for the finished height of forms.
6.	Adjust the height of the receiver on the rod until the on-grade (centre-line) position is indicated on the receiver by: - the centre bar - the green flashing LED - a solid audio tone
7.	Set the rod with the attached receiver on top of the form.
8.	Adjust the height of the form until the on-grade position is again indicated.
9.	Continue to additional positions until the forms are levelled to the rotating plane of the Zone60 HG.

5.2

Checking Grades

Checking Grades step-by-step

Application shown using the ZRP105 Receiver.



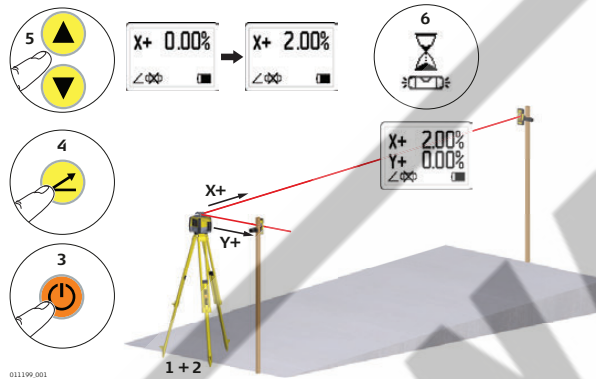
Step	Description
1.	Set up the Zone60 HG on a tripod.
2.	Set up the tripod on a stable surface outside the working area.
3.	Attach the receiver to a rod.
4.	Turn on the Zone60 HG and the receiver.
5.	Set the base of the rod on a known point for the finished grade.

Step	Description
6.	Adjust the height of the receiver on the rod until the on-grade (centre-line) position is indicated on the receiver by: - the centre bar - the green flashing LED - a solid audio tone
7.	Set the rod with the attached receiver on top of the excavation or concrete pour to check for correct elevation.
8.	Variances can be read in precise measurements with the digital receiver. 7a: Position is too high. 7b: Position is too low. 7c: Position is on grade.

5.3

Entering Grades

Entering Grades step-by-step



Step	Description
1.	Set up the Zone60 HG on a tripod.
2.	Set up the tripod at the base of the slope with the x-axis pointing in the direction of the slope.
3.	Turn on the Zone60 HG.
4.	Press the Grade button.
5.	Press the Up or Down button to enter grade for the x-axis (single slope). Press the Grade button to enter grade for the y-axis. Press the Grade button again to exit grade entry mode.
6.	Once grade is entered, the Zone60 HG will begin to adjust to grade. Do not disturb the Zone60 HG during this process.



To restore previous grade, press and hold the Grade button for 1.5 seconds.

Description

The Zone60 HG can be purchased with alkaline batteries or a rechargeable Li-Ion battery pack. The following information is appropriate only to the model you have purchased.

6.1**Operating Principles****First-time Use / Charging Batteries**

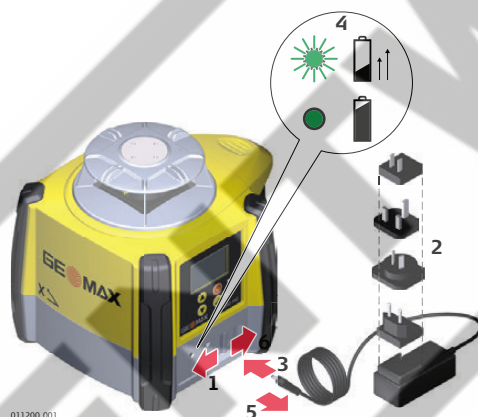
- The battery must be charged prior to using it for the first time because it is delivered with an energy content as low as possible.
- The permissible temperature range for charging is between 0°C to +40°C/ +32°F to +104°F. For optimal charging, we recommend charging the batteries at a low ambient temperature of +10°C to +20°C/+50°F to +68°F if possible.
- It is normal for the battery to become warm during charging. Using the chargers recommended by 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 from the actual battery capacity available.

Operation / Discharging

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

6.2**Battery for Zone60 HG****Charging the Li-Ion battery pack step-by-step**

The rechargeable Li-Ion battery pack on the Zone60 HG can be charged without removing the battery pack from the laser.



Step	Description
1.	Slide the locking mechanism on the battery compartment to the center position to expose the charge jack.
2.	Plug the AC connector into the appropriate AC power source.
3.	Connect the charger plug into the charge jack on the Zone60 HG battery pack.
4.	The small LED next to the charge jack flashes indicating that the Zone60 HG is charging. The LED is on solid when the battery pack is fully charged.
5.	When the battery pack is fully charged, disconnect the charger plug from the charge jack.
6.	Slide the locking mechanism to the left position to prevent dirt from getting into the charging jack.

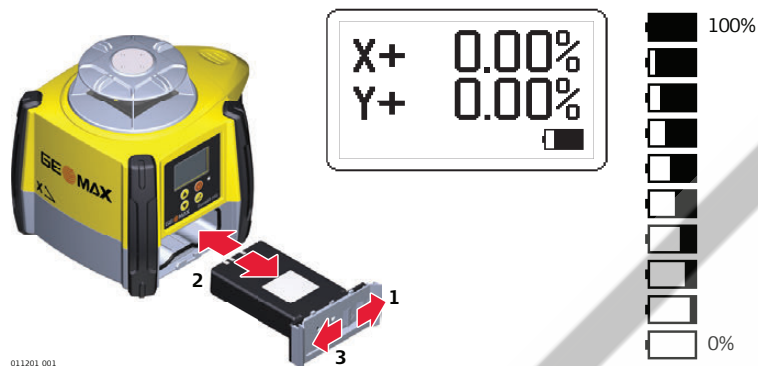


The battery pack reaches a full charge in approximately 5 hours if completely empty. A one hour charge should allow the Zone60 HG to run for a full eight hours.

Changing the Li-Ion batteries step-by-step

With the rechargeable Li-Ion battery pack the battery indicator on the Zone60 HG LCD display shows when the battery pack is low and needs to be charged.

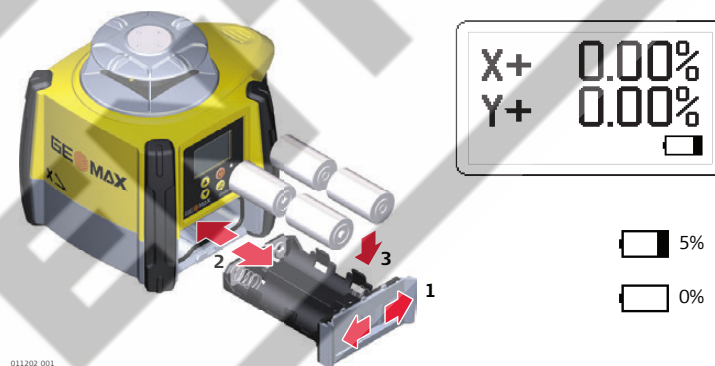
The charge indicator LED on the Li-Ion battery pack indicates when the pack is being charged (flashing slowly) or fully charged (on, not flashing).



Step	Description
	The batteries are inserted in the front of the laser.
	The rechargeable battery pack can be recharged without being removed from the laser.
1.	Slide the locking mechanism on the battery compartment to the right and open the cover of the battery compartment.
2.	To remove the batteries: Remove the batteries from the battery compartment.
	To insert the batteries: Insert the batteries into the battery compartment.
3.	Close the cover of the battery compartment and slide the locking mechanism to the left until it locks into position.

Changing the alkaline batteries step-by-step

With alkaline batteries the battery indicator on the Zone60 HG LCD display flashes when the batteries are low and need to be replaced. If no battery icon is shown, the batteries are okay.



Step	Description
	The batteries are inserted in the front of the laser.
1.	Slide the locking mechanism on the battery compartment to the right and open the cover of the battery compartment.
2.	To remove the batteries: Remove the batteries from the battery compartment.
	To insert the batteries: Insert the batteries into the battery compartment, ensuring that the contacts are facing in the right direction. The correct polarity is displayed on the battery holder.
3.	Close the cover of the battery compartment and slide the locking mechanism to the left until it locks into position.

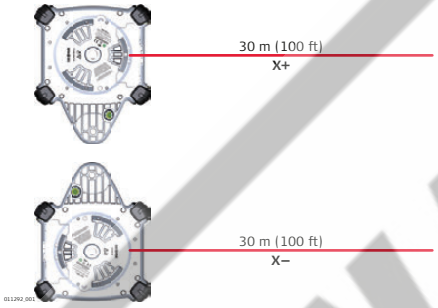
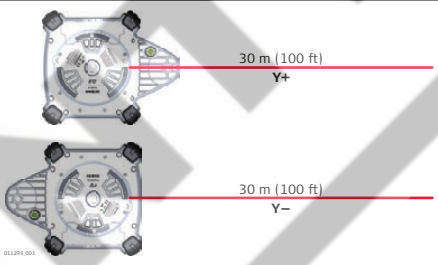
About

- It is the responsibility of the user to follow operating instructions and to periodically check the accuracy of the laser and work as it progresses.
- The Zone60 HG is adjusted to the defined accuracy specification at the factory. It is recommended to check the laser for accuracy upon receipt and periodically thereafter to ensure accuracy is maintained. If the laser requires adjustment, contact your nearest authorised service centre or adjust the laser using the procedures described in this chapter.
- Only enter the accuracy adjustment mode when you plan to change the accuracy. Accuracy adjustments should only be performed by a qualified individual that understands basic adjustment principles.
- It is recommended to perform this procedure with two people on a relatively flat surface.

7.1

Checking the Level Accuracy

Checking the level accuracy step-by-step

Step	Description
1.	Place the Zone60 HG on a flat, level surface or tripod approximately 30 m (100 ft) from a wall.
	
2.	Align the first axis so that it is square to a wall. Allow the Zone60 HG to self-level completely (approximately 1 minute after the Zone60 HG begins to rotate).
3.	Mark the position of the beam.
4.	Rotate the laser 180° and allow it to self-level.
5.	Mark the opposite side of the first axis.
	
6.	Align the second axis of the Zone60 HG by rotating it 90° so that this axis is square to the wall. Allow the Zone60 HG to self-level completely.
7.	Mark the position of the beam.
8.	Rotate the laser 180° and allow it to self-level.
9.	Mark the opposite side of the second axis.



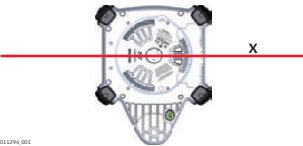
The Zone60 HG is within its accuracy specification if the four marks are within ± 1.5 mm ($\pm 1/16$ ") from the centre.

7.2

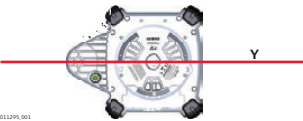
Adjusting the Level Accuracy

Description

In Adjustment Mode the X-axis LED indicates changes to the X-axis.



The Y-axis LED indicates changes to the Y-axis



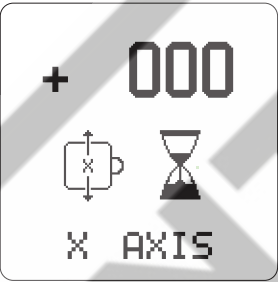
Entering Calibration mode step-by-step

Step	Description
1.	Turn off the power.
2.	Put the Zone60 HG in an upright position.
3.	Press and hold both the Up and Down Arrow buttons.
4.	Press the Power button. The X-axis calibration screen appears. The Zone60 HG is now in Calibration mode.

 In Calibration mode, the LED does not blink and the laser head continues to rotate. An hour-glass indicates that the Zone60 HG is levelling.

Calibrating the X-axis step-by-step

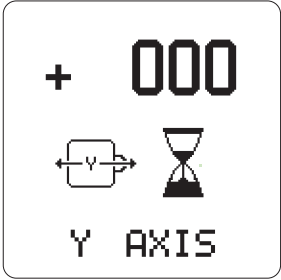
When entering Calibration mode, the X-axis calibration screen appears:



Step	Description
1.	When the hour glass has disappeared, indicating that the Zone60 HG has levelled, check both sides of the X-axis.
2.	Press the Up and Down Arrow Buttons to bring the plane of laser light to the specified level position.  Each step represents approximately 2 arc seconds of change. Therefore, 5 steps equal approximately 1.5 mm at 30 m (1/16" at 100').
3.	Press the Grade Button to accept the adjusted position and to switch to the Y-axis calibration screen.

Calibrating the Y-axis
step-by-step

After calibration of the X-axis, the Y-axis calibration screen appears:



Step	Description
1.	When the hour glass has disappeared, indicating that the Zone60 HG has levelled, check both sides of the Y-axis.
2.	Press the Up and Down Arrow Buttons to bring the plane of laser light to the specified level position.  Each step represents approximately 2 arc seconds of change. Therefore, 5 steps equal approximately 1.5 mm at 30 m (1/16" at 100').
3.	Press the Grade Button to accept the adjusted position and to switch to the X-axis calibration screen.
4.	Press and hold the Grade Button for 3 seconds to accept the adjusted positions, save and store the calibration settings and return to the Main User screen.

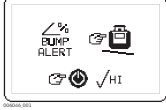
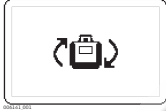
Exiting Calibration
mode



Press and hold the Grade button for 3 seconds to save and exit Calibration mode.

Pressing the Power button at any time while in Calibration mode will exit the mode without saving changes.

Alerts

Alert	Symptom	Possible causes and solutions
	Low Battery indication on the display.	The batteries are low. Replace the alkaline batteries or recharge the Li-Ion battery pack. Refer to "6 Batteries".
	Elevation (H.I.) Alert The Elevation (H.I.) Alert screen is shown and the audio beeps. (Level position)	The Zone60 HG has been bumped or tripod was moved. Turn off Zone60 HG to stop alert, check the height of the laser before beginning to work again. Allow Zone60 HG to re-level and check the height of the laser. After two minutes in the alert condition, the unit will shut off automatically.
	Bump Alert The Bump Alert screen is shown and the audio beeps. (Grade position)	The Zone60 HG has been bumped or tripod was moved. Turn off Zone60 HG to stop alert, check the height of the laser before beginning to work again. Allow Zone60 HG to re-level and check the height of the laser. After two minutes in the alert condition, the unit will shut off automatically.
	Servo Limit Alert The Servo Limit Alert screen is shown.	The Zone60 HG is tipped too far to reach a level position. Re-level the Zone60 HG within the 6 degree self-levelling range. After two minutes in the alert condition, the unit will shut off automatically.
	Tilt Alert The Tilt Alert screen is shown.	The Zone60 HG is tipped more than 45° from level. After two minutes in the alert condition, the unit will shut off automatically.
	Smart Slope Alert The Smart Slope Alert screen is shown.	The Zone60 HG is checking the level position before returning to grade. Refer to "Smart Slope".
	Temperature Alert The Temperature Alert screen is shown.	The Zone60 HG is in an environment where it cannot operate without causing damage to the laser diode. This could be a result of heat from direct sunlight. Shade the Zone60 HG from the sun. After two minutes in the alert condition, the unit will shut off automatically.

Troubleshooting

Problem	Possible Cause(s)	Suggested Solutions
The Zone60 HG is working, but not self-levelling.	The Zone60 HG is in Grade Mode.	The Zone60 HG will self-level only when 0.00% is shown in the display. In Grade mode, the Zone60 HG self-levels at 0.00%, then adjusts to the grade input.
Zone60 HG does not turn on.	The batteries are low or dead.	Check the batteries and change or charge the batteries if necessary. If the problem continues, return the Zone60 HG to an authorised service centre for service.
The distance of the laser is reduced.	Dirt is reducing the laser output.	Clean the windows of the Zone60 HG and the receiver. If the problem continues, return the Zone60 HG to an authorised service centre for service.
The laser receiver is not working properly.	The head is not rotating. The Zone60 HG may be levelling or in Elevation (H.I.) Alert.	Check for proper operation of the Zone60 HG.  Refer to the receiver manual for more information.
	The receiver is out of usable range.	Move closer to the Zone60 HG.
	The batteries of the receiver are low.	Change the receiver batteries.
Elevation (H.I.) Alert function is not working.	The Elevation (H.I.) Alert function is disabled.	The Elevation (H.I.) Alert function can be enabled or disabled in the Option Menu.
The Bump Alert feature activates too often.	The Bump Alert setting is too sensitive.	Change the Bump Alert setting from FINE to COARSE in the Option Menu.
The Smart Slope feature activates too often.	The Smart Slope setting is too sensitive.	Change the Smart Slope setting from FINE to COARSE in the Option Menu.
The display is too dark/light.	Contrast setting needs readjustment to lighting conditions.	Adjust the contrast setting in the Option Menu.
The grade shows in Percent (%) or Per mil (‰).	Wrong setting chosen.	Choose the desired setting in the Option Menu.

9 Care and Transport

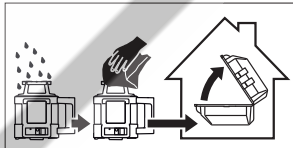
9.1 Transport

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.
Field adjustment	Periodically carry out test measurements and perform the field adjustments indicated in the User Manual, particularly after the product has been dropped, stored for long periods or transported.

9.2 Storage

Product	Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "10 Technical Data" for information about temperature limits.
Field adjustment	After long periods of storage inspect the field adjustment parameters given in this user manual before using the product.
Li-Ion and alkaline batteries	For Li-Ion and alkaline 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. For Li-Ion batteries • 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 30% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.

9.3 Cleaning and Drying

Product and accessories	• Blow dust off lenses and prisms. • Never touch the glass with your fingers. • 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 can 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 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.

10

Technical Data

10.1

Conformity to National Regulations

Conformity to national regulations

- FCC Part 15 (applicable in US)



- Hereby, GeoMax, declares that the product/s is/are in compliance with the essential requirements and other relevant provisions of the applicable European Directives. The declaration of conformity may be consulted at <http://www.geomax-positioning.com/Downloads.htm>.

10.2

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.

10.3

General Technical Data of the Laser

Operating range

Operating range (diameter):

Zone60 HG:

900 m/3000 ft

Self-levelling accuracy

Self-levelling accuracy:

±1.5 mm at 30 m (±1/16" at 100 ft)

Self-levelling accuracy is defined at 25°C (77°F)

Self-levelling range

Self-levelling range:

±5°

Rotation speed

Rotation speed:

10 rps

Grade range

Grade range:

Zone60 HG (dual grade):

X-axis and Y-axis ±8.00%

Laser Dimensions



Weight

Zone60 HG weight with battery:

3.2 kg/7.1 lbs.

Internal battery

Type	Operating times* at 20°C
Lithium-Ion (Li-Ion Pack)	40 h
Alkaline (four D-cells)	60 h

*Operating times are dependent upon environmental conditions.



Charging the Li-Ion battery pack takes a maximum of five hours.



Use only high quality alkaline batteries to achieve operating time.

Environmental specifications**Temperature**

Operating temperature	Storage temperature
-20°C to +50°C (-4°F to +122°F)	-40°C to +70°C (-40°F to +158°F)

Protection against water, dust and sand

Protection
IP67
Dust tight
Waterproof to 1 m temporary immersion.

Lithium-Ion charger

Type:	Li-Ion battery charger
Input voltage:	100 V AC-240 V AC, 50 Hz-60 Hz
Output voltage:	12 V DC
Output current:	3.0 A
Polarity:	Shaft: negative, Tip: positive

Lithium-Ion battery pack

Type:	Li-Ion battery pack
Input voltage:	12 V DC
Input current:	2.5 A
Charge time:	5 hours (maximum) at 20°C

GeoMax Zone60 HG Series



841545-1.0.0en

Original text

© 2015 GeoMax AG, Widnau, Switzerland

GeoMax AG
www.geomax-positioning.com

